PORT OF FRIDAY HARBOR
ALBERT JENSEN AND SONS INC. BOATYARD AND MARINA
FRIDAY HARBOR, WA

MODEL TOXICS CONTROL ACT (MTCA)
AGREED ORDER NO. DE 18071

DRAFT IN-WATER REMEDIAL INVESTIGATION REPORT

Prepared for
The Port of Friday Harbor
Friday Harbor, WA

Prepared by
Leon Environmental, LLC
Seattle, WA

June 2025

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Abbreviations and Acronyms

AET	Apparent Effects Threshold
BLWA	Boat Lift Work Area
BMPs	Best Management Practices
CIG	Climate Impact Group
COC	chain-of-custody
COPCs	Contaminants of Potential Concern
County	San Juan County
cPAH	carcinogenic polycyclic aromatic hydrocarbons
CRETE	CRETE Consulting Inc.
CSL	Cleanup Screening Level
CSM	Conceptual Site Model
DCAP	Draft Cleanup Action Plan
DMMP	Dredged Material Management Program
Ecology	Washington State Department of Ecology
ESA	Environmental Site Assessment
FDA	Former Dumping Area
FS	Feasibility Study
Ft bgs	feet below ground surface
IPG	Integrated Planning Grant
Jensen's	Albert Jensen and Sons Inc. Boatyard and Marina
L-E	Leon Environmental, LLC
MTCA	Model Toxics Control Act
NRCS	Natural Resources Conservation Service
OHW	Ordinary High Water
OPALCO	Orcas Power and Light Company
Order	Agreed Order Numberm18701
PCB	polychlorinated biphenyl
PMA	Port Management Agreement
Port	Port of Friday Harbor
PQL	Practical Quantitation limit
PSEP	Puget Sound Estuary Program
RAG	Remedial Action Grant
RBC	Risk-Based Concentration
RCP	Representative Concentration Pathway
RCW	Revised Code of Washington
Report	In-Water Remedial Investigation Report
RI	Remedial Investigation
RSLR	Relative Sea Level Rise
SAP	Sampling and Analysis Plan
SCLs	Sediment Cleanup Levels
SCO	Sediment Cleanup Objective
SCUM	Sediment Cleanup User's Manual
Site	Albert Jensen and Sons Inc. Boatyard and Marina
SLR	Sea Level Rise
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards

SQS	sediment quality standards
SRWA	Ship Rail Work Area
TBT	Tributyltin
TEQ	Toxicity equivalency
TOC	total organic carbon
Town	Town of Friday Harbor
TPH	Total Petroleum hydrocarbon
USDA	U.S. Department of Agriculture
UW	University of Washington
VOC	Volatile organic compound
WAC	Washington Administrative Code
WDNR	Washington State Department of Natural Resources
WE	Whatcom Environmental

Executive Summary

The objective of the State of Washington, Department of Ecology (Ecology) and the Port of Friday Harbor (Port) under Agreed Order No. DE 18071 (Order) is to provide for remedial action at the Albert Jensen & Sons Inc. site (Facility Site ID 42226979) (Site or Jensen's) where there has been a release or threatened release of hazardous substances. The Site is located at 1293 Turn Point Road, Friday Harbor, San Juan County, Washington, 98250.

The work under the Order, pursuant to Model Toxics Control Act (MTCA) (RCW 70.105D.050(1)), involves conducting a Remedial Investigation (RI) and Feasibility Study (FS), conducting interim actions if required or agreed to by Ecology, and preparing a preliminary Draft Cleanup Action Plan (DCAP) to select a cleanup alternative. The purpose of the RI/FS, and preliminary DCAP for the Site, is to provide sufficient data, analysis, and evaluations to enable Ecology to select a cleanup alternative for the Site.

The goal of this project is to clean up the historic contamination at Jensen's and to revitalize and expand existing uses at this industrial facility, which serves as a community and economic hub. This In-Water RI Report (Report) has been prepared to satisfy the requirements of the Order and Washington Administrative Code (WAC) Section 173-340-350 and WAC 173-204-550. This RI Report documents the nature and extent of contamination in the marine sediment portion of the Site, while a complementary RI Report documents Site upland conditions. The information compiled in these sediment and upland RI reports will be used to develop the FS Report and DCAP for both the sediment and uplands in accordance with WAC 173-340-356 through 173-340-390.

Chapter 1. Introduction and General Site Information

1.1 Introduction

The State of Washington, Department of Ecology (Ecology) and the Port of Friday Harbor (Port) entered Agreed Order No. DE 18071 (Order) to remediate the Albert Jensen & Sons Inc. property (Facility Site ID 42226979) (Site or Jensen's), where a release or threatened release of hazardous substances occurred as a result of historical activities by prior Site owners. The work under the Order, pursuant to the Model Toxics Control Act (MTCA) (RCW 70.105D.050(1)), involves conducting a Remedial Investigation (RI) and Feasibility Study (FS), conducting interim actions if required or agreed to by Ecology, and preparing a preliminary Draft Cleanup Action Plan (DCAP) to select a cleanup alternative. The purpose of the RI/FS, and preliminary DCAP for the Site, is to provide sufficient data, analysis and evaluations to enable Ecology to select a cleanup alternative for the Site.

The goal of this project is to clean up the historical contamination at Jensen's and to revitalize and expand existing uses at this industrial facility, which serves as a community and economic hub. The mandate from the Friday Harbor community is to honor the Site's history and its central role in shaping the Friday Harbor community, while providing: environmental restoration; commercial boatyard services; and a platform to provide the economic opportunity local businesses need to thrive.

This RI Report has been prepared to satisfy requirements of the Order and Washinton Administrative Code (WAC) Sections 173-340-350(7) and 173-204-550(6). The Order requires the Port to address both upland and in-water Site contamination. This RI Report documents the nature and extent of contamination in the marine sediment portion of the Site. The information compiled in this RI report, and associated upland RI Report (CRETE 2025) will be used to develop the FS and DCAP in accordance with WAC 173-340-356 through 173-340-390.

1.2 Objectives

The objective for the sediment remedial investigation is to address data gaps identified in the RI Work Plan (L-E and CRETE 2022) and refine the nature and extent of contamination exceeding preliminary MTCA cleanup levels, preliminary Sediment Management Standards (SMS) cleanup standards, and other regulatory requirements. This effort is expected to:

- Establish vertical and horizontal contamination profiles in areas where surface sediments exceed Sediment Quality Standards (SQS).
- Delineate the vertical and horizontal extent of dioxins/furans beyond the surface concentrations measured along the central marina shoreline, which may correlate with observed polychlorinated biphenyl (PCB) surface exceedances.
- Focus PCB analysis on areas showing benthic exceedances in surface sediments to facilitate background/human health evaluations.
- Delineate the vertical and horizontal extent of pesticides measured in surface sediments.

1.3 General Site Information

The Site is referred to as Albert Jensen and Sons, Inc. Boatyard and Marina. The Site constitutes a facility under RCW 70.105D.020(8). The Site is defined by where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located. Based upon factors currently known to Ecology, the Site is generally located at 1293 Turn Point Road, Friday Harbor, WA 98250 as shown in Figures 1-1 and 1-2, Vicinity and Site Map.

The Site address is:

Albert Jensen and Sons, Inc. Boatyard and Marina
1293 Turn Point Road
Friday Harbor, WA 98250
Section 13, Township 35N, Range 3W Parcel 351341005000

The legal description of the parcel is:

PR GL 6 PR SE-SE EX CO RD Sec 13, T 35N, R 3W.

The project coordinator for the Port of Friday Harbor is:

Todd Nicholson, Executive Director
204 Front Street
Friday Harbor, WA 98250 360-378-2688
toddn@portfridayharbor.org

The Site is located on the southern shore of Shipyard Cove of the Salish Sea, on San Juan Island, San Juan County. Turn Point Road provides a direct connection from the Town of Friday Harbor (Town) to the Site, which is located approximately 1.5 miles southeast of downtown. Turn Point Road continues to the east to Kansas Cove and then becomes Pear Point Road as it follows the Island's southern shoreline to circle back to the Town via Argyle Ave. The Site is located entirely within Shipyard Cove, a relatively shallow embayment that faces northward on the eastern side of San Juan Island. Shipyard Cove is generally protected by Brown Island; however, the Site is exposed to roughly 2.5 miles of fetch from a northerly direction (Figures 1-1 and 1-2, Vicinity and Site Map).

The Port purchased the Site from Albert Jensen & Sons, Inc. with the intent to address existing environmental concerns. The property encompasses one parcel (351341005000) of approximately 4.8 acres of upland with 652 linear feet of shoreline and approximately 5 acres of aquatic lands currently managed under a Port Management Agreement (PMA No. 20-080023) with the Washington State Department of Natural Resources (WDNR). The Site is partially developed and is currently underutilized due to impaired Site conditions. Surrounding land uses include industrial, commercial and residential development. The Port also owns and operates Shipyard Cove Marina and a barge ramp, which are located immediately to the northwest of Jensen's. The Port operates Jensen's and Shipyard Cove Marina as a single facility that it refers to as Jensen's Shipyard Cove Facility. Residential properties with private docks extend along the shoreline to the northeast of Jensen's.

1.4 Site History: Past and Current Conditions

Over a century of industrial uses contributed to legacy contamination measured in Site soils and marine sediments. Anecdotal evidence suggests that Site operations began as early as 1910. Originally, wooden boats were manufactured at the Site, but when wooden boats were phased out in the middle of the 20th century, the Site transitioned from shipbuilding to boat repair and maintenance.

According to Ecology (Ecology 2024), the San Juan Historical Society reports that in the early 1940s a local entrepreneur started a shipyard business employing 15 men year-round who built wooden boats for fishing, towing and other uses. A large part of the business focused on hauling local fishing boats out of the water and lined up along the beach for winter maintenance and repairs. The business repaired, serviced and returned boats to the water one at a time until all were ready for the start of fishing season.

During World War 2, the shipyard held a contract to build military barges. The Site also contained a log dump for San Juan Island logging industry. Logs would be branded on the end, dumped into the water and formed into log booms to be towed to lumber mills around Puget Sound.

Additional facilities, including a marina extending from Jensen's central shoreline into deeper intertidal and subtidal areas, and an upland fill area along the western property boundary extending from the upland into shallow intertidal areas, were built sometime between 1941 and 1972. Jensen's shipyard activities that likely contributed to detected contaminants include antifouling paint application and removal; mechanical and general maintenance work over water and land, and treatment of wooden boats using pesticides. Other facilities that operated on Site previously include a former underground gasoline storage tank, a machine shop that was also used for hazardous chemical storage, a small dump site, and marine railways.

Images depicting prior Site facilities are provided in Figures 1-3, San Juan Historical Society Imagery, Overview of historic Site Facility uses and Figure 1-4, San Juan Historical Society Imagery, prior Site Facility uses, facing north, looking over Shipyard Cove.
(Ecology 2024).

1.4.1 Current Conditions, Land Use and Contamination Sources

Jensen's is partially developed and is used currently as a boat maintenance facility and shipyard (Figure 15, Existing Conditions). Based on the needs of the Friday Harbor community, the Port plans to maintain and expand current facility operations.

The Site consists of three distinct areas: a boatyard, a marina, and an undeveloped upland and shoreline area. Jensen's is zoned as Rural Industrial, which allows for light industrial, light manufacturing, and some institutional uses.

Boatyard: The existing boatyard is located in the southern section of the Site, within the western portion of the upland parcel. It encompasses approximately 1.5 acres of active work areas, including boat storage, a laydown area, and a wash pad. Seven buildings are associated with current boatyard operations: an office/retail building, a machine shop, storage buildings, a water treatment building through which water from the wash pad is circulated and then discharged into an evaporating pond on Site, and a small shed. The remnants of a deteriorated cabin also remain on the undeveloped eastern section of the Site. The boatyard infrastructure also includes a 35-ton travel lift. The travel lift pier extends into the probable sediment cleanup area; therefore, the Port is in the process of removing the travel lift pier and replacing it with a new haul out pier located in the adjacent Shipyard Cove Marina section of the Port's larger Jensen's Shipyard Cove Facility. The Port may propose this work as an Interim Action under the Order in the future.

The marine services provided at the boatyard include haul-out, pressure wash, bottom paint, light mechanical, chandlery and parts, and boat storage. The boatyard area has several areas where maintenance was deferred by the prior owner. Ongoing releases from the degraded structures (e.g., visible sheen associated with the creosote pilings) have been observed. The Port is working to address these issues as work under the Order proceeds. For example, the Port installed sleeves around the travel lift pier pilings, which are reducing the extent to which piling creosote is exposed to marine waters.

The shoreline along the active boatyard area is characterized by vertical structures and steep berms. The boat pullout area consists of two piers supported by creosote-treated piling (the travel lift pier), ecology

blocks, and a concrete wall. A deteriorating overwater dock and Jensen's main walkway pier are located immediately east of the existing boat pullout area. The shoreline here is a stacked ecology block bulkhead, through which uncharacterized upland fill material is sloughing into intertidal areas. Along the western property line, a fill area partially contained by a failing creosote-treated bulkhead extends from the uplands out into intertidal area. This bulkhead is in an advanced state of failure, acting as a source of creosote-treated wood debris and allowing uncharacterized fill to spill into intertidal areas. The intertidal areas here are barren of vegetation except for sparce, non-native species.

The Port plans to continue implementing site improvements that are consistent with the existing boatyard uses, including improving paved working areas to expand upon existing uses.

Marina: Jensen's continues to operate an active marina that occupies the deeper intertidal and subtidal areas of the Site. The existing marina consists of approximately 30 slips.

The original marina included: a concrete floating breakwater; a system of solid-decking floats built primarily from treated-wood and open-cell Styrofoam float boxes; creosote-treated wood piles and dolphins; an elevated pier and wave wall constructed of creosote-treated wood; treated-wood and metal ramps connecting the float and elevated pier system; covered multi-slip moorage and an individual boathouse built with metal roofs and side walls; and a main walkway pier constructed of treated-wood.

Marina infrastructure underwent extensive repair and replacement under federal, state, and local emergency authorizations in 2021 after a winter storm drastically damage an already failing marina. The Port obtained 'after-the-fact' permits for this repair and replacement work after the most critical marina infrastructure was restored. Of the original marina infrastructure, only the original main walkway pier and portions of the concrete breakwater remain. Nearly all of the permitted reconstruction work is complete. In addition to the original main walkway pier, current marina structures include a new system of floats and floating finger piers consisting of steel piles and fully grated floats, and various standalone piles and dolphins. Replacement covered moorage has been completed using steel frames and transparent polycarbonate roofing. The permitted replacements for the original covered moorage were built without side walls and features clear roofs to allow light penetration.

The entire shoreline area, extending from intertidal elevations out to at least shallow subtidal depths, is heavily impacted with a substantial volume of debris, including concrete, tires, metal (motors, small parts, etc.), plastic, and other general rubbish. Within the former boathouse areas, there appears to be some debris present on the seafloor, including tires that can be observed from the marina floats. The Port intends to remove much of this debris as mitigation for subsequent permitted actions throughout the larger Jensen's Shipyard Cove Facility.

Undeveloped Upland and Shoreline Areas: The undeveloped area in the eastern portion of the property consists of approximately 2 acres of open grassy field and gravel parking areas. This area slopes moderately from Turn Point Road toward the waterfront and terminates at a low bank.

The Port recently removed a derelict boat building structure located above the shoreline immediately east of Jensen's active boatyard area. Four rails (two rails per pair), which appear to be composed of 10-inch x 10-inch creosote-treated timbers, extend from the intertidal area waterward of the former boat building structure out to subtidal elevations. It is not clear how far the rails extend, because they dive under the sediments at approximately 85 feet from the waterward edge of the concrete pad. The marine rails were used to launch and pull boats out of the water for repair. These derelict structures are likely sources of

contamination to upland, intertidal, and subtidal areas. A concrete pad is also located in this area; however, it was added later and is not original to the marine rail system.

The undeveloped area on the eastern-most side of the upland parcel contains the remnants of a small derelict cabin, a small oil storage building further east, and a shallow dug well. An underground storage tank was formerly located in the field south of the oil storage building. The upper shoreline area appears to be composed of upland fill material and garbage (metal, plastic, concrete, wood waste, etc.), which is consistent with historical descriptions of the area being used as a dump. The garbage and fill material from the upper shoreline are emerging from the bank as it descends to upper intertidal elevations. There appears to be a remnant shoreline timber (some treated) structure, possibly an old pier or ramp, which has left a debris pile extending from the upper shoreline down to intertidal elevations. These observations are generally consistent with the images Ecology obtained from the San Juan Historical Society, which are provided as Figures 1-3 and 1-4 (Ecology 2024).

The aquatic substrate along both Jensen's active boatyard and undeveloped area is heavily impacted with a substantial volume of debris, including concrete, tires, metal (motors, small parts, etc.), plastic, and other general rubbish. This debris is observed extending from intertidal elevations out to at least shallow subtidal depths. As noted above, the Port intends to remove much of this debris as mitigation for subsequent permitted actions throughout the larger Jensen's Shipyard Cove Facility.

The Port is working to expand the existing boatyard east into the undeveloped upland area, which will maintain Jensen's as an active boatyard that provides living wages and supports the Friday Harbor economy.

1.4.2 Site Boundary Justification

Methods to establish Site boundaries generally follow guidance provided in the current Sediment Cleanup User's Manual (SCUM) (Ecology 2021) and are further described in the letter, *Port of Friday Harbor Shipyard Cove Marina Property*, prepared in collaboration with Ecology (Crete 2024). The letter summarizes relevant site use history and environmental information to provide a basis for investigating the Shipyard Cove Marina property separately from the cleanup process that has been initiated for the Site under the Order. While the Shipyard Cove Marina and the Site were used historically for similar purposes (i.e., boat haul-out, maintenance, and storage), each have been operated independently by different owners for many years. Contamination on each of these properties is consistent with and found in areas that would have been used for respective site uses. There is no evidence of activities or processes that extended beyond the fenced boundary between the two properties. Although the data set is limited, it is likely that contamination at Shipyard Cove Marina originated from operations that occurred at Shipyard Cove Marina. Based on historical operations and analytical data, it is recommended that the boundary between the Jensen's and Shipyard Cove Marina sites be established at the property boundary.

Moreover, maps will be prepared and submitted following the approval of the cleanup standards clearly identifying areas of the Site that exceed the sediment cleanup objective (SCO), cleanup screening level (CSL), and site-specific sediment cleanup levels for each contaminant of concern (CoC). Surface sediment data suggests that sediment contamination is generally contained within the central shoreline and shallow subtidal areas of the Site. Existing data show that surface sediments along Jensen's lease boundary do not exceed SMS established in WAC 173-204. Because no obvious transport mechanisms have been identified that would cause exchange of potential contaminants between Jensen's and adjacent properties, there is no obvious rationale to expand the study area beyond the immediate marina footprint. For this reason, the proposed study area boundary is defined by the footprint where ship building, repair, and maintenance

activities occurred at Jensen's, which encompasses the areas where surface sediment exceedances of SMS criteria were measured, and subtidal areas at the outer extent of Jensen's existing marina infrastructure. Subsequent sediment characterization efforts, summarized in this Report, are anticipated to focus both on evaluating the depth of contamination and further refining the horizontal distribution of chemical contaminants.

1.5 Previous Sediment Investigations

The Port commissioned prior sediment investigations as part of the preliminary planning process it implemented when it acquired the Site for the purposes of remediating and redeveloping the facility. The Port completed additional work and investigations under an Integrated Planning Grant (IPG) and a Remedial Action Grant (RAG). It completed additional studies associated with the marina emergency repairs and replacement permitting process. Additional data and information evaluated in this RI Report were acquired from publicly available information sources. References for these prior investigations and existing information sources are cited below.

Table 1-1. Prior Site Facility Investigations

Author	Year	Report
Washington Department of Ecology	2001	Concentrations of Selected Chemicals in Sediments from Harbors in the San Juan Islands
U.S. Department of Agriculture	2009	Soil Survey of San Juan County Area, Washington
Whatcom Environmental Services	2017	Phase I Environmental Site Assessment, Jensen's Shipyard, 1293 Turn Point Road, Friday Harbor, Washington
Whatcom Environmental Services	2017	Sediment Sampling and Analysis Plan, Jensen's Shipyard and Marina, 1293 Turn Point Road, Friday Harbor, Washington
Whatcom Environmental Services	2018	Initial Investigation Report, Jensen's Shipyard, 1293 Turn Point Road, Friday Harbor, Washington
Whatcom Environmental Services	2018	Sediment Investigation, Sediment Sampling and Analysis Plan, Jensen's Shipyard and Marina, 1293 Turn Point Road, Friday Harbor, Washington
Whatcom Environmental Services	2018	Draft Sediment Data Report, Jensen's Shipyard and Marina, 1293 Turn Point Road, Friday Harbor, Washington
Whatcom Environmental Services	2018	Draft Remedial Investigation Report, Jensen's Shipyard and Marina, 1293 Turn Point Road, Friday Harbor, Washington
San Juan Surveying	2018	Topographic Survey for Port of Friday Harbor – Jensen's Shipyard Planning Map
Leon Environmental, LLC	2019	Intertidal and Subtidal Conceptual Site Model and Data Gaps Report, Jenson and Sons Boatyard and Marina, Friday Harbor, Washington.
Fairbanks Environmental Services, Inc.	2020	Port of Friday Harbor Albert Jensen and Sons Boatyard and marina Eelgrass and Macroalgae Survey
Marine Surveys & Assessments	2021	Jensen Marina Habitat Survey Report

Current and prior upland investigations are reported in the *RI Report – Upland Area* (CRETE 2025).

Chapter 2. Physical Characteristics and Natural Resources

2.1 Habitat Overview

The Site is located within Shipyard Cove, a relatively shallow embayment that faces northward on the eastern side of San Juan Island, immediately southeast of downtown Friday Harbor. San Juan Island, the second largest island in an archipelago between Vancouver Island, British Columbia, and mainland Washington. San Juan Island, within the rain shadow of the Olympic Mountain range, generally experiences relatively low levels of precipitation compared to the surrounding Puget Sound lowlands (Pater et al. 1998). The landscape throughout the island consists of rural and urban residential development, coniferous forests, oak woodlands, crop and pasture land, and recreational sites. Site bathymetry, uplands topography, and key subareas are shown in Figure 1-5. Shipyard Cove is generally protected by Brown Island; however, the Project site is exposed to roughly 2.5 miles of fetch through a narrow window from a direct northerly direction. The site is a combination of heavily impacted marine shorelines, a historic agricultural farm, which has transitioned into a gently sloping, predominantly invasive grass field, and a small upland forest surrounding the site with moderately steep slopes.

The shoreline along the active boatyard area is characterized by vertical structures and steep berms. The less developed areas along the eastern side of the property, especially waterward of the former boat building structure, are more gently sloped with areas of estuarine plants. The full extent of the site's low waterfront bank is composed of fill and debris, with contaminated soils known to exist in the active boatyard areas.

The undeveloped portions of the site are dominated by open grassy areas; other native vegetation is limited. Native trees and shrubs (a mix of evergreen and deciduous species) are found on the hillside east of the boatyard, near Turn Point Road, and in limited patches along the shoreline. Native plants present include Douglas fir (*Pseudotsuga menziesii*) and Pacific madrone (*Arbutus menziesii*), as well as native rose (*Rosa spp.*) and ocean spray (*Holodiscus discolor*). Some areas of estuarine vegetation, dominated by pickleweed (*Sarcocornia perennis*) and seaside plantain (*Plantago maritima*), were observed along the shoreline, especially waterward of the former boat building structure; however, substrate in all of these vegetated areas is highly impacted by a substantial volume of debris (typically concrete rubble, metal, plastic, wire, treated and untreated wood, etc.).

Patches of eelgrass (*Zostera marina*) may be present in the subtidal areas of Shipyard Cove; eelgrass beds in the vicinity of the project site were found historically to occur at depths up to minus 21 feet MLLW (WDNR 2001). An eelgrass survey conducted in June 2020 found two small patches of eelgrass at approximately -7 feet MLLW, one patch on either side of the Jensen's walkway float (Fairbanks 2020).
A subsequent habitat survey performed on June 10-11, 2021 (MSA 2021) documented Zostera marina eelgrass in one small bed and one patch between approximately -3.5 ft to – 6 ft MLLW. The small bed, measuring approximately 1,000 square feet and ranging in density from 0 to 16 turions per square meter, was documented on the west side of the marina, between the two main boathouse areas. The patch, measuring 3 feet by 1 foot with a density of 43 turions per square meter, was documented to the west of the bed and main walkway float.

2.2 Shoreline Characteristics

The upper shoreline areas of the Site consist predominantly of fill and debris that extend above ordinary high water (OHW). Except for the central area of the shoreline below the former boat building structure, the filled areas tend to descend steeply to upper intertidal elevations, where they generally level off to more natural slopes in intertidal and subtidal areas. Throughout the boatyard area, this filled shoreline

consists of berms and vertical structures (creosote-treated bulkheads, ecology block walls, etc.). The upper shoreline of the undeveloped eastern area consists of what appears to be general rubbish and fill soils. The central shoreline of the Site, located generally below the former boat building structure and between the marina pier (western boundary) and the old oil storage building (approximate eastern boundary), is more naturally sloped with pickleweed growing in large areas of the upper intertidal zone; however, this shoreline is highly impacted with concrete rubble, debris, and a concrete pad. Fill materials were observed up to 7.5-feet below ground surface along the shoreline bank near the oil shed. There is no natural shoreline within the site. Immediately west of the site, a marina and barge landing facility operate along the shoreline. The shoreline immediately east of the site is a residential property. Additional descriptions of specific sections of the Project area shoreline are provided below.

The shoreline along the western side of the site below the boatyard consists of an overgrown, gravel-paved filled area partially contained by a failing creosote-treated bulkhead. The aerial photographs provided in WE's Phase I Environmental Site Assessment (ESA) (WE 2017a) suggest that the area was filled between 1941 and 1972. The bulkhead is in an advanced state of failure, allowing fill to spill into intertidal areas. At intertidal elevations, the substrate consists of pea gravel, small cobbles, sand, and debris; this area is barren of any vegetation. Additional debris (including broken creosote- treated piling, larger metal and concrete) is present at deeper intertidal elevations.

The boatyard shoreline immediately east of the bulkhead consists of a steep berm separating the upland working area of the boatyard from intertidal areas. The berm is composed of rubble, garbage and other debris (metal, concrete, etc.). A band of vegetation (pickleweed, gumweed, henstooth, and drift algae) extends roughly 10 feet to 20 feet from the top of the berm but ends abruptly at intertidal elevations. At upper and shallow intertidal elevations, the substrate consists of pea gravel, small cobble, sand, and debris (garbage, concrete, metal, etc.). A light sheen was observed in limited areas of the intertidal substrate. Except for potential clam shows, there was no obvious benthic activity noted within the barren intertidal area during multiple site evaluations. Additional debris (including broken creosote-treated piling, larger metal, and concrete) is present at deeper intertidal elevations.

The boat pullout area is located between the bermed shoreline to the west and the old overwater deck to the east. The boat pullout consists of two piers supported by creosote-treated piling, ecology blocks, and a concrete wall. Each pier is covered with timber decking and a single concrete rail for a boat lift to operate. The shoreline here is a vertical bulkhead, consisting of stacked ecology blocks. Upland fill material is sloughing through the eastern side of the ecology block bulkhead into intertidal areas. The substrate beneath each pier is covered in a substantial volume of debris, including concrete, metal, wire, engine parts, and other garbage. The boat haul out area between the two piers is maintained at deeper depths than on either side. The substrate between the piers is covered in shell hash, with less debris evident than in surrounding areas. As throughout the site, debris extends throughout the intertidal area, with larger debris present at deeper elevations.

The shoreline immediately east of the boat pullout is completely covered by an old overwater deck and the marina pier. The overwater deck is composed of solid timber decking and supported by creosote-treated piles; however, the structure is in poor condition due to deferred maintenance and is proposed for removal under a future interim action. The marina pier is located immediately east of the overwater deck and is currently in operational condition. It is built with fully grated decking and supported by steel piles. The shoreline along the overwater deck and marina pier is a vertical bulkhead, consisting of stacked ecology blocks. The bulkhead is leaning waterward and requires maintenance. There is evidence that the bulkhead is being undermined, with settling observed in soils on the immediate upland side of the

bulkhead. The substrate beneath the overwater deck and marina pier is covered in a substantial volume of debris that is consistent with shoreline conditions along the boatyard.

The shoreline immediately east of the marina pier and waterward of the former boat building structure features a more natural-appearing slope, but the intertidal substrate consists of cobbles, imported gravel, mud, and concrete rubble. Concrete pads located between the marina pier and the former boat building extend from intertidal elevations up to the active boatyard. Four rails (two rails per pair), which appear to be composed of 10-inch x 10-inch creosote-treated timbers, extend out to subtidal elevations. It is not clear how far the rails extend, because they dive under the sediments at approximately 85 feet from the waterward edge of the concrete pad. The upper intertidal area consists of pickleweed that extends all the way up to the old boat building; this upper area is addressed in the ship rail work area (SRWA) in the uplands. There is evidence that clams may be present at lower intertidal elevations, but similar to the entire western half of the site, the benthic community in this area appears relatively barren.

The shoreline along the eastern boundary of the site is located below the undeveloped area. The upper shoreline area appears to be composed of upland fill material and garbage (metal, plastic, concrete, wood waste, etc.), which is consistent with historical descriptions of the area being used as a dump (WE 2017a). There appears to be a remnant shoreline timber (some treated) structure, possibly an old pier or ramp, which has left a debris pile extending from the upper shoreline down to intertidal elevations. The upper shoreline features mature vegetation (primarily native trees and shrubs, and invasive blackberries and scotch broom). Extending inland from the intertidal area along the eastern shoreline is buried debris and fill materials that comprise the bank. The debris and fill extend inland towards the oil shed and former abandoned cabin (demolished), comprising the Former Dumping Area (FDA). The garbage and fill material from the upper shoreline are emerging from the bank as it descends to upper intertidal elevations. Bank vegetation consists of snowberry, ocean spray, blackberry, and scotch broom. Upper intertidal vegetation consists of Turkish towel and ulva, which transition to pickleweed and rockweed at lower elevations. The intertidal substrate consists of gravel and cobble at upper intertidal elevations transitioning to mud, algae, and debris at lower intertidal elevations. Consistent with the entire site shoreline, a substantial field of debris extends out to subtidal elevations.

2.3 Upland Areas

2.3.1 Ship Rail Work Area

The SRWA includes rail lines east of the pier and the former boat building structure. The SRWA has a lower elevation than the surrounding uplands, including high intertidal elevations with abundant pickleweed. These rail lines were used to transport boats during ship building and maintenance, and contamination in the SRWA is likely a result of these activities. As outlined by Shannon & Wilson (2019), SRWA contamination may include metals from paint stripping operations, possibly impacted fill used to develop the SRWA, and TPH-DRO and cPAH from boat maintenance and drained boat bilge water. The SRWA may have also collected stormwater runoff, soils and debris eroded from adjacent upland areas. There are currently no operations that occur within the SWRA.

2.3.2 Boat Lift Work Area

The boat lift work area (BLWA) is an approximately 100-foot-wide area along the shoreline, immediately west of the SRWA and extending west to the western property line. The adjacent shoreline, from west to east, includes the small fill area that projects into the water, the berm area, the boat pullout, an old overwater deck, and the marina pier. Activities conducted in this area may be similar to those of the SRWA, including paint stripping, paint applications, draining boat bilges, treated wood use, and possibly impacted

fill materials used to develop and elevate this area in the past (Shannon 2019). Current operations include best management practices to minimize the potential for contaminant releases.

2.3.3 Former Dumping Area

The FDA is located to the east of the SRWA along the shoreline. This shoreline area was formerly used for dumping of miscellaneous boat parts or debris, which was observed during the Phase I Environmental Site Assessment by Whatcom Environmental Services (WE 2017a). Debris observed has included tires, plastic, metal parts, two engine blocks, hoses, cables, a large battery, and other metal and wood debris. No sheen or staining has been noted in the FDA.

A former cabin was located about 50 feet east of the FDA and a former oil shed was located adjacent to the FDA. The former owner indicated that the shed contained 300-gallon gasoline and diesel ASTs and a 300-gallon waste oil tank. During Phase 1 ESA a waste oil AST along with several smaller diesel, gasoline, and waste oil drums were observed. No evidence of spills or overtopping were noted in or around the building and concrete flooring was present throughout the shed for containment in the event of a spill (WE 2017a).

To the south and southeast of the FDA is a large grassy area that formerly included a residence. A water well may be present near the southern edge of the grassy area, but no well information was provided in previous documents. A UST was also formerly located near the western edge of the grassy area. The former UST was used to fuel equipment onsite, and was removed in the 1980's. The former owner indicated that the former UST contained gasoline. Soil and groundwater sampling in this area suggest that no contamination is present.

2.3.4 Former Above Ground Storage Tank

It is suspected that an AST was formerly located south of the central former shop building. There is no documentation regarding the size or contents of the former AST. Results from a shallow soil sample suggest that the AST likely contained a heavier fuel such as heating oil.

2.3.5 Shop Floor Drain

The shop building has also been noted as the machine shop building in previous documents, suggesting the presence of lubricants and cleaning solvents. A 3-inch diameter floor drain is present near the northwest corner of the building. The drain was used to dispose of liquids from the machine shop. The drain was investigated in the past, at which time it was noted that the drain appeared to flow to a holding tank or drum underground. The former owner noted that the tank or drum may have been perforated or may have contained a drain line for the contents to drain, but the destination of the contents was unclear. The tank or drum was not removed as part of previous investigations. A sample of material collected from the drain contained elevated TPH and metals plus PAHs, tetrachloroethene and a few other VOCs.

2.3.6 Stormwater Pond

A stormwater detention pond was located in the southwest portion of the property, west of the shop building. The pond was lined and equipped with a pump and fountain to facilitate evaporation. The pond was emptied of water annually. When emptied, the water was transported offsite and dumped on the ground and allowed to infiltrate. Ordinarily, the water was dumped on the property to the south, across Turn Point Road. A sample of pond sediment collected in 2018 indicated the presence of elevated metals concentration. No other analytes were tested. The Port decommissioned the pond in September 2021.

2.3.7 Former Orcas Power and Light Company Pad

A former Orcas Power and Light Company (OPALCO) storage area in the western portion of the site was identified and investigated for surface contamination. The pad is the building foundation of an OPALCO building that burnt down, possibly contributing to cPAHs. Shipyard activities, paint-stripping, and stored creosote-treated wood are possible sources of contamination. (Shannon 2019).

2.3.8 Wooded Hillside Area Along Turn Point Road

The wooded hillside area south of the OPALCO pad area, the former stormwater pond, and the shop building have not been investigated for contamination. No RECs were noted in the Phase I ESA (Whatcom 2017a). Preliminary investigations of the habitat characteristics consist of trees intermixed with invasive and non-native vegetation. Tree species at various life cycle stages throughout the upland hillside include western red cedar (*Thuja plicata*), Douglas fir (*Pseudotsuga menziesii*), and Pacific madrone (*Arbutus menziesii*).

2.4 Hydrology

The site is entirely saltwater (25 parts per thousand), and experiences mixed semidiurnal tides, with a tidal range of 7.76 feet (NOAA, Station ID 9449880). The average annual precipitation at the property is approximately 20 to 40 inches, the average annual air temperature is approximately 48 to 50°F, and the average frost-free period is 200 to 240 days (WE 2017a). The shoreline orientation faces northward and is entirely open to the dynamics of tides, waves, and winds from Puget Sound. No wind-wave analysis has been conducted at the site; however, this information has been identified as necessary to support necessary marina maintenance and improvement. Freshwater input is expected to be primarily surface runoff and seepage from storm events. WE and CRETE collected limited groundwater data at the site and identified a generally northward movement of groundwater from the uplands to and into the intertidal and subtidal areas (WE 2018d) but did not calculate volumes or definitively confirm interaction with marine waters.

Off site, an excavated ditch was observed along the neighboring property to the east. The unnamed ditch flows from a roadside ditch via a culvert under Turn Point Road. No upland source or channelization was observed. County aerial imagery does not show any presence of this ditch prior to 2008, indicating low likelihood of a historic wetland or stream. The ditch is approximately 2 feet to 4 feet wide and slightly over 1 foot deep. Water discharges from an approximately 6-inch corrugated plastic pipe into the ditch, then bisects the adjacent properties lawn until flowing subsurface at the top of the low shoreline bluff. Surface water flow in the ditch is likely seasonal and only has minimal peaks during winter storms and heavy precipitation events. Vegetation present along the upper banks of the ditch is dominated by reed canary grass (*Phalaris arundinceous*), soft rush (*Juncus effusus*), field horsetail (*Equisetum arvense*), and western sword fern (*Polystichum munitum*). Upland soils surround the ditch on either bank and at the top and bottom of the slope.

Although no detailed hydrologic study has been performed, the site is characterized by a relatively shallow groundwater table that may be influenced by the tidal cycle throughout the nearshore. Tidal response is typically observed in shallow shoreline aquifers of this nature to about 50 to 100 feet inland, depending on aquifer thickness and soil type. The sloped shoreline is comprised of materials generally pervious to groundwater flux, and the surrounding upland ground surface consists of unpaved soils that do not limit infiltration and percolation of precipitation.

2.5 Site Geology

Soils in the upland area of the subject property are described in the Soil Survey of San Juan County Area, Washington and summarized in the Phase I ESA prepared by WE (WE 2017a). The Soil Survey designates the upland soil as a mixture of Beaches-Endoaquents, tidal-Xerorthents association; Mitchellbay-Rock Outcrop-Killebrew complex; and Cady-Rock Outcrop Complex. The soil is composed of approximately 38% Beaches-Endoaquents, tidal-Xerorthents association; 26% Mitchellbay-Rock Outcrop-Killebrew complex; and 36% Cady-Rock Outcrop Complex. Table 2-1 summarizes the Natural Resources Conservation Service (NRCS) mapped soil types depicted in the USDA and WE Soil Surveys.

Table 2-1. USDA Natural Resources Conservation Service Mapped Soil Types

Map Unit	Map Unit Name	Typical Soil Profile	Soil Properties
1014	Beaches-Endoaquents, tidal-Xerorthents association, 0–5 % slopes	Beaches: H1: 0”-59”: n/a Tidal: C1: 0”-29”: gravelly sand C2: 29”-48”: very gravelly coarse sand C3: 48”-59”: extremely gravelly coarse sand	Landform: beaches Parent material: beach sand About 0” to the water table. Very poorly-excessively drained. Low available water storage in profile.
3001	Hoypus sandy loam, 3-25% slopes	Oi: 0”-1”: slightly decomposed plant material A: 1”-5”: sandy loam Bw1: 5”-20”: loamy sand Bw2: 20”-36”: very gravelly loamy sandy C: 36”-59”: extremely gravelly sand	Landform: hillslopes Parent material: glacial outwash More than 80” to the water table. Somewhat excessively drained. Low available water storage in profile.
3012	Hoypus sandy loam, 10-40% slopes	Oi: 0”-1”: slightly decomposed plant material A: 1”-5”: sandy loam Bw1: 5”-20”: loamy sand Bw2: 20”-36”: very gravelly loamy sandy C: 36”-59”: extremely gravelly sand	Landform: hillslopes Parent material: glacial outwash More than 80” to the water table. Somewhat excessively drained. Low available water storage in profile.
4008	Mitchellbay-Rock Outcrop-Kellebrew complex, 3-15% slopes	Oi: 0”-1”: slightly decomposed plant material A: 1”-6”: gravelly sandy loam Bw: 6”-15”: sandy loam E: 15”-20”: sandy loam 2Btg1: 20”-26”: loam 2Btg2: 26”-38”: loam 2Cd: 38”-59”: loam	Landform: valleys and valley sides Parent material: glacial drift over dense glaciomarine deposits About 4”-12” to water table. Somewhat poorly drained. Moderate available water storage in profile.
5000	Cady-Rock Outcrop complex, 5-30% slopes	Oi: 0”-1”: slight decomposed plant material A: 1”-4”: loam Bw: 4”-16”: fine sandy loam R: 16”-26”: unweathered bedrock	Landforms: hillslopes, mountain slopes Parent material: glacial drift mixed with colluvium from metasedimentary bedrock More than 80” to water table. Well drained. Low available water storage in profile.

Soils in the grassy uplands area included up to 1-foot of dark-brown organic-rich topsoil, with an underlying gravelly fine to medium-grained sand, orange-brown in color and observed up to 5-feet below ground surface (ft bgs). Below this gravelly sand was observed to be firm to hard, brown to gray, sandy silt with minor to some clay content. An occasional erratic boulder was observed in the undisturbed upland soils (CRETE 2021).

2.6 Sea Level Rise Predictions

Greenhouse gas emissions are primarily responsible for global climate change, resulting in widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere (IPCC AR6 2023). The level of future

emissions directly influences the climate variability and degree of change, both globally and within the Puget Sound region. Projected outcomes of global climate change include sea level rise and increase storm surge potential, although multiple factors affect regional and local rates of change, including ocean currents, wind patterns, the distribution of global and regional glacier melt, and global sea level rise rates (UW CIG 2015). Site specific estimations are based on best available science techniques for predicting regional variation including guidance and tools drawn from Ecology, the University of Washington Climate Impact Group, *Sea Level Rise in Washington State – A 2018 Assessment* (Miller *et al*. 2018), Washington Coastal Resilience Project, and Federal Emergency Management Agency (FEMA) floodplain mapping.

Table 2-2. Tidal Datums for NOAA Station: 9449880, Friday Harbor, WA.

Tide Line	Tide Level (feet MLLW)
Mean Higher High Water (MHHW)	7.76
Mean High Water (MHW)	7.11
Mean Tide Level (MTL)	4.70
Mean Sea Level (MSL)	4.55
Mean Low Water (MLW)	2.29
Mean Lower Low Water (MLLW)	0.00

Source: NOAA Tides and Currents: Center for Operational Oceanographic Products and Services.

Low and high emissions scenarios are applied to predict the varying degree of sea level rise, utilizing the Representative Concentration Pathway (RCP) modeling techniques (Van Vuuren *et al.* 2011; UW CIG 2015). Global greenhouse gas emissions, measured in gigatons of carbon, under the low scenario (RCP 4.5) estimates a slow climb until mid-century, a subsequent drastic decline and then stabilize in the last few decades of the 21st century. Under the high emissions scenario, global greenhouse gas emissions continue to increase until the end of the 21st century (UW CIG 2015). In addition to various emissions scenarios influencing sea level rise, regional assessments now incorporate the rate of vertical land movement throughout the State projecting relative sea level rise (RSLR) (Miller *et al.* 2018). The vertical land movement, with 1 standard deviation of uncertainty incorporated into the projection, is estimated at 0.1 feet, plus or minus 0.2 feet per century for the northeastern portion of San Juan Island (Miller *et al.* 2018).

Using the Interactive Sea Level Rise Projection Tools, developed by the University of Washington Climate Impacts Group and Washington Coastal Hazards Resilience Network, under the low emissions scenario (RCP 4.5), RSLR is estimated between 0.1 feet – 1.2 feet by 2050; by 2100 RSLR is estimated between 0.1 feet – 4.1 feet. Under the high emissions scenario (RCP 8.5), RSLR is estimated between 0.1 feet – 1.3 feet by 2050; by 2100 RSLR is estimated between 0.5 feet – 4.8 feet. These projections represent a range of potential increased MHHW elevations between 7.86 feet MLLW – 9.06 feet MLLW by the mid-21st century; and MHHW elevations between 7.86 feet MLLW – 12.56 feet MLLW by the end of the 21st century. Figure 2-1 depicts the estimated MHHW elevations at Jensen's derived from the RSLR projections under the low and high RCP scenarios. The site-specific projections will be considered when proposed cleanup actions and applicable remedial solutions.

Chapter 3. Sampling and Analysis Summary

The Sediment Characterization Report (Appendix A) prepared as part of this Report in compliance with WAC 173-340-350 and WAC 173-204-550. The purpose of the sediment investigation was to collect and analyze the data gaps identified in the RI Work Plan (L-E and CRETE 2022) and refine the nature and extent of sediment contamination exceeding preliminary MTCA cleanup levels, preliminary SMS cleanup levels, and other regulatory requirements. The RI Work Plan was developed collaboratively by the Port and Ecology.

The investigation followed guidance provided in Ecology's current SCUM (Ecology 2021). Sample followed current Puget Sound Estuary Program (PSEP) protocols. Sediment samples were analyzed for the contaminants of potential concern (COPCs) and conventional sediment parameters described in the In-Water Sampling and Analysis Plan (SAP), which is included as Appendix D of the RI Work Plan. After the RI Work Plan was finalized, a new Site management team at Ecology required changes to the SAP in March 2023, which were noted in an informal SAP addendum (L-E 2023). The Sediment Characterization Report, found in Appendix A, summarizes results from the sediment characterization effort completed between March 20-23, 2023.

3.1 Initial Data Gaps

The RI Work Plan (L-E and CRETE 2022) evaluated existing data, identified data gaps, and established a framework to address these data gaps, which are summarized below.

Initial surface sediment sampling performed in 2018 identified a preliminary list of sediment COPCs; however, the dataset was not sufficiently robust to definitively establish the nature and extent of the contamination, or to allow either identification or elimination of other potential contaminant sources. The sediment sampling framework described in the RI Work Plan (L-E and CRETE 2022) was established to fill data gaps from the 2018 sediment investigation (WE 2018a; WE 2018b).

The remedial investigation sediment sampling performed in 2023 addressed the data gaps identified in the RI Work Plan (L-E and CRETE 2022) and refined the nature and extent sediment contamination at the Site.

3.2 Overview of Field Investigations and Analytical Methods

The sediment remedial investigation is designed to address data gaps identified in the RI Work Plan (L-E and CRETE 2022), refine the nature and extent of sediment contamination exceeding preliminary MTCA cleanup levels, and inform preliminary SMS cleanup standards. The sediment sampling event occurred from March 20, 2023, to March 23, 2023. During this field effort, the sampling team collected core samples from thirteen (13) sample stations and surface sediment grab samples from fifteen (15) sample stations (Figure 3-1).

Analyses of sediment sample included COPCs and conventional sediment parameters depicted in the SAP (L-E 2023). Sample preparation methods, analytical methods, and reporting limits are summarized in Appendix A.

Since SCUM does not provide TBT screening criteria, Ecology and the Port agreed in the final RI Work Plan to screen based on Dredged Material Management Program (DMMP) criteria (USACE 2021). Shortly before the field team mobilized, however, Ecology requested supplemental toxicity testing at all locations where

TBT had been detected during the Port's 2018 sampling event to evaluate the extent of potential TBT effects.

The field team collected the additional toxicity samples Ecology requested in March 2023. Toxicity test methods followed guidance provided by Puget Sound Estuary Program (PSEP 1995), the SCUM (Ecology 2021), and subsequent updates implemented through the Sediment Management Annual Review Meeting (SMARM). The sediment toxicity testing included the 10-day amphipod test, the 20-day juvenile polychaete survival and growth test, and the benthic larval development test.

Chapter 4. In-Water Remedial Investigation Results

Sediment sampling and analyses are described in the Sediment Characterization Report (Appendix A). Analytical results are compared to Ecology's SMS numeric criteria (Ecology 2021), and polar molecular compound and metal analyte results are compared to SMS dry weight apparent effects threshold (AET) criteria. Nonionizable organic compound analyte results are normalized based on total organic compound (TOC) percentage and compared to TOC-normalized criteria. As established in the RI Work Plan (L-E and CRETE 2022), tributyltin and total chlordane results are compared to Dredge Material Management Program (DMMP) criteria (USACE 2021).

The sampling team collected samples at twenty-one (21) locations. Sediment contamination resulted in exceedances of SMS criteria at five (5) locations. These exceedances are only detected in surface sediments (0 – 1 ft and 0 – 10 cm). No exceedances of SMS criteria were detected below 1 ft. Analytes exceeding SMS criteria included: dioxin/furans, polychlorinated biphenyls (PCBs), and mercury. TBT exceeded DMMP criteria at one (1) location; however, subsequent toxicity testing required by Ecology as part of the March 2023 SAP addendum passed SMS criteria.

Chapter 5. Source Control and Recontamination Assessments

5.1 Source control evaluation

This source control evaluation follows the recommendations provided in Section 12.4.3.1 of the current SCUM (Ecology 2021), which prioritizes addressing historic sources, current sources, how sources contribute to sediment contamination, and the Port's authority to manage or control sources.

5.1.1 Historic Sources

All historic land use activities are upland sources of potential contamination and are described in Chapter 1 of this Report. Further evaluation of the impacts of the potential contamination sources is addressed in the *RI Report— Upland Area*, prepared by CRETE.

In November 2024, Ecology requested that the Port evaluate potential historic upland contamination sources from the SRWA to the eastern property boundary; however, Ecology determined that the existing data is sufficient to evaluate potential remediation options for both upland and in-water areas. This new area will be evaluated as part of the feasibility study, but is unlikely to affect the cleanup footprint significantly.

5.1.2 Current Sources

The current sources of sediment contamination result from historic and current upland facility operations. These sources include on-going upland operations, groundwater transport, and surface water flow across contaminated upland surfaces.

Chemical leaching from contaminated upland soil has the potential to percolate into groundwater.

Boat maintenance operations have the potential to mobilize contaminated soils; however, the Port's best management practices (BMPs) minimize the potential for these operations to transport contaminants and impact sediments.

The primary on-going sources include surface water runoff and wind-born mobilization of surface particulates.

The upland remedial investigation (CRETE 2025) is evaluating potential upland sources, including upland operations, groundwater impacts, surface water and wind-born transport. Jensen's heavily altered shoreline and upper intertidal areas along the active boatyard area pose a minor risk of offsite contaminant transport. The western section of this shoreline includes a deteriorating wooden bulkhead, which supports a fill area along the western boatyard boundary. Fill is sloughing through the deteriorating wooden bulkhead into marine sediments; however, mobilization of these soils across intertidal areas is unlikely due to negligible long-shore transport mechanisms. The eastern section of the active boatyard shoreline area is composed of an ecology block wall. Most upland maintenance activities occur in this area. The shoreline between these two armored areas consists of a steep berm.

The deteriorating creosote-treated wood (piles and bulkhead) present throughout the upper intertidal are releasing creosote into marine sediments.

5.2 Recontamination Potential

Removing and/or isolating contaminated upland soils and marine sediment will drastically reduce the recontamination potential.

If dredging is identified as the preferred sediment cleanup alternative, dredging residuals are a potential recontamination source. Dredging residuals are commonly grouped into two classifications: undisturbed residuals and generated residuals (Patmont and Palermo 2007).

Undisturbed residuals result from exposing a layer of contaminated sediments to the surface. Undisturbed residuals are unlikely, because sediment contamination is confined to the upper foot.

Generated residuals occur when contaminated sediments are mobilized by dredging. These fine particles mix into a nepheloid layer, which is subject to sediment transport. In areas that experience strong currents and/or high wave energy, generated residuals may travel a considerable distance; however, sediment transport mechanisms with Jensen's in-water areas are negligible. Generated dredging residuals are likely to resettle either within or immediately adjacent to the original dredging footprint.

Typical environmental dredging BMPs and completing multiple dredging passes is an effective way to manage generated residuals. Slope failures at the edge of the dredge cut can also generate dredging residuals. Because all anticipated COPCs are confined to the top 1-foot of sediment, the risk of residuals generated by slope failure is low.

Jensen's is undergoing active maintenance work to repair and replace existing shoreline and in-water infrastructure. The Port is currently working to remove the existing travel lift pier (TLP), which will be replaced with a haul out pier (HOP) outside the Site boundary. The TLP is located in an area where COPCs were detected at relatively high concentrations in surface sediments; however, because TLP pile removal will occur in the dry at low tides, the risk that contaminated sediments will mobilize is low. Any potential redistributed sediment will remain within the cleanup footprint.

Because the Site is an active marina, prop wash has the potential to mobilize surface sediments; however, prop wash is primarily limited to the existing TLP area. Once the Port transitions these operations to the new HOP, prop wash is unlikely to occur in the shallow intertidal areas where COPCs were detected at elevated concentrations.

Chapter 6. Conceptual Site Model

The most recent sediment data supports the conceptual site model described in the RI Work Plan (L-E and CRETE 2022).

Chapter 2 of this report summarizes the Site's physical characteristics and natural resources pertinent to the CSM including habitat features, shoreline characteristics, upland areas, hydrology, geology and sea level rise predictions.

6.1 Vulnerabilities to Climate Change Impacts

Projected outcomes of global climate change include sea level rise (SLR) and increased storm surge potential. Multiple factors affect regional and local rates of change, including ocean currents, wind patterns, the distribution of global and regional glacier melt, and global sea level rise rates (UW CIG, 2015). Section 2.6 described Site SLR scenarios, which project that MHHW may increase from a current elevation of 7.76 feet MLLW to a range of 7.86 feet MLLW to 9.06 feet MLLW by the mid-21st century; and MHHW elevations between 11.86 feet MLLW – 12.56 feet MLLW by the end of the 21st century (Figure 2-1). This potential increase in MHHW elevation is unlikely to impact the sediment.

6.2 Transport Pathways and Remaining Data Gaps

6.2.1 Transport Pathways and Contaminated Media

The transport pathways associated with Site contamination include upland sources, which may impact sediments. Three primary mechanisms from the upland into sediments include:

- Stormwater infiltration and leaching of contaminants from vadose zone soil (primarily the upper 2 feet of soil) to groundwater.
- Groundwater transport to surface water.
- Erosion of the upland soils to sediments.

6.2.2 Remaining data gaps and proposals for filling data gaps

The sediment characterization results support the CSM, which predicts that COPCs are generally confined within the active boatyard area. Ecology directed the Port to investigate what it described as a data gap along the eastern shoreline of the Site, where historic imagery (Figures 1-3 and 1-4) shows prior ship work occurring. The Port may perform additional sediment sampling during the feasibility study, as needed to characterize the nature and extent of COPCs within this area.

6.3 Receptors and Exposure Pathways

6.3.1 Human Receptors

The RI Work Plan identified multiple scenarios related to potential human exposure to sediment, surface water, and soil at the site, including water recreation; shore and upland recreation; occupational; fish, crab, and clam collection; and fish, crab, and clam consumption (L-E and CRETE 2022). Although each of the exposure pathways included in these scenarios is theoretically complete, the activities associated with some of these pathways are unlikely to occur frequently under both current and future use of the site. For example, direct contact with surface water may occur incidentally during fishing or boating, but swimming in the vicinity of the marina is unlikely given the vessel traffic at the marina. Similarly, occupational exposure would likely occur only sporadically. The exposure pathways that are most likely to occur at the site are incidental ingestion and dermal contact with site sediments and fish/shellfish consumption.

Direct sediment exposure

Activities with the potential for sediment exposure include beach play, clamming, launching small vessels, and shoreline fishing. Exposure to sediments is currently infrequent in intertidal areas along the western half of the property in front of the active boatyard. Intertidal areas in the eastern half of the site are currently more accessible to the public, but the Port of Friday Harbor is planning to develop this area such that public access would be unlikely in the future.

Ecology (2021) has included three default scenarios for evaluating human health risk from direct sediment contact at sediment cleanup sites: child beach play, subsistence clam digging by adults, and tribal net fishing by adults. Child beach play and clam digging are applicable to intertidal areas and tribal net fishing is applicable to subtidal areas. While clam digging is currently possible at the site, there is no evidence that clamming occurs at the default frequency (120 days/year) included for this scenario in Ecology's (2021) risk calculation spreadsheet. Given the physical constraints to net fishing that are associated with an active marina, the tribal net fishing scenario is also not appropriate for the Jensen Marina site. There is no evidence that tribal net fishing occurs in the vicinity of the marina.

A beach play scenario was developed to assess risks to young children (i.e., up to 6 years of age) from playing in intertidal sediments at the site. The exposure parameters for this scenario are discussed in Chapter 7 and Appendix B.

Consumption of Fish, Crabs, and Clams

The extent and frequency of the consumption of fish, crabs, and clams collected from the Jensen Marina area (or within the nearby shallow embayment) are unknown, but existing evidence suggests that harvesting does not occur. Nonetheless, for risk communication purposes this exposure pathway was considered in the development of SCOs and CSLs, as described in Chapter 7 and Appendix B.

6.3.2 Ecological Receptors

Higher trophic level species such as birds and mammals are similar to humans in that the greatest risks are associated with consumption of fish and shellfish (Ecology 2021). Risk-based sediment concentrations derived according to Chapter 7 and Appendix B are also expected to be protective of higher-trophic level aquatic-dependent wildlife (e.g., otters) that may be exposed to bioaccumulative chemicals (through foraging) at the site.

Chapter 7. Sediment Cleanup Standards

The Sediment Management Standards (SMS; Washington Administrative Code [WAC] 173-204) includes requirements for the protection of human health and the environment. The SMS rule includes a two-tier framework for developing human health risk-based sediment cleanup objectives (SCOs) and cleanup screening levels (CSLs) to address the bioaccumulative (via seafood consumption) and direct contact exposure pathways (WAC 173-204-561). The derivation of these cleanup standards is described in detail in Appendix B and summarized in this chapter, including sections on selecting bioaccumulative chemicals of concern (Section 7.1), exposure pathways and reasonable maximum exposure scenarios (Section 7.2), and the development of SCOs and CSLs that are protective of human and ecological health (Section 7.3).

7.1 Site Bioaccumulative Chemicals of Concern

The DMMP agencies have developed a list of bioaccumulative chemicals based on a comprehensive analysis of chemicals found in sediment and fish tissue in Washington State that are known to have effects on human health and wildlife (Ecology 2021). Using detection above the method reporting limit (MRL) as the primary criterion, the bioaccumulative COCs at the site are:

- cPAHs, expressed as toxic equivalents (TEQ)
- PCBs
- Dioxin/furan congeners, expressed as TEQ
- Pentachlorophenol
- Arsenic
- Cadmium
- Mercury
- Butyltins

SCOs and CSLs have been developed for these bioaccumulative chemicals.

7.2 Exposure Pathways and Reasonable Maximum Exposure

As summarized in Section 6.3, the exposure pathways for which cleanup standards were developed are dermal contact with site sediments and fish/shellfish consumption.

7.2.1 Direct sediment exposure

A beach play scenario was developed to assess risks to young children (i.e., up to 6 years of age) from playing in intertidal sediments at the site. Default exposure parameters were used in the absence of site-specific data, including an exposure frequency of 41 days/year and a sediment ingestion rate of 200 mg/day (Ecology 2021). The exposure frequency assumption for this scenario is almost certainly an overestimate of current conditions, based on observations made at the site, but it provides a significant degree of protectiveness. Values for other exposure parameters are provided in Appendix B.

7.2.2 Consumption of Fish and Shellfish

The extent and frequency of the consumption of fish, crabs, and clams collected from the Jensen Marina area (or within the nearby shallow embayment) are unknown, but existing evidence suggests that harvesting does not occur. No fish, crab, or clam chemistry data have been collected at the site. Without such data, the calculation of site-specific risk-based sediment concentrations for the protection of seafood consumers is highly uncertain (Ecology 2021). At sites without tissue chemistry, Ecology (2021) guidance provides a simplified approach where the SCO and CSL are established at background (natural or regional, respectively) or the practical quantitation limit (PQL), whichever value is higher. Ecology (2021) has

concluded that this approach is protective because risk-based sediment concentrations for most bioaccumulative chemicals are frequently below natural background.

For the Jensen Marina Site, the simplified approach (i.e., natural background or PQL) was followed. To provide additional risk communication context for a range of seafood consumption scenarios, sediment concentrations protective of seafood consumption were also calculated using biota-sediment accumulation factors (BSAFs) from technical literature or other Puget Sound sediment sites.

Ecology's risk calculation spreadsheet provides three default Reasonable Maximum Exposure (RME) scenarios, corresponding to Suquamish Tribal Adults, Tulalip Tribal Adults, and Columbia River Tribal Adults (Ecology 2021). The Suquamish and Tulalip scenarios are applicable to Puget Sound sites. Although the consumption rates associated with these tribal scenarios are not sustainable at a site as small as Jensen Marina, for the purposes of risk communication, risk-based sediment concentrations were calculated for risk-based tissue concentrations based on the Tulalip Tribal Adult RME scenario. This RME scenario includes a seafood consumption rate of 193 g/day, which includes seafood obtained from all sources (e.g., stores, restaurants), not just self-caught seafood from Puget Sound. This consumption rate also includes salmon, whose exposure to contaminants occurs primarily outside Puget Sound.

Risk-based sediment concentrations were also calculated for a second scenario that is more reflective of recreational fishing. This scenario assumed one meal of seafood per month, which is equivalent to 7.5 g/day. Values for other exposure parameters are provided in Appendix B.

7.2.3 Ecological Receptors

Higher trophic level species such as birds and mammals are similar to humans in that the greatest risks are associated with consumption of fish and shellfish (Ecology 2021). Risk-based sediment concentrations derived according to Section 7.3 and Appendix B are also expected to be protective of higher-trophic level aquatic-dependent wildlife (e.g., otters) that may be exposed to bioaccumulative chemicals (through foraging) at the site, so no SCOs or CSLs specific to higher trophic level ecological receptors were calculated.

7.3 SCO and CSL Development

For a given COC, the SCO and CSL for human health are determined based on the highest of the following:

- The lowest appropriate risk-based concentration (RBC) for the protection of human health for the 1×10^{-6} (for the SCO) or 1×10^{-5} (for the CSL) excess lifetime cancer risk threshold and/or a hazard quotient (HQ) of 1
- Natural background (for the SCO) or regional background (for the CSL)
- PQL

7.3.1 Risk-based Sediment Concentrations

Equations for calculating risk-based sediment cleanup levels (SCLs) are provided in Appendix B. For the seafood consumption scenarios, SCL calculations consisted of two steps, in the absence of site-specific tissue chemistry data:

Step 1: Determine the risk-based concentration in tissue for each COC for each seafood consumption scenario.

Step 2: Using literature-based BSAFs or BSAFs from other Puget Sound sediment sites, calculate risk-based sediment concentrations for the lowest risk-based tissue concentrations for each COC and seafood consumption scenario.

7.3.2 Natural Background

Natural background concentrations were adopted from SCUM Table 10-1 (Ecology 2021) for six of the eight bioaccumulative COCs (all except pentachlorophenol and TBT). No natural background concentration for pentachlorophenol is available because this compound was not detected in the datasets used by Ecology to derive natural background. The natural background concentration for TBT was derived from Puget Sound Ambient Monitoring Program data collected in 2002-2003. A table with natural background concentrations is provided in Appendix B.

7.3.3 Practical Quantitation Limit

SMS allows consideration of the PQL in establishing the cleanup levels when a COC concentration determined to be protective cannot be reliably detected using state-of-the-art, currently available analytical instruments and methods [WAC 173-204-505(15)]. If a natural background or the risk-based SCO is below the concentration at which a contaminant can be reliably quantified, then the SCO for that contaminant may default to the analytical PQL. A table in Appendix B includes PQLs for the eight bioaccumulative COCs evaluated at this site. The PQLs for five of the COCs are based on the programmatic PQLs presented in SCUM Table 11-1 (Ecology 2021). The other three PQLs are from the analytical laboratories used for the sediment investigations at this site.

7.3.4 SCOs and CSLs

The human health SCOs and CSLs calculated according to the scenarios and equations presented in Appendix B are presented in Table 7-1. The SCO and CSL values for five of the eight bioaccumulative COCs (cPAHs, PCBs, dioxin/furan TEQ, pentachlorophenol, and arsenic) are the natural background concentration or the PQL. The SCOs and CSLs for the other COCs (cadmium, mercury, TBT) are based on the tribal seafood consumption scenario. The SCOs and CSLs are the same because no regional background concentrations have been developed for this site.

Table 7-1. Human Health Risk-Based Sediment SCOs and CSLs

Chemical	Units	SCO	CSL	Basis
cPAH TEQ	µg/kg	21	21	Natural background
PCBs	µg/kg	4	4	PQL
Dioxin/furan TEQ	ng/kg	5	5	PQL
Pentachlorophenol	µg/kg	50	50	PQL
Arsenic	mg/kg	11	11	Natural background
Cadmium	mg/kg	1.9	1.9	Tribal consumption scenario
Mercury	mg/kg	0.28	0.28	Tribal consumption scenario
Tributyltin	µg/kg	26	26	Tribal consumption scenario

Chapter 8. In Water Remedial Investigation Conclusions

The Site has had over 100 years of industrial uses that contributed to legacy contamination. Historical shipyard activities represent the primary source of contamination. These are described in more detail above (Chapter 1) and in the upland RI Report (CRETE 2025).

This RI Report documents the nature and extent of contamination in the marine sediment portion of the Site. The information compiled in this RI report, and associated upland RI Report (CRETE 2025) will be used to inform the FS and DCAP in accordance with WAC 173-340-356 through 173-340-390.

Based on the investigation activities described in this report, sediment contamination resulted in exceedances of SMS criteria at five (5) sample locations. These exceedances are only detected in surface sediments (0 – 1 ft and 0 – 10 cm). No exceedances of SMS criteria were detected below 1 ft. Analytes exceeding SMS criteria included: dioxin/furans, PCBs, and mercury. TBT exceeded DMMP criteria at one (1) location; however, subsequent toxicity testing required by Ecology as part of the March 2023 SAP addendum passed SMS criteria.

The data and information provided in the RI will be used to develop remedial alternatives and to evaluate their effectiveness in the FS. The transport pathways associated with Site sediment contamination are primarily associated with upland sources that may impact sediments. These mechanisms include stormwater infiltration and leaching of contaminants from vadose zone soil, groundwater transport to surface water, and erosion of the upland soils to sediments. These mechanisms are addressed in *RI Report – Upland Area* (CRETE 2025).

Site specific sediment cleanup standards were developed to address the bioaccumulative chemicals of concern and potential direct contact exposure pathways for the protection of human health and the environment. Direct sediment exposure, consumption of fish and shellfish, and ecological receptors were evaluated and considered for the development of risk-based sediment cleanup levels.

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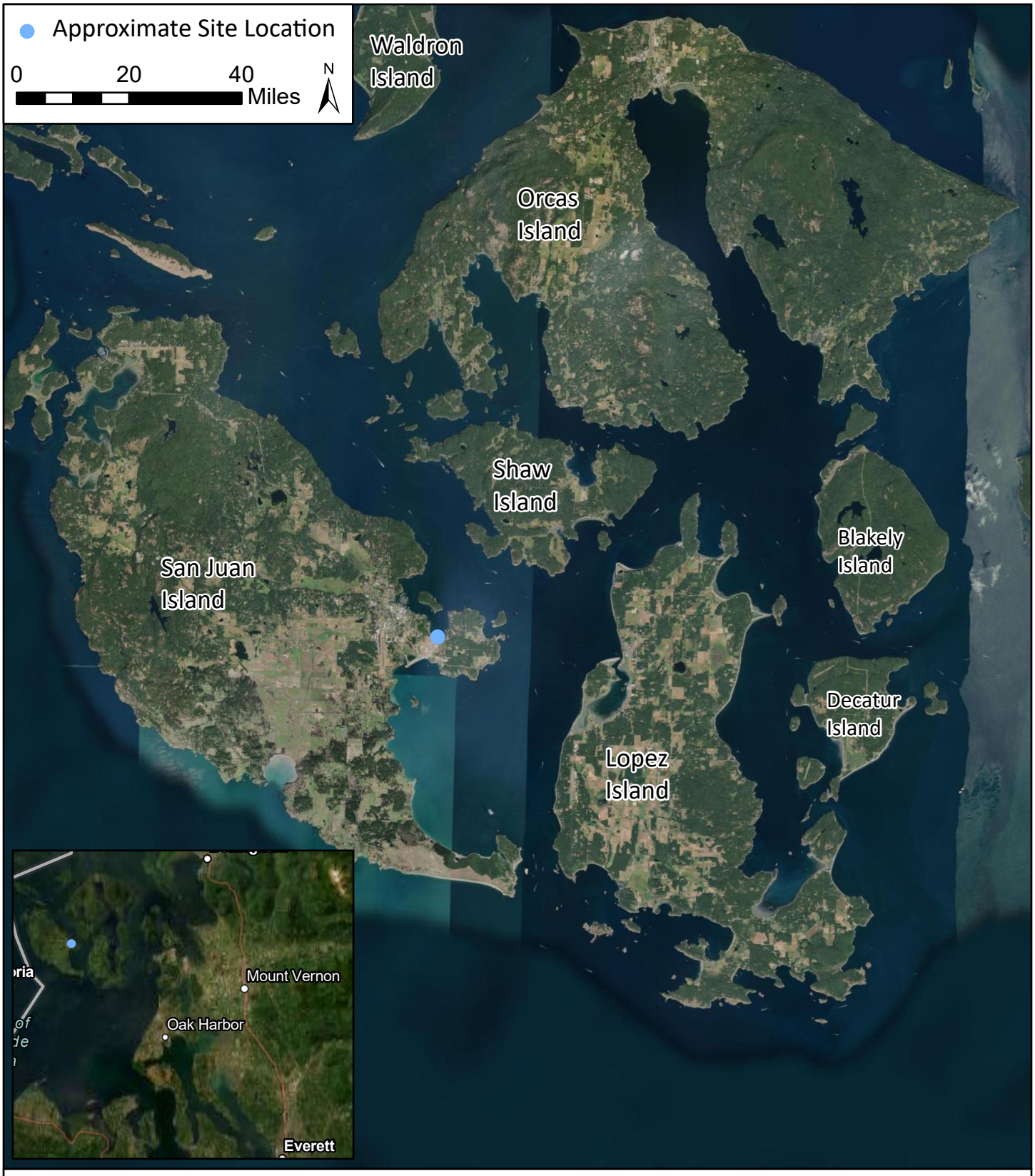


Port of Friday Harbor

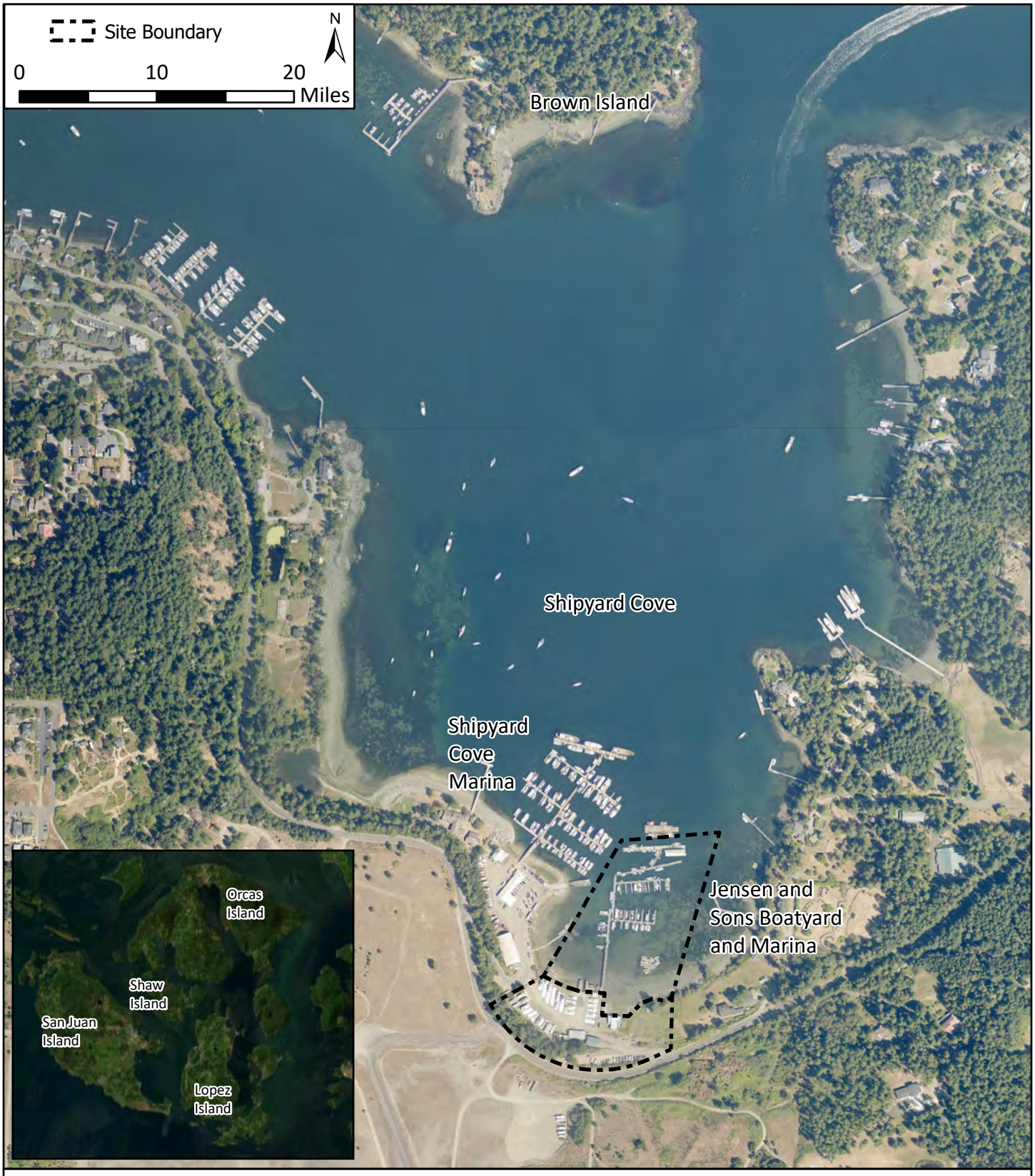
Jensen and Son's Boatyard and Marina

In-Water Remedial Investigation Report

Figure 1-1. Vicinity Map

LEON Environmental, LLC

Data Sources: ArcGIS Pro (3.5.0), ESRI World Imagery



Port of Friday Harbor

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In-Water Remedial Investigation Report

Figure 1-2. Site Map

LEON Environmental, LLC

Data Sources: ArcGIS Pro (3.5.0), San Juan County Imagery (2023)

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Figure 1-3. Overview of Historic Site Facility Uses

Data Sources: ArcGIS Pro (3.5.0), San Juan Historical Society Imagery

In-Water Remedial Investigation Report
San Juan Historical Society Imagery

LEON Environmental, LLC

Port of Friday Harbor
Jensen and Son's Boatyard and Marina

Figure 1-4. Historic Site Facility Uses

Data Sources: ArcGIS Pro (3.5.0), San Juan Historical Society Imagery

In-Water Remedial Investigation Report
San Juan Historical Society Imagery

LEON Environmental, LLC

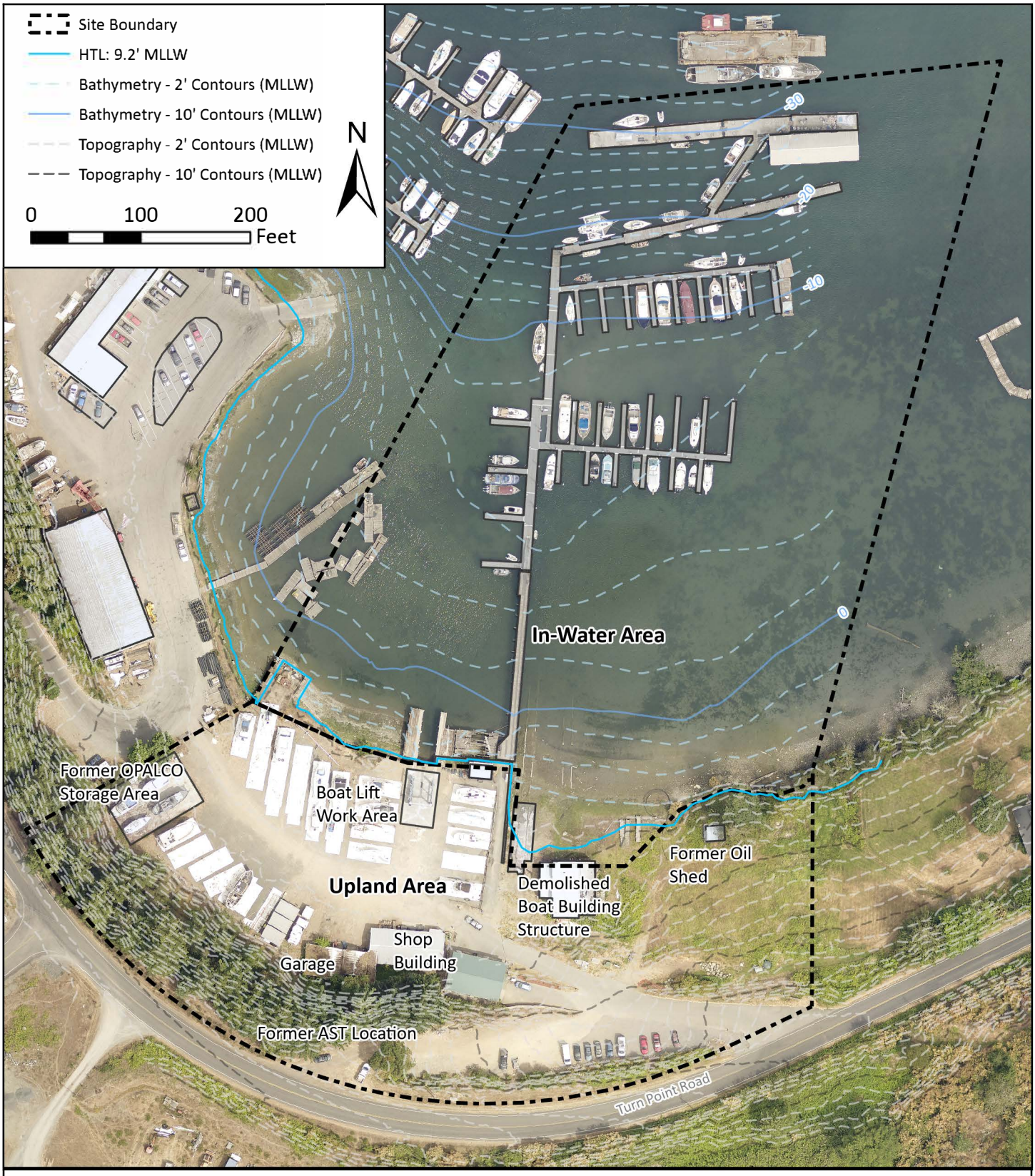

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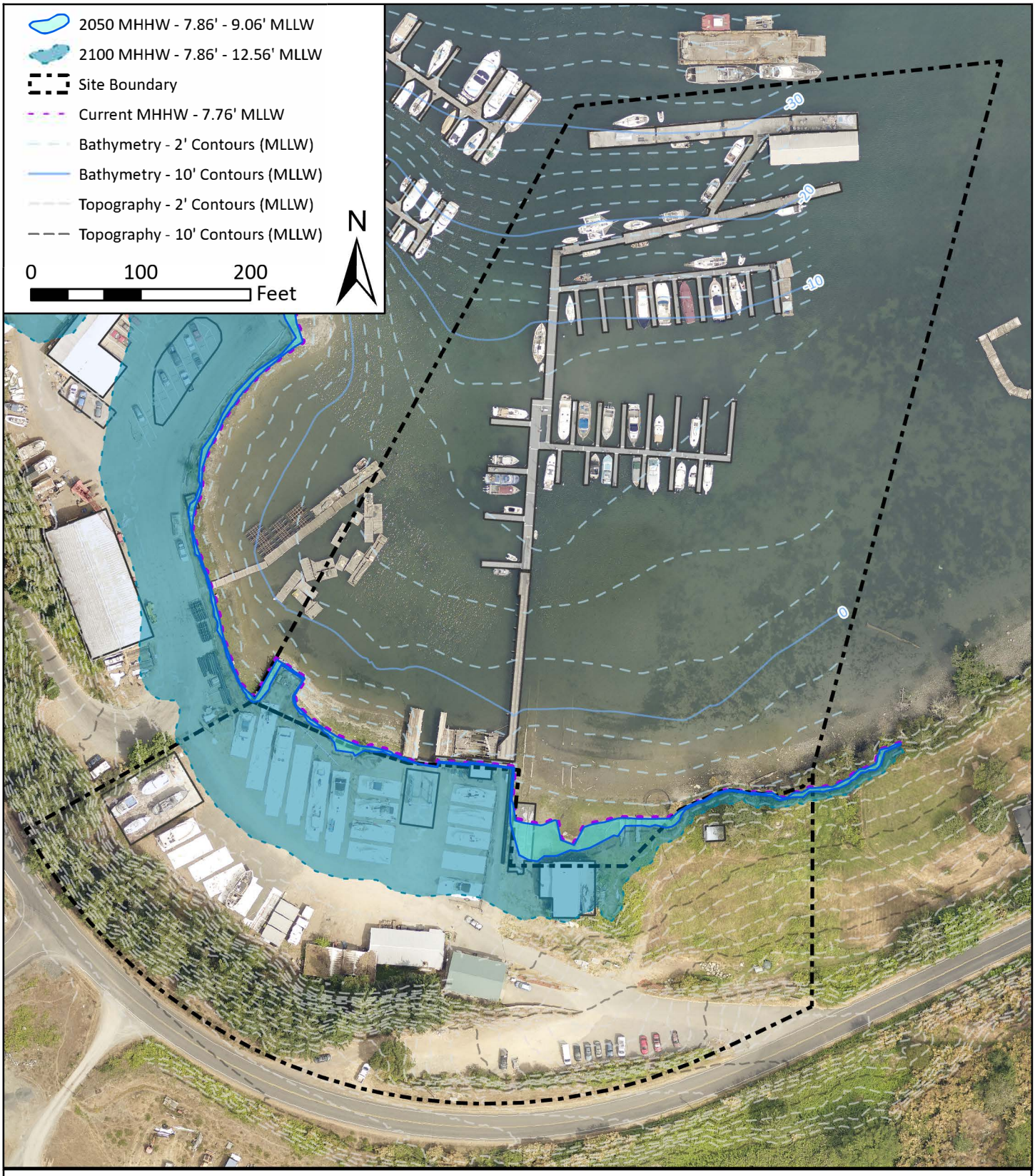
Figure 1-5. Existing Conditions

LEON Environmental, LLC

Data Sources: ArcGIS Pro (3.5.2), San Juan County Imagery (2023). San Juan Survey (2018).



Port of Friday Harbor
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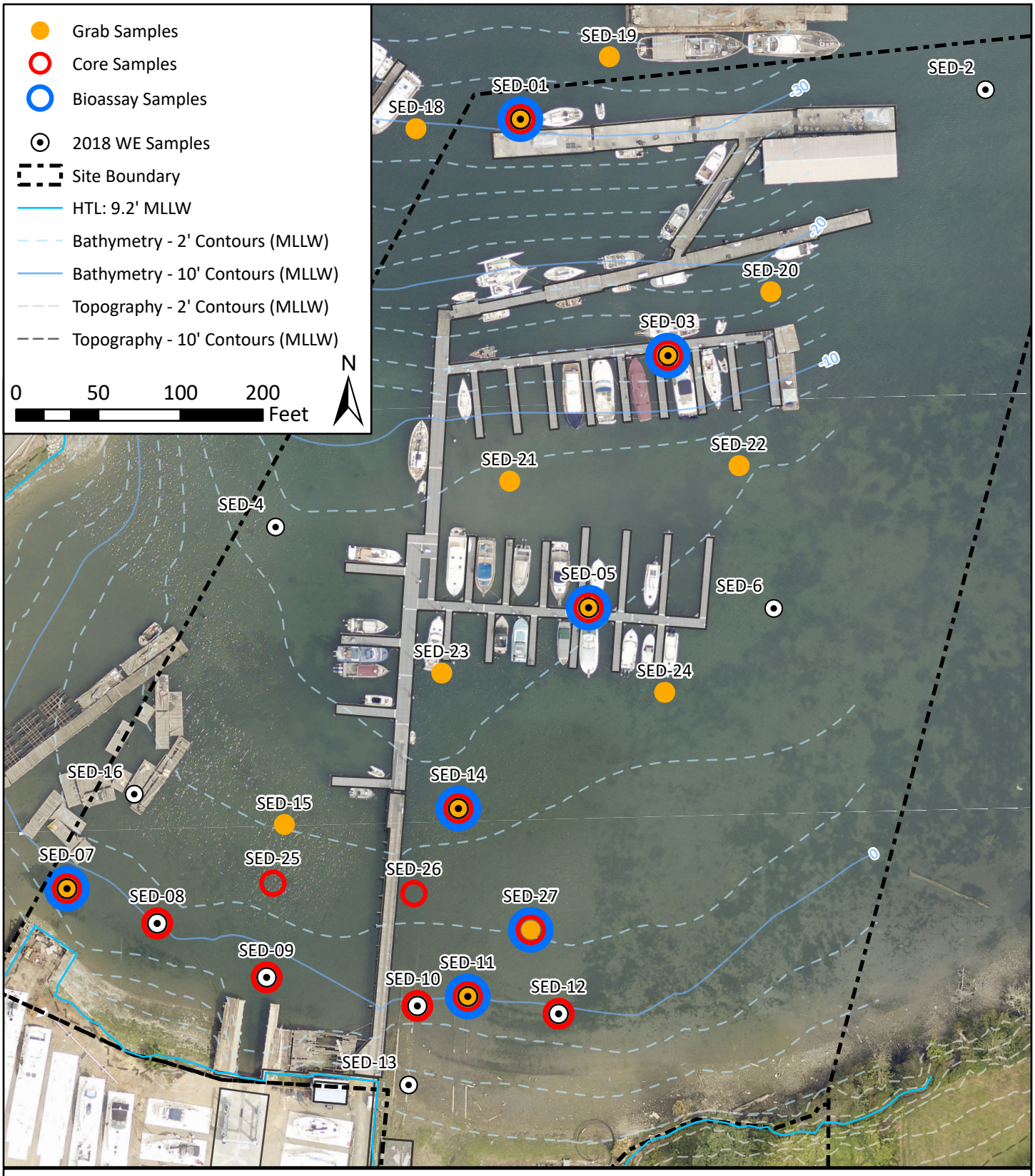
Figure 2-1. Site MHHW predictions based on Relative Sea Level Rise Projections.

Data Sources: ArcGIS Pro (3.5.2), San Juan County Imagery (2023). San Juan Survey (2018). UW Climate Impact Group: RSLR Projections (2025).

LEON Environmental, LLC



Port of Friday Harbor

Jensen and Son's Boatyard and Marina

In-Water Remedial Investigation Report

Figure 3-1. Sediment Sample Locations

Data Sources: Leon Environmental, LLC (2023). ArcGIS Pro (3.5.2). San Juan County Imagery (2023). San Juan Survey (2018). Whatcom Environmental (2018).

LEON Environmental, LLC

Port of Friday Harbor Sediments	AETs[b,c,d]			SED-1	SED-1		SED-2	SED-3	SED-3		SED-4	SED-5	SED-5		SED-6	SED-7	SED-7		
Dry-weight data summary				SED-01G	SED-01G	SED-01C	SED-02G	SED-03G	SED-03G	SED-03C	SED-04G	SED-05G	SED-05G	SED-05C	SED-06G	SED-07G	SED-07G	SED-07C	
Analyte[a]	SCO	CSL	DMMP[e]	0 - 4 in[j]	0 - 10 cm	0 - 1 ft	0 - 4 in[j]	0 - 4 in[j]	0 - 10 cm	0 - 1 ft	0 - 4 in[j]	0 - 4 in[j]	0 - 10 cm	0 - 1 ft	0 - 4 in[j]	0 - 4 in[j]	0 - 10 cm	0 - 1 ft	1 - 3 ft
Conventionals																			
Ammonia (mg/Kg)				4.40	8.74		4.16	6.10	4.51		2.50	10.80	12.00		10.20	4.60	10.40		
Total sulfides (mg/Kg)				28.00	304.00 J		3.34	405.00	259.00 J		3.00	261.00	262.00 J		30.00	0.31	89.70 J		
Total Solids (%)				4.80	53.25	55.22	3.10	6.20	45.94	55.48	3.60	6.40	51.94	54.83	7.20	3.10	73.61	81.65	77.08
Total Organic Carbon (% dry)				1.37	0.85	0.72	0.80	1.88	1.39	1.52	1.81	1.92	1.12	1.00	2.21	1.41	1.37	0.16	0.85
Metals	mg/kg dw		N/A																
Arsenic	57	93		8.00			4.84	7.39			6.19	9.51			7.06	6.11			
Cadmium	5.1	6.7		1.20			1.45	1.53			2.50	2.05			1.87	0.10			
Chromium	260	270		33.00			21.90	33.90			32.70	34.10			27.90	22.20			
Copper	390	390		33.00			14.00	42.10			36.60	62.80			41.60	82.30			
Lead	450	530		12.00 J+			4.00 J+	14.00 J+			17.00 J+	17.00 J+			13.00 J+	27.00 J+			
Mercury	0.41	0.59		0.07			0.04	0.08			0.08	0.10			0.09	0.08			
Nickel																			
Silver	6.1	6.1		0.10			0.05	0.10			0.09	0.13			0.10	0.13			
Zinc	410	960		96.00			53.10	95.90			78.10	109.00			78.00	92.00			
Organometallics	ug/kg dw		ug/kg dw																
Monobutyltin																	6.31	4.06 U	4.07 U
Dibutyltin																	15.60	5.75 U	5.76 U
Tributyltin[e]			73	3.80			1.30 J	7.50			3.80	25.00			10.00	75.00	19.80	3.61 J	1.22 J
Tetrabutyltin																	4.98 U	4.97 U	4.98 U
Organics & Chlorinated Organics	µg/kg dw		N/A																
2,4-Dimethylphenol	29	29		67.00 U			63.00 U	75.00 U	29.00 UJ	29.00 UJ	65.00 U	83.00 U	29.00 UJ	29.00 UJ	84.00 U	32.00 U	29.00 UJ	29.00 UJ	
2-Methylphenol	63	63		44.00 U			41.00 U	49.00 U	63.00 UJ	63.00 UJ	43.00 U	55.00 U	63.00 UJ	63.00 UJ	55.00 U	21.00 U	63.00 UJ	63.00 UJ	
4-Methylphenol[g]	670	670		48.00 U			45.00 U	54.00 U	200.00 U	200.00 U	47.00 U	60.00 U	200.00 U	200.00 U	60.00 U	390.00	200.00 U	200.00 U	
Benzoic acid	650	650		1100.00 R			960.00 R	1200.00 R	500.00 U	500.00 U	990.00 R	1300.00 R	500.00 U	500.00 U	1300.00 R	480.00 R	500.00 U	500.00 UJ	
Benzyl alcohol	57	73		52.00 U			49.00 U	58.00 U	57.00 UJ	57.00 UJ	51.00 U	65.00 U	57.00 UJ	57.00 UJ	66.00 U	25.00 U	57.00 UJ	57.00 UJ	
Pentachlorophenol	360	690		56.00 U			53.00 U	63.00 U	50.00 U	50.00 U	55.00 U	70.00 U	50.00 U	50.00 U	71.00 U	98.00 J	50.00 U	50.00 U	
Phenol	420	1200		33.00 U			31.00 U	37.00 U	100.00 U	100.00 U	32.00 U	41.00 U	100.00 U	100.00 U	42.00 U	140.00	100.00 U	100.00 U	
Organics & Chlorinated Organics	µg/kg dw		N/A																
1,2,4-Trichlorobenzene	31	51		28.00 U			26.00 U	31.00 U	4.00 UJ	4.00 UJ	27.00 U	35.00 U	4.00 UJ	4.00 UJ	35.00 U	13.00 U	4.00 UJ	4.00 UJ	
1,2-Dichlorobenzene	35	50		26.00 U			24.00 U	29.00 U	10.00 U	10.00 U	25.00 U	32.00 U	10.00 U	10.00 U	32.00 U	12.00 U	10.00 U	10.00 U	
1,4-Dichlorobenzene	110	110		27.00 U			25.00 U	30.00 U	14.00	10.00 U	26.00 U	33.00 U	10.00 U	10.00 U	34.00 U	13.00 U	10.00 U	10.00 U	
Dibenzofuran	540	540		36.00 U			60.00 J	41.00 U	10.00 U	10.00 U	35.00 U	45.00 U	10.00 U	10.00 U	46.00 U	17.00 U	10.00 U	10.00 U	
Hexachlorobenzene	22	70		35.00 U			33.00 U	39.00 U	10.00 UJ	2.10 UJ	34.00 U	44.00 U	2.10 UJ	2.10 UJ	44.00 U	17.00 U	10.00 U	2.10 UJ	
Hexachlorobutadiene	11	120		32.00 U			30.00 U	36.00 U	10.00 U	10.00 U	31.00 U	40.00 U	10.00 U	10.00 U	40.00 U	15.00 U	10.00 U	10.00 U	
N-nitrosodiphenylamine	28	40		34.00 U			32.00 U	38.00 U	10.00 U	10.00 U	33.00 U	43.00 U	10.00 U	10.00 U	43.00 U	16.00 U	10.00 U	10.00 U	
Phthalates[d]	µg/kg dw		N/A																
Bis(2-Ethylhexyl)phthalate	1300	1900		94.00 U			89.00 U	110.00 U	180.00	160.00 U	92.00 U	120.00 U	160.00 U	160.00 U	120.00 U	45.00 U	160.00 U	160.00 U	
Butylbenzyl phthalate	63	900		39.00 U			37.00 U	44.00 U	20.00 UJ	20.00 UJ	38.00 U	49.00 U	20.00 UJ	20.00 UJ	50.00 U	19.00 U	20.00 UJ	20.00 UJ	
Diethyl phthalate	200	>1,200[f]		39.00 U			37.00 U	44.00 U	100.00 UJ	100.00 UJ	38.00 U	49.00 U	100.00 UJ	100.00 UJ	50.00 U	19.00 U	100.00 UJ	100.00 UJ	
Dimethyl phthalate	71	160		43.00 U			40.00 U	48.00 U	71.00 UJ	71.00 UJ	42.00 U	53.00 U	71.00 UJ	71.00 UJ	54.00 U	33.00 J	71.00 UJ	71.00 U	
Di-n-butyl phthalate	1400	1400		51.00 U			48.00 U	57.00 U	100.00 U	100.00 UJ	50.00 U	64.00 U	100.00 UJ	100.00 UJ	64.00 U	24.00 U	100.00 UJ	100.00 U	
Di-n-octyl phthalate	6200	6200		34.00 U			32.00 U	38.00 U	100.00 U	100.00 UJ	33.00 U	43.00 U	100.00 UJ	100.00 UJ	43.00 U	16.00 U	100.00 UJ	100.00 U	
Pesticides[e]			µg/kg dw																
Aldrin			9.5	1.20 U	1.70 U	1.70 U	1.40 U	1.40 U	1.70 U	1.70 U	1.10 U	1.40 U	1.70 U	1.70 U	1.50 U	0.78 U			
Total Chlordane			2.8	2.80 J	2.20 U	2.20 U	5.30 J	5.30 J	2.20 U	2.20 U	1.60 UiJ	4.90 JP	2.20 U	2.20 U	1.50 U	1.20 UiJ			
beta-Hexachlorocyclohexane (beta-BHC)					0.50 UJ	0.50 UJ			0.50 U	0.50 UJ			0.50 UJ	0.50 UJ					
Dieldrin			1.9	0.42 U	1.00 E	1.00 E	0.75 JP	0.75 JP	1.00 U	1.00 E	0.39 U	1.90 J	1.00	1.00 UJ	0.93 Ui	1.30 Ui			
Endrin ketone					1.00 E	1.00 U			1.00 U	5.00 U			1.00 E	1.00 UJ					
Heptachlor			1.5	4.20 Ui	0.50 UJ	0.50 UJ	2.60 Ui	2.60 Ui	0.50 E	0.50 UJ	0.69 U	3.10 Ui	0.50 UJ	0.50 UJ	0.93 U	0.52 U			
4,4'-DDD			16	1.20 U	1.00 U	1.00 U	1.40 U	1.40 U	1.00 U	1.00 U	1.10 U	1.40 U	1.00 U	1.00 UJ	4.50 Ui	0.79 U			
4,4'-DDE			9	0.76 U	1.00 U	1.00 U	0.89 U	0.89 U	1.00 U	1.00 U	0.70 U	0.90 U	1.00 U	1.00 UJ	0.96 U	0.86 Ui			
4,4'-DDT			12	3.20 Ui	1.00 UJ	1.00 UJ	1.40 U	1.40 U	1.00 E	1.70 UJ	1.10 U	1.40 U	1.00 UJ	1.00 UJ	1.50 U	2.40 Ui			
PCBs	µg/kg dw		N/A																
Total Aroclor[h]	130	1000		33.50 U,J			16.10 U	50.85 U,J			22.20 U,J	71.25 U			44.50 U,J	32.75 U,J			
Polycyclic Aromatic Hydrocarbons	µg/kg dw		N/A																
Total PAHs				2580.00			1771.00	2162.00	1380.00	2027.60	1867.00	1460.00	1353.50	919.20	1931.00	1791.00	1063.30	816.90	
Total LPAH	5200	5200		399.00			679.00	328.00	93.20	107.40	405.00	281.00	99.50	63.10	369.00	228.00	66.00	36.90	
2-Methylnaphthalene	670	670		30.00 U			33.00 J	34.00 U	7.30	8.10	29.00 U	37.00 U	6.10	7.60	38.00 U	14.00 U	3.50	2.40	
Acenaphthene	500	500		34.00 U			47.00 J	38.00 U	4.60	5.10	51.00 J	43.00 U	3.40	2.60	43.00 U	16.00 U	2.50	2.00 U	
Acenaphthylene	1300	1300		28.00 U			26.00 U	31.00 U	5.30	6.10	27.00 U	35.00 U	5.00	3.30	35.00 U	13.00 U	2.90	2.00 U	
Anthracene	960	960		38.00 J			39.00 J	55.00 J	20.00	28.00	43.00 J	43.00 U	17.00	14.00	68.00 J	47.00	15.00	7.50	
Fluorene	540	540		35.00 U			49.00 J	39.00 U	8.30	10.00	34.00 U	44.00 U	7.30	6.50	44.00 U	17.00 U	4.50	2.60	
Naphthalene	2100	2100		34.00 U			38.00 J	35.00 U	5.00	6.20	30.00 U	39.00 U	3.80	3.70	39.00 U	15.00 U	2.10	2.80	
Phenanthrene	1500	1500		230.00			480.00	130.00	50.00	52.00	220.00	77.00 J	63.00	33.00	140.00	120.00	39.00	20.00	
Total HPAH	12000	17000		2181.00			1092.00	1834.00	1286.80	1920.20	1462.00	1179.00	1254.00	856.10	1562.00	1563.00	997.30	780.00	
Benzo[a]anthracene	1300	1600		100.00 J			43.00 J	130.00	87.00	110.00	80.00 J	77.00 J	76.00	59.00	130.00 J	100.00	71.00	28.00	
Benzo[a]pyrene	1600	1600		94.00 J			36.00 U	120.00	120.00	160.00 J	57.00 J	75.00 J	82.00 J	66.00 J	94.00 J	98.00	65.00 J	120.00	
Benzo[g,h,i]perylene	670	720		39.00 U			37.00 U	44.00 U	25.00	22.00 J	38.00 U	49.00 U	16.00 J	12.00 J	50.00 U	50.00	13.00 J	50.00	
Chrysene	1400	2800		510.00			100.00	280.00	190.00	200.00	140.00	190.00	160.00	130.00	280.00	270.00	170.00	70.00	
Dibenzo[a,h]anthracene	230	230		32.00 U			30.00 U	36.00 U	8.80	8.20 J	31.00 U	40.00 U	5.00 J	4.10 J	40.00 U	15.00 J	4.30 J	15.00	
Fluoranthene	1700	2500		660.00			450.00	510.00	150.00	210.00	520.00	300.00	240.00	120.00	400.00	460.00	210.00	50.00	
Indeno[1,2,3-c,d]pyrene	600	690		59.00 J			32.00 U	66.00 J	35.00	30.00 J	34.00 J	43.00 U	21.00 J	16.00 J	62.00 J	62.00	18.00	59.00 J	
Pyrene	2600	3300		400.00			260.00	320.00	350.00	600.00	420.00	200.00	310.00	200.00	230.00	240.00	200.00	79.00	
Total benzofluoranthenes	3200	3600		287.00 J			104.00 U,J	328.00 J	321.00	580.00 J	142.00 U	205.00	344.00 J	249.00 J	276.00 J	268.00	246.00 J	309.00	
Dioxins/Furans	ng/kg TEQ dw		N/A																
Dioxins/Furans[i,k]	5	5																U,J, 1.85 B	

Analyte	SED-8	SED-8		SED-9		SED-9		SED-10		SED-10		SED-11	SED-11			SED-12	SED-12	SED-13	
	SED-08G	SED-08C		SED-09G		SED-09C		SED-10G		SED-10C		SED-11G	SED-11G	SED-11C		SED-12G	SED-12C	SED-13G	
	0 - 4 in[j]	0 - 1 ft	1 - 3 ft	0 - 4 in[j]	0 - 6 in	0 - 1 ft	1 - 3 ft	0 - 4 in[j]	0 - 7 in	0 - 1 ft	1 - 3 ft	0 - 4 in[j]	0 - 10 cm	0 - 1 ft	1 - 3 ft	0 - 4 in[j]	0 - 1 ft	0 - 4 in[j]	0 - 8 in
Conventionals																			
Ammonia (mg/Kg)	5.60			7.30				4.10				5.80	13.50			3.80		4.40	
Total sulfides (mg/Kg)	5.00			730.00				709.00				2.00	204.00 J			29.00		219.00	
Total Solids (%)	6.20	68.94	72.56	11.30		67.96	76.50	3.40		77.06	82.83	6.50	72.27	67.04	73.76	3.40	59.79	4.20	
Total Organic Carbon (% dry)	2.54	2.89	0.53	4.29		1.40	1.75	1.26		0.71	2.07	2.69	1.26	1.10	0.69	1.03	1.26	1.98	
Metals																			
Arsenic	8.12			12.80		3.84	2.57	9.02		4.60	4.27	9.42	4.16	3.70	2.93	5.82		16.40	
Cadmium	1.51			2.01		0.85	0.56	0.61		0.44	0.53	1.29	0.86	0.94	0.69	0.93		0.37	
Chromium	34.40			50.90		10.50	8.16	22.40		8.92	7.58	25.50	10.50	12.10	8.46	19.00		32.60	
Copper	202.00			578.00		47.40	5.27	1370.00		152.00	24.80	168.00	70.90	65.00	17.50	49.60		1380.00	
Lead	60.00 J+			106.00 J+		10.70	0.84	105.00 J+		26.50	15.80	109.00 J+	21.60 J	25.70	52.70	19.00 J+		193.00 J+	
Mercury	0.28			0.35		0.10	0.03 U	1.45		1.10	0.15	0.44	0.25 J	0.36	0.09	0.09		0.85	
Nickel						7.59	6.22			8.22	6.47		7.75	7.94	6.39				
Silver	0.13			0.15		1.00 U	1.00 U	0.10		1.00	1.00 U	0.09	1.00 U	1.00 U	1.00 U	0.06		0.10	
Zinc	141.00			206.00		76.70	13.60	589.00		105.00	27.30	116.00	102.00	85.20	31.80	56.90		928.00	
Organometallics																			
Monobutyltin		10.40	4.07 U			7.19	4.06 U			9.46	4.65			7.32					
Dibutyltin		36.40	3.28 J			37.10	5.75 U			56.10	8.36			23.30 J					
Tributyltin[e]	210.00	58.30	19.70	300.00		52.60	3.84 U	4000.00		63.80	12.80	53.00		26.70 J		9.30		4000.00	
Tetrabutyltin		4.97 U	4.98 U			5.00 U	4.98 U			4.92 U	4.99 U			4.98 U					
Organics & Chlorinated Organics																			
2,4-Dimethylphenol	65.00 U	29.00 UJ		84.00 U		29.00 UJ	29.00 UJ	63.00 U		580.00 UJ	29.00 UJ	63.00 U	29.00 UJ	29.00 UJ	29.00 UJ	63.00 U		63.00 U	
2-Methylphenol	42.00 U	63.00 UJ		55.00 U		63.00 UJ	63.00 UJ	41.00 U		1300.00 UJ	63.00 UJ	41.00 U	63.00 UJ	63.00 UJ	63.00 UJ	41.00 U		41.00 U	
4-Methylphenol[g]	46.00 U	200.00 U		190.00		200.00 U	200.00 U	45.00 U		4000.00 U	200.00 U	45.00 U	200.00 U	200.00 U	200.00 U	45.00 U		93.00	
Benzoic acid	980.00 R	500.00 U		1300.00 R		500.00 UJ	500.00 UJ	960.00 R		10000.00 UJ	500.00 UJ	960.00 R	500.00 U	500.00 UJ	500.00 UJ	960.00 R		960.00 R	
Benzyl alcohol	50.00 U	57.00 UJ		68.00 J		57.00 UJ	57.00 UJ	49.00 U		1100.00 UJ	57.00 UJ	49.00 U	57.00 UJ	57.00 UJ	57.00 UJ	49.00 U		49.00 U	
Pentachlorophenol	280.00 J	50.00 U		70.00 U		50.00 U	50.00 U	240.00 J		1000.00 U	50.00 U	53.00 U	50.00 U	50.00 U	50.00 U	53.00 U		230.00 J	
Phenol	32.00 U	100.00 U		46.00 J		100.00 U	100.00 U	31.00 U		2000.00 U	100.00 U	31.00 U	100.00 U	100.00 U	100.00 U	31.00 U		68.00 J	
Organics & Chlorinated Organics																			
1,2,4-Trichlorobenzene	27.00 U	4.00 UJ		35.00 U		5.00 UJ	4.00 UJ	26.00 U		200.00 UJ	4.00 UJ	26.00 U	4.00 UJ	4.00 UJ	5.00 UJ	26.00 U		26.00 U	
1,2-Dichlorobenzene	25.00 U	10.00 U		32.00 U		10.00 U	10.00 U	24.00 U		200.00 U	10.00 U	24.00 U	10.00 U	10.00 U	10.00 U	24.00 U		24.00 U	
1,4-Dichlorobenzene	26.00 U	10.00 U		33.00 U		10.00 U	10.00 U	25.00 U		200.00 U	10.00 U	25.00 U	10.00 U	10.00 U	10.00 U	25.00 U		25.00 U	
Dibenzofuran	35.00 U	13.00		45.00 U		11.00	10.00 U	97.00		200.00 U	10.00 U	34.00 U	10.00 U	10.00 U	10.00 U	34.00 U		34.00 U	
Hexachlorobenzene	34.00 U	2.10 UJ		44.00 U		4.90 J	2.10 UJ	33.00 U		200.00 UJ	2.10 UJ	33.00 U	10.00 UJ	2.10 UJ	2.10 UJ	33.00 U		33.00 U	
Hexachlorobutadiene	31.00 U	10.00 U		40.00 U		10.00 U	10.00 U	30.00 U		200.00 U	10.00 U	30.00 U	10.00 U	10.00 U	10.00 U	30.00 U		30.00 U	
N-nitrosodiphenylamine	33.00 U	10.00 U		43.00 U		10.00 U	10.00 U	32.00 U		200.00 U	10.00 U	32.00 U	10.00 U	10.00 U	10.00 U	32.00 U		32.00 U	
Phthalates[d]																			
Bis(2-Ethylhexyl)phthalate	230.00 J	160.00 U		370.00 J		160.00 U	160.00 U	340.00 J		3200.00 U	160.00 U	150.00 J	160.00 U	160.00 U	160.00 U	89.00 U		540.00 J	
Butylbenzyl phthalate	49.00 J	20.00 UJ		70.00 J		20.00 UJ	20.00 UJ	37.00 U		1300.00 UJ	20.00 UJ	37.00 U	20.00 UJ	20.00 UJ	23.00 J	37.00 U		71.00	
Diethyl phthalate	38.00 U	100.00 UJ		49.00 U		100.00 UJ	100.00 UJ	37.00 U		2000.00 UJ	100.00 UJ	37.00 U	100.00 UJ	100.00 UJ	100.00 UJ	37.00 U		37.00 U	
Dimethyl phthalate	130.00	71.00 U		190.00		71.00 UJ	71.00 UJ	300.00		1400.00 U	71.00 UJ	100.00	71.00 UJ	71.00 U	71.00 UJ	40.00 U		840.00	
Di-n-butyl phthalate	79.00 J	100.00 UJ		64.00 U		100.00 U	100.00 U	94.00 J		2000.00 U	100.00 U	160.00 J	100.00 UJ	100.00 U	100.00 U	48.00 U		210.00	
Di-n-octyl phthalate	33.00 U	100.00 U		170.00		100.00 U	100.00 U	48.00 J		2000.00 U	100.00 U	32.00 U	100.00 U	100.00 U	100.00 U	32.00 U		32.00 U	
Pesticides[e]																			
Aldrin	0.98 U	1.70 U		1.40 U		1.70 U	1.70 U	0.70 U		1.70 U	1.70 U	0.93 U	1.70 U	1.70 U	1.70 U	0.79 U		0.66 U	
Total Chlordane	4.80 UiJ	2.20 U		5.00 UiJ		2.20 U	2.20 U	7.50 JP		2.20 U	2.20 U	4.60 UiJ	2.20 U	3.00 U	2.20 U	1.10 J		12.00 J	
beta-Hexachlorocyclohexane (beta-BHC)		0.50 U				0.50 U	0.50 U			0.50 U	0.50 U		0.50 U	0.50 U	0.50 U				
Dieldrin	0.37 U	1.00 U		5.30		1.00 U	1.00 U	4.80 Ui		1.00 U	1.00 U	1.60 Ui	12.00 U	1.00 U	1.00 U	1.60		4.70 Ui	
Endrin ketone		1.70 U				1.70 U	1.00 U			1.20	1.00 U		1.00 U	1.50 U	1.00 U				
Heptachlor	0.65 U	0.50 U		2.20 Ui		0.50 U	0.50 U	0.52 Ui		7.00	0.50 E	0.61 U	0.50 UJ	0.50 E	0.50 E	0.53 U		1.20 Ui	
4,4'-DDD	1.10 Ui	1.00 U		4.10 P		1.00 U	1.00 U	19.00		1.00 U	1.00 U	5.70 P	2.50 U	5.00 U	1.00 U	0.81 U		36.00	
4,4'-DDE	0.67 U	1.00 U		1.00 JP		1.00 U	1.00 U	2.50 Ui		1.00 U	1.00 U	2.50	1.00 U	1.00 U	1.00 U	0.85 J		4.00 P	
4,4'-DDT	4.90 Ui	1.50 UJ		4.10 P		1.00 UJ	1.00 UJ	8.20 Ui		6.00 UJ	1.00 UJ	5.30 Ui	3.50 UJ	1.50 UJ	1.00 UJ	2.40 Ui		30.00 Ui	
PCBs																			
Total Aroclor[h]	159.25 U	53.65 U		265.00 U		24.95 U	4.70 U	657.00 U,J		693.30 U	33.30 U	243.20 U,J	70.25 U, J	104.65 U	23.95 U	45.05 U,J	8.70 U	1214.00 U,J	
Polycyclic Aromatic Hydrocarbons																			
Total PAHs	14689.00	5307.00		21887.00		3188.90	35.60	20887.00		3101.00	647.60	3721.00	2961.00	2442.50	688.00	1566.00		14484.00	
Total LPAH	1139.00	477.00		1317.00		1214.90	14.20	3216.00		477.00	61.80	418.00	198.00	212.50	78.10	272.00		1304.00	
2-Methylnaphthalene	29.00 U	12.00		37.00 U		16.00	2.00 U	28.00 U		40.00 U	2.80	28.00 U	3.80	7.40	3.60	28.00 U		28.00 U	
Acenaphthene	33.00 U	19.00		43.00 U		15.00	2.00 U	220.00		40.00 U	2.00 U	32.00 U	6.90 U	13.00	6.70	32.00 U		67.00	
Acenaphthylene	81.00 J	12.00		93.00 J		6.90	2.00 U	44.00 J		40.00 U	3.60	27.00 J	5.50	5.40	3.30	26.00 U		39.00 J	
Anthracene	260.00	50.00		380.00		35.00	2.00 U	420.00		67.00	8.10	77.00 J	33.00	45.00	13.00	32.00 U		180.00	
Fluorene	95.00 J	26.00		72.00 J		22.00	2.10	200.00		40.00 U	3.80	33.00 U	9.10	13.00	6.70	33.00 U		69.00	
Naphthalene	30.00 U	10.00		39.00 U		36.00	2.00 U	32.00 J		40.00 U	4.30	29.00 U	3.50	6.10	4.40	29.00 U		29.00 U	
Phenanthrene	640.00	360.00		690.00		1100.00	4.10	2300.00		250.00	40.00	220.00	140.00	130.00	44.00	120.00		920.00	
Total HPAH	13550.00	4830.00		20570.00		1974.00	21.40	17671.00		2624.00	585.80	3303.00	2763.00	2230.00	609.90	1294.00		13180.00	
Benzo[a]anthracene	990.00	250.00		1900.00		140.00	2.00 U	1700.00		220.00	50.00	250.00	170.00	180.00	48.00	86.00		1000.00	
Benzo[a]pyrene	800.00	280.00		1200.00		140.00	2.00 U	1700.00		260.00	67.00	240.00	180.00 J	220.00	58.00	100.00		200.00	
Benzo[g,h,i]perylene	370.00	48.00		520.00		34.00	2.00 U	1400.00		55.00	18.00	120.00	40.00 J	60.00	15.00	37.00 U		1100.00	
Chrysene	2400.00	580.00		4100.00		300.00	2.00 U	2300.00		300.00	59.00	500.00	320.00	270.00	58.00	210.00		1700.00	
Dibenzo[a,h]anthracene	100.00	15.00		130.00		13.00	2.00 U	280.00		40.00 U	4.80	33.00 J	12.00 J	18.00	3.90	30.00 U		210.00	
Fluoranthene	3700.00	1400.00		5500.00		410.00	2.50	5500.00		540.00	110.00	850.00	550.00	360.00	120.00	350.00		3400.00	
Indeno[1,2,3-c,d]pyrene	420.00	67.00		580.00		47.00	2.00 U	1200.00		69.00	21.00	150.00	51.00 J	72.00	18.00	58.00 J		950.00	
Pyrene	2300.00	1300.00		3200.00		480.00	2.90	31.00 U		570.00	140.00	560.00	520.00	440.00	160.00	220.00		2100.00	
Total benzofluoranthenes	2470.00	890.00		3440.00		410.00	4.00 U	3560.00		570.00	116.00	600.00	920.00 J	610.00	129.00	203.00		2520.00	
Dioxins/Furans																			
Dioxins/Furans[i,k]		23.29 J,B	U,J, 2.19 B		U,J, 17.74 B	12.07 J,B	U,U 0.24 J,J,B		J,B, 92.83 E	7.94 J,B	U,J, 1.53 B			7.27 J,B	U,J, 1.52 B		U,J, 0.38 B		U,J, 72.26 B

Analyte	SED-14	SED-14			SED-15	SED-15	SED-16	SED-18	SED-19	SED-20	SED-21	SED-22	SED-23	SED-24	SED-25		SED-26			SED-27	SED-27
	SED-14G	SED-14G	SED-14C		SED-15G	SED-15G	SED-16G	SED-18G	SED-19G	SED-20G	SED-21G	SED-22G	SED-23G	SED-24G	SED-25C		SED-26C			SED-27G	SED-27C
	0 - 4 in[j]	0 - 10 cm	0 - 1 ft	1 - 3 ft	0 - 4 in[j]	0 - 10 cm	0 - 4 in[j]	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 10 cm	0 - 1 ft	1 - 3 ft	0 - 1 ft	1 - 3 ft	3 - 5 ft	0 - 10 cm	0 - 1 ft
Conventionals																					
Ammonia (mg/Kg)	16.00	12.70			5.50	4.65	17.20													5.63	
Total sulfides (mg/Kg)	698.00 J-	170.00 J			822.00 J-	146.00 J	822.00 J-													86.40	
Total Solids (%)	5.10	54.58	68.13	67.96	5.40	61.15	9.20	55.22	49.60	63.62	44.90	49.09	40.27	43.07	75.95	77.79	60.95	74.64	78.85	64.47	71.93
Total Organic Carbon (% dry)	1.87 J	1.20	0.74	0.66	2.08 J	1.12	3.30 J-	0.93	0.61	0.63	1.33	1.55	1.79	1.61	0.49	0.18	1.47	0.43	0.20 J		0.52 J
Metals																					
Arsenic	4.06	4.04	2.65		4.23		6.99								2.65	2.03	6.99	1.94			
Cadmium	1.89	1.88	1.86		1.67		1.89								1.34	1.34	1.38	1.38			
Chromium	24.20	16.50	11.80		23.30		32.70								8.80	6.57	15.00	7.29			
Copper	52.50	53.20	31.40 J		59.40		90.90								26.60	8.92	259.00	18.30			
Lead	19.50	16.40 J	14.20 J		22.40		31.70								8.70	2.90	27.10	3.58			
Mercury	0.07	0.11 J	0.09 J		0.10		0.09								0.07	0.03 U	1.20	0.04			0.12 J
Nickel		12.30	9.18												7.01	5.62	10.50	5.47			
Silver	0.12 J	1.00 U	1.00 U		0.12 J		0.19 J								1.00 U	1.00 U	1.00 U	1.00 U			
Zinc	119.00	64.20	46.00		72.00		104.00								30.80	16.60	74.20	19.00			
Organometallics																					
Monobutyltin		7.58	5.30	4.07 U		6.98									2.13 J	4.07 U	40.60	4.81	1.97 J		4.35
Dibutyltin		36.70	22.40 J	2.87 J		36.90									8.47	5.77 U	216.00	20.30	5.77 U		6.84 J
Tributyltin[e]	91.30	27.10	32.70 J	4.41	48.80	101.00	36.90								12.60	0.95 J	214.00	98.70	3.85 U		9.84 J
Tetrabutyltin		5.00 U	5.00 U	4.99 U		4.98 U									5.00 U	4.99 U	4.99 U	4.99 U	4.99 U		4.99 U
Organics & Chlorinated Organics																					
2,4-Dimethylphenol	26.00 U	29.00 UJ	29.00 UJ	29.00 UJ	26.00 U		26.00 U								29.00 UJ	29.00 UJ	29.00 UJ	29.00 UJ			
2-Methylphenol	8.00 U	63.00 UJ	63.00 UJ	63.00 UJ	8.00 U		8.00 U								63.00 UJ	63.00 UJ	63.00 UJ	63.00 UJ			
4-Methylphenol[g]	22.00	200.00 U	200.00 U	200.00 U	15.00 U		34.00 J								200.00 U	200.00 U	200.00 U	200.00 U			
Benzoic acid	317.00 J	500.00 UJ	500.00 UJ	500.00 UJ	173.00 J		162.00 J								500.00 UJ	500.00 UJ	500.00 UJ	500.00 UJ			
Benzyl alcohol	15.00 U	57.00 UJ	57.00 UJ	57.00 UJ	15.00 U		15.00 U								57.00 UJ	57.00 UJ	57.00 UJ	57.00 UJ			
Pentachlorophenol	31.00 U	50.00 U	50.00 U	50.00 U	31.00 U		31.00 U								50.00 U	50.00 U	50.00 U	50.00 U			
Phenol	66.00	100.00 U	100.00 U	100.00 U	0.05		39.00 J								100.00 U	100.00 U	100.00 U	100.00 U			
Organics & Chlorinated Organics																					
1,2,4-Trichlorobenzene	6.00 U	4.00 UJ	4.00 UJ	4.00 UJ	6.00 U		6.00 U								4.00 UJ	4.00 UJ	4.00 UJ	4.00 UJ			
1,2-Dichlorobenzene	5.00 U	10.00 U	10.00 U	10.00 U	5.00 U		5.00 U								10.00 U	10.00 U	10.00 U	10.00 U			
1,4-Dichlorobenzene	4.00 U	10.00 U	10.00 U	10.00 U	4.00 U		4.00 U								10.00 U	10.00 U	10.00 U	10.00 U			
Dibenzofuran	16.00 J	10.00 U	10.00 U	10.00 U	10.00 J		32.00 J								10.00 U	10.00 U	10.00 U	10.00 U			
Hexachlorobenzene	5.00 U	10.00 UJ	2.10 UJ	2.10 UJ	5.00 U		5.00 U								2.10 UJ	2.10 UJ	2.10 UJ	2.10 UJ			
Hexachlorobutadiene	5.00 U	10.00 U	10.00 U	10.00 U	5.00 U		5.00 U								10.00 U	10.00 U	10.00 U	10.00 U			
N-nitrosodiphenylamine	9.00 U	10.00 U	10.00 U	10.00 U	9.00 U		9.00 U								10.00 U	10.00 U	10.00 U	10.00 U			
Phthalates[d]																					
Bis(2-Ethylhexyl)phthalate	47.00 J	260.00	160.00 U	160.00 U	64.00		82.00 J								160.00 U	160.00 U	160.00 U	160.00 U			
Butylbenzyl phthalate	8.00 U	63.00 UJ	63.00 UJ	20.00 UJ	8.00 U		8.00 U								20.00 UJ	20.00 UJ	20.00 UJ	20.00 UJ			
Diethyl phthalate	17.00 U	100.00 UJ	100.00 UJ	100.00 UJ	18.00 U		17.00 U								100.00 UJ	100.00 UJ	100.00 UJ	100.00 UJ			
Dimethyl phthalate	39.00	71.00 UJ	71.00 UJ	71.00 UJ	32.00		49.00								71.00 U	71.00 U	71.00	71.00 U			
Di-n-butyl phthalate	9.00 J	100.00 U	100.00 U	100.00 U	5.00 U		21.00 J								100.00 U	100.00 U	100.00 U	100.00 U			
Di-n-octyl phthalate	9.00 U	100.00 U	100.00 U	100.00 U	9.00 U		9.00 U								100.00 U	100.00 U	100.00 UJ	100.00 U			
Pesticides[e]																					
Aldrin		1.70 U	1.70 U	1.70 U				1.70 U	1.70 U	1.70 U	17.00 U	1.70 U	3.40 U	3.40 U	1.70 U		1.70 U				
Total Chlordane		2.20 U	2.20 U	2.20 U				2.20 U	2.20 U	2.20 U	22.00 U	2.20 U	4.40 U	4.40 U	2.20 U		2.20 U				
beta-Hexachlorocyclohexane (beta-BHC)		0.50 U	0.50 UJ	0.50 UJ				0.50 U	0.50 U	0.50 U	5.00 U	0.50 U	1.00 U	1.00 U	0.50 U		0.50 U				
Dieldrin		1.00 U	1.00 E	1.00 E				1.00 U	1.00 U	1.00 U	10.00 U	1.00 U	2.00 U	2.00 U	1.00 U		1.00 U				
Endrin ketone		1.00 U	1.00 E	1.00 E				1.00 U	1.00 U	1.00 U	10.00 U	1.00 U	2.00 U	2.00 U	1.00 U		3.40 U				
Heptachlor		0.50 E	0.50 UJ	0.50 UJ				0.50 E	0.50 U	0.50 E	1.00 U	0.50 E	1.00 E	5.00 U	0.50 U		0.50 UJ				
4,4'-DDD		1.00 U	1.00 U	1.20 U				1.00 U	1.00 U	1.00 U	10.00 U	1.00 U	2.00 U	2.00 U	1.00 U		20.00 U				
4,4'-DDE		1.00 U	1.00 U	1.00 U				1.00 U	1.00 U	1.00 U	10.00 U	1.00 U	2.00 U	2.00 U	1.00 U		1.00 U				
4,4'-DDT		1.20 E	1.00 UJ	1.00 UJ				1.00 E	1.00 U	1.00 E	2.00 E	1.00 E	2.00 E	2.00 E	1.00 UJ		20.00 UJ				
PCBs																					
Total Aroclor[h]	49.40 U,J	23.30 U	25.90 U	8.40 U	40.50 U,J		54.60 U,J						26.70 U	17.00 U	9.85 U	8.40 U	514.00 U	22.35 U			25.33 U
Polycyclic Aromatic Hydrocarbons																					
Total PAHs	3026.00	1897.80	1105.50	344.20	2226.00		11120.00								2147.50	75.00	3069.30	316.00			
Total LPAH	382.00	153.80	123.50	32.50	234.00		1090.00								313.60	14.10	165.30	21.90			
2-Methylnaphthalene	30.00	6.90	4.50	4.50	24.00		37.00 J								12.00	2.00 U	9.90	2.10			
Acenaphthene	12.00 J	5.40	5.10 J	2.70	10.00 J		31.00 J								4.10	2.00 U	8.30	2.00 U			
Acenaphthylene	40.00	5.10	2.90	2.00 U	26.00		99.00								7.50	2.00 U	11.00	2.00 U			
Anthracene	107.00	33.00	18.00	4.50	53.00		286.00								51.00	2.00 U	28.00	2.90			
Fluorene	26.00	13.00	7.60 J	3.50	5.00 U		63.00								20.00	2.00 U	12.00	2.00 U			
Naphthalene	37.00	4.30	2.90	2.80	25.00		31.00 J								11.00	2.00 U	15.00	2.00 U			
Phenanthrene	160.00	93.00	87.00 J	17.00	115.00		580.00								220.00	4.10	91.00	11.00			
Total HPAH	2644.00	1744.00	982.00	311.70	1992.00		10030.00								1833.90	60.90	2904.00	294.10			
Benzo[a]anthracene	251.00	160.00	65.00	15.00	152.00		883.00								150.00	5.10	160.00	14.00			
Benzo[a]pyrene	168.00	160.00	73.00	15.00	117.00		547.00								200.00	4.70	260.00 J	31.00			
Benzo[g,h,i]perylene	101.00 J	46.00	21.00	4.00	72.00 J		268.00 J								40.00	2.00	51.00 J	8.30			
Chrysene	621.00	280.00	130.00	19.00	360.00		1880.00								190.00	6.80	310.00	30.00			
Dibenzo[a,h]anthracene	41.00	14.00	6.00	14.00 U	23.00		106.00 J								8.90	2.00 U	16.00 J	2.80			
Fluoranthene	383.00	260.00	220.00	38.00	415.00		2200.00								360.00	11.00	470.00	49.00			
Indeno[1,2,3-c,d]pyrene	105.00	54.00	24.00	4.70	76.00		281.00 J								46.00	2.00 U	67.00 J	11.00			
Pyrene	366.00	290.00	220.00	52.00	357.00		1920.00								450.00	13.00	810.00	71.00			
Total benzofluoranthenes	608.00	480.00	223.00	150.00	420.00		1945.00								389.00	14.30	760.00 J	77.00			
Dioxins/Furans																					
Dioxins/Furans[i,k]			3.47 J,B												2.86 J,B		25.24 J,B	U,J, 1.34 B			U,J, 4.11 B

(a) All above values are dry weight normalized.
(b) Marine values are dry weight normalized for metals and polar organics and normalized to total organic carbon for nonpolar organics (see seaprate table).
(c) When total organic carbon is outside the range of 0.5 – 3.5%, Ecology may compare to both the TOC normalized criteria and the dry-weight AET values. When total organic carbon values are > 5%, analysis of total volatile solids is recommended.
(d) Dry weight AETs for phthalates are derived from Barrick et.al, 1988. The SCO is established as the lowest AET and the CSL is the 2nd lowest AET, consistent with the dry weight AETs for the other SMS chemicals. Bioassays may be used in place of these AETs if necessary.
(e) DMMP criteria are listed for chemicals that do not have SMS criteria. The DMMP bioaccumulation trigger (BT) criteria is listed for TBT. DMMP SL criteria are listed for pesticides.
(f) "greater than" value indicates that the upper bound toxicity level is unknown, but is known to be above the concentration shown.
(g) 3-methylphenol and 4-methylphenol may not be able to be separated. In this case 4-methylphenol may be reported as the sum of the 3- and 4-methylphenol isomers. See Appendix N for more detail.
(h) Upon approval by Ecology on a case-by-case basis, Total PCB congeners may be used as a direct substitute for Total PCB Aroclors to verify compliance with the CSL benthic criteria (i.e., the sum of Total congeners value can substitute for the sum of Total Aroclors), but not the SCO benthic criteria. If the benthic SCO is exceeded, bioassays should be analyzed.
(i) Chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans congeners, see Dioxins/Furans Tab.
(j) Grab samples collected by Whatcom Environmental on 2/12/18.

Internal user notes:
Summation w/non-detect values included as one-half MDL or one-half EDL for D/F
Outside Ecology's TOC range (see table note c).
Analytes exceeding DMMP criteria

Port of Friday Harbor Sediments Dioxin & Furan Summation		SED-7			SED-8						SED-9								
		SED-07C:0-1			SED-08C:0-1			SED-08C:1-3			SED-9G: 0-6			SED-09C:0-1			SED-09C:1-3		
		0 - 1 ft			0 - 1 ft			1 - 3 ft			0 - 6 in			0 - 1 ft			1 - 3 ft		
Analyte	TEF	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q
Dioxins (ng/Kg)																			
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	1	0.57	0.57	J	0.32	0.32	J	0.06	0.06	U	0.44	0.44	U	0.24	0.24	J	0.06	0.06	U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD)	1	0.14	0.14	U	3.29	3.29		0.32	0.32	J	7.67	0.77	J	1.30	1.30		0.08	0.08	U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD)	0.1	0.13	0.01	U	5.04	0.50		0.29	0.03	J	24.70	2.47	J	1.73	0.17		0.06	0.01	U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD)	0.1	1.16	0.12		21.50	2.15		1.38	0.14		74.30	7.43	J	13.40	1.34		0.06	0.01	U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD)	0.1	0.79	0.08	J	8.83	0.88		0.88	0.09	J	23.20	0.23	J	4.88	0.49		0.07	0.01	U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD)	0.01	31.50	0.32	B	1080.00	10.80	B	57.10	0.57	B	4760.00	1.43		556.00	5.56	B	2.31	0.02	UJ
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (1,2,3,4,6,7,8,9-OCDD)	0.0003	216.00	0.06	B	7300.00	2.19	J	415.00	0.12	B	24800.00	0.00	B	3810.00	1.14	B	15.00	0.00	B
Furans (ng/Kg)																			
2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF)	0.1	0.66	0.07	J	2.85	0.29	J	0.91	0.09	J	3.48	0.35	J	0.93	0.09	J	0.09	0.01	U
1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF)	0.03	0.15	0.00	U	3.06	0.09	J	0.61	0.02	J	4.71	0.14	J	2.10	0.06		0.10	0.00	U
2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8- PeCDF)	0.3	0.15	0.04	U	2.83	0.85		0.94	0.28	J	3.72	1.12	J	1.58	0.47	J	0.10	0.03	U
1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF)	0.1	0.11	0.01	U	3.98	0.40	J	0.95	0.09	J	8.28	0.83	J	2.70	0.27		0.04	0.00	U
1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8- HxCDF)	0.1	0.11	0.01	U	2.70	0.27	J	0.87	0.09	J	4.14	0.41	J	1.59	0.16		0.05	0.00	U
1,2,3,7,8,9-Hexac1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9- HxCDF)	0.1	0.15	0.02	U	1.61	0.16	J	0.48	0.05	J	4.06	0.41	J,B	1.78	0.18		0.06	0.01	U
2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF)	0.1	1.01	0.10		4.17	0.42		1.28	0.13		4.66	0.47	J	1.94	0.19		0.05	0.00	U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF)	0.01	29.90	0.30	B	60.40	0.60		10.30	0.10	B	114.00	1.14	J	36.20	0.36		0.18	0.00	J
1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF)	0.01	0.26	0.00	U	3.22	0.03	J	0.66	0.01	J	5.64	0.06	J	1.73	0.02		0.10	0.00	U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (1,2,3,4,6,7,8,9-OCDF)	0.0003	19.30	0.01	B	147.00	0.04		15.70	0.00	B	182.00	0.05	J	61.10	0.02		0.15	0.00	J
Total TEQ			**1.85**	**U,J,B**		**23.29**	**J,B**		**2.19**	**U,J,B**		**17.74**	**U,J,B**		**12.07**	**J,B**		**0.24**	**U,UJ,J,B**

Analyte	SED-10									SED-11						SED-12		
	SED-10G: 0-7			SED-10C:0-1			SED-10C:1-3			SED-11C:0-1			SED-11C:1-3			SED-12C:0-1		
	0 - 7 in			0 - 1 ft			1 - 3 ft			0 - 1 ft			1 - 3 ft			0 - 1 ft		
Analyte	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q
Dioxins (ng/Kg)																		
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	1.58	1.58	J	0.23	0.23	J	0.04	0.04	U	0.27	0.27	J	0.06	0.06	U	0.05	0.05	U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD)	8.94	8.94	J	1.44	1.44	J	0.10	0.10	U	1.91	1.91		0.35	0.35	J	0.09	0.09	U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD)	12.30	1.23	J	1.39	0.14		0.26	0.03	J	1.59	0.16		0.31	0.03	J	0.08	0.01	U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD)	94.90	9.49	J	7.10	0.71		1.83	0.18	J	6.87	0.69		1.42	0.14	J	0.33	0.03	J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD)	30.00	3.00	J	3.27	0.33	J	0.77	0.08	J	4.09	0.41		0.76	0.08	J	0.11	0.01	J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD)	4320.00	43.20		294.00	2.94	B	60.30	0.60	B	206.00	2.06	B	44.40	0.44	B	8.94	0.09	B
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (1,2,3,4,6,7,8,9-OCDD)	42400.00	12.72	B,E	2470.00	0.74	B	447.00	0.13	B	1470.00	0.44	B	318.00	0.10	B	59.30	0.02	B
Furans (ng/Kg)																		
2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF)	4.24	0.42	J	0.66	0.07	J	0.20	0.02	J	1.42	0.14		0.24	0.02	J	0.09	0.01	U
1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF)	2.91	0.09	J	0.48	0.01	J	0.11	0.00	U	1.08	0.03		0.09	0.00	U	0.10	0.00	U
2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8- PeCDF)	3.07	0.92	J	0.60	0.18	J	0.10	0.03	U	0.84	0.25	J	0.09	0.03	U	0.09	0.03	U
1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF)	15.20	1.52	J	1.65	0.17		0.46	0.05	J	1.73	0.17		0.48	0.05	J	0.05	0.00	U
1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8- HxCDF)	7.51	0.75	J	1.07	0.11		0.31	0.03	J	1.36	0.14		0.32	0.03	J	0.05	0.01	U
1,2,3,7,8,9-Hexac1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9- HxCDF)	5.00	0.50	J,B	0.35	0.04	J	0.07	0.01	U	0.46	0.05	J	0.05	0.01	U	0.07	0.01	U
2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF)	8.23	0.82	J	1.59	0.16	J	0.56	0.06	J	1.84	0.18		0.47	0.05	J	0.05	0.01	U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF)	610.00	6.10	J	56.80	0.57		14.90	0.15		32.60	0.33		11.50	0.12		1.28	0.01	
1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF)	35.20	0.35	J	2.98	0.03		0.87	0.01	J	1.96	0.02		1.00	0.01	J	0.08	0.00	U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (1,2,3,4,6,7,8,9-OCDF)	3900.00	1.17	J	297.00	0.09		62.30	0.02		95.30	0.03		40.60	0.01		2.92	0.00	
Total TEQ		**92.81**	**J,B,E**		**7.94**	**J,B**		**1.53**	**U,J,B**		**7.27**	**J,B**		**1.52**	**U,J,B**		**0.38**	**U,J,B**

Analyte	SED-13			SED-14			SED-25			SED-26						SED-27		
	SED-13G:0-8			SED-14C:0-1			SED-25C:0-1			SED-26C:0-1			SED-26C:1-3			SED-27C:0-1		
	0 - 8 cm			0 - 1 ft			0 - 1 ft			0 - 1 ft			1 - 3 ft			0 -1 ft		
Analyte	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q	Results	TEQ	Q
Dioxins (ng/Kg)																		
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	0.36	0.36	U	0.20	0.20	J	0.21	0.21	J	0.51	0.51	J	0.06	0.06	U	0.08	0.08	U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD)	8.81	8.81	J	0.72	0.72	J	0.72	0.72	J	4.31	4.31		0.17	0.17	J	0.69	0.69	J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD)	10.90	1.09	J	0.62	0.06	J	0.62	0.06	J	4.08	0.41		0.20	0.02	J	1.03	0.10	
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD)	67.50	6.75	J	3.57	0.36		2.73	0.27		26.10	2.61		1.31	0.13		4.34	0.43	
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD)	23.50	2.35	J	1.95	0.20		1.44	0.14		11.00	1.10		0.69	0.07	J	2.92	0.29	
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD)	3130.00	31.30		95.70	0.96	B	89.00	0.89	B	976.00	9.76	B	44.00	0.44	B	130.00	1.30	B
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (1,2,3,4,6,7,8,9-OCDD)	35800.00	10.74	B	761.00	0.23	B	611.00	0.18	B	8660.00	2.60	J	368.00	0.11	B	925.00	0.28	B
Furans (ng/Kg)																		
2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF)	6.17	0.62	J	1.02	0.10	J	0.37	0.04	J	3.10	0.31	J	0.08	0.01	U	0.70	0.07	J
1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF)	2.00	0.06	J	0.55	0.02	J	0.33	0.01	J	2.65	0.08		0.10	0.00	U	0.44	0.01	J
2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8- PeCDF)	3.09	0.93	J	0.49	0.15	J	0.15	0.05	J	2.33	0.70		0.11	0.03	U	0.54	0.16	J
1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF)	16.50	1.65	J	0.98	0.10	J	0.59	0.06	J	4.68	0.47		0.48	0.05	J	1.34	0.13	J
1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8- HxCDF)	8.01	0.80	J	0.90	0.09	J	0.38	0.04	J	3.45	0.35		0.33	0.03	J	1.13	0.11	
1,2,3,7,8,9-Hexac1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9- HxCDF)	5.17	0.52	J,B	0.27	0.03	J	0.19	0.02	J	1.57	0.16	J	0.15	0.01	U	0.16	0.02	U
2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF)	6.34	0.63	J	0.71	0.07	J	0.62	0.06	J	5.03	0.50		0.65	0.07	J	1.43	0.14	
1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF)	465.00	4.65	J	17.50	0.18	B	10.00	0.10		116.00	1.16		12.20	0.12	B	24.90	0.25	B
1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF)	40.20	0.40	J	0.92	0.01	J	0.58	0.01	J	5.85	0.06		0.67	0.01	J	1.59	0.02	
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (1,2,3,4,6,7,8,9-OCDF)	2030.00	0.61		32.60	0.01	B	23.20	0.01		554.00	0.17		28.50	0.01	B	51.00	0.02	B
Total TEQ		**72.26**	**U,J,B**		**3.47**	**J,B**		**2.86**	**J,B**		**25.24**	**J,B**		**1.34**	**U,J,B**		**4.11**	**U,J,B**

Notes:

(a) Where laboratory analysis indicates an individual chemical is not detected in a sediment sample, the method reporting limit shall be reported and shall be at or below the Marine Sediment Quality Standards chemical criteria value set in this table.

(b) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:

(i) Where laboratory analysis indicates a chemical is not detected in an individual compound/isomer then one-half the estimated dection limit will be reported and used in the total summation.

Port of Friday Harbor Sediments PCB Summations		Marine Sediment AETs		SED-01		SED-02		SED-03		SED-04		SED-05		SED-06		SED-07		SED-08		SED-08	
				SED-01G: 0-4		SED-02G: 0-4		SED-03G: 0-4		SED-04G: 0-4		SED-05G: 0-4		SED-06G: 0-4		SED-07G: 0-4		SED-08G: 0-4		SED-08C:0-1	
				0 - 4 in		0 - 4 in		0 - 4 in		0 - 4 in		0 - 4 in		0 - 4 in		0 - 4 in		0 - 4 in		0 - 1 ft	
Analytes	**CAS**	**SQS**	**SIZmax**	Results	Q	Results	Q	Results	Q	Results	Q	Result	Q	Results	Q	Results	Q	Results	Q	Results	Q
PCB Aroclors																					
Aroclor 1016	12674-11-2			2.75	U	2.30	U	3.25	U	2.55	U	3.25	U	3.50	U	1.95	U	2.45	U	0.65	U
Aroclor 1221	11104-28-2			2.75	U	2.30	U	3.25	U	2.55	U	3.25	U	3.50	U	1.95	U	2.45	U	0.65	U
Aroclor 1232	11141-16-5			2.75	U	2.30	U	3.25	U	2.55	U	3.25	U	3.50	U	1.95	U	2.45	U	0.65	U
Aroclor 1242	53469-21-9			2.75	U	2.30	U	3.25	U	2.55	U	3.25	U	3.50	U	1.95	U	2.45	U	22.00	
Aroclor 1248	12672-29-6			2.75	U	2.30	U	3.25	U	2.55	U	3.25	U	3.50	U	1.95	U	2.45	U	0.70	U
Aroclor 1254	11097-69-1			17.00	J	2.30	U	26.00		6.90	J	30.00		17.00	J	16.00	J	85.00		19.00	
Aroclor 1260	11096-82-5			2.75	U	2.30	U	8.60	J	2.55	U	25.00		10.00	J	7.00	J	62.00		10.00	
Total PCBs (b)		130	1000	**33.50**	**U,J**	**16.10**	**U**	**50.85**	**U,J**	**22.20**	**U,J**	**71.25**	**U**	**44.50**	**U,J**	**32.75**	**U,J**	**159.25**	**U**	**53.65**	**U**
Aroclor 1262	37324-23-5																			0.70	U
Aroclor 1268	11100-14-4																			0.70	U

Analytes	SED-09						SED-10						SED-11					
	SED-09G: 0-4		SED-09C:0-1		SED-09C:1-3		SED-10G: 0-4		SED-10C:0-1		SED-10C:1-3		SED-11G: 0-4		SED-11G:0-10		SED-11C: 0-1	
	0 - 4 in		0 - 1 ft		1 - 3 ft		0 - 4 in		0 - 1 ft		1 - 3 ft		0 - 4 in		0 - 10 in		0 - 1 ft	
Analytes	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
PCB Aroclors																		
Aroclor 1016	3.25	U	0.65	U	0.65	U	1.75	U	0.65	U	0.65	U	2.30	U	0.65	U	0.65	U
Aroclor 1221	3.25	U	0.65	U	0.65	U	1.75	U	0.65	U	0.65	U	2.30	U	0.65	U	0.65	U
Aroclor 1232	3.25	U	0.65	U	0.65	U	1.75	U	0.65	U	0.65	U	2.30	U	0.65	U	0.65	U
Aroclor 1242	77.00		0.65	U	0.65	U	200.00	J	0.65	U	14.00		36.00	J	0.65	U	18.00	
Aroclor 1248	3.25	U	0.65	U	0.70	U	1.75	U	430.00		0.65	U	2.30	U	0.65	U	0.70	U
Aroclor 1254	130.00		13.00		0.70	U	320.00		260.00		16.00		160.00		33.00		48.00	
Aroclor 1260	45.00		8.70		0.70	U	130.00		0.70	U	0.70	U	38.00		34.00	J	36.00	
Total PCBs (b)	**265.00**	**U**	**24.95**	**U**	**4.70**	**U**	**657.00**	**U,J**	**693.30**	**U**	**33.30**	**U**	**243.20**	**U,J**	**70.25**	**U, J**	**104.65**	**U**
Aroclor 1262			0.70	U	0.70	U			0.70	U	0.70	U			0.65	U	0.70	U
Aroclor 1268			0.70	U	0.70	U			0.70	U	0.70	U			0.65	U	0.70	U

Analytes	SED-11		SED-12				SED-13		SED-14								SED-15	
	SED-11C: 1-3		SED-12G: 0-4		SED-12C:0-1		SED-13G: 0-4		SED-14G: 0-4		SED-14G: 0-10		SED-14C: 0-1		SED-14C:1-3		SED-15G: 0-4	
	1 - 3 ft		0 - 4 in		0 - 1 ft		0 - 4 in		0 - 4 in		0 - 10 cm		0 - 1 ft		1 - 3 ft		0 - 4 in	
Analytes	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
PCB Aroclors								µg/kg dw (ppb dw)										
Aroclor 1016	0.65	U	1.95	U	0.65	U	8.50	U	0.75	U	0.65	U	0.65	U	0.65	U	0.75	U
Aroclor 1221	0.65	U	1.95	U	0.65	U	8.50	U	0.75	U	0.65	U	0.65	U	0.65	U	0.75	U
Aroclor 1232	0.65	U	1.95	U	0.65	U	8.50	U	0.75	U	0.65	U	0.65	U	0.65	U	0.75	U
Aroclor 1242	4.60		1.95	U	0.65	U	220.00	J	0.75	U	0.65	U	0.65	U	0.65	U	0.75	U
Aroclor 1248	0.70	U	1.95	U	0.70	U	8.50	U	14.20		0.70	U	0.70	U	0.70	U	11.70	J
Aroclor 1254	11.00		28.00		4.70		650.00		21.90		13.00		13.00		4.40		16.00	
Aroclor 1260	5.70		7.30	J	0.70	U	310.00		10.30	J	7.00		9.60		0.70	U	9.80	J
Total PCBs (b)	**23.95**	**U**	**45.05**	**U,J**	**8.70**	**U**	**1214.00**	**U,J**	**49.40**	**U,J**	**23.30**	**U**	**25.90**	**U**	**8.40**	**U**	**40.50**	**U,J**
Aroclor 1262	0.70	U			0.70	U			0.30	U	0.70	U	0.70	U	0.70	U	0.30	U
Aroclor 1268	0.70	U			0.70	U			0.30	U	0.70	U	0.70	U	0.70	U	0.30	U

Analytes	SED-16		SED-23		SED-24		SED-25				SED-26				SED-DUPC		SED-27	
	SED-16G: 0-4		SED-23G:0-10		SED-24G: 0-10		SED-25C:0-1		SED-25C: 1-3		SED-26C: 0-1		SED-26C: 1-3		DUPC C: 0-1		SED-27C: 0-1	
	0 - 4 in		0 - 10 cm		0 - 10 cm		0 - 1 ft		1 - 3 ft		0 - 1 ft		1 - 3 ft		0 - 1 ft		0 - 1 ft	
Analytes	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
PCB Aroclors																		
Aroclor 1016	0.80	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.43	U
Aroclor 1221	0.80	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.43	U
Aroclor 1232	0.80	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.43	U
Aroclor 1242	0.80	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	4.00		0.65	U	0.43	U
Aroclor 1248	14.90	J	0.70	U	0.70	U	0.65	U	0.70	U	0.70	U	0.70	U	0.70	U	0.43	U
Aroclor 1254	19.40		15.00		13.00		5.90		4.40		510.00		15.00		14.00		15.00	
Aroclor 1260	17.10	J	8.40		0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	9.80		8.20	J
Total PCBs (b)	**54.60**	**U,J**	**26.70**	**U**	**17.00**	**U**	**9.85**	**U**	**8.40**	**U**	**514.00**	**U**	**22.35**	**U**	**27.10**	**U**	**25.33**	**U,J**
Aroclor 1262	0.30	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.43	U
Aroclor 1268	0.30	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.43	U

Notes:

(a) Where laboratory analysis indicates an individual chemical is not detected in a sediment sample, the method reporting limit shall be reported and shall be at or below the Marine Sediment Quality Standards chemical criteria value set in this table.

(b) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:

(i) Where laboratory analysis indicates a chemical is not detected in an individual compound or isomer then one-half the method dection limit will be reported and used in the total summation.

Not included in summation per SCUM Appendix O

Port of Friday Harbor Sediments	SMS	SED-1			SED-2	SED-3	SED-3		SED-4	SED-5	SED-5		SED-6	SED-7	SED-7		SED-8	SED-8	SED-9	SED-9		SED-10	SED-10		SED-11	SED-11		SED-12	SED-12	SED-13	SED-14	SED-14		SED-15	SED-16	SYC-SED-17	SED-23	SED-24	SED-25			SED-26			SED-27
Dry-normalized data summary		SED-05G		SED-05C	SED-02G	SED-06G	SED-09G	SED-05C	SED-04G	SED-05G	SED-05G	SED-05C	SED-06G	SED-09G	SED-09G	SED-07C	SED-06G	SED-08C	SED-09G	SED-09C	SED-09C	SED-10G	SED-10C	SED-10C	SED-11G	SED-11G	SED-11C	SED-12G	SED-12C	SED-13G	SED-14G	SED-14C	SED-14C	SED-15G	SED-16G	SED-17G	SED-23G	SED-24G	SED-25C			SED-26C			SED-27C
Analyte*	SCO CSL	0 - 4 in	0 - 10 cm	0 - 1 ft	0 - 4 in	0 - 4 in	0 - 10 cm	0 - 1 ft	0 - 4 in	0 - 4 in	0 - 10 cm	0 - 1 ft	0 - 4 in	0 - 4 in	0 - 10 cm	0 - 1 ft	0 - 4 in	0 - 1 ft	0 - 4 in	0 - 1 ft	1 - 3 ft	0 - 4 in	0 - 1 ft	1 - 3 ft	0 - 4 in	0 - 10 cm	0 - 1 ft	1 - 3 ft	0 - 4 in	0 - 10 cm	0 - 4 in	0 - 4 in	0 - 1 ft	1 - 3 ft	0 - 4 in	0 - 4 in	0 - 4 in	0 - 10 cm	0 - 10 cm	0 - 1 ft	1 - 3 ft	0 - 4 in	0 - 10 cm	0 - 1 ft	1 - 3 ft	0 - 1 ft
Conventionals																																													
Ammonia (mg/kg)		4.40	8.74		4.16	6.10	4.51		2.50	10.80	12.00		10.20	4.60	10.40		5.60		7.30			4.10			5.80	13.50		3.80		4.40	16.00	12.70		5.50	17.20	17.60									
Total sulfides (mg/kg)		28.00	304.00 J		3.34	405.00	259.00 J		3.00	261.00	262.00 J		30.00	0.31	89.70 J		5.00		730.00			709.00			2.00	204.00 J		29.00		219.00	698.00 J-	170.00 J		822.00 J-	822.00 J-	51.30 J-									
Total Solids (%)		4.80	53.25	55.22	3.10	6.20	45.94	55.48	3.60	6.40	51.94	54.83	7.20	3.10	73.61	81.65	6.20	68.94	11.30	67.96	76.50	3.40	77.06	82.83	6.50	72.27	67.04	73.76	1.40	59.79	4.20	5.10	54.58	68.13	67.96	5.40	9.20	4.20	40.27	43.07	75.95	77.79	60.95	74.64	71.93
Total Organic Carbon (% dry)		1.37	0.85	0.72	0.80	1.88	1.39	1.52	1.81	1.92	1.12	1.00	2.21	1.41	1.37	0.58	2.54	2.89	4.29	1.40	1.75	1.26	0.71	2.07	2.69	1.26	1.10	0.69	1.03	1.26	1.98	1.87 J	1.20	0.74	0.66	2.08 J	3.30 J	0.49 J	1.79	1.61	0.45	0.18	1.47	0.43	0.52 J
Organics & Chlorinated Organics	mg/kg OC																																												
1,2,4-Trichlorobenzene	0.81 1.8	0.84 U			3.26 U	1.65 U	0.29 UJ	0.26 UJ	1.49 U	0.81 U	0.36 UJ	0.40 UJ	1.58 U	0.92 U	0.29 UJ	2.00 UJ	1.06 U	0.14 UJ	0.82 U	0.36 UJ	0.23 UJ	2.00 U	28.57 UJ	0.19 UJ	0.97 U	0.32 UJ	0.36 UJ	0.72 UJ	2.57 U	1.33 U	0.32 U	0.33 UJ	0.54 UJ	0.61 U	0.29 U	0.18 U	1.22 U			0.82 UJ	2.70 UJ	0.27 UJ	0.93 UJ			
1,2-Dichlorobenzene	2.3 2.3	1.90 U			3.00 U	1.54 U	0.72 U	0.66 U	1.38 U	1.67 U	0.89 U	1.00 U	1.45 U	0.85 U	0.73 U	6.21 U	0.98 U	0.35 U	0.75 U	0.71 U	0.57 U	1.90 U	26.47 U	0.48 U	0.89 U	0.79 U	0.91 U	1.45 U	2.65 U	1.21 U	0.27 U	0.83 U	1.35 U	1.52 U	0.24 U	0.15 U	0.82 U			2.04 U	5.56 U	0.68 U	2.33 U			
1,4-Dichlorobenzene	3.1 9	1.77 U			3.13 U	1.60 U	1.01	0.66 U	1.44 U	1.72 U	0.89 U	1.00 U	1.54 U	0.92 U	0.73 U	6.25 U	1.02 U	0.35 U	0.77 U	0.71 U	0.57 U	1.98 U	26.66 U	0.48 U	0.93 U	0.79 U	0.91 U	1.45 U	2.43 U	1.26 U	0.21 U	0.83 U	1.35 U	1.52 U	0.19 U	0.12 U	0.82 U			2.04 U	5.56 U	0.68 U	2.33 U			
Dibenzofuran	15 58	2.63 U			7.50 J	2.18 U	0.72 U	0.66 U	1.93 U	2.34 U	0.89 U	1.00 U	2.08 U	1.21 U	0.73 U	6.25 U	1.38 U	0.45	1.05 U	0.79	0.57 U	7.70	28.17 U	0.48 U	1.26 U	0.79 U	0.91 U	1.45 U	3.30 U	1.72 U	0.86 J	0.83 U	1.35 U	1.52 J	0.48 J	0.97 J	0.82 U			2.04 U	5.56 U	0.68 U	2.33 U			
Hexachlorobenzene	0.38 2.3	2.06 U			4.16 U	2.07 U	0.72 U	0.14 U	1.88 U	2.29 U	0.19 U	0.21 UJ	1.99 U	1.21 U	0.73 U	1.31 UJ	1.34 U	0.07 UJ	1.01 U	0.35	0.12 UJ	2.66 U	29.17 UJ	0.10 UJ	1.23 U	0.79 U	0.19 UJ	0.30 UJ	1.06 U	1.67 U	0.27 U	0.83 U	0.28 UJ	0.32 U	0.24 U	0.15 U	1.02 U			0.41 UJ	1.17 UJ	0.14 UJ	0.49 UJ			
Hexachlorobutadiene	3.9 6.2	2.34 U			3.75 U	1.91 U	0.72 U	0.66 U	1.71 U	2.08 U	0.89 U	1.00 U	1.81 U	1.06 U	0.73 U	5.78 U	1.22 U	0.35 U	0.93 U	0.71 U	0.57 U	2.38 U	29.17 U	0.48 U	1.12 U	0.79 U	0.91 U	1.45 U	2.91 U	1.52 U	0.27 U	0.83 U	1.35 U	1.52 U	0.24 U	0.15 U	1.02 U			2.04 U	5.56 U	0.68 U	2.33 U			
N-nitrosodiphenylamine	11 28	2.48 U			4.00 U	2.02 U	0.72 U	0.66 U	1.82 U	2.24 U	0.89 U	1.00 U	1.95 U	1.13 U	0.73 U	6.25 U	1.30 U	0.35 U	1.00 U	0.71 U	0.57 U	2.54 U	29.17 U	0.48 U	1.19 U	0.79 U	0.91 U	1.45 U	3.11 U	1.62 U	0.48 U	0.83 U	1.35 U	1.52 U	0.43 U	0.27 U	1.84 U			2.04 U	5.56 U	0.68 U	2.33 U			
*	mg/kg OC																																												
Bis(2-Ethylhexyl)phthalate	47 78	6.86 U			11.13 U	5.85 U	12.95	10.53 U	5.08 U	6.25 U	14.29 U	16.00 U	5.43 U	3.19 U	11.68 U	100.00 U	9.06 J	5.54 U	8.62 J	11.43 U	9.14 U	26.98 J	466.00 U	7.73 U	5.58 J	12.70 U	14.55 U	23.19 U	8.64 U	27.27 J	2.51 J	21.67	21.62 U	24.24 U	3.08	2.48 J	6.53 U			32.65 U	89.00 U	10.88 U	37.21 U			
Butylbenzyl phthalate	4.9 64	2.85 U			4.63 U	2.34 U	1.44 UJ	1.32 UJ	2.10 U	2.55 U	1.79 UJ	2.00 UJ	2.26 U	1.35 U	1.46 UJ	12.50 UJ	1.93 J	0.69 UJ	1.63 J	1.43 UJ	1.14 UJ	2.94 U	163.00 UJ	0.97 UJ	1.38 U	1.59 UJ	1.82 UJ	3.33	3.59 U	3.59	0.43 U	5.26 UJ	8.51 UJ	3.03 UJ	0.38 U	0.24 U	1.63			4.08 UJ	11.11 UJ	1.36 UJ	4.65 UJ			
Diethyl phthalate	61 110	2.85 U			4.63 U	2.34 U	7.19 UJ	6.58 UJ	2.10 U	2.55 U	8.93 UJ	10.00 UJ	2.26 U	1.35 U	7.30 UJ	62.50 UJ	1.50 U	3.46	1.14 U	7.14 UJ	5.71 UJ	2.94 U	283.00 UJ	4.83 UJ	1.38 U	7.94 UJ	9.09 UJ	14.49 UJ	3.59 U	1.87 U	0.91 U	8.33 UJ	13.51	15.15 U	0.87 U	0.52 U	3.47 J			20.41 U	55.56 U	6.80 UJ	23.26 UJ			
Dimethyl phthalate	53 53	3.14 U			5.00 U	2.55 U	5.11 UJ	4.67 UJ	2.32 U	2.76 U	6.34 UJ	7.10 UJ	2.44 U	2.34 J	5.18 UJ	44.38 U	5.12	2.46 U	4.43	5.07 U	4.06 U	23.81	497.00 U	3.43 U	3.72	5.63 UJ	6.45 U	10.29 U	3.88 U	42.42	2.09	5.92 UJ	9.59 UJ	10.76 UJ	1.54	1.48	2.65 U			14.49 U	39.44 U	4.83	16.51 U			
Di-n-butyl phthalate	220 1700	3.72 U			6.00 U	3.03 U	7.19 U	6.58 UJ	2.76 U	3.33 U	8.93 UJ	10.00 UJ	2.90 U	1.70 U	7.30 UJ	62.50 UJ	3.11 J	3.46 U	1.49 U	7.14 U	5.71 U	7.46 J	281.69 U	4.83 U	5.95 J	7.94 UJ	9.09 U	14.49 U	4.66 U	10.61	0.48 J	8.33 U	13.51 U	15.15 U	0.24 U	0.64 J	1.02 U			20.41 U	55.56 U	6.80 UJ	23.26 U			
Di-n-octyl phthalate	58 4500	2.48 U			4.00 U	2.02 U	7.19 U	6.58 UJ	1.82 U	2.24 U	8.93 UJ	10.00 UJ	1.95 U	1.13 U	7.30 UJ	62.50 U	1.30 U	3.46 U	3.96	7.14 U	5.71 U	3.81 J	281.69 U	4.83 U	1.19 J	7.94 UJ	9.09 U	14.49 U	3.11 U	1.62 U	0.48 U	8.33 U	13.51 U	15.15 U	0.43 U	0.27 U	1.63 J			20.41 U	55.56 U	6.80 UJ	23.26 U			
Pesticides																																													
PCBs	mg/kg OC																																												
	12 65	2.45			2.01 U	2.70			1.23 UJ	3.71			2.01	2.32 UJ			6.27	1.86 U	6.18	1.78 U	0.27 U	52.58 UJ	30.00 U	1.61 U	9.04 UJ	5.58 UJ	9.51 U	3.47 U	4.37 UJ	0.69 U	61.31 UJ	2.64 UJ	1.94 U	3.50 U	1.27 U	1.95 UJ	1.65 UJ	1.43 J	1.49 U	1.06 U	2.01 U	4.67 U	34.97 U	5.20 U	4.87 U	
Polycyclic Aromatic Hydrocarbons	mg/kg OC																																												
Total PAHs		188.32																																											
Total LPAH	370 780	29.12			221.38	115.00	99.28	133.39	103.15	76.04	120.85	91.92	87.38	127.02	77.61	510.56	578.31	183.63	510.19	227.78	2.03	1657.70	436.76	31.29	138.33	235.00	222.05	99.71	152.04	731.52	161.82	158.15	149.39	52.15	107.02	336.97	90.41			438.27	41.67	208.80	73.49			
2-Methylnaphthalene	38 64	4.13 J			84.88	17.45	6.71	7.07	22.38	14.64	8.88	6.31	16.70	16.17	4.82	23.06	44.84	16.51	30.70	86.78	0.81	255.24	67.18	2.99	15.54	15.71	19.32	11.32	26.41	65.86	20.43	12.82	16.69	4.92	11.25	33.03	12.86			64.00	7.83	11.24	5.09			
Acenaphthene	16 57	2.48 U			5.88 J	2.02 U	0.33	0.34	2.82 J	2.24 U	0.30	0.26	1.95 U	1.13 U	0.18	1.25 U	1.30 U	0.66	1.00 U	1.07	0.11 U	17.46	5.63 U	0.10 U	1.19 U	0.55 U	1.18	0.97	3.11 U	3.38	0.64 J	0.45	0.69 J	0.41	0.48 J	0.94 J	1.02 U			0.84	1.11 U	0.56	0.47 U			
Acenaphthylene	66 66	2.04 U			3.25 U	1.65 U	0.38	0.40	1.49 U	1.82 U	0.45	0.33	1.58 U	0.92 U	0.21	1.25 U	3.19 J	0.42	2.17 J	0.49	0.11 U	3.49 J	5.63 U	0.17	1.00 J	0.44	0.49	0.48	2.52 U	1.97 J	2.14	0.43	0.39	0.30 U	1.25	3.00	1.43 J			1.53	1.11 U	0.75	0.47 U			
Anthracene	220 1200	2.77 J			4.88 J	2.93 J	1.44	1.84	2.38 J	2.24 U	1.52	1.40	3.08 J	3.33	1.09	4.69	10.24	1.73	8.86	2.50	0.11 U	33.13	9.44	0.39	2.86 J	2.62	4.09	1.88	3.11 U	9.09	5.72	2.75	2.43	0.68	2.55	8.67	2.45 J			10.41	1.11 U	1.90	0.67			
Fluorene	23 79	2.55 U			6.13 J	2.07 U	0.60	0.66	1.88 U	2.29 U	0.65	0.65	1.99 U	1.21 U	0.33	1.63	3.74 J	0.90	1.68 J	1.57	0.12	15.87	5.63 U	0.18	1.23 U	0.72	1.18	0.97	3.20 U	3.48	1.39	1.08	1.03 J	0.53	0.24 U	1.91	1.02 J			4.08	1.11 U	0.82	0.47 U			
Naphthalene	99 170	2.48 U			4.75 J	1.86 U	0.36	0.41	1.66 U	2.03 U	0.34	0.37	1.76 U	1.06 U	0.15	1.75	1.18 U	0.35	0.91 U	2.57	0.11 U	2.54 J	5.63 U	0.21	1.08 U	0.28	0.55	0.64	2.82 U	1.46 U	1.98	0.36	0.39	0.42	1.20	0.84 J	1.02 U			2.24	1.11 U	1.02	0.47 U			
Phenanthrene	100 480	16.79			60.00	6.91	3.60	3.42	12.15	4.01 J	5.63	3.30	8.33	8.51	2.85	12.50	25.20	12.46	16.08	78.57	0.23	182.54	35.21	1.93	8.18	11.11	11.82	6.38	11.65	46.46	8.56	7.75	11.76 J	2.58	5.53	17.58	5.92			44.90	2.28	6.19	2.56			
Total HPAH	960 5300	159.20			136.50	97.55	92.58	126.33	80.77	61.41	111.96	85.61	70.68	110.85	72.80	487.50	533.46	167.13	479.49	141.00	1.22	1402.46	369.58	28.30	122.79	219.29	202.73	88.39	125.63	665.66	141.39	145.33	132.70	47.23	95.77	303.94	77.55			374.27	33.83	197.55	68.40			
Benz[a]anthracene	110 270	7.30 J			5.38 J	6.91	6.26	7.24	4.42 J	4.01 J	6.79	5.90	5.88 J	7.09	5.18	17.50	38.98	8.65	44.29	10.00	0.11 U	134.92	30.99	2.42	9.29	13.49	16.36	6.96	8.35	50.51	13.42	13.33	8.78	2.27	7.31	26.76	5.31			30.61	2.83	10.88	3.26			
Benz[a]pyrene	99 210	6.86 J			4.50 U	6.38	8.63	10.53 J	3.15 J	3.91 J	7.32 J	6.60 J	4.25 J	6.95	4.74 J	75.00	31.50	9.69	27.97	10.00	0.11 U	134.92	36.62	3.24	8.92	14.29 J	20.00	8.41	9.71	10.10	8.98	13.33	9.86	2.27	5.63	16.58	4.08			40.82	2.61	17.69 J	7.21			
Benzo[b,k]perylene	31 78	2.85 U			4.63 U	2.34 U	1.80	1.45 J	2.10 U	2.55 U	1.43 J	1.20 J	2.26 U	3.55	0.95 J	31.25	14.57	1.66	12.12	2.43	0.11 U	71.43	7.75	0.87	4.46	3.17 J	5.45	2.17	3.59 U	55.56	5.40 J	3.83	2.84	0.61	3.46 J	8.12 J	2.24 J			8.16	1.11	3.47 J	1.93			
Chrysene	110 460	37.23			12.50	14.89	13.67	13.16	7.73	9.90	14.29	13.00	12.67	19.15	12.41	43.75	94.49	20.07	95.57	21.43	0.11 U	182.54	42.25	2.85	18.59	25.40	24.55	8.41	20.39	85.86	33.21	23.33	17.57	2.88	17.31	56.97	13.67			38.78	3.78	21.09	6.98			
Dibenz[a,h]anthracene	12 33	2.34 U			3.75 U	1.91 U	0.63	0.54 J	1.71 U	2.08 U	0.45 J	0.41 J	1.81 U	1.06 J	0.31 J	9.38	3.94	0.52	3.03	0.93	0.11 U	22.22	5.63 U	0.23	1.23 J	0.95 J	1.64	0.57	2.91 U	10.61	2.19	1.17	0.81	2.12 U	1.11	3.21 J	1.22 U			1.82	1.11 U	1.09 J	0.65			
Fluoranthene	160 1200	48.18			56.25	27.13	10.79	13.82	28.73	15.63	21.43	12.00	18.10	32.62	15.33	31.25	145.67	48.44	128.21	29.29	0.14	436.51	76.06	5.31	31.60	43.65	32.73	17.39	33.98	171.72	20.48	21.67	29.73	5.76	15.95	66.67	18.98			73.47	6.11	31.97	11.40			
Indeno[1,2,3-c,d]pyrene	34 88	4.31 J			4.00 U	3.51 J	2.52	1.97 J	1.88 J	2.24 U	1.88 J	1.60 J	2.81 J	4.40	1.31	36.88 J	16.54	2.32	13.52	3.36	0.11 U	90.48	9.72	1.01	5.58	4.05 J	6.55	2.61	5.63 J	47.98	5.61	4.50	3.24	0.71	3.65	8.52 J	2.65 J			9.39	1.11 U	4.56 J	2.56			
Pyrene	1000 1400	29.20			32.50	17.02	25.18	39.47	23.20	10.42	27.68	20.00	10.41	17.02	14.60	49.38	90.55	44.98	74.59	34.29	0.17	240.48	80.28	6.76	20.82	41.27	40.00	23.19	21.36	106.06	19.57	24.17	29.73	7.88	17.16	58.18	13.67			91.84	7.22	55.10	16.51			
Total benzofluoranthenes	230 450	20.95 J			13.00 UJ	17.45 J	23.09	38.16 J	7.85 U	10.68	30.71 J	24.90 J	12.49 J	19.01	17.96 J	193.13	97.24	30.80	80.19	29.29	0.23 U	282.54	80.28	5.60	22.30	73.02 J	55.45	18.70	19.71	127.27	32.51	40.00	30.14	22.73	20.19	58.94	15.71			79.39	7.94	51.70 J	17.91			

Outside Ecology's TOC range (see table note c).

(a) Row 25 through Row 38, Row 47, and Row 52 through Row 70 values are organic carbon-normalized and in mg/kg.
(b) Marine values are dry weight normalized for metals and polar organics and normalized to total organic carbon for nonpolar organics.
(c) When total organic carbon is outside the range of 0.5 – 3.5%, Ecology may compare to both the TOC normalized criteria and the dry-weight AET values. When total organic carbon values are > 5%, analysis of total volatile solids is recommended.
(d) Dry weight AETs for phthalates are derived from Barrick et al, 1988. The SCO is established as the lowest AET and the CSL is the 2nd-lowest AET, consistent with the dry weight AETs for the other SMS chemicals. These differ from the DMMP values for phthalates which were updated in 2005, based on additional bioassay endpoints and synoptic chemistry/bioassay data. Bioassays may be used in place of these AETs if necessary.
(e) "greater than" value indicates that the upper bound toxicity level is unknown, but is known to be above thecconcentration shown.
(f) Upon approval by Ecology on a case-by-case basis, Total PCB congeners may be used as a direct substitute for Total PCB Aroclors to verify compliance with the CSL benthic criteria (i.e., the sum of Total congeners value can substitute for the sum of Total Aroclors), but not the SCO benthic criteria. If the benthic SCO is exceeded, bioassays should be analyzed.

Data Qualifier Flags

B	This analyte was detected in the method blank.
E	Estimated concentration for an analyte response above the valid calibration range. A dilution is required to obtain an accurate quantitation of the analyte.
J	Estimated concentration value detected below the reporting limit.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
UJ	Indicates estimated concentrations with low bias Continuing Calibration Verification outlier
Ui	Indicates the analyte was not detected above the MDL value shown and the MDL is elevated due to chromatographic interference.
J+	Indicates estimated concentrations which may be biased high.
J-	Indicates estimated concentration which may be biased low.
P	Indicates laboratory experienced a greater than 40 % difference in analyte concentration when run on two separate machines. The lower result is reported here. All 2/12/18 Aroclors were run twice.
R	Indicates data is rejected since analysis did not meet quality control objectives. Analyte may or may not be present in sample.

Appendix A: Sediment Characterization Report

Appendix B: Development of Sediment Cleanup Objectives and Cleanup Screening Levels for Human Health and Ecological Receptors