

# PRELIMINARY DESIGN CONCEPT REPORT WHATCOM WATERWAY SITE CLEANUP

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## LIST OF ACRONYMS AND ABBREVIATIONS

ASB	aerated stabilization basin
BNSF	Burlington Northern Santa Fe
BST	Bellingham Shipping Terminal
CAP	Cleanup Action Plan
CMCRP	Compliance Monitoring and Contingency Response Plan
CQAP	Construction Quality Assurance Plan
DMMP	Dredged Material Management Program
Ecology	Washington Department of Ecology
EDR	engineering design report
ESA	Endangered Species Act
FSEIS	Final Supplemental Environmental Impact Statement
GP	Georgia-Pacific
GP West	Georgia-Pacific West
HPA	hydraulic project approval
IC	Institutional Control
kg	kilograms
MGP	manufactured gas plant
MHHW	mean higher high water
MLLW	mean lower low water
MNR	monitored natural recovery
MTCA	Model Toxics Control Act
NEPA	National Environmental Policy Act
ng	nanograms
NPDES	National Pollutant Discharge Elimination System
PDCR	Preliminary Design Concept Report
PLP	potentially liable parties
Port	Port of Bellingham
PRDI	pre-remedial design investigation
propwash	propeller wash
RCW	Revised Code of Washington
RI/FS	Remedial Investigation/Feasibility Study

SEPA	State Environmental Policy Act
Site	Whatcom Waterway Site
SMS	sediment management standards
SQS	sediment quality standards
SSSMGP	South State Street Manufactured Gas Plant
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources

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## 1 INTRODUCTION

This *Preliminary Design Concept Report* (PDCR) describes the design concept as proposed for implementation of the cleanup of the Whatcom Waterway Site (Site) in Bellingham, Washington. That design will be further developed in coordination with the Washington State Department of Ecology (Ecology) during detailed design and permitting for the cleanup.

### 1.1 Site Description

Figure 1 presents the Site vicinity and location features. Cleanup of the Site is to be performed by the Port of Bellingham (Port) and other cooperating potentially liable parties (PLPs) under Ecology oversight, in accordance with *Consent Decree* No. 07-2-02257-7. The cleanup will satisfy the cleanup requirements of the Model Toxics Control Act (MTCA), Chapter 70.105D in the Revised Code of Washington (RCW), as administered by Ecology under the MTCA Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC). The cleanup also complies with the Sediment Management Standards (SMS; WAC 173-204).

The Site is located within Bellingham Bay in Washington State. It includes sediments that have been impacted by contaminants historically released from industrial waterfront activities, including mercury discharges from the former Georgia-Pacific (GP) Corporation's chlor-alkali plant; wood waste and degradation products from historic log rafting activities; phenolic compounds from pulp mill wastewater discharges; and other industrial releases. Surface sediment contamination from other historic industrial activities is commingled with Site contamination in several areas. Ecology has designated several other cleanup sites throughout the Bellingham Bay waterfront areas, including the Central Waterfront site, I & J Waterway site, Cornwall Avenue landfill site, the former South State Street Manufactured Gas Plant (SSSMGP) site, and the R.G. Haley site. The cleanup action for the Whatcom Waterway Site is being coordinated with these separate site cleanups by the Port and Ecology as described in this report.

The primary contaminant of concern for the Whatcom Waterway site cleanup is mercury. The chlor-alkali plant was constructed by GP in 1965 to produce chlorine and sodium hydroxide for use in bleaching and pulping wood fiber. The chlor-alkali plant discharged mercury-containing wastewater into the Whatcom Waterway during the late 1960s and 1970s. Mercury discharges from the chlor-alkali plant were subsequently reduced through source controls and wastewater treatment and were terminated with the closure of the facility in 1999. The remediation of the upland chlor-alkali plant site is being addressed under MTCA as the separate Georgia-Pacific West (GP West) cleanup site. The Whatcom Waterway Site cleanup addresses contaminated marine sediments associated with the historical chlor-alkali plant discharges. Section 2 provides additional information about the Site history and the context for the current work.

## **1.2 Purpose of Report**

This PDCR provides an overview of the cleanup action that will be implemented to address the requirements of the Consent Decree (Ecology 2007) as amended by Ecology with the First Amendment to the Consent Decree (Ecology 2011). The design concept described in this report addresses these requirements and incorporates the findings of pre-remedial design investigations (PRDI) completed during 2008 and 2009 in support of the design process. The PRDI findings are described in the *PRDI Data Report* (Anchor QEA 2010).

The concepts presented in this report are preliminary and are based on preliminary design that has been conducted to date by the Port. These design concepts will be described in more detail after completion of engineering design activities under Ecology oversight.

Consistent with the First Amendment to the Consent Decree (Ecology 2011), the construction of the cleanup action will involve two separate construction projects (described as cleanup phases 1 and 2 in the First Amendment to the Consent Decree), each addressing a discrete area of the Site. These two construction projects (described in Sections 3 and 4 of this report) address separate and distinct areas of the Site, and they are appropriately being designed and permitted as separate projects. A separate engineering design report (EDR) will be completed and issued for public review and comment prior to implementing each of the two phases of cleanup implementation described in this PDCR.

This report also describes the areas of the Site that are being addressed through monitored natural recovery (MNR). No active construction work is planned for these areas; however, monitoring is required as part of the Site cleanup to document compliance with Site cleanup levels. The Phase 1 EDR will include a compliance monitoring plan for these areas. MNR areas are discussed in Section 5.

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## 2 BACKGROUND

This section provides additional information regarding the history of the Site and the context for the current PDCR.

### 2.1 Site Background

As described in Section 1.1, the Whatcom Waterway Site includes sediments that have been impacted by contaminants historically released from industrial waterfront activities, including mercury discharges from the former GP chlor-alkali plant; wood waste and degradation products from historic log rafting activities; and phenolic compounds from pulp mill wastewater discharges. There are multiple cleanup sites located adjacent to the Whatcom Waterway as shown in Figure 1, and sediment contamination from those other sites is commingled with subsurface contamination in portions of the Site. Cleanup of the Site is being coordinated with these separate actions, which are also overseen by Ecology.

The chlor-alkali plant discharged mercury-containing wastewater into the Whatcom Waterway primarily during the late 1960s and 1970s. Initial environmental investigations of the Site during the 1980s and 1990s identified mercury in sediment at concentrations that exceed applicable standards, as well other contaminants from industrial releases.

The Remedial Investigation/Feasibility Study (RI/FS) process for the Whatcom Waterway Site began in 1996 and has included two supplements to reflect updated land use within portions of the Site. The most recent 2006 Supplemental RI/FS report (RETEC 2006) described the nature and extent of contamination, presented the conceptual site model, and assessed potential alternatives for cleanup of each portion of the Site. In the RI/FS, the different portions of the Site were divided into sediment site units as shown in Figure 1. These units were developed based on differences in the following parameters:

- Physical factors, including bathymetry, sediment particle size and texture, wood material distribution, wind and wave energies, and the characteristics of adjacent shorelines.

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- Land use and navigation, including upland zoning, shoreline infrastructure, navigation uses, natural resources, ongoing waterfront revitalization activities, and potential interrelationships between cleanup considerations and these factors.
  - Natural resources, including the types of existing aquatic habitats within the unit.
  - Contaminant distribution, including patterns of surface and subsurface contamination and relative contaminant concentrations.

Technologies evaluated for use for Site cleanup include removal with upland disposal, treatment, reuse, containment (including capping, nearshore confined disposal, and confined aquatic disposal), enhanced natural recovery, MNR, and institutional controls. Potential environmental impacts associated with the cleanup action were evaluated under the State Environmental Policy Act (SEPA). Ecology's SEPA impacts analysis was documented in a Final Supplemental Environmental Impact Statement (FSEIS) issued by Ecology (Ecology 2007a).

Ecology subsequently developed a Cleanup Action Plan (CAP) for the Site. The CAP describes Ecology's selected cleanup action for the Site, consistent with MTCA and SMS requirements. The CAP included the following information:

- Summary of project background and environmental conditions.
- Cleanup requirements applicable to the Site, including cleanup standards and other federal, state, and local laws applicable to the cleanup action.
- Summary description of the remedial alternatives evaluated in the RI/FS
- Rationale for selection of the proposed cleanup alternative.
- A description of the cleanup action selected by Ecology, consistent with MTCA requirements, including a description of the types, levels, and amounts of hazardous substances that will remain on site as part of the cleanup and the measures that will be used to prevent migration and contact with those substances.
- Compliance monitoring, contingency action requirements, and institutional controls are also described.

In 2007, after public notice and opportunity to comment, a Consent Decree (including the CAP) was signed by the cooperating PLPs and Ecology, and entered into the records of

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Whatcom County Superior Court. The Port and the cooperating PLPs subsequently conducted a PRDI pursuant to a work plan (Anchor QEA 2008a). The PRDI provides sampling and testing data necessary for designing the cleanup action defined in the CAP. In 2010, a *PRDI Data Report* was submitted to Ecology containing the results of the information developed as part of the PRDI (Anchor QEA 2010). As described below, Amendments to the CAP were made in 2011 based on updated information developed during the PRDI.

## 2.2 Summary of Pre-remedial Design Investigations

Under the terms of the Consent Decree, the Port and the other cooperating PLPs developed a *PRDI Work Plan* (Anchor QEA 2008a) for Ecology review focused on filling pre-design data gaps to allow remedial design and permitting activities to move forward. Following Ecology approval of the *PRDI Work Plan* in June 2008, investigation activities commenced in July 2008 and were completed in May 2009. Testing activities completed as part of the PRDI were extensive and included:

- Updated surveys of site physical conditions using bathymetric and side-scan sonar surveys and sediment probing within the aerated stabilization basin (ASB).
- Oceanographic data collection documenting current and wave behavior within Bellingham Bay.
- Surface sediment testing, including both chemical and biological (i.e., bioassay) testing.
- Specialized testing of sediments, including pore-water and mercury speciation in surface sediments, and contaminant leachability measurements in planned dredging areas.
- Testing of subsurface sediment quality using samples collected by vibracore, hollow-stem auger, and diver-deployed core methods.
- Collection of geotechnical data for use in engineering design of the cleanup action.
- Surveys of current habitat characteristics, including surveys of eel grass occurrence within the proposed construction areas.

Most PRDI findings were consistent with previous expectations or represented an improvement in site environmental conditions. Information developed during the PRDI

documented that surface sediment quality continued to recover naturally within most areas of the Site. No contamination exceeding site cleanup levels was detected in planned MNR areas and no exceedances of cleanup levels were noted in surface sediments within Units 6B or 6C, which had been identified for capping. The lateral extent of surface sediment contamination within Unit 5B was determined to be smaller than previously estimated. Within the Unit 8 (ASB), the thickness of the contaminated sludge was verified, and this sludge was determined to overlay a thick sequence of clean native sandy sediments. Also, with the exception of the transition sands immediately beneath the ASB sludges, no contamination was identified in the sandy materials used to construct the interior of the ASB berm or in the sediments beneath the berm.

In one area the PRDI findings provided new information that required a substantial change to the planned cleanup as defined in the original CAP (Ecology, 2007b). Specifically, updated information indicated that levels of dioxin/furans in buried sediments offshore of the shipping terminal (within Units 1A and 1B) would be unlikely to meet Dredged Material Management Program (DMMP) guidelines for unconfined open-water disposal, as planned in the original CAP. Concentrations of dioxin/furans in these materials (expressed using the toxicity equivalents or TEQ method) ranged from 26 to 39.8 nanograms (ng) TEQ/kilograms (kg) (parts per trillion), with an average concentration of 33 ng/kg.

The primary effect of the dioxin/furan testing data was that a different disposal option was needed for the Units 1A/1B materials slated for unconfined open-water disposal in the original CAP. As described below, Ecology developed the First Amendment to the Consent Decree (Ecology 2011) including changes to the cleanup action to provide a different management method for these sediments. This also presented an opportunity to manage a portion of the sediments from Units 1C and 5B differently.

### **2.3 Required Cleanup Action**

In 2011, after public notice and opportunity to comment, the First Amendment to the Consent Decree (including amendments to the CAP and schedule) was signed by the cooperating PLPs and Ecology and entered into the records of Whatcom County Superior

Court. The adjustments made to the original cleanup action affected specific areas of the Site. The CAP now requires the Port to do the following:

- After removing contaminated industrial sludge and sediment from the industrial waste lagoon (Unit 8) and disposing of it in an approved upland landfill, remove an estimated 340,000 cubic yards of clean material from Unit 8. Stockpile clean material for later use.
- Place contaminated material dredged from Units 1A, 1B, 5B, and a portion of 1C into Unit 8. Contain the placed material under a clean sediment layer, or cap, and apply institutional controls to eliminate exposure to humans and the environment.
- The project schedule was also adjusted to reflect a change in the project sequencing to allow the Port to clean up the inner waterway portion of the Site first (Units 2A, 2C, 3, 4, and a portion of Unit 1C), followed by the remainder of the Site.

The cleanup actions described in the current PDCR are in compliance with the Consent Decree (Ecology 2007) as amended by these 2011 changes (Ecology 2011). The cleanup action meets the requirements of the MTCA, the SMS, and the requirements of the Consent Decree. The amended cleanup action is consistent with the planned land use for the Site, including the Port's plans to continue deep-draft shipping and to convert the ASB (Unit 8) to a marina. The cleanup action is also consistent with Port and City plans for redevelopment of the 220-acre Waterfront District (consisting of the waterfront properties located between the Cornwall Avenue Landfill site and the I & J Waterway site) as described in the *Draft Sub-area Plan* (Port and City, 2010).

The design and implementation of the cleanup of the Site will be implemented in two cleanup phases, with two separate and independent construction projects, each addressing distinct areas of the Site. Monitoring for each of the two construction projects will be performed consistent with the Compliance Monitoring and Contingency Response Plan, which will be prepared during the design and permitting for each project.

The construction project to be completed in Phase 1 site areas (Figure 2) will include cleanup actions within the Inner Waterway (Units 2A and 3B), the Log Pond (Unit 4), and a portion of the Bellingham Shipping Terminal (BST) (Unit 1C). The work to be performed in these

areas is described in Section 3. The construction project addressing these Phase 1 areas will include the following activities:

- **Inner Waterway areas (Units 2A and 3B):** Dredging and capping will be performed within portions of the Inner Waterway. This work will include remediation of the portion of the Whatcom Waterway that overlaps with the Central Waterfront Site (along the northern shoreline of the Whatcom Waterway). Cleanup in the Inner Waterway will also include some structure demolition and removal, replacement or removal of bulkheads in steep shoreline areas, and repair and replacements of some existing structures as necessary to accomplish the remediation.
- **Log Pond area (Unit 4):** A cap was placed within the Log Pond during 2000 as part of an Interim Remedial Action. Contingency actions are required to repair the cap edges. Work within the Log Pond includes shoreline capping as necessary to repair these shoreline edges of the cap. Cleanup within the Log Pond will include stabilization of the shoreline located adjacent to BST and some demolition of selected structures (e.g., timber piles) as necessary to complete the contingency actions.
- **Bellingham Shipping Terminal area (Unit 1C):** The BST is located within the Outer Waterway. This area includes sediment deposits with contaminant concentrations that are higher than those in other Unit 1C and adjacent areas. Remediation activities include dredging and upland disposal of approximately 56,500 cubic yards of contaminated sediments from a portion of Unit 1C.

Monitoring of portions of Units 3, 5, and 6 and all of Units 7 and 9, designated for MNR under the Consent Decree (Ecology 2007) and First Amendment to the Consent Decree (Ecology 2011), will also be performed following completion of the construction work in Phase 1 areas. Section 5 discusses how MNR areas are to be addressed.

The construction project to be completed in Phase 2 areas (Figure 3) will address Units 1A, 1B, 2B, 2C, 5B, 6B, 6C, 8, and a portion of 1C. These activities will be performed in association with certain waterfront redevelopment activities, including development of the planned marina within Unit 8 and reconfiguration of portions of BST. The construction project addressing these Phase 2 areas is described in Section 4 and includes the following activities:

- **ASB (Unit 8):** The cleanup action will include removal of the sludge and associated contaminated sediments from the ASB. Sludge and contaminated sediments will be managed by upland disposal. Following the removal of contaminated material from Unit 8, the cleanup action will remove reusable sandy sediments, including approximately 340,000 cubic yards of clean material to be stockpiled (likely at the GP West Site) for later use. This excavation will provide sufficient volume for confined aquatic disposal of sediments to be dredged from Units 1A, 1B, 5B, and part of 1C. Subsequent to placement of these materials, Unit 8 will be covered with a subaqueous cap compatible with future planned marina uses. Then the ASB will be opened to Bellingham Bay, including dredging of the access channel (Unit 2B). The access channel will be dredged in a location consistent with planned marina uses (to be determined as part of final design).
- **Outer Waterway (Units 1A, 1B, and a portion of 1C):** Sediments within Units 1A and 1B and a portion of Unit 1C will be dredged and disposed of within Unit 8.
- **Shoulder of the ASB (Unit 5B):** Sediments from within a portion of Unit 5B will be dredged and disposed of within Unit 8 as described above. The excavation area will be backfilled with clean sediments to restore existing grades and maintain habitat functions in this area. Clean reusable, native sediments excavated from beneath Unit 8 are to be used for this backfill.
- **Inner Waterway (Unit 2C):** Sediments within Unit 2C are to be capped. Clean reusable, native sediments excavated from beneath Unit 8 are to be used for some of this capping material. In association with this work, the portion of the BST pier extending into the Log Pond will be removed to facilitate capping and armoring of this area. The moorage function previously provided by the pier will be replaced with new breasting and mooring dolphins placed at the opposite, offshore end of the BST.
- **Barge dock area (Portion of Units 6B and 6C):** The PRDI indicated that sediments in Unit 6 have naturally recovered, though a portion of this area may be subject to propeller wash (propwash) and associated sediment disturbance. A layer of armoring material will be placed in this area to protect against potential disturbance.

## 2.4 Sediment Cleanup Levels

Sediment cleanup levels and points of compliance were defined in the CAP and Consent Decree for the Site (Ecology 2007). These criteria remained unchanged in the First Amendment to the Consent Decree (Ecology 2011). Site cleanup levels and points of compliance include the following:

- **Sediment quality standard (SQS) for site-associated contaminants:** Sediment cleanup levels for site-associated contaminants were defined in the CAP, including mercury, phenolic compounds, and PAH compounds. For these compounds, the cleanup levels have been established at the SQS. Compliance with the SQS is to be determined using a combination of chemical testing and contingent bioassay testing. Samples that exceed the chemical SQS but pass bioassay testing are considered to comply with the SQS, consistent with Washington's SMS regulations.
- **Bioaccumulation screening level for mercury:** An additional requirement was established in the CAP and Consent Decree for mercury, to ensure that the cleanup protects against potential bioaccumulation of mercury and methylmercury compounds. This screening level is 1.2 mg total mercury/kg dry weight. This value was developed using area-weighted averaging, but is to be applied throughout surface sediments at the Site.
- **Sediment points of compliance:** Compliance with the sediment cleanup levels is measured based on the upper 12 cm of the sediment bed. In addition, while cleanup levels do not directly apply to sediment below 12 cm, the SMS require that the potential risks of the current or future exposure of deeper sediments be considered and minimized through the implementation of the cleanup action.

Dioxin/furans are known to be present in surface and subsurface sediments throughout most of Bellingham Bay and other urban bays within Puget Sound. The full range of sources for these compounds in Bellingham Bay has not yet been determined but may include contributions from many sources throughout the bay, including former combustion sources, former GP pulp/paper mill operations, former wood-treating facilities, historic and ongoing stormwater and wastewater discharges, and atmospheric deposition.

The First Amendment references an Ecology evaluation of dioxin and furans in the surface sediments of Bellingham Bay. This work was completed and a report issued in June 2011 (Ecology 2011). Ecology is reviewing these and other acceptable dioxin/furans data, as well as collecting additional data, for the surface sediments of Bellingham Bay to determine if a background concentration can be identified.

In addition, Ecology is revising the SMSs to include a framework for regulating widespread contaminants such as dioxin/furans that currently do not have defined numeric SMS cleanup levels and that typically have multiple historic and ongoing sources. These revisions are slated to be issued for public review in 2012.

These Ecology efforts could result in a future amendment to the CAP addressing dioxin/furans within the Site. Until then, reasonable and prudent measures to address dioxin/furans as part of the cleanup action (e.g., incorporating dioxin/furan concentrations in analysis of dredging depths and management of dredging residuals, evaluating dioxin/furan mobility as part of capping design, and incorporating dioxin/furan analysis in planned compliance monitoring) have been incorporated into the preliminary design concept as described in this PDCR.

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### 3 CONSTRUCTION PROJECT FOR PHASE 1 AREAS

This section describes the construction project to be implemented to address cleanup action requirements within Phase 1 areas of the Site (Figure 2). This will include work within the Inner Waterway (Units 2A and 3B), the Log Pond (Unit 4), and a portion of the BST (portions of Unit 1C). This section is divided into the following subsections:

- Section 3.1 describes the design concept for each construction element and Site area.
- Section 3.2 presents the project permitting required to implement this work.
- Sections 3.3 and 3.4 describe the compliance monitoring and contingency response actions for the Phase 1 areas.
- Section 3.5 describes the institutional controls required for the Phase 1 areas.
- Section 3.6 discusses how the cleanup work will be coordinated with ongoing work at the adjacent Central Waterfront and GP West cleanup sites.

#### 3.1 Design Concept

Figure 2 summarizes the construction work to be performed within the Phase 1 cleanup areas. This work will be designed, permitted, and constructed as a discrete construction project.

##### 3.1.1 Site Preparation

A number of site preparation activities are required in order to complete construction within the Phase 1 cleanup areas. These include:

- **Sediment offloading area:** If sediments are transported for disposal by truck or rail from the GP West site, then a sediment offloading facility will be developed using the GP West dock. This on-site offloading area will be made available to the contractor should they elect to design, construct, and manage the transload, stockpile, dewatering, and rehandling facility on the Port's property. The contractor may also elect to transport sediment and debris by barges to an off-site location where offloading, stockpiling, dewatering, and rehandling will occur. The specifications will allow contractor flexibility to select their preferred transload location for completion

of these activities, but require minimum performance standards be met during the use of such facilities.

- **Construction of rail switching and potential transload facilities:** The main line of the Burlington Northern Santa Fe (BNSF) railroad passes adjacent to the GP West property on the south and east sides. The Port is currently in discussions with BNSF to install rail switching that would allow for access to a spur line (to be constructed) that would be suitable for off-site rail shipment of sediments from the Site. Discussions between the Port and BNSF are ongoing and no formal agreements regarding installation of this switch have been reached at this time. The Port currently anticipates that switching will be installed and that rail access will be available for use by a contractor during the Phase 1 construction.
- **Preparation of material management areas:** Port-owned land within the GP West mill site and within the Central Waterfront site will be used for necessary transload, stockpile, dewatering, and rehandling areas, unless the selected contractor provides a suitable off-site facility where these activities can be performed. Two general stockpile and equipment staging locations are anticipated for use by the contractor for completion of the Whatcom Waterway cleanup project:
  - **GP West staging areas:** A stockpile/dewatering area will be made available to the contractor at the former GP West mill site for stockpiling of dredged sediment and debris. This stockpile is anticipated to be necessary in order to create sufficient buffer capacity to coordinate with maximum landfill facility production rates so that the contractor can manage the daily throughput for transporting contaminated sediment and debris to the landfill. Additional stockpiles may be prepared if dewatering is performed prior to sediment loading, transportation, and disposal.
  - **Central Waterfront staging areas:** An additional staging and stockpile area may be developed at the Central Waterfront site to stage debris and construction materials used during shoreline stabilization and capping activities there.
- **Water management:** Stormwater and wastewater will be appropriately managed at all upland materials transload, stockpile, and rehandling areas. All stormwater will be filtered through appropriate filter media if the stormwater flows through impacted

sediments. Debris stockpiles may be covered to protect against rainfall infiltrating into contaminated stockpiles, or stormwater may be collected and treated. The contractor will be responsible for preparing a Stormwater Pollution Prevention Plan (SWPPP) that meets applicable regulatory and permit requirements. Water generated on the GP West property will be managed using the ASB and the Port's National Pollutant Discharge Elimination System (NPDES) permit. This permit was recently modified by Ecology to specifically authorize management of water from sediment handling and remediation activities. The Port has submitted a timely renewal application for this permit to Ecology. A new SWPPP and construction stormwater permit will be obtained for work to be performed in upland areas of the Central Waterfront (those outside the capture area of the ASB) if necessary.

### **3.1.2 Outer Waterway Dredging (Unit 1C)**

Impacted sediments within the Phase 1 areas of Unit 1C will be removed by dredging to the extent technically practicable. The elevation of dredge cuts is expected to range from neat line elevations of 35 feet to 40 feet below mean lower low water (MLLW) in Berth 1 of Unit 1C (plus additional overdredge allowances) . Dredging in Berth 2 is limited to removal of a high-spot area that poses an increased potential risk of cap recontamination due to potential propwash effects.

The final dredging prism will be documented in the EDR and will consider geotechnical and structural integrity limitations associated with existing piers and structures in the BST area. The dredging will remove contaminated sediments from the federal navigation channel areas, and allow for future unencumbered channel maintenance in these areas. Stable side slopes will be established in between Unit 1C dredging areas and the sediments in adjacent areas. Under-dock areas will not be dredged as part of the construction project for Phase 1 areas. These areas are addressed as part of the work in Phase 2 areas (see Section 4).

Sediments removed during dredging will be barged to an offload facility and transferred to railcars or trucks for transportation to a permitted Subtitle D landfill facility. Examples of currently permitted regional landfill facilities include, but are not limited to, the Allied Waste landfill facility in Roosevelt (Washington) and the Waste Management landfill

facilities located in Wenatchee (Washington) and Columbia Ridge (Oregon). Post-dredging residual sediment contamination will be considered as part of design and permitting and will include the use of best practices to manage residuals. The design concept includes verification testing to document dredging performance and removal of target sediments, followed by placement of clean sand cover (estimated thickness between 6 inches and 1 foot; to be revisited as part of the EDR) to manage post-dredging residuals.

### **3.1.3 Inner Waterway Dredging and Capping (Units 3B and 2A)**

The federal navigation channel that was in the Inner Waterway was deauthorized in the Water Resources Development Act legislation of 2007. The Inner Waterway includes aquatic lands owned by the Washington Department of Natural Resources (WDNR), the Port, the City, and Meridian Pacific. The cleanup of these areas under the Consent Decree is consistent with the plan management of the Inner Waterway as a multi-purpose waterway with shallow and intermediate drafts.

Impacted sediments in the Inner Whatcom Waterway will be partially removed by dredging, and remaining sediments will be contained using an armored sediment cap. Sediments removed during dredging will be barged to an offload facility and transferred to railcars or trucks for transportation to a Subtitle D landfill facility. Approximate dredging and capping areas are shown in Figure 2.

The design concept assumes that the engineered cap within the Phase 1 areas of the Inner Waterway will be placed such that the top of the cap is located at least 2 feet below the “effective water depth” of the waterway (i.e., the water depth to be actively maintained to support navigation uses). The top of cap elevations in the waterway bottom areas will be between 20 and 22 feet below MLLW, providing effective water depths of between 18 and 20 feet below MLLW. This 2-foot difference allows for future maintenance dredging to be performed in the navigation areas without disturbing the cap.

During design and permitting, cap design details will be finalized, including the cap thickness and material type, capping side slopes, and armoring design. Armoring is expected throughout all capping areas, though the type and thickness of armoring will vary by

location. Analyses of propwash, wave erosion, and other potential cap disturbances are being conducted during remedial design, and appropriate measures will be included in design of the cap to protect against cap erosion or instability. At this time, the cap in Phase 1 waterway areas is anticipated to have a nominal thickness of 3 feet, including both the chemical isolation and armoring layers or functions. The design and protectiveness of the final cap thickness will be documented in the EDR.

The shoreline slopes along the north and south sides of the Waterway are to be capped. The work along the north side of the Waterway addresses co-located sediment contamination associated with both the Whatcom Waterway and the Central Waterfront site. The stabilization and capping of this shoreline is being conducted pursuant to Port-City interlocal agreements for the cleanup of the Chevron and Colony Wharf properties. Shoreline stabilization measures will also address source control requirements necessary to protect the cap against recontamination from upland soils and groundwater. The coordination of the Whatcom Waterway and Central Waterfront site cleanups is described in Section 3.6.

The construction of the cap for the north and south sides of the waterway areas will include multiple construction activities. Final slope configurations will vary by subarea as necessary to provide stable completed shoreline slopes, minimize required fills in navigable waters, and minimize potential impact to existing uses and adjacent structures. Construction elements for these shoreline areas include the following:

- **Dock and structure removal:** The former Chevron dock will be permanently removed. The timber catwalk and foam tank located adjacent to the clarifier bulkhead will also be removed permanently.
- **Piling removal and replacement:** The row of existing timber pilings and dolphins located on the north side of the waterway will require removal to perform shoreline capping and armoring. Some of these pilings will need to be replaced in order to preserve existing waterway functions and provide for equipment moorage during cleanup project construction activities. Piling replacements will be performed after construction of the cap using appropriate materials (i.e., use of concrete or steel piles rather than treated wood piling). The dolphins located adjacent to the clarifier

bulkhead are being evaluated as part of engineering design for remediation in this area.

- **Sloping shoreline capping:** Sloped shoreline caps will be constructed along most areas and will be armored with stone to protect against wave and propwash erosion. The final side-slopes in these areas will be 2 horizontal to 1 vertical (2H:1V) or flatter from approximately mean higher high water (MHHW) to the toe of the slope. In some areas, a wall structure may be used to achieve a vertical slope between approximately MHHW and the final grade in the adjacent uplands, while minimizing potential required fills of navigable waters. In the Central Waterfront area, the protectiveness of the cap design is being reviewed by Ecology in light of upland soil and groundwater contamination, and additional measures may be incorporated into the capping design as needed based on the findings of Ecology's review.
- **Remediation of existing bulkheaded shorelines:** Existing bulkheads are present in multiple areas of the waterway as shown in Figure 2. Bulkhead replacement, removal, or containment by slope capping will need to be conducted to ensure that the waterway cap is stable. These measures will be designed to allow completion of the Whatcom Waterway remediation project, provide stable completed shoreline caps, minimize required fills in navigable waters, and minimize potential impact to existing uses and adjacent structures. The detailed design will be documented in the EDR. Current design concepts and alternatives for existing bulkhead areas are described below:
  - **Central Waterfront shoreline bulkheads:** Two existing bulkheads are located within the Central Waterfront Site, at the Colony Wharf and Chevron subareas. The locations of these two existing bulkheads are shown in Figure 2. The soils and groundwater behind these two bulkheads are known to be impacted by petroleum contamination. The shoreline stabilization and capping activities in these areas must consider potential ongoing source control and cap recontamination concerns associated with that upland contamination. Options for addressing shoreline stabilization and capping in these areas are being evaluated as part of the EDR development. The shoreline stabilization and capping at the former Colony Wharf property must also address remediation requirements in a manner that minimizes impacts to existing structures and uses at this City-owned

property. Based on these requirements, the design approach for the Colony Wharf bulkhead area will likely include construction of a sheetpile bulkhead just offshore of the existing bulkhead. The design of the bulkhead will address soil and groundwater source control requirements, and allow for capping of sediments in adjacent portions of the waterway at elevations (8 to 10 feet below MLLW) compatible with existing uses and structures. The approach for the Chevron bulkhead area is being reviewed in light of Ecology source control expectations for this area and could include construction of a full or partial bulkhead, or a sloping cap, or some combination of approaches to protect and stabilize the shoreline. Upland elevations and grades within the Central Waterfront site are assumed to remain the same as existing, consistent with planning activities for the marine trades area.

- **Clarifier bulkhead:** The shoreline at the existing clarifier bulkhead may be stabilized by one of two methods. One option is to place a new steel sheetpile wall just offshore of the existing bulkhead. The other option is to cut back the existing bank as necessary to allow construction of a stable, sloping cap from the base of the waterway to the top of the slope. Options for addressing this shoreline are being reviewed as part of ongoing engineering design and the selected option will be documented in the EDR. Extensive soil and groundwater testing has been performed as part of the GP West Remedial Investigation in this area, and those data are being evaluated as part of that review. The cap or bulkhead stabilization will consider current and planned upland elevations, which may be increased by approximately 2-3 feet over existing grade to accommodate potential sea-level rise.
- **Meridian Pacific property bulkhead:** A damaged bulkhead section is located on the Meridian Pacific Highway, LLC (Meridian Pacific) property. This property is not located within the Central Waterfront cleanup site, and there are no known upland recontamination concerns in this area. Full removal of this bulkhead section is not safe given the proximity of the adjacent building (approximately 10 feet from the bulkhead). The impacted sediments located in front of this bulkhead will be capped, with the cap surface extending to an elevation of

approximately MHHW. Voids behind the damaged bulkhead wall will be filled with clean fill material.

### **3.1.4 Log Pond Contingency Action (Unit 4)**

The Log Pond area was previously remediated as part of an Interim Action completed in 2001 (Anchor, 2001a). Results of multi-year monitoring (Anchor 2001b, Anchor 2002, and RETEC 2006) have confirmed that the majority of the cap is meeting performance objectives; however, some erosion has occurred at the shoreline edges where the cap was the thinnest, exposing or threatening to expose mercury-contaminated sediment. As part of the final cleanup of the Site, contingency actions will be taken to contain exposed contaminants and to prevent further cap erosion.

As shown in Figure 2, actions in the Log Pond area will include modifications to the shoreline edges of the cap to ensure long-term stability. These modifications include the placement of cap material of appropriate size. Unused timber piling will be removed from the Log Pond as necessary to construct these actions.

Side slopes within the southern, central, and northern Log Pond shorelines will be modified, with placement of cap materials (appropriate grades of sand and gravel with armor stone) that will be stable under anticipated wind and wave conditions. A coarser stone armor material will likely be required in the central and northern shoreline areas due to higher wave energies occurring in these areas. Specific material sizing will be documented in the EDR.

Capping adjacent to BST will include stabilization and capping of the shoreline. This area currently includes a creosote-treated timber bulkhead. This shoreline will be stabilized using a newly constructed armored slope. Existing timber piling will be cut off within the lower portion of the bulkhead structure prior to cap and armor placement.

Design and permitting will include assessment of habitat changes associated with the shoreline modifications within the Log Pond, including any potentially required mitigation measures.

### **3.1.5 Monitored Natural Recovery**

MNR will manage Units 3A, 5A, 5C, 6A, 7, 9, and those portions of 5B, 6B, and 6C that are currently meeting site cleanup levels. See Section 5 for a discussion of these areas. No construction is planned in these areas; however, monitoring is required as part of the Site cleanup to document compliance with Site cleanup levels. The Phase 1 EDR will include a monitoring plan to evaluate the effectiveness of natural recovery processes in these areas.

## **3.2 Permitting**

The construction project addressing cleanup requirements in the Phase 1 areas will require the following permits:

- **Nationwide 38 permit:** Because no activities other than those required to implement the cleanup are to be conducted, it is anticipated that construction work for Phase 1 areas will be performed under a Nationwide 38 permit. The federal permitting process includes review of issues relating to wetlands, threatened and endangered species, habitat impacts, historical/archeological resources, and dredged material management. Because the Site area is potential habitat for threatened and endangered species, the permit process will include Endangered Species Act (ESA) review. The National Marine Fisheries Service and the United States Fish and Wildlife Service will perform the review as part of the USACE permit process. As part of the federal permit process, the USACE will review the cleanup actions to determine whether they will disturb historical or archaeological resources as required under the National Historic Preservation Act (NHPA).
- **National Pollutant Discharge Elimination System permitting:** A permit is required for discharge of generated wastewaters to waters of the United States pursuant to Section 402 of the Clean Water Act. The cleanup of the Site will generate wastewater and contaminated stormwater from upland sediment handling areas that will be treated and either discharged to the local sanitary sewer system or to surface water. Management of stormwater and waters from dredge material management is allowed under the existing NPDES permit maintained by the Port for the ASB and associated outfall. The Port has submitted a timely application for renewal to Ecology for this

permit. The construction work may also require a construction stormwater general permit for certain activities.

- **Washington State scientific collection permit:** Long-term monitoring following completion of construction in Phase 1 areas is anticipated to include crab tissue collection and analysis. Permits are required from WDFW for the collection of food fish, shellfish, or wildlife or their nests and/or eggs for the purpose of research or display pursuant to WAC 220-20-045 and WAC 232-12-276. WDFW issues this permit as part of their management and protection of the resource.

The cleanup will meet the substantive requirements of permits or approvals that are procedurally exempt under RCW 70.105D.090. The Washington Department of Fish and Wildlife (WDFW) and the City will be consulted as part of cleanup design and permitting to ensure consistency with substantive requirements. The substantive requirements of the following regulatory programs known at this time to be applicable to the cleanup will be followed:

- **Hydraulic project approval:** The project will not require a formal hydraulic project approval (HPA). HPAs are issued by WDFW and define state requirements for construction activities in order to avoid unnecessary disturbance to fish, shellfish, and wildlife. The Port and Ecology will work with WDFW to ensure protection of fish, shellfish, and wildlife during project construction.
- **Shoreline Management Act:** The substantive provisions of the City's Shoreline Master Program will be considered by Ecology as part of the EDR process, but no shoreline permit is required.
- **Critical Areas Ordinance:** The substantive provisions of the City's Critical Areas Ordinance will be considered by Ecology as part of the EDR process, but no critical areas permit is required.
- **Water quality review from the State of Washington pursuant to Section 401 of the Clean Water Act:** No formal 401 water quality certification will be required from Ecology. Water quality issues are addressed by Ecology as part of the EDR review and approval.

The placement of caps on state-owned aquatic lands managed by DNR will also involve development of appropriate agreements (e.g., easement agreements) consistent with the planned remedial action. These agreements will address some of the requirements of the institutional controls required for capping areas (see Section 3.5).

### **3.3 Compliance Monitoring**

Compliance monitoring and contingency responses (if needed) will be implemented in accordance with WAC 173-340-410, Compliance Monitoring Requirements. Detailed requirements for Phase 1 areas will be described in a site Construction Quality Assurance Plan (CQAP) and a Compliance Monitoring and Contingency Response Plan (CMCRP) to be prepared as a part of the Phase 1 EDR.

The objective of these plans is to confirm that cleanup standards have been achieved and also to confirm the long-term effectiveness of cleanup actions at the Site. The plans will contain discussions on duration and frequency of monitoring, the trigger for contingency response actions, and the rationale for terminating monitoring. The plans will be subject to public review as part of a draft Phase 1 EDR. The three types of compliance monitoring to be conducted include:

1. **Protection monitoring:** This type of monitoring is used to confirm that human health and the environment are adequately protected during the construction period of the cleanup action.
2. **Performance monitoring:** Performance monitoring is used to confirm that the cleanup action has attained cleanup standards and other performance standards.
3. **Confirmation monitoring:** Confirmation monitoring is used to confirm the long-term effectiveness of the cleanup action once performance standards have been attained.

The cleanup action for Phase 1 areas incorporates monitoring to determine whether cleanup standards have been achieved. The categories of compliance monitoring to be undertaken in Phase 1 areas include:

- **Water quality (protection monitoring):** During construction, various controls will be implemented as feasible to ensure water quality protection within the Site area.

Protection will be verified through a combination of intensive monitoring (e.g., once per construction shift) and routine monitoring (e.g., once weekly). Protection monitoring will identify the need for further controls as appropriate.

- **Sediment quality in removal and cap areas (performance monitoring):** The effectiveness of sediment removal during and following construction will be verified in a two-step sequence. First, physical surveys (as outlined above) will be performed to verify that dredging has achieved required dredge depths, which will be developed during remedial design. Water quality monitoring and sediment monitoring will be used to assess potential dredging residuals impacts outside of dredge areas. In capping areas, physical surveys will be used to ensure that desired cap thicknesses and side slopes are achieved. In the second step, post-construction (Year 0) surface sediment samples (0 to 12 cm) will be collected and analyzed for mercury, phenol, 4-methylphenol and dioxins as part of performance monitoring.
- **Physical integrity (performance and confirmation monitoring):** Monitoring will be conducted during the remedial action to guide construction activities. Following completion of construction, long-term physical monitoring of cap surfaces and naturally recovered areas will be performed to verify that they are not substantially eroded over time by natural and anthropogenic forces. Engineering cap thickness and natural recovery thickness will be periodically assessed and compared with the minimum required thickness determined during remedial design to ensure integrity of the caps. This monitoring will incorporate bathymetric surveys, sediment cores, and direct inspections of intertidal and shoreline areas.
- **Sediment quality in cap areas (confirmation monitoring):** Sediment quality in the caps constructed within the Phase 1 areas will be documented during long-term confirmation monitoring. This monitoring will be conducted in parallel with monitoring of MNR areas as described in Section 5. Where enhanced natural recovery is used as part of management of dredge residuals, then these areas will also be included within the scope of confirmation monitoring. Sediment quality monitoring events are anticipated to be conducted during years 1, 3, 5, 10, 20, and 30 after completion of the construction activities. Additional monitoring events may be required or the term extended in the event that sediment areas are shown during physical and chemical monitoring to be unstable or to exhibit recontamination.

Chemical and/or confirmatory biological monitoring of surface sediments will be performed to verify that these areas achieve and maintain compliance with site cleanup levels as described in the CAP (Ecology 2007).

### 3.4 Contingency Response Actions

The EDR will define specific performance standards for each element of the cleanup action. During construction, contingency response actions could be triggered by a number of types of events. The following types of contingencies shall be addressed in the CQAP:

- **Achievement of physical performance standards:** Construction contingencies shall address compliance with physical performance standards such as dredging depth or target cap elevation and thickness. Contingencies could be triggered by the presence of unanticipated field conditions and generally can be addressed through modifications of equipment selection, dredging/capping methods, or production rate.
- **Dredging residuals management:** Ecology expects that the CQAP will consider potential management options and contingencies for dredge residuals. These contingencies shall address potential contingencies such as limited redredging or use of MNR or enhanced natural recovery. These contingencies are relevant in dredge areas where subsequent capping is not included in the proposed cleanup action (i.e., Unit 1C). Water quality monitoring and sediment monitoring will be used to assess potential dredging residuals impacts outside of dredge areas.
- **Water quality impacts:** Construction contingencies shall be considered in the event that water quality performance standards are not met during dredging or capping. These contingencies may include actions such as implementing operational controls or additional best management practices; or temporarily ceasing operations, assessing the cause of the water quality problem, defining appropriate measures to correct the problem, and making appropriate notifications and reports to Ecology relating to the water quality problem and the measures taken to correct the problem.

Contingency response actions could also be triggered after completion of construction. The following types of contingencies shall be addressed in the CMCRP:

- **Sediment recontamination:** The potential for sediment recontamination will be monitored as part of long-term sediment monitoring. The CMCRP will discuss triggers and potential contingency responses including response timelines if recontamination is observed. Generally these responses will include collection of appropriate data to define the source and extent of recontamination, assessment of control options for the source of the recontamination (e.g., implementation of enhanced stormwater source control and/or treatment), and implementation of appropriate corrective measures for the area of recontamination (e.g., monitoring, capping, or dredging as appropriate to the location, extent, and stability of the affected area).
- **Performance and stability of sediment caps:** The sediment caps to be placed as part of the cleanup are intended to be stable under site conditions and anticipated land and navigation uses. The physical integrity of the caps will be monitored to ensure that they are not substantially eroded by natural or anthropogenic forces. If the physical integrity of the caps is compromised, then contingency response measures will be implemented in a timely manner. Generally these responses will include collection of appropriate data to define the source and extent of the cap erosion, assessment of potential control options, and implementation of appropriate corrective measures for the affected area. These corrective measures could include placement of additional cap material, construction of protective groins or armoring, or modifications to cap elevation through dredging and new material placement.

### 3.5 Institutional Controls

The remedial action includes institutional controls. Institutional controls include a number of measures to be implemented to protect the integrity of the remedial action. These measures include both restrictive covenants and other measures as described below.

Prior to completion of the construction project in Phase 1 areas, an Institutional Control (IC) Plan will be developed for Ecology review and approval, in consultation with the appropriate federal, state, and local agencies. The IC Plan will outline anticipated restrictive covenants to be filed for the Site capping and MNR areas. The IC Plan will also address such matters as waterway signage on prohibited activities, vessel size and speed, signage regarding protection

of capped areas, lease prohibitions or usage restrictions and notifications, and a plan for enforcing the waterway restrictions. The current remedial action anticipates ongoing navigation uses, navigation maintenance dredging, and other activities in portions of the Site following completion of the remedial action. The IC Plan for the Site will consider these ongoing uses and maintenance activities.

MTCA restrictive covenants are one part of the planned institutional controls. Restrictive covenants document the nature and extent of contamination and the remedial action. Restrictive covenants limit activity on the property to those activities that will not interfere with the integrity of the remedial action. For example, they limit uses of the cap and natural recovery areas to those that do not interfere with the remedial action, and prohibit the modification of cap and natural recovery areas without the consent of Ecology. In addition, restrictive covenants require owners of the property to notify all lessees or property purchasers of the restrictions on the use of the properties. Finally, restrictive covenants require the owners of the properties to make provisions for continued monitoring and operation and maintenance of the remedial action prior to conveying title, easement, lease, or other interest in the property. Restrictive covenants will be subject to Ecology's approval before being recorded.

In addition to the notification and review requirements of the restrictive covenants, future in-water construction activities are also subject to additional project reviews under state and federal permitting authorities (e.g., USACE Section 10/404, WDFW HPA, and Ecology water quality certification, and City of Bellingham permitting requirements).

Restrictive covenants will be recorded with Whatcom County for all areas capped as part of the construction project in Phase 1 Areas. These restrictive covenants will be filed upon completion of the active cleanup measures. For state-owned properties, the restrictive covenants will be recorded in the WDNR's index plates and property files used to track ownership and use activities for state-owned aquatic lands. These may include easements for constructed cap areas. These controls will remain in place indefinitely unless removal is approved by Ecology. Restrictive covenants are expected to be placed in the cap construction areas listed below. Anticipated uses in each area are described below:

- **Capping areas within the Inner Waterway (Units 2A and 3B, including overlapping Central Waterfront site areas):** These portions of the Inner Whatcom Waterway are to be capped and armored, including the southern shoreline of the Central Waterfront site. Navigation uses in these areas will include operations as a locally managed, multi-purpose channel. The Port, WDNR, and USACE completed the deauthorization process for the federal navigation channel in this area during 2007. Operation of the multi-purpose channel will include periodic maintenance dredging by the Port (in conjunction with other property owners along the Waterway) to maintain water depths, but future deepening or widening of the channel is not anticipated. Channel dimensions and Central Waterfront shoreline configurations are to be established as part of the Phase 1 EDR. Future land uses along the Inner Waterway are expected to consist of marine trades and mixed-use redevelopment consistent with updated property zoning.
- **Capping areas within the Log Pond (Unit 4):** Areas within the Log Pond are currently capped, and that cap will be modified as part of the Log Pond contingency actions. The existing restrictive covenant placed at the time the Interim Action was completed will be replaced or amended as necessary to address the scope of the cap modifications. The Log Pond is a Bellingham Bay priority habitat restoration area. Navigation use in the nearshore portions of the Log Pond is not anticipated, with the exception of small boat access (i.e., kayaks or hand-carry boats). Navigation within the outer portion of the Log Pond is expected to be limited to small boat access to support BST vessel-mooring activities (e.g., use of small boat to attach bow/stern lines to the mooring dolphins within the Log Pond). Public shoreline access may be provided in the future to a portion of the Log Pond shoreline as part of planned redevelopment of the GP West mill site. No deepening for navigation uses is anticipated for the Log Pond area.

### **3.6 Coordination with Other Actions**

The construction project associated monitoring activities occurring in Phase 1 areas will be conducted in coordination with other actions overseen by Ecology as described below:

- **Central Waterfront cleanup:** The Central Waterfront site shares more than 1,200 linear feet of shoreline with the Whatcom Waterway. The Central Waterfront site is approximately 55 acres, and is undergoing an RI/FS consistent with a MTCA agreed order between the Port and Ecology. Site coordination issues considered as part of the engineering design for Phase 1 areas include the following:
  - **Remediation of co-located surface sediments:** Surface sediment contamination from historic upland boatyard activities along the southern shoreline of the Central Waterfront site includes copper, zinc, and tributyl tin. Contaminated surface sediments from the Central Waterfront site overlay buried mercury-contaminated sediment that comprises part of the Whatcom Waterway Site. These surface sediments will be remediated as a consequence of the construction activities in the Phase 1 cleanup areas. Remediation of these surface sediments will require the removal of certain piling/dolphin structures, some of which will be replaced following remediation of the sediments.
  - **Shoreline stabilization and source control measures:** Areas of upland soil and groundwater contamination are located along portions of the shoreline at the former Chevron and Colony Wharf properties. Stabilization of these shoreline areas is required in order to permit the remediation of the Whatcom Waterway sediments, and to prevent future cap instability and potential recontamination of waterway sediments by bank erosion. Additional measures may be required to prevent recontamination of the waterway sediments by direct migration of contaminated groundwater or hydrocarbon products from adjacent upland areas. The design for shoreline capping and stabilization measures along this portion of the shoreline includes review of measures potentially necessary to address these source control concerns. The final shoreline stabilization design will be documented in the EDR.
  - **Interim cleanup action—petroleum seepage area:** A small area of recurring petroleum seepage along the Whatcom Waterway shoreline will be remediated under an amendment to the existing Central Waterfront agreed order. This interim cleanup action will be completed prior to initiation of Whatcom Waterway construction activities.

- **Final Central Waterfront cleanup action:** Cleanup actions in upland areas of the Central Waterfront site, including any associated monitoring activities, will be implemented separately as part of the final Ecology-selected cleanup remedy for the Central Waterfront site. The final Central Waterfront site remedy is to be documented in a CAP and Consent Decree. These documents will also document the work completed in overlapping site areas as part of the Whatcom Waterway construction effort, as well as any additional actions required to complete the cleanup of the Central Waterfront site.
- **Opportunities for coordinated long-term monitoring:** The specific monitoring requirements associated with the Whatcom Waterway site will be documented in the Phase 1 EDR. To the extent that the cleanup action at the Central Waterfront site requires in-water monitoring, the monitoring programs for the two sites may be coordinated where appropriate.
- **GP West site cleanup:** The Phase 1 construction activities include construction along two portions of the GP West shoreline.
  - **Log Pond construction:** Construction activities within the Log Pond abut the GP West cleanup site, which is undergoing an RI/FS and interim remedial actions to address soil and groundwater contamination. The protectiveness of the sediment capping to be implemented within the Log Pond is being evaluated in coordination with the groundwater fate and transport evaluations being conducted at the GP West site. The protectiveness of the cap in this area will be documented in the EDR. The monitoring work required for the cap within the Log Pond will be coordinated with GP West site monitoring and is expected to address in-water monitoring requirements for both the Whatcom Waterway and GP West sites. The specific monitoring requirements will be documented in the Phase 1 EDR.
  - **Capping of south shoreline near clarifier bulkhead:** Capping of the south shoreline near the existing clarifier bulkhead will require stabilization of this shoreline. No groundwater contamination has been detected during testing performed in the clarifier bulkhead areas as part of the GP West RI/FS activities. However, shoreline stabilization is required to prevent potential sediment cap instability and

to prevent potential re-contamination of sediments via bank erosion of upland soils. Options for addressing these stabilization requirements include construction of a bulkhead structure or alternately, sloping and capping the shoreline. The final approach selected for this area will be described in the EDR, and the construction work will be completed as part of the Whatcom Waterway cleanup.

- **Final GP West cleanup:** Upland cleanup actions and associated monitoring activities will be implemented separately as part of the final Ecology-selected cleanup remedy for the GP West cleanup site. The final GP West site remedy is to be documented in a CAP and Consent Decree.

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## 4 CONSTRUCTION PROJECT FOR PHASE 2 AREAS

This section describes the construction project to be implemented to address cleanup action requirements within Phase 2 areas of the Site. The construction project addressing these distinct Phase 2 areas will include work in Units 2B, 5B, 6B, 6C, 8, and a portion of 1C. This section is divided into the following subsections:

- Section 4.1 describes the design concept for each construction element and Site area.
- Section 4.2 presents the project permitting required to implement this work.
- Sections 4.3 and 4.4 describe the compliance monitoring and contingency response actions for the Phase 2 areas.
- Section 4.5 describes the institutional controls required for the Phase 2 areas.
- Section 4.6 discusses how the cleanup work will be coordinated with other ongoing work.

### 4.1 Design Concept

Figure 3 summarizes the construction work to be performed within the Phase 2 cleanup areas. This work will be designed, permitted, and constructed in coordination with certain waterfront redevelopment activities that are associated with and dependent on the cleanup actions in these areas. Permitting and environmental review for these activities is to be coordinated as described in Section 4.2.

#### 4.1.1 Site Preparation

A number of site preparation activities are required in order to complete construction work within the Phase 2 cleanup areas. These include:

- **Sediment offloading area:** ASB sludge will likely be transported for disposal by truck or rail from the GP West site. A sediment offloading facility will be developed using the GP West property. This on-site offloading area will be made available to the contractor should they elect to design, construct, and manage the transload, stockpile, dewatering, and rehandling facility on the Port's property. The contractor may also elect to transport sediment and debris by barges to an off-site location where offloading, stockpiling, dewatering, and rehandling will occur. The specifications will

allow contractor flexibility to select their preferred transload location for completion of these activities, but require minimum performance standards be met during the use of such facilities.

- **Material management areas:** Port-owned land within the GP West mill site and the Central Waterfront site will be used as necessary for transload, stockpile, and rehandling areas. Two general stockpile and equipment staging locations are anticipated for use by the contractor:
  - **GP West staging areas:** Multiple stockpile/dewatering areas will be made available to the contractor at the former GP West mill site for stockpiling of dredged sediment and debris. This stockpile is anticipated to be necessary in order to create sufficient buffer capacity to coordinate with maximum landfill facility production rates so that the contractor can manage the daily throughput for transporting contaminated sediment and debris to the landfill. Additional stockpiles may be prepared if dewatering is performed prior to sediment loading, transportation, and disposal. Stockpiles will also be required for management of clean dredge sands from Unit 8 (from beneath the ASB) prior to their reuse.
  - **Central Waterfront staging areas:** An additional staging and stockpile area may be developed at the Central Waterfront site adjacent to the ASB to facilitate construction within Unit 8. This area will likely be located between the warehouse building and the ASB.
- **Water management:** Stormwater and wastewater will be appropriately managed at all upland materials transload, stockpile, and rehandling areas. Provisions for water management will generally be consistent with those for construction in Phase 1 areas. As described in Section 3.1.1 for Phase 1 areas, the cleanup of the Site will generate wastewater and contaminated stormwater from upland sediment handling areas that will be treated and either discharged to the local sanitary sewer system or to surface water. Management of stormwater and waters from dredge material management is allowed under the existing NPDES permit maintained by the Port for the ASB and associated outfall. The construction work may also include an additional construction stormwater permit for certain activities occurring outside of the drainage area for the

Port's existing NPDES permit. During the cleanup of Phase 2 areas, the following additional actions may be required to support water management:

- **ASB outfall isolation:** Prior to remediation of the ASB sludge, the ASB will be isolated from the adjacent outfall. Permitting for this change will be addressed as part of NPDES permitting prior to implementing this work.
- **Return water management within the ASB:** Some dredging activities may involve a full or partial closed-loop water management within the ASB in order to minimize the quantity of water requiring treatment and discharge. For example, return flows from hydraulic dredging of clean reusable ASB sands may be returned to the ASB in a closed-loop system.
- **NPDES permit modifications or renewal:** Prior to construction in Phase 2 areas, the NPDES permit for the ASB and outfall will be modified or renewed to incorporate appropriate cleanup project requirements. The Port does not anticipate continued use by the Port of the GP-owned outfall following completion of cleanup construction in the Phase 2 areas. Any future uses of the outfall beyond completion of the cleanup action would be determined by GP.
- **ASB site preparation activities:** Preparation for ASB sludge removal requires completion of a number of specific activities within or adjacent to the ASB:
  - **Remove weirs:** Weirs that exist within the ASB will be demolished and removed from the ASB with mechanical dredging or similar demolition equipment.
  - **Remove aerators:** Aerators and associated pipelines and debris that exist within the ASB will be demolished and removed with mechanical dredging or similar demolition equipment.
  - **Construct gravel ramps:** Gravel ramps will be constructed to facilitate access to the ASB berm and within the ASB by construction equipment and personnel with purchased gravel.
  - **Disconnect outfall outlet structure:** The existing outlet structure will be modified as necessary to isolate the ASB from the outfall during remediation. As described above, the permitting for this change will be addressed in NPDES permit modification or renewal.

- **Remove and recycle berm asphalt:** Asphalt surfacing that is present on the upper 8 vertical feet of the ASB berm slopes will be removed by mechanical dredging equipment or land-based or barge-mounted excavation equipment. The asphalt will be crushed and reused (e.g., for subgrade fill or road base at the GP West mill site) on Port property.

#### **4.1.2 Aerated Stabilization Basin Sludge and Transition Sand Removal**

Pursuant to the First Amendment to the CAP (Ecology 2011), sludge and impacted sediments (transition sands) immediately underlying the sludge that exceed cleanup standards will be removed from the ASB by dredging. Contaminated materials will be disposed in a permitted upland landfill.

The design concept for ASB sludge and transition sand removal includes multiple steps.

- First, the water level in the ASB will be lowered and the connection between the ASB and the outfall will be sealed.
- Second, the water treatment equipment (aerators and weirs) will be removed as described in Section 4.1.1 above.
- Third, the contaminated ASB sludge will be removed. The dredged materials may be treated to enhance separation of solids from the entrained waters. Separated solids will be shipped and disposed in a permitted upland landfill. Produced waters from dredging and materials handling will be returned to the ASB in a fully or partially closed-loop system or will be treated and properly disposed. The maintenance of a water layer overlying the sludge during removal was identified in the RI/FS as a method for minimizing odors and potential wildlife exposures during sludge removal.
- Fourth, the transition sands at the bottom of the ASB will be removed and transferred to the uplands for use elsewhere or disposal in a permitted upland landfill, depending on contaminant concentrations and reuse options as determined during engineering design.

#### **4.1.3 Removal and Reuse of Aerated Stabilization Basin Sands**

Following removal of contaminated sludge and transition sands from Unit 8, an estimated 340,000 cubic yards of clean sand will be removed and stockpiled for later use. Hydraulic dredging may be used for this site, with recirculation of generated water to the ASB. However, flexibility for equipment choice will be left to the contractor.

The dredging of clean sand will be performed within the approximate limits shown on Figure 3 (limits of confined disposal area). This provides an offset from the toe of the existing ASB berm to prevent destabilization of this area during construction. The base of dredging is limited by the top of the marine drift layer (silt and clay sediments), which cannot be cost effectively removed using the same methods used for removing clean sand.

Stockpile areas for clean sand management will likely be located within the GP West site, which can currently accommodate the area needed for temporary storage of this volume of material. Best management practices and appropriate stormwater management would be used for the clean sediment stockpile area.

#### **4.1.4 Outer Waterway Dredging**

After clean sand is removed from the ASB as described in Section 4.1.3, approximately 184,400 cubic yards of sediment from open-water areas of Units 1A, 1B, and a portion of 1C will be dredged. This includes approximately 124,400 cubic yards from Units 1A and 1B, and approximately 60,000 cubic yards of sediment from portions of Unit 1C. These sediments are anticipated to be dredged mechanically, transloaded over the ASB berm, and placed in the deep-excavated portion of Unit 8. The placement area is to be located shoreward of the Inner Harbor Line, and targeted placement elevations will be deeper than -18 feet MLLW.

Dredging will also be performed in under-dock portions of Unit 1C, located adjacent to Berth 1. This dredging is anticipated to be performed largely by a diver-operated hydraulic dredge. The estimated dredge volume is 7,800 cubic yards. Dredged material and entrained waters from this dredging will be placed in the ASB. This will likely involve accumulation of the

materials in a barge, followed by transloading of the materials to the ASB, and placement within the deep-excavated portion of Unit 8.

Post-dredging residuals will be considered as part of design, and permitting and residuals management will include the use of best practices. These are anticipated to include post-dredge verification testing to ensure removal of target sediments. Placement of clean sediment material (estimated thickness of 6 to 12 inches in open-water areas and thicker sequences in under-dock areas) will be included for post-dredging residuals management.

Dredging is expected to enable future unencumbered maintenance dredging within the federal channel areas of Units 1A, 1B, and 1C. No institutional controls are anticipated for these areas of the Site.

#### **4.1.5 Unit 5B Dredging and Backfill**

Pursuant to the First Amendment to the CAP (Ecology 2011), contaminated sediments within Unit 5B that exceed surface cleanup standards will be addressed by dredging. Dredging is anticipated to be performed mechanically, with removal depths to the base of the contamination or at least 3 feet. No dredging would be performed immediately adjacent to the ASB berm or the buried outfall structure. The total volume of dredging within Unit 5B is estimated at 18,000 cubic yards. These sediments would be transloaded across the ASB berm and placed within the Unit 8 disposal area.

After completion of dredging, the Unit 5B excavation would be backfilled with clean sands. The reusable sands generated from the development of the Unit 8 disposal site are to be used for this backfill. The backfill will restore initial grades as they existed prior to initiation of the dredging. Some gravel or stone armoring material may be incorporated into the backfill if required to maintain long-term sediment stability.

The remaining areas of Unit 5B, as well as 5A and 5C, do not exceed cleanup standards. These areas will still be addressed using MNR as described in Section 5.

#### **4.1.6 Capping of Unit 2C**

Unit 2C is located within portions of the Inner Waterway. In this area, the impacted buried sediments are to be capped. The cap will vary in thickness, generally from about 3 feet to 6 feet, including cap isolation and armor materials. Transitions between Phase 1 and Phase 2 capping areas are expected to occur where the cap is 3 feet thick, transitioning to the thicker cap sections in the areas near the Log Pond. The specific cap dimensions and materials will be defined as part of the Phase 2 EDR. Reusable sands generated from the dredging of the Unit 8 disposal area will be used for a portion of the required cap material.

The existing GP West dock structure is anticipated to remain in place. The capping design for Unit 2C will be designed to prevent structural damage to the dock. This will include use of appropriate cap thickness tapering or cap offsets adjacent to the structure. If the dock structure is removed in the future, the cap area will be extended to the shoreline of the GP West site unless other provisions are made with Ecology for management of these areas.

Portions of Unit 2C are located adjacent to the Log Pond. The BST pier currently extends into one of these sloping areas, which will likely be subject to propwash disturbances. Capping and armoring of this area is to be performed, but cannot be implemented effectively with that pier extension in place. To support capping and armoring of this slope area, the pier extension (Figure 3) will be removed and the area will then be capped. The moorage function previously conducted by the pier extension will be replaced by installing breasting and mooring dolphins on the opposite (i.e., offshore) end of BST.

#### **4.1.7 Capping and Opening the Aerated Stabilization Basin**

After the dredged materials from Units 1A, 1B, 5B, and portions of Unit 1C have been placed within the Unit 8 disposal area, the sediments will be capped with berm transition sediments and a layer of clean sediment.

The berm transition sediments will be removed by dredging, with placement directly over the contaminated sediments. Between 2 and 4 feet of sediments are anticipated to be removed from the inner berm faces during this step, resulting in approximately 1 foot of

material placed over the contaminated sediments within the confined disposal facility. Then additional clean sandy sediment will be used to place the isolation cap over the confined disposal facility. These sediments will be approximately 3 feet in final thickness and will include one or more of the following:

- Clean berm sands generated during final shaping of the inner ASB berms.
- Clean reusable sands generated during excavation of the Unit 8 disposal site.
- Clean sandy sediments generated during opening of the ASB berm during construction of the access channel for the future marina.

The cap will provide for long-term containment of the sediments placed in the confined disposal facility. The target elevation of the top of the cap is estimated to be -14 feet MLLW or deeper, consistent with planned navigation uses of Unit 8. The final cap elevation, composition, and thickness will be determined during engineering design. Coarser materials will be included within the cap if necessary to resist propwash or other erosive forces.

The berm between Unit 8 and Bellingham Bay will be opened in a location consistent with final design of the future marina. Water quality within the basin will be verified prior to opening of the berm. Clean sand from opening of the berm will be used as part of Unit 8 capping. Stone materials removed from the ASB berm will likely be crushed and reused by the Port for upland redevelopment activities (e.g., road subgrade fill). Capping and armoring of the access channel will be performed as necessary in the outer section where the channel extends into the Whatcom Waterway, and the side slopes will be armored to protect against propwash and wave erosion of the ASB berms.

#### **4.1.8 Unit 6 Capping**

The areas near the barge docks at the BST (Units 6B and 6C) were sampled during the PRDI and did not exceed cleanup standards. Based on these data, the capping footprint is to be reduced. Capping is recommended for portions of these areas that are likely to be subject to propwash forces during anticipated navigation uses (Figure 3). The capping material is anticipated to include a 1-foot layer of gravel mix, with the material designed to resist

potential propwash erosion effects. These effects will be assessed and final cap design details will be defined during the Phase 2 EDR.

## 4.2 Permitting

The permitting for the construction project in Phase 2 areas will be performed in parallel with permitting for related waterfront redevelopment activities. These redevelopment activities include construction of the new waterfront marina and modifications to the BST pier. Cleanup actions at the Site are anticipated to require the following permits:

- **Permit for discharge of dredged, excavated, or fill material to waters of the United States pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act:** It is anticipated that an Individual Section 10/404 permit, issued by the USACE, will be required for construction activities within Phase 2 areas. This permit is anticipated to address all inter-related cleanup and redevelopment activities, including the waterfront marina and BST pier modifications. The federal permitting process includes review of issues relating to wetlands, tribal treaty rights, threatened and endangered species, habitat impacts, historical/archeological resources, dredged material management, environmental impacts in accordance with the National Environmental Policy Act (NEPA), and other factors. The time required to complete federal permitting and associated regulatory reviews can vary from one to several years, and will include ESA review, Section 106 of the National Historic Preservation Act of 1966 review, and NEPA review.
- **Section 401 water quality certification:** As part of the 404 permitting process, a section 401 water quality certification must be obtained from Ecology. Certification ensures that the 404 permitted actions will comply with State water quality standards and other aquatic resource protection requirements under Ecology's authority.
- **National Pollutant Discharge Elimination System permitting:** Stormwater and wastewater will be appropriately managed at all upland materials transload, stockpile, and rehandling areas. Management of stormwater and waters from dredge material management is allowed under the existing NPDES permit maintained by the Port for the ASB and associated outfall. Prior to construction in Phase 2 areas, the NPDES permit for the ASB and outfall will be modified or renewed to incorporate appropriate

project requirements (these modifications are not necessary for construction in the Phase 1 areas). The construction work may also require a construction stormwater general permit for certain activities.

- **Washington State scientific collection permit:** Long-term monitoring following completion of construction in Phase 2 areas is anticipated to include crab tissue collection and analysis. Permits are required from WDFW for the collection of food fish, shellfish, or wildlife or their nests and/or eggs for the purpose of research or display pursuant to WAC 220-20-045 and WAC 232-12-276. WDFW issues this permit as part of their management and protection of the resource.

The cleanup will also meet the substantive requirements of permits or approvals that are procedurally exempt under RCW 70.105D.090. The substantive requirements of the following permits, known at this time to be applicable to the cleanup, will be followed. Separate permits may be required for development activities performed in coordination with the construction of the cleanup action in Phase 2 areas:

- **Hydraulic project approval:** HPAs are managed by WDFW and define State requirements for construction activities in order to avoid unnecessary disturbance to fish, shellfish, and wildlife. An HPA will likely be required for completion of the new marina and for construction of new breasting and mooring dolphins adjacent to BST.
- **Shoreline Management Act permitting:** Projects within the city limits of Bellingham and within 200 feet of the ordinary high water mark of Bellingham Bay typically must obtain a Shoreline Management Substantial Development or Shoreline Conditional Use Permit (Shoreline Permits). Shoreline Permits are issued by the City, and include requirements to protect the ecological function of shorelines. The marina and the BST pier reconfigurations are subject to this permitting requirement.
- **Critical Areas Ordinance:** Projects within the city limits of Bellingham and within regulated critical areas buffers typically must obtain a Critical Areas Permit. Critical Areas Permits are issued by the City and include requirements to protect the values and functions of critical areas. The marina and the BST pier reconfigurations may be subject to this permitting requirement.
- **Development Permits:** Projects within the city limits of Bellingham that include fill

and grade activities and construction of new infrastructure require permits for these activities. Grading and building permits are issued by the City and include requirements to protect the environmental and human health and safety. The marina and the BST pier reconfigurations are subject to this permitting requirement.

WDFW and the City will be consulted as part of cleanup design and permitting to identify applicable substantive requirements and to ensure that these requirements are addressed as part of the cleanup. Permitting activities for redevelopment activities will be addressed by the Port in parallel with the cleanup.

The placement of caps on state-owned aquatic lands managed by DNR will also involve development of appropriate agreements (e.g., easement agreements) consistent with the planned remedial action. These agreements will address some of the requirements of the institutional controls required for capping areas (see Section 4.5).

### **4.3 Compliance Monitoring**

Compliance monitoring and contingency responses (if needed) will be implemented in accordance with WAC 173-340-410, Compliance Monitoring Requirements. Detailed requirements for Phase 2 areas will be described in a site CQAP and a CMCPR to be prepared as a part of the Phase 2 EDR.

As with the compliance monitoring for construction in Phase 1 areas (Section 3.3), the compliance monitoring for Phase 2 areas will include protection monitoring, performance monitoring, and confirmation monitoring. The categories of compliance monitoring to be undertaken in Phase 2 areas include the following:

- **Water quality (protection monitoring):** During construction, various controls will be implemented as feasible to ensure water quality protection within the Site area. Protection will be verified through a combination of intensive monitoring (e.g., once per construction shift) and routine monitoring (e.g., once weekly). Protection monitoring will identify the need for further controls as appropriate.

- **Sediment quality in removal and cap areas (performance monitoring):** The effectiveness of sediment removal during and following construction will be verified in a two-step sequence. First, physical surveys (as outlined above) will be performed to verify that dredging has achieved required dredge depths, which will be developed during remedial design. In capping areas, physical surveys will be used to ensure that desired cap thicknesses and side slopes are achieved. In the second step, post-construction (Year 0) surface sediment samples (0 to 12 cm) will be collected and analyzed for mercury, phenol, 4-methylphenol and dioxins as part of performance monitoring.
- **Physical integrity (performance and confirmation monitoring):** Monitoring will be conducted during the remedial action to guide construction activities. Following completion of construction, long-term physical monitoring of cap surfaces will be performed to verify that they are not substantially eroded over time by natural and anthropogenic forces. Engineering cap thickness will be periodically assessed and compared with the minimum required thickness determined during remedial design to ensure integrity of the engineered caps. This monitoring will incorporate bathymetric surveys, sediment cores, and direct inspections of intertidal and shoreline areas.
- **Sediment quality in cap areas (confirmation monitoring):** Sediment quality in the caps constructed within the Phase 2 areas will be documented during long-term confirmation monitoring. Where enhanced natural recovery is used as part of management of dredge residuals, then these areas will also be included within the scope of confirmation monitoring. Sediment quality monitoring events are anticipated to be conducted during years 1, 3, 5, 10, 20, and 30 after completion of the construction activities. Additional monitoring events may be required or the term extended in the event that sediment areas are shown during physical and chemical monitoring to be unstable or to exhibit recontamination. Chemical or biological monitoring of surface sediments will be performed to verify that these areas achieve and maintain compliance with site cleanup levels as described in the CAP (Ecology 2007).

#### **4.4 Contingency Response Actions**

The EDR will define specific performance standards for each element of the cleanup action. During and following construction, contingency response actions could be triggered by a number of types of events. The same types of contingencies described for Phase 1 areas (see Section 3.4) shall be addressed in the CQAP and CMCRP developed as part of the Phase 2 EDR:

- Achievement of physical performance standards during construction
- Dredging residuals management during construction
- Water quality impacts during construction
- Recontamination of cap areas post-construction
- Performance and stability of sediment cap areas post-construction

#### **4.5 Institutional Controls**

The remedial action includes institutional controls. As described in Section 3.5 for Phase 1 areas, institutional controls include a number of measures to be implemented to protect the integrity of the remedial action. These measures include both restrictive covenants and other measures as described below.

Prior to completion of the construction project in Phase 2 areas, an IC Plan will be developed for Ecology review and approval, in consultation with the appropriate federal, state, and local agencies. The IC Plan will outline anticipated restrictive covenants to be filed for the Site capping areas. The IC Plan will also address such matters as waterway signage on prohibited activities, vessel size and speed, signage regarding protection of capped areas, lease prohibitions or usage restrictions and notifications, and a plan for enforcing the waterway restrictions. The current remedial action anticipates ongoing navigation uses, navigation maintenance dredging, and other activities in portions of the Site following completion of the remedial action. The IC Plan for the Site will consider these ongoing uses and maintenance activities.

MTCA restrictive covenants are one part of the planned institutional controls. Restrictive covenants document the nature and extent of contamination and the remedial action.

Restrictive covenants limit activity on the property to those activities that will not interfere with the integrity of the remedial action. For example, they limit uses of cap areas to those that do not interfere with the remedial action, and prohibit the modification of cap areas without the consent of Ecology. In addition, restrictive covenants require owners of the property to notify all lessees or property purchasers of the restrictions on the use of the properties. Finally, restrictive covenants require the owners of the properties to make provisions for continued monitoring and operation and maintenance of the remedial action prior to conveying title, easement, lease, or other interest in the property. Restrictive covenants will be subject to Ecology's approval before being recorded.

In addition to the notification and review requirements of the restrictive covenants, future in-water construction activities are also subject to additional project reviews under state and federal permitting authorities (e.g., USACE permit review, WDFW HPA permit reviews, and Ecology water quality certifications).

Restrictive covenants will be recorded with Whatcom County for all areas capped as part of the construction project in Phase 2 Areas. These restrictive covenants will be filed upon completion of the active cleanup measures. For state-owned properties, the restrictive covenants will be recorded in the WDNR's index plates and property files used to track ownership and use activities for state-owned aquatic lands. These may include easements for constructed cap areas. These controls will remain in place indefinitely unless removal is approved by Ecology. Restrictive covenants are expected to be placed in the cap construction areas listed below. Anticipated uses in each area are described below:

- **Capping areas within the Inner Waterway (Unit 2C, along with any portion of the marina access channel which receives a sediment cap):** These portions of the Inner Whatcom Waterway are to be capped and armored. Navigation uses in these areas will include operations as a locally managed, multi-purpose channel. As described in Section 3.5, the Port, Washington Department of Natural Resources (WDNR), and USACE completed the deauthorization process for the federal navigation channel in this area during 2007. Operation of the multi-purpose channel will include periodic maintenance dredging by the Port (in conjunction with other property owners along the Waterway) to maintain water depths, but future deepening or widening of the

channel is not anticipated. Future land uses along the Inner Waterway are expected to consist of marina uses, marine trades, and mixed-use redevelopment consistent with updated property zoning.

- **Capping area near barge dock (Unit 6):** A portion of Unit 6 near the barge dock will be capped to resist potential propwash erosion. These areas are expected to continue in Port-related navigation use.
- **Confined disposal facility (Unit 8):** The confined disposal facility within Unit 8 will be capped with the design anticipating future marina use of the ASB. Institutional controls will be filed for all areas occupied by the confined disposal facility and its cap.

#### 4.6 Coordination with Other Actions

The design, permitting, and construction work in Phase 2 areas will require coordination with other activities, including:

- **Development of ASB marina:** Remediation of the ASB as described in the Consent Decree (as amended) is based on Port land use plans to open the ASB to Bellingham Bay and to develop a 28-acre marina within the basin. The marina will include public shoreline access and habitat enhancements. The construction activities for the Site cleanup and the development of the marina will be managed by the Port as multiple elements of a single Port project that encompasses cleanup, restoration, and redevelopment. The Port plans to integrate the design, permitting, and associated environmental reviews for this work to ensure an opportunity for informed agency and stakeholder review of the Phase 2 project. Construction phasing between the cleanup and the development of the marina will be coordinated to avoid logistical conflicts and minimize unnecessary disturbance to fisheries resources.
- **Modifications to BST pier:** In order to accomplish the cleanup actions in Phase 2 areas, the BST pier extension into the Log Pond portions of Unit 2C needs to be removed. The function previously provided by the pier will be replaced in a different area with the installation of new breasting and mooring dolphins at the opposite (offshore) end of BST. The design, permitting, and associated environmental reviews

for this work will be integrated with those of the cleanup action to ensure an opportunity for informed agency and stakeholder review of the project.

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## 5 MONITORED NATURAL RECOVERY

The MNR areas shown on Figure 4 will be monitored to document compliance with Site cleanup levels. Institutional controls will be required for these areas of the Site to ensure the long-term integrity of the natural recovery areas.

- **Emergent tideflat at the head of the waterway (Unit 3A):** This unit is located at the head of the Whatcom Waterway, adjacent to Unit 3B. The Port has been working with agencies and local stakeholder groups to conduct additional habitat restoration work in this area, but a specific proposed project has not been identified or funded at this time.
- **Areas offshore of the ASB (Unit 5):** Excluding the portion of Unit 5B to be dredged and backfilled (Section 4.1.5), and any areas dredged as part of developing the final marina access channel (Section 4.1.7), the balance of Unit 5 is to be managed by MNR. These areas consist primarily of deep-water offshore areas.
- **Areas near BST (Unit 6):** Excluding the portion of Units 6B and 6C to be capped (as described in Section 4.1.8), the balance of Unit 6 is to be managed by MNR. These areas consist primarily of deep-water offshore areas.
- **Starr Rock area (Unit 7):** Sediments in the Starr Rock area currently comply with site-specific cleanup goals. These areas will be addressed using MNR. No sediment capping or dredging is proposed for this area.
- **Remaining areas of the Site (Unit 9):** Surface sediments in the remaining area of the Site currently comply with applicable cleanup standards. This area will be addressed using MNR.

### 5.1 Monitoring Activities

Monitoring activities will be implemented in natural recovery areas. The monitoring program for MNR areas will be documented in the Phase 1 EDR and attachments.

Monitoring expectations include the following:

- **Physical integrity (confirmation monitoring):** Natural recovery areas will be periodically tested to monitor the accumulation of clean overlying sediment, and to ensure that natural recovery areas are not substantially eroded over time by natural or

anthropogenic forces. This monitoring will incorporate methods such as bathymetric surveys, sediment cores, and direct inspections (for intertidal and shoreline areas).

- **Sediment quality (confirmation monitoring):** Sediment quality in all natural recovery areas will be documented during long-term confirmation monitoring. Sediment quality monitoring events are anticipated to be conducted during years 1, 3, 5, 10, 20, and 30 after completion of the remedial action. Additional monitoring events may be required or the term extended in the event that sediment areas are shown during physical and chemical monitoring to be unstable or to exhibit recontamination. Chemical and/or confirmatory biological monitoring of surface sediments will be performed to verify that these areas maintain compliance with site cleanup standards as described in the CAP (Ecology 2007).
  - Surface sediment samples (0 to 12 cm) will be collected along a systematic grid. Sample collection procedures will be specified in the CMCRP attached to the EDR. Samples will be analyzed for mercury, phenol, 4-methylphenol, and dioxins.
  - Consistent with the CAP (Ecology 2007), the total number of confirmational monitoring locations throughout the Site's cap and natural recovery areas is expected to be between 20 and 30. Approximately 12 of these are expected to be located in natural recovery areas. Final monitoring locations and number will be determined as part of the EDR and CMCRP development.
- **Tissue monitoring (confirmation monitoring):** As discussed in the RI/FS, bioaccumulation monitoring has been performed at the Site. The tissue data exhibiting the strongest correlation to Site sediment mercury concentrations and the most relevance to potential human health exposures is that for adult male Dungeness crab muscle. Tissue monitoring is anticipated to be performed as part of confirmation monitoring during the years 3, 5, and 10 monitoring events after completion of construction in Phase 2 areas. Additional monitoring events may be required or the term extended in the event that sediment areas or associated tissues are shown during monitoring to exhibit recontamination or to exceed effects levels. Tissue monitoring locations are anticipated to include a minimum of three collection areas within the Site and two clean reference areas. Adult male Dungeness crab will be collected from

test and reference areas for tissue analysis of total mercury levels. Compositing will only be performed if necessary to obtain sufficient tissue for analysis.

## 5.2 Contingency Response Actions

Contingency response actions for MNR areas will be defined in the Phase 1 EDR.

- **Performance and stability of natural recovery areas:** If the sediments in natural recovery areas experience significant erosion, then contingency response measures will be implemented in a timely manner. These responses will generally include collection of appropriate data to define the source and extent of the erosion, assessment of potential control options, and implementation of appropriate corrective measures for the affected area. Corrective measures could include enhancement of the natural sedimentation with placement of new material, construction of protective groins or armoring, or modifications to the sediment bed elevation through dredging and new material placement.
- **Recontamination of natural recovery areas:** The potential for sediment recontamination will be monitored as part of long-term sediment monitoring. The CMCRP prepared as part of the Phase 1 EDR will discuss triggers and potential contingency responses, including response timelines if recontamination is observed. Generally these responses will include collection of appropriate data to define the source and extent of recontamination, assessment of control options for the source of the recontamination (e.g., implementation of enhanced stormwater source control or treatment), and implementation of appropriate corrective measures for the area of recontamination (e.g., monitoring, capping, or dredging as appropriate to the location, extent, and stability of the affected area).
- **Tissue quality concerns:** The CMCRP prepared as part of the Phase 1 EDR will discuss measures to be taken in the event that elevated or elevating trends in tissue mercury concentrations are observed during MNR area monitoring. Such observations could occur following the period of cleanup construction when sediment disturbances will be greatest or following sediment disturbance events caused by sediment recontamination or cap erosion. Generally Ecology expects that these measures will include collecting appropriate data to assess the nature and extent of tissue quality

concerns, assessing the source of the tissue quality problem, and defining options for correction of the problem. The Phase 1 CMCRP document will discuss protocols for communication of tissue-quality issues with other regulatory agencies and potentially affected stakeholders.

### **5.3 Institutional Controls**

The remedial action for MNR areas includes institutional controls. As described in Section 3.5 for Phase 1 construction areas, institutional controls include a number of measures to be implemented to protect the integrity of the remedial action. The institutional controls for the Site MNR areas will be described in the IC Plan to be developed for Ecology review and approval, prior to completion of construction in Phase 1 areas. The IC Plan will be developed in consultation with the appropriate federal, state, and local agencies. The IC Plan will outline anticipated restrictive covenants to be filed for the Site MNR areas, and other appropriate measures for these areas. The IC Plan will also address such matters as signage on prohibited activities, vessel size and speed, signage regarding protection of capped areas, lease prohibitions or usage restrictions and notifications, and a plan for enforcing the waterway restrictions. The current remedial action anticipates ongoing navigation uses, navigation maintenance dredging, and other activities in portions of the Site following completion of the remedial action. The IC Plan for the Site will consider these ongoing uses and maintenance activities.

MTCA restrictive covenants are one part of the planned institutional controls. Restrictive covenants document the nature and extent of contamination and the remedial action. Restrictive covenants limit activity on the property to those activities that will not interfere with the integrity of the remedial action. For example, they limit uses of the natural recovery areas to those that do not interfere with the remedial action, and prohibit the modification of natural recovery areas without the consent of Ecology. In addition, restrictive covenants require owners of the property to notify all lessees or property purchasers of the restrictions on the use of the properties. Finally, restrictive covenants require the owners of the properties to make provisions for continued monitoring and operation and maintenance of the remedial action prior to conveying title, easement, lease,

or other interest in the property. Restrictive covenants will be subject to Ecology's approval before being recorded.

In addition to the notification and review requirements of the restrictive covenants, future in-water construction activities are also subject to additional project reviews under state and federal permitting authorities (e.g., USACE Section 10/404, WDFW HPA, and Ecology water quality certification, and City of Bellingham permitting requirements).

Restrictive covenants will be recorded with Whatcom County for all MNR areas. These restrictive covenants will be filed upon completion of the active Phase 1 cleanup measures. For state-owned properties, the restrictive covenants will be recorded in the WDNR's index plates and property files used to track ownership and use activities for state-owned aquatic lands. These controls will remain in place indefinitely unless removal is approved by Ecology. Restrictive covenants are expected to be placed in the MNR areas listed below. Anticipated uses in each area are described below:

- **Head of the waterway (Unit 3A):** This portion of the Inner Waterway is located within the locally managed, multi-purpose channel. As described in Section 3.5, the Port, DNR, and USACE completed the deauthorization process in 2007 for the federal navigation channel that formerly extended into this area. Unit 3A includes emergent nearshore intertidal and subtidal habitat. Future land uses along the Inner Waterway are expected to consist of marine trades and mixed-use redevelopment consistent with updated property zoning and Waterfront District Planning. However, no navigation dredging is currently anticipated within Unit 3A. Future uses may include the implementation of habitat enhancement or public access improvements. Some docks and pilings associated with existing over-water structures are also located in this area and may require repair, replacement, or removal from time to time. Such construction activities would be subject to Ecology review, and BMPs will be implemented during any in-water construction activities as appropriate to minimize potential sediment disturbance.
- **Shoulder of the ASB (Unit 5):** Other than the Portion of Unit 5B that is to be managed by dredging and disposal in Unit 8 (see Section 4.1), sediments within Unit 5 are to be managed by MNR. Sediments in these areas currently comply with Site cleanup

levels. These areas are located adjacent to the ASB and have relatively shallow water depths. Areas of emergent shallow intertidal and subtidal aquatic habitat are located adjacent to the ASB. With the exception of the ASB, the buried NPDES-permitted ASB outfall pipe, and the Central Waterfront area shorelines, no structures are currently located in Unit 5. Navigation uses are limited by naturally shallow water depths to transiting of the area by shallow-draft vessels. Future navigation dredging within Unit 5 is not currently anticipated.

- **MNR areas near barge dock (Unit 6):** A portion of Unit 6 (portions of Unit 6B and 6C) near the barge dock will be capped to resist potential propwash erosion. The remaining areas of Unit 6 are expected to continue in Port-related navigation use. No navigation dredging projects are currently planned for this area. If uses change and navigation dredging is required, that dredging would be subject to Ecology review, and measures would be required to ensure appropriate management of dredged materials and continued compliance with Site cleanup levels. Docks and structures associated with the Port terminal are located in this area. Future construction activities could be required around these structures for maintenance, repair, or construction/demolition. Such construction activities would be subject to Ecology review, and BMPs will be implemented during any in-water construction activities as appropriate to minimize potential sediment disturbance.
- **Starr Rock (Unit 7):** Unit 7 includes the offshore sediments within and around the former Corps-authorized Starr Rock sediment disposal site. There are no structures currently located in these areas. Navigation uses in these areas are primarily limited to small-boat navigation due to the shallow water depths.
- **Remaining Areas of the Site (Unit 9):** Unit 9 consists of the remaining areas of the Site (beyond the boundaries of Units 1 through 8) that contain low-level, buried subsurface mercury contamination. No exceedances of surface sediment cleanup standards have been noted within this area of the site in either the 1996 or 2002 sampling events. Most of the Unit 9 areas consist of deep-water, offshore areas. However, Unit 9 also abuts the shoreline along the northern and eastern sides of the Site. Shoreline marine structures are located within nearshore portions of Unit 9 including near the I & J Waterway and Squalicum Inner Boat Basin. As described in Section 5.4 below, the construction by the City of the Over-water Walkway project is

planned for the area between Boulevard Park and the Cornwall Avenue Landfill site, and several separate cleanup sites (I & J Waterway, R.G. Haley, Cornwall Avenue Landfill, and the South State Street Former MGP site) are located within or abutting Unit 9. Coordination with these other projects is described in Section 5.4 below. If navigation dredging is required in Unit 9 areas, that dredging would be subject to Ecology review, and measures would be required to ensure appropriate management of dredged materials and continued compliance with Site cleanup levels. Future construction activities (maintenance, repair, or construction/demolition associated with marine structures located in Unit 9) could be required. Such construction activities would be subject to Ecology review, and BMPs will be implemented during any in-water construction activities as appropriate to minimize potential sediment disturbance.

#### 5.4 Coordination with Other Actions

A number of ongoing cleanup and development actions are located within or adjacent to MNR areas of the Site. Some of these ongoing activities include:

- **I & J Waterway cleanup:** The I & J Waterway site is approximately 4 acres and is undergoing an RI/FS through a MTCA agreed order with Ecology. Surface sediment contamination from historic industrial activities along the southern shoreline of the I & J Waterway includes but is not limited to bis(2-ethylhexyl)phthalate and nickel. Contaminated surface sediments from the I & J Waterway site overlay buried contaminated sediment that comprise part of the Whatcom Waterway Site as shown in Figure 1. Surface and subsurface contaminated sediment will be remediated as part of the cleanup selected for the I & J Waterway site. Other dredged material management activities will occur as part of future Port and USACE maintenance dredging activities for the federal channel. Project reviews conducted as part of these separate projects will include a review of potential impacts from or to the Whatcom Waterway MNR areas.
- **Cornwall Avenue landfill cleanup:** The Cornwall Avenue landfill site is approximately 8 acres and is undergoing an RI/FS and Interim Remedial Action under a MTCA agreed order between the Port, City, WDNR, and Ecology. Surface sediment

contamination from historic municipal landfill activities along the shoreline at the south end of Cornwall Avenue includes but is not limited to solid waste and associated hazardous substances. Contaminated surface sediments from the Cornwall Avenue landfill site overlie buried contaminated sediment that comprise part of the Whatcom Waterway Site as shown in Figure 1. Surface and subsurface contaminated sediment will be remediated as part of the cleanup selected for the Cornwall Avenue landfill site. Project reviews conducted as part of the Cornwall Avenue landfill cleanup will include a review of potential impacts from or to the Whatcom Waterway MNR areas.

- **R.G. Haley site cleanup:** The R.G. Haley site as currently defined is approximately 8 acres, and is undergoing an RI/FS through a MTCA agreed order between the City and Ecology. Surface sediment contamination from historic wood treatment activities along the shoreline at the south end of Cornwall Avenue includes but is not limited to pentachlorophenol and dioxins. Contaminated surface sediments from the R.G. Haley site overlay buried contaminated sediment that comprise part of the Whatcom Waterway Site as shown in Figure 1. Surface and subsurface contaminated sediment will be addressed as part of the cleanup selected for the R.G. Haley site. Project reviews conducted as part of the R.G. Haley site cleanup will include a review of potential impacts from or to the Whatcom Waterway MNR areas.
- **Former South State Street MGP site cleanup:** This cleanup site includes areas impacted by former operation of the South State Street MGP. The site includes portions of Boulevard Park and adjacent aquatic lands. Contaminants at the Site include PAH compounds and other hydrocarbons associated with MGP operations. This area is undergoing an RI/FS under a MTCA agreed order between the City and Ecology. Project reviews conducted as part of the former South State Street MGP site cleanup will include a review of potential impacts from or to the Whatcom Waterway MNR areas.
- **Boulevard Park Over-water Walkway project:** The City is currently conducting engineering design and permitting for a project known as the Boulevard Park Over-water Walkway (Over-water Walkway). The Over-water Walkway is planned as a pedestrian trail between Boulevard Park and the Cornwall Avenue landfill area. The Over-water Walkway project has been included in multiple City of Bellingham

planning documents between 2002 and 2010. The project includes placement of new pilings and over-water walkway structures within Unit 9. Permitting and construction for the Over-water Walkway and the cleanup actions will incorporate best management practices to minimize potential sediment disturbance.

- **Removal of creosote-treated pilings and dock structures:** Removal of creosote-treated pilings and dock structures may occur within areas of the Site designated for MNR. These activities remove a potential source of PAH contamination from Bellingham Bay. Where structures require replacement, these replacements will maximize the use of appropriate materials, such as concrete, that do not represent a potential source of water quality or sediment contamination. Permitting and construction for future removal actions and the cleanup actions will incorporate best management practices to minimize potential sediment disturbance.

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## 6 NEXT STEPS

Consistent with the First Amendment to the Consent Decree (Ecology 2011), the Phase 1 EDR will be submitted to Ecology consistent with the Ecology-approved schedule. The Phase 1 EDR will provide detailed engineering assumptions for the construction work proposed for Phase 1 Site areas. That report will also document compliance monitoring and contingency responses for the construction project, as well as for the MNR areas.

Following Ecology review of the Phase 1 EDR, the Phase 1 EDR will be updated and issued for public review and comment. Permitting for the construction in Phase 1 areas will also be coordinated with the EDR process. After public review and Ecology approval of the EDR, the Phase 1 cleanup actions will be implemented and an IC Plan completed and implemented. Finally, an as-built report will be prepared. The Phase 1 cleanup work will be considered complete after Ecology approval of the as-built report. All Phase 1 work will be conducted pursuant to the schedule contained in the First Amendment to the Consent Decree.

Detailed engineering and permitting for the construction in Phase 2 areas will be initiated after Ecology review and approval of the Phase 1 as-built report. The Phase 2 cleanup process will also include development of an EDR, completion of project permitting, implementation of construction, development of an IC Plan, and preparation of an as-built report. All Phase 2 work will be conducted pursuant to the schedule contained in the First Amendment to the Consent Decree.

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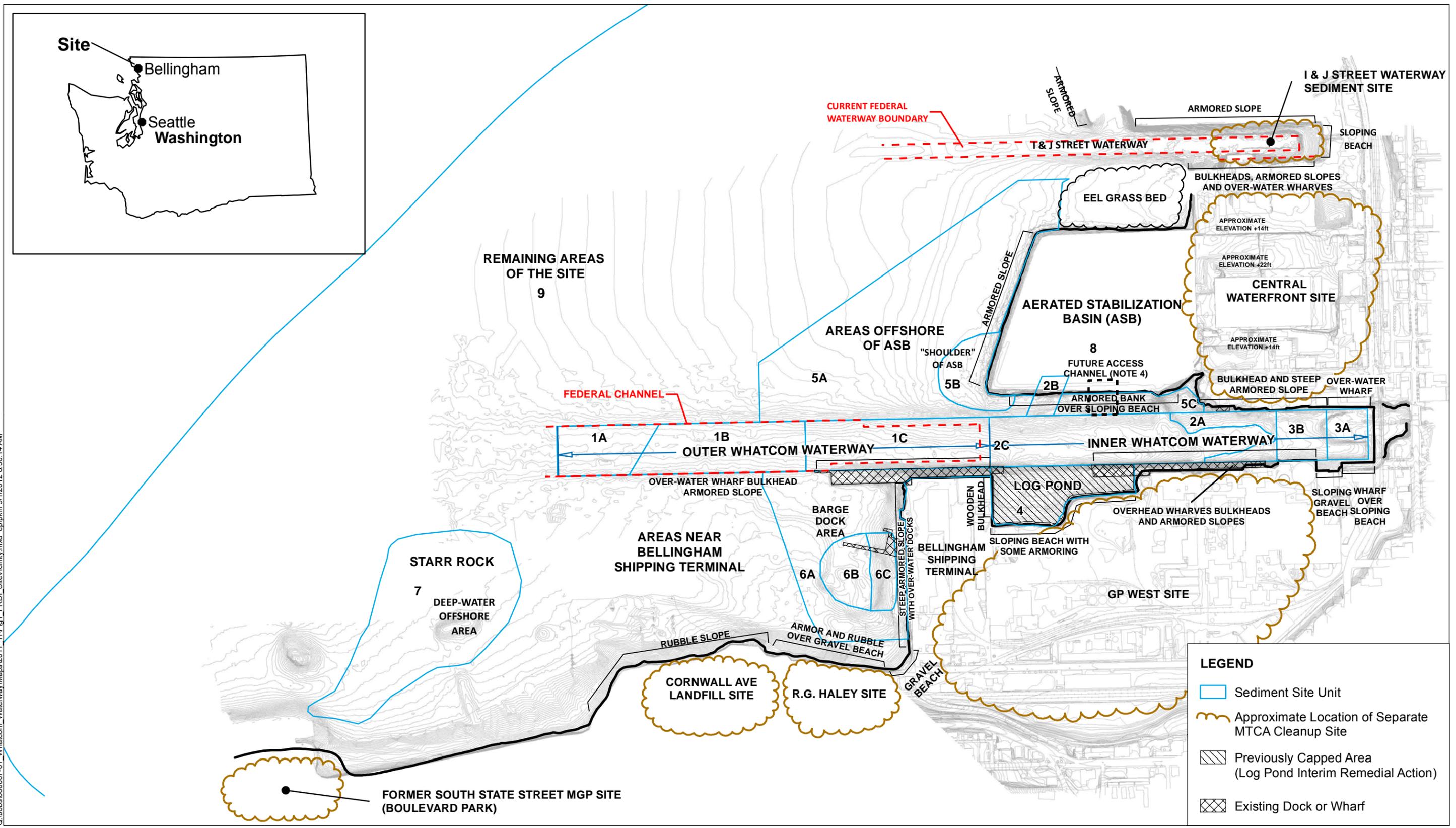
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# FIGURES

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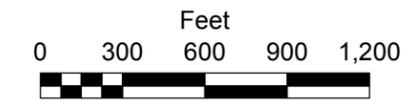
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**LEGEND**

- Sediment Site Unit
- Approximate Location of Separate MTCA Cleanup Site
- Previously Capped Area (Log Pond Interim Remedial Action)
- Existing Dock or Wharf

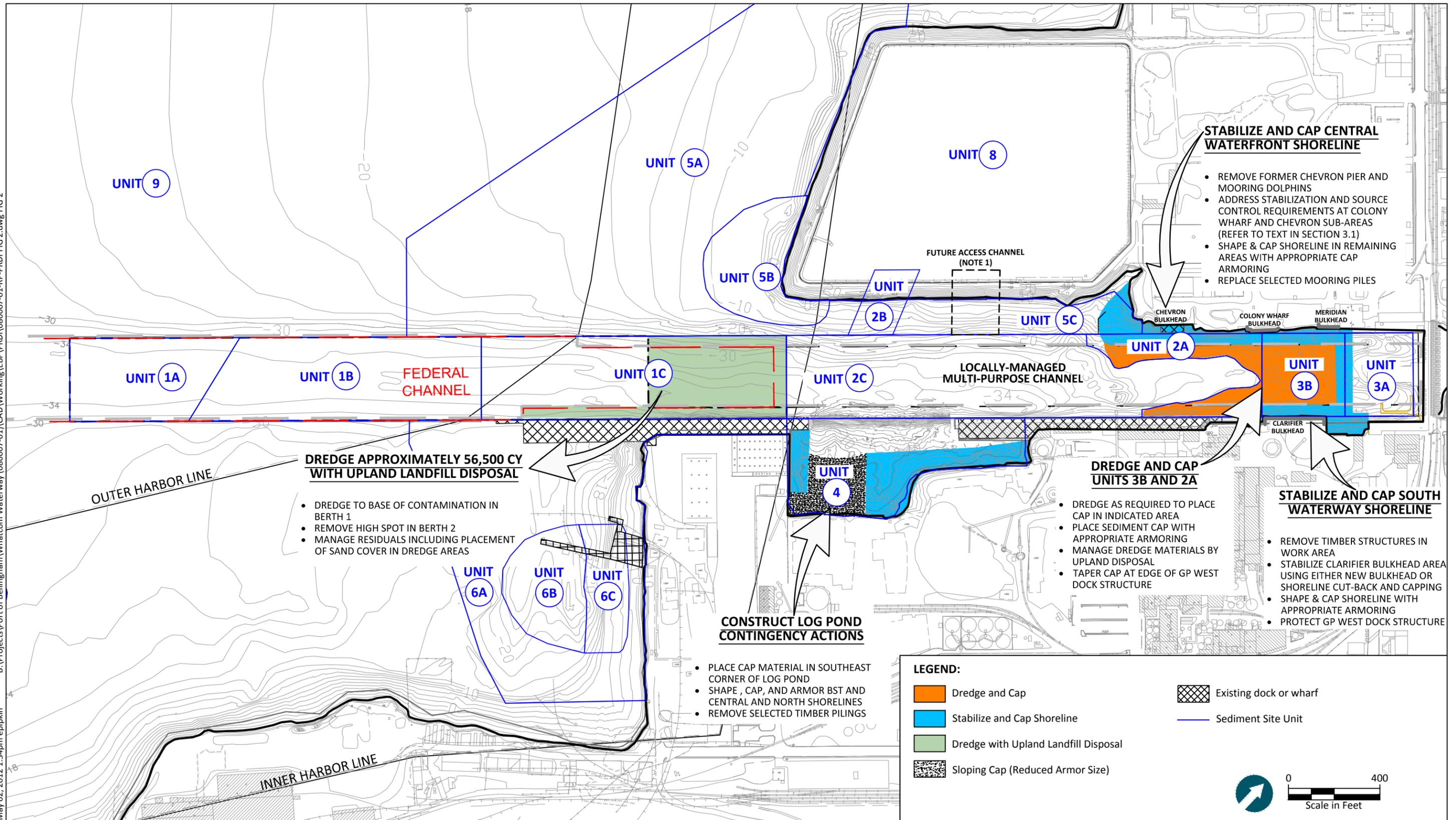
**NOTES:**  
 1. Site units are shown based on those in Figure 2-3 Cleanup Action Plan, Whatcom Waterway Site, September 2007. Unit 9 boundary updated based on PRDI findings.  
 2. Horizontal datum: Washington State Plane North, NAD 83 Feet.  
 3. Vertical datum: Mean Lower Low Water (MLLW).  
 4. Unit 2B was established in the Cleanup Action Plan based on the anticipated marina access channel location. This location will be adjusted during final design.



**Figure 1**  
 Site Location and Vicinity Features  
 Whatcom Waterway Preliminary Design Concept Report

B:\Projects\Port of Bellingham\Whatcom Waterway (080007-01)\CAD\Working\EBP\PRDI\080007-01-PP-PRDI FIG 2.dwg FIG 2

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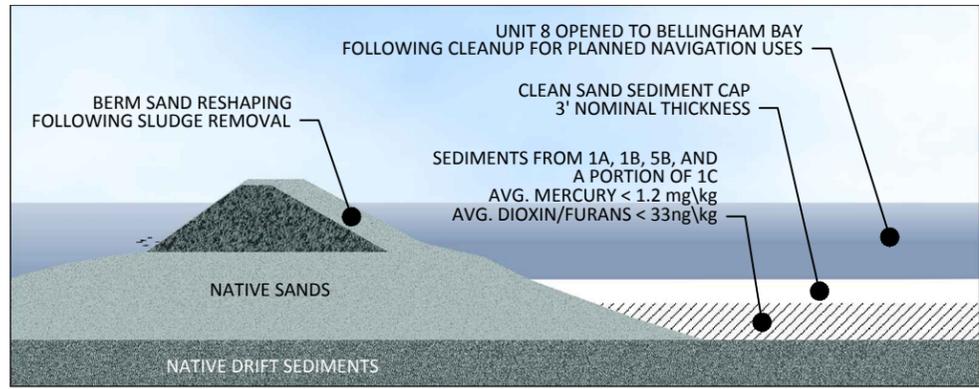
**SOURCE:** Figure 6-5 of Exhibit 1 of the First Amendment to the Whatcom Waterway Site Consent Decree (2011).  
**HORIZONTAL DATUM:** Washington State Plane North, NAD 83 Feet.  
**VERTICAL DATUM:** Mean Lower Low Water (MLLW).

**NOTES:**  
 1. Unit 2B was established in the Cleanup Action Plan based on the anticipated marina access channel location. This location will be adjusted during final design.



**Figure 2**  
 Construction Project for Phase 1 Areas  
 Whatcom Waterway Preliminary Design Concept Report

B:\Projects\Port of Bellingham\Whatcom Waterway (080007-01)\CAD\Working\EBP\PRDI\080007-01-PR-PRDI FIG 3.dwg FIG 3



**NOTE:** The final cap elevation, composition, and thickness to be determined during engineering design.

**CROSS-SECTION A-A'**

— **SLUDGE REMOVAL, DEWATERING AND UPLAND DISPOSAL FOLLOWED BY REMOVAL OF APPROXIMATELY 340,000 CY OF CLEAN SAND. PLACEMENT OF APPROXIMATELY 210,200 CY OF CONTAMINATED SEDIMENT FROM 1A, 1B, 5B, AND A PORTION OF 1C FOLLOWED BY CAPPING AND OPENING OF UNIT 8 TO BELLINGHAM BAY IN CONJUNCTION WITH PLANNED NAVIGATION USES.**

**DREDGE APPROXIMATELY 192,200 CY WITH CONFINED DISPOSAL IN UNIT 8**

- DREDGE UNITS 1A, 1B, AND PORTION OF 1C
- DREDGE BERTH 1 UNDER DOCK AREAS
- MANAGE DREDGE RESIDUALS INCLUDING PLACEMENT OF SAND COVER

**DREDGE APPROXIMATELY 18,000 CY WITH CONFINED DISPOSAL IN UNIT 8**

- BACKFILL WITH CLEAN SAND

**DREDGE AND CAP**

- **PLANNED ACCESS CHANNEL CONNECTING UNIT 8 TO BELLINGHAM BAY FOLLOWING CLEANUP (LOCATION TO BE FINALIZED DURING ENGINEERING DESIGN), POTENTIAL LOCATION SHOWN**

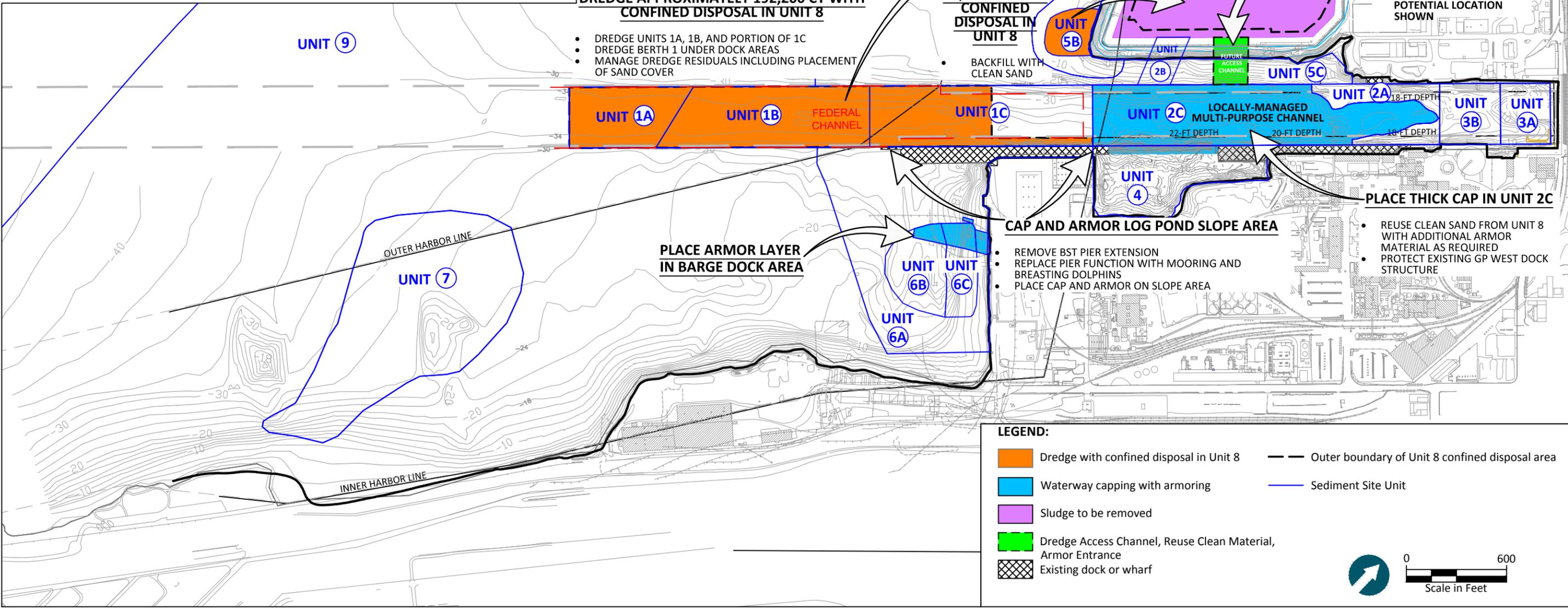
**PLACE THICK CAP IN UNIT 2C**

- REUSE CLEAN SAND FROM UNIT 8 WITH ADDITIONAL ARMOR MATERIAL AS REQUIRED
- PROTECT EXISTING GP WEST DOCK STRUCTURE

**PLACE ARMOR LAYER IN BARGE DOCK AREA**

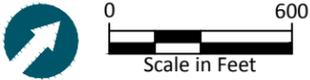
**CAP AND ARMOR LOG POND SLOPE AREA**

- REMOVE BST PIER EXTENSION
- REPLACE PIER FUNCTION WITH MOORING AND BREASTING DOLPHINS
- PLACE CAP AND ARMOR ON SLOPE AREA



**LEGEND:**

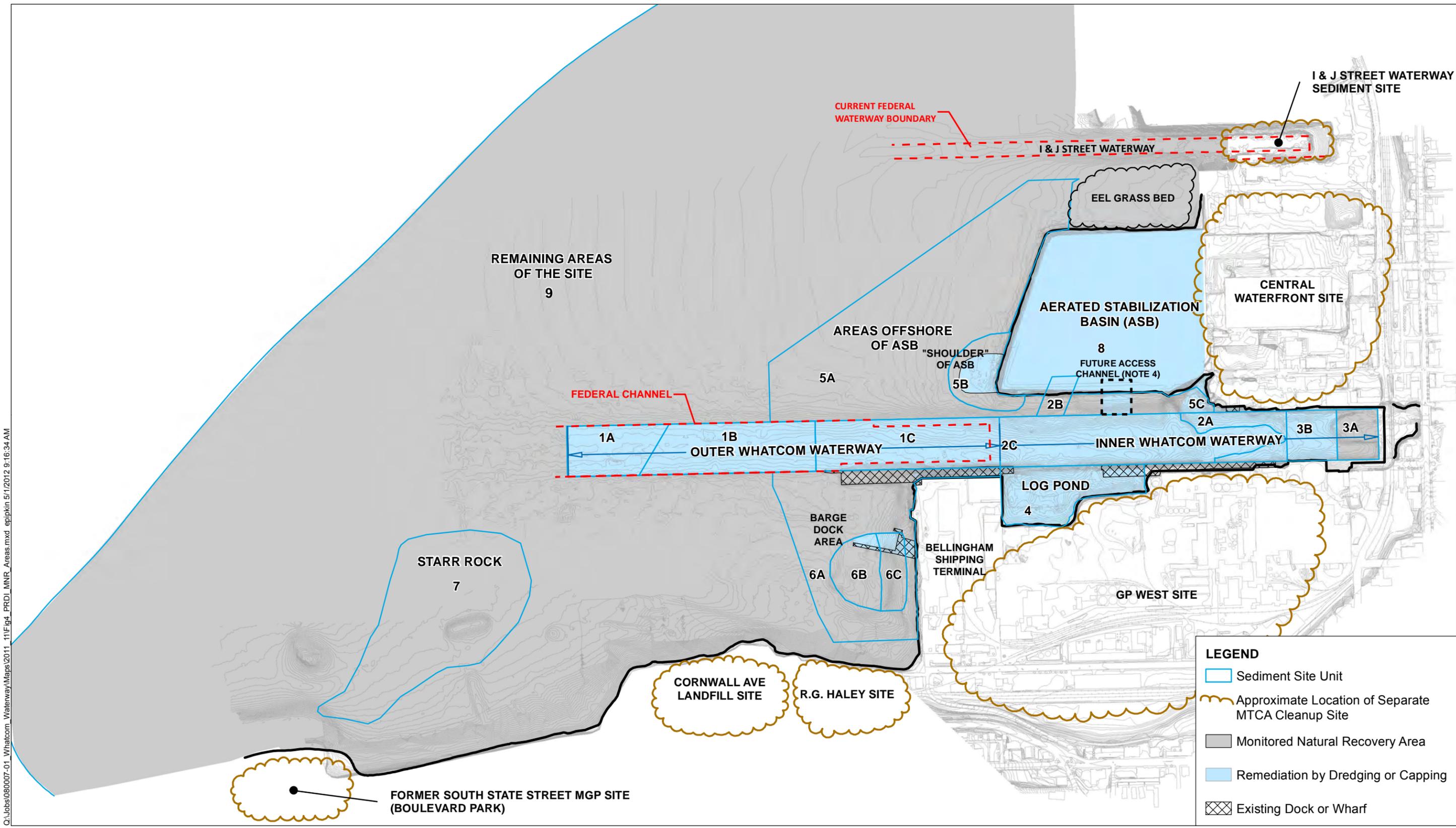
- Dredge with confined disposal in Unit 8
- Waterway capping with armoring
- Sludge to be removed
- Dredge Access Channel, Reuse Clean Material, Armor Entrance
- Existing dock or wharf
- Outer boundary of Unit 8 confined disposal area
- Sediment Site Unit



**SOURCE:** Figure 6-5 of Exhibit 1 of the First Amendment to the Whatcom Waterway Site Consent Decree (2011).  
**HORIZONTAL DATUM:** Washington State Plane North, NAD 83 Feet.  
**VERTICAL DATUM:** Mean Lower Low Water (MLLW).

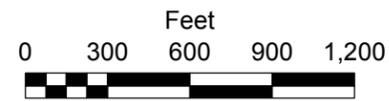


**Figure 3**  
 Construction Project for Phase 2 Areas  
 Whatcom Waterway Preliminary Design Concept Report



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**NOTES:**  
 1. Site units are shown based on those in Figure 2-3 Cleanup Action Plan, Whatcom Waterway Site, September 2007. Unit 9 boundary updated based on PRDI findings.  
 2. Horizontal datum: Washington State Plane North, NAD 83 Feet.  
 3. Vertical datum: Mean Lower Low Water (MLLW).  
 4. Unit 2B was established in the Cleanup Action Plan based on the anticipated marina access channel location. This location will be adjusted during final design.



**Figure 4**  
 Monitored Natural Recovery Areas  
 Whatcom Waterway Preliminary Design Concept Report