

**Statement of Work
Duwamish River Habitat Restoration Program
East Side West Waterway - Site 02
Seattle, Washington**



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ABBREVIATIONS

AMP	Adaptive Management Plan
Bluefield	Bluefield Holdings, Inc.
COC	chemical of concern
DSAY	Discounted Service Acre-Years
Ecology	Washington Department of Ecology
ESA	Endangered Species Act
JARPA	Joint Aquatic Resource Permit Application
MLLW	Mean Lower Low Water
NOAA	National Oceanic and Atmospheric Administration
NRD	Natural Resource Damages
OHW	Ordinary High Water
Project	Bluefield Holdings Habitat Project – Site 02 in Seattle, WA
SEPA	State Environmental Policy Act (SEPA)
Site	Bluefield Holdings Habitat Project – Site 02 in Seattle, WA
SPIF	Special Project Information Form
Trustees	Elliot Bay Trustee Council
USACE	U.S. Army Corps of Engineers

**STATEMENT OF WORK
BLUEFIELD HOLDINGS HABITAT PROJECT - SITE 02
DUWAMISH WATERWAY, SEATTLE, WA**

1.0 INTRODUCTION

This Statement of Work for Duwamish River Habitat Restoration Program, East Side West Waterway - Site 02 in Seattle, Washington (the “Project” or “Site”), is the result of an effort between the Elliot Bay Trustee Council (Trustees) and Bluefield Holdings, Inc. (Bluefield). This document describes the work that will be carried out for the development of new habitat on leased City of Seattle property along the Lower Duwamish Waterway.

Industrial development along the Lower Duwamish Waterway has largely eliminated off-channel habitat used by estuarine species, resulting in limited rearing and refuge habitat in the existing channel. The restoration Project described in this Statement of Work will create two new off-channel inlets which will provide refuge and feeding opportunities for out-migrating salmonids, juvenile English sole, shorebirds and waders. The restored uplands adjacent to the created inlets will provide food and refuge for a broad range of bird groups. The Project is located on property that has been secured through a Master Lease with the City of Seattle. The existing intertidal portion of the Project site includes rubble, riprap, debris and derelict creosote piling beneath the Spokane Street Bridge and the West Seattle Bridge (Figure 1). Consequently, aquatic habitat in the area is very poor.

The restoration Project at Site 02 will create or restore approximately 1.99 acres of habitat from lands currently occupied by riprap and un-vegetated upland. The target acreages of the different habitat types are:

- 0.42 acre of vegetated buffer,
- 0.70 acre of intertidal high marsh,

- 0.13 acre of intertidal low marsh,
- 0.31 acre of habitat mix over rip rap (RRFM), and
- 0.44 acre of shallow subtidal mudflat.

Following construction of the new habitat and off-channel inlets, operations, maintenance and monitoring activities will be conducted by Bluefield for an initial 10-year period. Following completion of the initial 10-year period, the City of Seattle will continue stewardship activities in accordance with the Master Lease.

Success criteria for the proposed habitat will include measures of physical stability and biological integrity, as described in Tables 1 - 3. Physical criteria will include the stability of the site over time compared to the as-built designated habitat areas. Monitoring parameters for physical stability will include:

- Area of intertidal habitat (subdivided by mudflat, marsh and HMRR),
- Area of upland habitat,
- Slope and channel profiles, slope and channel stability,
- Tidal circulation.

Biological monitoring will be performed after vegetation planting to assess:

- Success, as measured by survival and species composition,
- Aerial coverage, as measured by percent cover,
- Species diversity, as measured by species composition,
- Status and maintenance of herbivory protection devices/measures, and
- Presence and the percent cover of noxious weeds.

The Site is secured through the Master Agreement with the City of Seattle. A long-term stewardship fund will be established to continue all appropriate maintenance of the Project to ensure the longevity of the fully functioning habitat.

Statement of Work
Bluefield Holdings Habitat Project – Site 02
October 13, 2011

The purpose of this document is to describe:

- The conceptual design of the Project,
- The process for finalizing the design of the Project, including the opportunities for Trustee input,
- The investigations that will be conducted for the Project, and
- The conceptual Operations and Maintenance Plan and Monitoring Plan that will be implemented for the near term (10 years).

2.0 PROJECT DESCRIPTION

The habitat restoration project for Site 02 will consist of constructing two off-channel inlets on the east side of the West Waterway, under and adjacent to the Spokane Street and West Seattle Bridges, at approximate Duwamish River mile 0.5 (Figure 1).

Construction activities will include removal of existing rubble, debris and derelict creosote piling from the shoreline, excavation of upland soils to create new intertidal area, and replacing riprap where possible with fish-friendly materials including sediment, fish mix gravels, and large woody debris. Both new off-channel inlets will maximize the length and width of intertidal habitat within the confines of the existing utilities and infrastructure at the Site (Figures 2 and 3). The current face of the property running parallel with the Duwamish River will be sloped back and the riprap face of the shoreline will be replaced with larger natural boulders, cobble material, and large woody debris to the extent practicable within slope and hydrodynamic limitations. For the purposes of hydraulic stability during high flow storm events, some rock (rip rap or quarry spalls) may be installed under more fish friendly materials as appropriate. The Site will be finished with additional soil cover, the planting of upland vegetation, and planting and seeding of a tidal marsh. The project will involve coordination with the Muckleshoot Indian Tribe to establish goals for the number, location, and structure of net attachments at the site, subject to permit approval and approval by the Natural Resource Trustees. A schematic design of the post-construction Habitat zones based on elevations is shown in Figure 4. Additional draft design drawings, including profiles and cross sections, are included in Figure 5.

3.0 PERMITTING

All appropriate and applicable permits will be obtained prior to construction of the Project. The Trustees will be provided with a copy of the permit application package for their review and written approval prior to submittal to the regulatory agencies. The level of detail is anticipated to be a 30% design level.

Upon receiving written approval of this Statement of Work for the Project by the Trustees, the required design drawings and permit applications will be prepared and submitted to the appropriate regulatory agencies.

The following list of permits is based on a preliminary review of the regulatory framework surrounding the Project. After consultation with the regulatory agencies, a revised list of required permits will be developed.

3.1 JOINT AQUATIC RESOURCE PERMIT APPLICATION

The Joint Aquatic Resource Permit Application (JARPA) process may be used to apply jointly for any or all of the permits below:

3.1.1 Federal Permits

- U.S. Army Corps of Engineers (USACE),
- Endangered Species Act (ESA) compliance.
- National Historic Preservation Act, Section 106 compliance.

3.1.2 SEPA Review

- State Environmental Policy Act (SEPA) Checklist.

3.1.2 State Permits and Approvals

- Washington Department of Ecology: Section 401 Water Quality Certifications,

- Washington Department of Fish and Wildlife: Hydraulic Project Approvals,
- Washington Department of Natural Resources: Use Authorizations for State-Owned Aquatic Lands.

3.1.2 Local (City or County) Permits

- Shoreline Compliance.

3.2 APPLICATION FOR STREAMLINED PROCESSING OF FISH HABITAT ENHANCEMENT PROJECTS

This permit form can be completed in addition to the regular JARPA, to request streamlined processing if the Project meets certain conditions.

3.3 UNITED STATES ARMY CORPS OF ENGINEERS

The Section 404 Permit Process will be initiated with the submittal of the JARPA to the U. S. Army Corps of Engineers. The Corps will review the JARPA and authorize the project under Nationwide Permit #27, which authorizes minor work in Waters of the United States for stream and wetland restoration activities.

3.4 CITY OF SEATTLE PERMITS

- Shoreline Master Use Permit,
- City Street Use Permit
- Construction Permits.

4.0 DESIGN PROCESS

The design process is subject to obtaining various permits and regulatory approval. As described in Section 3.0, the Trustees will review and provide written approval for the 30% design prior to the submittal of permit documents. After the permits have been issued, the 90% design will be developed. The 90% design will be submitted to the Trustees for review and written approval prior to finalizing the 100% design and construction. The following sections summarize the criteria for completing the design process.

4.1 DESIGN CRITERIA

The Project will be constructed from an uplands site currently at elevation +16 feet Mean Lower Low Water (MLLW). The Site will consist of two off-channel inlets separated by the base of the Spokane Street Bridge swing arm base (Figure 2).

The northern inlet will extend approximately 100 feet (30 meters) perpendicular (roughly east-west) to the river. Two peninsulas will be created on either side of the inlet to create off-channel protection. The excavation for the entrance to the inlet will begin at approximately +8 ft MLLW and will consist of intertidal marsh vegetation, transitioning from +8 to +12 ft MLLW, above which a vegetated buffer zone consisting of tree and shrub species will be planted.

The southern inlet will extend approximately 420 feet (130 meters) parallel (roughly north-south) to the river, traveling northeast from the inlet and turning southeast and under the West Seattle Bridge. Similar to the northern inlet, excavation for the entrance to the inlet channel will begin at approximately +8 ft MLLW and will consist of intertidal marsh vegetation, transitioning from +8 to +12 ft MLLW. A vegetated buffer zone consisting of tree and shrub species will be planted above the marsh. A peninsula extending north from the southern edge of the Project will be constructed to a maximum elevation of +13 MLLW and will act as a barrier between the main channel and the constructed off-channel habitat during all but the highest of tidal events. Large woody debris and other bio-engineered elements will be

incorporated into the design of the peninsula to maintain structural integrity during extreme high tides and high flow events. The existing intertidal slope will be modified by the placement of habitat mix (gravels) over the existing rip rap from elevation -4 ft MLLW to +8.

The site will be over-excavated approximately three feet, and then appropriate topsoil will be imported and spread over the intertidal and riparian portions of the site to finished grade. The bottom of the both inlet channels will gradually slope up to approximately +10 ft MLLW. The inlet channel will be contoured with flattened side-slopes up to approximately +12 ft MLLW, and will support high marsh vegetation between +10 ft and +12 ft MLLW. From there, the habitat will transition to riparian habitat up to between approximately +15 ft to +18 ft MLLW. Beyond the riparian habitat, the remainder of the site (excluding utility features and access) will be preserved and planted as upland habitat area.

The total footprint of both off-channel inlets is constrained by limitations posed by existing underground utilities and structures onsite (Figure 3).

The alignment of the inlets and post-construction habitat types and zones are shown in Figure 4. The proposed Project will create approximately 1.99 acre of habitat from lands currently covered by riprap and un-vegetated upland, including approximate acreages of the following habitat types:

- 0.42 acre of vegetated buffer,
- 0.70 acre of intertidal high marsh,
- 0.13 acre of intertidal low marsh,
- 0.31 acre of habitat mix over rip rap (RRFM), and
- 0.44 acre of shallow subtidal mudflat.

The Project will include the removal of rubble and debris from the bank and mudflat, replacing riprap with fish-friendly cobble material and large woody debris to the extent practicable. The

alignment maximizes the length and width of intertidal habitat, within the confines of the existing utilities and infrastructure on the Project site.

A portion of the site will include a new category of habitat, “habitat mix covered riprap” (RRHM), first described in the SOW for Bluefield’s Site 01. This is a pilot category specific to this site. Trustees will determine if this habitat category is of value and it will be subject to the following conditions (See Table 1 for monitoring requirements):

- Two layers of material must be placed for the creation of RRHM. The first layer is intended to fill the interstices of the riprap and can be any type of clean fill material available. The second layer shall be composed of clean $\frac{3}{4}$ minus rounded gravel (smaller material is acceptable if conditions are such that it is expected to remain in place).
- The second layer shall be at least 1 foot thick over the entire area to be classified as RRHM. RRHM is intended to be a permanent habitat type and monitoring is required to ensure that the material remains in place at the minimum thickness (1 ft). Any portion of the covering that is displaced must be replaced, or the value assigned to the RRHM portion of the project will be reduced by the percentage of the area that no longer meets the conditions describing the habitat. It is, therefore, recommended that the initial placement of habitat mix exceed the 1 ft minimum thickness as some settling and redistribution is expected.

The marsh vegetation will be planted within the habitat elevations specified by trustees. Bluefield Holdings will plant appropriate species within this zone and maintain them as set forth in this SOW. In the event Trustees determine that the marsh does not meet its success criteria, an Adaptive Management Plan will be developed and implemented in an attempt to meet those success criteria (See section 7.4). The project will involve coordination with the Muckleshoot Indian Tribe to establish goals for the number, location, and structure of net attachments at the site, subject to permit approval and approval by the Natural Resource Trustees.

4.2 GEOTECHNICAL AND GEOMORPOLOGICAL CRITERIA

Project site slopes are known to be stable, high unstable banks are absent, there are no bedrock outcroppings present, and none of the habitat will be load bearing. In addition, much of the Project site is off-channel and subject to much lower erosional stress than the main channel. The overall design will also protect critical infrastructure (i.e., utilities, roads, and bridges) from erosion using standard and accepted industry practices in the selection and placement of materials. Once constructed, the habitat features will be allowed to settle, and stabilize naturally. A limited geotechnical investigation will be performed (as described below), to gain additional information on the depth of the native soil horizon and to collect information for soil disposal options.

During the design phase, test pits will be excavated at the Site to obtain geotechnical information on subsurface conditions. A minimum of two test pits (potholes) will be excavated at the Site using a backhoe or small excavator. Test pits will be advanced to approximately two feet below subgrade elevation. This will allow observation and sampling as necessary of *in situ* material that will remain onsite as well as material that will be excavated and sent offsite.

Samples of the final subgrade surface will be collected and analyzed for grain size and chemical analysis for comparison to the Trustees' Injury Thresholds (Chart 1). Representative samples will also be collected from material that will be excavated for geotechnical testing and chemical analysis to determine potential reuse or disposal options.

4.3 ENVIRONMENTAL CRITERIA

No chemical data exists regarding the potential presence of contaminants in the immediate area of the Project. However, Bluefield conducted due diligence activities in the area, including review of environmental databases, Sanborn Maps, property ownership records, and informal interviews with City of Seattle personnel familiar with historical operations. The due diligence activities completed by Bluefield did not indicate any industrial activities, environmental releases, or recognized environmental conditions at, or immediately adjacent to the Site. Therefore impacts from historical operations are not likely to be present.

During the geotechnical investigation described in Section 4.2, opportunities exist to examine soils at the final subgrade surface. At each test pit excavated as part of the geotechnical investigation, a composite soil sample will be collected from the elevation of the final subgrade surface (to 2-feet below that surface) and submitted for laboratory analysis. The goal of this sampling is to ensure that the soils at the final subgrade surface (including the depth interval 1-2 feet below the subgrade surface) meet the Trustees' Injury Thresholds (Chart 1). Laboratory analysis will include the standard analytes listed in the Lower Duwamish Chemicals of Concern (COC) list. During excavation of the test pits, additional samples may be collected at discrete intervals for archiving at the laboratory and analyzed for COCs if composite sample results shows concentrations above regulatory standards. A sampling and analysis plan will be prepared prior to initiating field activities, and included as part of the Soil Management Plan (See Section 7.1.1). Chart 1 shows the Duwamish Chemicals of Concern and the Injury Thresholds.

**Chart 1
Duwamish Chemicals of Concern and Trustees' Injury Thresholds**

Substances of Concern	Symbol	Units	Injury Threshold
Total PAH		ppm dw	1
Total PCB		ppm dw	0.128
Metals			
Arsenic	As	ppm dw	57
Cadmium	Cd	ppm dw	2.7
Chromium	Cr	ppm dw	63.5
Copper	Cu	ppm dw	270
Lead	Pb	ppm dw	360
Mercury	Hg	ppm dw	0.41
Silver	Ag	ppm dw	3.0
Zinc	Zn	ppm dw	410
Tributyltin	TBT	ppm dw	0.102
Chlorobenzenes			
1,2-dichlorobenzene	oDCB	ppb dw	35
1,4-dichlorobenzene	pDCB	ppb dw	110
1,2,4-trichlorobenzene	TCB	ppb dw	31
Hexachlorobenzene	HCB	ppb dw	22
Phthalates			
Bis (2-Ethylhexyl) phthalate	bEPH	ppb dw	1300
Butylbenzyl phthalate	BBPH	ppb dw	63
Di-n-butyl phthalate	DnBPH	ppb dw	1400
Di-n-octyl phthalate	DOPH	ppb dw	61
dimethylphthalate	DMPH	ppb dw	71
Phenols			
4-methyl phenol	MP4	ppb dw	110
2,4-dimethyl phenol	DMP	ppb dw	29
Phenol	Phenol	ppb dw	180
Hexachlorobutadiene	HCBD	ppb dw	11
DDTs			
	p,p''DDD	ppb dw	16
	p,p''DDE	ppb dw	9
	p,p''DDT	ppb dw	12
ppm- parts per million ppb- parts per billion dw- dry weight			

During final construction, soils at the final subgrade surface above Sediment Quality Standards will be removed and replaced with clean soil, or a 1-2 foot layer of clean soil (that meets the Sediment Quality Standards) will be placed over the top of the affected soil. Results of the geotechnical investigation will be incorporated into the final design and Soil Management Plan.

Material excavated during construction of the habitat will be loaded into trucks and transported to an upland staging area and temporarily stockpiled on plastic sheeting (or other appropriate material). Clean material will be segregated and evaluated (including analytical testing for comparison to the Model Toxics Control Act, Chapter 173-340 revised January 2003, published Method A Soil Cleanup Levels for Unrestricted Land Uses) for beneficial reuse at the Project site or at another offsite location. Potentially contaminated material will be stockpiled separately and tested using the appropriate analytical methods. If excavated material has chemical concentrations above the Trustees' injury thresholds, that material will not be used as the upper 1 – 2 foot final surface for any portion of the habitat. If excavated material has chemical concentrations below MTCA Unrestricted Land Uses levels, that material will be used in the creation of the forested upland portion of the site. Any excavated material that exceeds the MTCA Unrestricted Land Use levels will be transported offsite for proper disposal in accordance with all applicable regulations.

5.0 CONSTRUCTION & HABITAT CREATION

On receipt of the appropriate permits and written authorization from the Trustees, Bluefield will initiate construction activities in accordance with the approved plans and specifications summarized in the following sections. The construction phase of the Project includes initial habitat development that will be designed to meet the physical and biological success criteria developed as part of this document. In order to allow construction in the dry during periods of daytime low tide, as long as permits are approved, construction work will take place during the June – October time frame.

Public Informational Meeting

Once permits are finalized and construction is scheduled, Bluefield will hold an informational public meeting to inform the community of the upcoming restoration project, and to answer any questions. Bluefield will provide Trustees written notice of the meeting 30 days in advance.

Construction

A trackhoe (excavator) will likely be used to excavate the onsite materials and a small bulldozer may assist in the fine grading of the site. Other construction equipment such as loaders and dump trucks will be used to transport material. Initially, site access will be established and erosion and sediment control measures installed. The trackhoe will excavate the habitats, leaving a berm of approximately 10 feet in width at the outlets to prevent the tidal ebb from entering the Project site during construction.

During excavation, soils will be evaluated for contamination and suitability for re-use (see Section 7.1.1 – Soil Management Plan). If over-excavation is warranted, extra material will be removed from the site and clean material that meets Trustees' Injury Thresholds will be placed to prepare the rough grading for the site. Select materials will then be imported and final grades established.

Any excavated material which exceeds Model Toxics Control Act (Chapter 173-340 revised January 2003) published Method A Soil Cleanup Levels for Unrestricted Land Uses shall be considered contaminated soil and shall be disposed of offsite, at an approved facility in accordance with all appropriate federal, state and local regulations regarding the handling, transporting and disposal of contaminated material.

Planting and site stabilization (i.e., mulching) will be conducted after the final grades are established. During planting and stabilization, access for a trackhoe will be retained so that the berms can be removed and the inlets fine graded during low tide.

Upon final stabilization and planting of the inlet area, an as-built survey will be prepared and monitoring baselines will be established.

Corrective Action Plan

In the event that there is a significant problem that would prevent this Project from being constructed as designed, Bluefield and the Trustees will discuss and formulate a corrective management strategy that will allow the Trustees to determine what attributes are not on target for Project success and what actions need to be taken to achieve Project success. Within 60 days of the Trustees' written notification to Bluefield that a corrective management strategy is necessary, a Corrective Action Plan shall be drafted by Bluefield and presented to the Trustees for their written approval.

Notice of Construction Completion

Within 60 days upon completion of construction, or other such period of time as agreed to by the Parties, Bluefield shall submit a written notice of completion to the Trustees.

6.0 OPERATIONS, MAINTENANCE & MONITORING

Following initial construction of the Project, operations, maintenance and monitoring activities will be conducted to enhance the survivability of newly established plants, as well as to evaluate the performance of the newly created habitat. The goal of the Project is to create a self-sustaining habitat(s) that will complement any existing natural resources and further enhance the natural ecosystem and support native estuarine species. The Monitoring Plan will be developed and followed to determine if the goals and objectives of the habitat project is being achieved (See Section 7.1.4). Implementation of the monitoring plan will determine if restoration objectives are being met, the operations and maintenance plan is sufficient, contingency measures need to be taken, adaptive management strategies need to be implemented, and contingency measures and adaptive management strategies are successful.

Operations and maintenance activities will be conducted relatively frequently during the first year after planting, then will decrease in frequency over the 10-year monitoring program (see Tables 1-3). Maintenance and Stewardship activities will transfer to the City of Seattle after the initial 10-year monitoring program, in accordance with the Master Lease.

The following sections and attached Tables 1-3 outline the general operations, maintenance and monitoring activities to be performed during the ten years following construction of the habitat. Additional details will be provided in the Maintenance Plan and Monitoring Plan that will be available for Trustee review and approval with the 30% design and in the Monitoring Plan.

6.1 OPERATIONS AND MAINTENANCE

Maintenance will be required to ensure success of the newly created habitat. During the first ten years Operations and Maintenance will include the following activities:

- **Watering:** watering of upland plants may be necessary depending on weather conditions and the time of planting. Watering, if needed, will be conducted using a watering truck or temporary irrigation system until upland plants become established.

This activity is expected to be necessary for only a portion of the ten-year maintenance period.

- **Mulching:** Mulching may be required following initial plant installation and during weeding activities.
- **Weeding:** Weeding around shrubs may be required during the first summer to facilitate plant establishment and reduced competition. Weeding will be accomplished by hand with simple tools, and will be performed as necessary based on periodic site inspections. A complete list of noxious weeds that will be removed from the site will be presented for review with the 30% design.
- **Dead Plant Removal:** Dead plant removal will be performed as necessary after scheduled monitoring activities. Plants will be replaced as necessary to maintain diversity in accordance with the approved Planting Plan and success criteria.
- **Debris Removal:** Material that adversely affects the habitat area will be removed as needed.
- **Goose Exclusion System.** Grazing by Canada geese and other animals will be minimized by using an adaptive and variable range of physical restraints or barriers. Several types of physical restraints and barriers have been used at similar sites. Installation of the barriers or restraints will take place before, or simultaneous with, planting of intertidal vegetation. Physical restraints or barriers will be maintained for five years unless agreed to be unnecessary by the Trustees. Periodic monitoring should confirm adequate site maintenance of devices.

The Monitoring Plan will include a description of activities that will be conducted to maintain the ecological function of the projects (i.e., invasive species control and removal of anthropogenic material). These activities will be conducted on an as-needed basis. The plan

will not cover “force majeure” events. “Force majeure,” in the context of this discussion, includes all physical events (e.g., flood flows or seismic events) that exceed the design criteria for the projects that will be developed using accepted professional engineering standards.

6.2 MONITORING

Project monitoring will be conducted to evaluate the performance of the newly created habitat. The proposed monitoring activities are developed around both physical and biological success criteria, as listed below and summarized in Tables 1-3. Additional details on specific field methods will be provided in the Monitoring Plan that will be submitted as part of the 30% design.

6.2.1 Re-contamination Monitoring

If the chemical analysis of soils excavated during the geotechnical investigation identifies the presence of contamination at levels above the Washington Department of Ecology’s Sediment Quality Standards, Trustees must be notified within seven days. A sediment recontamination monitoring plan will then be developed to monitor for potential recontamination of the completed restoration project with the specific constituent(s) identified. The sediment recontamination monitoring plan will be submitted to the Trustees for review and written approval. Sediment recontamination monitoring will be conducted in years 3, 5, and 10 of the project. Trustees will be notified within 7 days if any areas of the site exceed SQS values. This will trigger discussions with the Trustees over possible causes and appropriate responses. If an investigation indicated that recontamination above the SQS of the habitat substrate is due to on-site migration from upland sources, action to address the recontamination will be required by the Trustees at their discretion.

6.2.2 Physical Success Criteria

The physical success criteria for the Project include the following elements, within the parameters described in Table 1:

- Maintaining intertidal areas,
- Slope stability (intertidal),
- Tidal circulation,
- Sediment/soil structure,
- Salinity, and
- Channel morphology.

Although these parameters have been established as success criteria, the goal of the Project is „a self-sustaining habitat“. The project will be allowed to settle naturally. Monitoring tasks will include periodic surveys using traditional mapping techniques using Global Positioning System (GPS)-referenced information, aerial photographs, visual observations, and the collection of soil samples for analysis, as appropriate.

6.2.2 Biological Success Criteria

Biological success criteria monitoring includes maintaining the appropriate marsh and riparian vegetation coverage within the parameters outlined in Table 2, minimizing the intrusion of non-native or invasive plant species. Monitoring tasks will include periodic surveys based on traditional mapping techniques, aerial photographs, and visual observations, as appropriate.

6.2.3 Additional Monitoring Requirements

In addition to monitoring the physical and biological criteria, the presence of fish and invertebrate prey resources will be monitored in accordance with the criteria presented in Table 3. Fish presence will be observed periodically during March, May and June, as specified in 7.1.4 and in Table 3. Invertebrate prey (epibenthic) resources will be assessed using a suction sampler. Since the creation of a suitable habitat cannot guarantee that the habitat will be populated by estuarine species, there are no success criteria for the presence or absence of fish or invertebrate species. The purpose of the presence/absence monitoring is for scientific evaluation purposes, in accordance with requests by the Trustees. Fish or invertebrate presence is not success criteria for the Project, although they are certainly an intended result of the

restoration. If the monitoring indicates that fish or invertebrate species are not present at the Site, discussions with the Trustees will be initiated to determine potential reasons for the absence and whether adaptive management actions are warranted.

6.2.4 Monitoring Status Report

The Trustees will be provided with Monitoring Status Reports during the initial 10-year monitoring period. The Monitoring Status Reports will include a description of monitoring and Operations and Maintenance activities completed during specific monitoring years, a summary of any data collected during the year (including survey maps and tabular data), and activities/results of any newly implemented adaptive management plans (if needed). The Monitoring Status Report will be prepared and submitted to the Trustees by April 1 of the year following any monitoring activities.

7.0 PLANS AND DOCUMENTATION

As part of the design and permitting process, a variety of plans and documents will be developed and submitted to the appropriate agencies for review and comment. Following completion of the permitting process, and prior to initiating construction of the habitat, a final design package will be prepared. Following construction of the habitat, as-built drawings will be prepared and submitted to the Trustees (See section 7.3).

A summary of the additional plans and documentation that will be prepared is provided below.

7.1 PERMIT APPLICATION PACKAGE

Prior to submitting applications for permits that will be required for construction of the restoration Project, Bluefield will prepare a Permit Application Package for review by the appropriate permitting agencies. The Trustees will be provided a copy of the Permit Application Package for review and written approval prior to submittal to the permitting agencies. Subsequent to the Trustee’s review of the Permit Application Package, the Trustees

will be provided with more detailed documentation for their review and written approval, for the following documents:

- Soil Management Plan,
- Planting Plan,
- Operations and Maintenance Plan, and
- Monitoring Plan.

7.1.1 Soil Management Plan

No chemical data exists regarding the potential presence of contaminants in material that will be excavated during construction of the Project. Some of the soils may contain contaminants at concentrations above levels of regulatory concern, and will need to be appropriately managed. As such, a Soil Management Plan will be prepared prior to initiating construction activities.

The Soil Management Plan will include detailed descriptions of all pertinent procedures related to soil excavation, removal, and placement, including, but not limited to the following:

- **Soil Handling:** the Soil Management Plan will include a description of the types of equipment that will be used at the Site; dewatering procedures (if needed); procedures for installation of plastic liners beneath soil piles, silt fences; and stormwater management.
- **Sampling and Analysis:** including procedures for installation of test pits; management of soil excavated from the test pits; sample collection and sample handling methodology; chain of custody procedures and laboratory analyses; and data evaluation and reporting.
- **Soil Management:** including a description of criteria for determination of soil disposition (i.e., reuse or offsite disposal); and procedures for transporting and disposal of soil to offsite facilities (if needed).

- **Health and Safety:** a site-specific health and safety plan will be developed in accordance with federal standards to provide information on potential hazards; mitigation any potential Site-related risks; training for Site personnel; and the location of emergency medical facilities.

Excavated soils and debris will be placed directly into trucks and transported to a designated uplands site for temporary stockpiling. As the excavation activities are planned during periods of the summer and low tide, significant dewatering of the material should not be required. Excavated soils will be placed directly in steel bins or on plastic sheeting material, and segregated as appropriate at the Project site or at an offsite location. Obvious debris will be transported directly to a landfill. Representative samples from excavated soil will be collected and submitted for laboratory analysis to determine the proper methods for disposal. Excavated soil that is free of contamination may be evaluated for beneficial reuse.

Any excavated material which exceeds Model Toxics Control Act (Chapter 173-340 revised January 2003) published Method A Soil Cleanup Levels for Unrestricted Land Uses shall be considered contaminated soil and shall be disposed of offsite, at an approved facility in accordance with all appropriate federal, state and local regulations regarding the handling, transporting and disposal of contaminated material.

7.1.2 Planting Plan

A Planting Plan will be developed as part of the Permit Application Package. The Planting Plan will provide details of the types and density of native plants that will be installed at the Project site. Upland plantings will be designed to provide an appropriate variety of ground shrub, herbaceous, understory, and canopy layers that will provide structural and habitat diversity. The plan will also present detailed information on the tidal marsh including:

- Species by elevations zone,
- Planting densities for rooted and bareroot stock by species, and
- Seeding densities by species.

7.1.3 Operations and Maintenance Plan

The Operations & Maintenance Plan will include detailed descriptions on the methodology, frequency, and duration of activities designed to maintain the suitability of the Project, as described in Section 6. In addition, this plan will describe the long-term stewardship of the Site that will be conducted by the City of Seattle after the initial 10-year monitoring period. The Operations and Maintenance Plan will be comprised of two sections: Initial operations and maintenance during the 10 year performance monitoring period and stewardship after the 10 year performance monitoring period.

Stewardship will be conducted after the initial 10-year monitoring period, so the project continues to meet specified performance criteria. The plan will include a description of activities that will be conducted to maintain the ecological function of the projects (i.e. invasive species control and removal of anthropogenic material). These activities will be conducted on an as-needed basis. The plan will not cover “force majeure” events. “Force majeure” in the context of this discussion, includes all physical events (e.g., flood flows or seismic events) that exceed the design criteria for the projects that will be developed using accepted professional engineering standards.

The Operations and Maintenance Plan will provide details for the required monitoring activities, including but not limited to:

- **Watering:** the Operations and Maintenance Plan will include a schedule for watering of upland plants, depending on weather conditions and the time of planting,
- **Mulching:** The Operations and Maintenance Plan will include a description for the type and approximate quantities of mulch that will be applied following initial plant installation, as well as supplemental mulching during weeding activities,

- **Weeding:** Weeding will be required around shrubs during the first summer to facilitate plant establishment and reduced competition. A complete list of noxious weeds that will be removed from the site will be included in the Operations and Maintenance Plan,
- **Dead Plant Removal:** Dead plant removal will be performed as necessary after scheduled monitoring activities. The Maintenance Plan will provide criteria for replacement and re-establishment of the plants as necessary.
- **Debris Removal:** Material that adversely affects the habitat area will be removed as needed – an initial schedule will be provided in the plan, and debris removal will be performed as necessary.
- **Goose Exclusion System.** The monitoring Plan will include descriptions of various physical restraints and barriers to minimize grazing, along with a plan to adaptively manage the exclusion system.

7.1.4 Monitoring Plan

As described in Section 5, the goals of the Project are to create a self-sustaining habitat(s) that will complement and enhance existing habitats in this part of the Duwamish River. To evaluate the effectiveness of this Project, physical and biological success criteria have been developed and are outlined in Table 1 and Table 2. Other monitoring requirements, such as documenting fish presence and invertebrate prey resources are listed in Table 3. A brief description of monitoring activities is provided below, and summarized in Table 1 through Table 3. The Monitoring Plan will include detailed procedures for each activity listed below:

- **Intertidal Area:** provide calculations of total intertidal area within 3-months of completion, and visual inspections after flood events. Methodologies will include aerial photography, GPS-referenced traditional mapping techniques, and photo documentation at pre-determined stations. Monitoring will be conducted in years 1, 3, 5, and 10.

- **Intertidal Stability/Slope Erosion:** provide as-built plan drawings within 3-months of completion, and visual inspections after flood events. Methodologies will include aerial photography, GPS-referenced traditional mapping techniques, and photo documentation at pre-determined stations. Monitoring will be conducted in years 1, 3, 5, and 10.
- **Tidal Circulation:** conduct visual inspections of the Project area for impeded tidal flow twice per year during May and June. Monitoring will be conducted in years 1, 3, 5, and 10.
- **Sediment/Soil Structure:** conduct periodic testing of soils for grain size distribution, total organic carbon, and total Kjeldahl nitrogen (if needed). Random samples will be collected from predetermined areas in proportion to different soil types. Monitoring will be conducted in Year 0 as needed.
- **Salinity:** the salinity of soil, intertidal sediment, and surface water will be periodically tested at the Site. Sample collection methods will include soil cores and standard laboratory procedures, and hand-held salinity probes, as applicable. Monitoring will be conducted in Year 0 as needed.
- **Marsh Vegetation Areal Coverage:** provide as-built plan drawings within 3-months of completion. Methodologies will include aerial photography, GPS-referenced traditional mapping techniques, and photo documentation at pre-determined stations. Monitoring will be conducted in years 1, 2, 3, 5, 7, and 10.
- **Marsh Vegetation Survival:** Quantitative sampling for vascular plant species and visual cover estimates will be conducted using standardized sampling transects relative to the shoreline and in proportion to the extent of each habitat type. Methodologies for cover estimates will include aerial photography, GPS-referenced traditional mapping techniques, and photo documentation at pre-determined stations, in reference to the initial as-built drawings. Monitoring will be conducted in years 1, 2, 3, 5, 7, and 10.

- **Riparian Vegetation Areal Coverage:** provide as-built plan drawings within 3-months of completion. Methodologies will include aerial photography, GPS-referenced traditional mapping techniques, photo documentation at pre-determined stations, and ground truthing. Monitoring will be conducted in years 1, 3, 5, and 10.
- **Riparian Vegetation Survival:** determine percent survival based on aerial photography, GPS-referenced traditional mapping techniques, photo documentation at pre-determined stations, and ground truthing. Monitoring will be conducted in years 1, 2, 3, and 4.
- **Fish Presence:** monitor and record fish presence in the area three times per year from the shore during peak of juvenile salmonid outmigration (May or June) for three hours at a time. Monitoring will be conducted in years 1, 3, 5 and 10.
- **Invertebrate Prey Resources:** monitor epibenthic invertebrate presence in each of two elevation strata (marsh and mudflat). Samples will be collected using a suction sampler located near fish sampling observation sites at high tides concurring with juvenile salmon outmigration. Monitoring will be conducted in years 1, 3, 5 and 10.

7.2 FINAL DESIGN PACKAGE

The Final Design Package will incorporate any revisions required as part of the permitting process, all plans referenced above, any additional specifications required for construction, along with copies of all permits required to construct the habitat. The 90% Design Package will be provided to the Trustees for review and written approval prior to initiation of construction activities. Following Trustee review, the 100% design will be prepared to support construction.

7.3 AS-BUILT DRAWINGS

A set of „as-built“ drawings will be submitted post-construction, documenting the final dimensions of the inlet and areas within each elevation (habitat) zone. These will include a set of drawings indicating the species and density of plants installed in each re-vegetated habitat zone. The As-Built Drawings will be submitted to the Trustees within 90 days of acceptance of the construction contract as complete.

7.4 ADAPTIVE MANAGEMENT PLAN

In the event that the prescribed actions are not successful at achieving one or more of the performance criteria, or unforeseen external circumstances interfere with success, an adaptive management process will be implemented. An Adaptive Management Plan (AMP) will be developed to evaluate a Habitat Restoration Project’s original goals after a Project’s construction, and when the monitoring results indicate that such project will not meet its original goals. The AMP will provide for additional actions to achieve a Habitat Restoration Project’s original goals or will provide modified goals should the original goals prove infeasible. The AMP will be approved in writing by the Trustees. Data acquired from monitoring and maintenance will be used to determine if the Adaptive Management Plan is successful in achieving the desired performance standard.

The AMP will be prepared in response to biological or physical parameters that are not meeting the success criteria summarized in Tables 1 and 2. For example, if specific noxious weeds do not respond to hand or mechanical treatment methods, the AMP will consider the use of herbicides to achieve the physical success criteria (Table 1). Development of the AMP will be done in consultation with the Trustees and Trustees will provide written approval prior to implementation. Upon approval of the AMP by the Trustees, the plan will be implemented and monitored to ensure success of the functioning habitat.

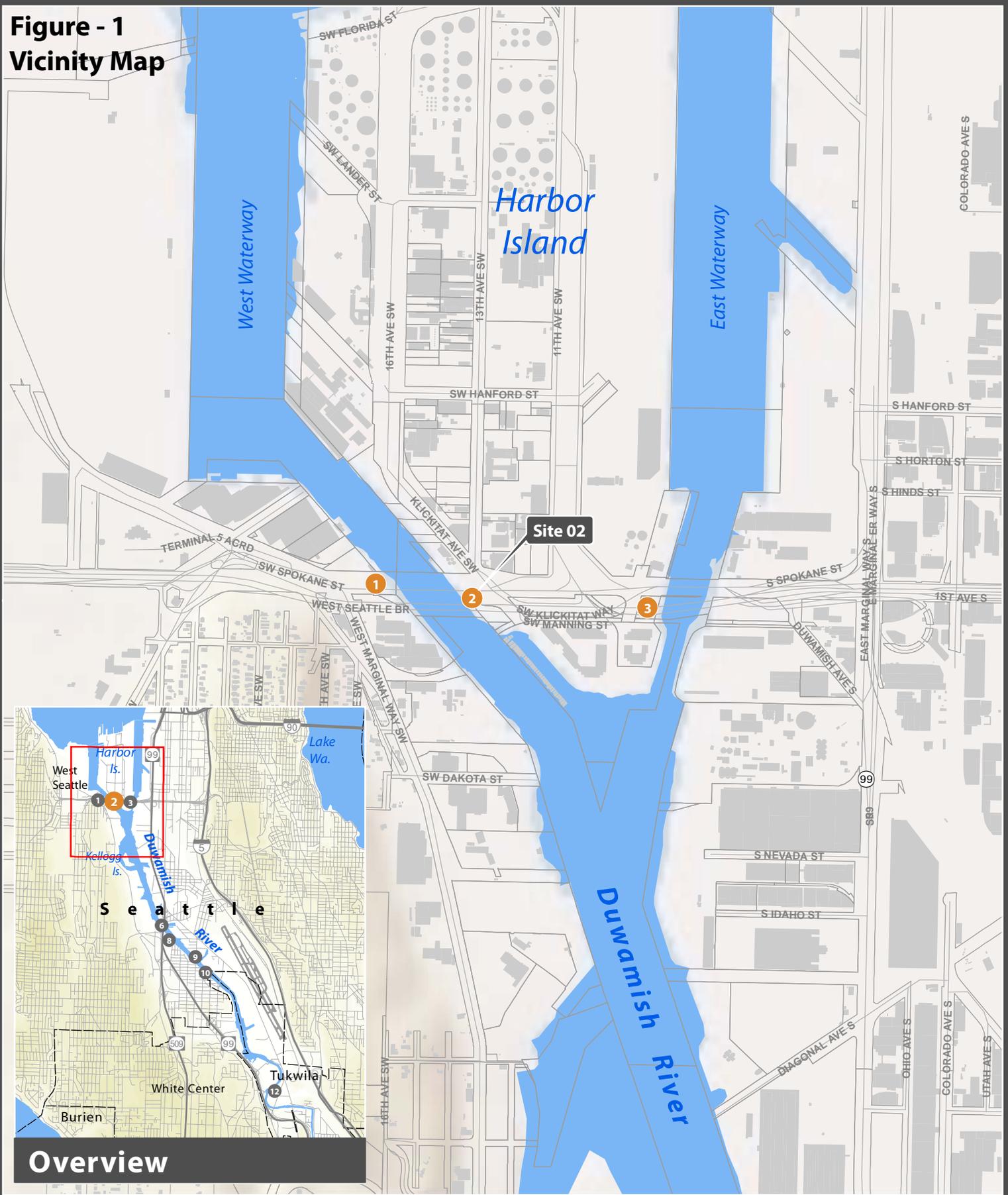
8.0 SCHEDULE

All construction drawings will be finalized upon obtaining all required permits and approvals. Construction of the site is expected to begin in the spring of 2012. Intertidal construction will be performed during summer low tides to take advantage of lower, daylight low tides that only occur during the summer months. Most of the excavation and material placement would take place “in the dry” during the low tide periods, significantly reducing the actual amount of in water work that is required. A detailed construction and monitoring schedule will be provided in the Final Design Package.

Within 90 days of approving a Project’s scope of work, Bluefield shall commence permitting of the Conditional Project. Within 30 days of receiving all permits, Bluefield will submit a construction schedule to the Trustees for their review and written approval.

FIGURES

**Figure - 1
Vicinity Map**



Overview

LEGEND

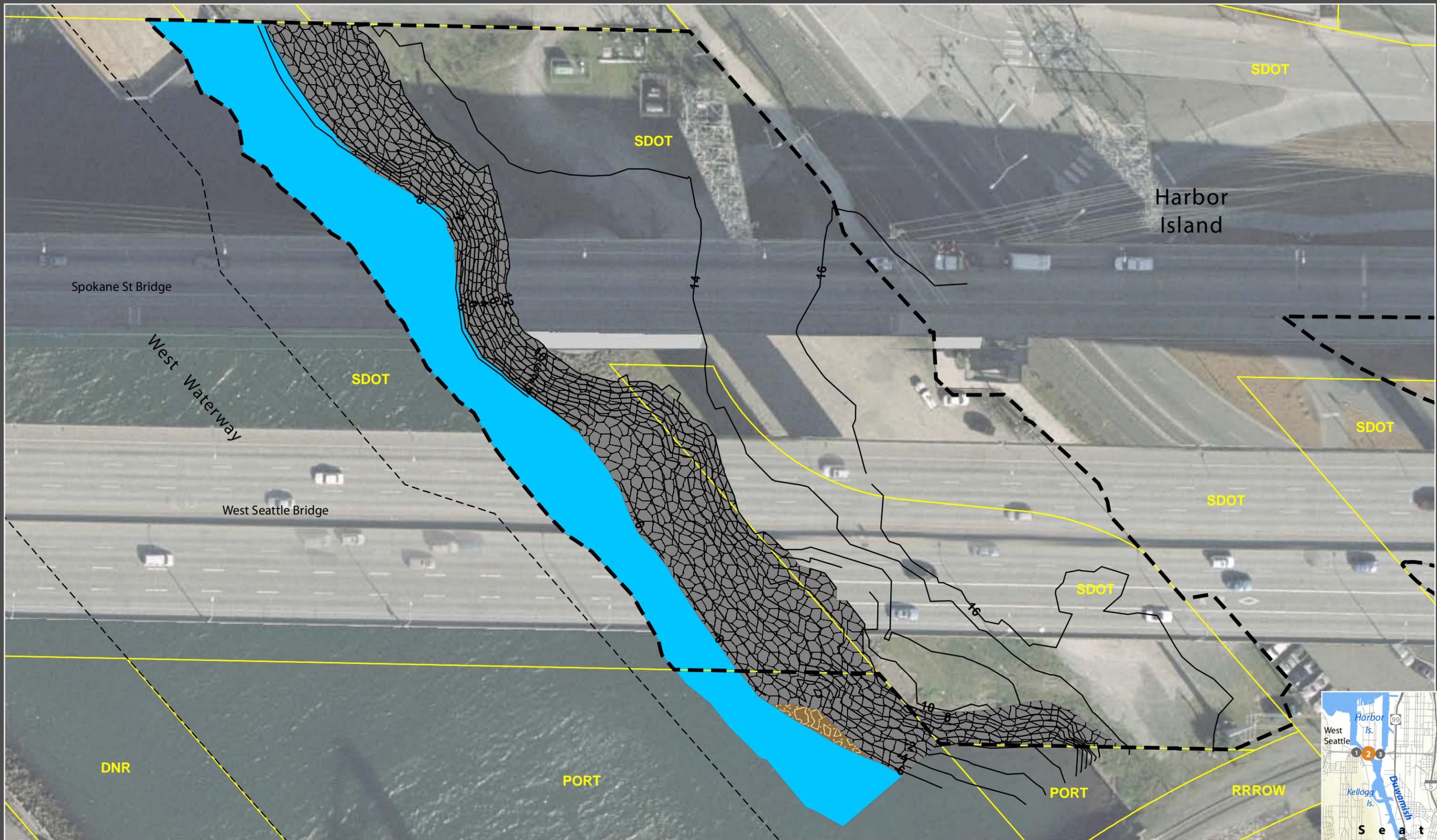
- # Project Sites
- Tax Parcels
- Streets
- Water
- Buildings



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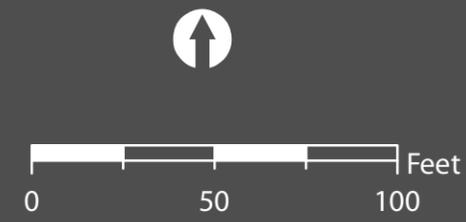


Figure - 2
Existing Conditions



LEGEND

--- Navigation Channel Existing Conditions	Intertidal (BA)
Project Area	Shallow Sub-Tidal
Parcel Boundary	Deep Sub-Tidal
Unvegetated Upland	Riprap



Date: 08.05.11
 1 inch = 50 feet
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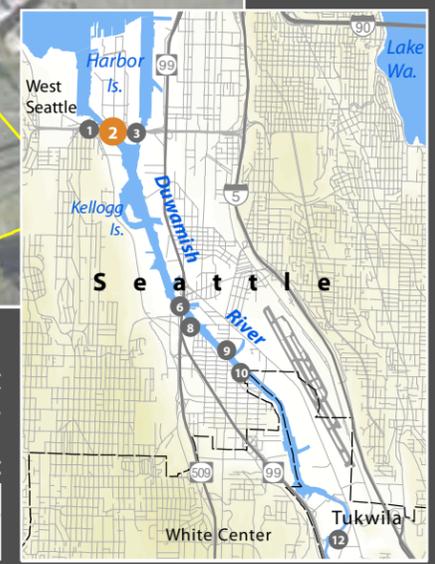
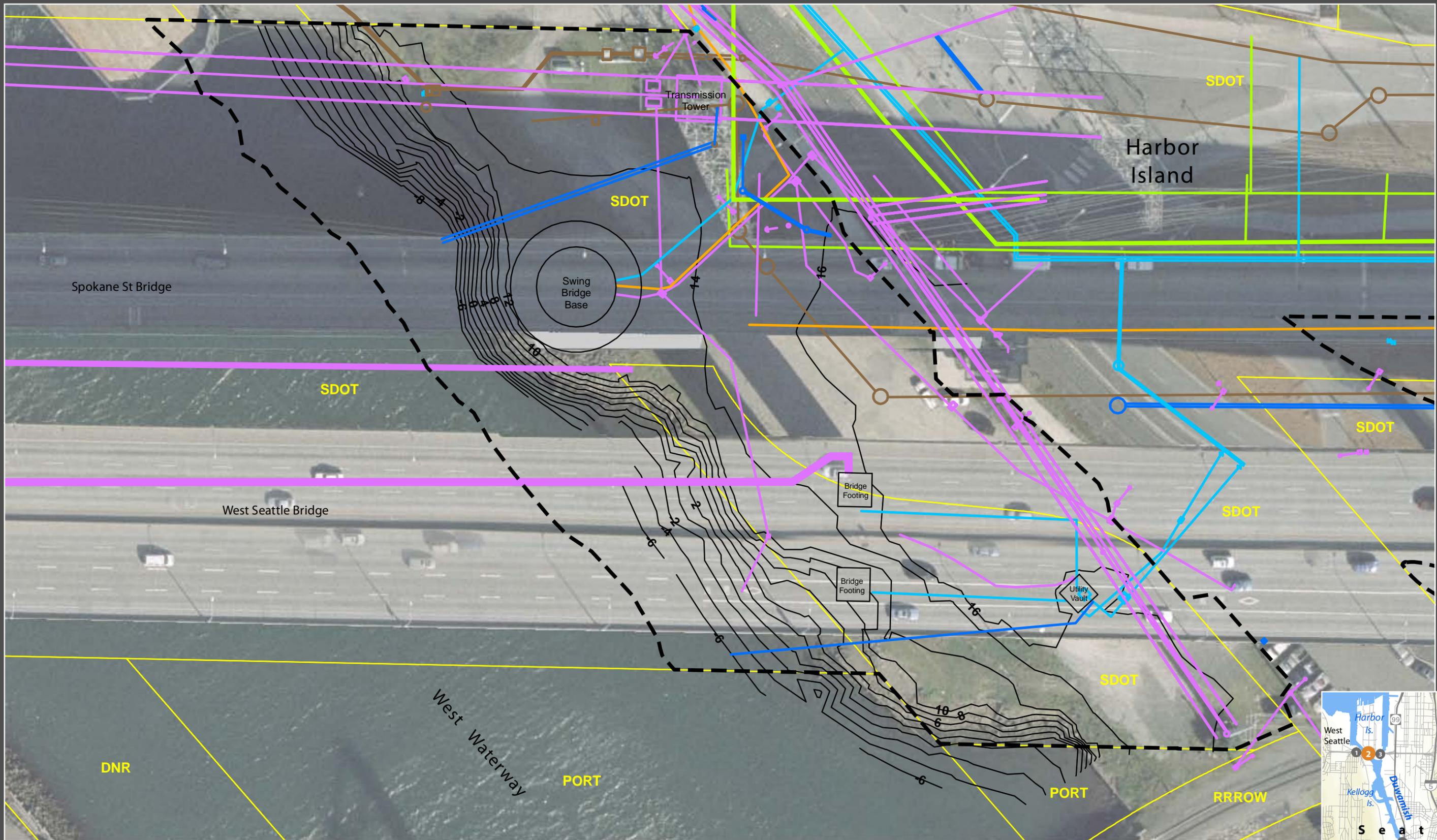


Figure - 3
Existing Utilities



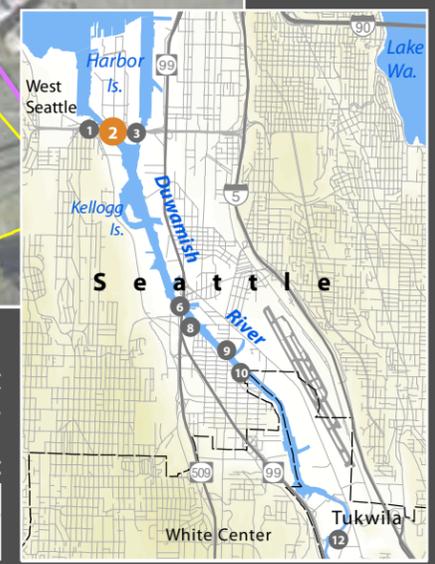
LEGEND

Project Area	Layer	Sanitary Sewer	Water
Parcel Boundary	Electricity	Storm	Structure Outlines
	Gas	Telephone	

↑

0 50 100 Feet

Date: 08.05.11
 1 inch = 50 feet
 Sheet Size: 11x17
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**Figure - 4 - East Side West Waterway
Post-construction Habitat Zones**



LEGEND

--- Navigation Channel	Proposed Habitat	IT(Low Marsh)	Shallow Sub-Tidal
Project Area	VB1	IT(Mudflat)	
Parcel Boundary	IT(High Marsh)	RRHM	

0 50 100 Feet

Date: 08.05.11
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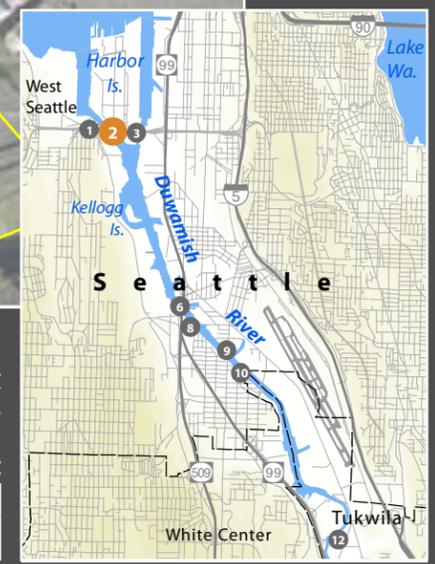
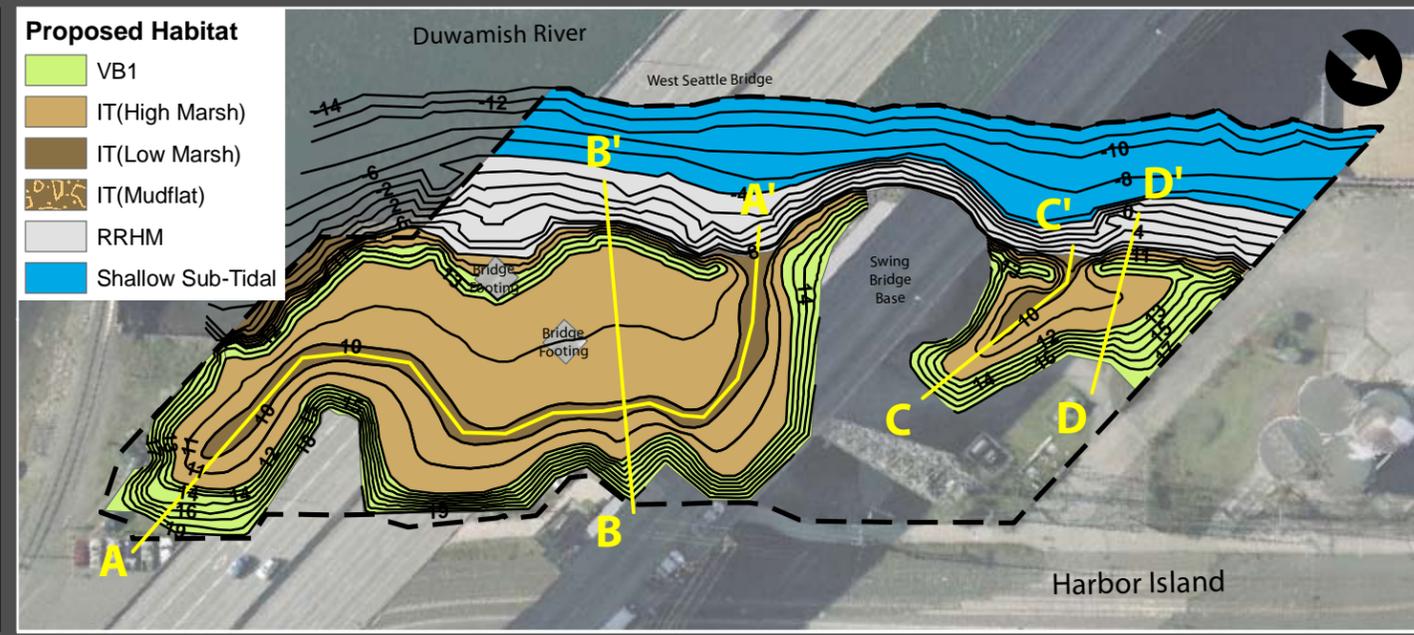
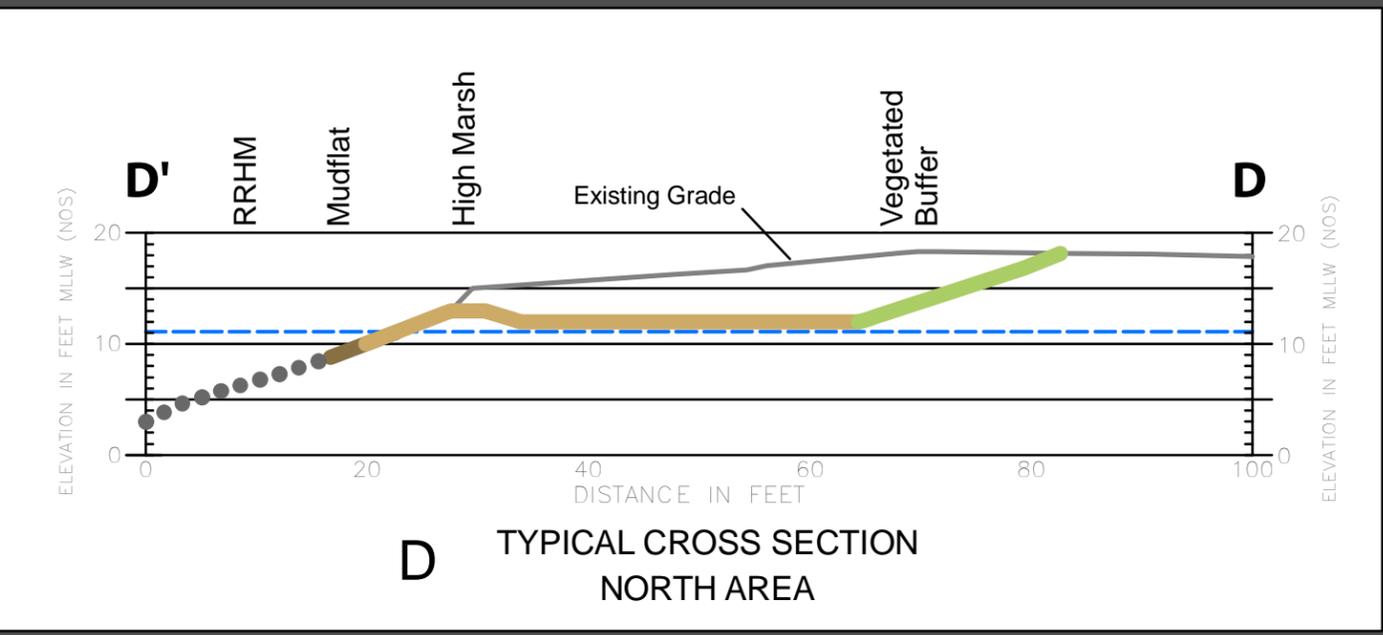
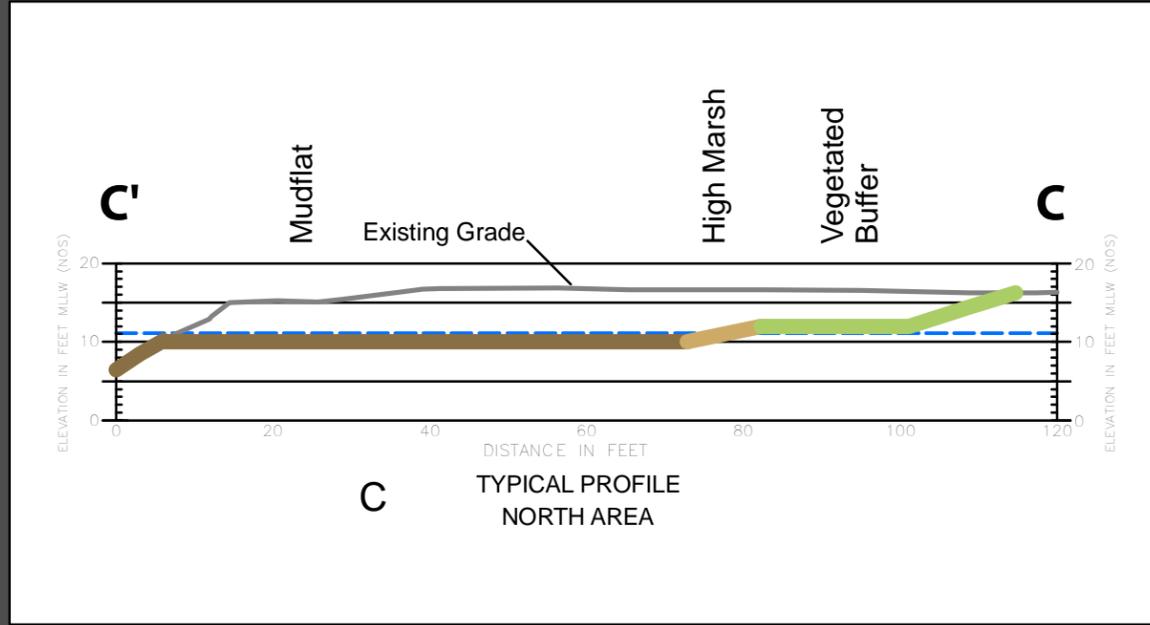
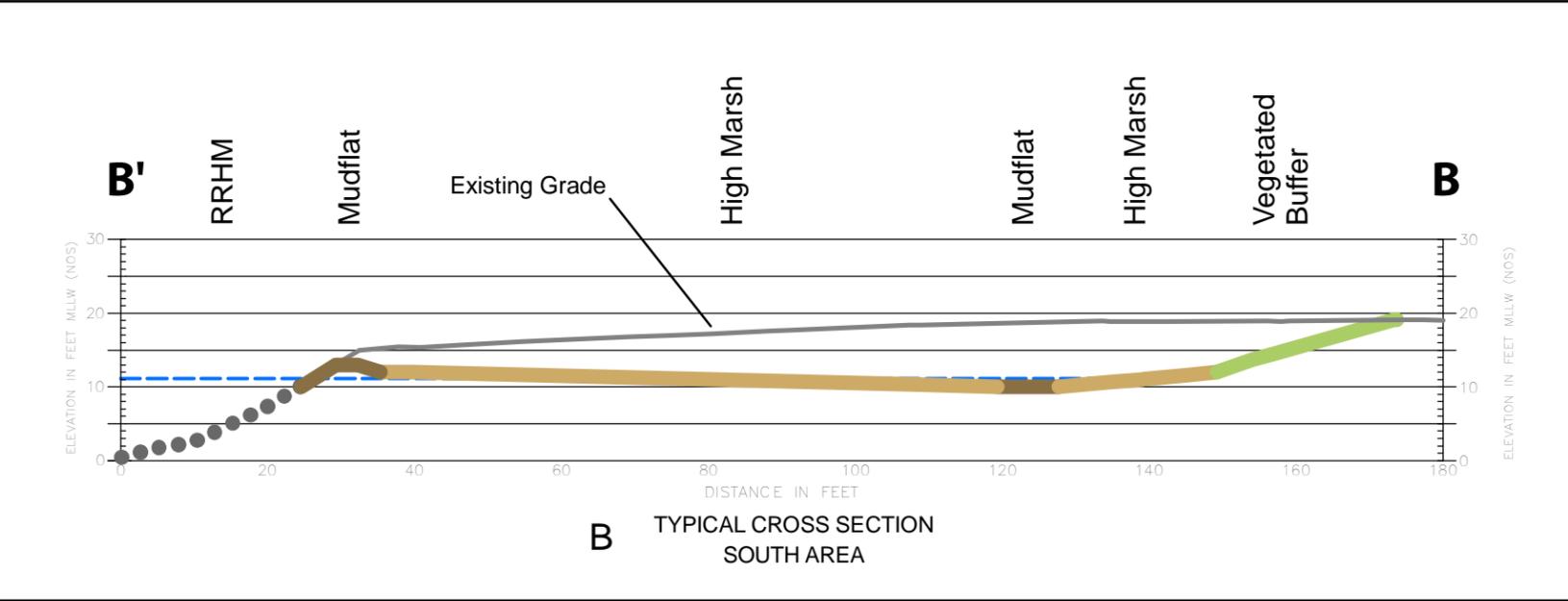
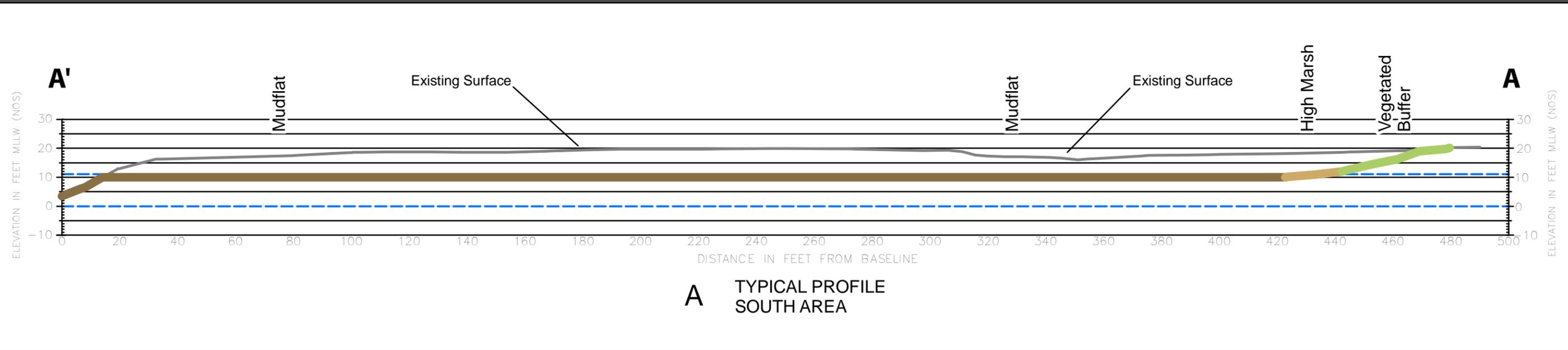


FIGURE 5 - East Side West Waterway

Draft Design Cross-Sections



TABLES

TABLE 1
PHYSICAL SUCCESS CRITERIA

	Intertidal Area	Intertidal Stability/ Slope Erosion	Tidal Circulation	Sediment/ Soil Structure	Site Salinity	Sediment Quality/Recontamination
Description:	The total restored area between an elevation of +12 ft NOS MLLW and -4 ft MLLW will be at least 90% of the target intertidal acreage.	The “as-built” elevations in the area planned for marsh will be +/- 0.5 ft of the elevations specified in the construction plan. The low gradients necessary for marsh development should be stable over time. The site should be allowed to evolve naturally, barring extreme erosion events. 75% of the target elevations will be maintained through year 5. “As-built” elevations for the habitat classified as “habitat mix covered riprap” (RRHM), which will be determined after a 1 ft minimum thickness of appropriate material has been placed over the riprap (per description in Section 4.1 of the SOW), will be maintained. This habitat type is a pilot project specific to this site is expected to persist as a permanent habitat without the need for continuous addition of covering material.	The tidal amplitude, as determined by both timing and elevation of high and low tide events, is equivalent inside and outside of the project area.	Over time, sites may accumulate fine-grained materials and organic matter. This would involve a decrease in mean grain size and an increase in organic carbon in the surface sediments and site soils.	Salinity is suitable for emergent plant propagation, colonization and growth. Salinity affects seed germination and plant establishment.	No evidence of contamination due to On-site migration of upland or subsurface contaminants to groundwater or aquatic area.
Monitoring Tasks:	Calculate the total intertidal acreage below +12 ft MLLW of the project and provide “as-built” plan drawings within 3 months of completion. Visually inspect after extreme flood events to determine erosional impacts.	Provide “as-built” plan drawings within 3 months of completion to document Visually inspect after extreme flood events to determine erosional impacts. Measure elevations along set transect line to detect changes over time. Visually inspect RRHM to monitor slope stability and ensure that habitat mix is remaining at 1 ft minimum thickness.	Visual inspections of the project area for impeded tidal flow, or potential fish stranding twice a year during May and June period.	Grain size distribution and organic carbon determination by collecting core samples in vegetated (>+10 ft MLLW) and unvegetated (<+9 ft MLLW) areas. Test for total nitrogen after Kjeldahl digestion or directly with CNH analyzer (if warranted).	Sample soil and intertidal sediment surface and/or core using standard sampling methods and accredited soils testing laboratory. Note areas void of vegetation. Determine surface water salinity at multiple locations in the intertidal area to the nearest ppt. Measure dissolved oxygen as appropriate.	If the chemical analysis of soils excavated during the geotechnical investigation identifies the presence of contamination at levels above the Washington Department of Ecology’s Sediment Quality Standards, then the restoration site will be monitored to determine if the habitat substrate (sediment) becomes recontaminated over time with the specific constituents identified. The compliance criteria that will be used to assess potential recontamination will be the Washington State Sediment Quality Standards.
Monitoring Methods:	Aerial photography, or traditional mapping survey techniques, and photo documentation at pre-determined photo stations.	Aerial photography, underwater photography, or traditional mapping survey techniques, and photo documentation at pre-determined photo stations.	Visual inspections to verify non-impeded tidal circulation. Tidal gauges, data loggers, if appropriate.	Random sampling within predetermined areas and in proportion to different soil types. Hydrometer and sieve to determine particle size. Replicate samples taken under similar tidal regime.	Hand-held salinity probe or refractometer, and data logger at multiple locations, as needed.	A sediment monitoring scope of work will be submitted for review and approval of the Trustees.
Schedule	Years: 1, 3, 5, and 10.	Years: 1, 3, 5, and 10.	Years: 1, 3, 5, and 10.	Year 0 and as needed if the marsh fails to meet success criteria and replanting or reseeded is unsuccessful.	Year 0 and as needed if the marsh fails to meet success criteria and replanting or reseeded is unsuccessful.	Sediment monitoring will be conducted in years 3, 5, and 10 of the project.
Contingency Measures:	In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees, and approved by them in writing. The adaptive management plan will be implemented as appropriate for the project conditions and goals.	Excessive erosion will be stabilized by non-structural approaches such as vegetation, fiber mats, or other “soft” engineered approaches. In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees, and approved by them in writing. The adaptive management plan will be implemented as appropriate for the project conditions and goals. In the event RRHM is not meeting the success criteria, an adaptive management plan, which may include addition of more habitat mix to maintain the minimum 1 ft depth, will be developed. However, if continuous maintenance is required, then the habitat classification RRHM will be judged to be unsuccessful, and the DSAY value of the area will be subtracted from the total project value.	In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees, and approved by them in writing. The adaptive management plan will be implemented as appropriate for the project conditions and goals.	If the intertidal sediments or upland soils do not support the biological production anticipated, amendments can be considered to augment nutrient deficiencies. In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees and approved by them in writing. The adaptive management plan will be implemented as appropriate for the project conditions and goals.	If salinity is a limiting factor for plant growth and propagation, more appropriate plantings of species will be considered. In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees and approved by them in writing. The adaptive management plan will be implemented as appropriate for the project conditions and goals.	Any areas of the site exceeding SQS values will trigger discussions with the Trustees over possible causes and appropriate responses. If an investigation indicated that recontamination above the SQS of the habitat substrate is due to on-site migration from upland sources, action to address the recontamination may be required by the Trustees.

TABLE 2
BIOLOGICAL SUCCESS CRITERIA

	Marsh Vegetation Areal Coverage	Marsh Vegetation Survival/Species Composition	Marsh and Riparian Vegetation Herbivory Avoidance	Riparian Vegetation Areal Coverage	Riparian Vegetation Survival
Description	Percent cover of vegetation should be stable or increasing within portions of the project where elevations are suitable to marsh establishment.	Percent cover of native marsh species should be stable or increasing over time, with 25% cover of clonal dominants (e.g. pickleweed/saltgrass, bullrush, sedge) at 3 years, 50% at 5 years, and not less than 75% after 10 years. The project should not contain more than 5% cover by area of non-native or invasive plant species.	Confirm the success of stopping physical herbivory by Canada geese using physical barriers of wire, rope, rebar, posts, string, netting, or another acceptable exclusion system that is adequate to meet the vegetation coverage requirements.	Percent cover of native riparian vegetation should be stable or increasing over time, with 15% cover at year 3, 75% cover at year 5, and cover not less than 90% of the upland vegetated area of the project after 10 years (percent coverage will be based on ‘plan view’ habitat maps). Invasive and non-native plant coverage should be less than 5%. A minimum of 5% cover of at least six species should be maintained (at least four species other than willow and alder). Evaluation of success will be assessed at Years, 3, 5, and 10. The goal will be an appropriate variety of ground shrub, herbaceous, understory, and canopy layers that will provide structural and habitat diversity.	Riparian trees and shrubs should maintain not less than 75% survival over the first three years following initial planting.
Monitoring Tasks	An as-planted survey will be mapped following initial planting(s). Areal extent of vegetation will be measured from aerial photographs, if available. Record as-planted counts of species by elevation.	Standardized sampling transects will be established relative to the shoreline in proportion to the extent of each habitat type. The transects will encompass portions of the project area suitable for intertidal vegetation establishment. Data analysis will include an estimate of areal extent of marsh vegetation cover and any observations in changes over time. Permanent sampling locations (quadrats along transects) will be established and marked for elevation.	There are several exclusion device designs that have proven successful in studies conducted in the Duwamish River and Commencement Bay. Such a design will be employed and monitored at all newly planted NRDA restoration project sites. Installation of devices must take place before or simultaneous with planting of intertidal vegetation. Periodic, and initially frequent, visual inspections of herbivore exclusion systems and immediate repair to reduce herbivory until the plant root systems have established themselves.	Prepare “as-planted” maps with photo documentation following initial plantings to serve as a baseline. Record as-planted counts of species by location.	Conduct an “as-planted” survey following initial plantings to serve as baseline using fixed, color photo points.
	Use GPS-referenced traditional survey techniques to map the patch perimeter. Photo points will be established. Color photographs will adequately cover the site and will be collected at each sampling period.	Quantitative sampling for vascular plant species composition to record species presence (for frequency of occurrence data), and visual cover estimates for all species. Species composition of marsh vegetation and the occurrence of invasive species that exceeds 1% will be reported.	Devices must be maintained for 4 years post planting (initial planting or replanting). Periodic monitoring should confirm adequate site maintenance of devices. Observations will be logged for 5 years post planting (or replanting).	Determine percent coverage for each vegetation layer (tree, shrub, and groundcover) using aerial photography and field ground-truthing.	Determine percent survival for each vegetation layer (trees, ground cover, and shrubs using aerial photography and ground-truthing.

	Marsh Vegetation Areal Coverage	Marsh Vegetation Survival/Species Composition	Marsh and Riparian Vegetation Herbivory Avoidance	Riparian Vegetation Areal Coverage	Riparian Vegetation Survival
Monitoring Methods	Aerial photography, or traditional mapping survey techniques, and photo documentation.	Aerial photography, or traditional mapping survey techniques, and photo documentation.	Periodic visual inspections.	Randomly distributed survey quadrants.	Direct counts of a subset of planted material.
Schedule	Years: 1, 2, 3, 5, 7, and 10.	Years: 1, 2, 3, 5, 7, and 10.	Years 1 through 5 post planting (or replanting).	Years: 1, 3, 5, and 10.	Years: 1, 2, 3, and 4.
Contingency	Evidence of plant failure or if recruitment rates fail to meet expectations will trigger appropriate actions including determining cause of failure and making needed project adjustments and/or replanting. In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees. The adaptive management plan will be implemented as appropriate for the project conditions and goals.	Any occurrence of an individual invasive species that exceeds the threshold of 1 percent by vegetated area, or total non-native and invasive species exceeding 5 percent by vegetated area, will be controlled primarily by physical means (pulling, mowing, burning). <i>Spartina</i> spp. that is found to colonize any portion of the site (irrespective of the areal coverage) will be immediately controlled. Physical removal will occur as soon as invasive plants are identified and definitely prior to seed set. Chemical treatment (herbicides) will only be considered if physical removal fails. Evidence of plant failure, or if natural recruitment rates fail to meet expectations, will trigger consideration of contingency measures. Depending on the hypothesized reason for failure, responses could include additional planting, soil amendments, herbivore exclusions, and/or focused stewardship efforts. Assumptions about appropriate plant species, elevation, salinity, and other design factors will be reexamined and the project goals readjusted if new information suggests this path.	Immediately repair of any damage to the herbivore exclusion devices caused by logs, trampling, or geese.	Excessive failure rates (25% loss annually) for plant survival addressed by secondary planting if appropriate, and if causal factors of failure can be determined and corrected. In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees. The adaptive management plan will be implemented as appropriate for the project conditions and goals.	Excessive failure rates (25% loss annually) for plant survival addressed by secondary planting if appropriate, and if causal factors of failure can be determined and corrected. In the event that established success criteria are not being met, an adaptive management plan will be prepared with input from the Trustees. The adaptive management plan will be implemented as appropriate for the project conditions and goals.

TABLE 3
ADDITIONAL MONITORING REQUIREMENTS

	Fish Presence	Invertebrate Prey Resources
Description	Estuarine fish should access the project area. Juvenile salmonids are anticipated to occur.	Invertebrate prey taxa known to be important to juvenile salmonids are anticipated within the project area.
Monitoring Tasks	Monitor fish use of the project area.	Monitor epibenthic invertebrate community development in project area.
	Record fish presence (species if possible) and relative abundance.	Three samples will be collected once each year in each of two elevation strata (i.e., marsh, and mudflat) . In each sample invertebrates known to be important salmonid prey items will be identified to the lowest practical taxonomic level and enumerated.
Monitoring Methods	Observe via snorkeling three times (early, mid, late) during peak of juvenile salmonid outmigration (March, May and June). All fish species observed will be recorded.	Epibenthic invertebrates sampled using a suction sampler. Sample stations located near fish sampling sites at high tide and concurrent with juvenile salmon outmigration. Samples will be collected during the juvenile salmonid outmigration (May or June).
Schedule	Years: 1, 3, 5 and 10.	Years: 1, 3, 5 and 10.
Contingency Measures	The purpose of this monitoring activity is to provide data as requested by the Trustees. There are no success criteria, contingency measures or adaptive management activities associated with this monitoring requirement. Failure of fish to use the areas could indicate that a basic restoration goal is not being met, and will trigger discussions regarding possible causes.	The purpose of this monitoring activity is to provide data as requested by the Trustees. There are no success criteria, contingency measures or adaptive management activities associated with this monitoring requirement. Failure of the epibenthic community to develop could indicate that a basic restoration goal is not being met, and will trigger discussions regarding possible causes.