



THEA FOSS AND WHEELER-OSGOOD WATERWAYS REMEDIATION PROJECT

YEAR 6 MONITORING

ANNUAL OPERATIONS, MAINTENANCE, AND MONITORING REPORT

OCTOBER 3, 2012



Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY

Prepared by:

CITY OF TACOMA

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1.0 INTRODUCTION

1.1 Purpose and Objectives of Operations, Maintenance, and Monitoring Plan Activities

This document presents a summary of operations, maintenance, and monitoring activities performed in 2012 for the Thea Foss and Wheeler-Osgood Waterways Remediation Project (Foss Project). Operations, maintenance, and monitoring activities were performed during Year 6 at the habitat areas within the Foss Project site and at the confined disposal facility (Figure 1-1). The work was performed in accordance with the Operations, Maintenance, and Monitoring Plan (OMMP) for the Thea Foss and Wheeler-Osgood Waterways Remediation Project (City of Tacoma 2006). Remediation construction was completed in 2006 by the City of Tacoma (City) under a Consent Decree (CD) issued by the U.S. Environmental Protection Agency (EPA).

The OMMP describes the baseline and long-term qualitative, physical, and chemical monitoring to be completed at the site and sets forth specific performance standards for planned monitoring activities to demonstrate that the long-term objectives for the project are met. The OMMP also details the process for contingency planning and presents possible response actions in the event that performance standards are not achieved.

Figure 1-2 shows the remedial actions completed by the City in the Thea Foss and Wheeler-Osgood Waterways. The area in which the City performed remedial actions as part of the Foss Project is identified as the City's work area. Also identified on Figure 1-2 is the Utilities' work area at the head of the Thea Foss Waterway. In this area, monitoring is being performed by the Utilities in accordance with the Head of the Thea Foss Waterway Remediation Project, Operations, Maintenance and Monitoring Plan (PacifiCorp 2003). The City continues to work cooperatively with the Utilities work group to respond to the identified recontamination occurring in their work area.

The OMMP was prepared in compliance with the Record of Decision (ROD) (EPA 1989), Administrative Order on Consent (AOC) / Statement of Work (SOW) (EPA 1994) for pre-remedial design investigation and remedial design, Explanation of Significant Difference (ESD) (EPA 1997), 2000 ESD, 2004 ESD, and the CD/SOW (EPA 2003) for remediation construction. The work completed in accordance with the OMMP is also in compliance with these documents.

The OMMP establishes an integrated program designed to evaluate and ensure the effectiveness of the remedial actions relative to the project Remedial Action Objectives (RAO). Work being performed under the OMMP is intended to ensure that the completed remedial actions performed at the site achieve the performance objectives as specified in the ROD and subsequent ESDs as related to the protection of surface sediment, surface water, and biological and physical habitat quality.

The RAO for the cleanup is stated in the ROD as:

- The objective of the selected remedy is to achieve acceptable sediment quality in a reasonable timeframe.

Additional language in the ROD states that the remedy was designed to incorporate the following:

- Natural recovery considerations are used to identify sediment remedial action levels that delineate sediments that are allowed to recover naturally from those that require active sediment cleanup;
- The sediment quality objective also applies to source control requirements. Monitoring sources and sediments will be used to determine the effectiveness of source controls; and
- Habitat function and enhancement of fisheries resources will also be incorporated as part of the overall project cleanup objectives.

The OMMP was developed and results will be evaluated to ensure that the RAOs for the site are achieved.

1.2 Scope of the Year 6 Operations, Maintenance, and Monitoring Report

The monitoring tasks and information comprising Year 6 and included in this report are the following:

- Habitat mitigation area monitoring including qualitative monitoring of the cap and berm at the St. Paul Waterway Confined Disposal Facility (CDF); and
- Status of additional project related tasks that include the following:
 - Implementation of tasks required under the Institutional Controls Plan (ICP);
 - Ongoing stormwater source control activities;
 - Ongoing work to deauthorize the navigational channel in encroachment areas.

Table 1-1 summarizes the overall monitoring schedule for OMMP activities to be performed.

1.3 Organization of the Annual OMMP Reports

For each monitoring year, an Annual Operations, Maintenance, and Monitoring Report (Annual Report) is prepared presenting the final, comprehensive information and data for monitoring activities completed in the previous year. The Annual Report will also document any decisions and/or contingency actions, planned or implemented.

The structure of the Annual Report for Year 6 Monitoring, and all Annual Reports, follows the outline of the OMMP to provide a consistent presentation and placement of information generated to monitor remedial actions performed as part of the Foss Project.

The following topics are presented in the Annual Report:

- Section 1.0 – Introduction
- Section 2.0 – Sediment Remediation Area Performance Monitoring
- Section 3.0 – Early Warning Monitoring for Recontamination
- Section 4.0 – Benthic Recolonization Monitoring

- Section 5.0 – Confined Disposal Facility Monitoring
- Section 6.0 – Habitat Mitigation Area Monitoring
- Section 7.0 – Additional Project Related Activities

The Annual Report also includes the following appendices:

- Appendix A – Physical Cap Integrity Monitoring
- Appendix B – Sediment and Cap Performance Monitoring
- Appendix C – Benthic Recolonization Monitoring
- Appendix D – Confined Disposal Facility Monitoring
- Appendix E – Habitat Mitigation Area Monitoring
- Appendix F – Health and Safety Plan
- Appendix G – Additional Project Related Activities

During monitoring years when any of these tasks are not required, placeholders will be maintained in the report so that information for a specific activity will consistently be in a specific section. For example, Habitat Mitigation Area Monitoring will consistently be found in Section 6.0 and Appendix E of the Annual Reports.

TABLES

1-1 – Monitoring Schedule

FIGURES

1-1 – Project Location Map

1-2 – Completed Remedial Actions

**Table 1-1
Monitoring Schedule**

Activity	Monitoring Year (Calendar Year)										
	Year 0 (2006)	Year 1 (2007)	Year 2 (2008)	Year 3 (2009)	Year 4 (2010)	Year 5 (2011)	Year 6 (2012)	Year 7 (2013)	Year 8 (2014)	Year 9 (2015)	Year 10 (2016)
1) Sediment Remediation Area Performance Monitoring											
Supplemental Data Collection for Natural Recovery Area Sediment Quality	X										
Sediment Quality (0 to 10 cm) Performance Monitoring of Cap and Natural Recovery Areas			X		X			X			X
Low Tide Slope Cap Inspection for Cap Integrity	X		X		X			X			X
Subtidal Cap Hydrographic Survey for Cap Integrity			X		X			X			X
2) Early Warning Monitoring for Recontamination											
Sediment Quality (0 to 2 cm) Monitoring			X		X			X			X
3) Benthic Recolonization Monitoring											
Sediment Profile Imaging and Archive Sediment Sample (0 to 10 cm) Collection			X		X			X			X
4) Confined Disposal Facility Monitoring											
72-Hour Tidal Study and Slug Tests	X										
Baseline Monitoring		4Q	4Q								
Performance Monitoring					X			X			X
5) Habitat Mitigation Area Monitoring											
Qualitative Ground Surveys ¹	X	X	X	X	X	X	X	X	X	X	X
Quantitative Vegetation Surveys		X	X		X			X			X

Activity	Monitoring Year (Calendar Year)										
	Year 0 (2006)	Year 1 (2007)	Year 2 (2008)	Year 3 (2009)	Year 4 (2010)	Year 5 (2011)	Year 6 (2012)	Year 7 (2013)	Year 8 (2014)	Year 9 (2015)	Year 10 (2016)
Photo Documentation	X	X	X		X			X			X
Elevation Monitoring ^{2,3}	X	X	X	X		X		X			X
Brackish Marsh Salinity Monitoring	X	X									
Juvenile Salmonid Monitoring		X		X							
Invertebrate Monitoring		X		X							
Water Surface Elevation Monitoring	X			X		X		X			X

Notes:

4 Q Four quarters.

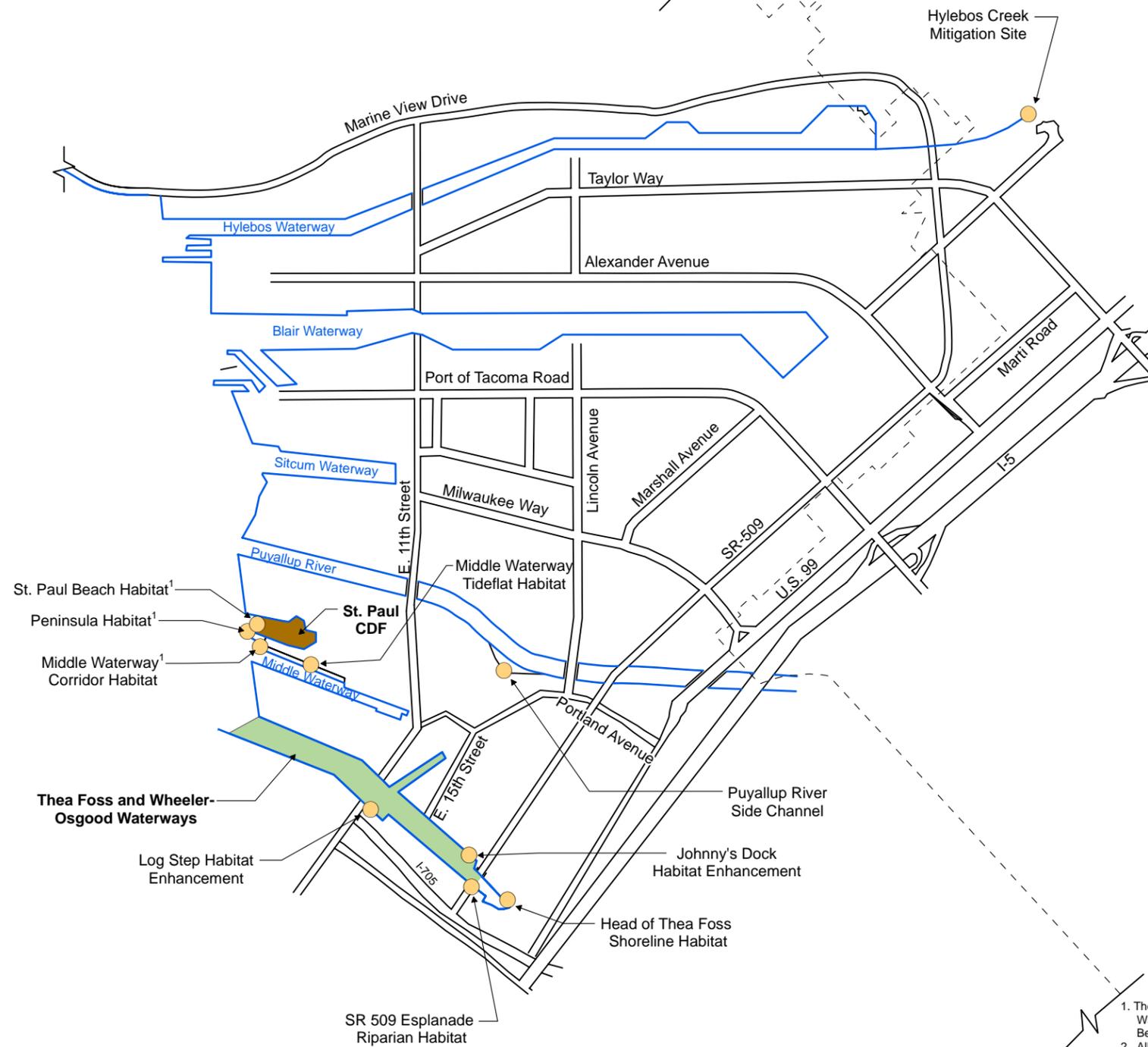
- 1 Includes visual observations of the containment berm and offset berm and the CDF cap. In addition, photographs will be taken at North Beach photo points P-1 through P-5 at each qualitative monitoring event to track the erosion which has occurred at the site.
- 2 The vertical datum used during the construction phase of the project was MLLW. Due to the length of the OMMP monitoring period and the fact that MLLW changes over time, the vertical datum to be used during this phase has been designated as NGVD 29.
- 3 Note that survey transects of the channels at Hylebos Creek will be performed annually while monitoring of elevation stakes at other locations will be performed on the schedule shown.

Legend

-  Enhancement, Mitigation, and Habitat Areas
-  Thea Foss and Wheeler-Osgood Waterways
-  St. Paul CDF



0 1500 3000 6000
Approximate Scale in Feet



NOTES

1. The St. Paul Beach Habitat, Peninsula Habitat, and the Middle Waterway Corridor Habitat are collectively called the North Beach Habitat.
2. All locations are approximate.



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Annual OMMP Report**

**Figure 1-1
Project Location Map**

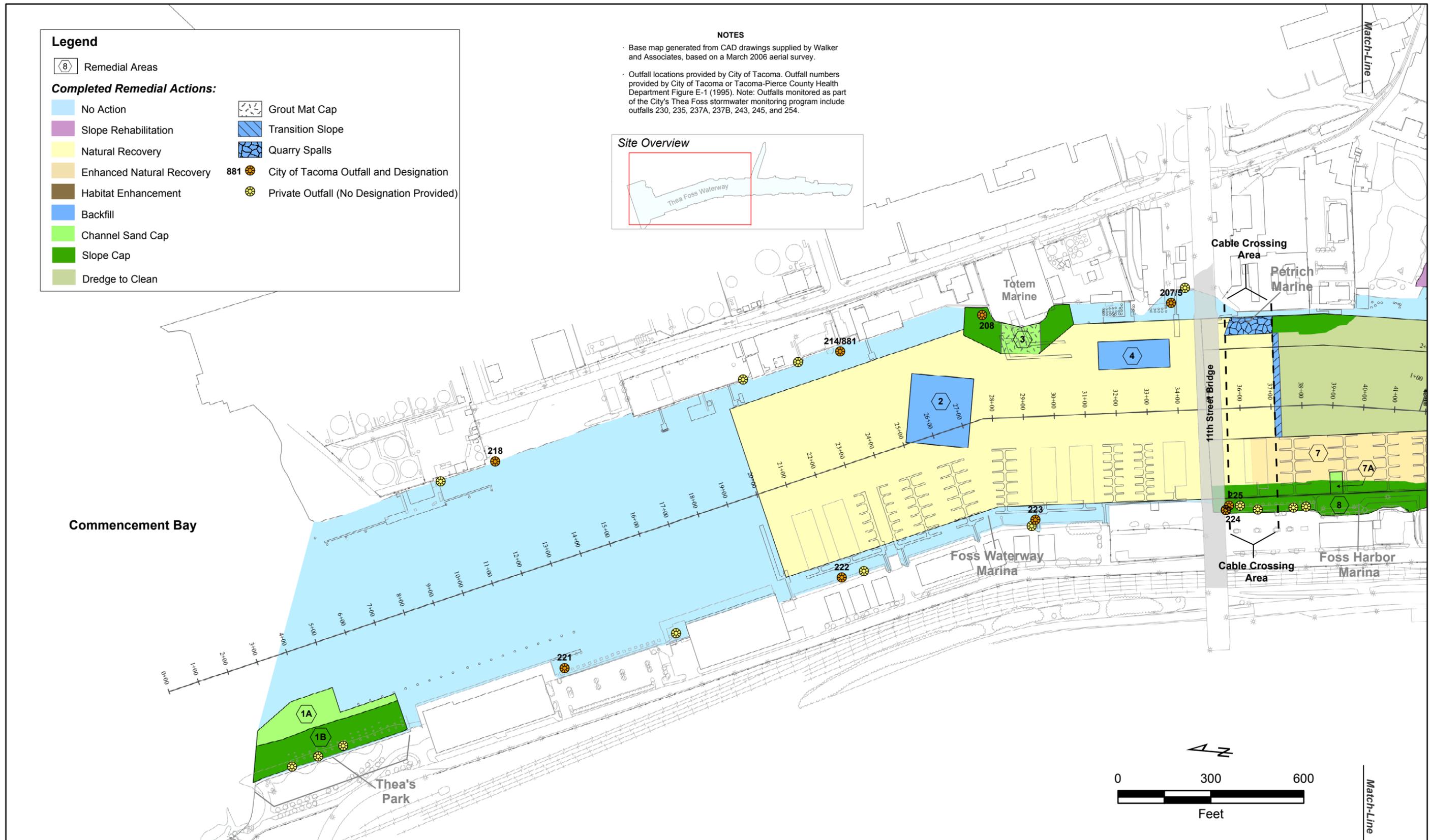
Legend

- | | |
|------------------------------------|--|
| Remedial Areas | |
| Completed Remedial Actions: | |
| No Action | Grout Mat Cap |
| Slope Rehabilitation | Transition Slope |
| Natural Recovery | Quarry Spalls |
| Enhanced Natural Recovery | 881 City of Tacoma Outfall and Designation |
| Habitat Enhancement | Private Outfall (No Designation Provided) |
| Backfill | |
| Channel Sand Cap | |
| Slope Cap | |
| Dredge to Clean | |

NOTES

- Base map generated from CAD drawings supplied by Walker and Associates, based on a March 2006 aerial survey.
- Outfall locations provided by City of Tacoma. Outfall numbers provided by City of Tacoma or Tacoma-Pierce County Health Department Figure E-1 (1995). Note: Outfalls monitored as part of the City's Thea Foss stormwater monitoring program include outfalls 230, 235, 237A, 237B, 243, 245, and 254.

Site Overview



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Annual OMMP Report**

**Figure 1-2 (Page 1 of 2)
Completed Remedial Actions**



**Thea Foss and Wheeler-Osgood Waterways
Annual OMMP Report**

**Figure 1-2 (Page 2 of 2)
Completed Remedial Actions**

2.0 SEDIMENT REMEDIATION AREA PERFORMANCE MONITORING

Sediment remediation area performance monitoring is performed to evaluate the long-term effectiveness of sediment caps, enhanced natural recovery, and natural recovery remedies implemented by the City of Tacoma as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. Performance monitoring activities include physical inspection of capped areas to ensure that the engineered caps remain intact; chemical monitoring of the cap surface (0 to 10 cm) sediments to confirm that the underlying contaminants are contained; and chemical monitoring of surface (0 to 10 cm) sediments within natural recovery and enhanced natural recovery areas to confirm that natural recovery is occurring within the compliance period. The monitoring program includes the collection, analysis, and interpretation of sediment physical and chemical quality data from intertidal sampling locations, channel cap sampling locations, and at natural recovery sampling locations, and conducting hydrographic surveys and low tide slope cap inspections.

As described in Section 2.0 of the Operations, Maintenance, and Monitoring Plan (OMMP) (City of Tacoma 2006), sediment remediation area performance monitoring is performed to achieve the following objectives:

- Ensure sediment caps provide effective containment, both physically and chemically, of contaminated underlying sediments, and provide a substrate that promotes colonization by aquatic organisms; and
- Confirm that within natural recovery areas chemical concentrations will attenuate to below Sediment Quality Objectives (SQO) within the 0 to 10 cm compliance interval within 10 years of completion of remediation construction (i.e., by 2016).

Sediment remediation area performance monitoring was not required as part of Year 6 OMMP activities. Sediment remediation area performance monitoring was performed during baseline and Year 2 and Year 4 monitoring, and will be performed again in Year 7. The schedule for OMMP activities to be performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project (Foss Project) is presented in Table 1-1. The detailed scope of sediment remediation area performance monitoring activities to be conducted in Year 7 is described in the OMMP.

3.0 EARLY WARNING MONITORING FOR RECONTAMINATION

Early warning monitoring for recontamination, referred to as early warning monitoring, will be performed to evaluate the potential for recontamination in the Thea Foss and Wheeler-Osgood Waterways. As described in Section 3.0 of the Operations, Maintenance, and Monitoring Plan (OMMP) (City of Tacoma 2006), early warning monitoring includes collection and analysis of recently deposited sediments represented by the 0 to 2 cm interval of the sediment column. Early warning sampling and analysis data will be used to evaluate the potential for recontamination and identify potential sources of recontamination (if suspected) before the remediated sediments become out of compliance with the remedial action and long-term monitoring objectives. Early warning monitoring will be performed throughout the Thea Foss and Wheeler-Osgood Waterways including dredged to clean, capped, and natural recovery areas.

Early warning monitoring is specifically designed to achieve the following objectives:

- Monitor the chemical quality of recently deposited sediments in remediation areas of the Thea Foss and Wheeler-Osgood Waterways with attention to potential sources of recontamination (i.e., marinas, outfalls, industrial facilities, etc.); and
- Identify potential sources of recontamination if exceedances of chemical Sediment Quality Objectives (SQO) and early warning threshold concentrations have occurred or are predicted to occur.

Early warning monitoring was not required as part of Year 6 OMMP activities. Early warning monitoring was performed as part of Year 4 monitoring activities and will be performed next in Year 7. The schedule for OMMP activities to be performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project (Foss Project) is presented in Table 1-1. The scope of early warning monitoring to be conducted in Year 7 is described in the OMMP.

4.0 BENTHIC RECOLONIZATION MONITORING

Periodic monitoring is being performed in the Thea Foss and Wheeler-Osgood Waterways to track the progress of benthic recolonization. Benthic habitat was altered by historical contamination and sediment dredging and capping actions completed in the waterways. Given the habitat improvements resulting from the completed remedial actions, the waterway is expected to be recolonized by benthic infauna and epifauna common to Commencement Bay. As described in Section 4.0 of the Operations, Maintenance, and Monitoring Plan (OMMP) (City of Tacoma 2006), benthic recolonization monitoring utilizes Sediment Profile Imagery (SPI) technology. SPI will allow for data to be collected on sediment composition, benthic habitat classification, infaunal successional stages, redox potential discontinuity, and organism-sediment index. Data from each specific location within a remediation area will be evaluated relative to previous years of monitoring at the specific location to assess the rate and success of benthic recolonization.

The objective of the benthic recolonization monitoring is to document and evaluate the success of benthic recolonization in the Thea Foss and Wheeler-Osgood Waterways. Benthic recolonization will be evaluated throughout the waterways including dredged to clean, capped, and natural recovery areas as described in the OMMP. Additionally, four benthic monitoring locations outside of the remediated areas near the mouth of the waterway are included to provide background information in non-remediated areas.

Benthic recolonization monitoring was not required as part of Year 6 OMMP activities. Benthic recolonization monitoring was performed in Year 4 and will be performed next in Year 7. The schedule for OMMP activities to be performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project (Foss Project) is presented in Table 1-1. The scope of benthic recolonization monitoring to be conducted in Year 7 is described in the OMMP.

5.0 CONFINED DISPOSAL FACILITY PERFORMANCE MONITORING

As described in the St. Paul Waterway Confined Disposal Facility Performance Monitoring Plan dated February 18, 2010, the objective of CDF performance monitoring is to compare long-term post-construction groundwater quality with baseline conditions established in the first two years following construction, to determine if constituents are being transported in groundwater from the CDF at concentrations that could pose a potential threat to surface water quality at the point of compliance. This comparison allows for the evaluation of the effectiveness of the remedy to ensure that the selected remedy remains protective, and an assurance that baseline concentrations are not exceeded in the surface water outside of the CDF. The performance standard for the performance monitoring program is to evaluate whether statistically significant increases in contaminant concentrations relative to the established groundwater baseline concentrations are observed.

Performance monitoring at the CDF is specifically designed to achieve the following objectives:

- Monitoring at the disposal site to evaluate the effectiveness of the remedy; and
- The St. Paul disposal site will be subject to long-term monitoring to ensure that the selected remedy remains protective, including that baseline concentrations are not exceeded in surface water outside of the CDF after construction.

CDF performance monitoring was not required as part of Year 6 OMMP activities. CDF performance monitoring was performed as part of Year 4 monitoring activities and will be performed next in Year 7. The scope and schedule for CDF performance monitoring activities to be performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project (Foss Project) are described in the St. Paul Waterway Confined Disposal Facility Performance Monitoring Plan.

6.0 HABITAT MITIGATION AREA MONITORING

6.1 Introduction

This section presents a summary of the Year 6 habitat mitigation area monitoring performed at the Thea Foss and Wheeler-Osgood Waterways Remediation Project (Foss Project) habitat mitigation and enhancement area sites. This habitat mitigation area monitoring was performed in accordance with the Operations, Maintenance, and Monitoring Plan (OMMP) for the Thea Foss and Wheeler-Osgood Waterways Remediation Project (City of Tacoma 2006) as modified by the Annual Technical Memoranda submitted for agency review. Activities performed during Year 6 monitoring are identified in Table 6-1.

As described in Section 6.0 of the OMMP, the habitat mitigation areas for the project are identified as the North Beach Habitat, Middle Waterway Tideflat Habitat, Puyallup River Side Channel, and the Hylebos Creek Mitigation Site. Constructed acreages of these mitigation areas are provided in Table 6-2. The Thea Foss Habitat Enhancement Areas are identified as the Johnny's Dock Habitat Enhancement, Head of Thea Foss Shoreline Habitat, SR 509 Esplanade Riparian Habitat, and the Log Step Habitat Enhancement.

The following sections summarize the habitat mitigation area monitoring requirements, monitoring activities performed during Year 6, the findings of these inspections, and whether the performance objectives for each activity have been achieved.

6.1.1 Habitat Mitigation Area Monitoring Objectives

The OMMP specifies that habitat mitigation monitoring be performed to achieve the following objectives:

- To evaluate the effectiveness of the development of biological features and physical features at the mitigation and enhancement sites to confirm that they are on a trajectory to provide habitat function necessary to meet the objectives for each site; and
- To confirm that the habitat sites have attained and continue to meet the objectives for each site over time.

The OMMP requires that various components of habitat mitigation monitoring occur throughout the first ten years following completion of the remedial action. After 10 years of monitoring, the City of Tacoma (City) and U.S. Environmental Protection Agency (EPA) will evaluate the need for and scope of additional monitoring.

6.1.2 Scope of Habitat Mitigation Area Monitoring

Habitat mitigation area performance monitoring consists of three components: habitat mitigation area monitoring, habitat mitigation area maintenance, and contingency planning and response actions, as needed.

The following monitoring activities are performed during the various monitoring periods:

- Qualitative monitoring, including observations of evidence of erosion or sedimentation, evidence of damage or disease, condition of large woody debris (LWD) and goose

Section 6.0 – Habitat Mitigation Area Monitoring

enclosures, conditions/types of vegetation, species of wildlife observed, and soil/sediment quality. In addition, it includes a qualitative evaluation of the CDF cap and berms;

- Quantitative monitoring, including estimates of cover of various vegetation types, density of plants in marsh areas, and notes on types of vegetation present (not required in Year 6);
- Photo documentation, consisting of taking photographs at established photo points for comparison with the previous year's photos (not required in Year 6);
- Elevation monitoring by measuring the change in elevation of the sediment surface at the established elevation monitoring locations relative to the baseline elevation, or by measuring the elevation along centerline transects in the channels at Hylebos Creek (only Hylebos Creek transects required in Year 6);
- Brackish marsh salinity monitoring, consisting of the measurement of soil salinity in the irrigated area at the Middle Waterway Tideflat Habitat (requirement completed in Year 1);
- Juvenile salmonid monitoring, consisting of field observations of presence of salmonids at the various mitigation sites (requirement completed in Year 3);
- Invertebrate monitoring, including placement of insect fallout traps in the upper intertidal areas at the Puyallup River Side Channel and the Hylebos Creek Mitigation site (requirement completed in Year 3); and
- Water surface elevation monitoring at Hylebos Creek for informational purposes (not required in Year 6).

Routine maintenance, performed on an ongoing basis throughout the year, is the key component of the habitat maintenance and monitoring program. The City maintains a contract with the Washington Conservation Corps (WCC) to provide a crew for performance of these routine maintenance activities at the various mitigation and enhancement sites. The crew picks up garbage, repairs goose exclusion grids, tightens LWD cables, pulls, cuts or applies herbicides to weeds, and replants on an as needed basis. A summary of their work during the past year is provided in Section 6.3.

Adaptive management and contingency planning procedures were established in Sections 6.4 and 6.5 of the OMMP. As issues are identified, these procedures are implemented to determine the best course of action. At this time there are no issues that have been identified for follow-up in accordance with these procedures.

6.2 Habitat Mitigation Area Monitoring

As required by the OMMP, habitat monitoring activities are generally performed when tidal elevations are below 0.0 feet Mean Lower Low Water (MLLW) except at the Hylebos Creek Mitigation Site where the primary monitoring activities are performed when tidal elevations are below 8.78 feet MLLW. Exceptions to this are noted in the reporting sections as applicable.

Standardized field forms are used to document observations of conditions at the sites.

6.2.1 Summary of Habitat Mitigation Area Monitoring

Year 6 habitat mitigation area monitoring activities are set forth in the OMMP. As indicated above, the primary function of habitat monitoring is to evaluate the effectiveness of the development of biological features and physical features at the mitigation and enhancement sites to confirm that they are on a trajectory to provide habitat function necessary to meet the objectives for each site, and to confirm that the individual habitat sites have attained and continue to meet their objectives over time.

Year 6 habitat monitoring included the following activities:

- Qualitative ground surveys; and
- Elevation monitoring – transects at the Hylebos Creek site only.

Details of these activities at each of the mitigation and enhancement sites are provided below.

6.2.2 Summary of Field Activities

Year 6 habitat monitoring activities were initiated on July 19, 2012, and continued intermittently at the various sites until August 20, 2012. Copies of the completed inspection forms, and survey information for these monitoring activities are included in Attachment E-1 in Appendix E. The following is a summary of activities performed at each site.

North Beach Habitat – The St. Paul Beach Habitat, Peninsula Habitat, and Middle Waterway Corridor Habitat areas as defined during the construction process are collectively referred to as the North Beach Habitat (see Figure 6-1). These habitat areas are buffered from upland activities by a 10- to 20-foot wide riparian buffer.

The completed St. Paul Beach portion of the habitat area is composed of low gradient, fine grained beach habitat. The beach slopes at a low angle (10H:1V or flatter) to approximately 8 feet MLLW and is composed of habitat mix. The beach then slopes more steeply upward (approximately 3H:1V), meeting the St. Paul Confined Disposal Facility (CDF) berm at an elevation of approximately 13.5 feet MLLW. The beach surface in this area is comprised of habitat mix and rounded cobbles similar to the nearby Olympic View Resource Area beach.

The containment berm face and the adjacent area are planted with native plants to form a riparian buffer. An additional planting area was constructed in 2010 as authorized by EPA to resolve additional habitat acreage owed by the City as a result of the remediation construction project. The area is approximately 15 feet wide and was constructed landward of the edge of the existing riparian zone at the site. Approximately 1 foot of topsoil was placed across the area prior to planting with riparian vegetation.

The peninsula portion of the habitat area is composed of restored littoral habitat including a continuation of the shallow water habitat contours of the St. Paul Beach. Over 1,900 creosote treated piles were removed from this area during construction so that the existing contours could be covered with sand ranging in depth from six inches to several feet. This portion of the habitat area includes the development of an undulating band of marsh habitat at an elevation of 10 feet MLLW to 12 feet MLLW, above the steeper transition between 8 feet MLLW and 10 feet MLLW. The upper beach slopes to a relatively low pass across the central area of the

peninsula. This pass allows juvenile salmonids moving across the face of the St. Paul Beach at tides above MLLW to continue their migration in relatively protected shallow water into the entrance of the Middle Waterway. North of the pass, the habitat area rises to an offshore shoal or reef at 12 feet MLLW. This shoal partially shelters areas to the south and east from waves from the northwest.

Existing uplands at the tip of the Middle/St. Paul Peninsula were cut back and excavated to provide new marine habitat area at the southwest corner of the site. Eight nodes of marsh species appropriate for lower and upper saltmarsh elevations were planted in this habitat area. Three of these nodes were designated as pilot nodes during the design approval phase of the project due to their exposure and the likelihood that plantings would be difficult to establish. LWD was placed in the southwest corner to increase habitat complexity and to provide protective cover for juvenile salmonids. As a result of some erosion that was identified at the face of the containment berm after the baseline monitoring event, additional LWD was placed at the northwest corner of the site in August 2007.

To accelerate colonization, the design documents required that four additional planting nodes be established at this site in the first or second spring following construction. Due to the continuing shifting of the beach and the minimal organics on the beach in front of the containment berm, the City requested that the location of these additional planting nodes be reconsidered. Following a site visit in late summer 2008, the agencies agreed that two of these nodes would be constructed around the corner of the peninsula, closer to the potential marsh area. These nodes were constructed and planted with a combination of saltgrass, tufted hairgrass, and pickleweed in fall 2009. The other two nodes were placed at the Puyallup River Side Channel as discussed further below. These added nodes are not subject to the performance standards for the site and are therefore not required to be monitored under the OMMP.

The Middle Waterway Corridor portion of the habitat area consists of a narrow shoreline that connects the peninsula portion of the site with the broad mudflats and brackish marsh in the southern portion of Middle Waterway. Approximately 250 feet of stacked concrete bulkhead along the east shore of the Middle Waterway were removed and the slope protected with a thick slope cap and habitat mix. This design provides shallow-water, fish-passable shoreline access to and from the inner Middle Waterway habitat areas during most tidal conditions.

Performance standards for this site include minimal change in elevation; development of saltmarsh and riparian vegetation coverage; and juvenile salmonid presence. Performance standards are intended to ensure that created aquatic and riparian habitat are maintained over time, and to verify that habitat is not lost in the future. As indicated above, for this habitat area, saltmarsh performance standards apply to only five of the ten nodes; three of the original nodes in the most exposed areas of the site and the two added nodes were planted on a pilot basis or to accelerate colonization and do not have performance standards associated with them.

Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 19, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in good condition. Upon arrival, there were two eagles, Canada Geese, seagulls, a great blue heron, crows, Caspian terns, a moon snail and bees observed at the site. No significant amount of erosion was identified, with the exception of the toe of the slope of the containment berm where it meets the habitat beach, which is discussed below. Dynamic beach conditions led to some sediment accumulation in some areas and a push of gravel on the outer

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portion of the cutback area. There were no indications of animal damage or vandalism found, and very minimal amounts of trash and wrack associated with the tideline. There was no indication of vegetative disease observed. Most of the LWD in the potential marsh area need to have their anchors tightened in place again or need to be replaced. The LWD are moving around and appear to be causing some impacts to plant success, location and density in the potential marsh area. There are still five pieces of LWD present in this area of the six that were initially installed.

As described in the Baseline Annual Report (March 2007), after completion of the baseline qualitative survey in July 2006, some erosion along the toe of slope at the containment berm was identified. Several meetings and discussions with the agencies occurred, and as a result, the City placed additional LWD at agreed upon locations in August 2007. In addition, quarterly photographs and observations of the area were conducted through 2008 in conjunction with the quarterly baseline CDF monitoring. Based upon these quarterly inspections, the erosion appeared to have generally stabilized, and per agency concurrence, the area is currently being monitored as part of the regularly scheduled qualitative monitoring of the North Beach Habitat area. There were no issues identified with the cap or berm during this inspection.

There was no change noted in the appearance of the surface soils in the riparian or aquatic areas relative to previous monitoring events. There was no indication of odor or sheen in either area. Overall, there was no apparent site disturbance and no follow-up actions were needed.

Habitat mix/fine-grained material was present at the surface of the upper intertidal area in depths similar to previous observations. Through probing of this material, it was found that the depth of fine-grained material ranged from approximately three inches at the east end of the beach to more than twelve inches present near the peninsula at the northwest corner of the site. The beach substrate is continuing to shift and grade.

The site was planted in accordance with the approved planting plans. A combination of pickleweed and saltgrass were planted in eight marsh planting nodes. As indicated above, of these, three were considered pilot nodes due to their exposure and were not successful in becoming established. There continues to be minimal success of the saltgrass in the remainder of this area, however, the pickleweed is spreading in the potential marsh area although the area appears somewhat reduced from previous observations. There are significant amounts of pickleweed volunteering outside the nodes. The movement of the LWD may be impacting growth and spreading of the pickleweed in this area.

There is still no volunteer vegetation on the island. It appears that the conditions are not favorable for plant establishment in this area.

The original riparian area was hydroseeded and is planted with a combination of American dunegrass, Hooker's willow, and oceanspray. Overall, there was a high survival rate for the riparian plantings in the area above the potential marsh, and a somewhat lower survival rate along the CDF berm. In addition, this area is impacted by the erosion of the face of the containment berm discussed above. Dunegrass is establishing and continuing to spread at the base of the containment berm where chunks of soil with established roots have dropped on the upper intertidal area. This is continuing to help with stabilization of the toe of the slope. Since some of the plants on this slope have been lost to the erosion, a supplemental planting of willows and additional dunegrass may be beneficial.

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The newer riparian area was planted with a combination of Douglas fir, big-leaf maple, Pacific madrone, oceanspray, red-flowering currant, evergreen huckleberry, beaked hazelnut, black hawthorn, and snowberry. The trees were planted close to the waterward edge of the new planting area to prevent the root structure from impacting the containment aspect of the berm. There is a high survival rate for the new plantings, although some have not survived, notably some maple and madrone. A few volunteer species were present in this area at the time of the inspection, including willow, cottonwood and fireweed. The area had not been hydroseeded, so was generally weedy, and also somewhat dry. Mulching will be considered, at least around the base of the established plants.

A few invasive weeds were present in the overall riparian area, including white sweet clover, willow herb, daisy and cudweed. Oxeye daisy is present all along the berm. Minor weeding of the riparian area is therefore needed.

Quantitative Vegetation Monitoring – Quantitative vegetation monitoring was not required during Year 6.

Photo Documentation – Photo documentation was not required during Year 6. Some general photos of the site were taken during the inspection and are available for review upon request.

Elevation Monitoring – Elevation monitoring was not required during Year 6.

Juvenile Salmonid Monitoring – Juvenile salmonid monitoring as described in the OMMP is complete.

Brackish marsh salinity monitoring, invertebrate monitoring, and water surface elevation monitoring are not required at this mitigation site.

Containment Berm Erosion Monitoring – As indicated in previous annual reports, an area of erosion on the bayward face of the containment berm was identified in 2006. The area was monitored closely for several years, and since it appeared to have stabilized, EPA agreed during the Year 3 annual meeting that a response action was not warranted and that the City would continue to monitor the area on a routine basis. In accordance with the CDF Performance Monitoring Plan, the City will perform this monitoring in conjunction with the CDF monitoring which is scheduled to be completed next in Years 7 (2013) and 10 (2016). The City also agreed to qualitatively monitor the area in Years 5 and 6 as part of the North Beach Habitat site qualitative monitoring and to note any substantial changes observed in this area. This qualitative monitoring was performed, and no substantial changes in the conditions were noted. Some continued erosion was observed, along with additional plant establishment on the upper beach. No corrective actions appear necessary at this time. The area will be monitored again during Year 7.

There were no concerns with the CDF cap or berm identified during this qualitative inspection. Simpson continues to store logs and other equipment on the CDF cap.

Middle Waterway Tideflat Habitat – The Middle Waterway Tideflat Habitat with its associated mudflats and tidal channel was constructed on excavated uplands and existing tideflat along approximately 1,450 linear feet of the 1,800-foot long eastern shoreline of the Middle Waterway (see Figure 6-2). This habitat area begins immediately south of the relocated log haul out and immediately to the north of the existing Trustees/Simpson restoration project site along the

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southeast side of the waterway, and across Middle Waterway from the City's NRDA settlement restoration project and the Middle Waterway Action Committee shoreline restoration project.

The habitat area was excavated from elevations of 18 feet MLLW down to approximately 0 feet MLLW. A meandering tidal channel was excavated down to -4 feet MLLW at the north end, rising to -2 feet MLLW at the south end. The upper shoreline between 13 feet MLLW and 8 feet MLLW is enhanced with at least six inches of topsoil to support riparian plantings.

The marsh site is buffered from adjacent industrial activities with a 10- to 25-foot wide riparian area planted with native tree and shrub species and hydroseed. A freshwater sprinkler irrigation system irrigates the riparian area as well as approximately 40,000 sq. ft. of the site between elevation 11.5 feet MLLW and 12.5 feet MLLW for the purpose of establishing brackish marsh habitat. Freshwater flow is considered essential to the development and continued growth of the desired emergent brackish marsh community at this habitat area. The brackish marsh is in the 10 feet MLLW to 13 feet MLLW elevation range, which varies between 10 and 60 feet in width. The irrigation system generally follows the 13 feet MLLW contour and is designed to reduce sediment pore water salinity in the elevation band between 11.5 feet MLLW and 12.5 feet MLLW.

Twelve 10- by 50-foot (3- by 15-meter) nodes of brackish marsh species were originally planted in this zone. These plots were planted to stimulate development of a brackish marsh at the Middle Waterway Tideflat Habitat. Brackish marsh plantings consist of Lyngby's sedge (*Carex lyngbeyi*) and Seacoast bulrush (*Scirpus maritimus*). It was anticipated that these introduced brackish marsh plants would establish a seed source allowing expansion between the initial planting nodes over time, and this is consistent with observations.

Additional planting areas were constructed in 2009 as authorized by EPA to resolve additional habitat acreage owed by the City as a result of the remediation construction project. Some of these additional planting areas connected the existing nodes within the irrigated band. These areas were also planted with Lyngby sedge and Seacoast bulrush to accelerate colonization of the band. In addition, for added function and diversity, and to accelerate colonization of the upper intertidal area, the City also constructed planting nodes at the toe of the riparian slope and planted these areas with tufted hairgrass, gumweed, and coastal strawberry. Saltgrass was also intended to be placed in this area but was not available at the original time of the planting. The saltgrass was planted in December 2011 to fulfill the EPA requirements.

Four additional planting nodes were established at this site in spring 2007 to accelerate colonization. Two of these nodes were constructed north of the irrigated area, and two to the south. These nodes were planted with a combination of saltgrass, tufted hairgrass, and pickleweed. These added nodes are not subject to the performance standards for the site and are therefore not required to be monitored under the OMMP.

Performance standards for this site include minimal change in elevation over time; development of a brackish marsh and riparian vegetation cover; and juvenile salmonid presence. Performance standards are intended to ensure that created aquatic and riparian habitat are maintained over time, and to verify that habitat is not lost in the future.

Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 19, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in excellent condition. Upon arrival, there were some Caspian terns, seagulls,

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ducks and small avian present at the site. No new areas of erosion or sedimentation were observed.

There was some minor indication of animal damage in the marsh area where it appeared that geese/birds were continuing to eat the grasses, but there continues to be no indication of disease or animal damage in the riparian area. The animal damage in the marsh does not seem to be significantly impacting the continued growth and development of the site. There were no indications of vandalism at the site and only very small amounts of trash present in the tide line.

All of the goose exclusion grids have been removed at this time. Remaining LWD pieces are generally in good condition. Some additional LWD recruitment was observed throughout the site. Very small amounts of bark were present at the site, likely from the log haul out facility located north of the habitat area. It is estimated that the bark covered less than 1% of the portion of the site between elevation 10 feet MLLW and 13 feet MLLW, with most occurring at the southern end of the site. The presence of bark does not appear to be affecting plant development as the amounts accumulated are so minimal.

The onsite soils were observed to be unchanged from the last monitoring event. The surface soils in the aquatic area consist of brown silty sand with some algae and fine grasses present in areas. The surface soils in the riparian area are brown topsoil/sandy silt. There was no indication of odor or sheen in the riparian area and only small areas of organic sheen with no associated odor in the intertidal area. Overall, there was no apparent site disturbance and no follow-up actions were needed.

The site was planted in accordance with the approved planting plans. A combination of Lyngby sedge and Seacoast bulrush were planted in 12 original planting nodes in the upper intertidal zone between elevation 11.5 feet MLLW and 12.5 feet MLLW. The planting area was expanded in 2009 as discussed above, by constructing additional nodes between the existing, and planting with the same species to accelerate colonization. In addition, 10 nodes were constructed between 12.5 feet MLLW and the toe of the riparian slope. These areas were planted with a combination of tufted hairgrass, saltgrass, gumweed, and coastal strawberry. A combination of trees and shrubs, including black cottonwood, red alder, shore pine, Douglas fir, big-leaf maple, Hooker's willow, oceanspray, Sitka willow, and red-flowering currant were planted in the riparian area.

It was noted during the inspection that all of the plants were doing very well, with continued growth and spreading of both established plants and volunteers. The grasses have continued to spread well since the last monitoring event. Because of the success of plants both in the marsh and in the riparian area, minimal weeds are present at the site, and only minor weeding is needed. No new volunteer species were observed in either the riparian or marsh areas. Plants were continuing to thrive in the irrigated areas. Maintenance of the irrigation system remains an ongoing issue although the plants seemed to be continuing to survive well even in areas where the need for repairs to the system was identified.

Quantitative Vegetation Survey – Quantitative vegetation monitoring was not required during Year 6.

Photo Documentation – Photo documentation was not required during Year 6. Some general photos of the site were taken during the inspection and are available for review upon request.

Elevation Monitoring – Elevation monitoring was not required during Year 6.

Brackish Marsh Salinity Monitoring – Brackish Marsh Salinity Monitoring as described in the OMMP is complete.

Juvenile Salmonid Monitoring – Juvenile salmonid monitoring as described in the OMMP is complete.

Invertebrate monitoring and water surface elevation monitoring are not required at this mitigation site.

Puyallup River Side Channel – The Puyallup River Side Channel (PRSC) provides off-channel habitat intended for use by juvenile salmonids for rearing and refuge during their outmigration to the estuary (see Figure 6-3). The project merged an existing isolated wetland and an adjacent parcel that was excavated to as deep as -2 feet MLLW from existing uplands, into a single off-channel habitat area. The existing flood control levee structure was breached following construction of a new levee to allow the river and the associated tidal hydrology to enter. The excavated channel and reconfigured existing wetland contain water during most tides.

A substantial area was left between about 6 feet MLLW and 13 feet MLLW to allow development of brackish marsh and riparian assemblages. The area on the inside of the existing Puyallup River dike has been planted with riparian vegetation. The mudflat areas below Ordinary High Water (OHW) have been left for natural colonization by native brackish marsh species (as occurred at the Gog-Le-Hi-Te site across the river).

Additional plantings were put in at the site in 2009. First, as described above, the original design documents required that four additional planting nodes be established at the North Beach Habitat site in the first or second spring following construction to accelerate colonization. Due to site conditions at North Beach, the City requested that two of these required nodes be relocated to the Puyallup River Side Channel. The agencies approved this request, so two nodes were placed at this site at the upstream and downstream ends at approximate elevation 11 feet MLLW to 13 feet MLLW in fall 2009. These added nodes are not subject to the performance standards for the site and are therefore not required to be monitored under the OMMP.

Second, additional plantings were authorized by EPA to resolve additional habitat acreage owed by the City as a result of the remediation construction project. Additional plantings were placed in the riparian areas on both the old and new levee structures. On the old levee, the existing planting area was enhanced with additional trees and shrubs, and the 3-foot walking path was eliminated by planting. The waterward slope of the new levee was planted over an approximately 10-foot width above approximate elevation 13 feet MLLW. All parties acknowledge that the area will be mowed by the Army Corps of Engineers on a routine basis for levee maintenance, however, the benefit provided to the habitat area between maintenance events made this area a priority for planting.

Performance standards for this site include the development of riparian vegetation cover and juvenile salmonid presence. Performance standards are intended to ensure that created aquatic and riparian habitat are maintained over time, and to verify that habitat is not lost in the future. Since the purpose of the additional plantings on the old levee was to accelerate

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colonization, the performance standards for area-weighted average cover were increased for this area. Because of the routine maintenance of the new levee section, there are no performance standards associated with the plantings in this area.

Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 19, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in excellent condition. At the time of the survey, the stream flow in the Puyallup River was 2,980 cfs at the USGS River monitoring station 12101500, identified as “Puyallup River at Puyallup, WA”.

Upon arrival, there were crows and ducks present at the site, along with evidence of other animal usage including possible coyote scat, animal trails and raccoon tracks. No new areas of erosion were observed within the side channel. There was no indication of animal damage or disease at the site. There was minimal trash present, and some cut branches noted. An occupied transient camp was found near the breach on the old levee structure, and the Tacoma Police Department was subsequently notified. A relatively large amount of organic material (sticks, branches) has accumulated, not surprisingly, in the downstream end of the project.

The onsite soils were observed to be unchanged from the last monitoring event. The surface soils in the upland area are gray and sandy, while surface soils in the aquatic area are brown and silty. There was no indication of odor or sheen in either the upland area or the aquatic area. Overall, there was no apparent site disturbance and no follow-up actions were needed.

The site was originally planted in accordance with the approved planting plans. A combination of trees and shrubs, including black cottonwood, red alder, shore pine, Douglas fir, big-leaf maple, Hooker’s willow, oceanspray, red-flowering currant, and Sitka willow were planted on the top of the old, cutdown levee. As indicated above, additional plantings in the riparian area on both the old and new levees were placed in 2009. The old levee was enhanced with black cottonwood, red alder, shore pine, Douglas fir, big-leaf maple, Hooker’s willow, oceanspray, red-flowering currant, red-osier dogwood, and Sitka willow. These newer plantings are doing very well, and the pathway is no longer apparent at this time. Species planted on the waterward face of the new levee include Sitka and Hooker’s willow, red alder, red-osier dogwood, snowberry, and Nootka rose. It was noted during the inspection that overall on the old levee the riparian plants were doing very well, and both original and newer plants are growing and spreading well. The plants on the new levee were not doing as well with the alder and willow showing better success than the red-osier dogwood. Recently it was observed that the waterward face of the new levee had been mowed by the ACOE down to the mudline.

As noted above, additional planting nodes were placed in the upper intertidal area in fall 2009 and were planted with Lyngby’s sedge. During the inspection it was noted that there was very little to no success of the Carex within these nodes. The only new volunteer plant identified during the inspection was an ash tree at the north end. Some invasive species, including butterfly bush, chamomile, birdsfoot trefoil and reed canary grass were present. Minor weeding of this area is therefore required.

Upon visual inspection, habitat mix/fine-grained material was found to be present in the upper intertidal area at the site. Photos were taken and are available for review upon request.

Quantitative Vegetation Survey – Quantitative vegetation monitoring was not required during Year 6.

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Photo Documentation – Photo documentation was not required during Year 6. Some general photos of the site were taken during the inspection and are available for review upon request.

Elevation Monitoring – Elevation monitoring was not required during Year 6.

Invertebrate Monitoring – Invertebrate monitoring as described in the OMMP is complete.

Juvenile Salmonid Monitoring – Juvenile salmonid monitoring as described in the OMMP is complete.

Brackish marsh salinity monitoring and water surface elevation monitoring are not required at this mitigation site.

Hylebos Creek Mitigation Site – Hylebos Creek is the major tributary to the Hylebos Waterway. The project area is located on the right bank of lower Hylebos Creek. Hylebos Creek has a large watershed, the majority of which extends north into King County. The project site is bordered by the 4th Street Bridge at its southern end and the stream reach lies completely within the saltwater wedge associated with Commencement Bay's tidal prism. Approximately 400 feet of creek reach is within the project area. The total project area includes a riparian/forested wetland enhancement and created aquatic habitat (see Figure 6-4).

On-site native vegetation includes Oregon ash, red osier dogwood, salmonberry, and black cottonwood. This project complements the neighboring restored areas, including the Milgard mitigation project and the NRDA Trustees' Jordan project. Both projects are located upstream of the Hylebos Creek Mitigation Site. The Jordan project is designed to provide off-channel salmon habitat to the east of the creek's bank, while the Milgard project restored the creek's western wetland buffer. Additional sites present downstream near the mouth of Hylebos Creek include the Hauff site, the Place of Circling Waters and the Mowitch site. The Hylebos Creek Mitigation Site adds to the area's habitat value and extends the wildlife corridor already established through restoration both upstream and downstream.

Habitat in this area was enhanced within a linear band paralleling Hylebos Creek. Enhancements included removal of non-native invasive Himalayan blackberry, reed canary grass, and yellow-flag iris. These species were replaced with native plants appropriate to the new hydrological regime, including Sitka willow, Sitka spruce, Nootka rose, mock orange, Hooker's willow, and oceanspray. While much of the reed canary grass and yellow-flag iris were removed during construction, they still exist at the site due to a large parent source upstream.

Where possible with the least disturbance to native vegetation, small channel "fingers" were excavated into the existing bank to allow water inundation during periods of high freshwater flows or tidal surges. The off-channel area provides habitat for the creek's out-migrating juvenile salmonids that need refuge areas while acclimatizing to saltwater. The added aquatic habitat, water retention and wetland enhancement provide a more diverse habitat and increased wildlife protection by screening it from the adjacent open areas. Preservation of the existing mature native bankside vegetation allows for the continued contribution of leaf litter, shade, and nutrients to the creek.

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Performance standards for this site include minimal change in elevation (average change along centerline transect of channels less than 0.2 feet from as-built elevations); development of forested wetlands vegetative cover and juvenile salmonid presence. Performance standards are intended to ensure that created aquatic habitat is maintained over time, and to verify that habitat is not lost in the future.

Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 20, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in excellent condition. At the time of the qualitative inspection, the stream flow in the Puyallup River was 4,670 cfs at the USGS River monitoring station 12101500, identified as Puyallup River at Puyallup, WA.

Upon arrival, there were some small avian species, slugs, caterpillars and gnats present at the site, along with evidence of beaver. No significant erosion or sedimentation were identified at the site. There was no indication of disease noted and only minor beaver damage observed. The only trash present was one large, suspicious-looking black plastic bag that had an odor. This was referred to the Tacoma Police Department. There were no wrack or organic material accumulations present. The LWD were present and in good condition and no maintenance actions were identified.

The onsite soils were observed to be unchanged from the last monitoring event. The upland surface soils are light brown gravelly sand and surface soils in the aquatic areas are brown to gray, sandy silt to gravelly sand. There was no indication of odor or sheen in either area. No obstruction to fish passage in the channels was observed. Overall, there was no apparent site disturbance and no follow-up actions were needed.

The site was planted in accordance with the approved planting plans. The upland forest was planted with a variety of trees and shrubs, including Douglas fir, Sitka spruce, big-leaf maple, shore pine, thimbleberry, oceanspray, snowberry, mock orange, kinnickinick, western service berry, baldhip rose and bracken fern. Erosion control hydroseed mix was also applied at the site. This portion of the site is in excellent condition, with conifers doing very well and no maintenance activities identified.

The forested wetland portion of the site was also planted with a combination of trees and shrubs, including red alder, Oregon ash, western red cedar, black cottonwood, western crabapple, beaked hazelnut, Pacific ninebark, black twinberry, vine maple, red-osier dogwood, Hooker's willow, and Sitka willow. The willows that were staked along the creek are doing very well. The forested wetland portion of the site appears to be doing very well and no required maintenance activities were noted. Several willows and alder have fallen into the marsh area, providing shade and diversity without blocking fish passage.

The emergent wetland was planted with a combination of sawbeak sedge, slough sedge, small-fruited bulrush, hardstem bulrush, and reed mannagrass. This portion of the site appeared to be establishing well with a very high aerial coverage (estimated). No required maintenance activities were identified.

Some invasive weeds were identified at the site, including reed canary grass, poison hemlock, tansy, curled dock and blackberry, and minor weeding as a part of regularly scheduled maintenance is needed. Pepperweed was also found at the site for the first time. Purple loosestrife has been found at this site in the past but was not observed during this monitoring

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event. In general, invasive species control will be an ongoing issue at this site as there are significant parent sources for these invasive weeds upstream of the site.

Quantitative Vegetation Survey – Quantitative vegetation monitoring was not required during Year 6.

Photo Documentation – Photo documentation was not required during Year 6.

Elevation Monitoring – The survey of the centerline transects in the north and south nodes was performed on August 20, 2012. A summary of the survey information is shown on Figure 6-9, and the survey data are included in Attachment E-1. Figure 6-10 includes transects which show the elevations from this Year 6 survey, along with the design and as-built centerline elevations within the north and south nodes. As depicted on Figure 6-10, the contractor built the lobes deeper than the approved design depths, and the as-built elevations of the lobes at the site were an average of 0.74 feet deeper in the north lobe and 1.17 feet deeper in the south lobe as compared to the design elevations. Between the time that construction of this site was completed in September 2005 and the time of the baseline survey of the elevation stakes in the nodes was completed in July 2006, the site had silted in such that the elevations at Year 0 were closer to, but still below the approved design elevations at all but one location surveyed (near the mouth of the north lobe).

According to the OMMP, the performance criteria relative to elevation changes at this site indicate that the average elevation change along the centerline transect of the channels must be less than 0.2 feet from the as-built elevations. Based upon this criteria, the south lobe does not meet this performance criteria (average Year 6 change in south lobe relative to as-built elevations was 0.45 feet) while the north lobe is right at the criteria with an average change of 0.20 feet (Table 6-5). However, when the elevations are compared to either the design elevations or the Year 0 elevations, both lobes meet the performance criteria.

Invertebrate Monitoring – Invertebrate monitoring as described in the OMMP is complete.

Juvenile Salmonid Monitoring – Juvenile salmonid monitoring as described in the OMMP is complete.

Surface Water Elevation Monitoring – Surface water elevation monitoring not required during Year 6 monitoring.

Brackish marsh salinity monitoring is not required at this mitigation site.

Johnny's Dock Habitat Enhancement – This area is a pocket beach constructed to enhance the habitat between the Foss Landing and Johnny's Dock Marinas (see Figure 6-5). Prior to remediation, an old timber access pier with a brick foundation was present at the site. As part of construction of this habitat area, this structure was removed from the marine environment. A thick quarry spall cap consisting of an 18-inch deep layer of filter material overlain by an 18-inch deep layer of quarry spalls was then placed. Habitat mix was placed on the slope over the quarry spalls between elevations -10 feet MLLW and 13 feet MLLW. Saltmarsh vegetation was planted between 10 feet MLLW and 13 feet MLLW, and LWD was added to the slope to add complexity to the habitat feature. A goose exclusion grid was installed to minimize herbivory but has since been removed.

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Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 19, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in fair condition. Upon arrival at the site geese and a goldfinch were present. No significant erosion or sedimentation were identified. Extensive goose predation on the grasses was noted, but there were no indications of disease, vandalism, trash or wrack present. The goose exclusion grid has been removed and the LWD was found to be present and in good condition.

The onsite soils were observed to be unchanged from the last monitoring event. The surface soils are grey, gravelly sand habitat mix. There was no indication of odor or sheen. Overall, there was no apparent site disturbance and no follow-up actions were needed.

The site had been planted in accordance with the approved planting plans. A combination of pickleweed and saltgrass were planted between elevations 10 feet MLLW and 12 feet MLLW. Tufted hairgrass had been planted above that, between 12 feet MLLW and 13 feet MLLW. *Distichlis spicata* is the dominant species at the site, but it continues to be grazed significantly by the geese. One pickleweed plant and only a few tufted hairgrass plants were observed during this monitoring event. Some volunteer gumweed was present along with goose tongue and native blackberry. There were no invasive species identified during the inspection.

Photo Documentation – Photo documentation was not required during Year 6 monitoring. Some general photos of the site were taken during the inspection and are available for review upon request.

Head of Thea Foss Shoreline Habitat – A portion of the eastern shoreline at the head of the waterway was cut back as part of the Utilities' remediation project, to create aquatic habitat below ordinary high water (see Figure 6-6). Saltmarsh and littoral vegetation were planted in a 5- to 8-foot side strip landward of a log step structure (at approximately 12.4 feet MLLW) along the shoreline. A goose exclusion grid was constructed across the area to minimize herbivory but has since been removed.

Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 19, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in excellent condition. Upon arrival, there were some small avian species and a bunny present at the site. No significant erosion or sedimentation were identified at the site. There were no indications of animal damage, disease or vandalism at the site, and only minor amounts of trash and wrack found at the high tide line. The goose exclusion grid has been removed, and the site appears stable. The log step appeared to be in good condition.

The onsite soils were observed to be unchanged from the last monitoring event. The surface soils are grayish-brown silty sand. There was no indication of odor or sheen. Overall, there was no apparent site disturbance and no deficiencies in soil conditions were identified.

The site had been planted in accordance with the approved planting plans as modified following baseline monitoring. All of the planted species are continuing to do well and are spreading nicely. There seems to be a bit less salt grass and tufted hairgrass than what has been previously observed. The potentilla is dominating the shoreline. The volunteer gumweed is spreading well onto the upper beach on the water side of the logs along with pickleweed, orache and brass buttons. Some vegetation had been removed at the north end of the site during the recent remediation of the American Plating site.

There were a few pepperweed plants observed that were flowering as well as some St. John's Wort and white sweet clover. Therefore, some minor weeding is needed. South of the site near the twin 96ers, a number of invasive species are present including blackberry, nightshade, Scot's broom and white sweet clover. The City will look into maintaining this area to eliminate this seed source.

Photo Documentation – Photo documentation was not required during Year 6 monitoring. Some general photos of the site were taken during the inspection and are available for review upon request.

SR 509 Esplanade Riparian Habitat – Upland vegetation was planted above the ordinary high water level along the shoreline south of Alber's Mill (see Figure 6-7). In order to account for shading by the SR 509 Bridge, two different assemblages of riparian vegetation were planted: one tree and shrub assemblage appropriate for full sun exposure, and a shrub assemblage appropriate for partial shade. An irrigation system was initially constructed under the bridge in the shaded area and was subsequently extended to the north and south ends of the enhancement area. Construction of a park on the adjacent property was completed in 2009. The sprinkler system for the habitat site has now been incorporated into the overall park sprinkler system, although there have been issues with the system since incorporation. The planting area has been extended south of the habitat site as part of overall site landscaping.

Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 19, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in fair condition. Vegetation outside of the bridge shadow is doing quite well while those under the bridge are nearly non-existent. Upon arrival at the site for the qualitative inspection, there were some seagulls and pigeons present. No significant sedimentation or erosion were identified. There was no indication of animal damage or disease present, and only minor trash observed. There was some damage to the sprinkler system and some broken limbs on the trees which may have been a result of vandalism. The sprinkler system needs to be inspected to ensure that it is in good, working order.

The onsite soils were observed to be unchanged from the last monitoring event. The surface soils are grayish-brown, silty sand and topsoil. There was no indication of odor or sheen. Overall, there were no apparent deficiencies in soil conditions identified.

The site had been planted in accordance with the approved planting plans. As indicated above, two different assemblages were originally planted due to the shading provided by the SR 509 Bridge. In the area with full sun, a combination of Pacific madrone, shore pine, oceanspray, red-flowering currant, and tall Oregon grape had been planted. In the shaded area beneath the bridge, a combination of Pacific rhododendron, salal, and red huckleberry were planted. The plants in the unshaded areas, particularly the red flowering currant, shore pine, Oregon grape and oceanspray, are doing very well, while those under the bridge are not thriving at all. There were some volunteer species identified during the inspection, including cottonwood and an increasing amount of gumweed in the adjacent intertidal area. Invasive species identified during the inspection include plantain, tansy, poison hemlock and oxeye daisy. Ongoing weeding of the site is needed.

Photo Documentation – Photo documentation was not required during Year 6 monitoring. Some general photos of the site were taken during the inspection and are available for review upon request.

Log Step Habitat Enhancement – Approximately 35 treated timber piling, a 12- by 14-foot concrete vault, and other debris were removed from an area on the west side of the waterway between the Colonial Fruit warehouse and the Foss Harbor Marina . A portion of the area was dredged, and a thick quarry spall cap consisting of 18 inches of filter material overlain by 18 inches of riprap was constructed. Habitat mix was placed over the area between the elevations of -10 feet MLLW and 11 feet MLLW (see Figure 6-8).

A 2-step log transition was constructed between elevations 11 feet MLLW and 13 feet MLLW and a 3-foot bench was constructed using 18 inches of filter material overlain with an 18-inch deep layer of quarry spalls. Habitat mix was placed over the quarry spalls, and saltmarsh grasses planted at elevation 13 feet MLLW along the 65-foot long high intertidal bench.

Qualitative Ground Survey – The qualitative ground survey at this site was conducted on July 19, 2012. A copy of the completed field form can be found in Attachment E-1. Overall, the site was noted to be in excellent condition. Upon arrival, there were pigeons and seagulls observed off-site, but no wildlife found present at the site itself. No sedimentation was identified at the site and only a minor amount of erosion from the area covering the outfall. There were no indications of animal damage, disease, trash, or vandalism. The log step appeared to be in good condition and only minor maintenance, including checking the anchors on the logs, is needed.

There was no change in the surface soils noted at the site and there was no indication of odor or sheen. Overall, there was no apparent site disturbance and no deficiencies in soil conditions were identified.

The site had been planted in accordance with the approved planting plans. A combination of American dunegrass and tufted hairgrass was planted in a 3-foot wide bench behind the log step at an elevation of approximately 13 feet MLLW. It was noted during the inspection that the dunegrass was continuing to do very well and is clearly the dominant species at the site. There was no tufted hairgrass observed. Pickleweed, gumweed and orache are volunteering at the site. Some invasive species are present adjacent to the site including St. John's Wort and a cherry tree. Therefore, only minor weeding is needed.

Photo Documentation – Photo documentation was not required during Year 6 monitoring. Some general photos of the site were taken during the inspection and are available for review upon request.

6.2.3 Summary of Findings from Habitat Mitigation Area Monitoring

The primary performance criteria for the mitigation sites is the maintenance of the total habitat acreage for the project. The habitat enhancement areas were designed to enhance the habitat function where possible within the remediated areas, and specific long-term performance criteria for these sites are not applicable.

Very few follow-up actions were identified during this monitoring event. Those that were identified are discussed in the sections above, and are summarized in Table 6-6.

An evaluation of whether each of the mitigation sites meets the applicable performance criteria for Year 6 is provided below and summarized in Table 6-6.

North Beach Habitat – The only identified Year 6 performance standard for this site is presence of habitat mix at the surface. Habitat mix was observed on the beach surface so this performance criteria is met.

Middle Waterway Tideflat Habitat – There are no Year 6 performance standards for this site.

Puyallup River Side Channel – The only identified Year 6 performance standard for this site is presence of fine-grained material in the interstices of the riprap between elevations 13 feet MLLW and 9 feet MLLW. Fine-grained material was observed so the site meets this performance criteria.

Hylebos Creek Mitigation Site – Year 6 performance standards for this site include minimal change in elevation and no obstruction of fish passage in the channels. The performance standard relative to elevation in the channels at this site indicate that the average elevation change along the centerline transect of the channels must be less than 0.2 feet from as-built elevations. Based upon this criteria, the site does not meet the performance standard (average Year 6 change in south lobe relative to as-built elevations was 0.45 feet and in the north lobe was 0.20 feet). However, if the elevations are compared to either the design elevations or the Year 0 elevations, the site does meet the performance criteria.

No obstruction to fish passage was observed in the channels, so the site meets this performance criteria.

6.2.4 Schedule of Habitat Mitigation Area Monitoring Activities

The next round of habitat mitigation area monitoring activities is scheduled for Year 7. Year 7 monitoring activities are summarized in Table 6-7 and include quantitative and elevation monitoring at the mitigation sites, and qualitative site surveys and photo documentation at both the mitigation sites and the enhancement sites. These activities are scheduled to be conducted in June or July 2013, during appropriate tidal cycles.

6.3 Habitat Mitigation Area Maintenance

6.3.1 Maintenance Approach

As indicated above, routine maintenance of the habitat mitigation and enhancement sites is performed for the City by the WCC crew. Both City staff and WCC have visited the sites periodically during the year for informal inspections and maintenance, as well as specifically following up on issues identified during the qualitative site surveys.

6.3.2 Completed Maintenance Activities

Since the performance of the qualitative site inspections in July 2012, the WCC has begun following up on the maintenance issues identified. Specifically, they have performed the following activities:

- Removed two goose exclusion grids at the Puyallup River Side Channel;
- Picked up trash as needed from all sites;
- Removed invasives at all sites as needed.

6.3.3 Replanting Performed as Part of Maintenance Activities

Under the approved OMMP, replanting of the sites will generally be performed as a contingency action if, upon completion of quantitative evaluation, it is determined that plant coverage is less than the performance standards. Based upon the Year 4 quantitative vegetation survey, there were three areas where vegetation performance standards were not achieved, however, as discussed in detail in the Year 4 Annual Report, replanting was determined to be unnecessary at that time. Quantitative surveys were not required during Year 6, and qualitative surveys did not indicate the need for replanting in any of these areas. Quantitative monitoring will be performed in Year 7 and the need for replanting will be evaluated at that time.

As indicated above, in a letter dated February 8, 2007, EPA set forth a demand to the City for an additional 0.63 acres of habitat mitigation. This additional mitigation area was required in part as a condition of a time extension allowed during the Thea Foss sediment remediation project and also due to a delay in completing construction of all mitigation areas. Following additional discussion of this issue, the City submitted a proposal for fulfilling this habitat requirement. EPA approved this proposal on October 13, 2009. The proposal included enhancement of the riparian areas at the North Beach Habitat and Puyallup River Side Channel, and enhancement of the marsh area at the Middle Waterway Tideflat Habitat. All plantings were completed as of December 2011. The City has requested final approval of this work from EPA and is currently awaiting response.

6.4 Contingency Planning and Response Actions

The approach to adaptive management and contingency planning are set forth in Sections 6.4 and 6.5 of the OMMP, respectively. There are no ongoing or new issues identified at this time that are subject to adaptive management and contingency planning.

TABLES

- 6-1 – Year 6 Monitoring Activities
- 6-2 – Mitigation Area Acreage
- 6-3 – Survey Information for Photo Points and Elevation Stakes
- 6-4 – Summary of Findings from Year 6 Habitat Mitigation Area Monitoring
- 6-5 – Hylebos Creek Transect Elevations
- 6-6 – Performance Standard Schedule by Site
- 6-7 – Year 7 Monitoring Activities

FIGURES

- 6-1 – North Beach Habitat
- 6-2 – Middle Waterway Tideflat Habitat
- 6-3 – Puyallup River Side Channel
- 6-4 – Hylebos Creek Mitigation Site
- 6-5 – Johnny’s Dock Habitat Enhancement
- 6-6 – Head of Thea Foss Shoreline Habitat
- 6-7 – SR 509 Esplanade Riparian Habitat
- 6-8 – Log Step Habitat Enhancement
- 6-9 – Hylebos Creek Habitat Quantitative Monitoring Locations
- 6-10 – Hylebos Creek Centerline Transect Elevation Comparison

**Table 6-1
Year 6 Monitoring Activities**

	North Beach Habitat	Middle Waterway Tideflat Habitat	Puyallup River Side Channel	Hylebos Creek Mitigation Site	Thea Foss Enhancement Areas
Qualitative Ground Survey	x	x	x	x	x
Photo Documentation	--	--	--	--	--
Quantitative Vegetation Monitoring	--	--	--	--	n/a
Invertebrate Monitoring	n/a	n/a	--	--	n/a
Elevation Monitoring	--	--	--	x	n/a
Water Surface Elevation Monitoring	n/a	n/a	n/a	--	n/a
Brackish Marsh Salinity Monitoring	n/a	--	n/a	n/a	n/a
Juvenile Salmonid Monitoring	--	--	--	--	n/a

x activity performed
 -- activity not performed this monitoring year
 n/a activity not required at this location

**Table 6-2
Mitigation Area Acreage**

Site	Subtidal, acres (Below -10 feet MLLW)	Littoral, acres (Between OHW and -10 feet MLLW)	Total Aquatic Habitat, acres	Riparian, acres
North Beach Habitat	0.10	7.26	7.36	0.30
Middle Waterway Tideflat Habitat	--	8.84	8.84	0.55
Puyallup River Side Channel	--	5.39	5.39	0.44
Hylebos Creek Mitigation Site	--	0.58	0.58	0.30

¹ At the Hylebos Creek Mitigation Site, the riparian area subject to performance monitoring is identified as forested wetland (see Figure 6-4).

Table 6-3
Survey Information for Photo Points and Elevation Stakes

Site	Photo Point Identification	Elevation Stake Identification	Coordinates	Elevation Top of Stake	
				Top of Stake	Depth from Top of Stake to Sediment Surface
North Beach Habitat	P-1		710023.3 / 1161327		
	P-2		709994.3 / 1161228		
	P-3		709909.6 / 1160964		
	P-4		709869.5 / 1160958		
	P-5		709671.7 / 1160934		
	P-6		710551.3 / 1160645		
		E-1	710056.7 / 1161259	-0.689	1.07
		E-2	710001.4 / 1161054	8.207	1.09
		E-3	709900.2 / 1160916	5.383	0.68
		E-4	709818.6 / 1160941	5.984	1.02
		E-5	709742.3 / 1160912	3.442	1.05
Middle Waterway Tideflat Habitat	P-1		708961.1 / 1161384		
	P-2		708534.1 / 1161575		
	P-3		708040.6 / 1161800		
	P-4		707863.4 / 1161619		
		E-1	708976.1 / 1161325	6.801	1.05
		E-2	708792.6 / 1161327	0.398	1.05
		E-3	708545.3 / 1161470	-1.133	1.05
		E-4	708494.6 / 1161558	5.429	1.02
		E-5	708269 / 1161523	0.003	1.05
		E-6	707981.6 / 1161745	5.548	1.05

Site	Photo Point Identification	Elevation Stake Identification	Coordinates	Elevation Top of Stake		
				Top of Stake	Depth from Top of Stake to Sediment Surface	
Puyallup River Side Channel	P-1		706460.3 / 1164098			
	P-2		706548.9 / 1164081			
	P-3		706064.8 / 1163970			
	P-4		705490.6 / 1164036			
	P-5		705143.7 / 1164421			
	P-6		705321.7 / 1164354			
			E-1	706461.3 / 1164073	6.273	1.06
			E-2	706278.4 / 1164065	3.089	1.03
			E-3	706109.5 / 1164066	1.68	1.05
			E-4	705269.5 / 1164313	0.563	1.06
			E-5	705220.3 / 1164352	2.443	1.05
			E-6	705180.7 / 1164385	4.414	1.08
Hylebos Creek Mitigation Site	P-1		706015.6 / 1181008			
	P-2		705967.8 / 1181125			
	P-3		705840.7 / 1181168			
	P-4		705733.2 / 1181050			
	P-5		705943.3 / 1181089			
	P-6		705787.3 / 1181053			
	P-7		705708.4 / 1181016			
			E-1	705743.9 / 1181053	2.483	1.07
			E-2	705904.4 / 1181079	2.474	1.05
			E-3	705819.2 / 1181135	6.49	1.07
			E-4	705869.6 / 1181162	3.829	1.07
			E-5	705955.1 / 1181110	2.97	1.07
		E-6	705999 / 1181026	2.763	1.03	

Site	Photo Point Identification	Elevation Stake Identification	Coordinates	Elevation Top of Stake	
				Top of Stake	Depth from Top of Stake to Sediment Surface
Johnny's Dock Habitat Enhancement	P-1		703065.1 / 1160772		
	P-2		703022.6 / 1160731		
Head of Thea Foss Shoreline Habitat	P-1		702352.7 / 1160773		
	P-2		701860.2 / 1160780		
SR 509 Esplanade Riparian Habitat	P-1		702697.8 / 1160410		
	P-2		702498.2 / 1160286		
	P-3		702257.3 / 1160311		
Log Step Habitat Enhancement	P-1		705509.6 / 1160052		

Note: Horizontal Datum 83-91
Vertical Datum NGVD 29

**Table 6-4
Summary of Findings from
Year 6 Habitat Mitigation Area Monitoring**

Site	Corrective Action Tasks
North Beach Habitat	<ul style="list-style-type: none"> - minor weeding / trash removal - tighten/replace anchors on large woody debris - mulch around plants in newer riparian area
Middle Waterway Tideflat Habitat	<ul style="list-style-type: none"> - repair/replace sprinkler heads as needed - minor weeding / trash removal - check large woody debris anchors and tighten anchors as needed
Puyallup River Side Channel	<ul style="list-style-type: none"> - minor weeding / trash removal
Hylebos Creek Mitigation Site	<ul style="list-style-type: none"> - minor weeding / trash removal - check large woody debris anchors and tighten anchors as needed
Johnny's Dock Habitat Enhancement	<ul style="list-style-type: none"> - minor weeding / trash removal - check large woody debris anchors and tighten anchors as needed
Head of Thea Foss Shoreline Habitat	<ul style="list-style-type: none"> - minor weeding / trash removal - check large woody debris anchors and tighten anchors as needed
SR 509 Esplanade Riparian Habitat	<ul style="list-style-type: none"> - minor weeding / trash removal - check sprinkler system to ensure proper function
Log Step Habitat Enhancement	<ul style="list-style-type: none"> - minor weeding - check large woody debris anchors and tighten anchors as needed

**Table 6-5
Hylebos Creek Transect Elevations**

South Lobe Elevations											
Point	Northing	Easting	Design Elevation	Post Construction Elevations	Year 0 Elevations	Year 1 Elevations	Year 2 Elevations	Year 3 Elevations	Year 4 Elevations	Year 5 Elevations	Year 6 Elevations
S-1	705914.01	1181063.36	1.7	1.05	--	1.30	1.23	1.75	1.09	0.25	-0.07
S-2	705904.40	1181079.00	1.7	0.53	1.42	1.53	1.44	1.17	1.01	1.26	1.50
S-3	705880.46	1181098.72	1.7	0.67	--	1.32	1.23	1.36	1.26	1.28	1.53
S-4	705855.87	1181095.14	1.7	0.73	--	1.39	1.36	1.31	1.39	1.34	1.46
S-5	705826.47	1181088.39	1.8	0.66	--	1.27	1.26	1.30	1.26	1.16	1.29
S-6	705804.98	1181082.76	1.8	0.64	--	0.66	0.71	0.81	0.79	0.68	0.84
S-7	705783.57	1181075.84	1.8	0.61	--	1.22	1.18	1.19	1.18	1.11	1.21
S-8	705763.37	1181064.01	1.9	0.67	--	1.09	1.04	1.05	1.01	0.98	1.07
S-9	705743.90	1181053.00	2.3	0.62	1.41	1.33	1.35	1.34	1.28	1.37	1.42

North Lobe Elevations											
Point	Northing	Easting	Design Elevation	Post Construction Elevations	Year 0 Elevations	Year 1 Elevations	Year 2 Elevations	Year 3 Elevations	Year 4 Elevations	Year 5 Elevations	Year 6 Elevations
N-1	705988.18	1181015.70	1.2	1.48	--	1.44	1.43	1.43	1.30	1.53	1.40
N-2	705999.00	1181026.00	1.5	1.41	1.73	1.61	1.68	1.71	1.47	1.69	1.56
N-3	705987.66	1181055.16	2.1	1.74	--	2.08	2.07	1.88	1.86	1.85	1.74
N-4	705975.21	1181076.61	2.4	1.52	--	1.93	1.91	1.87	1.73	1.76	1.72
N-5	705961.87	1181097.96	2.7	1.92	--	2.00	2.05	2.17	1.95	1.91	1.92
N-6	705949.49	1181119.73	2.7	1.55	--	2.00	1.93	1.51	1.88	1.90	1.81
N-7	705936.30	1181140.86	2.8	1.17	--	1.95	1.90	1.84	1.86	1.84	1.80
N-8	705908.34	1181150.64	3.0	1.40	--	2.06	1.97	1.92	1.93	1.92	1.87
N-9	705869.60	1181162.00	3.5	2.15	2.76	2.64	2.69	2.54	2.50	2.51	2.36

**Table 6-6
Performance Standard Schedule by Site**

Performance Standard	2006 - Year 0	2012 - Year 6	Performance Standard Achieved?
1.0 North Beach Habitat			
Elevation			n/a ¹
1.1.3 Presence of habitat mix at the surface.	B	X	Yes
Riparian Vegetation			n/a ¹
Saltmarsh Vegetation			n/a ¹
Salmonid Presence			n/a ¹
2.0 Middle Waterway Tideflat Habitat			
Elevation			n/a ¹
Riparian Vegetation			n/a ¹
Brackish Marsh Vegetation			n/a ¹
Salmonid Presence			n/a ¹
3.0 Puyallup River Side Channel			
Elevation			n/a ¹
3.1.2 Presence of fine-grained material in interstices of riprap between elevation 13 feet MLLW and 9 feet MLLW.	B	X	Yes
Riparian Vegetation			n/a ¹
Brackish Marsh Vegetation			n/a ¹
Salmonid Presence			n/a ¹

Performance Standard	2006 - Year 0	2012 - Year 6	Performance Standard Achieved?
4.0 Hylebos Creek Mitigation Site			
Elevation			
4.1.1 Average change along centerline transect of channels is less than 0.2 feet from as-built elevation.	B	X	No ²
4.1.2 No obstruction to fish passage in channels.		X	Yes
Forested Wetland Vegetation			n/a ¹
Emergent Wetland Vegetation			n/a ¹
There is no quantitative performance standard associated with emergent wetland vegetation at this site.			n/a
Salmonid Presence			n/a ¹
Surface Water Elevation			n/a ^{1,3}

B = Baseline

¹ This monitoring activity was not performed during this monitoring event.

² See Sections 6.2.2 and 6.2.3 for additional discussion on compliance with this performance criteria.

³ Water surface elevation monitoring is performed for informational purposes only.

**Table 6-7
Year 7 Monitoring Activities**

	North Beach Habitat	Middle Waterway Tideflat Habitat	Puyallup River Side Channel	Hylebos Creek Mitigation Site	Thea Foss Enhancement Areas
Qualitative Ground Survey	x	x	x	x	x
Photo Documentation	x	x	x	x	x
Quantitative Vegetation Monitoring	x	x	x	x	n/a
Invertebrate Monitoring	n/a	n/a	--	--	n/a
Elevation Monitoring	x	x	x	x	n/a
Water Surface Elevation Sampling	n/a	n/a	n/a	x	n/a
Brackish Marsh Salinity Monitoring	n/a	--	n/a	n/a	n/a
Juvenile Salmonid Monitoring	--	--	--	--	n/a

x activity required
 -- activity not required this monitoring year
 n/a activity not required at this location

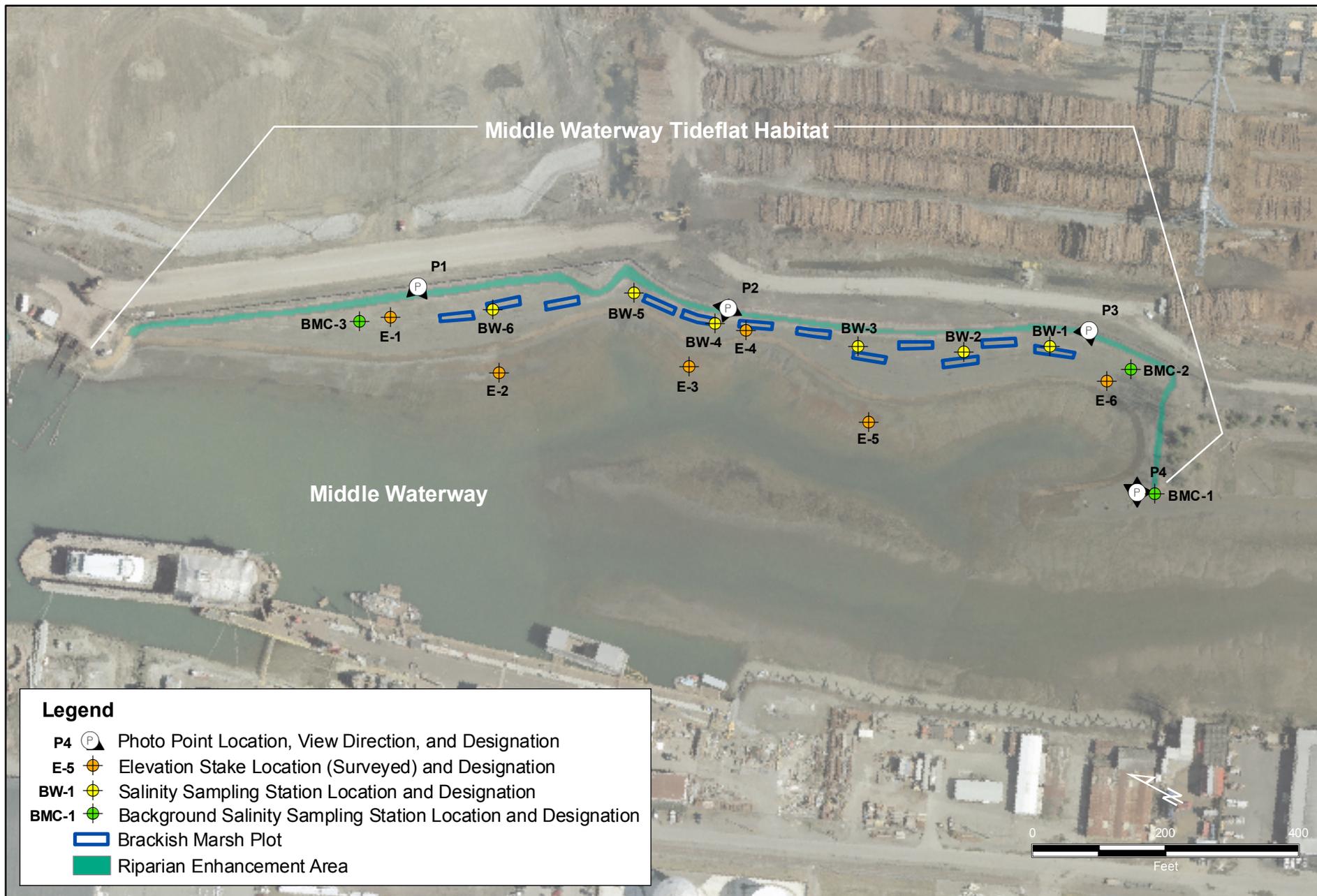


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**Figure 6-1
North Beach Habitat**

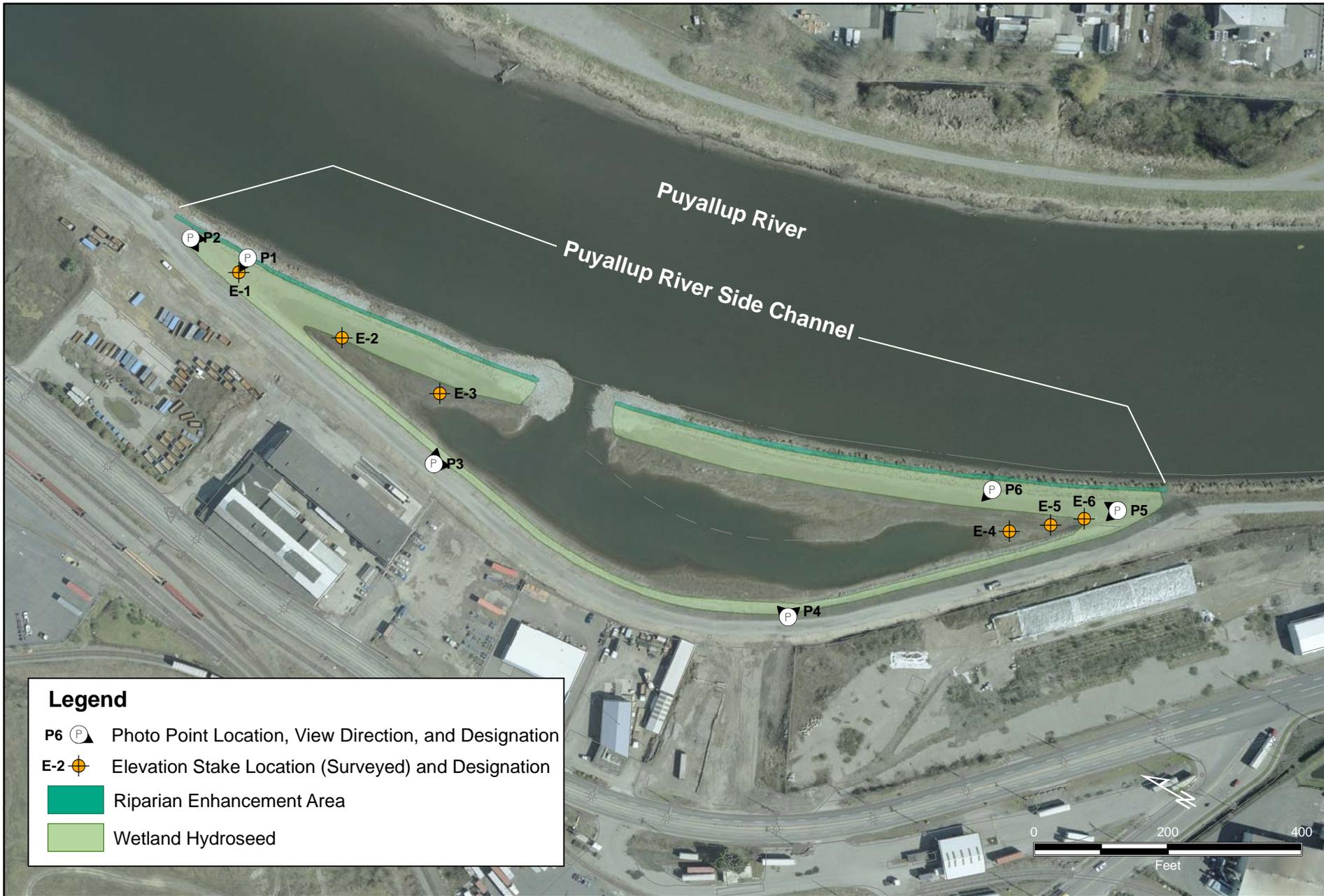


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**Figure 6-2
Middle Waterway Tideflat Habitat**

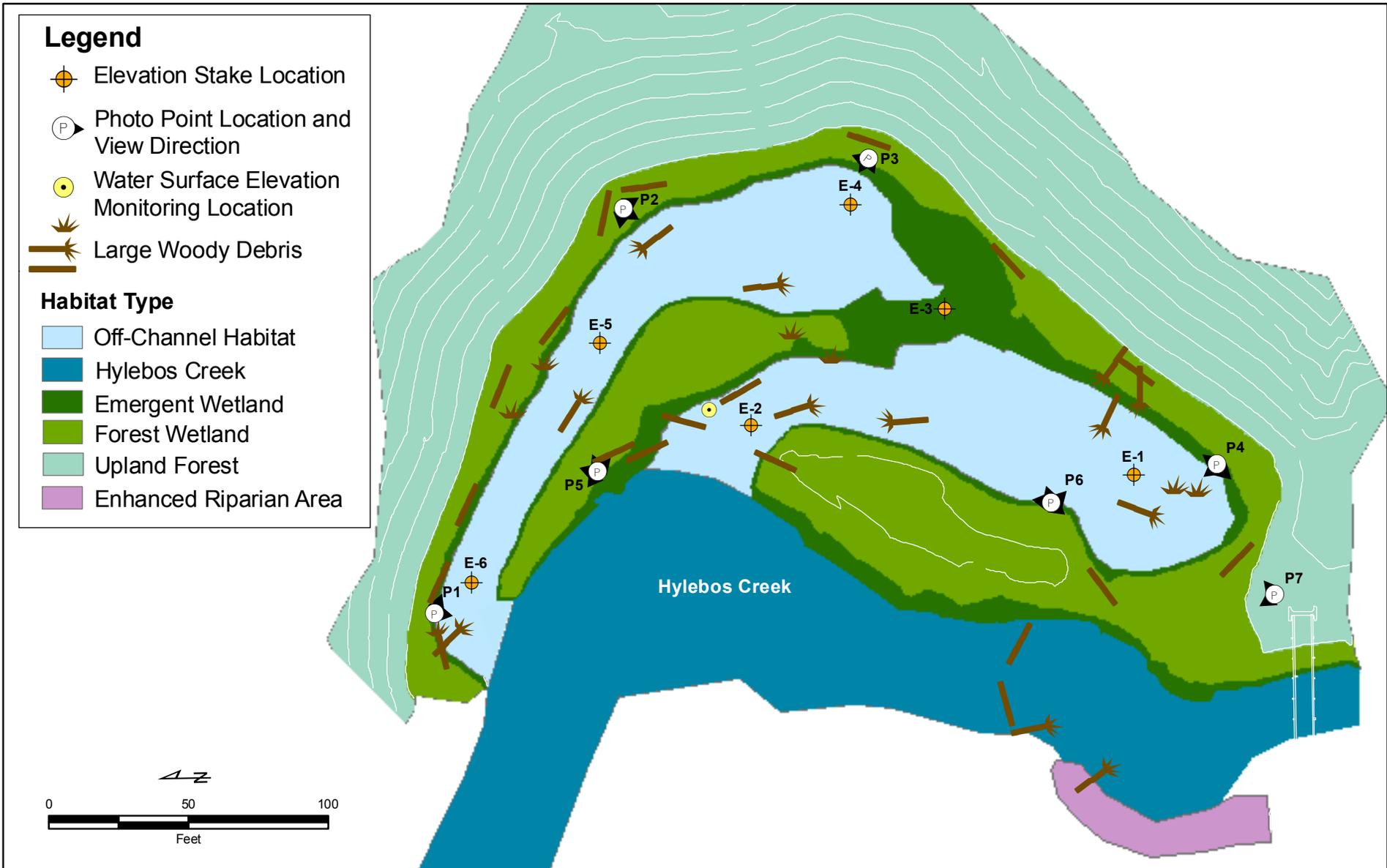


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**Figure 6-3
Puyallup River Side Channel**

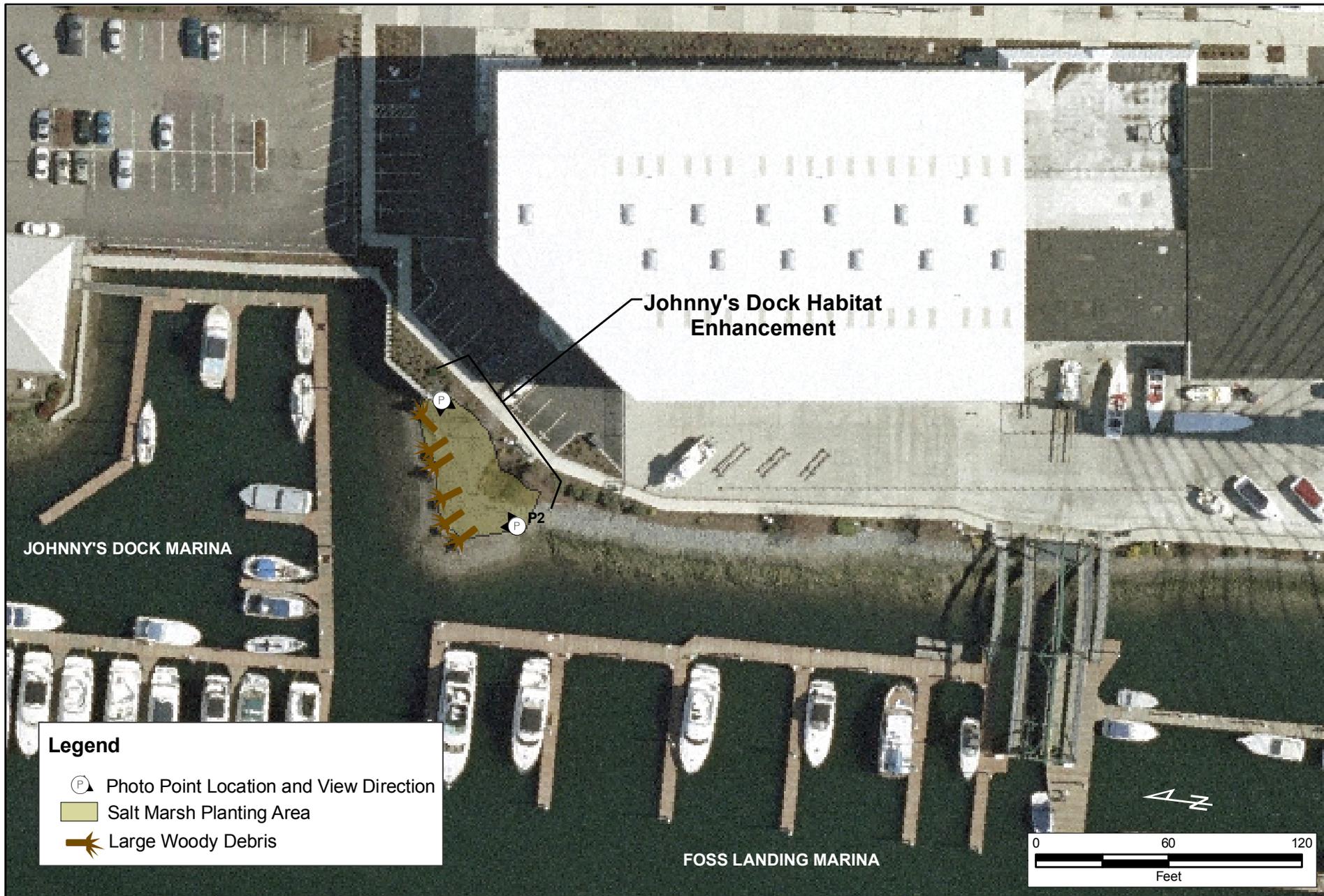


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**Figure 6-4
Hylebos Creek Mitigation Site**



Legend

-  Photo Point Location and View Direction
-  Salt Marsh Planting Area
-  Large Woody Debris



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**Figure 6-5
Johnny's Dock Habitat Enhancement**

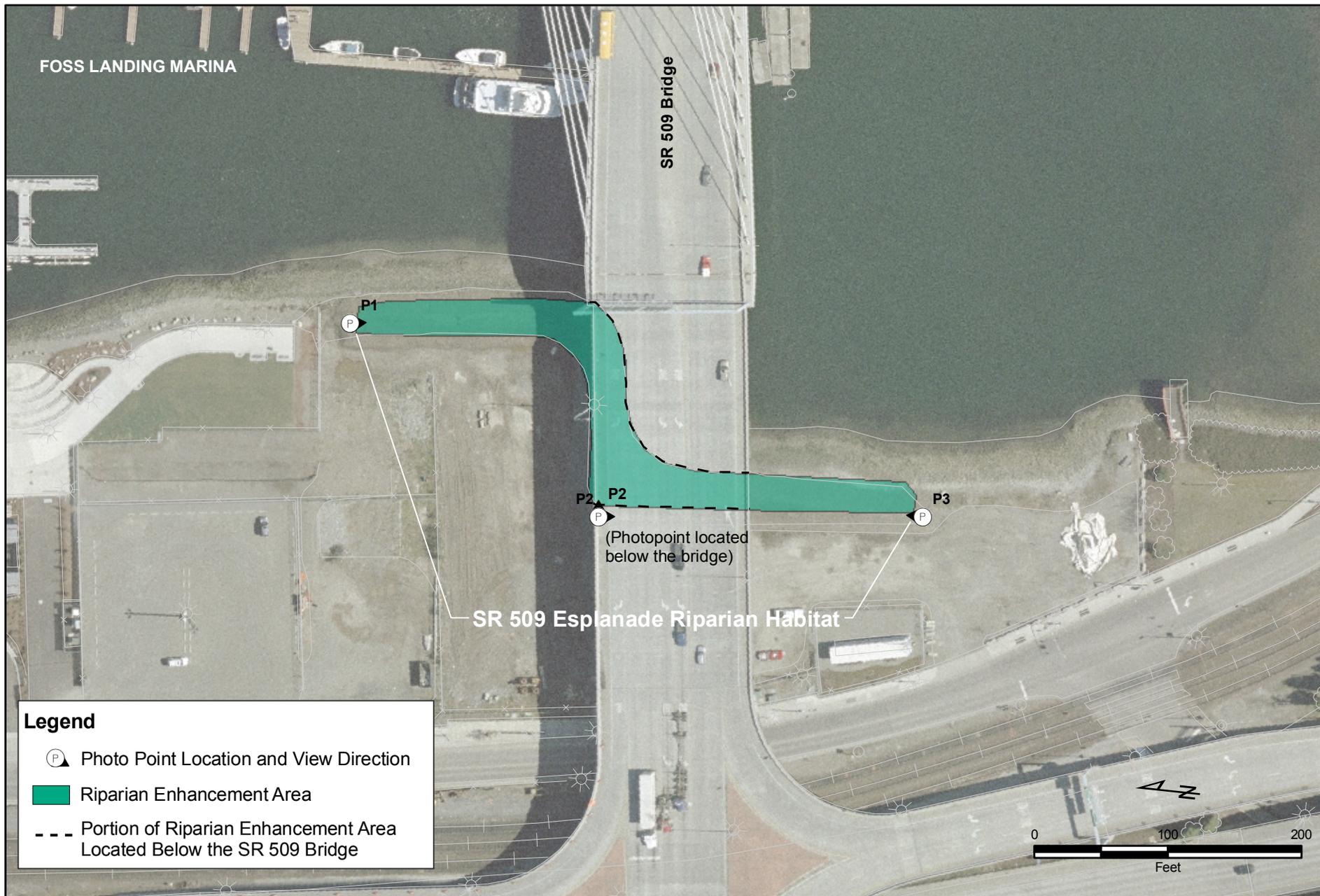


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**Figure 6-6
Head of Thea Foss Shoreline Habitat**

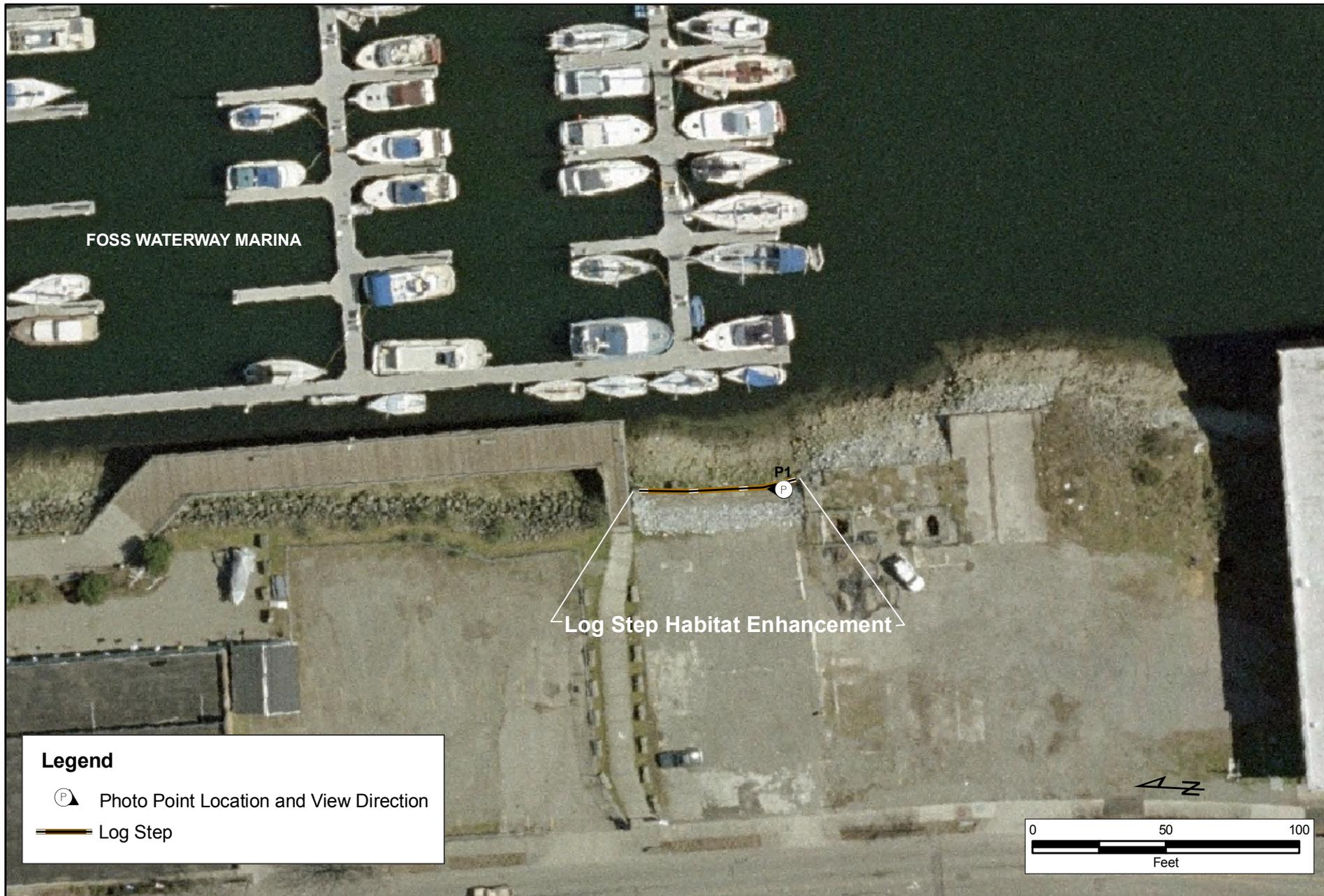


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**Figure 6-7
SR 509 Esplanade Riparian Habitat**



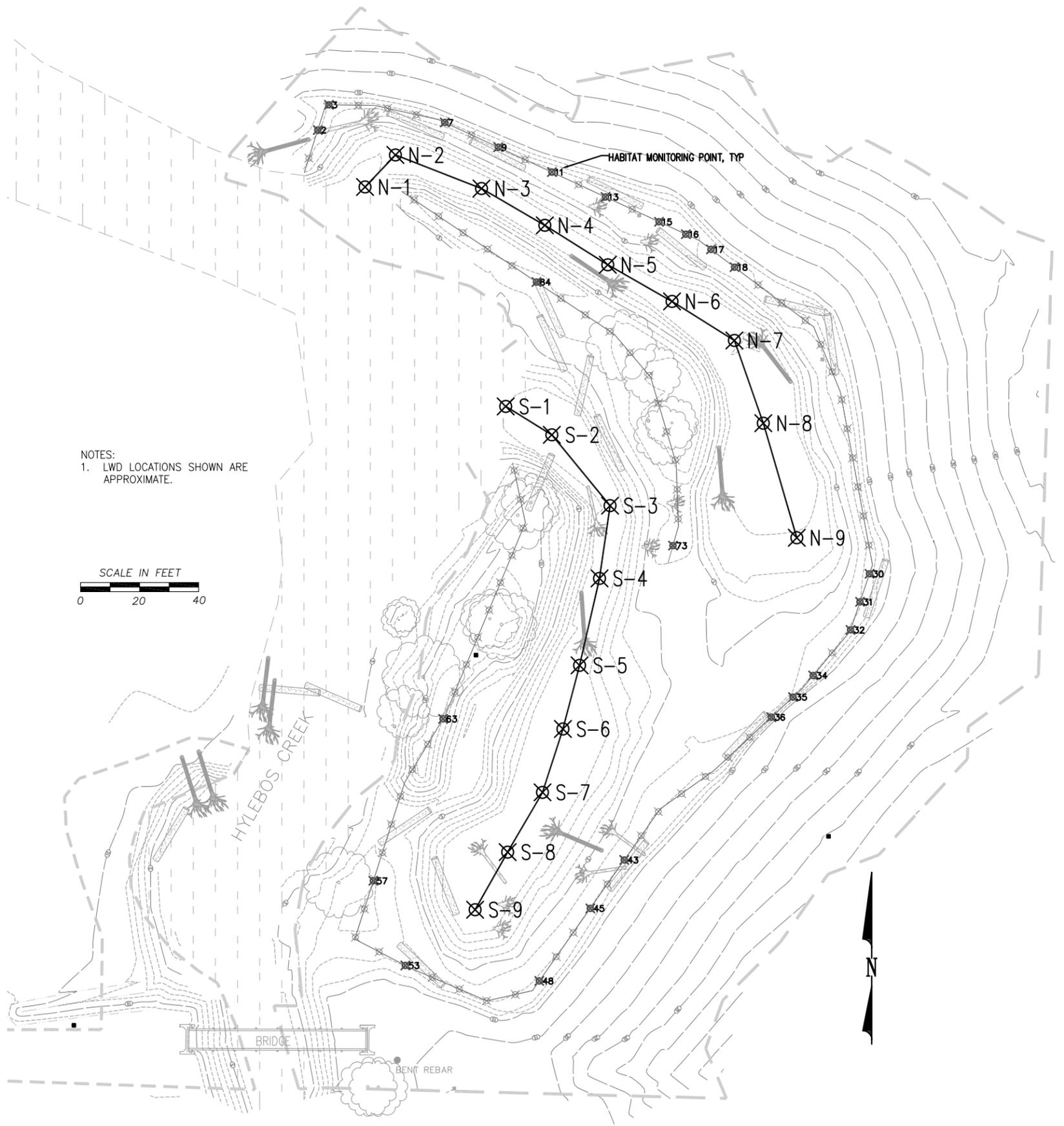
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Figure 6-8
Log Step Habitat Enhancement

\\fs005\foass\CAD - THEA FOSS\Habitat_Sites\Hylebos_Creek\dwg\yr6\OMMP_yr 6_10_hylebos_Cr.dwg, REPORT, 9/21/2012 1:39:43 PM, hbeiding



SOUTH LOBE CENTERLINE			
POINT	NORTHING	EASTING	YR 6 ELEV.
S-1	705914.01	1181063.36	-0.07
S-2 (E-2)	705904.40	1181079.00	1.50
S-3	705880.46	1181098.72	1.53
S-4	705855.87	1181095.14	1.46
S-5	705826.47	1181088.39	1.29
S-6	705804.98	1181082.76	0.84
S-7	705783.57	1181075.84	1.21
S-8	705763.37	1181064.01	1.07
S-9 (E-1)	705743.90	1181053.00	1.42
NORTH LOBE CENTERLINE			
POINT	NORTHING	EASTING	YR 6 ELEV.
N-1	705988.18	1181015.70	1.4
N-2 (E-6)	705999.00	1181026.00	1.56
N-3	705987.66	1181055.16	1.74
N-4	705975.21	1181076.61	1.72
N-5	705961.87	1181097.96	1.92
N-6	705949.49	1181119.73	1.81
N-7	705936.30	1181140.86	1.8
N-8	705908.34	1181150.64	1.87
N-9 (E-4)	705869.60	1181162.00	2.36



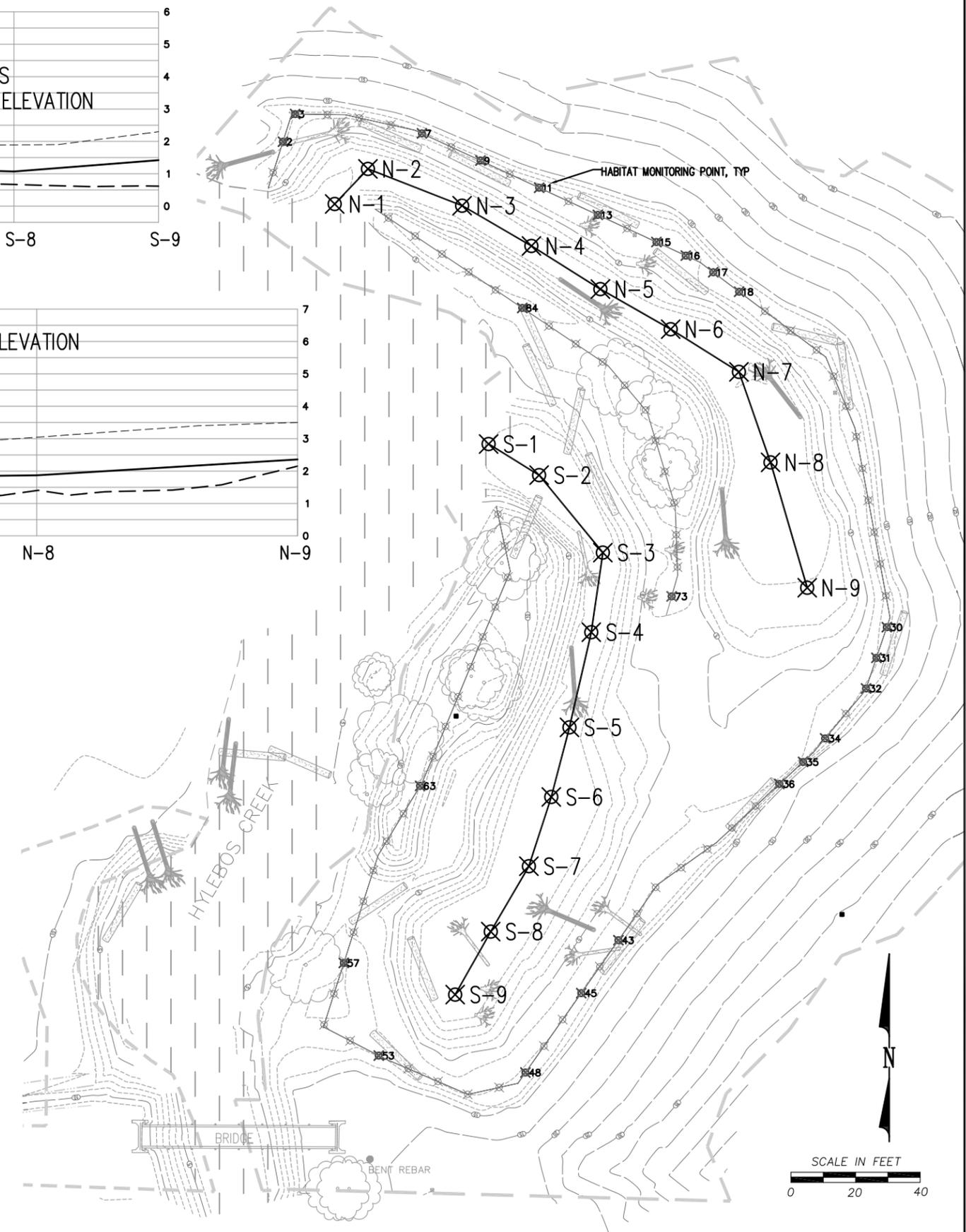
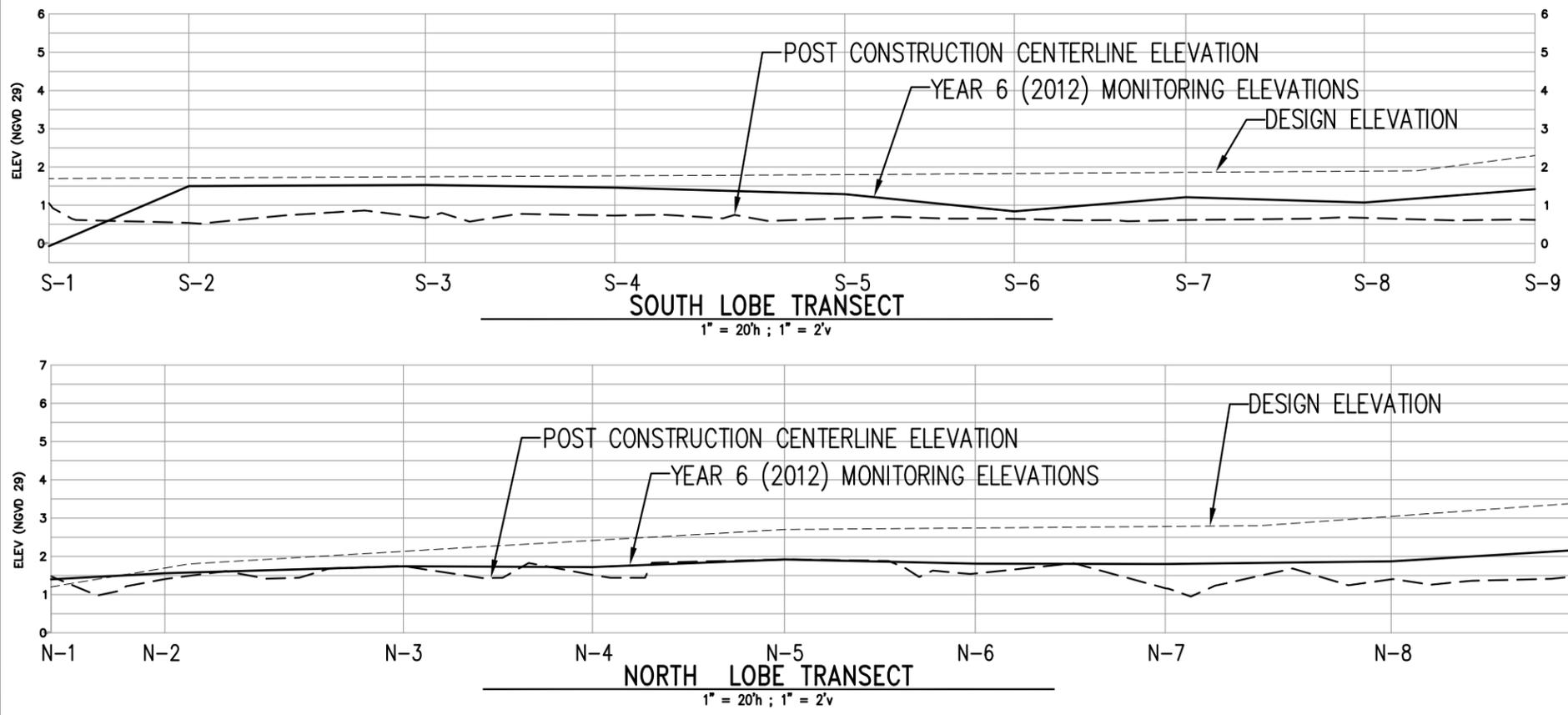
DRAWN BY: TAF/LIH
DATE: 9/21/2012

THEA FOSS AND WHEELER-OSGOOD WATERWAYS

OMMP

FIGURE 6-9
HYLEBOS CREEK HABITAT
QUANTITATIVE MONITORING LOCATIONS

\\fs005\fosscad - THEA FOSS\Habitat_Sites\Hylebos Creek\dwg\yr6\OMMP_2012_Monitoring_report.dwg, PROFILE, 9/21/2012 12:15:28 PM, lbeliding



DRAWN BY: TAF/LIH
DATE: 9/21/12

Thea Foss and Wheeler Osgood Waterways
OMMP

Figure 6-10
Hylebos Creek Centerline Transect Elevation Comparison

7.0 ADDITIONAL PROJECT RELATED ACTIVITIES

7.1 Introduction

Numerous other activities were ongoing during the implementation of the Operations, Maintenance, and Monitoring Plan (OMMP) for the Thea Foss and Wheeler-Osgood Waterways Remediation Project (City of Tacoma 2006) that have some affect on the project. Therefore, status updates on these various activities are provided for informational purposes in this section of the annual reports.

7.2 Institutional Controls

In September 2006, the City of Tacoma (City) received the U.S. Environmental Protection Agency's (EPA) approval of an Institutional Controls Plan for the project. The objective of the plan is to ensure that contamination capped in the Thea Foss and Wheeler-Osgood Waterways and in the Confined Disposal Facility within the St. Paul Waterway, and contamination which is otherwise left in place in the Thea Foss and Wheeler-Osgood Waterways (i.e., in natural recovery areas), remains contained and/or undisturbed for the purpose of:

- Reducing the potential exposure of marine organisms to contaminated sediments disposed of and confined in aquatic disposal sites or confined by capping; and
- Reducing the potential exposure of marine organisms to contaminated sediments left in place in the Thea Foss and Wheeler-Osgood Waterways.

Implementation of plan elements which occurred prior to the date of this report have been reported in the applicable Annual Operations, Maintenance, and Monitoring Reports. The following provides a status update on activities related to plan implementation which occurred during Year 6:

- Project representatives continued to work with the City's Building and Land Use Services (BLUS) division to implement procedures to ensure that future development in and adjacent to the Foss Project areas where remedial actions and habitat mitigation work have been completed, are undertaken in a manner that protects the remedy and the habitat. Project representatives worked with BLUS and EPA on a case by case basis to review development proposals as they were submitted. Several development plans are currently under construction or consideration and are being monitored relative to their potential impact on the cleanup areas. These proposals include the following:
 - **Waterway Park** – The Foss Waterway Development Authority (FWDA) is planning a park development on the east side of the head of the Thea Foss Waterway. Foss Project staff met with the FWDA to discuss the Head of the Thea Foss Shoreline Habitat Area and the need to coordinate subsequent phases of park development with that area. Plans for the habitat area have been provided to the FWDA. The FWDA received a grant for remediation of the American Plating property landward of the ordinary high water mark, which was required to occur before park development. Remediation is nearing completion at this time. The contractor is currently waiting for the grass to establish and provide stabilization of the bank before removing an environmental barrier that was placed between the habitat area and the remediation site. At that time, bank

Section 7.0 – Additional Project Related Activities

shaping and habitat plantings can be completed. The City will continue to work with the FWDA as the remediation is completed and as the park development plan is finalized.

- **Public Esplanade** – The FWDA has completed the design of the Site 9 public esplanade (this is the site immediately south of the Murray Morgan Bridge). The next step is to secure funding in 2013 for permitting. The design is also complete for the Site 11 Phase II public esplanade located immediately north of the Murray Morgan Bridge. It is currently anticipated that construction of this section will begin in the fall of 2013.
- **Seaplane Float** – The FWDA is working to find funding sources to allow this project to move into the design and permitting phase.
- **Murray Morgan (11th Street) Bridge** – In early 2010, the City took ownership of the Murray Morgan Bridge under a turnback agreement with WSDOT. The bridge is currently closed to vehicular traffic and rehabilitation activities are continuing. Sediment samples were taken prior to construction and will be repeated at the end of construction to ensure that the waterway was not impacted by construction activities. Bridge rehabilitation work will continue to be coordinated with EPA and Foss Project staff as needed to ensure that the remediated areas are not compromised.
- **Simpson Cogeneration Facility** – As discussed in previous Annual OMMP Reports, the City was notified that Simpson was planning the development of a cogeneration facility at their site with a hog fuel storage pile placed on top of the CDF. Construction of the cogeneration facility was completed, and initial discussions were held regarding the requirements of design for placement of the hog fuel pile on the CDF. The Foss Project team provided comments on the Shoreline Substantial Development Permit and the Mitigated Determination of Non-Significance regarding the need to ensure that development is performed in a manner that does not compromise the integrity of the CDF. These comments were incorporated into the decision documents. Further meetings with Simpson's design staff were held with discussions regarding the need for a cap/barrier under the pile to prevent infiltration, as well as a collection system for runoff. Anticipated settlement of the CDF surface will also need to be taken into account with the design. Simpson informed the City in 2009 that construction had been delayed due to economic conditions. There has been no update to that status since that time. The Foss Project team will continue coordination with Simpson through the design and construction phases of the project as additional information becomes available.
- **Commencement Bay Marine Services** – The Port of Tacoma completed the reconfiguration of the marina associated with this facility, which is located within RA 3, the grout mat cap area. The Foss Project team and EPA worked with the Port through the design and permitting phase of the project to ensure that there would be no impact to the remedial cap in this area.
- **Tacoma Metals Site Remediation** – This site is located adjacent to the Puyallup River Side Channel habitat mitigation area. As of the date of this report, the property owners are continuing to work with Ecology to update the RI/FS and to develop the cleanup action plan for the site.

The City will continue to review additional design submittals as they are developed to ensure consistency with, and protection of the remedy.

7.3 Stormwater Source Control

7.3.1 Introduction

The Thea Foss and Wheeler-Osgood Waterways are located in a highly urbanized drainage basin with residential, commercial and industrial land uses and transportation corridors. Sources of Contaminants of Concern (COCs) continue to exist in the drainage basins and are conveyed to the waterways via stormwater (municipal and private), aerial deposition, marinas, and groundwater seeps. The contaminants identified as having the greatest potential to affect sediment quality following the cleanup action include PAHs and phthalates.

Under a Unilateral Administrative Order dated September 30, 2002, and a Consent Decree with the Environmental Protection Agency dated May 9, 2003, the City of Tacoma is implementing a stormwater monitoring and source control strategy for the municipal storm drains entering the Thea Foss and Wheeler-Osgood Waterways to help provide long-term protection of sediment quality in the waterways. The Thea Foss Post-Remediation Source Control Strategy uses a multifaceted approach consisting of aggressive source control efforts, a comprehensive monitoring program, a computer model to predict impacts and a decision matrix to identify the need for additional source controls. The strategy's elements are integrated with the City's NPDES Phase I requirements, however, many of the elements performed in the Thea Foss basin exceed NPDES requirements.

The City prepared and submitted the Thea Foss and Wheeler-Osgood Waterways 2011 Source Control and Water Year 2011 Stormwater Monitoring Report (Stormwater Annual Report) in March 2012. This Stormwater Annual Report outlines the City's existing programs and studies completed in 2011 and includes a discussion of the need for additional source controls. Included are annual source control evaluations for the seven major outfalls discharging to the waterways; Outfalls 237A, 237B, 235, 230, 243, 245 and 254. The evaluations include a drain by drain assessment and incorporate the review of ongoing studies, source control investigations, water quality data and stormwater suspended particulate matter (SSPM) data for that outfall/basin.

In addition to the 2011 source control evaluations, the Stormwater Annual Report contained a review of the results from the first ten years of outfall monitoring conducted under the City's NPDES Program, source control actions completed in the Thea Foss drainage basins and computer model predictions. The history and trends emerging over the ten years of the program (2002-2011) are examined and presented in the report.

7.3.2 Stormwater Time Trend Analysis

Part of the evaluation included in the Stormwater Annual Report is an assessment of whether stormwater quality is improving over time. As described in the report, over a ten year period (October 2001-2011), stormwater, baseflow and SSPM were sampled at the seven major outfalls that discharge into the Thea Foss and Wheeler-Osgood Waterways. To date, 1,289 samples have been collected with 322 baseflow and 709 stormwater samples collected at the outfalls and 62 outfall and 196 upline SSPM samples collected in pipeline sediment traps

Section 7.0 – Additional Project Related Activities

deployed throughout the watershed. This depth of data provides the basis for meaningful statistical evaluation of the trends over the monitoring period.

The number of statistically significant time trends observed in Tacoma's stormwater monitoring record increased to thirty-seven (37 out of 49 tests, or greater than 75 percent of the tests). All trends were in the direction of decreasing concentrations. This is a larger number of significant reductions than has ever been observed previously (e.g., 26 significant trends (about 50 percent) were observed in Year 9, ten significant trends (about 20 percent) were observed in Year 8, and only four significant trends (about eight percent) were observed in Year 6.

The time trends were modeled with best-fit regression equations to estimate percent reductions over the 10-year monitoring period for these constituents and outfalls:

- **TSS:** 44 to 67 percent reduction in OFs 230, 235, 237A, and 237B
- **Lead:** 41 to 49 percent reduction in OFs 235, 237A, 237B, and 245
- **Zinc:** 48 to 51 percent reduction in OFs 237B and 254, respectively
- **PAHs:** 80 to 96 percent reduction in phenanthrene in all seven drains
83 to 97 percent reduction in pyrene in all seven drains
85 to 96 percent reduction in indeno(1,2,3-c,d)pyrene in all seven drains
- **DEHP:** 57 to 87 percent reduction in OFs 230, 235, 237A, 237B, 243, and 245

7.3.3 Municipal, State, and Federal Source Control Efforts

The cumulative effect of municipal, state, and federal source control efforts has likely contributed to these observed improvements in stormwater quality. The City has directed numerous source control efforts in this watershed focused on these COCs. The City implements aggressive source control activities that comply with or exceed the requirements of the NPDES permit. Many of these activities have been developed specifically to respond to sources of contaminants found during various investigations.

Stormwater Management Program. The Phase I NPDES permit requires a Stormwater Management Program which is divided into 10 components including stormwater outfall sampling, source control, maintenance, inspections, capital projects and program development and implementation for the municipal separated storm sewer system (MS4). The City integrates these NPDES program elements with the current Thea Foss Program.

In 2011, City staff performed the following field activities within the Thea Foss Basin:

- Responded to 262 spills/complaints including conducting investigations;
- Provided technical assistance on source control and best management practices;
- Conducted 452 business and BMP inspections;
- Conducted 351 City-wide BMP inspections; and
- Continued the IDDE program which investigates and removes illicit connections.

Information from various source control field activities is entered into a web-based database which is an effective tool for retrieving historical information and examining trends.

Municipal Stormwater Ordinance. The City's stormwater ordinance, through the 2008 Surface Water Management Manual, requires stormwater treatment and control systems on new and redeveloped sites and provides a mechanism for enforcement of the stormwater management

Section 7.0 – Additional Project Related Activities

regulations. Through new development and redevelopment, stormwater runoff from industrial and commercial sites throughout the Thea Foss Basin are being converted from untreated to treated runoff (i.e., removal of solids from stormwater runoff).

Special Studies. Tacoma has conducted a number of special studies to better understand the distribution of DEHP and PAHs in the urban environment and how these and other COCs might best be controlled.

Stormwater treatment studies. Stormwater treatment studies are being completed to evaluate the ability of proprietary and public domain stormwater treatment systems to remove DEHP and PAHs from stormwater runoff. Systems tested include StormFilter, AquaShield, AquaFilter, pervious pavements, bioswales and rain gardens. The City will evaluate each technology's effectiveness, applicability and reasonableness for use within the Thea Foss Watershed.

Basin-wide sewer line cleaning. Basin-wide sewer line cleaning of three entire drainage basins (254, 235, and 230) and part of a fourth basin (237A) was completed during summer 2007 and 2008. The objective of the sewer line cleaning program is to remove residual sediments in the storm drains and sediment-bound contaminants. Contaminants in sediments may not be from new sources, but from legacy contamination in the pipe that could be continuing to impact stormwater or baseflow quality through re-suspension and/or dissolution.

A statistical comparison of pre-cleaning versus post-cleaning data ("before" and "after" conditions) shows there are statistically significant reductions in the mean concentrations of all seven Thea Foss index chemicals in OF235 and OF237A, in six of the seven index chemicals in OF230, and in four of the seven index chemicals in OF254. Sewer line cleaning appears to have been most effective at removing PAHs from stormwater, resulting in 59 to 92 percent reductions in all four drains, including both light and heavy PAH fractions. DEHP shows a significant reduction of approximately 65 to 68 percent in OF235 and OF237A, respectively. DEHP is also showing a significant reduction of 26 percent in OF230 which is newly detected this year.

Zinc shows a significant reduction of 24 to 28 percent in response to line cleaning in three of the four basins (Basins 235, 237A, and 254). In 2010, reductions in TSS and lead concentrations were only discernible in one basin, OF235. In 2011, reductions of 17 to 44 percent in TSS, and 11 to 36 percent in lead, are statistically significant in three of the four basins (including OFs 230, 235, and 237A). These statistical comparisons will continue to be updated as more post-cleaning data are collected. The statistical power of this test should increase over time, and quite possibly statistical differences that cannot be resolved today may be distinguishable in the future.

GIS-based pollutant loading model. The City is developing a GIS-based pollutant loading model to evaluate other stormwater BMPs that may be effective on a basin-wide scale (i.e., affecting tens, hundreds, or thousands of acres). The BMPs under consideration are street sweeping, low-impact development (LID), and engineered treatment devices such as filtration vaults. The goals of this study are: to evaluate the feasibility and cost-effectiveness of stormwater BMPs implemented on a basin-wide scale; to identify areas of concentrated pollutant runoff where source control efforts are best focused; and to assess the degree to which stormwater BMPs will cause a reduction of pollutant loadings, and thereby improvements in Thea Foss sediment quality. The model is currently being calibrated to the City's stormwater monitoring record.

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Following calibration, basin-wide BMP implementation scenarios will be run to determine their cost effectiveness at reducing end-of-pipe pollutant loads.

Other State Regulations. In 2010, Ecology reissued the Industrial Stormwater General Permit (ISWGP) which includes new requirements. It is anticipated that under Ecology's ISWGP and the existing Construction Stormwater Permit, contaminants in stormwater will be reduced over time from industrial facilities and construction sites. It is also anticipated that reductions of air pollution will occur through Ecology's Air Program. As reductions in air pollution are realized, the pollutant loads washed off upland surfaces and entrained in stormwater runoff will decrease.

7.3.4 Compliance with Sediment Quality Objectives in the Waterway

In 2010, Year 4 in-waterway monitoring was conducted by the City in the area from just north of the SR509 Bridge to the mouth of the waterway. Year 7 sediment monitoring was performed in the head of the waterway during 2011. There was no monitoring in either portion of the waterway during Year 6. In general, current in-waterway sediment results indicate that the SQOs are not exceeded with the exception of PAHs and DEHP in some localized areas. The City will be performing sediment monitoring in the area north of SR509 in 2013. The next round of monitoring in the Utilities' work area is scheduled for 2014.

7.3.5 2012 Work Plan

The source control work plan for 2012 identifies specific activities for the watershed and for each basin. Each activity was prioritized in order of highest to lowest with higher priorities given to eliminating/reducing point sources and activities that are based on best professional judgment to provide a measurable benefit in reducing chemical loadings to the waterway. Some highlights planned for 2012 are:

- Re-evaluate the post cleaning stormwater data to determine the ongoing effectiveness of storm line cleaning and the onsite BMP performance.
- OF237A: Continue evaluation of PAHs and mercury in the area draining to FD13 and FD13B. Review the 2011-2012 SSPM data to monitor improvement from the stormwater treatment retrofit.
- OF237B: Monitor TPCHD activities at the site of a neighborhood fueling station and reinspect the FD31 branch, if needed, for other possible sources of PAHs and TPHs.
- OF230: Continue source tracing for mercury and PCBs in the area draining to FD3A.
- OF235: Design and construct the Hood Street Treatment Retrofit project.
- OF245: Investigate Quality Transport with TPCHD to locate source(s) of phthalates.
- OF230: Continue source tracing for mercury and PCBs in the area draining to FD18.
- OF237A: Investigate potential sources of phthalates in the area draining to FD10C.

More information about these activities can be found in the Stormwater Annual Report.

7.3.6 Conclusion

While overall stormwater trends are decreasing, analytical data indicates that there are some areas where higher concentrations of certain contaminants are present where additional source control efforts can be implemented. The City believes further improvements in stormwater quality may be realized in the future with ongoing Phase I NPDES permit programs and continuing improvements in source control implementation. Sediment trap results are valuable

in that they provide an early warning of potential sources to the waterway sediments that can be investigated and addressed before SQO exceedances requiring action are identified in the waterways. Additional source control efforts are focused on the COCs for each basin and whether it is found in baseflow, stormwater or SSPM.

Reduction of contaminant loads to the Thea Foss and Wheeler-Osgood Waterways is expected to continue through the City's implementation of its stormwater source control program, as well as through the control of other sources, many of which are outside the City's jurisdiction and must be coordinated by other federal, state, and local authorities. The improvement in stormwater quality since the mid-1990s indicates that source control efforts in the Thea Foss Watershed have been effective in reducing chemical concentrations in stormwater. The City believes further improvements in stormwater quality may be realized in the future with ongoing Phase I NPDES Permit programs and continuing improvements in source control implementation. The City is moving forward with ongoing source tracing investigations, treatability studies, and other special investigations for evaluating and identifying cost-effective controls for metals, DEHP and PAHs in municipal stormwater.

7.4 Recontamination in the Head of the Thea Foss Waterway

As part of the Utilities' Operations, Maintenance, and Monitoring Plan (OMMP) for the Head of the Thea Foss Waterway, sediment sampling and analysis was not required in Year 8 (2012) (Tetra Tech 2003). The most recent compliance monitoring event conducted in the head of the waterway was the Utilities' Year 7 (2011) OMMP monitoring. This Year 7 compliance monitoring included collection and analysis of sediment samples from the compliance interval (0-10 cm) from 18 sampling locations. The sampling locations and chemical parameters were consistent with the previous OMMP monitoring events. Consistent with previous sampling events, the City coordinated with the Utilities to perform the additional phthalate and PAH monitoring at the 4 stations located in the area of additional cap material placement during the Year 7 event. The results of this Year 7 monitoring were summarized in the City's Year 5 OMMP Annual Report.

The next Utilities compliance monitoring event is scheduled for Year 10 (2014). The City will again coordinate with the Utilities to perform any additional phthalate and PAH monitoring required in the area of additional cap material placement, however, monitoring of these stations in Year 10 is not required in the existing Utilities' OMMP.

7.5 Deauthorization of Navigation Channel in Encroachment Areas

In accordance with a Memorandum of Agreement between the Army Corps of Engineers (ACOE) and EPA, the City was required to initiate an informal process to deauthorize portions of the federally authorized channel where capping materials encroach on the authorized channel width. The City submitted a request for deauthorization to ACOE on September 25, 2007. A response from ACOE was received on July 9, 2008. The response indicated that, while navigation projects can generally be modified both formally and informally, the informal process would be best for this request at this time. This involves coordination with the congressional delegation to request language be included in the Water Resources Development Act. The ACOE did indicate that they could assist with legislative drafting services for this, if requested by a member of Congress. The City is continuing to coordinate with its Government Relations Office and the Congressional delegation on the shoreline deauthorization. The WRDA bill did

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not pass in Congress this past session, so the City will work to include the appropriate language in the bill when it is next considered.

Appendix A
Physical Cap Integrity Monitoring

Appendix A – Physical Cap Integrity Monitoring

This task was not performed during this monitoring event. However, for consistency in reporting, the structure of the OMMP Report and subsequent annual reports will follow the outline of the OMMP. This will provide consistent presentation and placement of information generated during the monitoring of remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. Physical cap integrity monitoring data will be included in Annual OMMP Reports for Monitoring Years 7 and 10.

Appendix B

Sediment and Cap Performance Monitoring

Appendix B – Sediment and Cap Performance Monitoring

This task was not performed during this monitoring event. However, for consistency in reporting, the structure of the OMMP Report and subsequent annual reports will follow the outline of the OMMP. This will provide consistent presentation and placement of information generated during the monitoring of remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. Sediment and cap performance monitoring data will be included in Annual OMMP Reports for Monitoring Years 7 and 10.

Appendix C
Benthic Recolonization Monitoring

Appendix C – Benthic Recolonization Monitoring

This task was not performed during this monitoring event. However, for consistency in reporting, the structure of the OMMP Report and subsequent annual reports will follow the outline of the OMMP. This will provide consistent presentation and placement of information generated during the monitoring of remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. Benthic recolonization data will be included in Annual OMMP Reports for Monitoring Years 7 and 10.

Appendix D
Confined Disposal Facility Monitoring

Appendix D– Confined Disposal Facility Monitoring

This task was not performed during this monitoring event. However, for consistency in reporting, the structure of the OMMP Report and subsequent annual reports will follow the outline of the OMMP. This will provide for consistent presentation and placement of information generated during the monitoring of remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. CDF performance monitoring data will be included in Annual OMMP Reports for Monitoring Years 7 and 10.

Appendix E
Habitat Mitigation Area Monitoring

Attachment E-1

**Habitat Mitigation Area Monitoring
Field Forms and Survey Data**

Qualitative Ground Survey, Mitigation Sites

Date: 7.19.12 Time: 1 pm

Year: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Site (circle): North Beach Habitat (NBH), Middle Waterway Tideflat (MWT), Puyallup River Side Channel (PRSC), Hylebos Creek Habitat (HCH)

Staff Present: D. Pooley, M Herley

Weather Conditions: sunny

River Discharge* (CFS) (PRSC & HCH only): n/a

Overall health and vigor of plants: Excellent (+) Fair Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion		✓	present, approx similar to 2011 gravel bar increasing on W end
Sedimentation		✓	
Wildlife		yes	see notes.
Vegetation: Invasive	yes	no	dry, but holding on.
Volunteer			no new noted.
Survival (%)			not n/a
Bark Coverage (%) (MWT only)			n/a
Animal Damage			none noted
Disease			none noted.
Trash			none noted
Vandalism			none noted.
Large Woody Debris		✓	some recruitment & movement
Wrack or Organic Material			* 5 still present in potential marsh.

* For the Hylebos Creek site, use "Riparian" column for forested wetland and "Marsh" column for emergent wetland. Include additional qualitative notes on high slope upland vegetation below

*Data from USGS Puyallup River at Puyallup Station (USGS 12101500)

Wildlife Notes (Species observed, other evidence):

eagles (2) eating lunch (bird) great blue heron, geese
 crows, seagulls, caspian terns, moorshail, bees

Insect Sampling Notes (PRSC and HCH, Year 1 and 3 only):

Date/Time Deployed	Date/Time Retrieved	Monitoring Site	Photo Numbers

Insect Sampling Observations / Observable Insect Prey (e.g., amphipods, mycids, larvae):

Any indication of fish obstruction in the channels? (HCH only)

n/a

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	none
Color:	brown	brown/grey
Texture:	topsoil	rock/cobble Sand/silty sand.

Presence/condition of habitat mix/fine-grained material at surface - NBH (visual and probe) and PRSC (visual only):

W. end $\geq 12''$; E end approx. 3" tapering b/t both ends

Elevation Monitoring

Monitoring Point	1	2	3	4	5	6
Elevation Relative to Baseline (in)						
Picture Number						

Notes: At MWT, elevation monitoring point 1 was not driven flush initially, so the baseline measurement is at -0.25".

Photo Points (Circle Site) (Record Picture # and Time):

Date: _____

7.19.12

Year: 0, 1, 2, 4, 7, 10

Year 6 pics not required.

North Beach	1A - W	1B - NW	2A - E	2B - N
	2C - W	3A - E	3B - N	3C - NW
	4A - S	4B - SW	4C - NW	5A - S
	5C - N	5D - E	6 - W	
Middle Waterway Tideflat	1A - NW	1B - SW	2A - N	2B - W
	2C - S	3A - N	3B - W	4A - S
	4C - N	4D - E		
Puyallup River Side Channel	1 - W	2A - S	2B - SW	3A - SE
	3B - E	4A - NE	4B - SE	5A - N
	6 - W			
Hylebos Creek	1A - E	1B - S	2A - SE	2B - SW
	2C - W	3A - SW	3B - W	3C - NW
	4B - N	4C - NW	5A - S	5B - W
	5D - E	6A - N	6B - NE	6C - SE
	7A - NE	7B - N		

approx 4 pics taken.

Notes:

massive - oxeye daisy all along berm

Qualitative Ground Survey, Mitigation Sites

Date: 7.19.12 Time: 12:30pm Year: 0, 1, 2, 3, 4, 5, (6), 8, 9, 10

Site (circle): North Beach Habitat (NBH) Middle Waterway Tideflat (MWT), Puyallup River Side Channel (PRSC), Hylebos Creek Habitat (HCH)

Staff Present: D Pooler, M. Henley

Weather Conditions: sunny

River Discharge* (CFS) (PRSC & HCH only): n/a

Overall health and vigor of plants: Excellent Fair Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion			no new areas
Sedimentation			no new areas.
Wildlife		✓	seagulls
Vegetation: Invasive	✓		minimal.
Volunteer			no new noted.
Survival (%)			n/a
Bark Coverage (%) (MWT only)			minimal <1%
Animal Damage		✓	minimal goose
Disease			none noted.
Trash			minimal (high tide)
Vandalism			none noted
Large Woody Debris		✓	some recruitment
Wrack or Organic Material		✓	minimal.

* For the Hylebos Creek site, use "Riparian" column for forested wetland and "Marsh" column for emergent wetland. Include additional qualitative notes on high slope upland vegetation below

*Data from USGS Puyallup River at Puyallup Station (USGS 12101500)

Wildlife Notes (Species observed, other evidence):

seagulls, ducks, caspian terns, sm. avian species.

Insect Sampling Notes (PRSC and HCH, Year 1 and 3 only):

Date/Time Deployed	Date/Time Retrieved	Monitoring Site	Photo Numbers

Insect Sampling Observations / Observable Insect Prey (e.g., amphipods, mycids, larvae):

Any indication of fish obstruction in the channels? (HCH only)

n/a

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	some, organic in nature
Color:	brown	brown, algae
Texture:	topsoil, silty sand	silty sand.

Presence/condition of habitat mix/fine-grained material at surface - NBH (visual and probe) and PRSC (visual only):

n/a

Elevation Monitoring

not required.

Monitoring Point	1	2	3	4	5	6
Elevation Relative to Baseline (in)						
Picture Number						

Notes: At MWT, elevation monitoring point 1 was not driven flush initially, so the baseline measurement is at -0.25"

Photo Points (Circle Site) (Record Picture # and Time):

Date: 7/19/12

Year 6 pics not required.

Year: 0, 1, 2, 4, 7, 10

North Beach	1A - W	1B - NW	2A - E	2B - N
2C - W	3A - E	3B - N	3C - NW	3D - S
4A - S	4B - SW	4C - NW	5A - S	5B - W
5C - N	5D - E	6 - W		
Middle Waterway Tideflat	1A - NW	1B - SW	2A - N	2B - W
2C - S	3A - N	3B - W	4A - S	4B - W
4C - N	4D - E	<i>≅ 6 pics taken</i>		
Puyallup River Side Channel	1 - W	2A - S	2B - SW	3A - SE
3B - E	4A - NE	4B - SE	5A - N	5B - NE
6 - W				
Hylebos Creek	1A - E	1B - S	2A - SE	2B - SW
2C - W	3A - SW	3B - W	3C - NW	4A - NE
4B - N	4C - NW	5A - S	5B - W	5C - N
5D - E	6A - N	6B - NE	6C - SE	6D - S
7A - NE	7B - N			

Notes:

Qualitative Ground Survey, Mitigation Sites

Date: 7.19.12 Time: 1:48pm Year: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Site (circle): North Beach Habitat (NBH), Middle Waterway Tideflat (MWT), Puyallup River Side Channel (PRSC), Hylebos Creek Habitat (HCH)

Staff Present: D. Pooley, M. Henley

Weather Conditions: sunny

River Discharge* (CFS) (PRSC & HCH only):

Overall health and vigor of plants: Excellent Fair Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion			no significant noted
Sedimentation		∅	not measured year to
Wildlife		∅	crows, gulls,
Vegetation: Invasive			see notes.
Volunteer		∅	ash @ n. end.
Survival (%)			along berm ⊕ alder & willow ⊖ Red Osier Dogwood
Bark Coverage (%) (MWT only)			n/a
Animal Damage			none noted.
Disease			none noted.
Trash			minimal.
Vandalism	∅		minor cutting of tree branches
Large Woody Debris		yes	≈ 2 logs.
Wrack or Organic Material		yes	heavy - downstream end

* For the Hylebos Creek site, use "Riparian" column for forested wetland and "Marsh" column for emergent wetland. Include additional qualitative notes on high slope upland vegetation below

*Data from USGS Puyallup River at Puyallup Station (USGS 12101500)

Wildlife Notes (Species observed, other evidence):

Scat (coyotes), animal trails, raccoon tracks,

Insect Sampling Notes (PRSC and HCH, Year 1 and 3 only):

Date/Time Deployed	Date/Time Retrieved	Monitoring Site	Photo Numbers

Insect Sampling Observations / Observable Insect Prey (e.g., amphipods, mycids, larvae):

Any indication of fish obstruction in the channels? (HCH only)

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	none
Color:	brown	brown w/algae
Texture:	topsoil / sandy	silty sand

Presence/condition of habitat mix/fine-grained material at surface - NBH (visual and probe) and PRSC (visual only):

present,

Elevation Monitoring

Monitoring Point	1	2	3	4	5	6
Elevation Relative to Baseline (in)						
Picture Number						

Notes: At MWT, elevation monitoring point 1 was not driven flush initially, so the baseline measurement is at -0.25".

PRSC, 2012

Photo Points (Circle Site) (Record Picture # and Time):

Date: 7.19.12

Year 6 no pics required.

Year: 0, 1, 2, 4, 7, 10

North Beach	1A - W	1B - NW	2A - E	2B - N
2C - W	3A - E	3B - N	3C - NW	3D - S
4A - S	4B - SW	4C - NW	5A - S	5B - W
5C - N	5D - E	6 - W		
Middle Waterway Tideflat	1A - NW	1B - SW	2A - N	2B - W
2C - S	3A - N	3B - W	4A - S	4B - W
4C - N	4D - E			
Puyallup River Side Channel	1 - W	2A - S	2B - SW	3A - SE
3B - E	4A - NE	4B - SE	5A - N	5B - NE
6 - W	not required, approx 6 pics taken			
Hylebos Creek	1A - E	1B - S	2A - SE	2B - SW
2C - W	3A - SW	3B - W	3C - NW	4A - NE
4B - N	4C - NW	5A - S	5B - W	5C - N
5D - E	6A - N	6B - NE	6C - SE	6D - S
7A - NE	7B - N			

Notes:

inv - butterfly bush, chamomille, birdsfoot trefoil, RCG

Path is gone.

Transient camp found on upstream side of mouth opening. will be reported to TPD for removal.

Qualitative Ground Survey, Mitigation Sites

Date: 7.20.12 Time: 10:30 am

Year: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Site (circle): North Beach Habitat (NBH), Middle Waterway Tideflat (MWT), Puyallup River Side Channel (PRSC), Hylebos Creek Habitat (HCH)

Staff Present: D. Podley, M. Henley

Weather Conditions: rain

River Discharge* (CFS) (PRSC & HCH only): _____

Overall health and vigor of plants: + Excellent Fair Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion			none noted
Sedimentation			" "
Wildlife	✓	✓	see notes
Vegetation: Invasive	✓	✓	see notes
Volunteer	✓	✓	many
Survival (%)			n/a
Bark Coverage (%) (MWT only)			n/a
Animal Damage	✓		some beaver
Disease			none noted
Trash	✓		big blk bag? see notes.
Vandalism			none noted - 1 broken ald
Large Woody Debris		present	no significant accumulation
Wrack or Organic Material			" "

* For the Hylebos Creek site, use "Riparian" column for forested wetland and "Marsh" column for emergent wetland. Include additional qualitative notes on high slope upland vegetation below

*Data from USGS Puyallup River at Puyallup Station (USGS 12101500)

Wildlife Notes (Species observed, other evidence):

beaver, sm avian species, slugs, caterpillars, gnats

Insect Sampling Notes (PRSC and HCH, Year 1 and 3 only):

Date/Time Deployed	Date/Time Retrieved	Monitoring Site	Photo Numbers
			year 1

Insect Sampling Observations / Observable Insect Prey (e.g., amphipods, mycids, larvae):

year 1.

Any indication of fish obstruction in the channels? (HCH only)

no obstructions noted

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	none
Color:	brown	brown
Texture:	topsoil	silty sand

Presence/condition of habitat mix/fine-grained material at surface - NBH (visual and probe) and PRSC (visual only):

n/a

Elevation Monitoring

Monitoring Point	1	2	3	4	5	6
Elevation Relative to Baseline (in)						
Picture Number						

Notes: At MWT, elevation monitoring point 1 was not driven flush initially, so the baseline measurement is at -0.25".

Photo Points (Circle Site) (Record Picture # and Time):

Year 4

Year: 0, 1, 2, 4, 7, 10

Date: 7.20.12

North Beach	1A - W	1B - NW	2A - E	2B - N
2C - W	3A - E	3B - N	3C - NW	3D - S
4A - S	4B - SW	4C - NW	5A - S	5B - W
5C - N	5D - E	6 - W		
Middle Waterway Tideflat	1A - NW	1B - SW	2A - N	2B - W
2C - S	3A - N	3B - W	4A - S	4B - W
4C - N	4D - E			
Puyallup River Side Channel	1 - W	2A - S	2B - SW	3A - SE
3B - E	4A - NE	4B - SE	5A - N	5B - NE
6 - W				
Hylebos Creek	1A - E	1B - S	2A - SE	2B - SW
2C - W	3A - SW	3B - W	3C - NW	4A - NE
4B - N	4C - NW	5A - S	5B - W	5C - N
5D - E	6A - N	6B - NE	6C - SE	6D - S
7A - NE	7B - N	no pics taken, too wet		

Notes:

- Suspicious blk plastic bag w/ smell at end b/t creek and first side channel (most upstream channel)
- Many fallen willow and alder into marsh area. Perfect!
- Lots of growth; very thick under brush.
- Here total coverage in riparian and marsh areas; All bowl slopes have minimal coverage but conifers doing well
- Invasives: BB, poison hemlock, tansy, Reed Canary Grass, pepper tree
- Willows staked along creek doing great.
- Invasives: curled dock, new

Code
63712

Qualitative Ground Survey, Thea Foss Enhancement Sites

Date: 7.19.12 Time: 11:20 am Year: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Site (circle): Johnny's Dock (JDH), Head of Thea Foss (HTF), SR509 Esplanade (509), Log Step Habitat (LSH)

Staff Present: D. Pooley, M. Henley
Weather Conditions: sunny

Overall health and vigor of plants: Excellent Fair Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion			none noted
Sedimentation			none noted.
Wildlife			goldfish, geese
Vegetation			
Invasive			none noted
Volunteer			1 pickleweed on WSD
Survival (%)			n/a.
Animal Damage		☞	salt grass mowed by geese
Disease			none noted
Trash			none noted
Vandalism			none noted
Large Woody Debris			still present
Wrack or Organic Material			none noted.

Wildlife Notes (species observed, other evidence):

goldfinch, geese

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	none
Color:		grey
Texture:		Gravelly sand

Notes:

Photo Points (Circle Site):

Year 6 no pics required

Year: 0, 1, 2, 4, 7, 10

Johnny's Dock	1A - SW	1B - NW	2A - NW	2B - NE
	23 Pics taken			
Head of Thea Foss	1 - S	2 - N		
SR509 Esplanade	1 - S	2A - E	2B - S	3 - N
Log Step	1 - N			
Additional Photos				

Exclusion Grid Status (JDJ, HTF, LSH)

none present

Vegetation Diversity Notes:

marsh

~~RIPARIAN~~

Planted Species

few tufted hairgrass.
salt grass
gumweed.

Volunteer Species

1 pickleweed on LWD, goose tongue, native BB.

Invasive Species

none noted.

MARSH

Planted Species

Volunteer Species

Invasive Species

MISCELLANEOUS ADDITIONAL NOTES:

Qualitative Ground Survey, Thea Foss Enhancement Sites

Date: 9.19.17

Time: 10:46 am

Year: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Site (circle): Johnny's Dock (JDH), Head of Thea Foss (HTF), SR509 Esplanade (509), Log Step Habitat (LSH)

Staff Present: D. Podley M. Henley

Weather Conditions: Sunny

Overall health and vigor of plants: Excellent Fair Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion			none noted
Sedimentation			none noted
Wildlife	✓		bunny
Vegetation			
Invasive			pepperweed, wh. swt clove,
Volunteer			gumweed, orache, brass buttons
Survival (%)			n/a
Animal Damage			none noted.
Disease			none noted.
Trash			minor
Vandalism			none noted.
Large Woody Debris			present, no recruitments
Wrack or Organic Material			very minor.

Wildlife Notes (species observed, other evidence):

sm. avian species, bunny

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	none
Color:	brown	grey
Texture:	silty sand/topsoil	riprap / fish mix gravels

Notes:

Ask about corner near gloers - BB, nightshade, scot's broom, wh. sweet clover - large seed source

- Some vegetation removed during the remediation of the Amer Plating site, esp. at 509 (N) end.

Photo Points (Circle Site):

Year 4

Year: 0, 1, 2, 4, 7, 10

Johnny's Dock	1A - SW	1B - NW	2A - NW	2B - NE
Head of Thea Foss	1 - S	2 - N	2 Pics taken = not required.	
SR509 Esplanade	1 - S	2A - E		
Log Step	1 - N			
Additional Photos				

Exclusion Grid Status (JDJ, HTF, LSH)

none present, removed

Vegetation Diversity Notes:

RIPARIAN

Planted Species

Doing well.

Volunteer Species

none noted.

Invasive Species

St. John's wort, wh. sweet clover,

MARSH

Planted Species

Seems to be less salt grass & tufted hairgrass than previously
Potentilla dominating shoreline veg.

Volunteer Species

Many volunteers sunweed,
pickleweed, orach, brass buttons,

Invasive Species

pepperweed (flowering)

MISCELLANEOUS ADDITIONAL NOTES:

Qualitative Ground Survey, Thea Foss Enhancement Sites

Date: 7.19.12

Time: 9:45

Year: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Site (circle): Johnny's Dock (JDH), Head of Thea Foss (HTF), SR509 Esplanade (509), Log Step Habitat (LSH)

Staff Present: D. Pooley, M. Henley

Weather Conditions: overcast.

Overall health and vigor of plants: Excellent (Fair) Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion			none noted.
Sedimentation			none noted.
Wildlife			pigeon, seagulls.
Vegetation			
Invasive	e		tansy, poison hemlock
Volunteer			quinnweed.
Survival (%)			≈ 50%. heavy on rose & snowberry
Animal Damage			none noted.
Disease			none noted.
Trash	e	e	minor random garbage.
Vandalism	e		sprinkler & trees
Large Woody Debris			none noted.
Wrack or Organic Material			none noted.

Wildlife Notes (species observed, other evidence):

dog poop.

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	none
Color:	brown	brown green algae / kelp.
Texture:	topsoil	coarse sand / rip rap

Notes:

Photo Points (Circle Site): year 6. Year: 0, 1, 2, 4, 7, 10

	1A - SW	1B - NW	2A - NW	2B - NE
Johnny's Dock				
Head of Thea Foss	1 - S	2 - N		
SR509 Esplanade	1 - S	2A - E	2B - S	3 - N
Log Step	1 - N			
Additional Photos				

37 pics taken

Exclusion Grid Status (JDJ, HTF, LSH)

none

Vegetation Diversity Notes:

RIPARIAN

Planted Species overall good, except for area under bridge

Volunteer Species mostly weedy, cottonwood, queen anne's lace

Invasive Species plantain, tansy, poison hemlock, eye daisy.

MARSH

Planted Species none

Volunteer Species sunweed increasing.

Invasive Species none noted.

MISCELLANEOUS ADDITIONAL NOTES:

Qualitative Ground Survey, Thea Foss Enhancement Sites

Date: 7.19.12

Time: 9:21 am

Year: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Site (circle): Johnny's Dock (JDH), Head of Thea Foss (HTF), SR509 Esplanade (509) Log Step Habitat (LSH)

Staff Present: D. Poolcy, M. Henley

Weather Conditions: overcast

Overall health and vigor of plants: Excellent Fair Poor

Qualitative Observations:

	Riparian Area	Marsh Area	Comments
Erosion		" possible minor amt from area covering outfall	
Sedimentation		none noted.	
Wildlife			none noted.
Vegetation			
Invasive			present outside of priy area
Volunteer		pickleweed. & 1 gumweed, & 1 orache	
Survival (%)		no tufted hairgrass present	
Animal Damage			none noted
Disease			" "
Trash			" "
Vandalism			" "
Large Woody Debris			present.
Wrack or Organic Material			none noted.

Wildlife Notes (species observed, other evidence):

pigeon off-site, sea gull off-site

Soil/Sediment Quality:	upland	aquatic areas
Odor:	none	none
Sheen:	none	none
Color:	gray riprap	green-brown algae
Texture:	large coarse sand	coarse sand to cobble

Notes: Colonial Fruit Building demo'd

Photo Points (Circle Site):

Year(s)

Year: 0, 1, 2, 4, 7, 10

	1A - SW	1B - NW	2A - NW	2B - NE
Johnny's Dock				
Head of Thea Foss	1 - S	2 - N		
SR509 Esplanade	1 - S	2A - E	2B - S	3 - N
Log Step	1 - N	TOOK 2 PICS, although not required.		
Additional Photos				

Exclusion Grid Status (JDJ, HTF, LSH)

none there.

Vegetation Diversity Notes:

RIPARIAN

Planted Species only dune grass.

Volunteer Species ~~grass~~ none noted.

Invasive Species all outside of proj. area -

cherry tree, St John's wort

MARSH

Planted Species none

Volunteer Species gumweed, orache, pickleweed.

Invasive Species none noted.

MISCELLANEOUS ADDITIONAL NOTES:

Hylebos Creek

Job File: Hylcrkch4

Control File Hy KPort MID

Horizontal Datum NAD 83-91

Vertical Datum NGLD89

See Pg 1 FB 3711 for control information

π@ 729 BS 726 FS 852 - 861 724 L

π@ 734 BS 729 FS ~~862~~ 862 → 872

8/11/11 Job File Hylcrkch5

π@ 734 BS 729 FS 873 → 876

π@ 729 BS 726 FS 877 → 900

Job File Hylcrkch5

π@ 729 BS 734 → 903

π@ 734 BS 729 904 → 923, 924 → 936, 937 → 951
729

807 BS 734 FS 952, 95

Loc. #
McMillen
Haydon

9

FB 3711

8/11/11

	Sediment #	Pipe	From top of pipe
E1 = S9	852		0.80
E2	859		1.15
E3	862		0.92
E4 = N9	863		1.20
E5	870		0.95
E6	872		1.05

8/20/12

E1 = S9 0.90

E2 0.95

E3 0.90

E4 = N9 1.10

E5 0.85

E6 = N2 1.00

Hylebos Creek Forest Vlettlands

Point #	HCWV #	HCWV #	Elev
924		2	8.36
925		3	7.71
926		7	7.58
927		9	7.37
928		11	6.66
929		13	6.34
930		15	6.41
931		16	6.73
932		17	6.46
933		18	7.70
934		25	6.55
935		30	7.51
936		31	6.86
937		32	7.35
938		34	6.00
939		35	7.08
940		36	6.96
941		37	7.17
942		45	6.97
943		48	7.42
944		53	8.41
945		57	7.61
946		63	11.92

FB 3717

8/20/12

Lovett
Greenawald
Hudson.

55

Point #	HCWV #	Elev
947	Transect End	6.42
948	84	7.11
949	Transect End	6.12
950	73	6.28
951	Transect End	6.47
952	Transect End	6.86
See Pg 10		

Hylebos Creek Channel

Point#	Channel #	Elev
914	N-1	1.40
913	N-2	1.56
915	N-3	1.74
916	N-4	1.72
917	N-5	1.92
918	N-6	1.81
920	N-7	1.80
921	N-8	1.87
922	N-9	2.36
912	S-1	-0.07
903	S-2	1.50
905	S-3	1.53
906	S-4	1.46
907	S-5	1.29
908	S-6	0.84
909	S-7	1.21
910	S-8	1.07
911	S-9	1.42

3711 8/20/12

Low-tt
Greenwallt
Hudson

56

Appendix F
Health and Safety Plan

Appendix F – Health and Safety Plan

For consistency in reporting, the structure of the OMMP Report and subsequent annual reports will follow the outline of the OMMP. This will provide consistent presentation and placement of information generated during the monitoring of remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. No modifications to the Health and Safety Plan were made during this reporting period.

Appendix G
Additional Project Related Activities

Appendix G – Additional Project Related Activities

For consistency in reporting, the structure of the OMMP Report and subsequent annual reports will follow the outline of the OMMP. This will provide consistent presentation and placement of information generated during the monitoring of remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. No additional project related information is available that requires reporting during this reporting period.