

# CONSENT DECREE APPENDIX G

## (For the Harborton Restoration Project)

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# CONSENT DECREE APPENDIX G1

## (Harborton Habitat Development Plan, including appendices to the Habitat Development Plan)

*Note: This Habitat Development Plan, including Appendices to the Habitat Development Plan, has been adapted for inclusion in the Consent Decree. The original document was submitted to, and approved by, the Trustees under the Memorandum of Agreement (“MOA”) framework described in the prefatory paragraphs of the Consent Decree. However, as stated in the prefatory paragraphs of the Consent Decree, the MOA framework is not enforceable and is not operative under the Consent Decree.*

*This Habitat Development Plan, as adapted to the Consent Decree, is enforceable under the terms of the Consent Decree. Portions of this Habitat Development Plan contain historical information, statements of past and present environmental conditions and uses, and statements regarding the views of various governmental entities. By incorporating this Habitat Development Plan, as adapted, into the Consent Decree, the Plaintiffs do not warrant the accuracy of all of the information, statements, and views authored originally by Restoration Credit Seller and expressed herein. However, the commitments contained in this Habitat Development Plan with respect to the development of the Harborton Restoration Project are accepted by Plaintiffs and Portland General Electric.*

*Significant effort has been made to ensure consistency between the obligations in this Habitat Development Plan and the provisions in the main body of the Consent Decree. As stated in Paragraph 3.b of the Consent Decree, in the event of conflict between the main body of the Consent Decree and this Appendix, the provisions in the main body of the Consent Decree shall control.*



# Portland General Electric Harborton Habitat Development Plan

**SUBMITTED BY**  
Portland General Electric



**May 2021**  
**Adapted on September 28, 2022 for inclusion in the Consent Decree**

# Portland General Electric Harborton Habitat Development Plan



**SUBMITTED BY**

Portland General Electric  
121 SW Salmon Street  
Portland, OR 97204

**May 2021**

**Adapted on September 28, 2022 for inclusion in the Consent  
Decree**

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Appendix I Intentionally Omitted

Appendix J Intentionally Omitted

Appendix K Intentionally Omitted

Appendix L Intentionally Omitted

Appendix M Intentionally Omitted

Appendix N Intentionally Omitted

Appendix O Intentionally Omitted

Appendix P Stewardship Funding Agreement

Appendix Q Trustee Monitoring and Stewardship Oversight Budget

Appendix R Intentionally Omitted

Appendix S Intentionally Omitted

## List of Acronyms and Abbreviations

<b>BMP</b>	Best Management Practices
<b>BNSF</b>	Burlington Northern – Santa Fe
<b>BP</b>	British Petroleum
<b>BPA</b>	Bonneville Power Administration
<b>City or COP</b>	City of Portland
<b>CPD</b>	City of Portland Datum (add 2.125 feet to convert to NAVD 88)
<b>DEQ</b>	Oregon Department of Environmental Quality
<b>DSAY</b>	Discounted Service Acre Years
<b>DSL</b>	Oregon Department of State Lands
<b>DU</b>	Decision Unit
<b>ESA</b>	Endangered Species Act
<b>ESCP</b>	Erosion and Sediment Control Plan
<b>FEMA</b>	Federal Emergency Management Agency
<b>FSCV</b>	Forecast Settlement Credit Value
<b>FSCV2</b>	Forecast Settlement Credit Value 2
<b>HEA</b>	Habitat Equivalency Analysis
<b>HUC</b>	Hydrologic Unit Code
<b>LWM</b>	Large Woody Material
<b>NAVD 88</b>	North American Vertical Datum of 1988 (subtract 2.125 feet to convert to CPD)
<b>NOAA Fisheries</b>	National Marine Fisheries Service
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>NRDA</b>	Natural Resource Damage Assessment
<b>NWPCC</b>	Northwest Power and Conservation Council
<b>ODFW</b>	Oregon Department of Fish and Wildlife
<b>ODOT</b>	Oregon Department of Transportation
<b>OHWE</b>	Ordinary High-Water Elevation (regulatory elevation of 18.0 feet CPD along the Willamette at the Project, per USACE)
<b>OLWE</b>	Ordinary Low Water Elevation
<b>PGE</b>	Portland General Electric
<b>PNWR</b>	Portland and Western Railroad
<b>Project</b>	PGE’s Harborton Restoration Project, described in this document
<b>Property</b>	PGE Harborton Substation Property
<b>RM</b>	River Mile
<b>Site</b>	Portion of Property on which Project is being developed
<b>Trustee Council</b>	Portland Harbor Natural Resource Trustee Council
<b>USACE</b>	U.S. Army Corps of Engineers
<b>USFWS</b>	U.S. Fish and Wildlife Service



## 1. Introduction and Project Background

This report presents Portland General Electric's (PGE) plan to restore tributary and off-channel habitats at its 73.8-acre Harborton Substation property (Property) (Figure 1). The Harborton Property is identified as a high-value restoration opportunity in the City of Portland's (City or COP) 2009 River Plan North Reach Recommended Draft (COP 2009) and by the Portland Harbor Natural Resource Trustee Council (Trustee Council), as part of the Trustee Council's Ecological Restoration Portfolio (Trustee Council 2012).

The portion of the Property not included in the habitat development project includes a 20.4-acre industrial facility comprised of an electrical substation, switch yard, service roads, two transmission towers supporting overhead power lines, and undeveloped open areas. The remaining 53.4 acres of the Property ("Site"), which comprises the footprint of the habitat development project ("Project"), includes Sub Area 4, which is a mix of shoreline, remnant native riparian, and backwater floodplain habitats; Sub Area 3 – a diked area that has been filled with dredge spoils, and Sub Areas 1 and 2, which are a mix of shoreline and riparian habitat. Sub Area 1 includes a short length of seasonal channel (Figure 2). Two intermittent tributaries occur along the northern and southern boundaries of the Property, hereafter referred to as the "existing north drainage" and "South Channel." Both tributaries present barriers to fish passage, due in part to the low flow regimes of the Willamette River and Multnomah Channel and to a collapsed culvert at the Project boundary in Sub Area 1 (South Channel; Figure 3). A total of 17.7 acres of wetlands have been delineated on the Property (URS 2010). Wetlands associated with the existing north drainage have been identified by the Oregon Department of Fish and Wildlife (ODFW) and U.S. Fish and Wildlife Service (USFWS) as high-value northern red-legged frog (*Rana aurora aurora*) habitat (Trustee Council 2015).

The restoration goals of the Project are to restore, enhance, and preserve approximately 53.4 acres of land at the Harborton Property to serve as a Natural Resource Damage restoration site (Figure 2. Harborton Site Map). The activities proposed to achieve the Project's restoration goals are detailed in subsequent sections of this document and are summarized as follows:

- Excavation and re-grading to provide seasonally available off-channel habitat associated with the new North Channel, and additional upland and wetland riparian habitat buffer areas within the floodplain for out-migrating juvenile Chinook salmon (*Oncorhynchus tshawytscha*).
- Earthwork and/or habitat management of existing upland, primarily to control invasive plant species and re-establish native vegetation, reclaim excavated material and to convert part of the existing substation to upland habitat.
- Construction of a new North Channel through Sub Area 3 to provide fish passage opportunities between Sub Areas 3, 4, and the Willamette River.
- Enhancement of aquatic, riparian, and upland habitat characteristics in and proximate to the new North Channel through installation of habitat enhancement features/elements, invasive species management, and re-vegetation with native emergent, herbaceous, shrub, and tree species.
- Preservation of existing wetland in areas utilized by northern red-legged frogs (*Rana aurora aurora*) and other wildlife.
- Creation of new wetland in upland areas adjacent to known northern red-legged frog habitat through excavation and removal of imported fill in Sub Area 3, installation of aquatic and riparian habitat enhancement features/elements, management of invasive plant species, and re-vegetation with native emergent, herbaceous, shrub, and tree species.

- Enhancement of shoreline, riparian, and upland habitats in all four Sub Areas through invasive species management, re-vegetation with native plantings, and routine maintenance.

### 1.1 PROJECT LOCATION

The Property is in the lower Willamette River 5th field Hydrologic Unit Code (HUC) number 17090012, where Multnomah Channel diverges from the mainstem Willamette River at approximately river mile (RM) 3.1 (Figure 1). The Property is located within the Willamette River's historic floodplain and tidally influenced lower reach. The Site encompasses 53.4 acres of the west bank of the Willamette River and the southwestern bank of Multnomah Channel.

The Property is located at 12500 NW Marina Way, Portland, Oregon, just inside the Portland city limits. The Property is bounded to the northeast and northwest by the Willamette River and Multnomah Channel, respectively. Undeveloped land is located to the northwest, which is owned by Fred's Marina and is proposed as the Miller Creek Natural Resource Damage Assessment (NRDA) restoration project by Wildlands, Inc.

NW Marina Way borders the Property to the southwest, and beyond it is a rail line immediately adjacent to the road. A thin vegetated buffer separates the rail line from Oregon Highway 30. The southeastern Property boundary abuts a utility corridor for high voltage transmission line owned by the Bonneville Power Administration (BPA). South of this transmission corridor is a parcel owned by PGE for service access to the PGE transmission line that runs parallel to the BPA line. Further south is the Morse Bros., Inc. sand and gravel operation.

### 1.2 CURRENT AND HISTORICAL LAND USE

The Property consists of two parcels (tax lots 2N1W34-100 and 2N1W34-300) that PGE purchased between 1939 and 1975. Restoration activities are proposed on both of the current tax lots (Figure 3) PGE is petitioning the County to redraw the Property lines so that the habitat Project would occur entirely within its own parcel.

Currently, the Harborton Substation is a power transfer and distribution facility used to provide continuous electricity to substations and customers and to protect the public and equipment from electrical and mechanical faults. The developed part of the Property is fenced and includes the Harborton substation, which is currently under reconfiguration. The former switchyard, former aboveground storage tank area, rail spur, and former pump station have recently been demolished. Boundaries of the substation perimeter are shown in Figure 3. The developed portion of the Property is outside the restoration footprint of the Project and will not be subject to habitat creation, maintenance, and monitoring. PGE anticipates the developed portion of the Property to be subject to periodic maintenance, which is likely to entail quarterly, short duration (1-2 hour) visits by one or two PGE employees. Visits most likely will be entirely within the driveway and fenced substation yard. It is unlikely that periodic maintenance will have any noticeable effect on or impact to the adjacent Project.

As late as 1936, the Property was made up of natural bottomland habitat bordered by the Willamette River and Multnomah Channel (Photograph 1). A large, periodically inundated side channel of Multnomah Channel flowed through the Property during high water conditions.



***Photograph 1. 1936 aerial photo. Image depicts extensive inundation and formation of side channel during high water conditions. Predates construction of BPA transmission towers, Olympic Pipeline, and Fred's Marina.***



***Photograph 2. 1955 aerial photo. Image predates construction of Olympic Pipeline. Fred's Marina and BPA transmission towers completed. Photo depicts site conditions during low water. Note wetland in center of open area.***



***Photograph 3. 1970 aerial photo. Image predates construction of substation. BPA transmission towers, Olympic Pipeline easement, and dike separating Fred's Marina property are evident.***



***Photograph 4. 1980 aerial photo. Image depicts completed substation with generation and fuel storage facilities. Note formation of wetlands in undeveloped portion of the Property.***

Fred's Marina boat basin and the BPA transmission towers were completed sometime before 1955 (Photograph 2). Sometime prior to 1970, an elevated berm or access road was constructed along the eastern Property boundary (Photograph 3). Photograph 3 also shows the Olympic Pipeline easement, which crosses through Sub Area 4, running generally parallel to the western Property boundary, from NW Marina Way to Multnomah Channel. The pipeline delivers liquid fuels (e.g., diesel, gas, jet fuel) from Puget Sound to storage and distribution facilities in the Portland Harbor. The pipeline is buried within a 30-foot-wide easement across the Harborton Property and a 100-foot easement at the Multnomah Channel shoreline. The easement language describes the pipeline as being installed 4 feet below the ground surface elevation, though depth-of-cover surveys conducted in 2012 indicated that the pipeline varies in depth between 5 and 7 feet below ground surface elevation through the low-elevation interior of the wetlands.

Most development has occurred on tax lot 2N1W34-300, which was purchased in 1968. Between 1968 and 1971, a network of dikes was constructed and fill/dredge material was placed on portions of the parcel. Approximately 55% (40 acres) of the 73.8-acre Property received fill material, and about 32% (24 acres) of the Property was fully filled equal to or above the 100-year flood elevation and developed. The 100-year flood elevation for the Property is reported as 28.8 feet elevation City of Portland Datum (CPD) by the Federal Emergency Management Agency (FEMA) special flood hazard areas maps and studies (FEMA 2010a & 2010b). PGE developed a portion of tax lot 2N1W34-300 in the early 1970s to provide electrical distribution as well as additional power-generating capacity during emergencies or high use periods. By 1973, the Harborton substation was completed and operational (Photograph 4). Most of the power-generating infrastructure on the Property has since been dismantled and is no longer located on the Property. In 1986, PGE allowed the Oregon Department of Transportation (ODOT) to place additional dredge material within the diked portions of tax lot 2N1W34-300.

The Site falls within two zoning designations. Tax lot 2N1W34-100, the undeveloped parcel, is zoned for "open space," with "river natural" and "river water quality" overlay zones. Tax lot 2N1W34-300, which includes the developed electrical substation, is zoned for "heavy industrial," with "river general" and "river water quality" overlay zones. The intended use of the Property for resource enhancement was approved under the City's Type II review procedure.

### 1.3 SITE SUITABILITY

In 2008, the Trustee Council developed criteria for identifying and evaluating potential ecological restoration sites. These criteria address habitat features and attributes for several potentially injured species, including salmon, lamprey, sturgeon, bald eagles, osprey, spotted sandpipers, and mink. These criteria were used to evaluate a site's ability to provide habitat "lift," in terms of benefits to these species, by comparing existing conditions at the site to potential restored conditions.

As part of the NRDA Restoration Program, the Trustee Council used the criteria developed in 2008 to identify restoration sites within the Lower Willamette River Subbasin. The Trustee Council reviewed restoration opportunities identified in the City's *River Plan* (COP 2009) and draft *Ecosystem Restoration General Investigation Study* (COP 2005), as well as soliciting recommendations from the public and community organizations. The Trustee Council screened these opportunities using the ecological restoration criteria developed in 2008. As a result of this effort, potential restoration opportunities and 44 restoration sites were identified in the 2012 *Ecological Restoration Portfolio* (Trustee Council 2012).

Both the COP's *River Plan* and the Trustee Council's *Ecological Restoration Portfolio* have identified PGE's Harborton Site as a high value restoration opportunity. The City identifies the Site as having

“high value resources” and includes “special habitat areas” (COP 2009). Wetlands at the Site have been identified by ODFW as high value northern red-legged frog habitat and likely the largest remaining population of the species within city limits (Trustee Council 2015). The Trustee Council enumerates the potential benefits offered by the Harborton Site, as follows:

*Off-channel and tributary waters are some of the most productive rearing sites for salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Natural beaches and shallow wetlands also serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Native vegetation will provide food and cover for a variety of species while reducing erosion and enhancing water quality. The structural diversity, snags, and large wood that may be enhanced in the forested portion of the site provide valuable habitat complexity for terrestrial species. Revegetation would provide large trees for perching and nesting opportunities for bald eagle, osprey and other birds. (Trustee Council 2012).*

## 2. Project Goals

The purpose of the PGE Harborton Restoration Project is to restore and improve seasonally available off-channel aquatic and riparian habitat for fish and wildlife, and to protect existing habitat for red-legged frogs and other wildlife that already use the Site. Specifically, in association with the Portland Harbor NRDA process, the proposed restoration is intended to restore and enhance habitat for species that were potentially injured by releases of hazardous substances to the Portland Harbor Assessment Area, including salmon, lamprey, bald eagle, mink, and others.

All juvenile salmonids in the Willamette River system must pass through the Portland Harbor during outmigration. Historically, juvenile salmonids used the lower Willamette River for substantial feeding and growth prior to moving into the Columbia River, its estuary, and the sea (Trustee Council 2010). Physical and chemical degradation of this river reach has compromised its ability to support juvenile salmonids. Juvenile salmonids are believed to now pass rapidly through the Harbor for lack of suitable off-channel habitat (Trustee Council 2010). Consequently, Willamette River smolts entering the Columbia River estuary and the Pacific Ocean are believed to be less fit compared to their pre-development, antecedent runs.

Loss of associated off-channel habitat such as large off-channel lakes, alcoves, and lagoons, and the loss of access to the historic floodplain have further diminished the capacity of this river reach for nurturing endemic salmonids and other native fish populations (Trustee Council 2010). Salmon habitat modeling for the *Willamette River Subbasin Plan*, conducted by the Northwest Power and Conservation Council (NWPCC), identifies the lack of off-channel habitat in the lower Willamette River as a limiting factor for salmonid recovery (NWPCC 2004), including recovery of salmonids listed under the Endangered Species Act (ESA). The Subbasin Plan identifies Portland Harbor off-channel habitat as the second highest restoration priority to achieve the goals of salmonid recovery, including recovery of ESA-listed stocks. These factors suggest that restoring habitat historically used by juvenile salmonids could help recover species protected under the ESA and improve conditions for all aquatic species found in this reach.

As a result of past and continued impacts to the Willamette River in the Portland Harbor, this Project addresses the lack of available off-channel, fish-accessible aquatic habitat within the Portland Harbor, thereby directly addressing one of the primary limiting factors for fish recovery in the area. Additionally, the Site serves as breeding and rearing habitat for northern red-legged frogs, which will likely benefit from overall habitat restoration. Elements of the restoration Project are tailored to provide habitat benefits to other species as well, such as habitat complexity structures designed for mink and snags designed to create perching opportunities for eagle, osprey, and other birds.

This Project is being developed for the purpose of selling the Discounted Service Acre Years (DSAYs) generated by this Project to other parties in the Portland Harbor. Restoration at the Property will also contribute to a cluster of existing and proposed restoration sites within close proximity. Alder Creek (completed in 2015) and Miller Creek (potential construction under consideration) are across Multnomah Channel and immediately adjacent to the Site, respectively. Completion of all three projects would provide approximately 160 acres of restored habitat in a critical location for both aquatic and terrestrial species. Construction of these three sites would create a connectivity corridor between Forest Park, the Willamette River, and Sauvie Island.

Multiple construction alternatives were considered during the design. Key issues have included development of off-channel fish habitat, preservation of northern red-legged frog habitat, the integrity of buried utilities onsite, and wetlands. The final design provides less off-channel fish habitat than the originally conceived design, but avoids potential impacts to buried utilities, reduces the loss of

northern red-legged frog habitat, and maximizes effective post-project wetland acreage within other Site constraints.

## 2.1 APPROPRIATENESS OF RESTORATION DESIGN

PGE began work on the Harborton restoration design in early 2012. Initial work built upon the restoration concepts presented in the Trustee Council's Ecological Restoration Portfolio. The focus of the preliminary restoration was on creating off-channel habitat for juvenile salmonids by connecting the interior wetlands to the Willamette River. In July 2012, PGE submitted its conceptual Harborton Restoration Proposal (URS 2012) to the Trustee Council. This proposal presented a preliminary restoration concept and habitat equivalency analysis (HEA) for the Site (initial build alternative). Following preliminary technical assistance from the Trustee Council, PGE initiated engineering and investigation activities to advance the restoration design. Over 15 major design concepts have been evaluated to address development constraints on the Property. Consequently, the proposed Project has evolved in an iterative fashion, based on engineering, ecological, and planning considerations. The following sections highlight the major design modifications that have occurred as a result of Site constraints, but which have resulted in a Project that reduces risk to extant infrastructure, maximizes restoration opportunity on-site, and is more ecologically balanced for species which utilize similar habitats.

## 2.2 CONSTRAINTS

### Existing Buried Utilities

#### 2.2.1

In the spring of 2013, discussions were held with British Petroleum (BP), which operates and manages the Olympic Pipeline, a 14-inch-diameter, high-pressure fuel pipeline that crosses the Property. Since the preliminary restoration concept proposed excavation and placement of fill within the pipeline easement, BP raised concerns that these activities could adversely affect the integrity of the pipeline. To address BP's concerns, URS (now AECOM) completed a geotechnical investigation of the Site in the fall of 2013, with an emphasis on assessing the physical properties of soil within and adjacent to the pipeline easement (URS 2013).

The findings of the geotechnical investigation indicate that soils adjacent to and underlying the pipeline consist primarily of fine-grained alluvial sediment with an organic component. Such soils are characterized by a high degree of compressibility. Additionally, the wetlands that have formed over the pipeline easement have resulted in highly saturated soil conditions, creating buoyancy characteristics that provide support to the pipeline. The consequence of these two findings is that 1) placement of fill on such soils creates a risk of compression and settling, possibly resulting in deformation and damage to the Olympic Pipeline, and 2) dewatering of soils associated with excavation near the pipeline could result in additional soil compression, similarly resulting in possible pipeline deformation and damage (URS 2013). To address these potential risks to the pipeline, PGE revised its restoration concept to avoid potential impacts to the pipeline while still achieving the restoration goals originally identified in the 2012 restoration concept.

In February 2014, PGE submitted a revised restoration proposal to the Trustee Council (2014 Design; URS 2014a). The 2014 Design incorporated a new alignment for the North Channel that largely avoided alteration of existing wetlands overlaying the Olympic Pipeline, thereby precluding the need to place fill within the pipeline easement. The 2014 Design proposed minor excavation within the wetlands overlaying the pipeline (including in the pipeline easement) in the form of drainage swales to collect surface water and convey it to a new tributary outlet channel, which would



discharge to the Willamette River. The design for Sub Areas 3 and 4 includes the following modifications:

- No excavation or material placement within the pipeline easement.
- Expansion of the existing frog pond wetland complex into Sub Area 3.
- An increase in the new North Channel confluence elevation with the Willamette to 8 feet CPD to match the naturally forming beach elevation along the Willamette.
- An expansion of the channel margin wetland benches along the new North Channel.

Additionally, the 2014 design eliminated the re-alignment of the South Channel's course, which was part of the 2012 concept. Since then, final Project design has eliminated any work on the South Channel out of consideration for potential maintenance of existing overhead electrical transmission lines and supporting infrastructure. Now, PGE will not conduct any restoration actions around the South Channel and restoration actions in this area are limited to treatment of invasive species and establishment of native vegetation (see Figure 2).

### Substation Redevelopment and Expansion

In summer 2014, PGE's Substation Engineering group and Transmission and Distribution groups began planning the redevelopment of the Harborton Substation to address increased service needs in the region. This resulted in further refinement of the restoration design during the remainder of 2014 to coordinate on the future layout needs of the substation and development of an optimal substation configuration to serve both proposed uses of the Property. The final coordination effort between PGE and the Trustee Council acknowledged and identified those areas needed to sustain substation and power transmission functions, resulting in a final, contiguous habitat restoration area totaling 53.39 acres.

#### 2.2.3

### Northern Red-Legged Frog Breeding Habitat Protection and Enhancement

In the spring of 2014, ODFW raised concerns about potential Project effects to Site wetlands found in the northwestern corner of the Property. At issue was the use of these wetlands by northern red-legged frogs for part of their breeding cycle. As a result of development along the floodplains of the Willamette River and Multnomah Channel, breeding habitat for the northern red-legged frog has become increasingly fragmented and rare. Therefore, preserving functional breeding habitat for this species is a high priority. ODFW has since determined that the Harborton wetlands constitute the largest northern red-legged frog breeding site within the Portland city limits (Trustee Council 2015).

To address concerns, PGE held several meetings with ODFW, the USFWS, the National Marine Fisheries Service (NOAA Fisheries), and a local conservation group that aids the frogs in reaching the Harborton wetlands during their winter migration from Forest Park. The result of these meetings was further revision to the Project to protect the wetland hydrology and habitat found in the northwestern corner of the Site. The resulting increased protection of the northern red-legged frog's habitat would increase the risk of stranding juvenile salmonids in the wetlands as the river stage decreases following flooding. Discussions with NOAA Fisheries and ODFW were held and the final modifications were developed to retain suitable surface water levels in the wetlands to protect frog breeding habitat and minimize fish stranding. Additionally, PGE has incorporated wetland enhancement features to specifically provide habitat areas that will retain inundated conditions into the summer, which is necessary for successful amphibian metamorphosis.

In the winter of 2015, the Trustee Council identified further conservation measures to protect the population of northern red-legged frogs at Harborton. From 2015 to 2018, additional discussions

were held with the Trustee Council, in consultation with ODFW, USFWS, and stakeholders, to alter the design and subsequent Site management to protect habitat breeding areas. PGE discussed the recommended conservation measures with the Trustee Council and has worked to include the recommendations in the final design.

The iterative nature of Project development has resulted in a more optimized restoration design. Due to the close interaction with the Trustee Council and resource agencies, each design update has resulted in less of a focus on a single species (i.e., juvenile salmonids) in favor of a more integrated restoration design that will benefit multiple species. While this approach results in trade-offs in restoration benefits between species that may use the same habitat, it ensures a level of protection for all habitats on-site while keeping the initial design goal of restoration of seasonally available off-channel habitat. This is in keeping with the approach selected as the preferred alternative for restoration design documented in the Final Portland Harbor Programmatic EIS and Restoration Plan (NOAA 2017) and reflective of the restoration concepts presented in the Ecological Restoration Portfolio (Trustee Council 2012). As a consequence of the multi-year design coordination with the Trustee Council and other resource agencies, the proposed restoration activities are consistent with the habitat and species protection goals of the state and federal agencies involved with approving and permitting the Project. Consequently, the proposed restoration activities are considered appropriate for an NRDA restoration project and, more generally, appropriate for the ecological conditions present at the Site.

#### Existing Easements

<sup>224</sup>The Property is and will continue to be encumbered with a pre-existing underground pipeline easement granted to Olympic Pipe Line Company, dated June 10, 1965 (“Pipeline Easement”) as well as an associated in service pipeline (the “Pipeline”); and adjacent communication conduit easement granted to Pacific Fiber Link, L.L.C., dated September 28, 1998 (“Conduit Easement”) and an associated in service communication conduit (the “Conduit”). These existing easements are depicted and described collectively as “Olympic Pipeline Easement (Existing)” in Figure 2. The physical footprints of the Property encumbered by the existing easements shall not be valued for full NRD habitat credit. PGE shall address any impacts to restoration and habitat values created by the Harborton Project by activities in the existing easement areas by restoring those areas to equal or better condition (see Section 5 of Appendix H, PGE Harborton Restoration Project: Monitoring and Adaptive Management Plan).

### 3. Existing Site Ecological Conditions

This section describes the existing ecological conditions found on the Site. Information supporting this section is drawn from assessments of the Site's habitat types and restoration potential prepared by the City, the Trustee Council, and other government entities. Information was also obtained through primary research conducted at the Site by PGE and its consultants, including collection of Baseline Monitoring data in accordance with the Harborton Baseline Monitoring and Maintenance Plan submitted to the Trustee Council (URS 2014b). In 2010, wetland delineation was conducted for the entire Property (URS 2010). Concurrence with the delineation was received from the Oregon Department of State Lands (DSL) on October 25, 2010 (DSL 2010a). Although the concurrence has recently expired, no land use changes have occurred onsite and, as a result, the wetland boundaries described in the 2010 wetland delineation report are unlikely to have changed. Regardless, wetland delineation verification has been completed.

The Harborton Site is documented within the City's River Plan North Reach, *Recommended Draft 2009, Volume 3A: Natural Resources Inventory: Riparian Corridors and Wildlife Habitat* (COP 2009). The Site is described within Inventory Site WR3 as "Harborton Wetlands" which includes the study area, surrounding properties, and river area. The report describes the Site as the largest remnant of black cottonwood-ash bottomland forest within the North Reach of the river in the City. It also identifies the Site as providing important habitat connectivity for several species and notes it as the highest quality wildlife area in the North Reach due to the complexity of riparian/wetland habitat types (COP 2009). Relative to other sites evaluated by the report, Inventory Site WR3 was assigned a high relative rank for river, wetland, and forests/shrub habitats. The City's wildlife habitat model assigned a medium relative rank to the forested wetland areas. The forested wetlands are designated Special Habitat Areas by the City (COP 2009).

Historical alterations across the Property have resulted in distinct Sub Areas that differ from one another in terms of their respective degree of alteration/disturbance and remaining habitat. The Sub Areas were delineated by ecological characteristics and/or development features, which guided development of specific restoration actions within each Sub Area. The Sub Areas are identified on Figure 2. A discussion of each Sub Area follows. Representative photos of Sub Area features can be found in Appendix A.

#### 3.1 SUB AREA 1

Sub Area 1 consists of 1.6 acres of shoreline riparian habitat. A minor feature of Sub Area 1 is a short length of small stream (the South Channel) that originates in the Portland West Hills and flows from southwest to northeast across the adjacent PGE Property through a collapse culvert to its confluence with the Willamette River. The intermittent stream has observable discharge between 5 and 8 months of the year. The culvert on the adjacent PGE Property is a complete barrier to fish passage. Consequently, fish accessing the short length of channel in Sub Area 1 currently have no means of continuing upstream beyond the Property.

Stream flow in the South Channel is impeded by a collapsed culvert located upstream just beyond the Property boundary. This collapsed culvert blocks fish passage; both the culvert's inlet and outlet are submerged and likely partially collapsed. Downstream of this culvert, the South Channel flows a variable distance (from 0 to 125 feet depending on river stage) to the Willamette River in a shallow channel through mature, mixed riparian vegetation. Stream gradient in this portion of the South Channel is dependent on river stage, ranging from no gradient during near-bankfull conditions (approximately 16 feet elevation CPD or greater) to approximately 8% gradient when river stage is at

the ordinary low water elevation (OLWE), identified at 5.8 feet elevation CPD (United States Geological Survey 2011).

### 3.2 SUB AREA 2

Sub Area 2 is approximately 10.7 acres in total and includes 3.7 acres of river frontage. This area is largely composed of a berm, constructed of fill material, which stretches approximately 900 linear feet and extends from approximately 16 feet elevation to 24 feet elevation CPD. The berm separates the developed portion of the Property (substation, switchyard, and pole yard) from the river and extends into Sub Area 3 where it serves as the riverward containment dike for the Sub Area. The berm supports a mix of native and non-native trees (~30%-50% cover) and understory dominated by invasive species (~70% cover). Below the berm, a low elevation river terrace exists that appears to be remnant native floodplain, vegetated primarily with invasive grasses (>80% cover). The terrace is an accumulation zone for large woody material (LWM), which serves to enhance the ecological conditions of the terrace for juvenile salmonids. The riverward edge of the terrace is an abrupt vertical face varying up to 3.5 feet in height. The vertical face is likely the result of wave and wake erosion caused by vessel traffic on the Willamette River. Below the vertical face, the nearshore habitat is an unvegetated sandy beach.

### 3.3 SUB AREA 3

The majority of the 17.5-acre Sub Area 3 was diked and partially filled with dredge spoils prior to 1986. Since then, the area has reverted to riparian shrub, scrub-shrub wetland, and herbaceous wetland habitat. Canopy cover is largely native species, but is patchy, consisting of isolated clumps (<15% cover). Understory vegetation is dominated by invasive grasses and shrubs (> 80% cover). Sub Area 3 is generally flat to gently sloping, but the microtopography within the Sub Area is complex due to the random placement of fill material. Interior elevations range from 20 to 24 feet CPD. Three wetlands were delineated in this area (URS 2010), though wetland expression is more accurately described as a mosaic of wetland and non-wetland conditions. Precipitation, surface and groundwater discharge from the developed portions of the substation appear to be the principal hydrologic inputs to this area.

The dike fronting the Willamette River forms the northeast boundary of the Sub Area and was constructed, in part, to contain dredge fill placed within the Sub Area. The dike eliminated any surface water connection from Sub Area 3 to the river, though groundwater seeps have been observed at the base of the dike, below the riverward face.

Along the northwest edge of Sub Area 3, the dike turns away from the river and extends inland, forming the boundary between Sub Areas 3 and 4. The dike, an elevated railroad berm/access road along the southwest boundary, and the fill slope of the substation function to contain the dredge spoils that were placed in Sub Area 3. The combined Olympic Pipeline/fiber optic cable easement is located along the southwest border of the Property and parallel to NW Marina Way, outside of the proposed restoration work area (Figure 2).

### 3.4 SUB AREA 4

Sub Area 4 contains the largest extent of remnant natural shoreline conditions that are not altered by placement of fill. This 23.6-acre area consists of historic floodplain, mixed riparian forest, mature Oregon ash-dominated upland forest, willow-dominated scrub-shrub wetland, and reed canarygrass-dominated herbaceous wetland habitats. Two wetlands were documented within this Sub Area (URS 2010).

Beginning at the shoreline and proceeding inland to the southwest, the existing topography rises to an elevation ranging from 18 to 23 feet CPD, corresponding with a naturally formed low ridge oriented parallel to the river shoreline and composed of native alluvial soil. A narrow connection channel at the north corner of Sub Area 4 is at an elevation of approximately 15.4 feet CPD. Moving inland from the crest of the ridge, Site elevation decreases, to an average low elevation of 14 feet CPD and small pockets at 13 feet CPD. The low elevation areas in Sub Area 4 correspond with a 10.3-acre wetland complex found in the southwestern third of the Sub Area (URS 2010). Hydrologic inputs to the area include precipitation, infrequent inundation by Multnomah Channel when river stage exceeds 15.4 feet CPD, groundwater discharge from Sub Area 3, and an unnamed, small intermittent stream, which enters the Site from the Portland West Hills (i.e., the existing north drainage).

The existing north drainage is an important component of Sub Area 4 with respect to the proposed restoration. Historically, the existing north drainage was a tributary to Miller Creek, which flows onto the adjacent Fred's Marina property; however, construction of a dike and access road on the Fred's Marina property disconnected the existing north drainage from its historic channel and connection to Miller Creek. It is unknown if the dike originally included a culvert connection for the existing north drainage to Miller Creek, as no evidence of a culvert was found during site investigations. Limited flow does infiltrate through the dike, as wetlands to the west of the dike and within the historic channel are sustained by the water that permeates through the dike (pers. comm. Julie Mentzer, Project Manager for the Fred's Marina potential restoration site, October 11, 2013). As a consequence of being blocked by the dike and disconnected from its historic channel, the existing north drainage's current path is diverted into the low elevation portions of Sub Area 4, where it is impounded and has formed an extensive wetland complex between elevations of 13 feet and 16 feet CPD.

The existing north drainage's path and the natural low ridge along the shoreline cause the low elevation interior wetlands in Sub Area 4 to be inundated year-round. The extent of inundation and the depth of water in the wetlands vary with the season and correspond with the existing north drainage and precipitation inputs. During late summer and into fall, open water in the wetlands can be reduced to 13-foot elevation pockets; however, soil conditions remain saturated. During spring and winter, water level in the wetlands can rise in excess of the 15.4-foot ridge elevation, creating an open water connection with Multnomah Channel. Such conditions are typically associated with large precipitation events. Similarly, when river stage exceeds 15.4 feet CPD, an open water connection will also form with the interior wetlands. In periods when an open water connection between the interior wetlands and Multnomah Channel does not exist, water is lost from the wetlands via evapotranspiration and infiltration through and under the natural ridge. Infiltration is concentrated in the northern corner of Sub Area 4, corresponding with the lowest elevation of the natural ridge. Infiltration is sufficient that a stream channel has formed on the riverward side of the ridge, draining to Multnomah Channel. This erosional channel varies in width between 8- and 24-inches and is downcut up to 24 inches deep with nearly vertical banks. The channel has a steep gradient, in excess of 10% in places. Consequently, the existing discharge channel and the natural ridge create a barrier to upstream fish passage when river stage is below bankfull discharge.

The Olympic Pipeline crosses Sub Area 4, beginning at the south corner of the Sub Area and proceeding north in a straight line to Multnomah Channel (Figure 2). The pipeline easement is regularly maintained to prevent growth of woody vegetation, especially trees that may compromise the pipeline.

Sub Area 4 also includes a 13-acre ash-cottonwood hardwood forest, corresponding with the higher elevations of the natural ridge between Multnomah Channel and the low-elevation interior of the Sub

Area. The forest generally occupies elevations ranging from approximately 15 feet to 23 feet CPD. Within the ash-cottonwood forest is a 0.6-acre forested wetland. This forested wetland occupies a northwest-southeast oriented swale that appears to be a remnant river overflow channel that is not isolated. The wetland hydrology is likely sustained by a shallow, seasonally high water table and precipitation. Within the ash-cottonwood forest, canopy cover is high (>90% cover), while the understory is a mix of native and invasive species (~46% invasive cover). As the forest transitions to scrub-shrub wetland, canopy cover decreases (~ 75% cover), while invasive species understory increases (~ 55% cover). Vegetation cover data were gathered as part of Baseline Monitoring conducted by PGE at the Site during late summer 2014 (URS 2014b).

## 4. Proposed Restoration Work Plan

PGE proposes to restore and enhance tributary and off-channel habitats at the Harborton Site to serve as a restoration site to offset natural resource damages liability associated with the Portland Harbor Superfund Site. PGE will maintain use of the substation facility and adjacent areas supporting overhead transmission and infrastructure. The habitat restoration area will occupy 53.39 acres of the Property. PGE proposes to restore habitats in Sub Areas 1 through 4 through the following activities:

- Construction of a new North Channel stream channel through Sub Area 3 to improve the potential for fish passage between Sub Area 4 and the Willamette River.
- Enhancement of fish habitat and riparian habitat characteristics in and along the new North Channel.
- Excavation and re-grading of portions of the Site to provide approximately 28 acres of seasonally available off-channel habitat within the floodplain below 15.4 feet CPD.
- Preservation and enhancement of wetland area utilized by northern red-legged frogs, including expansion of standing water wetland areas into Sub Area 3 and native plantings to enhance amphibian (northern red-legged frog) habitat.
- Control of invasive plant species found throughout the Site (with the exception of northern red-legged frog breeding and rearing habitats) through removal, Site revegetation, and routine maintenance.
- Enhancement of shoreline, riparian, and upland habitats through native revegetation plantings and maintenance, and installation of habitat structures in Sub Areas 2, 3, and 4.
- Enhancement of shoreline and riparian habitats through invasive plant maintenance and native plant promotion in Sub Area 1. Enhancement of the South Channel through removal of manmade debris and control of invasive plants.

This document accompanies the 100% Design Drawings prepared for the Harborton restoration Project (Appendix B. PGE Harborton Stamped 100% Design Drawings). In this section, all design sheet references refer to the July 2020 100% Design Drawings. The Drawings depict existing and post-restoration conditions at the Site. Importantly, the 100% Design Drawings do not reflect any potential over excavation and placement of clean fill that may be necessary to ensure complete removal of residual contamination from the leave surface (see Section 4.2). The issue of over excavation and backfilling is addressed in Appendix F – Technical Memorandum: Plan to Reduce Exposure of Target Species to Residual Contamination at the Harborton Restoration Site. Sampling approach and methods are described in the Sampling and Analysis Plan – Harborton Restoration Project (Appendix G). The technical specifications that accompany the Stamped 100% Design Drawings are included as Appendix C. The anticipated hydrology and hydraulics resulting from the proposed restoration conditions are described by Inter-Fluve (2017) (Appendix D). The following sub-sections describe restoration actions in Sub Area 1 and Sub Area 2 and describe the combined set of restoration activities for Sub Areas 3 and 4. Combining these Sub Areas will achieve a more ecologically significant and connected restoration outcome. The boundaries of Sub Area 2 include an area that will be used for placement of soils excavated from elsewhere on the Site and revegetated to create riparian and upland habitats. The following sections detail restoration activities proposed for each Sub Area, summarize avoidance and minimization measures to be implemented to reduce Project impacts, and describe the planting plan developed to ensure the restoration Site achieves stated goals.

## 4.1 RESTORATION ELEMENTS

### Sub Area 1 Restoration Elements

The restoration design goals for Sub Area 1 include management of invasive species and enhancement of mink refuge. Restoration actions include placement of one mink rock pile and control of invasive vegetative species through removal, treatment, and planting of native species along the Willamette River shoreline. The limited nature of restoration activities in this Sub Area will accommodate future actions by PGE to maintain existing and potential future power infrastructure.

In the event that invasive species removal/treatment alone is not sufficient to establish a native plant community, planting in areas with established vegetation will generally be installed as follows:

- Emergent vegetation will be installed at elevations from 10 to 14 feet CPD.
- Scrub-shrub wetland vegetation will be installed at elevations from 12 to 18 feet CPD.
- Shrub riparian and upland vegetation will be installed from elevation 17 to 30 feet CPD.
- Forested upland vegetation will be installed from elevation 20+ feet CPD.
- Areas below 10 feet CPD are currently identified as beach or stream channel and will be seeded only.

### Sub Area 2 Restoration Elements

4.1.2

The restoration design goals for Sub Area 2 include the management of invasive species populations; creation of upland and riparian habitats on developed portions of the existing substation; and enhancement of native vegetation through installation and maintenance of native plantings. Current, developed portions of the original substation's footprint that will be used for storage of excavated soil will be vegetated to create new riparian-forested and upland-forested habitats.

#### **4.1.2.1 Excavated Soil Storage and Upland Habitat Creation**

PGE intends to place all excavated soils (fill and native soil) on Site. Excavated material from Sub Area 3 (Section 4.1.3), and removal of the berm separating Sub Areas 3 and 4 (Section 4.1.3) will generate up to 154,000 cubic yards of excavated soil<sup>1</sup>. Excavated soil may be mixed with a cement-based agent to facilitate drying. Excavated soil will be placed in the currently developed area at slopes and grades intended to avoid geotechnical instabilities associated with concentrating fill placement near the river bank<sup>2</sup>. Existing ground surface elevations for the storage areas range from 30 to 33 feet CPD (see soil storage area in Sub Area 2 on Sheet 24 of 35 – Appendix B). Proposed final grade elevations are between 28 and 56 feet CPD; consequently, the majority of fill placed would be above the 100-year flood elevation, established by FEMA (FEMA 2010) at 28.8 feet CPD

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<sup>1</sup> Volume includes material over excavated beyond the finished grade to manage residual contamination (Section 4.2), stabilize the slopes, and place streambed material.

<sup>2</sup> Additional geotechnical investigations and analysis were completed to inform this design submittal (GeoDesign 2016). The findings helped determine elevations, slopes, and other placement requirements.



for the Site<sup>3</sup>. The partitioning of fill between areas (new substation, upland habitat areas, swales, etc.) in Sub Area 2 was determined based on geotechnical and constructability considerations (GeoDesign 2016).

Excavated soils not suitable for planting (e.g., those that are contaminated, or that have been mixed with cement-based drying agents) will be placed first and capped by more suitable soils. The placement areas will be graded to blend into adjacent habitats along the shoreline and in Sub Areas 1 and 3. The placement areas will then be planted with a mix of native upland grass, shrub, and tree species. Species selection and placement is proposed to ensure that upland tree species do not pose a risk of falling into developed portions of the substation.

PGE will conduct post-construction soil testing to confirm that the cement drying agent does not negatively affect the pH of the soils on Site. These testing results will be provided to the Trustee Council for review.

#### **4.1.2.2 Vegetation Enhancement and Maintenance**

Much of Sub Area 2 will be vegetated to enhance and expand existing shoreline and riparian habitats, as well as create new upland habitat (as discussed above). Vegetation enhancement will serve to inhibit invasive species over the long term. Within both shoreline and riparian habitats, invasive species constitute the dominant herbaceous cover, consisting of reed canarygrass and Himalayan blackberry. The existing shrub and canopy layers are sparse and provide limited habitat function compared with expected riparian habitat. Habitat enhancement activities will focus on removing invasive species, seeding with native herbaceous cover, and planting native shrub and tree species (see Section 4.3.2).

Planting of new areas and supplemental planting in areas with established vegetation will generally be installed as follows:

- Scrub-shrub vegetation will be installed at elevations from 12 to 18 feet CPD.
- Shrub riparian and upland vegetation will be installed from elevation 17 to 30 feet CPD.
- Forested upland vegetation will be installed from elevation 20+ feet CPD.
- Areas below 10 feet CPD are beach and will be seeded only.

Ecological uplift is expected to result from improvements to shoreline and riparian habitats that benefit aquatic and terrestrial species and the creation of 10.7 acres of new riparian and upland habitats from currently developed areas. Time to full habitat functionality will be between 3 and 10 years for shrub and groundcover species and up to 40 years for riparian and upland trees.

#### **Sub Areas 3 and 4 Restoration Elements**

The restoration design goals for Sub Areas 3 and 4 are combined, with a focus on integrating these two distinct and hydrologically disconnected habitat areas into a large, contiguous, and hydrologically connected area. Restoration goals focus on the following elements:

- Creation of a new outlet channel for the North Channel so that fish can access the North Channel during periods when sufficient flow is present in the stream or the Willamette River is backwatering the North Channel.

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<sup>3</sup> The FEMA Flood Insurance Study covering the site reports the regulatory 100-year water surface at the site as 30.9 feet North American Vertical Datum of 1988 (NAVD88). The standard conversion of minus 2.125 from NAVD88 to the CPD was used.

- Excavation of existing fill in Sub Area 3 to expand off-channel habitat availability during high river stage conditions.
- Enhancements to the existing interior wetland complex to preserve and improve northern red-legged frog habitat while minimizing fish-stranding concerns.
- Establishing/enhancing native vegetation within these Sub Areas to improve and enhance existing and created wetland and riparian habitat types. The following sections detail the specific restoration components proposed for Sub Areas 3 and 4.

#### **4.1.3.1 Fish Passage Barrier Removal**

Restoration activities in Sub Areas 3 and 4 will focus on providing fish passage and increasing the frequency of hydrologic connectivity between the Sub Areas and the river. To accomplish this, historic fill will be removed from Sub Area 3. The berm separating Sub Areas 3 and 4 will be partially removed as part of the overall fill removal in Sub Area 3. The existing alignment of a poorly-defined tributary (i.e., the existing north drainage) within Sub Area 4 will remain in its current configuration. A new outlet location will be established from Sub Area 4 into Sub Area 3 effectively routing surface water from Sub Area 4 to the new meandering North Channel through Sub Area 3 when water elevations are above 15.4 feet CPD.

#### **4.1.3.2 North Channel Construction**

Following removal of fill in Sub Area 3, approximately 1,800 feet of moderate-gradient (~0.4%) meandering stream channel, the new North Channel will be excavated through the dredge fill and native soil in Sub Area 3, where it will discharge to the Willamette River. The North Channel's control elevation – the elevation at which surface water will discharge from the Sub Area 4 wetlands into the new outlet channel – will be set at 15.4 feet CPD, and the stream will discharge to the Willamette River at 8 feet CPD. The new outlet channel will be constructed as a small inset channel within a 200-foot-wide floodplain with side slopes down to the floodplain graded at a maximum slope of 5:1 to minimize erosion. An inset stream channel (3-foot bottom width, 1 foot deep, with side slopes of 2:1) will be excavated within the new floodplain. New stream channel substrate materials installed along the streambed will consist of boulder reinforcement at the shoreline, small boulders, cobbles, coarse and fine gravel, and sand.

Habitat and flow direction LWM will be installed along the length of North Channel to help control channel dynamics and provide cover habitat. Large wood structures will be installed at the upstream extent of the new channel, at approximately 15.4 feet CPD, to help maintain the existing hydraulic regime (preserving existing northern red-legged frog habitat) while minimizing the potential for fish stranding when river levels drop below 15.4 feet CPD. The 15.4-foot control elevation will be carried along the new channel for a distance of at least 30 feet to further facilitate maintenance of the existing wetland water level regime. Seepage controls (e.g., washing fines in the streambed gravels and possibly the use of pelletized clay) are included in the design to limit subsurface flow along the length of the new channel and help reduce the potential for a downstream reduction in surface flows during low discharge and low water levels in the Willamette River.

Trees removed during excavation will be salvaged and, if found suitable, may be used in addition to imported large wood as LWM added to the channel to re-establish beneficial habitat forming processes, such as pool formation, energy dissipation, and microhabitat creation (e.g., riverine wetlands). Use of LWM to stabilize channel meanders and direct stream flows appears adequate to maintain proposed channel enhancements and re-establish channel complexity. However, LWM will need to be ballasted to limit movement during high river stage and stream flow and to help retain smaller woody material within the stream channel.

Approximately 154,000 cubic yards of soil will be excavated to accomplish the restoration objectives in Sub Area 3. Due to the soft and saturated nature of the existing soils (GeoDesigns 2016), the channel valley side slopes will need rock placed at the toe of the slope and partway up the slope face to improve stability during initial excavation and high-water events. Additionally, the variable Site conditions may also require additional rock placements in particularly soft soil areas or areas with significant groundwater upwelling. At least 12 inches of topsoil will be placed on top of the rock and planted with riparian vegetation. These additional placements will be prescribed by the Engineering Team during construction based on field conditions. The excavated soil will be put to beneficial use to restore upland forest and grass/shrub habitats within Sub Area 2.

#### **4.1.3.3 Sub Area 4 Wetland Preservation and Enhancement**

The existing wetland habitat type in Sub Area 4 is in part a consequence of dike construction and filling of Sub Area 3. The large wetland complex remains inundated except for a few months during the late summer and is not accessible to juvenile salmonids. Earlier restoration concepts for the Site emphasized improving the quality of and access to habitats at the Site for the benefit of juvenile salmonids, consistent with the priorities of the NRDA Restoration Program in the Portland Harbor. Subsequent to development of these earlier restoration concepts, ODFW identified the wetlands in Sub Area 4 as important habitat for northern red-legged frogs. ODFW raised concerns with PGE and the Trustee Council about the earlier restoration concept, as it would affect the amount and quality of existing northern red-legged frog habitat in favor of creating habitat for juvenile salmonids. In response to ODFW's concerns, PGE met with ODFW and the Trustee Council in a series of meetings from 2014 to 2018 to discuss how to balance the needs of both northern red-legged frogs and juvenile salmonids. The outcome of these meetings is that PGE revised the restoration concept to include preservation and enhancement of the existing wetland amphibian habitat.

Based on investigation and analysis of water levels, and consideration of existing grades and northern red-legged frog habitat preferences, a 15.4-foot elevation was selected for the new Sub Area 4 outlet (i.e. the upstream end of the new North Channel at the Sub Area 3-4 boundary). This elevation will maintain the existing hydraulic regime characterized by sustained periods of inundation over the delineated wetlands, while also minimizing the potential for fish stranding as river levels rarely exceeded the 15.4-foot elevation<sup>4</sup>.

The large 10.3-acre wetland complex in Sub Area 4 is dominated by reed canarygrass, with dispersed patches of shrub and tree cover that are seasonally inundated. As previously discussed, the upstream end of the new channel alignment will be established at 15.4 feet CPD. The intent and performance criteria of the Project are to maintain the existing wetland hydrology to preserve use by amphibians. The existing material that comprises the contour/embankment between Sub Areas 3 and 4 will be largely left intact to minimize seepage between these two areas. At the new inlet channel between Sub Areas 3 and 4 washed fines and benign materials, such as bentonite, will be incorporated into the substrate along a short stretch of the channel inlet to minimize leakage through the coarse-grained substrate. Water should pass from Sub Area 4 to 3 via the new connection (inlet/outlet) to the new North Channel (as well as the existing berm notch on the north end of Sub Area 4) between 15.4 and 18 feet CPD elevation. Once water levels rise above 18.0 feet CPD, water from the Willamette River and Multnomah Channel will enter the wetland over the new contour/embankment of the wetland between Sub Areas 3 and 4 and over the existing embankment on the northern portion of Sub Area 4. The employment of seepage controls (e.g., fines and

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<sup>4</sup> Although the USACE regulatory OHW is listed at 18-ft CPD for the site analysis of stage data indicates that elevation is not frequently reached on a year to year basis.

bentonite, or other methods as necessary) are expected to preserve Sub Area 4 wetland conditions as they currently exist.

To mitigate for expected impacts to existing wetlands in Sub Area 3, a portion of the Sub Area 3 dredge spoils will be graded to match and extend a portion of the Sub Area 4 wetland. In addition to wetland expansion and native herbaceous plantings in the newly excavated area, woody material sourced from on-site clearing will be placed along the margins and in deep areas of the Sub Area 3/Sub Area 4 complex to provide habitat complexity that will benefit amphibians, reptiles, birds, and river/wetland-associated mammals. No excavation in Sub Area 4 is proposed except at the interface with Sub Area 3. Performance standards require that water will continue to be present in portions of Sub Area 4 as observed during baseline studies to facilitate amphibian metamorphosis.

Also present in Sub Area 4 is a 0.6-acre forested wetland located within a swale on the shoreline ridge. Prior to the filling of Sub Area 3, this wetland likely had a direct connection to the river when river discharge reached the 15-foot-elevation stage. This wetland feature will remain unmodified under the proposed restoration plan, since excavation is not proposed on the shoreline ridge. However, removal of the dike between Sub Areas 3 and 4 and the fill in Sub Area 3 will restore the connection between this wetland and the river when the river exceeds 15 feet elevation. To reduce the potential for unintended channel formation within the restored floodplain habitat, the proposed restoration design includes construction of a dedicated inflow/outflow channel to provide a defined and stable hydraulic connection between this wetland and the river. The inflow/outflow channel does not change the 15.4-foot threshold elevation at which the river would connect to the wetland, it merely directs flow in a stable channel to minimize erosions and to protect restored habitats.

#### **4.1.3.4 Native Vegetation Enhancement and Invasive Species Management**

In addition to the tributary channel realignment, extensive portions of Sub Area 3 will be vegetated to enhance and expand existing and converted wetland and riparian habitats, as well as control invasive species. Select plantings will be performed in Sub Area 4 on an as-needed basis determined by the effectiveness of reed canarygrass control (e.g., if invasive vegetation cannot be controlled through removal alone) (Appendix B – Sheet 33). Criteria that would trigger additional mitigating plantings are described in the Monitoring and Adaptive Management Plan (Appendix H). The ash-cottonwood hardwood forest has an understory layer that is approximately 46% invasive species, based on baseline vegetation surveys. Habitat within the forest will remain largely unmodified, though targeted control of herbaceous non-native species is proposed, along with supplemental planting of native shrub and emergent species (see Section 5.2). Revegetation within Sub Areas 3 and 4 will be designed to expand and enhance functional habitats found on Site and at similar restoration projects in the lower Willamette River.

Planting of new areas and supplemental planting in areas with established vegetation will generally be installed as follows:

- Emergent vegetation will be installed at elevations from 10 to 13 feet CPD.
- Scrub-shrub wetland vegetation will be installed at elevations from 12 to 18 feet CPD.
- Shrub riparian and upland vegetation will be installed from elevation 17 to 30 feet CPD.
- Forested upland vegetation will be installed from elevation 20+ feet CPD.
- Areas below 10 feet CPD are currently identified as beach or stream channel and will be seeded only.

A specific vegetation enhancement method will be to expand those areas that support a predominant native plant assemblage. Within all of Sub Area 3 and within those areas of Sub Area 4 that are: 1) reed-canarygrass dominant, 2) above 15 feet elevation CPD, and 3) outside of

recognized northern red-legged frog breeding and rearing areas, removal and control of invasive species will be necessary to allow native emergent, shrub-scrub, and tree species to become established. The installation of native vegetation in Sub Area 3 wetland areas (estimated elevations 10 to 13 CPD) may be performed over a number of years to ensure sufficient vegetation (both native and non-native) exists for amphibians to use for egg mass anchors. Installation of native vegetation in treated areas within Sub Area 4 may be performed as needed to promote northern red-legged frog habitat.

PGE will not treat or manage invasive species, including reed canarygrass within areas that are below the 15-foot CPD elevation contour or within recognized northern red-legged frog breeding and rearing areas (see Figure 4).

It is expected that much of the ecological uplift in Sub Areas 3 and 4 will occur within the first wet season following construction, as the tributary and converted off-channel habitat will be available for species use as river stage allows. Vegetation enhancements will result in habitat improvements within 3 to 10 years, with full functionality occurring within 40 years for riparian trees.

## 4.2 RESIDUAL CONTAMINATION MANAGEMENT

PGE has compared site-specific environmental sampling data collected for the Environmental Assessment for PGE's Harborton Site (May 2014) to the current design. These sampling data suggest that implementation of the current design may result in contamination remaining on the restored habitat leave surface. It is PGE's intent to identify, excavate, and backfill areas of residual contamination to ensure that no residual contamination remains at the leave surface in habitats accessible by target species (i.e., Chinook salmon). However, rather than relying upon existing data to determine which areas should be over-excavated and backfilled with clean material, PGE believes that obtaining results based on the actual surface leave is the most appropriate method to evaluate contaminant-related ecological loss. Samples will be collected for target constituents to confirm current conditions of leave surface. As described in the Harborton Sampling Plan (Sampling Plan, Appendix G), the leave surface of each decision unit (DU) will be evaluated using the approach described in the Sampling Plan to determine the level of contamination remaining in the DU. Where measured contamination exceeds the Trustee Council's established thresholds, the entire DU will be over excavated by one foot and backfilled with one foot of clean fill so that surface elevations are still consistent with the Project design. More detail regarding the location of potential residual contamination and plans for identifying and removing it are provided in Appendix F: Technical Memorandum: Plan to Reduce Exposure of Target Species to Residual Contamination at the Harborton Restoration Site and Appendix G: Sampling and Analysis Plan: Harborton Restoration Project. Failure to implement the plans outlined in Appendix F that results in residual contamination remaining on leave surfaces of key habitats may result in a reduction or elimination of credit in affected areas.

### Sub Area 3

The majority of potential residual contamination is within the bermed and filled portion of the Harborton Site, referred to as Sub Area 3 in the restoration proposal. Restoration activities in Sub Area 3 include the excavation of a new outlet channel for the North Channel. Select portions of the leave surface in Sub Area 3 will be sampled and analyzed as described in Appendix F: Technical Memorandum: Plan to Reduce Exposure of Target Species to Residual Contamination at the Harborton Restoration Site and Appendix G: Sampling and Analysis Plan: Harborton Restoration Project. Where measured contamination exceeds the Trustee Council's established thresholds, the entire DU will be over excavated by one foot and backfilled with one foot of clean fill so that surface elevations are still consistent with the Project design. Additionally, the inset channel will be over-excavated to a depth of at least 1 foot even if below the native material contact. The channel will be

rebuilt with imported clean streambed material. The excavated soil will be relocated to the soil placement location in Sub Area 2. The contaminated soil will be placed at the core of the soil pile and covered with native soil, consistent with the current management plan for the permanent soil placement area. The over-excavation areas in Sub Area 3 will be backfilled with a 1-foot-thick layer of clean material, meeting DEQ's Clean Fill standards (DEQ, 2014), from an off-site source to achieve the final proposed grades.

### 4.3 PLANTING PLAN

The successful installation of native wetland vegetation will require site preparation, seeding, planting, and ongoing invasive species control. The vegetation plan is outlined in the following sections. Control of invasive plant species will consist of active removal during site preparation, followed by active suppression and displacement by native plants during and after the 10-year effectiveness monitoring period, except as otherwise noted in Section 4.1.3.

#### Site Preparation

Herbicide will be applied in select areas of the Site in summer/fall prior to construction to address extensive non-native and invasive species cover. Herbicide will be applied in open areas by ATV-mounted sprayer. A backpack sprayer will be used in confined areas or in proximity to sensitive habitats (e.g., wetlands, streams). Only herbicides approved for use around water will be used near wetlands and streams. Herbicide will be applied during low-wind conditions to minimize spray drift. No herbicide will be applied in areas in Sub Area 4 below the 15 foot CPD elevation contour or otherwise identified as northern red-legged frog breeding habitat, as described in Section 4.1.3 and shown in Figure 4.

#### 4.3.2 Landscaping

Three planting zones were demarcated at the Site based on proposed post-construction Site elevations and predicted hydrological conditions: Wetland Zone (10-18 feet CPD), Riparian Zone (17-30 feet CPD), and Upland Zone (>30 feet CPD). The Wetland and Riparian Zones were further broken down by proposed restoration treatment into Creation and Enhancement Areas. Areas proposed for creation will be entirely unvegetated following construction; thus, the planting plan proposes closer spacing such that a dense layer of vegetation forms quickly to minimize colonization by non-native species. Enhancement areas contain preexisting vegetation, so spacing in these areas will be variable. Supplemental shrub and tree plantings will be distributed throughout the existing vegetation as practicable with the goal of increasing shrub layer density such that existing high cover of reed canarygrass is shaded out over time. See the Drawings for a depiction of planting areas throughout the Site (Appendix B). Table 1 contains a list of species for each planting zone that can stabilize soils, provide native wetland, riparian, and upland habitat, and aid in the control of invasive species.

## HARBORTON HABITAT DEVELOPMENT PLAN

Table 1. Planting Plan

Scientific Name	Common Name	Wetland Indicator Status	Approx. % of Planting Mix	Spacing (feet on center)	
				Creation Areas <sup>2</sup>	Enhancement Areas
WETLAND ZONE					
<i>Emergent Plugs/bulbs/corymbs</i> <sup>1</sup>					
<i>Carex obnupta</i>	slough sedge	OBL	20	2	3
<i>Eleocharis palustris</i>	creeping spikerush	OBL	20	2	3
<i>Sagittaria latifolia</i>	wapato	OBL	20	2	3
<i>Schoenoplectus acutus</i>	hardstem bulrush	OBL	20	2	3
<i>Scirpus microcarpus</i>	small-fruited bulrush	OBL	20	2	3
<i>Shrubs/Trees</i>					
<i>Cornus sericea</i>	red-osier dogwood	FAC	20	6	10
<i>Fraxinus latifolia</i>	Oregon ash	FACW	10	10	15
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottonwood	FAC	10	15	25
<i>Rosa nutkana</i>	Nootka rose	FAC	10	6	10
<i>Salix lasiandra</i> var. <i>lasiandra</i>	Pacific willow	FACW	10	10	15
<i>Salix scouleriana</i>	Scouler's willow	FAC	10	6	10
<i>Salix sitchensis</i>	Sitka willow	FACW	20	6	15
<i>Spiraea douglasii</i> var. <i>douglasii</i>	Douglas' spiraea	FACW	10	6	15
RIPARIAN ZONE <i>Shrubs/Trees</i>					
<i>Corylus cornuta</i> var. <i>californica</i>	beaked hazelnut	FACU	10	6	10
<i>Rosa nutkana</i>	Nootka rose	FAC	10	6	10
<i>Salix scouleriana</i>	Scouler's willow	FAC	10	6	10
<i>Spiraea douglasii</i> var. <i>douglasii</i>	Douglas' spiraea	FACW	10	6	10
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	common snowberry	FACU	20	6	10

## HARBORTON HABITAT DEVELOPMENT PLAN

Scientific Name	Common Name	Wetland Indicator Status	Approx. % of Planting Mix	Spacing (feet on center)	
				Creation Areas <sup>2</sup>	Enhancement Areas
<i>Alnus rubra</i>	red alder	FAC	15	10	15
<i>Crataegus douglasii</i>	black hawthorn	FAC	5	10	15
<i>Thuja plicata</i>	western red cedar	FAC	10	10	15
<i>Fraxinus latifolia</i>	Oregon ash	FACW	5	10	15
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottonwood	FAC	5	10	15
UPLAND ZONE <sup>3</sup> Trees/Shrubs					
<i>Acer macrophyllum</i>	bigleaf maple	FACU	20	10	15
<i>Alnus rubra</i>	red alder	FAC	10	10	15
<i>Frangula purshiana</i>	casacara	FACU	10	10	15
<i>Holodiscus discolor</i>	oceanspray	FACU	15	6	10
<i>Rubus parviflorus</i>	thimbleberry	FACU	10	6	10
<i>Sambucus racemosa</i> var. <i>arborescens</i>	red elderberry	FACU	10	6	10
<i>Mahonia aquifolium</i>	tall Oregon grape	UPL	5	6	10
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	common snowberry	FACU	20	6	10
<p><sup>1</sup> Emergent plugs to be planted at lowest elevations of Wetland Zone 1-foot above the observed persistent vegetation elevation along the Willamette at the Site.</p> <p><sup>2</sup> Creation Areas will be unvegetated and therefore will receive plant spacing at a higher density to limit competition from non-native species (relative to enhancement areas).</p> <p><sup>3</sup> Upland Zone - For safety reasons, trees in Riparian and Upland Zones to be planted only on slopes facing away from the substation.</p> <p>OBL – occurs in wetlands &gt;99% of the time</p> <p>FACW – occurs in wetlands 67 to 99% of the time</p> <p>FAC – occurs in wetlands 33 to 67% of the time</p> <p>FACU – occurs in wetlands 1 to 33% of the time</p> <p>UPL – occurs in wetlands &lt;1% of the time</p>					

Plant sources will vary depending upon vegetation type. Herbaceous emergent and grass species will be installed using seeding and/or plugs. Woody vegetation will be container stock, bare root, and/or live stakes. All container plants will be procured from native plant nurseries in northwestern Oregon or southwestern Washington. Choice of plant material type and size will depend upon



availability of plant material at the time of implementation. Live stake installation will include willow (*Salix* spp.), dogwood (*Cornus* spp.), and cottonwood (*Populus* spp.) species. Some live stakes may be collected from the existing habitats on the Site.

Temporary summer irrigation will be provided for select planting areas for up to 3 years following installation. Some of the restored riparian forested areas above the observed persistent vegetation elevation may require temporary irrigation for the first few years until the vegetation becomes sufficiently established to access Site groundwater. Supplemental irrigation will be considered only if precipitation amounts are lower than normal and risk plant establishment. A substation hydrant will be retained to be used as a water supply for temporary irrigation, if needed.

### Seeding

Post-construction restoration will include the application of native grass seed on all disturbed areas of the Site that are not designed for constant or frequent inundation (e.g., restored channel bottoms). Seeding will occur prior to the rainy season in order to provide soil stabilization on the Site. Seed mixes have been developed for each planting zone in accordance with state and local requirements and are customized for application within specific post-construction elevation ranges. Each seed mix contains plant species well suited to Site conditions in order to minimize the ability of invasive species to establish at the Site. Areas to be seeded will be scarified prior to hydroseeding. Reseeded areas will also be treated with straw mulch or wood mulch and/or bonded fiber tackifiers in accordance with the Erosion and Sediment Control Plan (ESCP) and the Project ecologist's recommendations. Hydroseeding should occur immediately following construction. Table 2 lists seed mixes proposed for each planting zone.

**Table 2. Proposed Seeding Mixes for Planting Zones**

Scientific Name	Common Name	Wetland Indicator Status
WETLAND ZONE		
<i>Agrostis exarata</i>	spike bentgrass	FACW
<i>Alopecurus geniculatus</i>	water foxtail	OBL
<i>Beckmannia syzigachne</i>	American sloughgrass	OBL
<i>Carex obnupta</i>	slough sedge	OBL
<i>Carex stipata</i>	awl-fruit sedge	OBL
<i>Deschampsia cespitosa</i>	tufted hairgrass	FACW
<i>Eleocharis palustris</i>	creeping spikerush	OBL
<i>Festuca rubra rubra</i>	native red fescue	FAC
<i>Glyceria occidentalis</i>	western mannagrass	OBL
<i>Hordeum brachyantherum</i>	meadow barley	FACW
<i>Montia parvifolia</i>	littleleaf miner's lettuce	FAC
<i>Rumex salicifolius</i>	willow-leaved dock	FACW
<i>Scirpus microcarpus</i>	small-fruited bulrush	OBL

## HARBORTON HABITAT DEVELOPMENT PLAN

Scientific Name	Common Name	Wetland Indicator Status
<i>Tolmeia menziesii</i>	piggyback plant	FAC
RIPARIAN ZONE		
<i>Agrostis exarata</i>	spike bentgrass	FACW
<i>Bromus vulgaris</i>	Columbia brome	FACU
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	miner's lettuce	FAC
<i>Festuca rubra rubra</i>	native red fescue	FAC
<i>Lupinus rivularis</i>	streambank lupine	FAC
<i>Montia parvifolia</i>	littleleaf miner's lettuce	FAC
<i>Poa pratensis</i>	Kentucky bluegrass	FAC
<i>Tellima grandiflora</i>	fringecup	FACU
<i>Urtica dioica</i>	stinging nettle	FAC
UPLAND ZONE		
<i>Achillea millefolium</i>	yarrow	UPL
<i>Bromus carinatus</i>	California brome	UPL
<i>Bromus vulgaris</i>	Columbia brome	FACU
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	miner's lettuce	FAC
<i>Elymus glaucus</i>	blue wildrye	FACU
<i>Festuca rubra rubra</i>	native red fescue	FAC
<i>Fragaria chiloensis</i>	beach strawberry	FACU
<i>Lotus unifoliolatus</i>	American bird's-foot trefoil	FACU
<i>Lupinus rivularis</i>	streambank lupine	FAC
<i>Poa pratensis</i>	Kentucky bluegrass	FAC

Table Note: Application rate to be determined by seed supplier.

OBL – occurs in wetlands >99% of the time

FACW – occurs in wetlands 67 to 99% of the time

FAC – occurs in wetlands 33 to 67% of the time

FACU – occurs in wetlands 1 to 33% of the time

UPL – occurs in wetlands <1% of the time

#### 4.4 REGULATORY DRIVEN AVOIDANCE AND MINIMIZATION MEASURES

All proposed restoration activities will comply with applicable local, state, and federal regulations. These regulations are not necessarily coincident with the Trustee Council's monitoring, adaptive management, and reporting requirements. Construction of the restored and enhanced habitats will be managed by PGE to ensure that the habitats are constructed as designed and that impacts to existing fish and wetland habitats, as well as other sensitive resources, will be minimized or avoided where possible. In order to protect sensitive resource areas at the Site, the following measures will be implemented throughout construction:

- A Project proponent representative familiar with the Project will manage habitat restoration/creation activities on a daily basis. If situations arise that could be detrimental to the sensitive resource areas, the representative will have the authority to stop construction activities until corrective actions have been taken.
- The Project proponent representative will attend pre-construction meetings and conduct environmental trainings regarding the location of wetland or other water features as well as other sensitive resources.
- An ESCP will be developed in compliance with DEQ requirements for approval of 1200-C construction stormwater permit to address potential sources of fugitive sediment migration and contamination risk.
- Erosion control best management practices (BMPs), as detailed in the ESCP, will be implemented during construction to prevent deleterious substances, such as sediment-laden run-off from grading operations, from entering surface waters during or following construction. BMPs include, but are not limited to, drainage pattern control, preserving vegetation wherever possible, and seeding and mulching areas of exposed soil.
- The external levee may remain in place until interior excavation is complete, after which the connection to the realigned North Channel will be excavated to final grade, opening up the constructed channel to the Willamette River.
- In-water construction sediment and turbidity containment BMPs, as detailed in the ESCP, will be implemented to reduce the magnitude and extent of turbidity and subsequent sedimentation resulting from excavation and fill in the Willamette River floodplain. BMPs include installation and maintenance of sediment and turbidity curtains around in-water construction areas to reduce water velocities within the work area, resulting in containment of turbid water and increased deposition of sediments within or in proximity to the work area. Turbidity will also be monitored, in accordance with DEQ National Pollutant Discharge Elimination System (NPDES) requirements, during all construction activities in connection with the Willamette River.
- Prior to construction, sensitive resources will be marked on construction drawings. Orange construction fencing or an equivalent visual barrier will be installed around the sensitive resources on the Site as necessary to alert construction personnel to the location of these resources.
- Temporary soil stockpiles will be located as far as reasonably practicable from sensitive resource areas, and BMPs will be implemented to prevent erosion from stockpiles entering surface waters. Exposed soil will be watered for dust control. The amount of water applied to the Site will be carefully monitored to prevent erosion and surface runoff due to excessive watering. Water application will be directed away from wetlands and surface waters.
- A vegetated bioswale will be constructed along the transition between the proposed substation footprint and the base of the permanent soil placement area to capture potential runoff from the excavated soils.

- All construction staging activities will occur within a secured staging area to be identified by the restoration ecologist and included on all construction plans and drawings. The staging area will be located as far as reasonably practicable from any jurisdictional wetland or other waters of the United States, given the size and constraints of the Site. All staging areas will be marked in the field. All refueling and maintenance activities will occur within the designated staging area.
- Any hazardous material spill will be cleaned up immediately, in accordance with all federal, state, and local regulations. All equipment will be maintained on a regular basis to minimize leaks and will be equipped with spill response kits. The ESCP will be implemented prior to construction, and all employees will be trained on spill prevention and response procedures. Additional measures and BMPs identified in the ESCP to minimize potential impacts to water quality associated with hazardous materials will be implemented.
- During construction, care will be taken to minimize any disturbance and compaction of existing soils by conducting the work during dry periods, when feasible, to ensure the majority of the Site's native terrain and soil characteristics remain unaffected.
- Cultural resources monitoring will occur during construction anytime that native soil is excavated. An Inadvertent Discovery and Monitoring Plan has been developed for the Site (Inter-Fluve 2016).
- Upon completion of the proposed Project, PGE will provide a post-construction ("as-built") report within 3 months following construction to the Trustee Council. The report will include an engineering plan set ("as-built drawings") containing redlined grading plans, planting plans, and habitat feature installations to document post-construction Site conditions and how features were installed. Updated mapping products will be generated to document the new baseline conditions on the Site. Mapping products will include post-construction surface, reference mapping of installed structural habitat elements (e.g., LWM, brush piles, etc.), and post-construction photography.

## 5. Performance Objectives and Standards of Success

Performance standards are designed to ensure that key elements of the Project are developing on a trajectory that will result in achievement of full function and value by the end of the established period. Performance standards developed for the restoration Project have been guided by the Trustee Council's monitoring and long-term stewardship expectations, requirements, and mechanisms for obtaining full restoration value at NRDA restoration sites in the Portland Harbor. A complete description of the full suite of interim and final performance standards is provided in Appendix H, Monitoring and Adaptive Management Plan.

## 6. Release of Credits and Credit Sales

The Trustee Council provided an estimate of the Forecast Settlement Credit Value (FSCV), also known as the Forecast DSAY value, of the original design of the Project in 2015. Since that time, PGE has made substantial revisions to the design, as outlined in Sections 2 and 4. In 2020, the Trustee Council developed a second Forecast Settlement Credit Value (FSCV2) for the Project. The letter documenting this revised credit estimate of 587.55 DSAYs for the Project is included as Appendix E. The FSCV2 was subsequently adjusted further to 586.5.<sup>5</sup> The final credit value for the Project shall be determined by the Trustee Council based upon attainment of the Performance Standards and other criteria and obligations outlined within the HDP.

Achievement of interim performance standards is associated with release of portions of the credit value for the Site as set forth in Consent Decree Section VII.F (Restoration Project DSAY Credits).

The Portland Harbor Natural Resource Trustee Council is adopting the Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) to track credits at Portland Harbor NRDA banks, including the Harborton restoration bank managed by PGE (Project Developer). This mitigation bank tracking system has recently been modified to accommodate projects that have NRDA, Section 404, or ESA credits available for sale, or any combination of the above. RIBITS now allows for on-line tracking of NRDA credit availability at newly recognized projects (initiation), credit releases, credit sales, credit returns, and third-party sales. This allows for transparent on-line storage of credit information. The RIBITS database will also be available as an on-line credit tracking system for NRDA matters at other sites.

Specific to tracking Portland Harbor NRDA credits, a Trustee Council representative or designee will enter credit initiation information about each Portland Harbor NRDA project into the RIBITS database, as well as project boundary information and information on credit releases as they occur. Project Developers will be responsible for entering information in RIBITS within 30 days of a transaction when credits are sold or returned. When Project Developers enter credit sales information for a Portland Harbor NRDA project, it will remain in pending status until approved by a Trustee Council representative. Credit tracking in RIBITS will not replace other forms of credit sale tracking and notification agreed to in each projects' Habitat Development Plan or in any consent decrees using credits from a particular bank.

. The following information will be recorded in the ledger for each transaction:

- Date of transaction
- Number of DSAY Credits transacted
- For DSAY Credits released for sale or transfer: reference of the purchaser's DSAY Credit settlement obligation with the Trustee Council to which the released credits correspond (to the extent known by PGE)
- For credit sales/transfers: the name, address, telephone number, contact for purchaser, and a Transaction ID number (generated by RIBITS)
  - For DSAY Credits withdrawn from the ledger for reasons other than DSAY Credit purchase: a sub-ledger entry detailing the specific reason for the withdrawal.

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<sup>5</sup> The Forecast DSAY Value of 586.5 DSAYs is current as of the date of lodging of the Consent Decree. See Consent Decree Paragraph 42. The Forecast DSAY Value of the project remains subject to further change as set forth in the main body of the Consent Decree.

- Number of DSAY Credits available from the project at the time of transaction (Calculated in RIBITS)
- Project's DSAY Credit balance after this transaction (calculated in RIBITS)

## 7. Project Schedule and Sequencing

The Project is expected to be completed in 8 months of work. The Project consists of the following elements (exact sequencing may vary, and many Project elements may be completed simultaneously):

- **Pre-Construction Activities (June)**
  - Mobilization to Project Site
  - Installation of engineering controls and erosion and sediment control measures for clearing/grubbing in Sub Area 3 (within perimeter dikes)
  - Installation of survey benchmarks and completion of baseline topographical survey
  - Installation of work areas (e.g., trailers, storage areas, parking, access roads, etc.)
  - Identification and flagging of utilities within the work areas
  - Installation of construction fencing to delimit work areas and sensitive resources
- **Construction (June – October)**
  - Installation of engineering controls (e.g., dewatering well points, isolation coffer dams, erosion and sediment control measures, etc.)
  - Wildlife salvage and relocation, clearing, grubbing, and remaining tree removal within Sub Area 3. Prior to earthwork in Sub Area 3 amphibians and reptiles will be captured and relocated to areas of Sub Area 4 that will remain undisturbed by construction activities.
  - Soil excavation, re-grading/realigning tributary, creation of new outlet channel, and aquatic habitat enhancement. Removal of the soil berm between Sub Area 3 and Sub Area 4 will be completed as a late-phase task after tadpoles have metamorphosed into frogs.
  - Placement of habitat features. Habitat features in Sub Area 4 will be installed after July or as dry conditions allow, whichever is later in the year in order to avoid disturbing early-growth stages of northern red-legged frog development.
  - Placement of fill for maintenance access
  - Sampling to characterize leave surface conditions relative to Trustee-identified contaminants of concern as described in the Harborton Site Sampling Plan and implementation of any required over-excavation and placement of clean fill as described in Appendix F and Appendix G.
  - Soil conditioning and final placement in Sub Area 2. Soil conditioning will include compaction of lifts for stability as specified in the geotechnical report and conditioning/amending as needed for plantings as noted on the 100% Design Sheet set.
- **Site Restoration**
  - Revegetation (planting, hydroseeding). Hydroseeding will occur as soon as feasible following completion of grading work. Revegetation of herbaceous plugs and woody plants are expected to use City of Portland recommendations for planting periods for guidance. Plantings are anticipated to occur from October through January, with supplemental plantings as needed. Plantings will be excluded from frog breeding habitat during critical frog life-stage periods (January to July).
  - Invasive species removal and treatment will begin in late Spring/early Summer.
  - Demobilization



Implementation monitoring will begin with an as-built survey to be completed within 3 months of construction. Effectiveness monitoring will begin approximately 1 year after construction. The Performance Period is the period beginning with the completion of restoration construction and implementation, and ending with the Trustee Council's determination that the Harborton Project has met the Performance Standards and other criteria and obligations outlined within the HDP or that the Performance Period is otherwise complete, whichever occurs first. The Performance Period is anticipated to span approximately 10 years or until the performance standards are met, whichever is earlier, as defined by the Monitoring and Adaptive Management Plan (Appendix H).

## 8. Monitoring and Adaptive Management Plan

Implementation and Effectiveness Monitoring will be used to ensure that the Harborton Project is constructed as designed and developing on a trajectory such that it will ultimately produce the ecological benefits it was designed to achieve. Monitoring will check for progress related to site-specific performance standards and the overall restoration goals of the Trustee Council. Monitoring methods will be driven by the relevant performance standards as described in Appendix H (Monitoring and Adaptive Management Plan) Sections 3 and 4.

In the event that monitoring data demonstrate that the Site is failing to meet performance standards and Project restoration goals, PGE or the designated natural resource consultant will review monitoring data and adjust maintenance activities in consultation with the Trustee Council as necessary to meet the restoration goals and objectives of the HDP. The complete details of the Adaptive Management Plan are described in Section 5.0 of Appendix H, Monitoring and Adaptive Management Plan.

## 9. Long-Term Stewardship

Following completion of the Harborton Project Performance Period, Project management and maintenance will be transferred to a long-term steward. The expectations and commitments for long-term stewardship of the Project are described in in Section 6.1 of Appendix H, Monitoring and Adaptive Management Plan. Long-term stewardship activities will be funded in perpetuity by the process outlined in Section 6.2 of Appendix H, Monitoring and Adaptive Management Plan. A site-specific long-term stewardship plan will be developed for the Harborton Project upon selection of the long-term steward for the Site.

## 10. Financial Obligations, Legal Agreements, and Financial Assurances

In addition to costs incurred by PGE to perform its obligations relative to Site construction, monitoring, maintenance, and adaptive management, as described within this Habitat Development Plan, PGE is obligated to: fund specific activities conducted by other entities over the duration of the Performance Period (see Table 3), provide financial assurances to guarantee funding of certain activities, and enter into specific legal agreements to guarantee the continued ecological value of the Site (see Table 4). These financial obligations, legal agreements, and financial assurances are described in the following sections.

### 10.1 TRUSTEE OVERSIGHT FUNDING

The final Trustee Council Oversight Budget, dated May 13, 2020, totaling \$339,823.61, has been agreed to by the Parties and is attached as Appendix Q. PGE will pay the total projected annual costs for Trustee Council oversight prior to January 1 of each calendar year for the term of the Performance Period; PGE will also compensate the Trustees for any overages incurred in the previous calendar year for PGE oversight activities. Payment will be made by check furnished to the DOI NRDAR Fund following the procedures outlined in the Department of the Interior Natural Resource Damage Assessment and Restoration Fund Assessment and Settlement Deposit Remittance Procedures.

The Trustee Council will provide annual cost documentation for oversight expenditures. Each year, actual costs will be compared to previously estimated costs at the end of each year and any excess funds will be applied to the subsequent year. Payments due for subsequent years will not be withheld or delayed if cost documentation has not been received. The Trustee Council reserves the right to disperse Trustee Council oversight funding to individual Trustees in amounts different from those estimated in the budget in Appendix Q.

### 10.2 FUNDING FOR LAMPREY MONITORING

USFWS has developed a detailed, site-specific Lamprey Monitoring Plan that outlines sampling locations, monitoring techniques, and objectives. The site-specific lamprey monitoring plan, Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey Harborton Restoration Site and supplemental Sediment Analysis Plan (“Harborton lamprey monitoring plan”), can be found in Attachments A and B to Appendix H, Harborton Restoration Project: Monitoring & Adaptive Management Plan. An estimated budget for the proposed monitoring is included as Attachment C. For all monitoring events occurring in Years 1-10, PGE will provide payment in advance of each monitoring event to USFWS and the designated Trustee Council member, as directed by the Trustee Council. Payment for years 15 and 20 of lamprey monitoring will be made to the designated Trustee Council member prior to the final release of credits, as outlined in Consent Decree Appendix G3. Credit Release Schedule.

As described in the notes following the budget estimate (Appendix H, Attachment C), the cost estimates provided in this budget reflect the best estimates of the costs of lamprey monitoring over the life of the Harborton Lamprey Monitoring Plan (20 years). The budget accounts for inflation in estimated costs beyond Year 0 based upon standard assumptions of inflation, but the Trustee Council or its representative will notify PGE of any necessary adjustments based upon actual future circumstances and costs. The Trustee Council will provide cost documentation annually and credit any remaining or excess funds toward the costs of subsequent monitoring years. Payments due for

subsequent monitoring events will not be withheld or delayed if cost documentation has not been received.

**Table 3. Financial Obligations**

Document	Location	Description
Trustee Monitoring and Oversight Budget	Appendix Q	Identifies the amount of funding to be provided to the Trustee Council during each year of the Performance Period for oversight of Project performance. PGE is required to pay the identified amount to the DOI NRDAR fund.
Lamprey Monitoring Budget	Appendix H, Attachment C	Identifies the amount of funding to be provided to USFWS and the designated Trustee Council member for lamprey monitoring in years 1-5, 6-8 (as needed), and 10, and the amount to be paid to the designated Trustee Council member prior to the final credit release for years 15 and 20 of lamprey monitoring.

### 10.3 LEGAL AGREEMENTS AND FINANCIAL ASSURANCES

Table 4 below shows the list of legal agreements and financial assurance documents required by the Trustee Council to guide Project implementation and oversight and to assure the ecological values of the Project will be protected. Document locations and a brief description of each document and relevant participants are included in the table.

**Table 4. Legal Agreements and Financial Assurances**

Document	Location	Description
Declaration of Covenants, Conditions, and Restrictions and Grant of Irrevocable License <ul style="list-style-type: none"> <li>Exhibit A. Legal Description of Overall Property</li> </ul>	Consent Decree Appendix G4-a	Party: PGE  Instrument that protects Site for conservation purposes; effective until Conservation Easement is recorded against the Property (which will protect the Site for conservation purposes in perpetuity). Terminates when Conservation Easement is recorded.
Conservation Easement Deed for the Harborton Restoration Project	Consent Decree Appendix G4-b	Party: PGE and easement holder  Instrument that protects Site for conservation purposes.
Credit Sales Agreement	Appendix K	Parties: PGE and individual purchasing parties.  Example agreement of terms for purchase and sale of DSAY credits from the Harborton

## HARBORTON HABITAT DEVELOPMENT PLAN

		<p>Restoration Project between PGE (seller) and a potentially responsible party/settling defendant as purchaser.</p> <p>The Trustee Council has provided feedback on this Agreement but acknowledges that this Agreement is between PGE and purchaser(s) and that the Trustee Council will not be involved in the negotiations between the specific parties.</p>
Irrevocable Standby Letter of Credit: Construction Security	Consent Decree Appendix	<p>Parties: PGE, Trustee Council, and Surety</p> <p>Financial assurance to guarantee the construction of the Project in accordance with the 100% design plans, including a 15% contingency (\$6,719,264.61).</p> <p><i>Because construction of the project has been completed as of the date of lodging of the Consent Decree, no Construction Security is required for the project, as indicated in Consent Decree Appendix G2-a.</i></p>
Irrevocable Standby Letter of Credit: Adaptive Management	Consent Decree Appendix G2-b	<p>Parties: PGE and Trustee Council</p> <p>Financial instrument creating separate account and management of funding for the Project's adaptive management needs. This will ensure that there are sufficient funds to conduct adaptive management activities to ensure that the Project meets post-construction performance standards. Funds are only used to meet adaptive management requirements. Funds will either be disbursed back to PGE (to reimburse PGE for money spent on adaptive management in a given year) or NOAA will keep the funds (or a portion thereof) if PGE has failed to meet a requirement and NOAA must complete and fund it. Anticipated to be 25% of the construction cost (\$1,105,621.25).</p>
Irrevocable Standby Letter of Credit: Years 15 and 20 Lamprey Monitoring Security	Consent Decree Appendix G2-c	<p>Parties: PGE, Trustee Council, and Surety</p> <p>Financial assurance to guarantee funding for Years 15 and 20 of lamprey monitoring, including sediment evaluation funding (\$94,944).</p> <p>Comes into play if PGE fails to provide funding for lamprey monitoring prior to the end of the</p>

## HARBORTON HABITAT DEVELOPMENT PLAN

		Performance Period for Years 15 and 20 of lamprey monitoring.
Irrevocable Standby Letter of Credit: Interim Management and Contingency Security and Years 1 – 10 Lamprey Monitoring Securities	Consent Decree Appendix G2-d	<p>Parties: PGE, Trustee Council, and Surety</p> <p>Financial assurance to guarantee funding for effectiveness monitoring during the Performance Period (\$1,809,048). This guarantees the full funding of vegetation and biological monitoring, reports, invasive plant management, trash removal, insurance (\$1,359,996), a 15% contingency (\$203,999) and to guarantee funding for Years 1-10 of lamprey monitoring (\$245,053).</p> <p>Comes into play if PGE fails to perform this work/provide the appropriate level of funding.</p>
Example Stewardship Funding Agreement	Appendix P	<p>Parties: PGE, Trustee Council, and selected long-term steward</p> <p>Example agreement for funding and management of the Project during the long-term stewardship period.</p> <p>PGE is required to fund this with \$2,617,642. This funding will come from the proceeds from the sale of DSAY credits. The money will be held in the PHERA.</p>

## 11. References

NOTE: Field work conducted prior to 2016 referred to within this report was completed by AECOM/PGE unless indicated otherwise. Inter-Fluve field work commenced in April 2016. Additionally, it should be known that AECOM contributed significantly to the content and structure of this report while under contract with PGE prior to April 2016.

AECOM 2015a. Portland General Electric Harborton Restoration Proposal. Prepared for Portland General Electric by AECOM Corporation. Portland, Oregon. March 2015.

AECOM 2015b. Technical Memorandum RE: Plan to Reduce Exposure of Target Species to Residual Contamination at the Harborton Restoration Site. Prepared for Portland General Electric and the Trustee Council by AECOM Corporation. Portland, Oregon. September 4, 2015.

COP. 2005. Draft Ecosystem Restoration General Investigation Study.

COP. 2009. River Plan North Reach, Recommended Draft 2009, Volume 3A: Natural Resources Inventory: Riparian Corridors and Wildlife Habitat. Bureau of Planning and Sustainability, City of Portland, Oregon.

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DSL. 2010b. Guidance for Using the Oregon Rapid Wetland Assessment Protocol in the State and Federal Permit Programs. April 2010.

FEMA, 2010a. FIRM Flood Insurance Rate Map, City of Portland, Oregon. Panel 60 of 250. Map Number 4101830060F. Map Revised November 26, 2010. Federal Emergency Management Agency, National Flood Insurance Program.

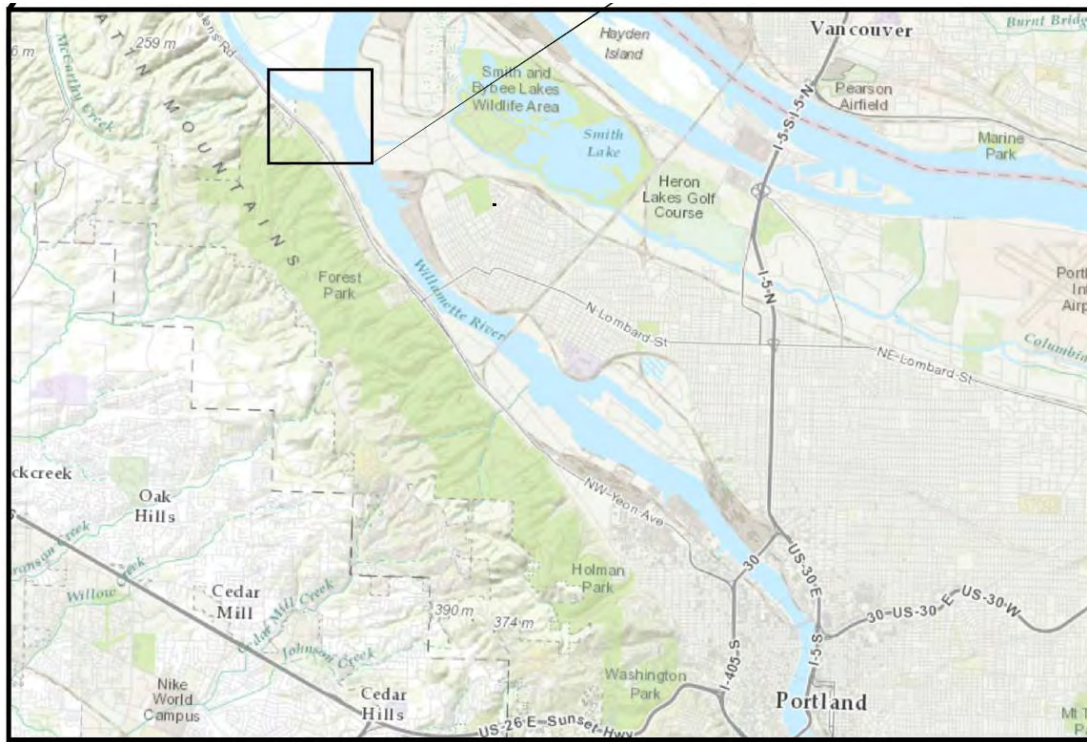
FEMA, 2010b. Flood Insurance Study, City of Portland, Oregon, Multnomah, Clackamas, and Washington Counties. Federal Emergency Management Agency. Effective November 26, 2010.



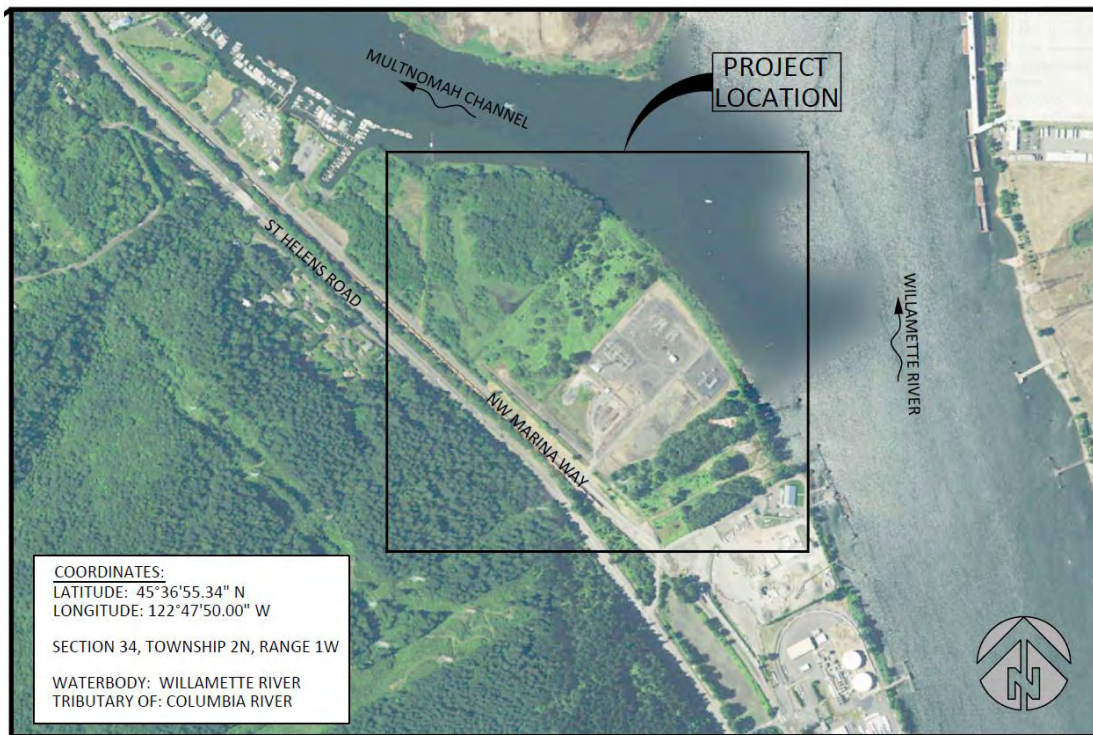
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- Trustee Council. 2012. Ecological Restoration Portfolio. April 2012. Available at: [http://www.fws.gov/filedownloads/ftp\\_OFWO/PortlandHarborNRDAWebSupport/Documents/Restoration\\_Portfolio.pdf](http://www.fws.gov/filedownloads/ftp_OFWO/PortlandHarborNRDAWebSupport/Documents/Restoration_Portfolio.pdf). Accessed May 22, 2012.
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- URS. 2014b. Draft Baseline Monitoring Plan, PGE Harborton Site. Prepared for Portland General Electric by URS Corporation. Portland, Oregon. January 2014.

HARBORTON HABITAT DEVELOPMENT PLAN

FIGURES

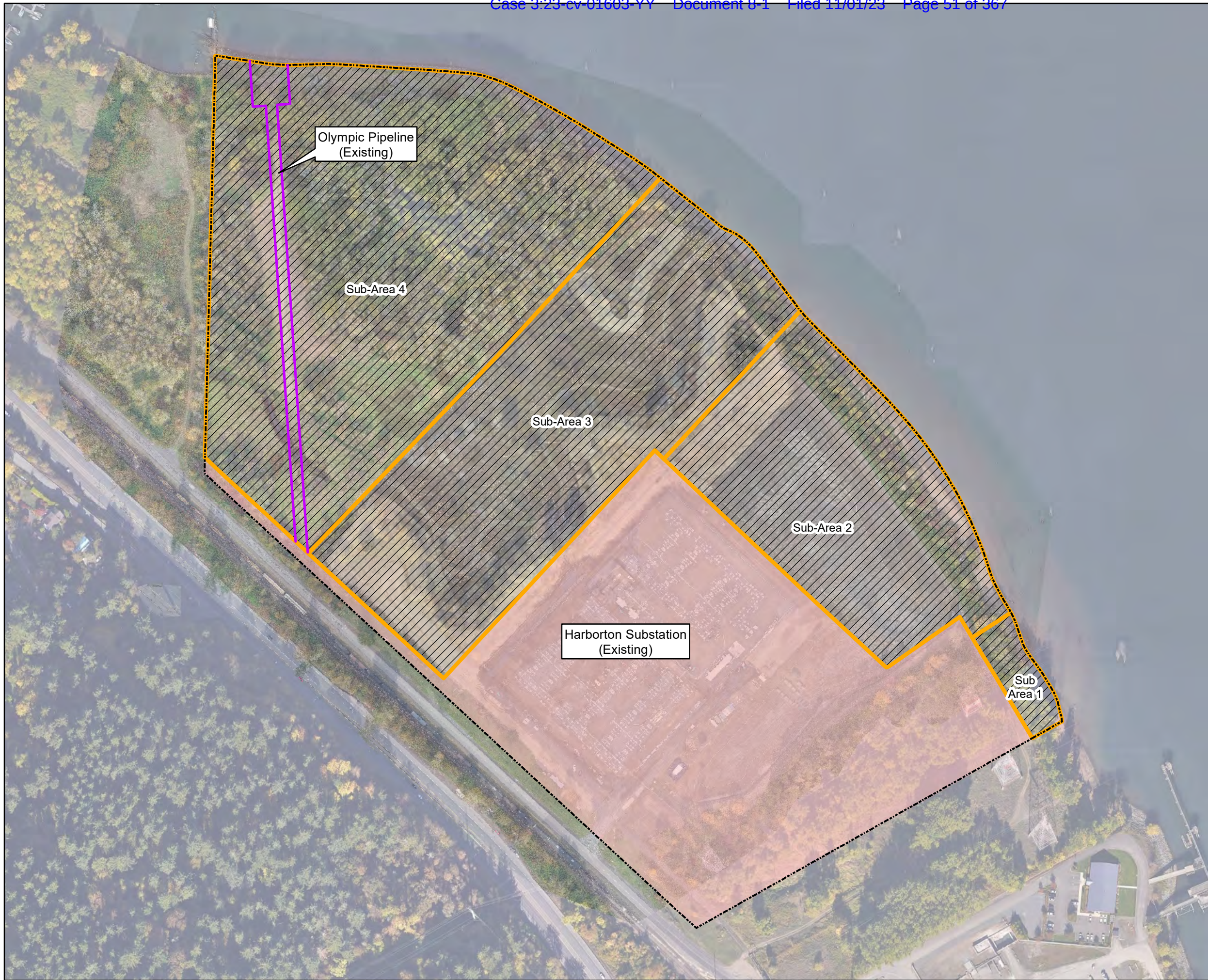






VICINITY MAP  
NOT TO SCALE

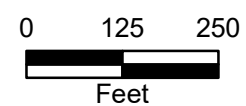


SITE MAP  
NOT TO SCALE

Figure 1. Site Maps



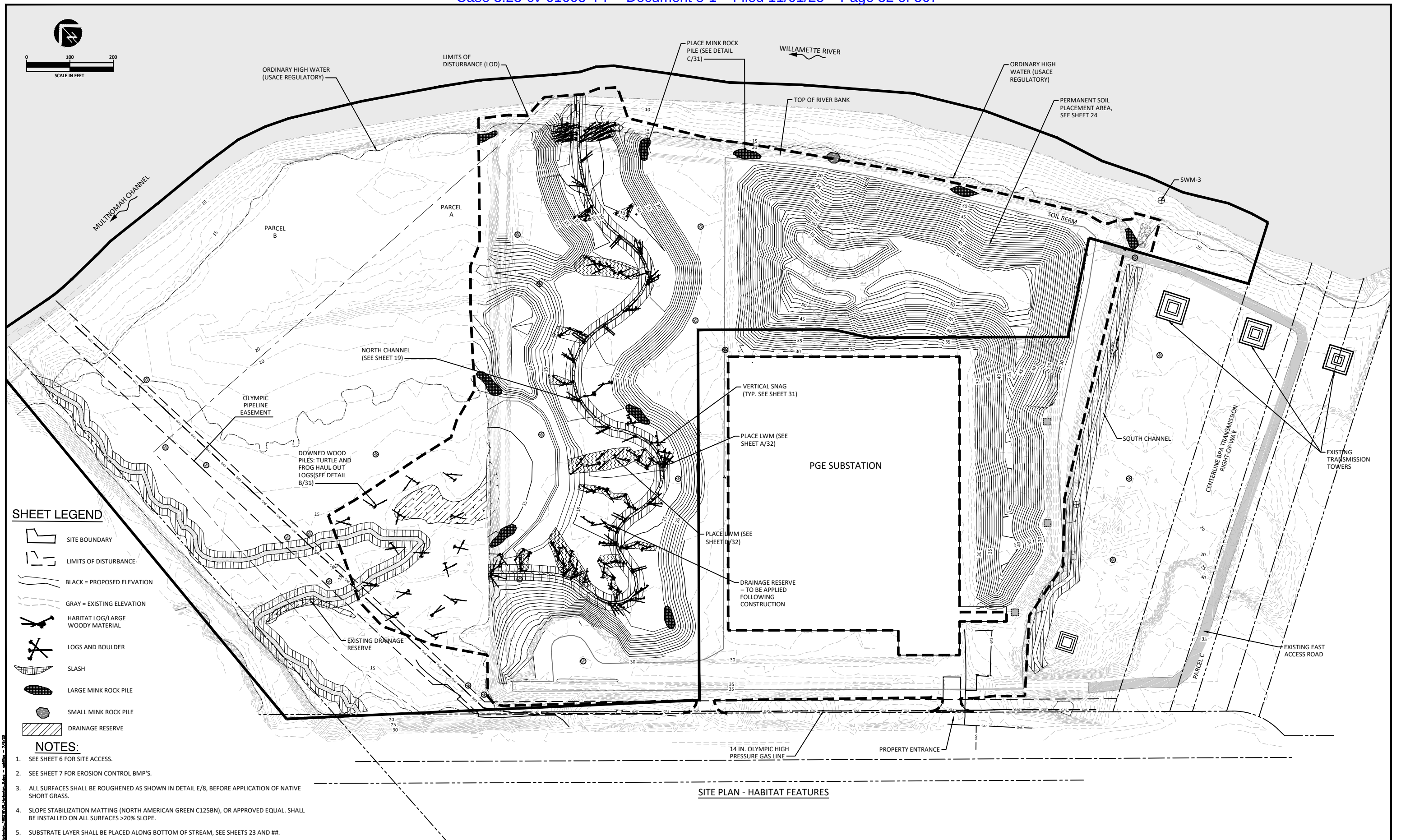
- Map Features**
-  Habitat Area
  -  Non-Habitat Area
  -  Property Line
  -  Olympic Pipeline



**Portland General Electric**  
Portland, Oregon

**Figure 2**  
**Harborton Site Map**

**PGE Environmental Services**



**SHEET LEGEND**

- SITE BOUNDARY
- LIMITS OF DISTURBANCE
- BLACK = PROPOSED ELEVATION
- GRAY = EXISTING ELEVATION
- HABITAT LOG/LARGE WOODY MATERIAL
- LOGS AND BOULDER
- SLASH
- LARGE MINK ROCK PILE
- SMALL MINK ROCK PILE
- DRAINAGE RESERVE

**NOTES:**

1. SEE SHEET 6 FOR SITE ACCESS.
2. SEE SHEET 7 FOR EROSION CONTROL BMP'S.
3. ALL SURFACES SHALL BE ROUGHENED AS SHOWN IN DETAIL E/8, BEFORE APPLICATION OF NATIVE SHORT GRASS.
4. SLOPE STABILIZATION MATTING (NORTH AMERICAN GREEN C125BN), OR APPROVED EQUAL, SHALL BE INSTALLED ON ALL SURFACES >20% SLOPE.
5. SUBSTRATE LAYER SHALL BE PLACED ALONG BOTTOM OF STREAM, SEE SHEETS 23 AND ##.

**SITE PLAN - HABITAT FEATURES**

NO.	BY	DATE	REVISION DESCRIPTION

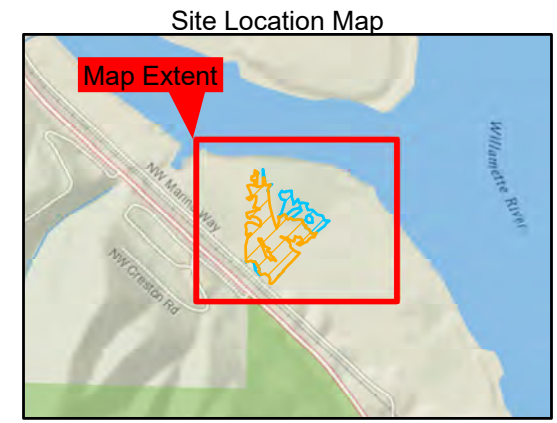
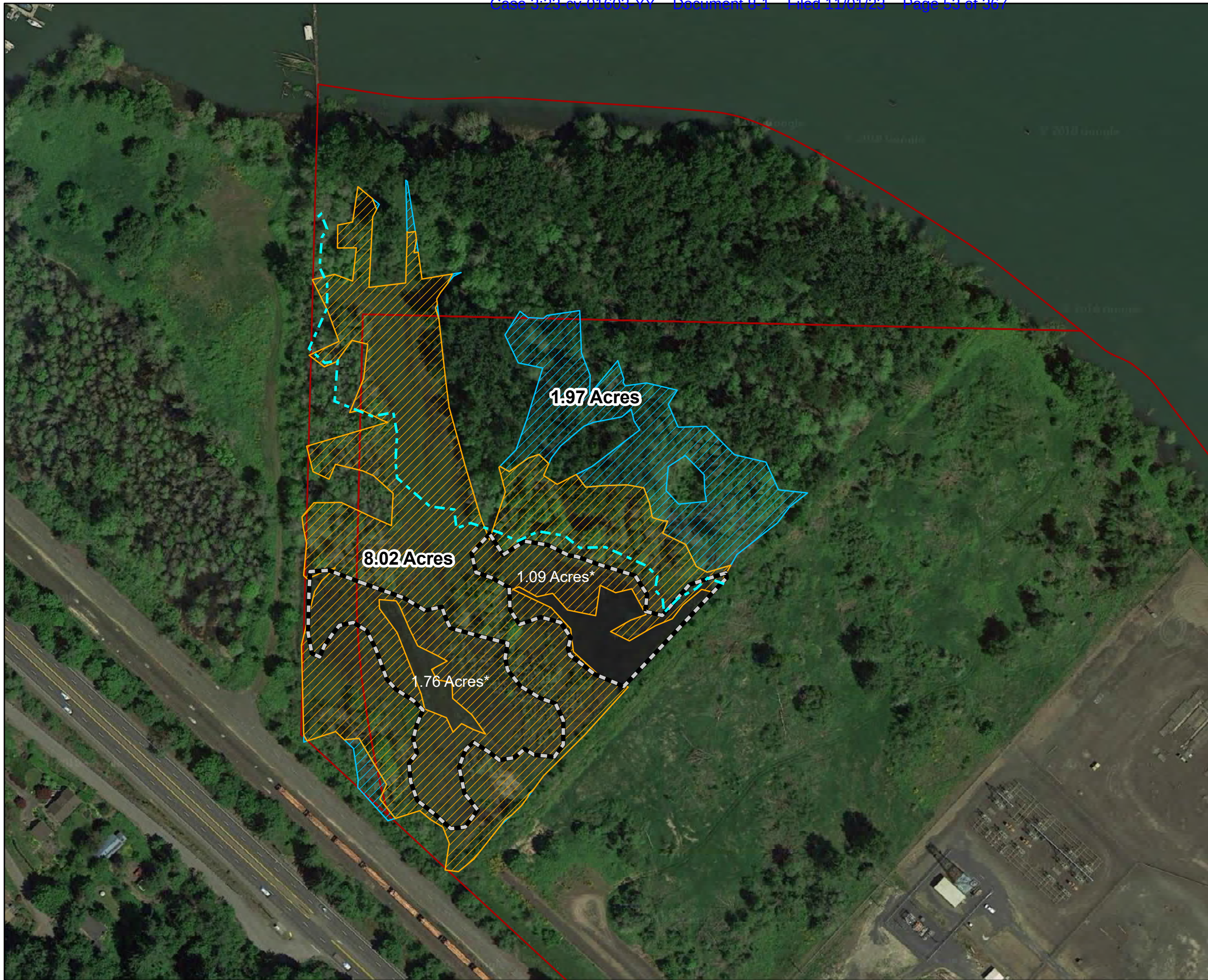
RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/6/20 DATE	160218 PROJECT

**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**








**HARBORTON SITE  
FEATURES**

**FIGURE  
3**

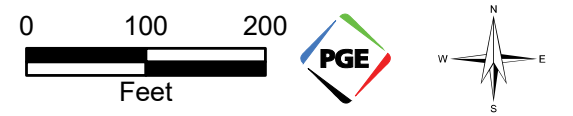


**Map Features**

-  Wetland Reed Canarygrass Area
-  Upland Reed Canarygrass Area
-  Red-legged Frog Breeding Habitat
-  PGE Property
-  15 ft. elevation (CPD)

Treatment	Acres
Upland RCG - Managed	1.97
Wetland RCG - Managed	2.84
Wetland RCG - Not Managed	5.18

\*Red-legged frog breeding habitat overlap with wetland reed canarygrass area is 2.16 acres.



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Portland, Oregon

**Figure 4 - Harborton Reed Canarygrass Treatment and Non-treatment Area**

## Appendix A. Site Photographs



*Sub Area 2, panoramic view from access over railroad spur tracks. Taken 4/22/2016*



*Sub Area 2, existing PGE substation. Taken 4/22/2016*

HARBORTON HABITAT DEVELOPMENT PLAN

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***Sub Area 3. Taken 4/22/2016***



***Sub Area 4, looking west. Taken 4/22/2016***

HARBORTON HABITAT DEVELOPMENT PLAN



***Sub Area 4, along Willamette River bank looking upstream. Taken 4/22/2016***



***Sub Area 3, wetland near river bank. Taken 4/22/2016***



HARBORTON HABITAT DEVELOPMENT PLAN



***Sub Area 1, at stream channel outlet to Willamette River. Taken 4/22/2016.***



***Sub Area 4, looking along pipeline easement towards Willamette River. Taken 4/22/2016***

HARBORTON HABITAT DEVELOPMENT PLAN



***Sub Area 4, river bank, looking downstream. Taken 4/22/2016***



***Sub Area 4, wooded wetland. Taken 4/22/2016***

HARBORTON HABITAT DEVELOPMENT PLAN

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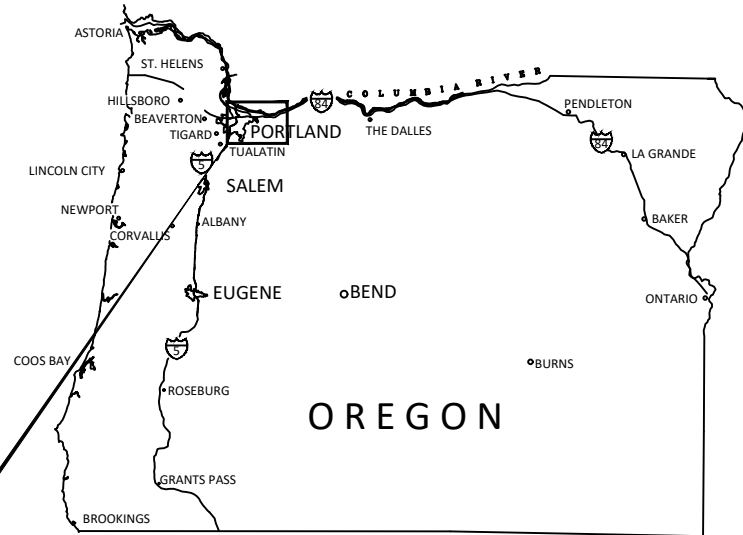
***Sub Area 4, open water wetland, looking toward Sub Area 3. Taken 4/22/2016***



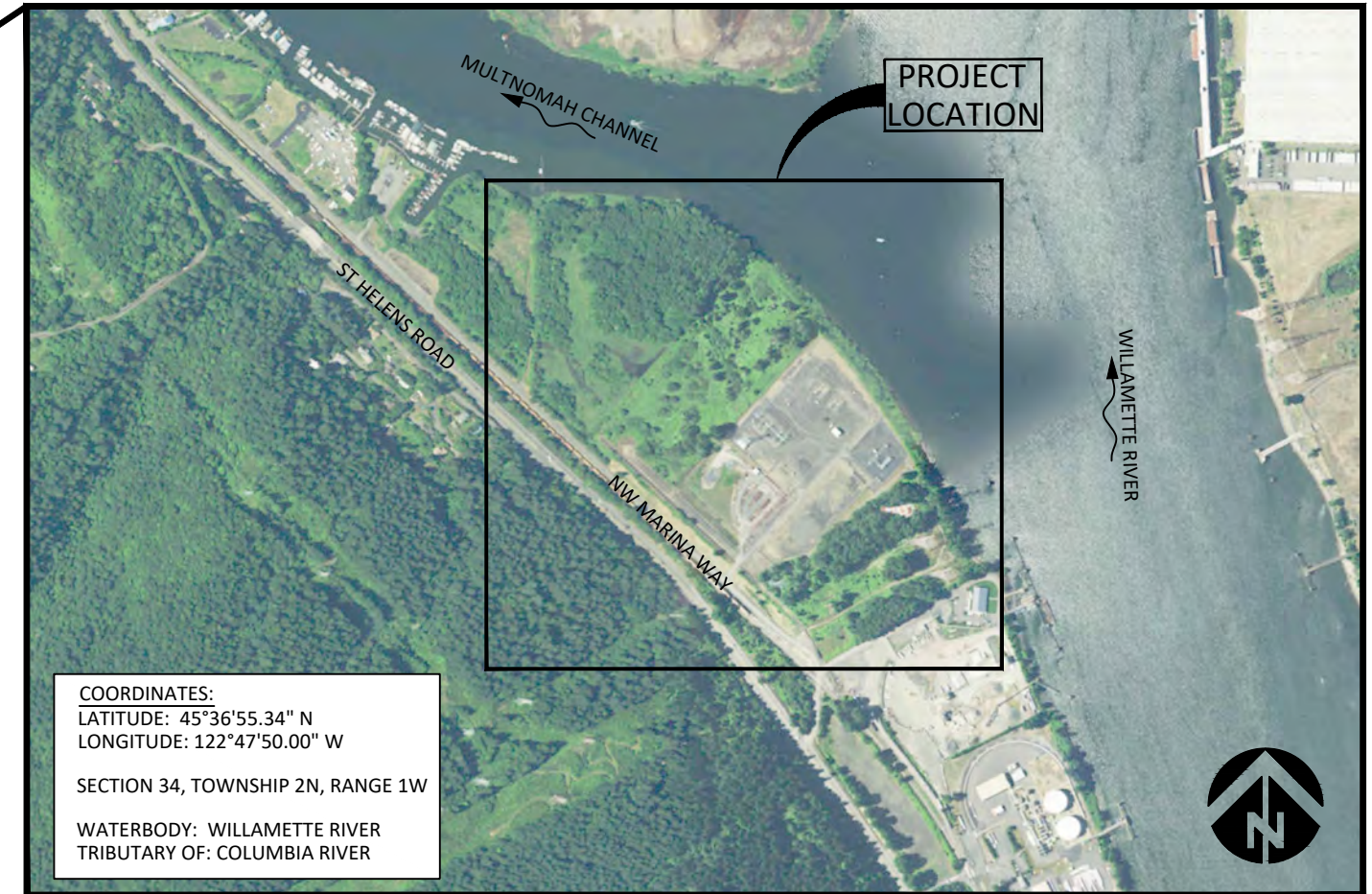
***Sub Area 4, open water wetland, looking north from Sub Area 3 berm. Taken 4/22/2016***

## **Appendix B – PGE Harborton Stamped 100% Design Drawings**

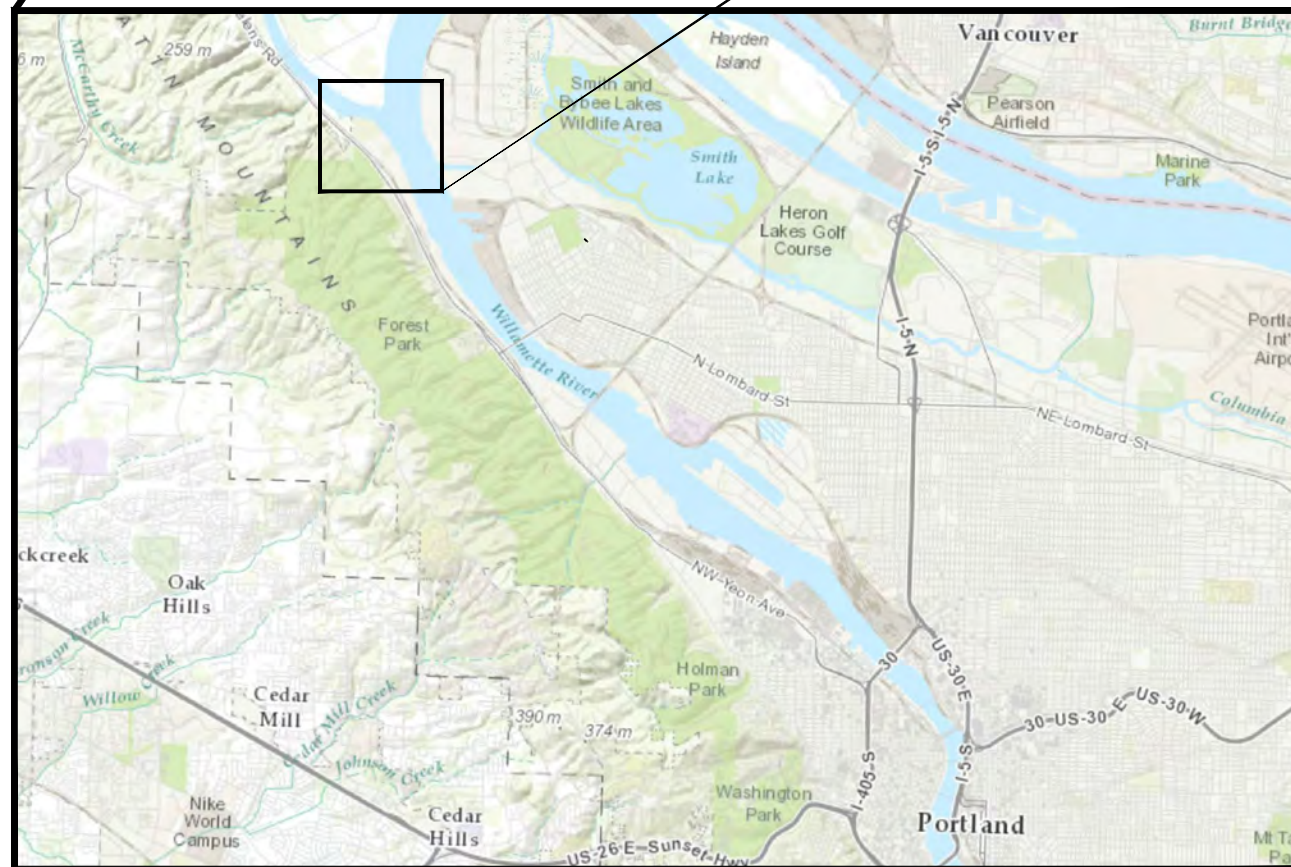
# PORTLAND GENERAL ELECTRIC HARBORTON RESTORATION PROJECT PORTLAND, OREGON July 23, 2020



**LOCATION MAP  
STATE OF OREGON**



**COORDINATES:**  
 LATITUDE: 45°36'55.34" N  
 LONGITUDE: 122°47'50.00" W  
 SECTION 34, TOWNSHIP 2N, RANGE 1W  
 WATERBODY: WILLAMETTE RIVER  
 TRIBUTARY OF: COLUMBIA RIVER



**VICINITY MAP  
NOT TO SCALE**

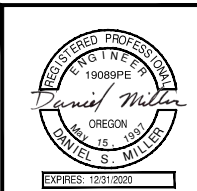
**SHEET INDEX**

- 1 - COVER SHEET, LOCATION AND SITE MAPS, AND DRAWING INDEX
- 2 - GENERAL NOTES
- 3 - EXISTING CONDITIONS
- 4 - EXISTING LANDUSE OVERVIEW
- 5 - EROSION, SEDIMENT, AND, POLLUTION CONTROL NOTES
- 6 - EROSION, SEDIMENT, AND, POLLUTION CONTROL PLAN - PRE CONST.
- 7 - EROSION, SEDIMENT, AND, POLLUTION CONTROL PLAN - ACTIVE CONST.
- 8 - EROSION, SEDIMENT, AND, POLLUTION CONTROL DETAILS - SHEET 1
- 9 - EROSION, SEDIMENT, AND, POLLUTION CONTROL DETAILS - SHEET 2
- 10 - SITE PLAN AND KNOWN UTILITIES
- 11 - SITE UTILITIES DEMOLITION AND IMPROVEMENTS PLAN
- 12 - CLEARING AND GRUBBING AND TREE REMOVAL PLAN
- 13 - DEWATERING PLAN
- 14 - SUBGRADING PLAN
- 15 - SUBGRADING PLAN - PROPOSED NORTH CHANNEL
- 16 - SUBGRADING CROSS-SECTIONS - PROPOSED NORTH CHANNEL
- 17 - SUBGRADING CROSS-SECTIONS - PROPOSED NORTH CHANNEL
- 18 - SUBGRADING CROSS-SECTIONS - PROPOSED NORTH CHANNEL
- 19 - PLAN AND PROFILE - PROPOSED NORTH CHANNEL

**SITE MAP**

NOT TO SCALE

- 20 - FINISHED GRADE CROSS-SECTIONS - NORTH CHANNEL
- 21 - FINISHED GRADE CROSS-SECTIONS - NORTH CHANNEL
- 22 - FINISHED GRADE CROSS-SECTIONS - NORTH CHANNEL
- 23 - TYPICAL DETAILS
- 24 - GRADING PLAN - FILL AREA
- 25 - GRADING CROSS-SECTIONS - FILL AREA
- 26 - GRADING CROSS-SECTIONS - FILL AREA
- 27 - PLAN VIEW - HABITAT FEATURES
- 28 - TYPICAL DETAILS AND NOTES - HABITAT FEATURES (SHEET 1)
- 29 - TYPICAL DETAILS AND NOTES - HABITAT FEATURES (SHEET 2)
- 30 - PLANTING PLAN
- 31 - TYPICAL DETAILS - PLANTING AND SEEDING
- 32 - TYPICAL DETAILS - PLANTING LAYOUT



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NO.	BY	DATE	REVISION DESCRIPTION

RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



**COVER SHEET, LOCATION AND  
SITE MAPS, AND DRAWING INDEX**

PROJECT LOCATION

12500 NW MARINA WAY
MULTNOMAH COUNTY, OR
LATITUDE = 45.6149, LONGITUDE = -122.797

PROPERTY DESCRIPTION

MULTNOMAH COUNTY TAX LOTS 100 AND 300 IN TOWNSHIP 2N, RANGE 1W, SECTION 34; MULTNOMAH COUNTY, OREGON

OWNER

COMPANY: PORTLAND GENERAL ELECTRIC
CONTACT: CHRISTOPHER BOZZINI, PE
ADDRESS: 121 SW SALMON STREET
ADDRESS: PORTLAND, OREGON 97204
PHONE: (503) 464-7853

PLANNING / ENGINEERING

COMPANY: INTER-FLUVE, INC.
CONTACT: MIKE BRUNFELT RG
ADDRESS: 501 PORTWAY AVENUE, SUITE 101
CITY: HOOD RIVER, OR 97031
PHONE: 541.386.9003
WWW.INTERFLUVE.COM

COMPANY: INTER-FLUVE, INC.
CONTACT: DAN MILLER PE
ADDRESS: 501 PORTWAY AVENUE, SUITE 101
CITY: HOOD RIVER, OR 97031
PHONE: 541.386.9003
WWW.INTERFLUVE.COM

ATTENTION EXCAVATORS

OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING 503-232-1987. IF YOU HAVE ANY QUESTIONS ABOUT THE RULES, YOU MAY CONTACT THE CENTER. YOU MUST NOTIFY THE CENTER AT LEAST TWO BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION. CALL 503-246-6699.

PERMITTEE'S SITE INSPECTOR

CONTACT: BRIAN BULLARD
COMPANY/AGENCY: PGE
PHONE: 503-878-3789
E-MAIL: BRIAN.BULLARD@PGN.COM

NARRATIVE DESCRIPTIONS

HABITAT AREA: 53.39 ACRES

EXISTING SITE CONDITIONS

PGE'S HARBORTON SITE IS AN APPROXIMATELY 74-ACRE INDUSTRIAL AREA. WITHIN THAT, THE HARBORTON RESTORATION SITE IS COMPRISED OF 53.4 ACRES OF REMNANT NATIVE RIPARIAN AND BACKWATER FLOODPLAIN HABITATS, A DIKED AREA THAT HAS BEEN FILLED WITH DREDGE SPOILS, AND AN INDUSTRIAL AREA THAT FORMERLY SUPPORTED A SUBSTATION. THE REMAINING APPROXIMATELY 20 ACRES NOT INCLUDED IN THE HABITAT RESTORATION EFFORT SUPPORT THE HARBORTON SUBSTATION, OVERHEAD TRANSMISSION LINES AND TOWERS, AND A NATURAL AREA WITH WETLANDS AND STREAM CHANNEL (SOUTH CHANNEL).

DEVELOPED CONDITIONS

UNDER THE PROPOSED RESTORATION PLAN, 53.4 ACRES OF THE SITE WILL BE DESIGNATED AS NATURAL HABITAT TO BE PROTECTED IN PERPETUITY. RE-ESTABLISHMENT OF NATURAL HABITAT WITHIN THE 53.4-ACRE AREA WILL INCLUDE EXCAVATION, RE-GRADING, AND CHANNEL AND FLOODPLAIN DEVELOPMENT TO PROVIDE FISH ACCESS TO THE ACTIVE CHANNEL MARGIN OF THE SITE, CREATION OF UPLAND HABITAT ON ABANDONED INDUSTRIAL LAND, ESTABLISHMENT OF NATIVE VEGETATION, INSTALLATION OF HABITAT FEATURES, AND PRESERVATION OF EXISTING DESIRABLE HABITAT.

NATURE OF CONSTRUCTION ACTIVITY AND ESTIMATED TIME TABLE

- \* CLEARING AND GRADING: JUNE 21 - JULY 15
\* CHANNEL CONSTRUCTION : JUNE 21 - OCTOBER 15
\* PLANTING: OCTOBER 1 - MARCH 31
\* FINAL STABILIZATION: OCTOBER 31 - MAY 31
TOTAL SITE AREA = 53.4 ACRES
NO WORK TO BE PERFORMED IN OR ADJACENT TO SUB-AREA 4 UNTIL JULY 15 OR SURFACE WATER IS ABSENT, WHICHEVER IS EARLIER.

SITE SOIL CLASSIFICATION

THERE ARE 4 DIFFERENT SOIL SERIES WITHIN THE PROPOSED CONSTRUCTION AREA PER THE 1985 SOIL SURVEY OF MULTNOMAH COUNTY AREA:

Table with 5 columns: MAPPING UNIT, SOIL UNIT NAME, SLOPE, DRAINAGE CLASS, WATER EROSION HAZARD. Rows include ALSAUGH CLAY LOAM, CONSER SILTY CLAY LOAM, SALEM SILT LOAM, WAPATO SILTY CLAY LOAM.

RECEIVING WATER BODIES

SUB-AREA 2 SITE RUNOFF FLOWS TO STREAMS IN SUB AREAS 1 AND 3 AND DIRECTLY TO WILLAMETTE RIVER. THE SOUTH CHANNEL DISCHARGES TO THE WILLAMETTE RIVER. SITE RUNOFF WITHIN SUB AREAS 2 AND 3 IS CURRENTLY INFILTRATED OR DIRECTED TO SEVERAL UNNAMED SWALES OR WETLANDS. SITE RUNOFF IN SUB AREA 4 IS DISCHARGED INTO UNNAMED WETLAND AREAS. FOLLOWING THE PROPOSED CONSTRUCTION ACTIVITIES, THE RUNOFF IN SUB AREA 3 AND 4 WILL BE DIRECTED THROUGH THE NEW CHANNEL ALIGNMENT TO MULTNOMAH CHANNEL.

SURVEY (BY OTHERS)

- 1. COORDINATES ARE BASED ON OREGON STATE PLANE GRID, NORTH ZONE, NAD83 (CORS 96, EPOCH 2002), INTERNATIONAL FEET. COORDINATES ARE DERIVED FROM AN NGS OPUS SOLUTION.
2. LOCAL ELEVATIONS BASED ON CITY OF PORTLAND BENCH MARK NUMBER 242 A BRASS DISC IN THE SOUTH CURB OF STATE HIGHWAY 30, 0.1 MILES WEST OF THE INTERSECTION WITH NW MARINA WAY, ELEVATION IS 53.614 FEET. TO CONVERT TO NAVD 88 DATUM ADD 2.10 FEET (COP STANDARD CONVERSION) TO ALL ELEVATIONS.
3. UNDERGROUND UTILITIES SHOWN ARE PER FIELD LOCATES PROVIDED BY THE RESPECTIVE UTILITY AGENCIES. ALL UNDERGROUND UTILITIES MUST BE FIELD VERIFIED PRIOR TO ANY CONSTRUCTION ACTIVITY.
4. TO CONVERT TO NAVD88 THEN USING THE LOCAL NAVD88 TO CPD DATUM CONVERSION.
5. THE SITE ORDINARY HIGH WATER (OHW) SURVEYED BY WH PACIFIC IS SHOWN AS THE REGULATORY OHW IS ESTABLISHED BY THE USACE IN THE NOVEMBER 2004 PORTLAND-VANCOUVER HARBOR INFORMATION PACKAGE, SECOND EDITION, RESERVOIR REGULATION AND WATER QUALITY SECTION. THE PUBLICATION LISTS THE OHW FOR THE PROJECT AREA AS 16.6-FT NGVD29.

GENERAL NOTES

- 1. CONTRACTOR SHALL CALL LOCAL AND/OR PRIVATE UTILITY LOCATE SERVICE FOR UTILITY LOCATIONS 48 HOURS PRIOR TO START OF CONSTRUCTION.
2. LOCATIONS OF EXISTING UTILITIES AS SHOWN ON THE DRAWINGS ARE BASED ON FIELD SURVEY BY OTHERS, AS-BUILT DRAWINGS AND GIS INFORMATION. LOCATIONS ARE NOT GUARANTEED TO BE COMPLETE OR ACCURATE. THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY DISCREPANCIES BEFORE BEGINNING CONSTRUCTION.
3. CONTRACTOR TO FIELD VERIFY EXACT DEPTH AND LOCATION OF EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATION AND NOTIFY ENGINEER OF ANY CONFLICT IMMEDIATELY. EXISTING UTILITIES SHALL BE EXPOSED BY HAND OR VACUUM EXCAVATION. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR COORDINATING TEMPORARY AND/OR PERMANENT UTILITY RELOCATION, ALL COSTS OF SUCH RELOCATION SHALL BE INCIDENTAL TO THE CONTRACT.
4. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, PAVING, UTILITIES, VEGETATION, ETC. AND UPON COMPLETION OF WORK REPAIR ANY DAMAGE THAT OCCURRED DURING CONSTRUCTION TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST TO OWNER.
5. SIZE, LOCATION AND TYPE OF ANY UNDERGROUND UTILITIES OR IMPROVEMENTS SHALL BE ACCURATELY NOTED AND PLACED ON AS-CONSTRUCTED DRAWINGS BY THE CONTRACTOR AND ISSUED TO THE OWNER AT COMPLETION OF PROJECT.
6. CONTRACTOR SHALL MAINTAIN THE SITE CLEAR OF DEBRIS, SUCH AS PAPER, TRASH, WEEDS, OR ANY OTHER DEPOSITS, ON A DAILY BASIS. ALL MATERIALS COLLECTED DURING CLEANING OPERATIONS SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
7. CONTRACTOR TO SUPPLY EROSION AND SEDIMENT CONTROL PLAN FOR ENGINEER APPROVAL PRIOR TO THE START OF WORK.
8. DELINEATION OF THE EXISTING FACILITIES IS BASED ON THE BEST AVAILABLE INFORMATION AND IS SUBJECT TO CHANGE.
9. CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR PROTECTION OF EXISTING FACILITIES FROM DAMAGE DUE TO CONTRACTOR'S OPERATIONS.
10. CONTRACTOR SHALL ENFORCE STRICT DISCIPLINE AND GOOD ORDER AMONG ITS EMPLOYEES AT ALL TIMES. CONTRACTOR SHALL NOT EMPLOY ANY PERSON UNFIT OR UNSKILLED IN ANY ASSIGNED PROJECT.
11. CONTRACTOR TO FOLLOW STATE AND FEDERAL SAFETY REGULATIONS FOR ALL EARTHWORK.
12. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO STARTING CONSTRUCTION. CONTRACTING OFFICER SHALL BE NOTIFIED OF ANY DISCREPANCIES OR INCONSISTENCIES.
13. DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALES SHOWN ON DRAWINGS.
14. THE CONTRACT DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE COMPLETED WORK DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. OBSERVATION VISITS TO THE SITE BY THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.
15. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FENCES, BARRIERS, DIRECTIONAL SIGNS, LIGHTS, AND FLAGGERS, AS NECESSARY, TO GIVE ADEQUATE WARNING TO THE PUBLIC AT ALL TIMES OF ANY DANGEROUS CONDITIONS TO BE ENCOUNTERED AS A RESULT OF THE CONSTRUCTION WORK.
16. CONTRACTOR SHALL PROVIDE FENCING AND OTHER RESTRICTIONS TO LIMIT ENTRY TO PROJECT WORK SITE TO AUTHORIZED PERSONNEL.
17. DUST SHALL BE CONTROLLED AT ALL TIMES BY CONTRACTING OFFICERS APPROVED METHODS SUCH AS WATERING.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAVEMENT REPLACEMENT FOR DAMAGE TO EXISTING PAVEMENT IN THE VICINITY OF THE SITE.

STATEMENT OF LIMITATIONS

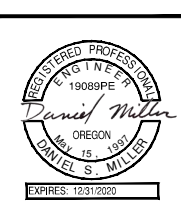
THIS PROJECT HAS BEEN DESIGNED BASED ON AVAILABLE TOPOGRAPHIC SURVEY AND GIS INFORMATION FROM VARIOUS SOURCES. INTER-FLUVE, INC. HAS RELIED ON THIS INFORMATION AS FURNISHED, AND IS NEITHER RESPONSIBLE FOR, NOR HAS CONFIRMED THE ACCURACY OF THIS INFORMATION. THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER IF SURVEYED CONDITIONS DIFFER FROM ACTUAL FIELD CONDITIONS. THESE DOCUMENTS ARE FOR USE BY PGE AND ITS CONTRACTORS ONLY, AND IS NOT TO BE DISTRIBUTED TO THIRD PARTIES. RE-USE OF THESE DOCUMENTS IS AT THE SOLE RISK OF SAID USER.

GENERAL LEGEND

Legend area containing symbols and descriptions for various site features: DEVELOPED AREA, OLYMPIC PIPELINE EASEMENT, EXISTING BERM, EXISTING WETLANDS, EXISTING POWER POLE, SURVEYED TREES, WETLAND SETBACK (50 FT.), GREENWAY SETBACK (50 FT.), 100-YR SHRUB SCRUB, LANDUSE, STRAW WATTLE, EXISTING ROAD, DITCH/SWALE, CATCH BASIN, CULVERT, SITE BOUNDARY, LIMITS OF DISTURBANCE, DEVELOPED AREA, BIOSWALE, OHW LINE, FIRE SUPPRESSION SYSTEM HYDRANT, MONITORING WELL/PIEZOMETER, CHAIN LINK FENCE, LIGHT POLE, EXISTING UTILITY POLE WITH GUY-WIRES, OVERHEAD POWER LINE, STATION, TRANSMISSION TOWERS, RAILROAD SPUR, STATIONS CONTROL POINT, HEAVY INDUSTRIAL, RIVER GENERAL (GREENWAY), OPEN SPACE, RIVER NATURAL (GREENWAY), RIVER WATER QUALITY (GREENWAY), RESIDENTIAL FARM AND FOREST, RIVER GENERAL (GREENWAY), ENVIRONMENTAL PROTECTION, HABITAT LOG/LARGE WOODY MATERIAL, SLASH, RIPARIAN HABITAT (EXISTING), UPLAND HABITAT (EXISTING), ACM HABITAT (EXISTING), SHALLOW WATER PRESENT THROUGHOUT YEAR SEASONAL WETLANDS, SEDIMENT FENCE, TURBIDITY CURTAIN, BIOBAG FILTERS, PROTECTIVE ORANGE FENCING, STORMWATER FLOW DIRECTION, BIOSWALE, DEMOLISH AND REMOVE FOR OFF SITE SALVAGE OR DISPOSAL, ABANDON IN-PLACE, REMOVE/ABANDON WELL, REMOVE/RELOCATED BY PGE, HYDRANT TO BE REMOVED, EXTENT OF GRUBBING AND TREE REMOVAL, TREES TO BE SALVAGED WITH ROOT WADS (10-INCH IN DIAMETER OR GREATER), TREES TO BE PROTECTED AND PRESERVED, DRAINAGE RESERVE.

Table with 3 columns: Role (RP, CP, DM, MB), Name (DRAWN, DESIGNED, CHECKED, APPROVED), Date (7/23/20), Project (160218).

PORTLAND GENERAL ELECTRIC
HARBORTON RESTORATION PROJECT
PORTLAND, OREGON

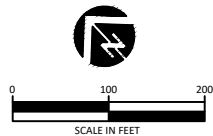


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**SHEET LEGEND**

DRAINAGE RESERVE



PARCEL	PROPERTY ID	ALT ACCOUNT #
A	R325472	R971340180
B	R325467	R971340100
C	R325470	R971340160



NO.	BY	DATE	REVISION DESCRIPTION

RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



**EXISTING CONDITIONS**

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**SHEET LEGEND**

- IHGq HEAVY INDUSTRIAL, RIVER GENERAL (GREENWAY)
- OSnq OPEN SPACE, RIVER NATURAL (GREENWAY), RIVER WATER QUALITY (GREENWAY)
- RFgp RESIDENTIAL FARM AND FOREST, RIVER GENERAL (GREENWAY), ENVIRONMENTAL PROTECTION
- X% SLOPE OF RIVER BANK
- [Pattern] WETLAND SETBACK (50 FT.)
- [Pattern] GREENWAY SETBACK (50 FT.)
- [Pattern] UPLAND HABITAT (EXISTING)
- [Pattern] SHALLOW WATER PRESENT THROUGHOUT MOST OF THE YEAR
- [Pattern] SEASONAL WETLANDS
- [Pattern] DRAINAGE RESERVE

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NO.	BY	DATE	REVISION DESCRIPTION

RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



**EXISTING LANDUSE OVERVIEW**



**STANDARD EROSION AND SEDIMENT CONTROL PLAN (ESCPP) DRAWING NOTES**

- A PRE-CONSTRUCTION MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE INSPECTOR TO DISCUSS EROSION AND SEDIMENT CONTROL MEASURES AND CONSTRUCTION LIMITS. (SCHEDULE A.8.C.I.(3))
- ALL INSPECTIONS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS.
- INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ'S 1200-C PERMIT REQUIREMENTS.
- RETAIN A COPY OF THE ESCPP AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY. DURING INACTIVE PERIODS OF GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS, RETAIN THE ESCPP AT THE CONSTRUCTION SITE OR AT ANOTHER LOCATION. (SCHEDULE B.2)
- ALL PERMIT REGISTRANTS MUST IMPLEMENT THE ESCPP. FAILURE TO IMPLEMENT ANY OF THE CONTROL MEASURES OR PRACTICES DESCRIBED IN THE ESCPP IS A VIOLATION OF THE PERMIT. (SCHEDULE A.8.A)
- THE ESCPP MEASURES SHOWN ON THIS PLAN ARE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, UPGRADE THESE MEASURES AS NEEDED TO COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL EROSION AND SEDIMENT CONTROL REGULATIONS. (SCHEDULE A.8.C.II.(1)(C))
- SUBMISSION OF ALL ESCPP REVISIONS IS NOT REQUIRED. SUBMITTAL OF THE ESCPP REVISIONS IS ONLY UNDER SPECIFIC CONDITIONS. SUBMIT ALL NECESSARY REVISION TO DEQ OR AGENT. (SCHEDULE A.12.C.III)
- PHASE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION. (SCHEDULE A.8.C.II.(1)(D))
- IDENTIFY, MARK, AND PROTECT (BY FENCING OFF OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES, AND VEGETATION AREAS TO BE PRESERVED. IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (E.G., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS. (SCHEDULE A.8.C.I.(1) & (2))
- PRESERVE EXISTING VEGETATION WHEN PRACTICAL AND RE-VEGETATE OPEN AREAS. RE-VEGETATE OPEN AREAS WHEN PRACTICABLE BEFORE AND AFTER GRADING OR CONSTRUCTION. IDENTIFY THE TYPE OF VEGETATIVE SEED MIX USED. (SCHEDULE A.7.A.V(1) AND A.7.A.V(3))
- EROSION AND SEDIMENT CONTROL MEASURES INCLUDING PERIMETER SEDIMENT CONTROL MUST BE IN PLACE BEFORE VEGETATION IS DISTURBED AND MUST REMAIN IN PLACE AND BE MAINTAINED, REPAIRED, AND PROMPTLY IMPLEMENTED FOLLOWING PROCEDURES ESTABLISHED FOR THE DURATION OF CONSTRUCTION, INCLUDING PROTECTION FOR ACTIVE STORM DRAIN INLETS AND CATCH BASINS AND APPROPRIATE NON-STORMWATER POLLUTION CONTROLS. (SCHEDULE A.7.D.I AND A.8.C)
- APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES AND FOR ALL ROADWAYS INCLUDING GRAVEL ROADWAYS. (SCHEDULE A.8.C.II.(2))
- ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS. (SCHEDULE A.8.C.I.(7))
- PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMPs SUCH AS: GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ONSITE, OR USE AN EXIT TIRE WASH. THESE BMPs MUST BE IN PLACE PRIOR TO LAND-DISTURBING ACTIVITIES. (SCHEDULE A.7.D.II.(1) AND A.8.C.I(4))
- WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER USE WATER-TIGHT TRUCKS OR DRAIN LOADS ON SITE. (SCHEDULE A.7.D.II.(3))
- USE BMPs TO PREVENT OR MINIMIZE STORMWATER EXPOSURE TO POLLUTANTS FROM SPILLS; VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE; OTHER CLEANING AND MAINTENANCE ACTIVITIES; AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, LEFTOVER PAINTS, SOLVENTS, AND GLUES FROM CONSTRUCTION OPERATIONS. (SCHEDULE A.7.E.I.(2))
- IMPLEMENT THE FOLLOWING BMPs WHEN APPLICABLE: WRITTEN SPILL PREVENTION AND RESPONSE PROCEDURES, EMPLOYEE TRAINING ON SPILL PREVENTION AND PROPER DISPOSAL PROCEDURES, SPILL KITS IN ALL VEHICLES, REGULAR MAINTENANCE SCHEDULE FOR VEHICLES AND MACHINERY, MATERIAL DELIVERY AND STORAGE CONTROLS, TRAINING AND SIGNAGE, AND COVERED STORAGE AREAS FOR WASTE AND SUPPLIES. (SCHEDULE A.7.E.III.)
- USE WATER, SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL. (SCHEDULE A.7.A.IV)
- THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. EXERCISE CAUTION WHEN USING TIME-RELEASE FERTILIZERS WITHIN ANY WATERWAY RIPARIAN ZONE. (SCHEDULE A.9.B.III). NO FERTILIZER IS TO BE USED IN SUB-AREA 4.

- IF A STORMWATER TREATMENT SYSTEM (FOR EXAMPLE, ELECTRO-COAGULATION, FLOCCULATION, FILTRATION, ETC.) FOR SEDIMENT OR OTHER POLLUTANT REMOVAL IS EMPLOYED, SUBMIT AN OPERATION AND MAINTENANCE PLAN (INCLUDING SYSTEM SCHEMATIC, LOCATION OF SYSTEM, LOCATION OF INLET, LOCATION OF DISCHARGE, DISCHARGE DISPERSION DEVICE DESIGN, AND A SAMPLING PLAN AND FREQUENCY) BEFORE OPERATING THE TREATMENT SYSTEM. OBTAIN PLAN APPROVAL BEFORE OPERATING THE TREATMENT SYSTEM. OPERATE AND MAINTAIN THE TREATMENT SYSTEM ACCORDING TO MANUFACTURER'S SPECIFICATIONS. (SCHEDULE A.9.D)
- TEMPORARILY STABILIZE SOILS AT THE END OF THE SHIFT BEFORE HOLIDAYS AND WEEKENDS, IF NEEDED. THE REGISTRANT IS RESPONSIBLE FOR ENSURING THAT SOILS ARE STABLE DURING RAIN EVENTS AT ALL TIMES OF THE YEAR. (SCHEDULE A.7.A.II)
- AT THE END OF EACH WORKDAY SOIL STOCKPILES MUST BE STABILIZED OR COVERED, OR OTHER BMPs MUST BE IMPLEMENTED TO PREVENT DISCHARGES TO SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATERS. (SCHEDULE A.7.E.II.(2))
- CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND DURING WET WEATHER. (SCHEDULE A.7.A.I)
- SEDIMENT FENCE: REMOVE TRAPPED SEDIMENT BEFORE IT REACHES ONE THIRD OF THE ABOVE GROUND FENCE HEIGHT AND BEFORE FENCE REMOVAL. (SCHEDULE A.9.C.I)
- OTHER SEDIMENT BARRIERS (SUCH AS BIOBAGS): REMOVE SEDIMENT BEFORE IT REACHES TWO INCHES DEPTH ABOVE GROUND HEIGHT AND BEFORE BMP REMOVAL. (SCHEDULE A.9.C.II)
- CATCH BASINS: CLEAN BEFORE RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT. SEDIMENT BASINS AND SEDIMENT TRAPS: REMOVE TRAPPED SEDIMENTS BEFORE DESIGN CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT AND AT COMPLETION OF PROJECT. (SCHEDULE A.9.C.III & IV)
- WITHIN 24 HOURS, SIGNIFICANT SEDIMENT THAT HAS LEFT THE CONSTRUCTION SITE, MUST BE REMEDIATED. INVESTIGATE THE CAUSE OF THE SEDIMENT RELEASE AND IMPLEMENT STEPS TO PREVENT A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIMEFRAME. (SCHEDULE A.9.B.I)
- THE INTENTIONAL WASHING OF SEDIMENT INTO STORM SEWERS OR DRAINAGE WAYS MUST NOT OCCUR. VACUUMING OR DRY SWEEPING AND MATERIAL PICKUP MUST BE USED TO CLEANUP RELEASED SEDIMENTS. (SCHEDULE A.9.B.II)
- THE ENTIRE SITE MUST BE TEMPORARILY STABILIZED USING VEGETATION OR A HEAVY MULCH LAYER, TEMPORARY SEEDING, OR OTHER METHOD SHOULD ALL CONSTRUCTION ACTIVITIES CEASE FOR 30 DAYS OR MORE. (SCHEDULE A.7.F.I)
- PROVIDE TEMPORARY STABILIZATION FOR THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES CEASE FOR 14 DAYS OR MORE WITH A COVERING SUCH AS BLOWN STRAW AND A TACKIFIER, LOOSE STRAW, COMPOST MULCH, TEMPORARY VEGETATIVE COVER, CRUSHED ROCK OR GRAVEL BASE. (SCHEDULE A.7.F.II)
- PROVIDE PERMANENT EROSION CONTROL MEASURES ON ALL EXPOSED AREAS. DO NOT REMOVE TEMPORARY SEDIMENT CONTROL PRACTICES UNTIL PERMANENT VEGETATION OR OTHER COVER OF EXPOSED AREAS IS ESTABLISHED. HOWEVER, DO REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AS EXPOSED AREAS BECOME STABILIZED, UNLESS DOING SO CONFLICTS WITH LOCAL REQUIREMENTS. PROPERLY DISPOSE OF CONSTRUCTION MATERIALS AND WASTE, INCLUDING SEDIMENT RETAINED BY TEMPORARY BMPs. (SCHEDULE A.7.A.V(2) AND A.8.C.III)
- IF TEMPORARY SEEDING IS CONDUCTED ON SITE, THE FOLLOWING SEED MIX SHALL BE APPLIED AT A RATE OF 50 LB/ACRE.

SPECIES	PROPORTION OF SEED MIX (BY WEIGHT)
SPIKE BENTGRASS (AGROSTIS EXARATA)	5
CALIFORNIA BROME (BROMUS CARINATUS)	20
COLUMBIA BROME (BROMUS VULGARIS)	20
TUFTED HAIRGRASS (DESCHAMPSIA CESPITOSA)	5
BLUE WILD RYE (ELYMUS GLAUCUS)	30
MEADOW BARLEY (HORDEUM BRANCHYANTHERUM)	20

**LOCAL AGENCY-SPECIFIC EROSION CONTROL NOTES**

- WHEN RAINFALL AND RUNOFF OCCURS DAILY INSPECTIONS OF THE EROSION AND SEDIMENT CONTROLS AND DISCHARGE OUTFALLS MUST BE PROVIDED BY SOME ONE KNOWLEDGEABLE AND EXPERIENCED IN THE PRINCIPLES, PRACTICES, INSTALLATION, AND MAINTENANCE OF EROSION AND SEDIMENT CONTROLS WHO WORKS FOR THE PERMITTEE.
- CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND FROM OCTOBER 1 THROUGH MAY 31 EACH YEAR.
- DURING WET WEATHER PERIOD, TEMPORARY STABILIZATION OF THE SITE MUST OCCUR AT THE END OF EACH WORK DAY.
- SEDIMENT CONTROLS MUST BE INSTALLED AND MAINTAINED ON ALL DOWN GRADIENT SIDES OF THE CONSTRUCTION SITE AT ALL TIMES DURING CONSTRUCTION. THEY MUST REMAIN IN PLACE UNTIL PERMANENT VEGETATION OR OTHER PERMANENT COVERING OF EXPOSED SOIL IS ESTABLISHED.
- ALL ACTIVE INLETS MUST HAVE SEDIMENT CONTROLS INSTALLED AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION. UNLESS OTHERWISE APPROVED, A SURFACE MOUNTED AND ATTACHABLE, U-SHAPED FILTER BAG IS REQUIRED FOR ALL CURB INLET CATCH BASINS.
- SIGNIFICANT AMOUNTS OF SEDIMENT WHICH LEAVES THE SITE MUST BE CLEANED UP WITHIN 24 HOURS AND PLACED BACK ON THE SITE AND STABILIZED OR PROPERLY DISPOSED. THE CAUSE OF THE SEDIMENT RELEASE MUST BE FOUND AND PREVENTED FROM CAUSING A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DEPARTMENT OF STATE LANDS REQUIRED TIME FRAME.
- SEDIMENT MUST NOT BE INTENTIONALLY WASHED INTO STORM SEWERS, DRAINAGE WAYS, OR WATER BODIES.
- SEDIMENT MUST BE REMOVED FROM BEHIND ALL SEDIMENT CONTROL MEASURES WHEN IT HAS REACHED A HEIGHT OF 1/3RD THE BARRIER HEIGHT, AND PRIOR TO THE CONTROL MEASURES REMOVAL.
- CLEANING OF ALL STRUCTURES WITH SUMPS MUST OCCUR WHEN THE SEDIMENT RETENTION CAPACITY HAS BEEN REDUCED BY 50% AND AT COMPLETION OF PROJECT.
- ANY USE OF TOXIC OR OTHER HAZARDOUS MATERIALS MUST INCLUDE PROPER STORAGE, APPLICATION, AND DISPOSAL.
- THE PERMITTEE MUST PROPERLY MANAGE HAZARDOUS WASTES, USED OILS, CONTAMINATED SOILS, WASTE, SANITARY WASTE, LIQUID WASTE, OR OTHER TOXIC SUBSTANCES DISCOVERED OR GENERATED DURING CONSTRUCTION.
- THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS. NUTRIENT RELEASES FROM FERTILIZERS TO SURFACE WATERS MUST BE MINIMIZED. TIME RELEASE FERTILIZERS SHOULD BE USED AND CARE SHOULD BE MADE IN APPLICATION OF FERTILIZERS WITHIN ANY WATER WAY RIPARIAN ZONE.
- OWNER OR DESIGNATED PERSON SHALL BE RESPONSIBLE FOR PROPER INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES, IN ACCORDANCE WITH CURRENT CLEAN WATER SERVICES STANDARDS AND STATE, AND FEDERAL REGULATIONS.
- PRIOR TO ANY LAND DISTURBING ACTIVITIES, THE BOUNDARIES OF THE CLEARING LIMITS, VEGETATED BUFFERS, AND ANY SENSITIVE AREAS SHOWN ON THIS PLAN SHALL BE CLEARLY DELINEATED IN THE FIELD. UNLESS OTHERWISE APPROVED, NO DISTURBANCE IS PERMITTED BEYOND THE CLEARING LIMITS. THE OWNER/PERMITTEE MUST MAINTAIN THE DELINEATION FOR THE DURATION OF THE PROJECT. NOTE: VEGETATED CORRIDORS TO BE DELINEATED WITH ORANGE CONSTRUCTION FENCE OR APPROVED EQUAL.
- PRIOR TO ANY LAND DISTURBING ACTIVITIES, THE BMPs THAT MUST BE INSTALLED ARE GRAVEL CONSTRUCTION ENTRANCE, PERIMETER SEDIMENT CONTROL, AND INLET PROTECTION. THESE BMPs MUST BE MAINTAINED FOR THE DURATION OF THE PROJECT.
- IF VEGETATIVE SEED MIXES ARE SPECIFIED, SEEDING MUST TAKE PLACE NO LATER THAN SEPTEMBER 1ST; THE TYPE AND PERCENTAGES OF SEED IN THE MIX ARE AS IDENTIFIED ON THE PLANS OR AS SPECIFIED BY THE DESIGN ENGINEER. IF SEEDING CAN NOT BE APPLIED PRIOR TO SEPTEMBER 1ST, SURFACES SHALL BE TREATED WITH A TACKIFIED HYDROSEED MIX AND STRAW SHALL BE PLACED.
- WATER-TIGHT TRUCKS MUST BE USED TO TRANSPORT SATURATED SOILS FROM THE CONSTRUCTION SITE. AN APPROVED EQUIVALENT IS TO DRAIN THE SOIL ON SITE AT A DESIGNATED LOCATION USING APPROPRIATE BMPs; SOIL MUST BE DRAINED SUFFICIENTLY FOR MINIMAL SPILLAGE.
- ALL PUMPING OF SEDIMENT LADEN WATER MUST BE DISCHARGED OVER AN UNDISTURBED, PREFERABLY VEGETATED AREA, AND THROUGH A SEDIMENT CONTROL BMP (I.E. FILTER BAG).
- THE ESCPP MUST BE KEPT ONSITE. ALL MEASURES SHOWN ON THE PLAN MUST BE INSTALLED PROPERLY TO ENSURE THAT SEDIMENT LADEN WATER DOES NOT ENTER A SURFACE WATER SYSTEM, ROADWAY, OR OTHER PROPERTIES.
- THE ESCP MEASURES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS DURING THE CONSTRUCTION PERIOD. THESE MEASURES SHALL BE UPGRADED AS NEEDED TO MAINTAIN COMPLIANCE WITH ALL REGULATIONS.
- WRITTEN ESCPP LOGS ARE TO BE MAINTAINED ONSITE AND AVAILABLE TO DISTRICT INSPECTORS UPON REQUEST.
- IN AREAS SUBJECT TO WIND EROSION, APPROPRIATE BMPs MUST BE USED WHICH MAY INCLUDE THE APPLICATION OF FINE WATER SPRAYING, PLASTIC SHEETING, MULCHING, OR OTHER APPROVED MEASURES.
- ALL EXPOSED SOILS MUST BE COVERED DURING WET WEATHER PERIOD.
- THE PERMITTEE IS REQUIRED TO MEET ALL THE CONDITIONS OF THE 1200-C PERMIT. THIS ESCPP AND GENERAL CONDITIONS HAVE BEEN DEVELOPED TO FACILITATE COMPLIANCE WITH THE 1200-C PERMIT REQUIREMENTS. IN CASES OF DISCREPANCIES OR OMISSIONS, THE 1200-C PERMIT REQUIREMENTS SUPERCEDE REQUIREMENTS OF THIS PLAN.

**BMP MATRIX FOR CONSTRUCTION PHASES**

REFER TO DEQ GUIDANCE MANUAL FOR A COMPREHENSIVE LIST OF AVAILABLE BMP'S.

BMPs	YEAR	2020		
	MONTH#:	PRE-CONSTRUCTION	ACTIVE CONSTRUCTION	POST CONSTRUCTION
EROSION PREVENTION				
LIVE STAKES			X	X
MAINTAIN EXISTING VEGETATION		X	X	X
TEMPORARY SEEDING AND PLANTING				
PERMANENT SEEDING AND PLANTING				X
MYCORRHIZAE/ BIOFERTILIZERS				
COMPOST BLANKETS				X
MULCHES				X
EROSION CONTROL BLANKETS & MATS				X
SOIL TACKIFIERS				X
WIND EROSION CONTROL		X	X	X
SCHEDULING		X	X	X
SODDING VEGETATIVE BUFFER STRIPS		X	X	X
UNPAVED ROADS GRAVELED OR OTHER BMP ON THE ROAD			X	
SOIL STOCKPILE MANAGEMENT			X	
SEDIMENT CONTROL				
SEDIMENT TRAP				
SEDIMENT FENCING		X	X	
STRAW WATTLES (LOOSE COMPACTION RICE STRAW)				
STORM DRAIN INLET PROTECTION				
COMPOST SOCKS				
COMPOST BERM				
TEMPORARY OR PERMANENT SEDIMENTATION BASINS				
IN-WATER CONSTRUCTION BMPs -TURBIDITY CURTAIN			X	
RUN OFF CONTROL				
SLOPE DRAINS				
ENERGY DISSIPATORS				X
TEMPORARY DIVERSION DIKES				
CHECK DAMS				X
DIVERSION OF RUN-ON		X	X	
CONSTRUCTION ENTRANCE		X	X	
ROCK OUTLET PROTECTION				
POLLUTION PREVENTION				
DESIGNATED CONSTRUCTION STAGING AREA			X	
HAZARDOUS WASTE MATERIALS SPILL PREVENTION			X	
PAVING OPERATIONS CONTROLS				
CONCRETE TRUCK WASHOUT				

**RATIONALE STATEMENT**

A COMPREHENSIVE LIST OF AVAILABLE BEST MANAGEMENT PRACTICES (BMP) OPTIONS BASED ON DEQ'S GUIDANCE MANUAL HAS BEEN REVIEWED TO COMPLETE THIS EROSION AND SEDIMENT CONTROL PLAN. SOME OF THE ABOVE LISTED BMP'S WERE NOT CHOSEN BECAUSE THEY WERE DETERMINED TO NOT EFFECTIVELY MANAGE EROSION PREVENTION AND SEDIMENT CONTROL FOR THIS PROJECT BASED ON SPECIFIC SITE CONDITIONS, INCLUDING SOIL CONDITIONS TOPOGRAPHIC CONSTRAINTS, ACCESSIBILITY TO THE SITE, AND OTHER RELATED CONDITIONS, AS THE PROJECT PROGRESSES AND THERE IS A NEED TO REVISE THE ESCPP, AN ACTION PLAN WILL BE SUBMITTED.

INITIAL \_\_\_\_\_

**DEWATERING NOTES**

1. SURFACE DISCHARGE OF DEWATERING WATER OFF THE SITE OR INTO THE WILLAMETTE RIVER IS NOT PERMITTED. ALL DEWATERING WATER SHALL BE TREATED ON SITE. STORAGE AND INFILTRATION OF DEWATERING WATER MAY INCLUDE THE USE OF SUB-AREA 4. SEE SHEET 13



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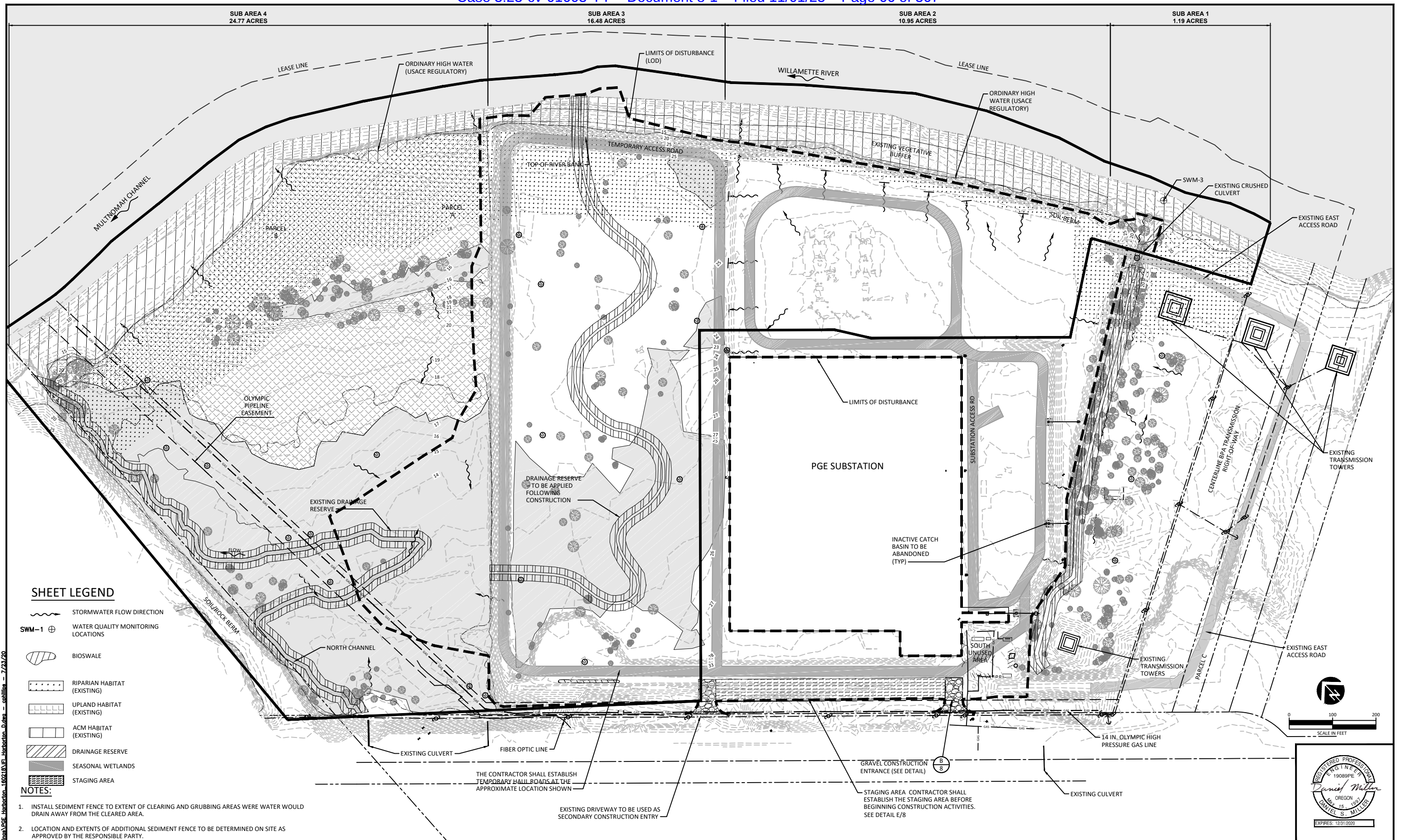
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**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



**EROSION, SEDIMENT, AND,  
POLLUTION CONTROL NOTES**

SHEET  
**5 OF 32**



**SHEET LEGEND**

- STORMWATER FLOW DIRECTION
- WATER QUALITY MONITORING LOCATIONS
- BIOSWALE
- RIPARIAN HABITAT (EXISTING)
- UPLAND HABITAT (EXISTING)
- ACM HABITAT (EXISTING)
- DRAINAGE RESERVE
- SEASONAL WETLANDS
- STAGING AREA

**NOTES:**

1. INSTALL SEDIMENT FENCE TO EXTENT OF CLEARING AND GRUBBING AREAS WHERE WATER WOULD DRAIN AWAY FROM THE CLEARED AREA.
2. LOCATION AND EXTENTS OF ADDITIONAL SEDIMENT FENCE TO BE DETERMINED ON SITE AS APPROVED BY THE RESPONSIBLE PARTY.

THE CONTRACTOR SHALL ESTABLISH TEMPORARY HULL ROADS AT THE APPROXIMATE LOCATION SHOWN

EXISTING DRIVEWAY TO BE USED AS SECONDARY CONSTRUCTION ENTRY

GRAVEL CONSTRUCTION ENTRANCE (SEE DETAIL)

STAGING AREA CONTRACTOR SHALL ESTABLISH THE STAGING AREA BEFORE BEGINNING CONSTRUCTION ACTIVITIES. SEE DETAIL E/8

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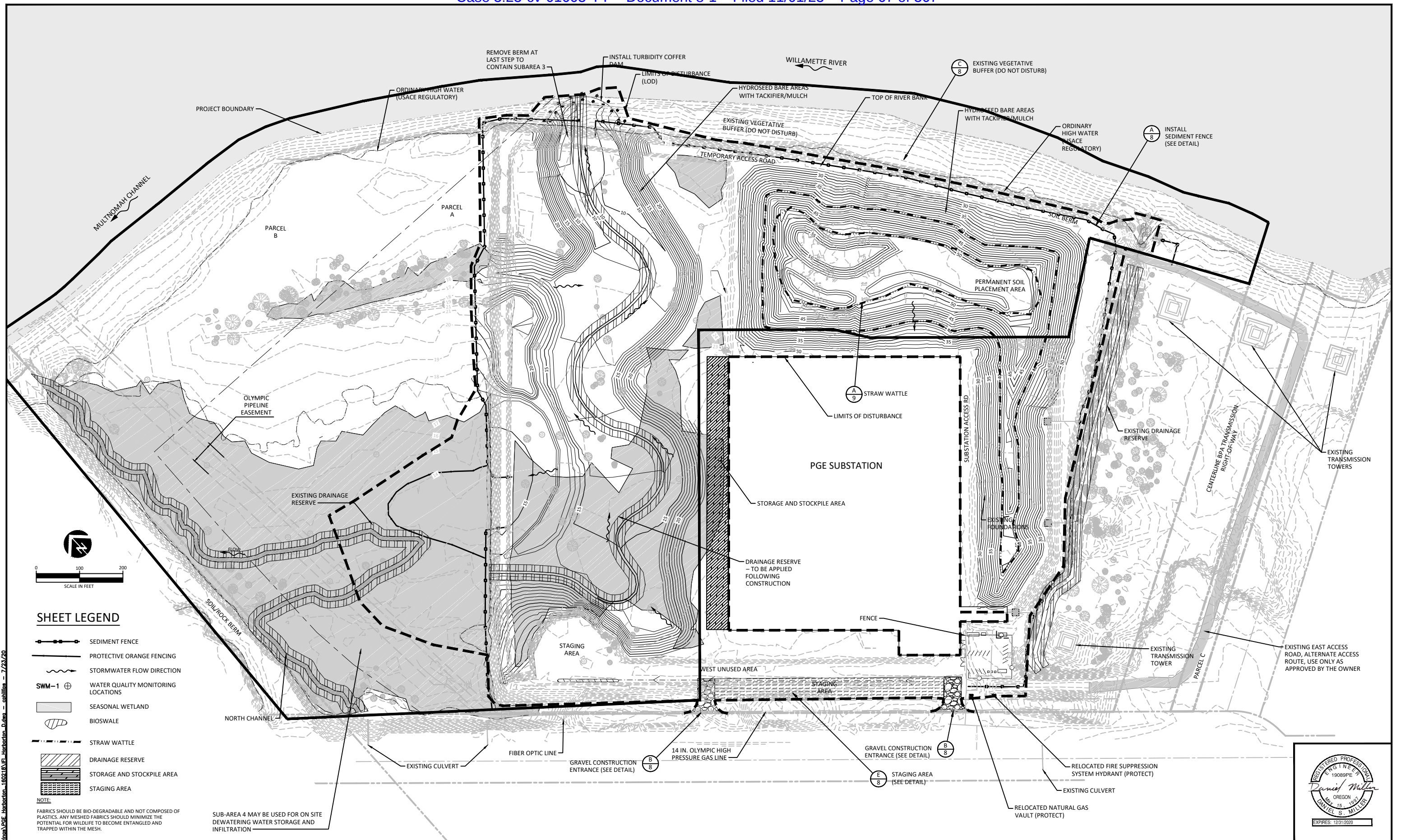
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PORTLAND, OREGON**



**EROSION, SEDIMENT, AND,  
POLLUTION CONTROL PLAN -  
PRE CONST.**

SHEET
6 OF 32





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**SHEET LEGEND**

- SEDIMENT FENCE
- PROTECTIVE ORANGE FENCING
- STORMWATER FLOW DIRECTION
- WATER QUALITY MONITORING LOCATIONS
- SEASONAL WETLAND
- BIOSWALE
- STRAW WATTLE
- DRAINAGE RESERVE
- STORAGE AND STOCKPILE AREA
- STAGING AREA

NOTE:  
FABRICS SHOULD BE BIO-DEGRADABLE AND NOT COMPOSED OF PLASTICS. ANY MESHED FABRICS SHOULD MINIMIZE THE POTENTIAL FOR WILDLIFE TO BECOME ENTANGLED AND TRAPPED WITHIN THE MESH.

SUB-AREA 4 MAY BE USED FOR ON SITE DEWATERING WATER STORAGE AND INFILTRATION

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PORTLAND, OREGON**

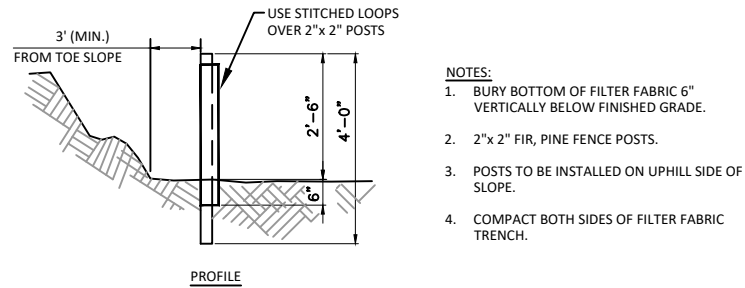


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**EROSION, SEDIMENT, AND,  
POLLUTION CONTROL PLAN -  
ACTIVE CONST.**

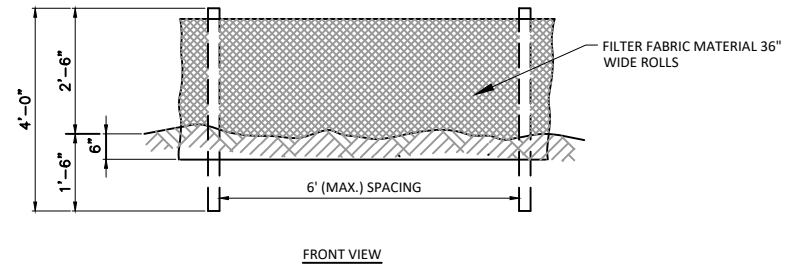
SHEET
7 OF 32





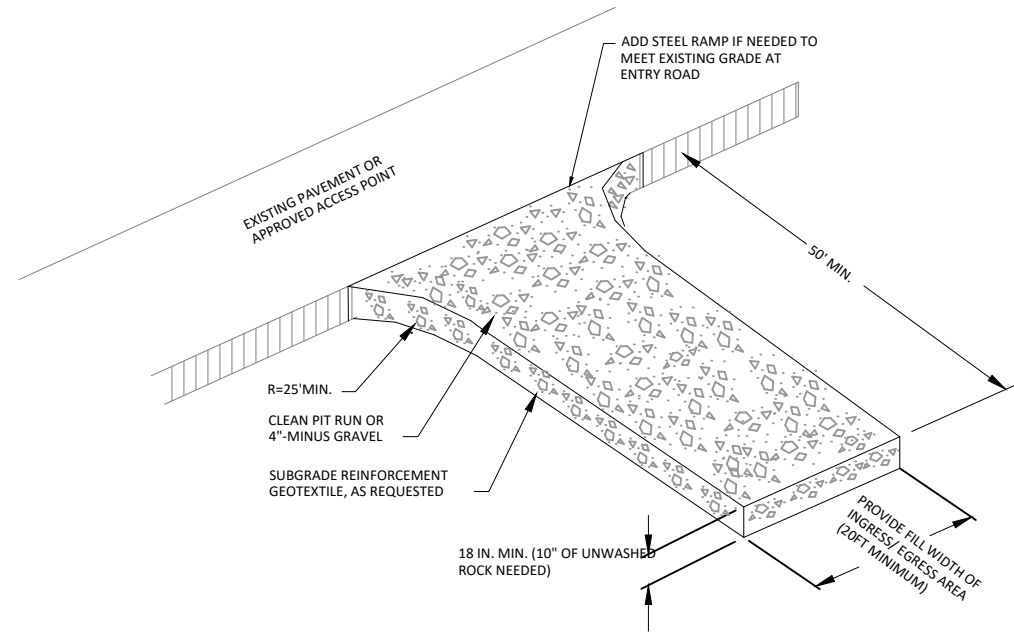
- NOTES:**
1. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
  2. 2"x 2" FIR, PINE FENCE POSTS.
  3. POSTS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.
  4. COMPACT BOTH SIDES OF FILTER FABRIC TRENCH.

PROFILE

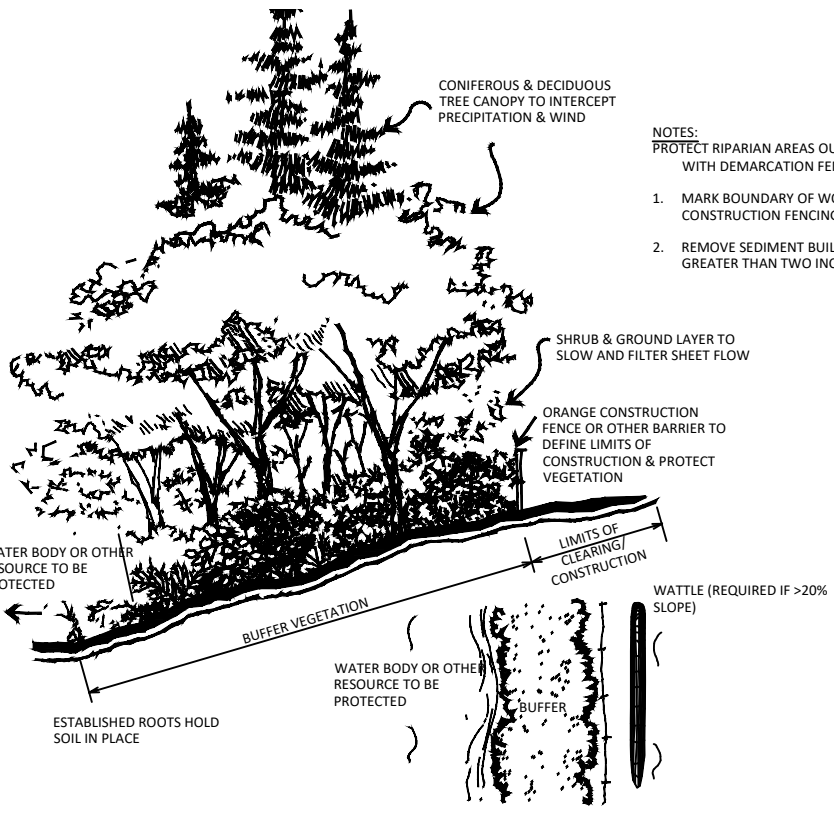


FRONT VIEW

**A**  
8  
NTS  
SEDIMENT FENCE

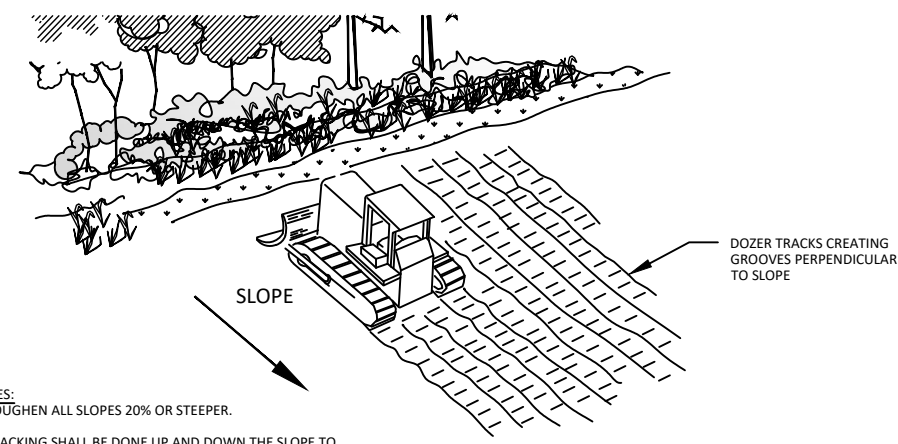


**B**  
8  
NTS  
GRAVEL CONSTRUCTION ENTRANCE



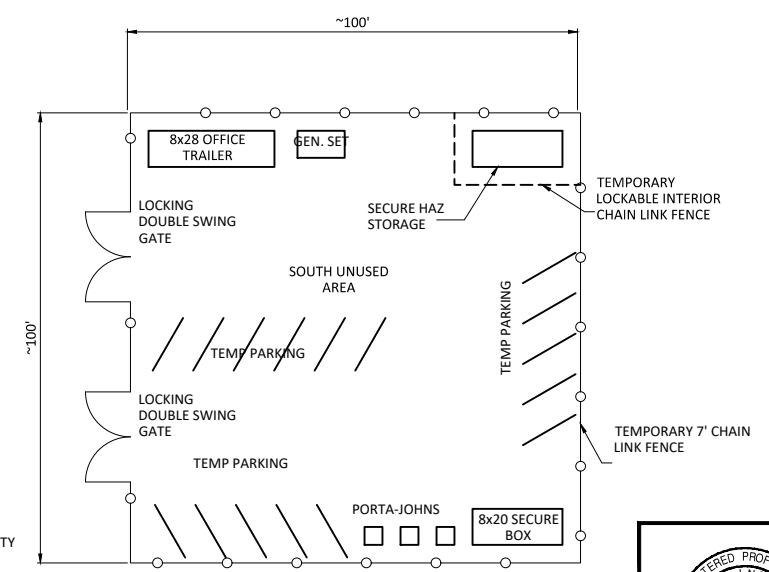
- NOTES:**
1. MARK BOUNDARY OF WORK AREAS WITH ORANGE CONSTRUCTION FENCING AND/OR SILT FENCE.
  2. REMOVE SEDIMENT BUILDUP IN THE BUFFER WHEN IT IS GREATER THAN TWO INCHES.

**C**  
8  
NTS  
VEGETATED BUFFER



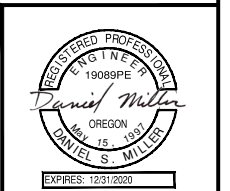
- NOTES:**
1. ROUGHEN ALL SLOPES 20% OR STEEPER.
  2. TRACKING SHALL BE DONE UP AND DOWN THE SLOPE TO LEAVE TRACK INDENTION.
  3. VEGETATE ROUGHENED SOIL AS QUICKLY AS POSSIBLE.
  4. INSPECT ROUGHENED AREAS WITHOUT VEGETATION AFTER RAIN EVENTS.
  5. RE-ROUGHEN IF THE GROOVES GET FILLED IN BY MORE THAN 2/3 THE ORIGINAL GROOVE.

**D**  
8  
NTS  
SURFACE ROUGHENING



NOTE: GEOTECHNICAL REPORT RECOMMENDS 12" GRANULAR MATERIAL PLACED FOR STABILITY OF STAGING AREA.

**E**  
8  
NTS  
SECURE STAGING AREA



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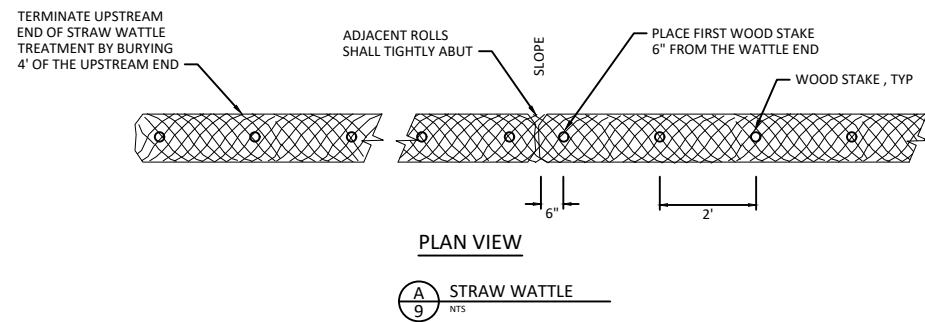
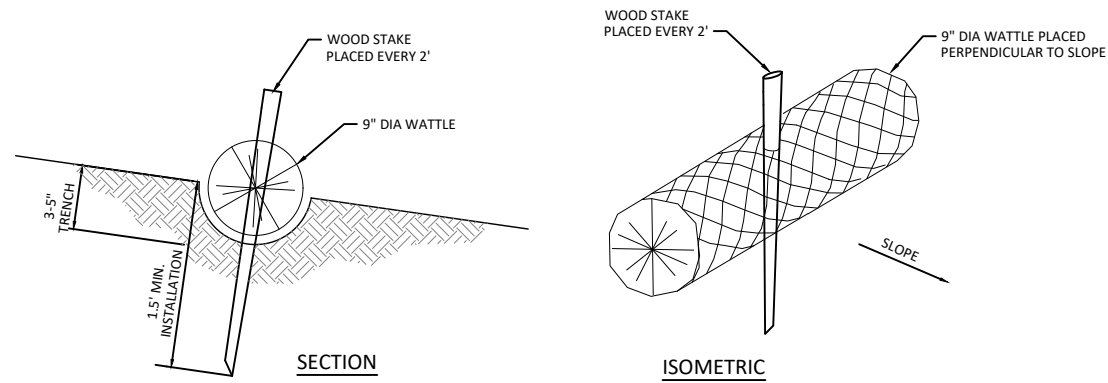
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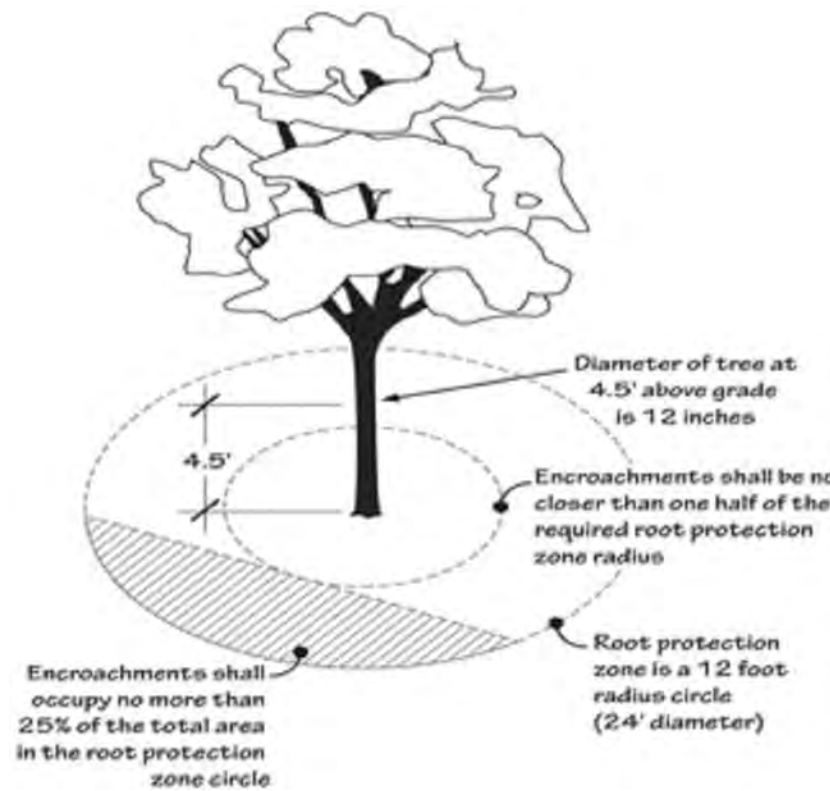


**EROSION, SEDIMENT, AND,  
POLLUTION CONTROL  
DETAILS - SHEET 1**



**GENERAL NOTES ON INSTALLING**

1. INSTALL THE WATTLES IN TRENCH, INSURING THAT NO GAPS EXIST BETWEEN THE SOIL AND THE BOTTOM OF THE WATTLE. THE ENDS OF ADJACENT WATTLES SHOULD BE TIGHTLY ABUTTED SO THAT NO OPENING EXISTS FOR WATER OR SEDIMENT TO PASS THROUGH.
2. WOOD STAKES SHOULD BE USED TO FASTEN THE WATTLES TO THE SOIL. WHEN CONDITIONS WARRANT, A STRAIGHT METAL BAR CAN BE USED TO DRIVE A "PILOT HOLE" - THROUGH THE WATTLE AND INTO THE SOIL.
3. WOOD STAKES SHOULD BE PLACED 6" FROM THE WATTLE END ANGLED PERPENDICULAR TO GRADE AND SPACED AT 2-FEET CENTERS LEAVING LESS THAN 1-2 INCHES OF STAKE EXPOSED ABOVE THE WATTLE.
4. AT TERMINAL ENDS OF WATTLES, EXCAVATE MIN 2' DEEP KEY TRENCH SO THAT MIN 4' OF WATTLE CAN BE BURIED.
5. CARE SHALL BE TAKEN DURING INSTALLATION SO AS TO AVOID DAMAGE OCCURRING TO THE WATTLE AS A RESULT OF THE INSTALLATION PROCESS. SHOULD THE WATTLE BE DAMAGED DURING INSTALLATION, A WOODEN STAKE SHALL BE PLACED EITHER SIDE OF THE DAMAGED AREA TERMINATING THE WATTLE SEGMENT.
6. ANY WATTLE DAMAGED DURING PLACEMENT SHALL BE REPLACED AS DIRECTED BY THE GOVERNMENT, AT THE CONTRACTOR'S EXPENSE.
7. STRAW WATTLES SHALL BE USED IN TRENCHES WHERE FLOWS REQUIRE TURBIDITY REDUCTION.



**TREE PROTECTION**

**GENERAL NOTES ON TREE PROTECTION**

THE ROOT PROTECTION ZONE FOR TREES SHALL EXTEND 1 FOOT FROM THE TREE TRUNK FOR EVERY INCH IN DIAMETER AS MEASURED FROM DIAMETER AT BREAST HEIGHT (DBH). ROOT PROTECTION FENCING WILL CONSIST OF BRIGHTLY COLORED CONSTRUCTION FENCING MARKED WITH YELLOW SIGNAGE READING "TREE ROOT PROTECTION ZONE." FENCING AND SIGNAGE SHALL BE INSTALLED BEFORE ANY GROUND DISTURBING ACTIVITIES TAKE PLACE, INCLUDING CLEARING, GRADING, OR CONSTRUCTION. THE FENCE SHALL REMAIN IN PLACE UNTIL FINAL INSPECTION. CONSTRUCTION ACTIVITIES MAY ENCROACH ON NO MORE THAN 25% OF THE ROOT PROTECTION ZONE AREA. THE ENCROACHMENT MAY NOT BE CLOSER THAN ONE HALF OF THE ROOT PROTECTION ZONE RADIUS. CUTTING A LARGE PERCENTAGE OF A TREE'S ROOTS CAN BE DANGEROUS. MOST LARGE TREE ROOTS, THOSE OVER 4 INCHES IN DIAMETER, ARE STRUCTURAL ROOTS THAT SUPPORT THE TREE. IF LARGE ROOTS ARE DISTURBED OR REMOVED, THE TREE MAY FALL OVER AND/OR DECLINE OR DIE. ROOTS OVER 4 INCHES IN DIAMETER SHOULD NOT BE CUT. IF CUTTING A TREE'S ROOTS IS UNAVOIDABLE, A CERTIFIED ARBORIST MUST APPROVE AND OVERSEE THE ROOT CUTTING.

**LIMITS OF DISTURBANCE**

LIMITS OF DISTURBANCE SHALL BE MARKED WITH HIGH VISIBILITY PLASTIC MESH SAFETY FENCE ("SNOW FENCE").

**SUMMARY OF QUANTITIES**

Item	units	Subtotal Quantities				Total Quantities
		Subarea 1	Subarea 2	Subarea 3	Subarea 4	
Clearing, grubbing, stripping	Acre	0.0	2.8	16.4	0.8	20.0
Excavation	CY	0	0	158700	0	158700
Fill - Soil Placement berm	CY	0	164670	0	0	164700
Backfill, common import (clean 12" cap)	CY	0	0	18300	0	18300
Backfill, imported stone (SSS, culvert scour protection)	CY	0	0	2000	0	2000
Backfill, common import (N and S channel substrate)	CY	0	0	710	0	710
LWM - 15" dbh x 30' long, no rootwads	EA	0	0	38	16	54
LWM - 15" dbh x 30' long, w/rootwads	EA	0	0	184	16	200
LWM - 33" diam. ballast boulders	EA	0	0	444	64	508
LWM - 15" dbh x 30' long, vertical snags	CY	0	0	70	0	70
Slash, salvaged	CY	0	0	190	0	190
Mink rock piles	EA	1	2	4	2	9

\*EXPANSION OF EXCAVATED MATERIAL AND COMPACTION OF PLACED MATERIAL IS ANTICIPATED BUT DIFFICULT TO ACCURATELY PREDICT. AS NOTED ON SHEET 24, FILL AREA HEIGHT WILL BE ADJUSTED TO ACCOMMODATE PLACED MATERIAL

NOTE: QUANTITIES ARE IN-PLACE MEASURE

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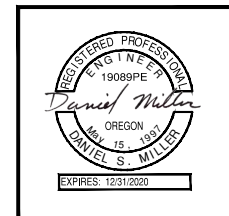
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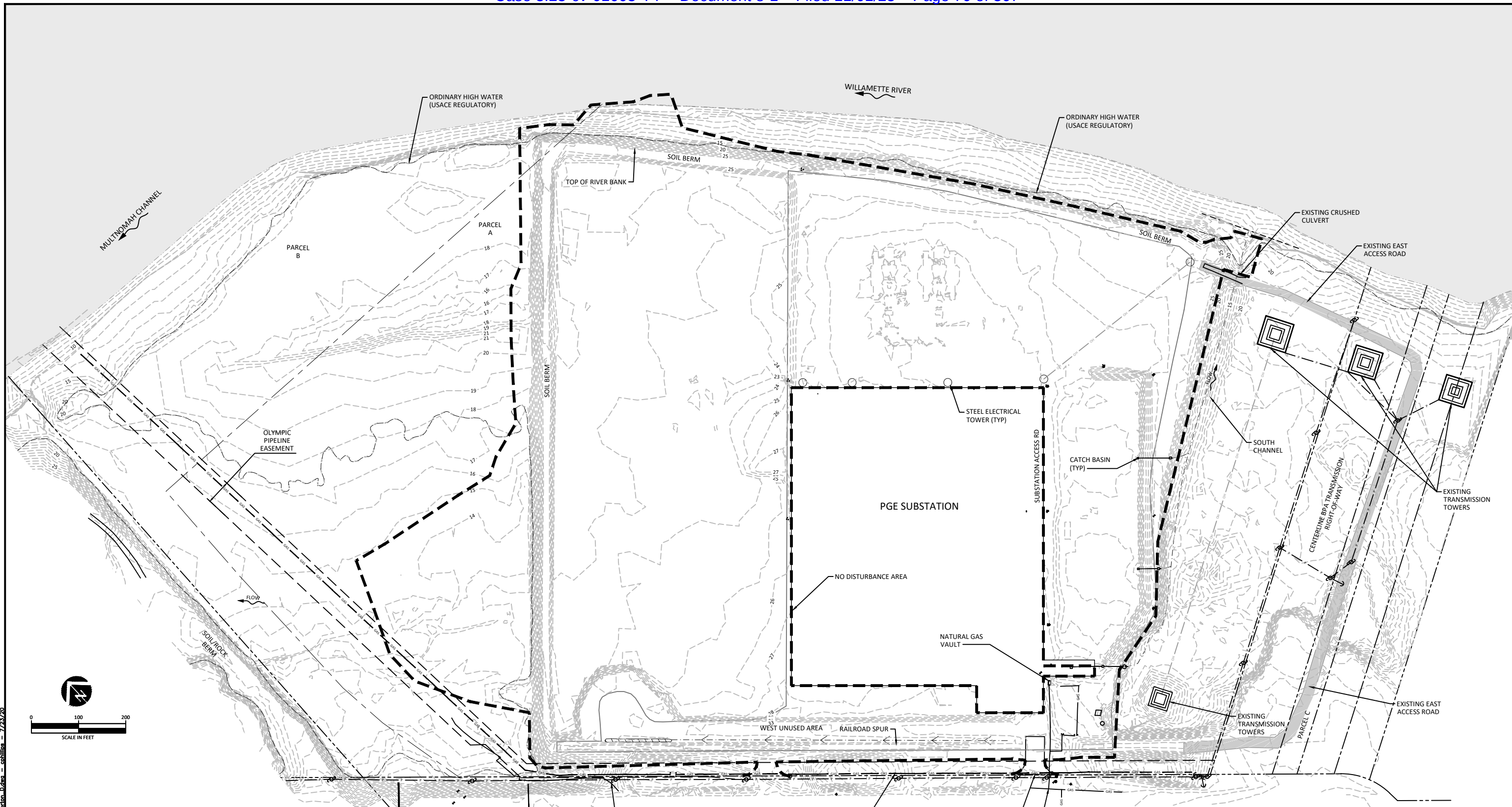
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**EROSION, SEDIMENT, AND,  
POLLUTION CONTROL  
DETAILS - SHEET 2**



SHEET  
**9 OF 32**



**NOTES**

1. MULTIPLE CONTRACTORS MAY BE WORKING AT THE SITE SIMULTANEOUSLY. THE CONTRACTOR SHALL COORDINATE WORK WITH PGE THROUGHOUT CONSTRUCTION ACTIVITIES, TO ENSURE WORK IS CONDUCTED SAFELY AND EFFICIENTLY.
2. THE LOCATIONS OF THE UTILITIES SHOWN ARE BASED ON THE MOST RECENT DATA AVAILABLE. ADDITIONAL UTILITIES MAY BE PRESENT AT THE SITE.
3. UTILITIES ARE APPROXIMATE. CONTRACTOR SHALL HAVE UTILITY LOCATE COMPLETED PRIOR TO CONSTRUCTION.
4. THE CONTRACTOR SHALL IDENTIFY AND FLAG ALL OVERHEAD AND ABOVE GROUND UTILITIES AND STRUCTURES TO BE PROTECTED WITHIN THE WORK AREAS.



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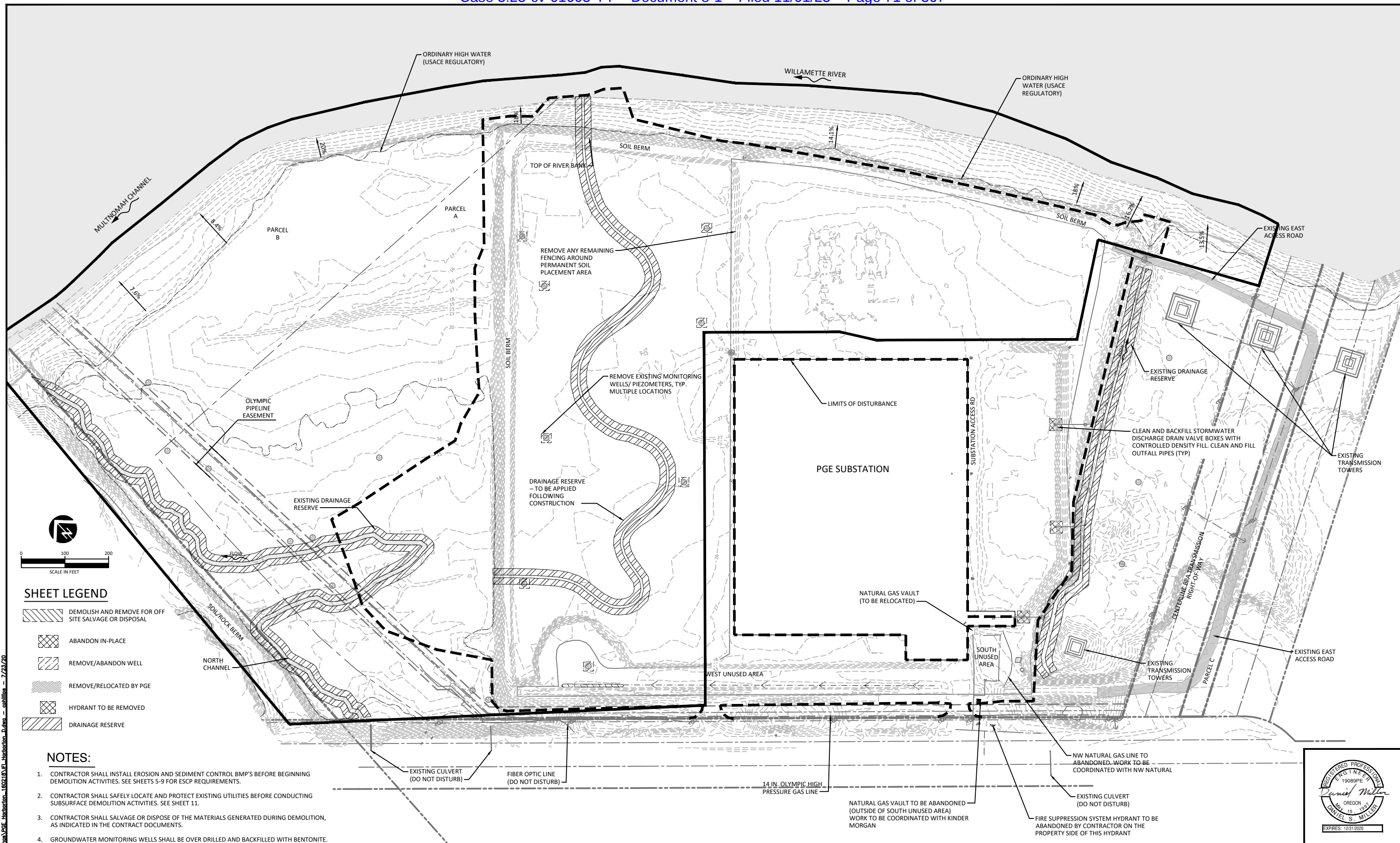
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**SITE PLAN AND  
KNOWN UTILITIES**

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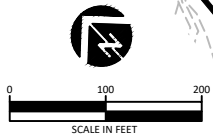
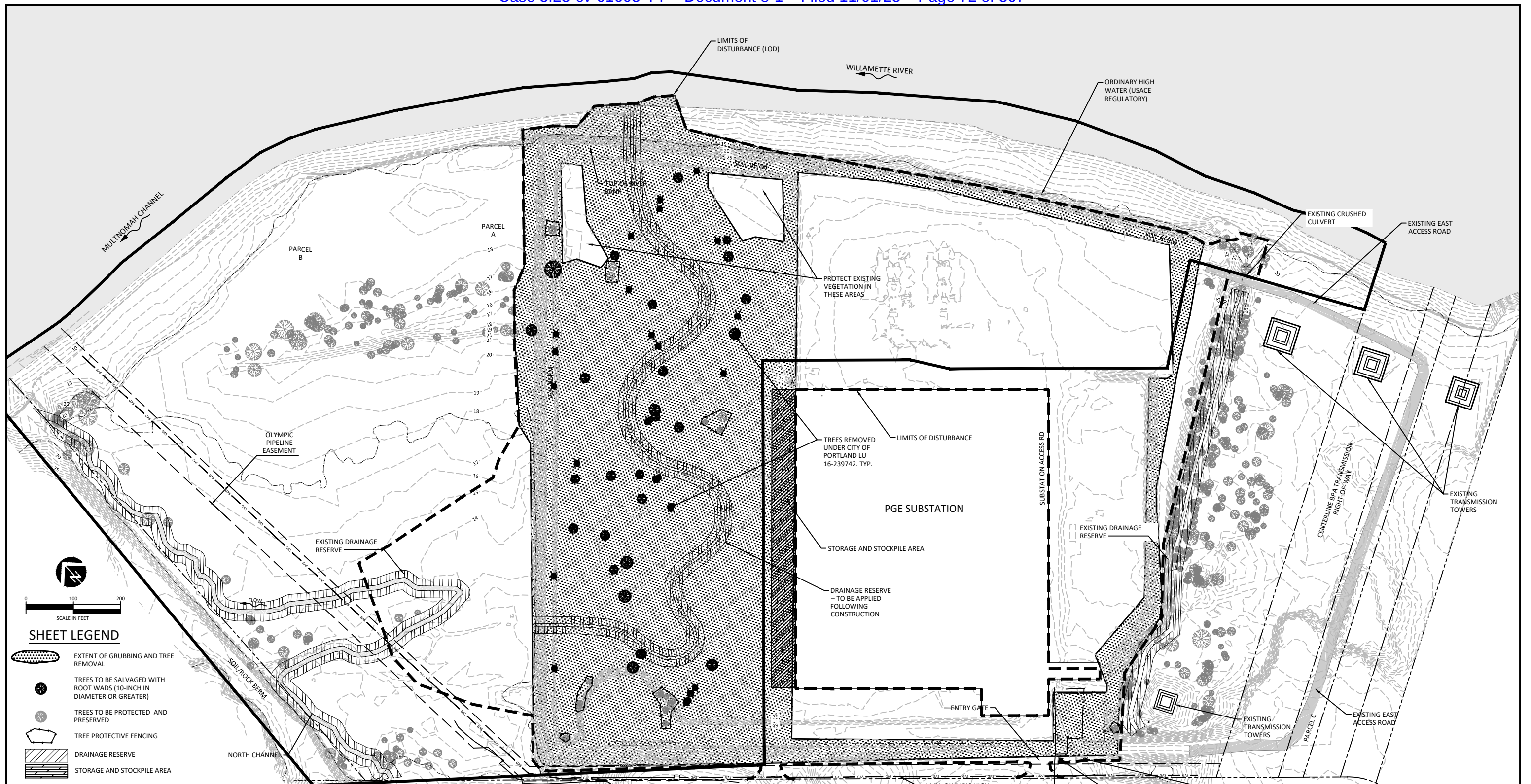
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**SITE UTILITIES DEMOLITION AND  
IMPROVEMENTS PLAN**



**SHEET LEGEND**

- EXTENT OF GRUBBING AND TREE REMOVAL
- TREES TO BE SALVAGED WITH ROOT WADS (10-INCH IN DIAMETER OR GREATER)
- TREES TO BE PROTECTED AND PRESERVED
- TREE PROTECTIVE FENCING
- DRAINAGE RESERVE
- STORAGE AND STOCKPILE AREA

**NOTES:**

1. INSTALL ENGINEERING CONTROLS AND EROSION AND SEDIMENT CONTROL (ESCP) BMP'S (SEE SHEET 5-9) BEFORE BEGINNING CLEARING AND GRUBBING ACTIVITIES. DEMARK EQUIPMENT ACCESS, STORAGE, AND REFUELING AREAS; DELIMIT WORK BOUNDARIES WITH CONSTRUCTION FENCING; DELIMIT LARGE WOOD, BRUSH, AND WOOD CHIP STORAGE LOCATIONS; AND, FLAG ALL TREES TO BE PRESERVED.
2. CONTRACTOR SHALL SAFELY LOCATE, IDENTIFY AND FLAG ALL OVERHEAD AND ABOVE GROUND UTILITIES AND STRUCTURES WITHIN THE CLEARING AND GRUBBING AREAS, AND STORAGE AREAS, AND HAUL ROUTES.
3. BRUSH AND TREES <6-INCHES DIAMETER AT BREAST HEIGHT (DBH) SHALL BE CUT WITH MECHANIZED EQUIPMENT (E.G. FLAIL MOWER, BRUSH HOG, OR SIMILAR) OR WITH HAND TOOLS (E.G. CHAIN SAWS, BRUSH BLADES, OR SIMILAR), AS APPROPRIATE. MATERIAL <6-INCHES DBH (E.G. BRANCHES, DEBRIS) SHALL BE COLLECTED AND TRANSPORTED TO THE STORAGE LOCATION AND TEMPORARILY STOCKPILED ON SITE FOR RE-USE DURING THE RESTORATION PHASE OF THE PROJECT.
4. TREES OR BRANCHES BETWEEN 6 AND 10-INCHES DBH SHALL BE LIMBED AND CUT TO 20-FOOT LENGTHS. CUT SECTIONS SHALL BE COLLECTED AND TRANSPORTED TO THE STORAGE AREA.
5. TREES > 10-INCHES DBH SHALL BE TOPPED AT APPROXIMATELY 20 FEET ABOVE GROUND SURFACE AND LIMBED. TREES SHALL BE CUT WITH MECHANIZED EQUIPMENT (E.G. CHAIN SAWS, BRUSH BLADES, OR SIMILAR). TREE BOLE SECTIONS > 10-INCHES DBH SHALL BE LIMBED AND CUT TO 20-FOOT LENGTHS. CUT SECTIONS SHALL BE COLLECTED AND TRANSPORTED TO THE STORAGE AREA.
6. REMAINING TREE BOLES (TRUNKS WITH ROOT WADS) SHALL BE UPROOTED PRIOR TO EXCAVATION. UPROOTING SHALL BE ACCOMPLISHED BY PUSHING OR PULLING TREE BOLES OVER WITH HEAVY MACHINERY (E.G. TRACTOR, BACKHOE, OR SIMILAR). TREE BOLES WITH ATTACHED ROOT WADS SHALL BE COLLECTED AND TRANSPORTED TO THE STORAGE AREA.
7. LARGE TREES WITH ROOT WADS SHALL BE TEMPORARILY STOCKPILED ON-SITE FOR RE-USE DURING THE RESTORATION PHASE OF THE PROJECT.
8. CLEARED WOODY MATERIAL SHALL BE STOCKPILED IN THE DESIGNATED AREA. MATERIAL SHALL BE PLACED IN PILES ACCORDING TO THE SIZE CLASSIFICATIONS DESCRIBED IN THE CLEARING NOTES.



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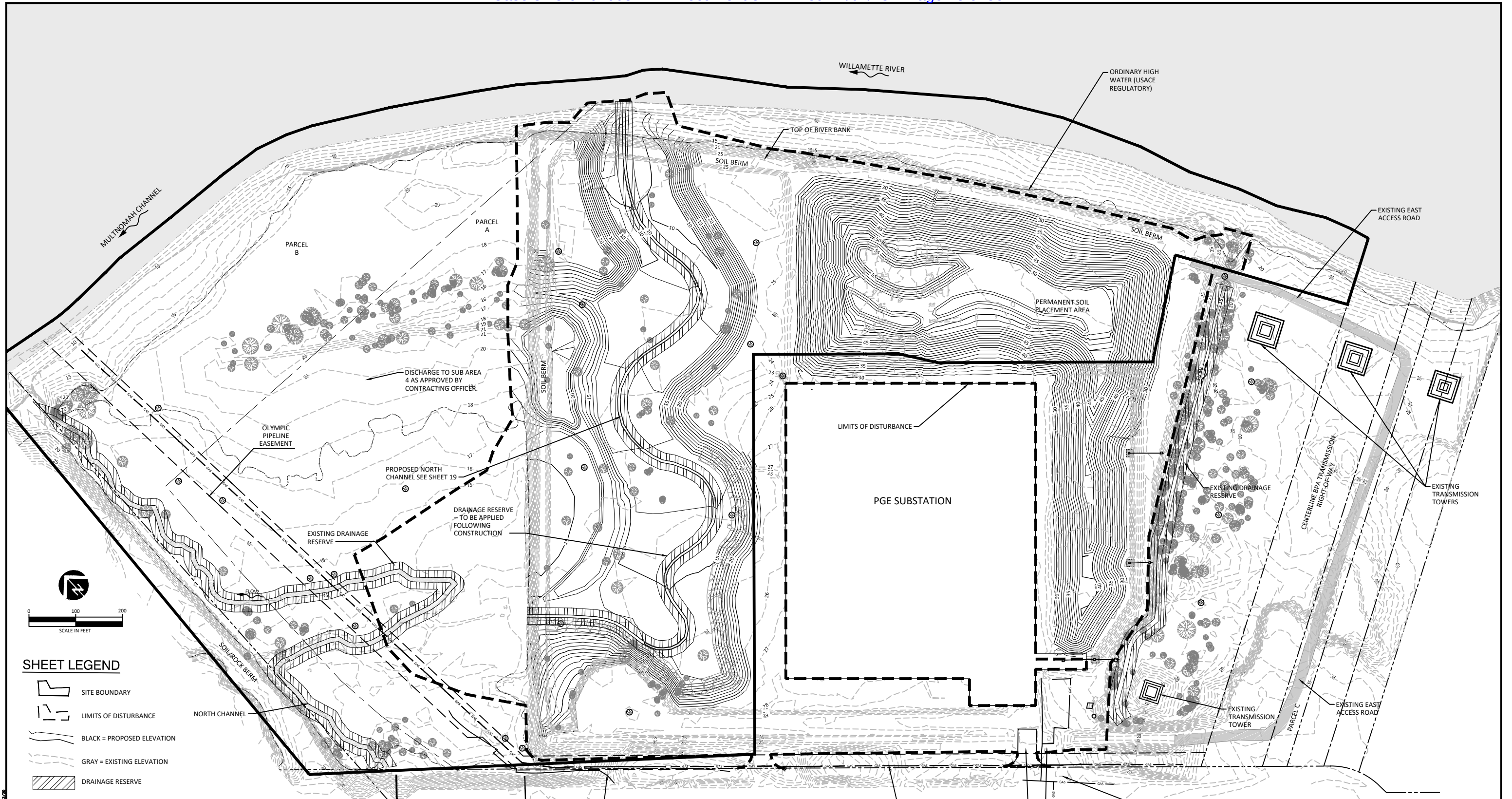
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**CLEARING AND GRUBBING AND  
TREE REMOVAL PLAN**





**SHEET LEGEND**

- SITE BOUNDARY
- LIMITS OF DISTURBANCE
- BLACK = PROPOSED ELEVATION
- GRAY = EXISTING ELEVATION
- DRAINAGE RESERVE

**NOTES:**

1. CONTRACTOR SHALL INSTALL EROSION AND SEDIMENT CONTROL BMP'S BEFORE BEGINNING EARTHWORK ACTIVITIES. SEE SHEETS 5-9.
2. CONTRACTOR SHALL LOCATE AND PROTECT EXISTING UTILITIES BEFORE CONDUCTING SUBSURFACE EXCAVATION ACTIVITIES.
3. EXCAVATION ACTIVITIES MUST BE CONDUCTED IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL PERMIT REQUIREMENTS AND CONTRACT DOCUMENTS.
4. CONTRACTOR TO REFER TO GEO-DESIGN REPORT. CONTRACTOR SHALL DEVELOP DEWATERING PLAN FOR APPROVAL BY CONTRACTING OFFICER PRIOR TO START OF WORK.



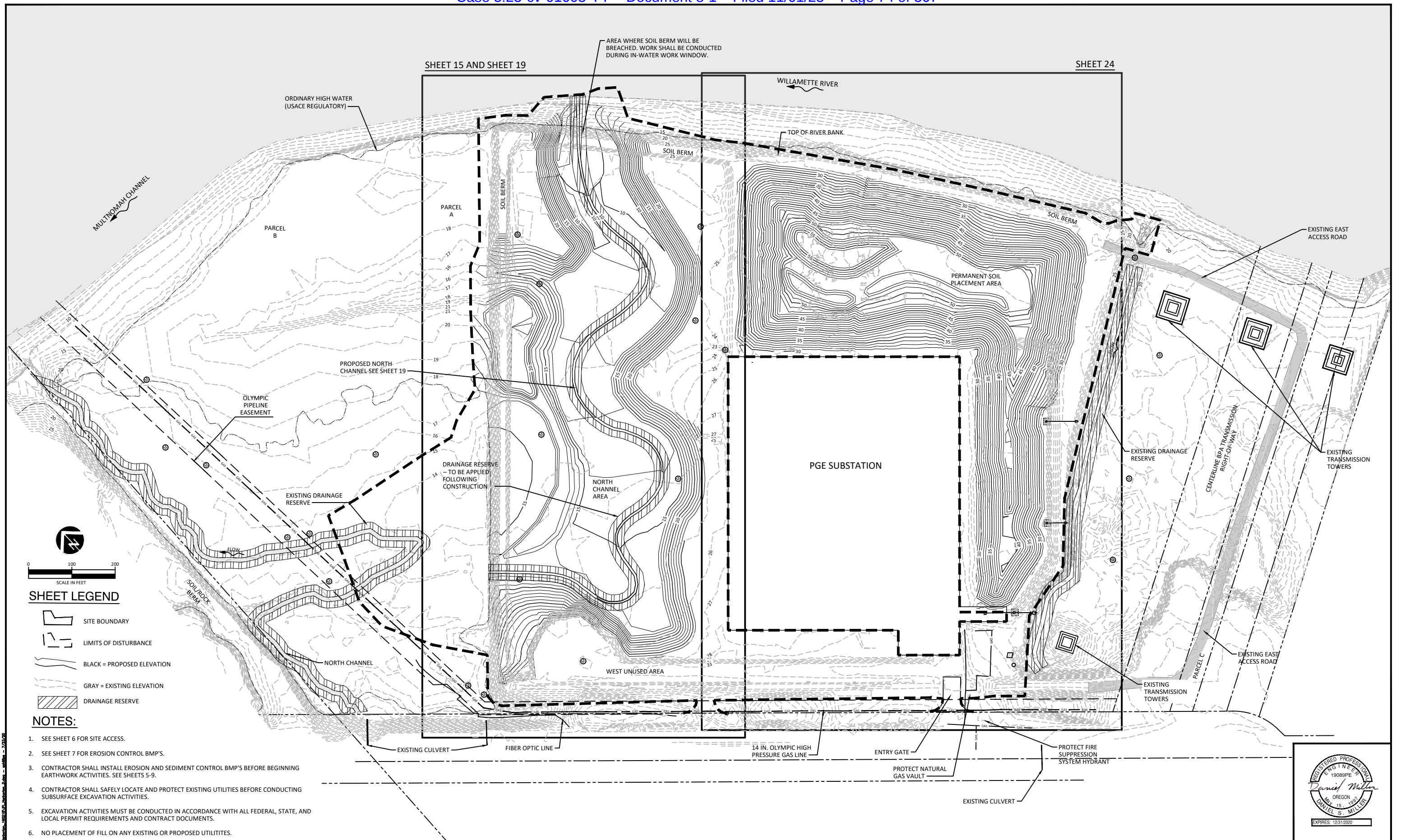
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**DEWATERING PLAN**



**SHEET LEGEND**

- SITE BOUNDARY
- LIMITS OF DISTURBANCE
- BLACK = PROPOSED ELEVATION
- GRAY = EXISTING ELEVATION
- DRAINAGE RESERVE

**NOTES:**

1. SEE SHEET 6 FOR SITE ACCESS.
2. SEE SHEET 7 FOR EROSION CONTROL BMP'S.
3. CONTRACTOR SHALL INSTALL EROSION AND SEDIMENT CONTROL BMP'S BEFORE BEGINNING EARTHWORK ACTIVITIES. SEE SHEETS 5-9.
4. CONTRACTOR SHALL SAFELY LOCATE AND PROTECT EXISTING UTILITIES BEFORE CONDUCTING SUBSURFACE EXCAVATION ACTIVITIES.
5. EXCAVATION ACTIVITIES MUST BE CONDUCTED IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL PERMIT REQUIREMENTS AND CONTRACT DOCUMENTS.
6. NO PLACEMENT OF FILL ON ANY EXISTING OR PROPOSED UTILITIES.

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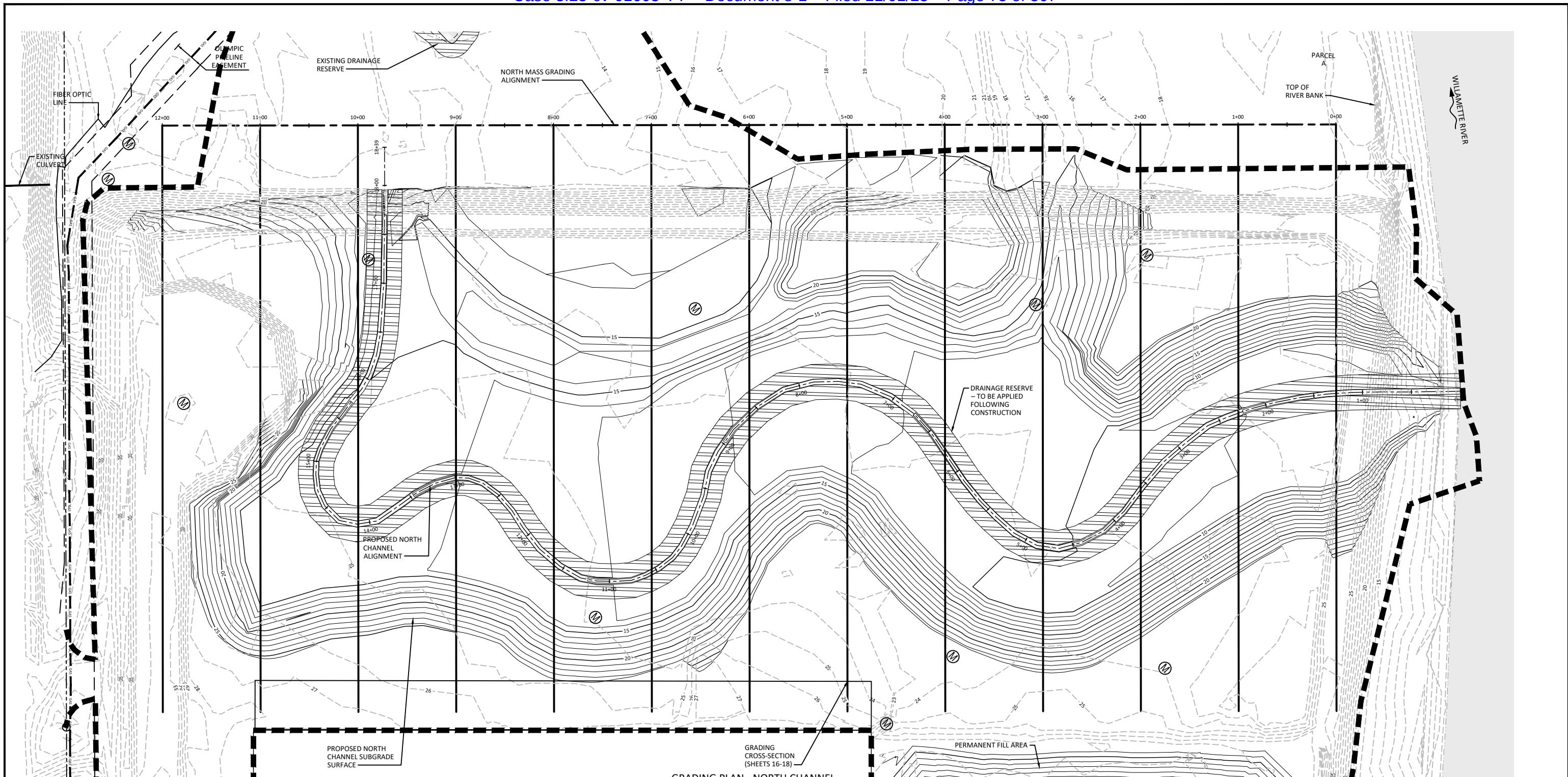
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**SUBGRADING PLAN**





**SHEET LEGEND**

- SITE BOUNDARY
- LIMITS OF DISTURBANCE
- BLACK = PROPOSED ELEVATION
- GRAY = EXISTING ELEVATION
- DRAINAGE RESERVE

**NOTES:**

1. SEE SHEET 6 FOR SITE ACCESS.
2. SEE SHEET 7 FOR EROSION CONTROL BMP'S.

**PROPOSED NORTH CHANNEL ALIGNMENT DATA**

PI Station	Northing	Easting	PI Station	Northing	Easting
0+00.00	719,549.02	7,614,601.26	3+86.66	719,213.42	7,614,456.71
0+51.97	719,510.48	7,614,566.39	4+14.38	719,185.71	7,614,457.23
0+78.95	719,490.80	7,614,547.93	4+40.86	719,160.17	7,614,450.23
1+11.48	719,466.61	7,614,526.19	4+64.56	719,139.24	7,614,439.11
1+37.42	719,446.52	7,614,509.78	4+87.35	719,124.85	7,614,421.44
1+63.59	719,425.20	7,614,494.60	5+13.80	719,116.42	7,614,396.37
1+90.67	719,402.24	7,614,480.24	5+39.06	719,114.05	7,614,371.22
2+16.72	719,379.28	7,614,467.94	5+61.42	719,113.41	7,614,348.87
2+42.73	719,355.38	7,614,457.67	5+88.05	719,115.28	7,614,322.30
2+62.96	719,336.29	7,614,450.97	6+18.77	719,120.08	7,614,291.96
2+93.81	719,305.56	7,614,448.35	6+47.16	719,124.25	7,614,269.88
3+20.75	719,278.63	7,614,447.37	6+73.80	719,124.78	7,614,237.25
3+53.83	719,245.76	7,614,451.00	7+03.62	719,119.19	7,614,207.95

**GRADING PLAN - NORTH CHANNEL**

PI Station	Northing	Easting	PI Station	Northing	Easting	PI Station	Northing	Easting	PI Station	Northing	Easting
7+36.46	719,105.63	7,614,178.05	10+62.09	718,811.46	7,614,170.84	13+20.98	718,718.60	7,613,955.49	15+71.69	718,712.87	7,613,835.75
7+59.83	719,090.59	7,614,160.16	10+77.40	718,797.39	7,614,164.81	13+43.84	718,696.57	7,613,949.38	15+88.00	718,729.03	7,613,833.60
7+84.88	719,071.89	7,614,143.48	10+94.48	718,784.17	7,614,153.99	13+62.02	718,678.52	7,613,947.26	16+05.37	718,745.53	7,613,828.16
8+16.35	719,044.26	7,614,128.44	11+12.89	718,770.96	7,614,141.17	13+92.31	718,648.53	7,613,943.01	16+26.87	718,764.50	7,613,818.06
8+49.01	719,012.09	7,614,122.74	11+29.80	718,760.94	7,614,127.54	14+12.99	718,631.38	7,613,931.15	16+48.10	718,781.46	7,613,805.27
8+81.98	718,979.12	7,614,123.14	11+54.25	718,753.67	7,614,104.20	14+31.67	718,620.56	7,613,916.23	16+78.93	718,804.01	7,613,784.25
9+09.85	718,951.84	7,614,128.83	11+81.69	718,750.46	7,614,076.95	14+52.77	718,619.87	7,613,895.14	17+01.84	718,820.66	7,613,768.52
9+32.38	718,930.86	7,614,137.04	12+08.64	718,752.87	7,614,050.10	14+70.15	718,625.41	7,613,878.67	17+22.31	718,834.75	7,613,753.67
9+57.81	718,910.30	7,614,152.01	12+29.69	718,756.65	7,614,029.40	14+86.36	718,635.03	7,613,865.62	17+76.94	718,872.54	7,613,714.22
9+90.96	718,880.58	7,614,166.70	12+51.48	718,757.45	7,614,007.62	15+00.77	718,645.30	7,613,855.50	18+39.07	718,914.77	7,613,668.64
10+13.92	718,858.83	7,614,174.04	12+70.91	718,754.00	7,613,988.50	15+13.54	718,656.55	7,613,849.47			
10+29.04	718,843.91	7,614,176.45	12+86.51	718,746.79	7,613,974.67	15+36.73	718,678.44	7,613,841.80			
10+46.74	718,826.28	7,614,174.84	12+99.68	718,737.48	7,613,965.35	15+54.58	718,696.06	7,613,838.97			

NO.	BY	DATE	REVISION DESCRIPTION

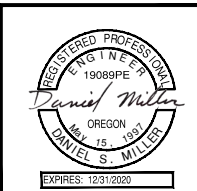
RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

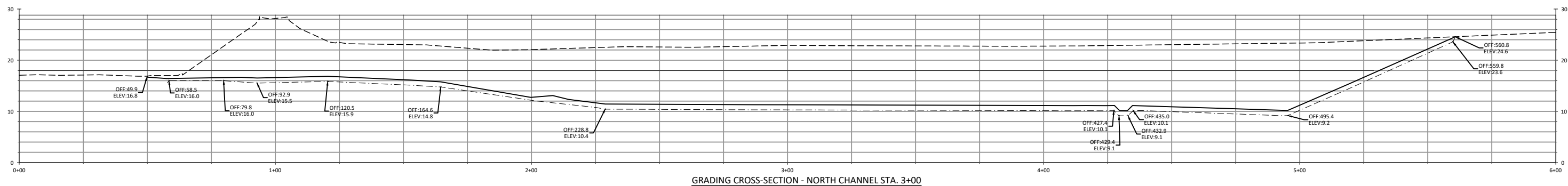
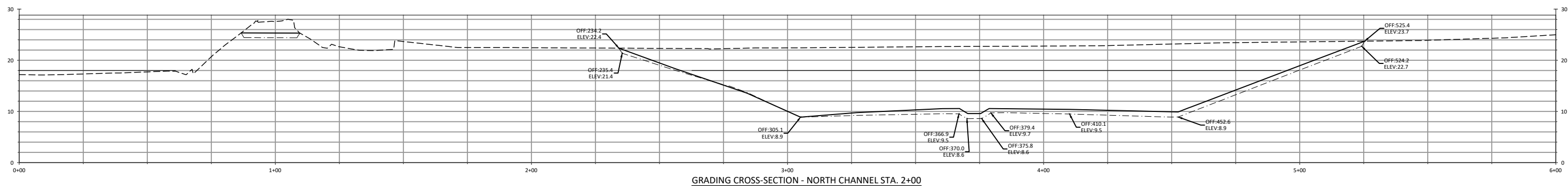
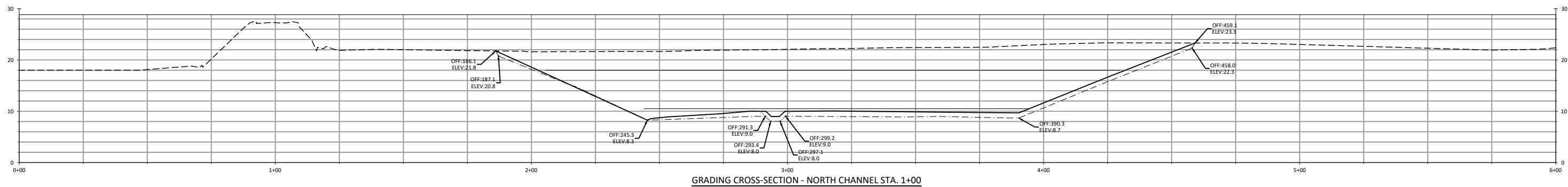
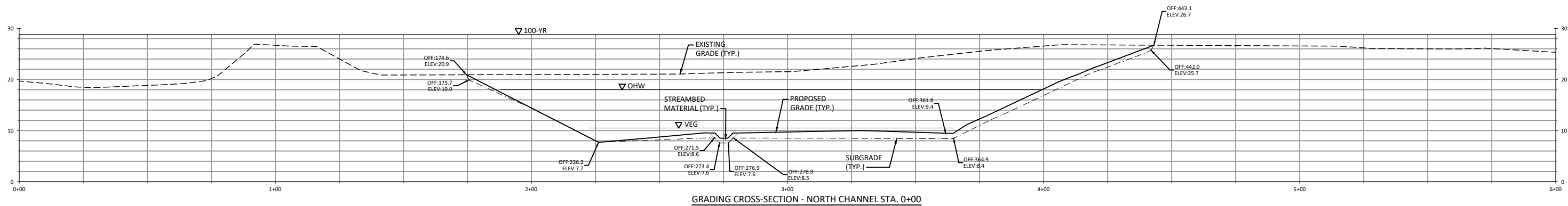
**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



**SUBGRADING PLAN - PROPOSED  
NORTH CHANNEL**

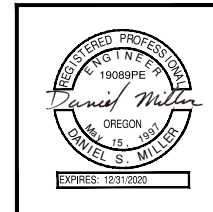
SHEET  
**15 OF 32**





NOTE: ALL NORTH CHANNEL MASS GRADING CROSS-SECTIONS OFF-SET DISTANCES REFERENCE TO THE NORTH CHANNEL MASS GRADING ALIGNMENT. SEE SHEET 15.

SCALE: 1" = 20'  
VERTICAL EXAGGERATION: 2x



NO.	BY	DATE	REVISION DESCRIPTION

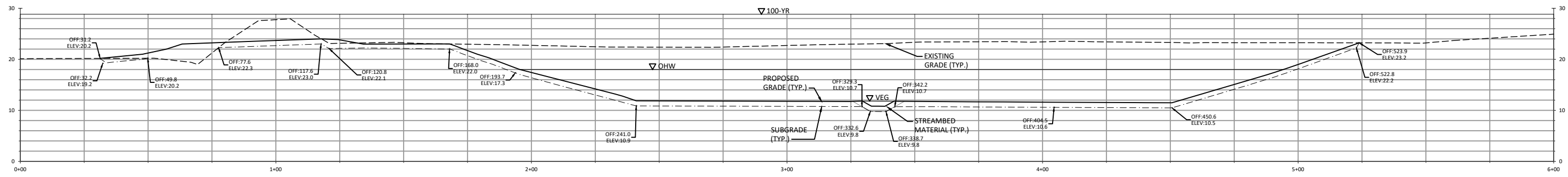
RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON

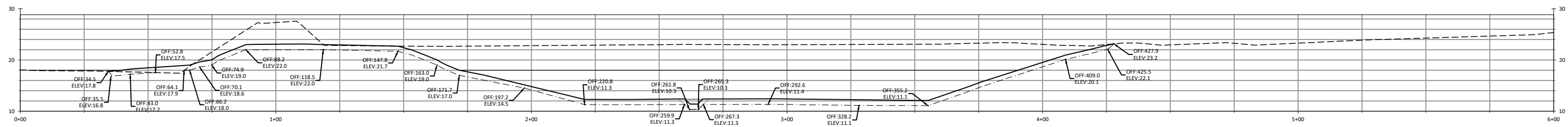


SUBGRADING CROSS-SECTIONS -  
PROPOSED NORTH CHANNEL

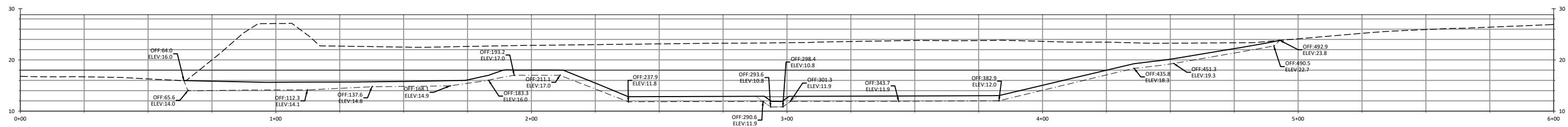
SHEET  
16 OF 32



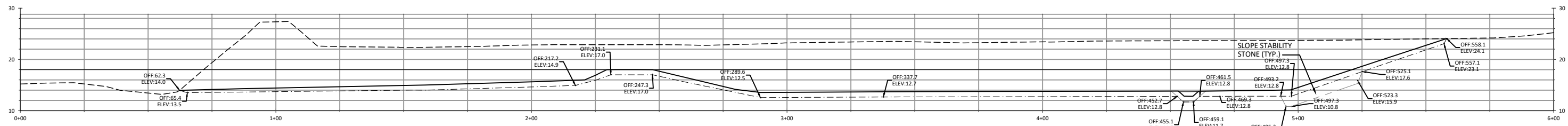
GRADING CROSS-SECTION - NORTH CHANNEL STA. 4+00



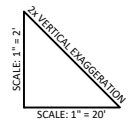
GRADING CROSS-SECTION - NORTH CHANNEL STA. 5+00



GRADING CROSS-SECTION - NORTH CHANNEL STA. 6+00



GRADING CROSS-SECTION - NORTH CHANNEL STA. 7+00



NOTE: ALL NORTH CHANNEL MASS GRADING CROSS-SECTIONS OFF-SET DISTANCES REFERENCE TO THE NORTH CHANNEL MASS GRADING ALIGNMENT. SEE SHEET 15.



NO.	BY	DATE	REVISION DESCRIPTION

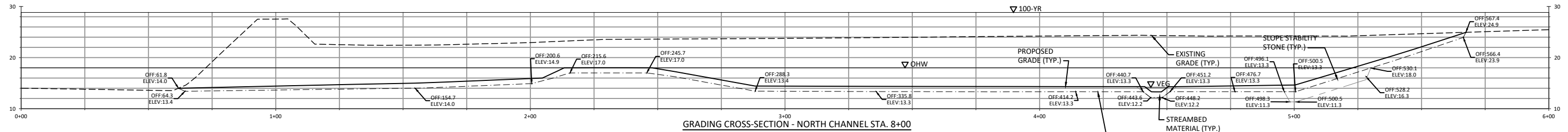
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MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

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HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON

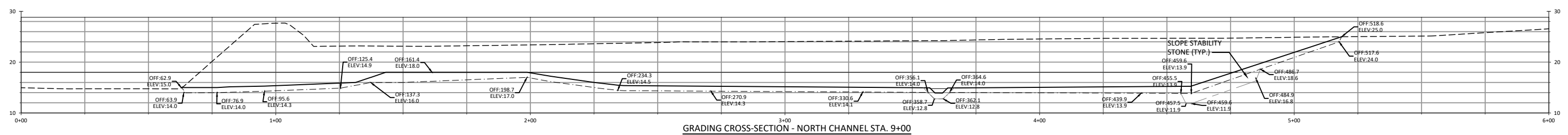


SUBGRADING CROSS-SECTIONS -  
PROPOSED NORTH CHANNEL

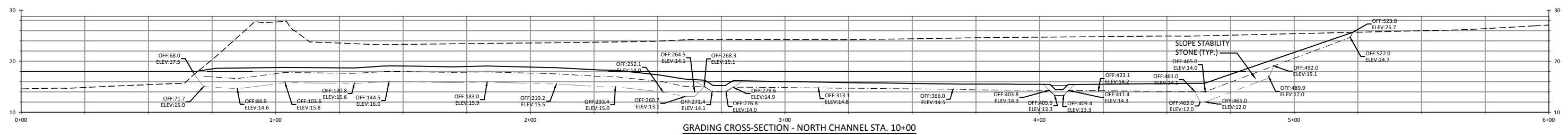
SHEET  
17 OF 32



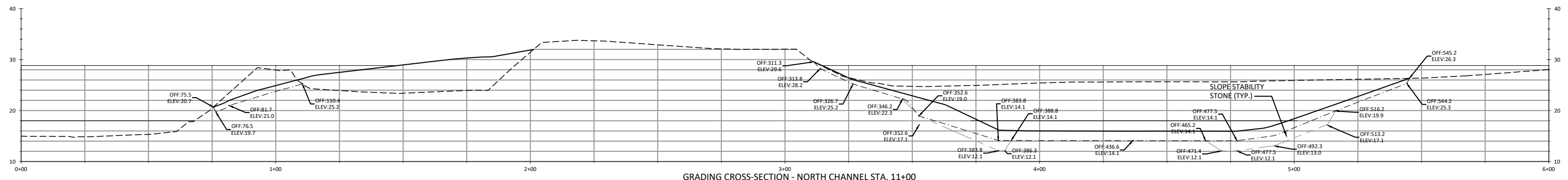
GRADING CROSS-SECTION - NORTH CHANNEL STA. 8+00



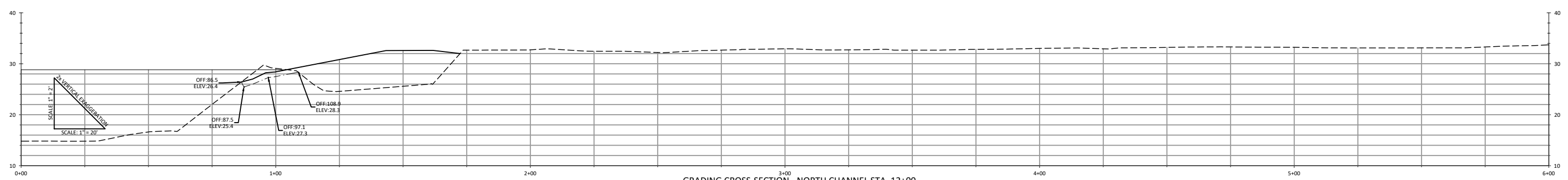
GRADING CROSS-SECTION - NORTH CHANNEL STA. 9+00



GRADING CROSS-SECTION - NORTH CHANNEL STA. 10+00

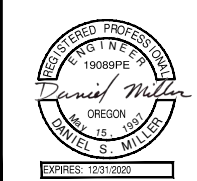


GRADING CROSS-SECTION - NORTH CHANNEL STA. 11+00



GRADING CROSS-SECTION - NORTH CHANNEL STA. 12+00

NOTE: ALL NORTH CHANNEL MASS GRADING CROSS-SECTIONS OFF-SET DISTANCES REFERENCE TO THE NORTH CHANNEL MASS GRADING ALIGNMENT. SEE SHEET 15.



NO.	BY	DATE	REVISION DESCRIPTION

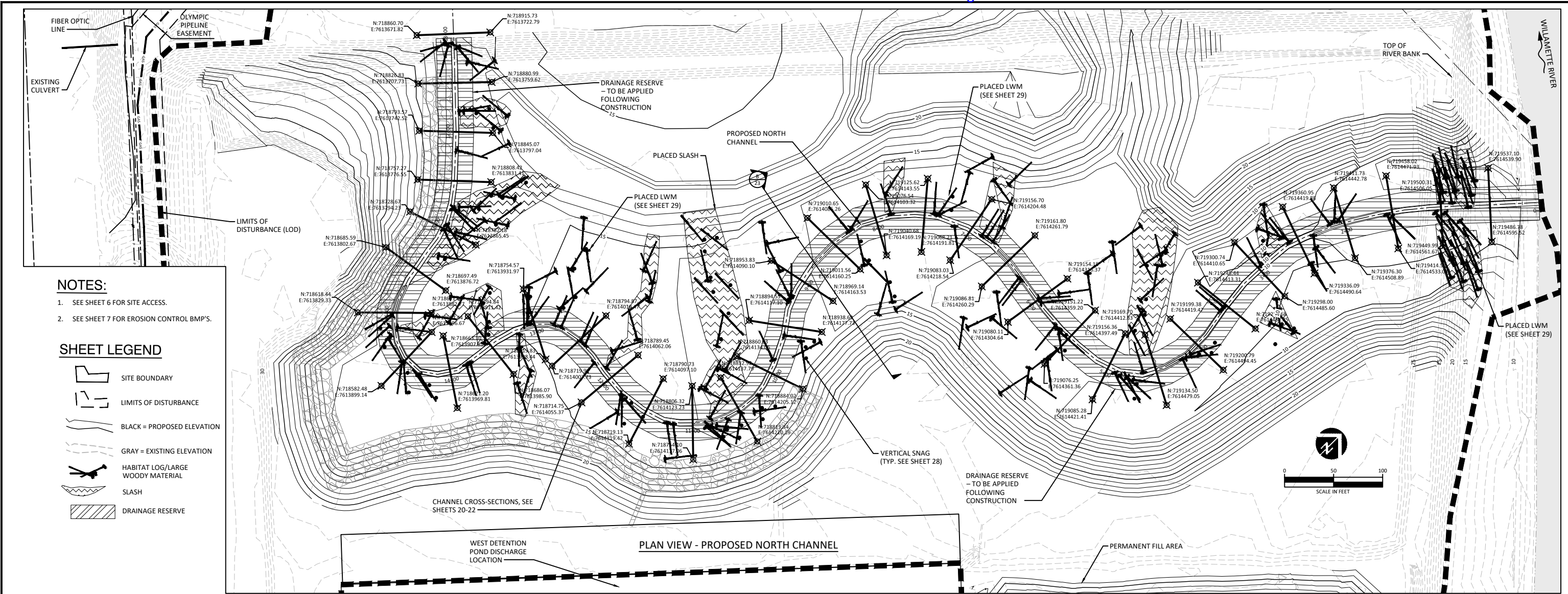
RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON



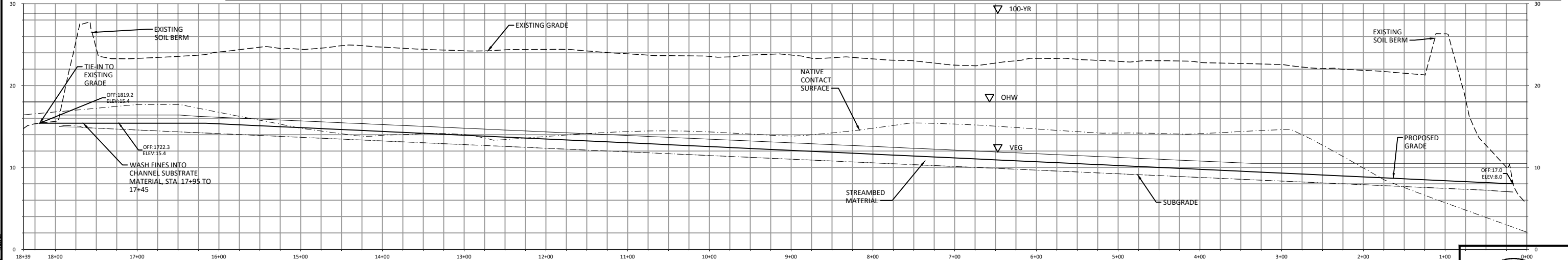
SUBGRADING CROSS-SECTIONS -  
PROPOSED NORTH CHANNEL

SHEET  
18 OF 32



- NOTES:**
- SEE SHEET 6 FOR SITE ACCESS.
  - SEE SHEET 7 FOR EROSION CONTROL BMP'S.

- SHEET LEGEND**
- SITE BOUNDARY
  - LIMITS OF DISTURBANCE
  - BLACK = PROPOSED ELEVATION
  - GRAY = EXISTING ELEVATION
  - HABITAT LOG/LARGE WOODY MATERIAL
  - SLASH
  - DRAINAGE RESERVE



PROFILE VIEW - PROPOSED NORTH CHANNEL

NO.	BY	DATE	REVISION DESCRIPTION

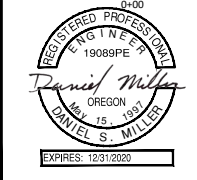
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MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

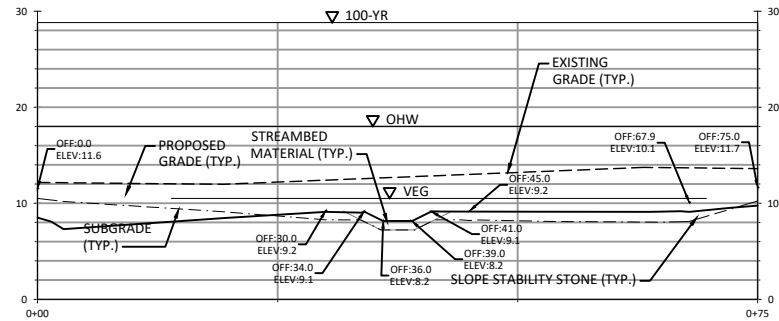
**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



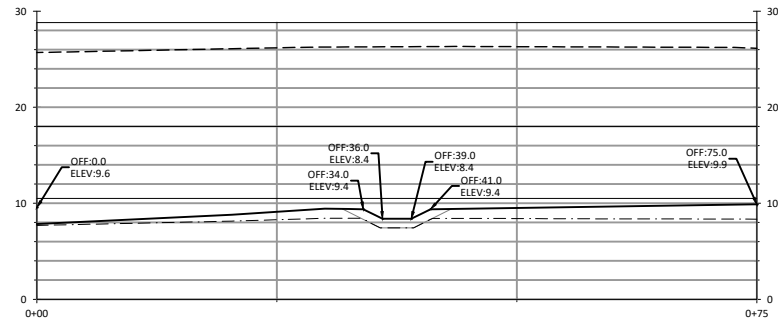
**PLAN AND PROFILE - PROPOSED  
NORTH CHANNEL**

SHEET  
**19 OF 32**

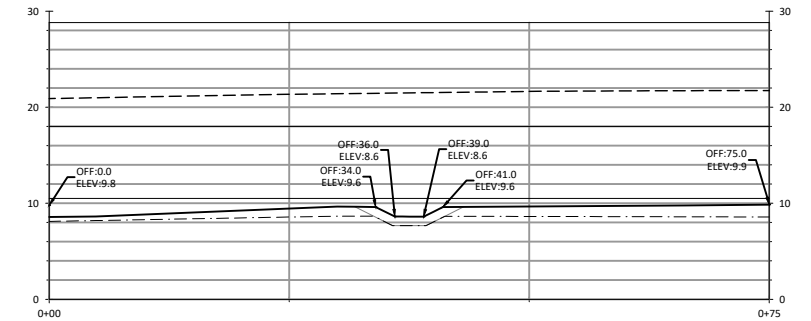




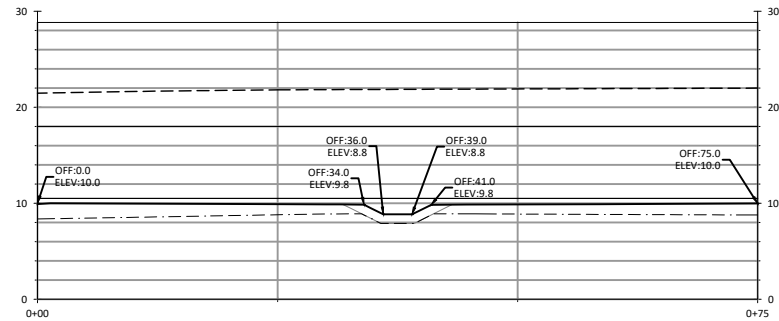
NORTH CHANNEL CROSS-SECTION - STA. 0+50



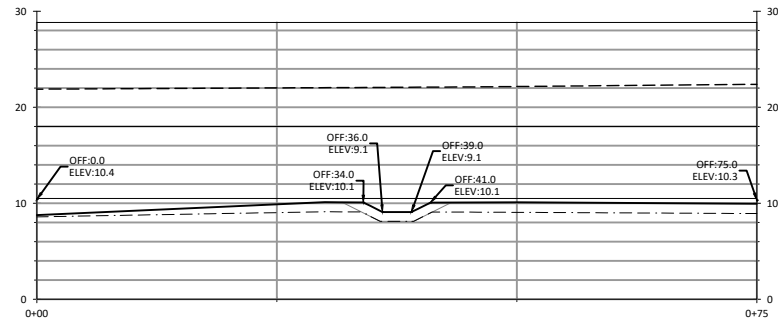
NORTH CHANNEL CROSS-SECTION - STA. 1+00



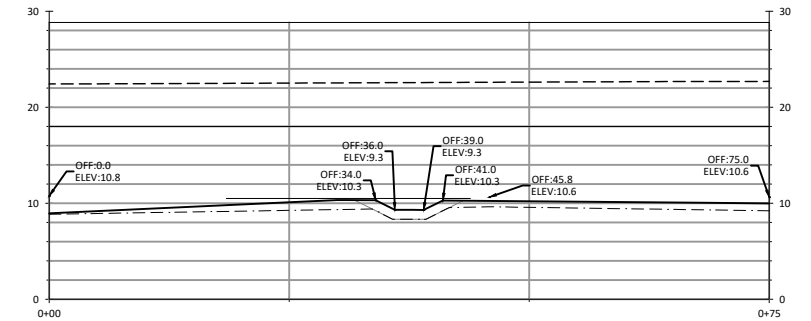
NORTH CHANNEL CROSS-SECTION - STA. 1+50



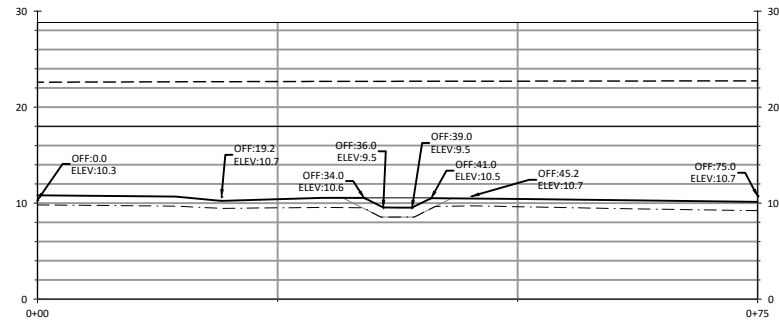
NORTH CHANNEL CROSS-SECTION - STA. 2+00



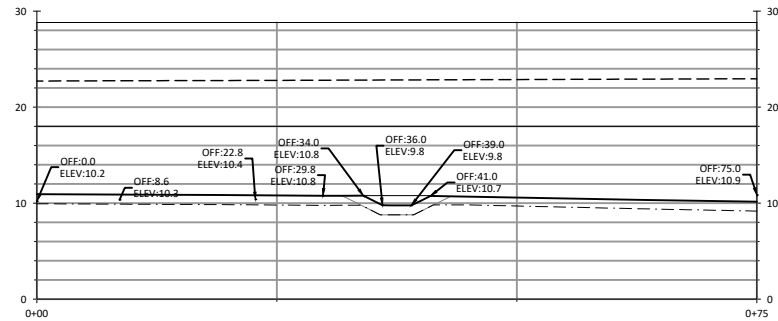
NORTH CHANNEL CROSS-SECTION - STA. 2+50



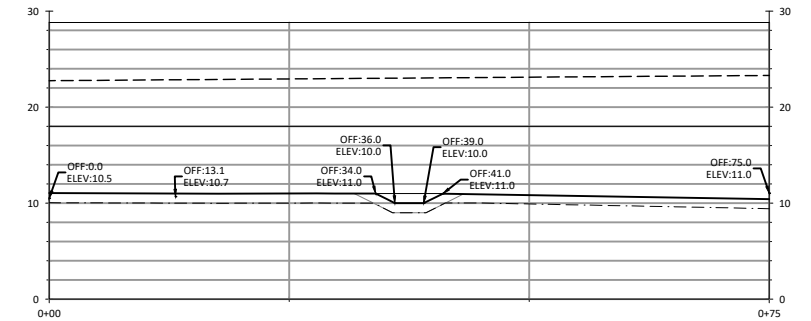
NORTH CHANNEL CROSS-SECTION - STA. 3+00



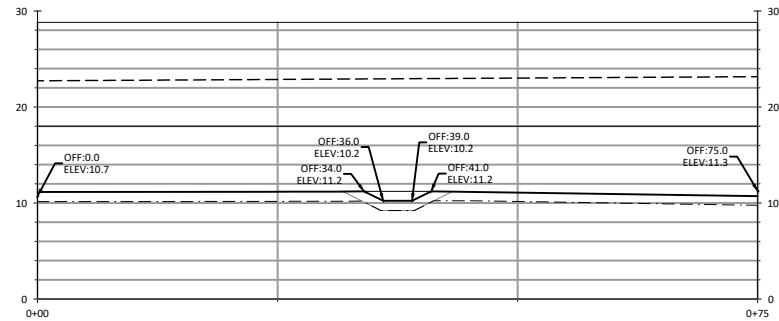
NORTH CHANNEL CROSS-SECTION - STA. 3+50



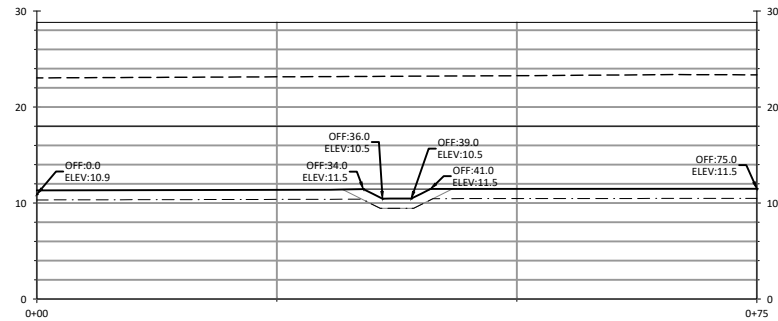
NORTH CHANNEL CROSS-SECTION - STA. 4+00



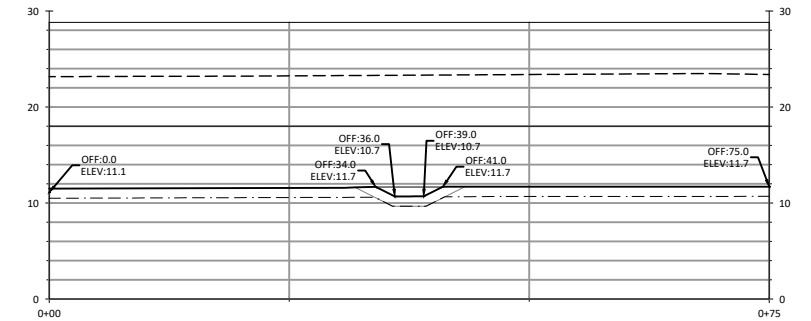
NORTH CHANNEL CROSS-SECTION - STA. 4+50



NORTH CHANNEL CROSS-SECTION - STA. 5+00



NORTH CHANNEL CROSS-SECTION - STA. 5+50



NORTH CHANNEL CROSS-SECTION - STA. 6+00

VERTICAL EXAGGERATION  
SCALE: 1" = 10'

NOTE: ALL NORTH CHANNEL CROSS-SECTIONS  
REFERENCE TO THE NORTH CHANNEL  
ALIGNMENT. SEE SHEET 19.



NO.	BY	DATE	REVISION DESCRIPTION

RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

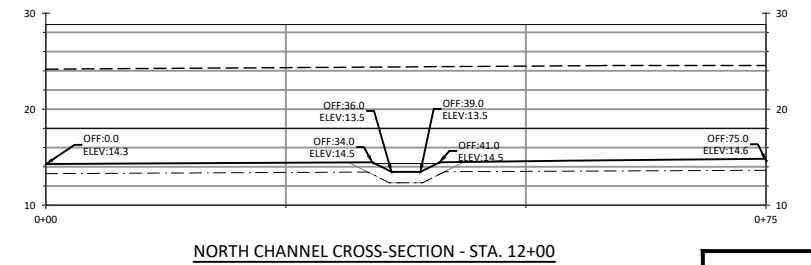
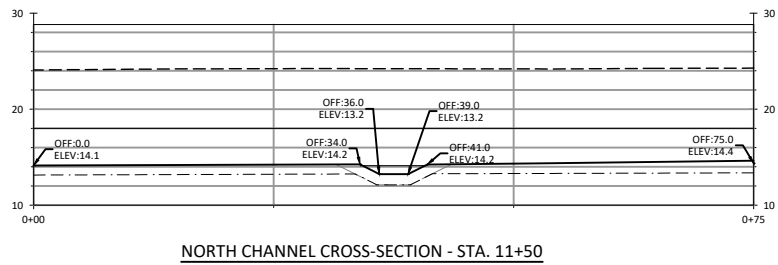
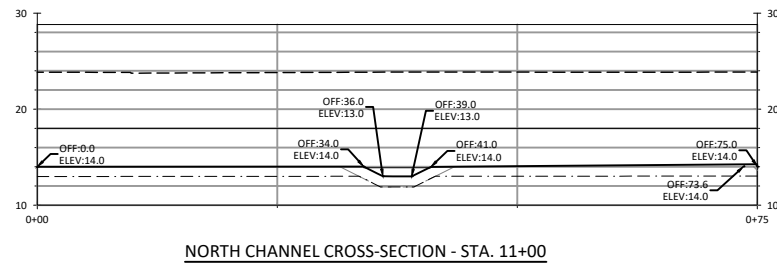
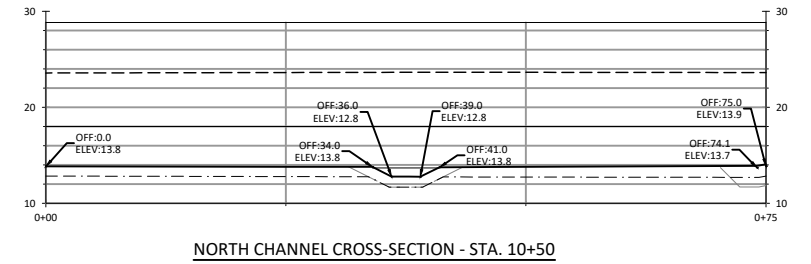
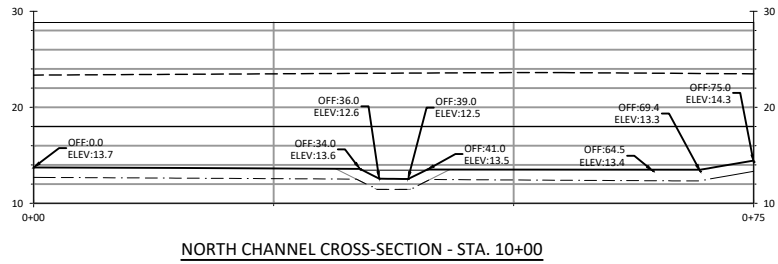
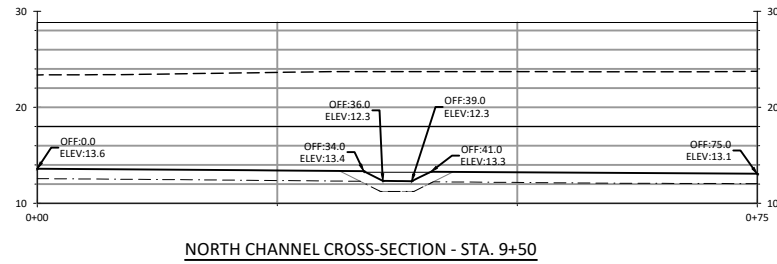
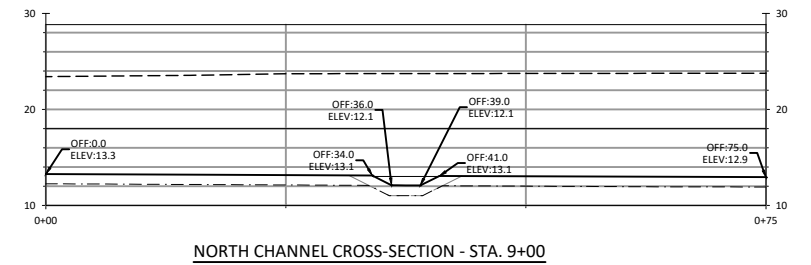
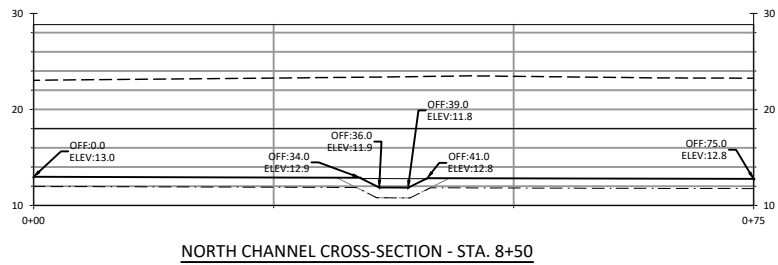
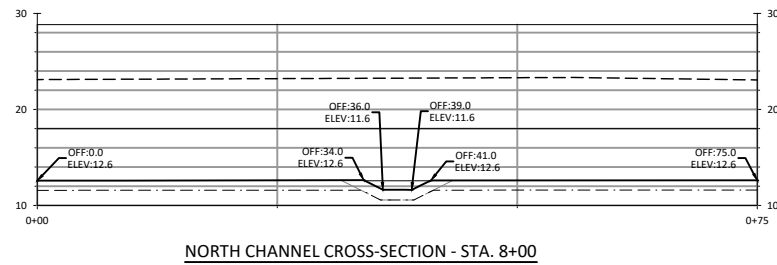
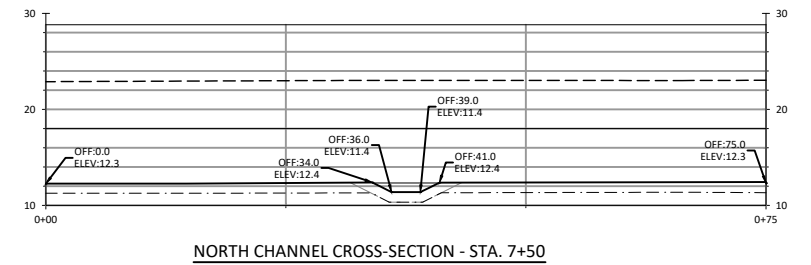
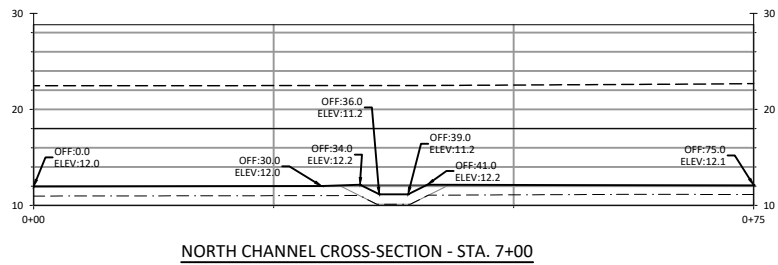
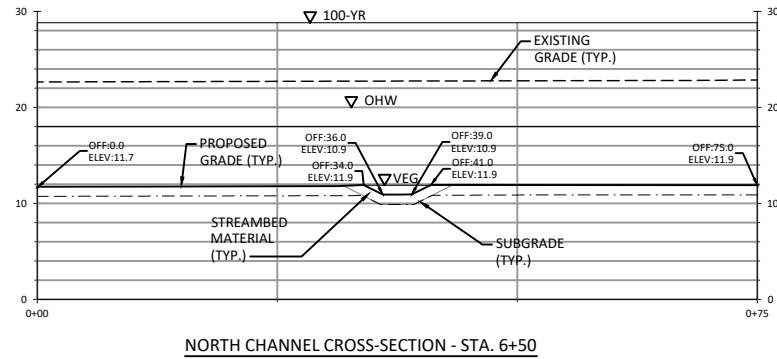
PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON



FINISHED GRADE  
CROSS-SECTIONS - NORTH  
CHANNEL

SHEET  
20 OF 32





VERTICAL EXAGGERATION  
SCALE: 1" = 10'

NOTE: ALL NORTH CHANNEL CROSS-SECTIONS  
REFERENCE TO THE NORTH CHANNEL  
ALIGNMENT. SEE SHEET 19.



NO.	BY	DATE	REVISION DESCRIPTION

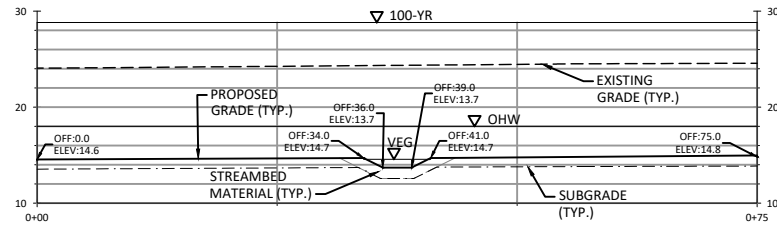
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PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON

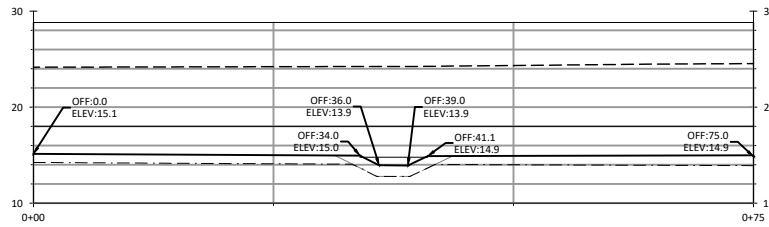


FINISHED GRADE  
CROSS-SECTIONS - NORTH  
CHANNEL

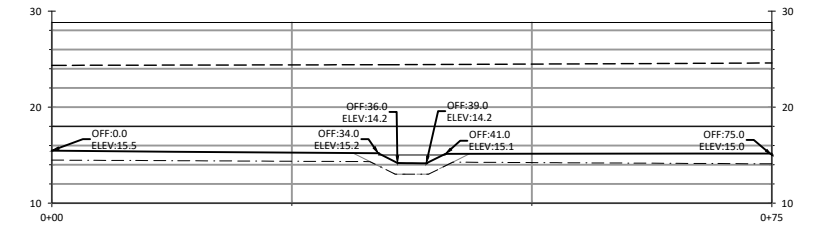
SHEET  
21 OF 32



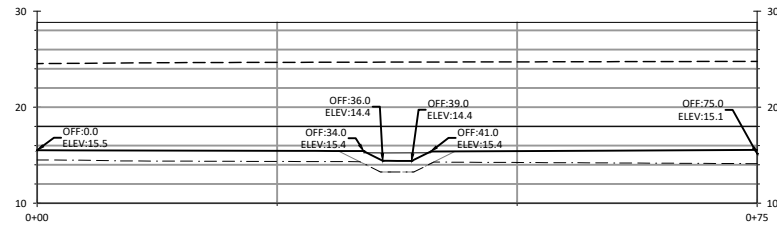
NORTH CHANNEL CROSS-SECTION - STA. 12+50



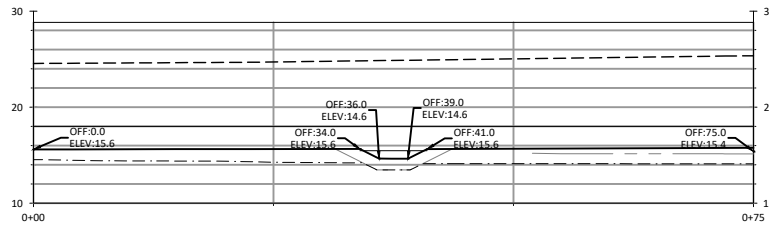
NORTH CHANNEL CROSS-SECTION - STA. 13+50



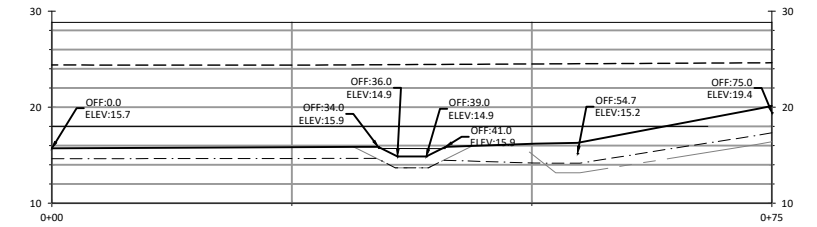
NORTH CHANNEL CROSS-SECTION - STA. 13+00



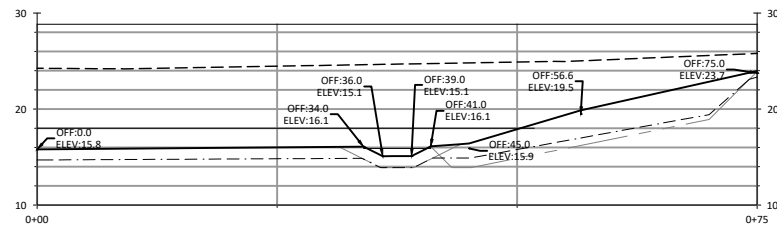
NORTH CHANNEL CROSS-SECTION - STA. 14+00



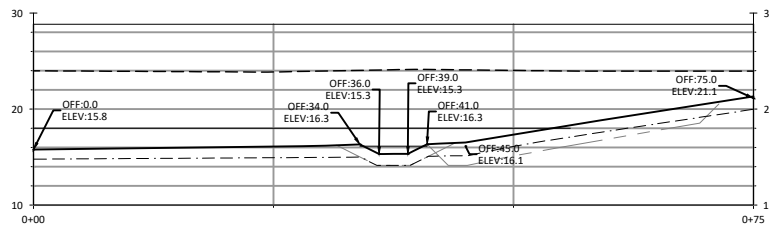
NORTH CHANNEL CROSS-SECTION - STA. 14+50



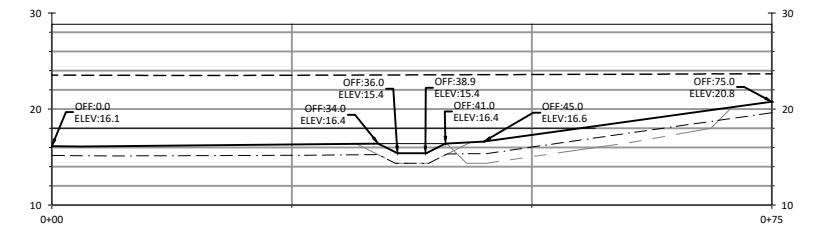
NORTH CHANNEL CROSS-SECTION - STA. 15+00



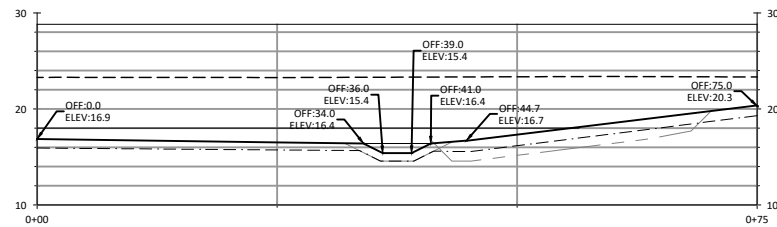
NORTH CHANNEL CROSS-SECTION - STA. 15+50



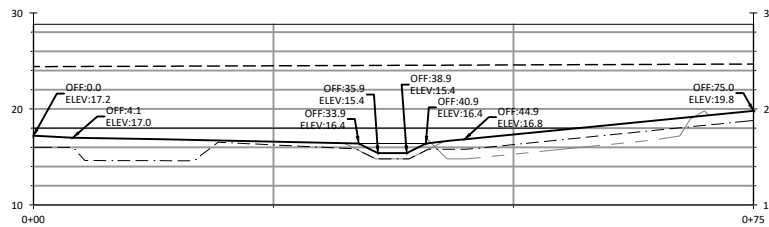
NORTH CHANNEL CROSS-SECTION - STA. 16+00



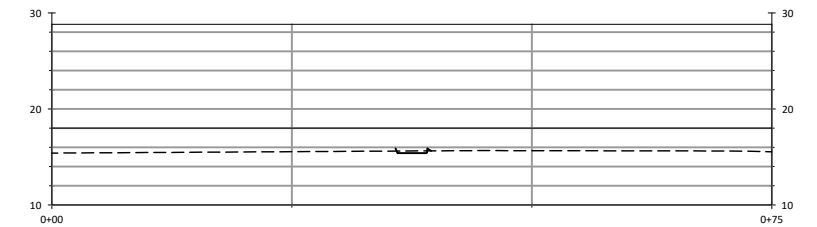
NORTH CHANNEL CROSS-SECTION - STA. 16+50



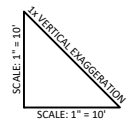
NORTH CHANNEL CROSS-SECTION - STA. 17+00



NORTH CHANNEL CROSS-SECTION - STA. 17+50



NORTH CHANNEL CROSS-SECTION - STA. 18+00



NOTE: ALL NORTH CHANNEL CROSS-SECTIONS REFERENCE TO THE NORTH CHANNEL ALIGNMENT. SEE SHEET 19.



NO.	BY	DATE	REVISION DESCRIPTION

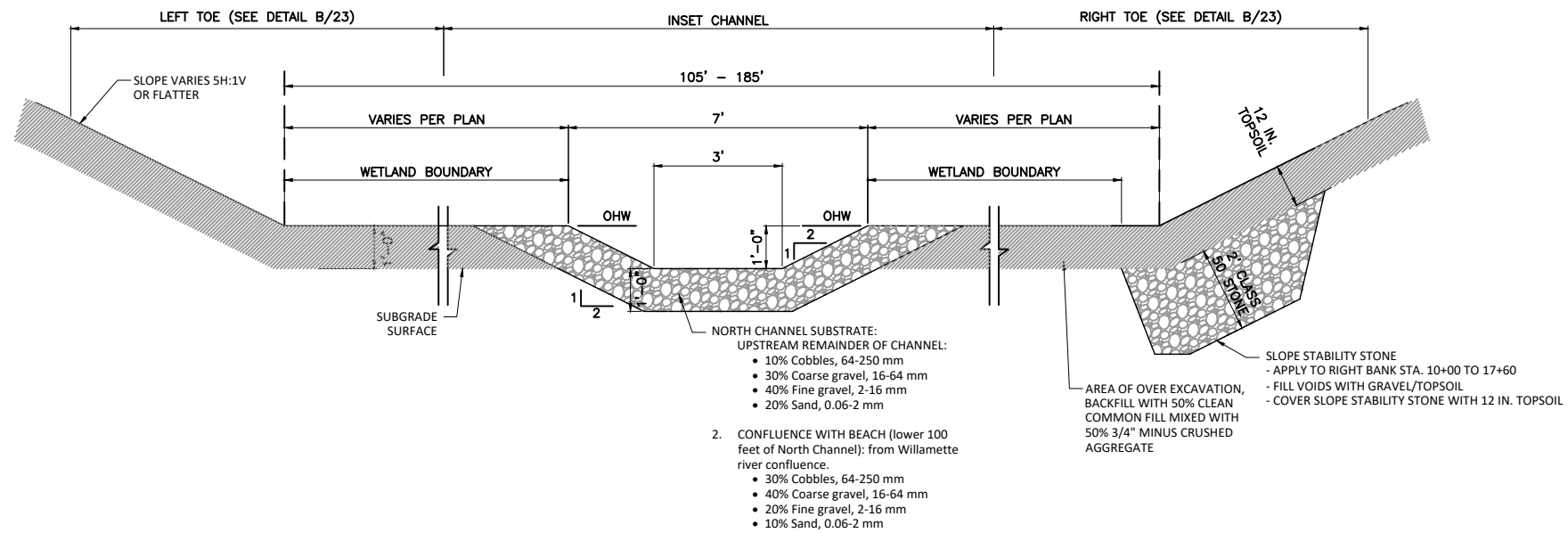
RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON

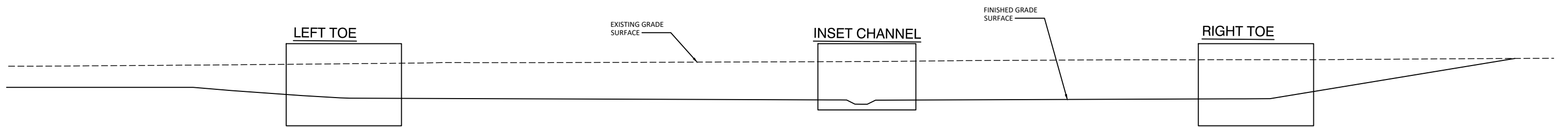


FINISHED GRADE  
CROSS-SECTIONS - NORTH  
CHANNEL

SHEET  
22 OF 32



**A**  
23  
SECTION: TYPICAL NORTH CHANNEL (SHEET 19)  
NTS



**B**  
23  
SECTION: NORTH TRIBUTARY CHANNEL (SHEET 19)  
NTS



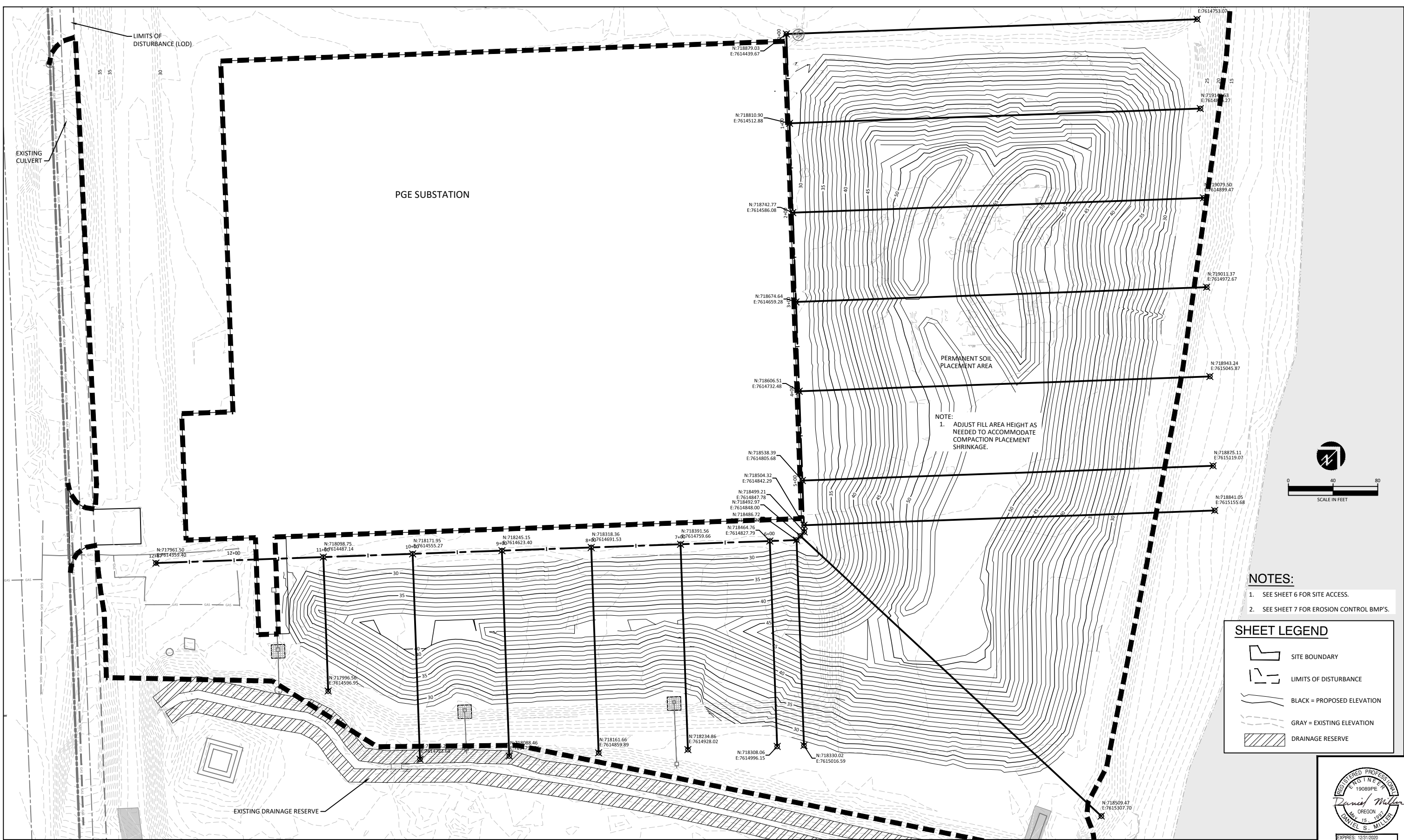
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RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

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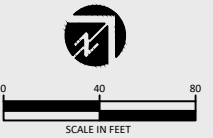
**TYPICAL DETAILS**



- NOTES:**
- SEE SHEET 6 FOR SITE ACCESS.
  - SEE SHEET 7 FOR EROSION CONTROL BMP'S.

**SHEET LEGEND**

	SITE BOUNDARY
	LIMITS OF DISTURBANCE
	BLACK = PROPOSED ELEVATION
	GRAY = EXISTING ELEVATION
	DRAINAGE RESERVE



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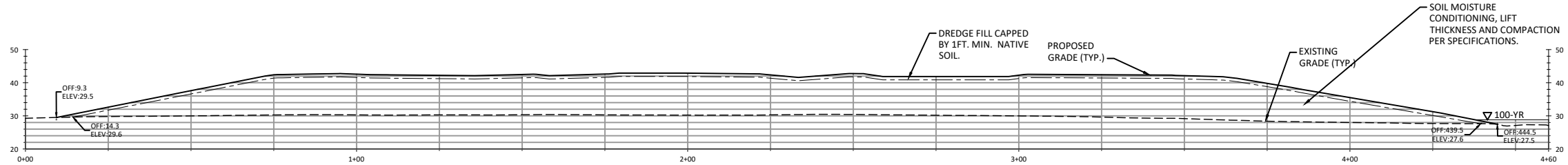
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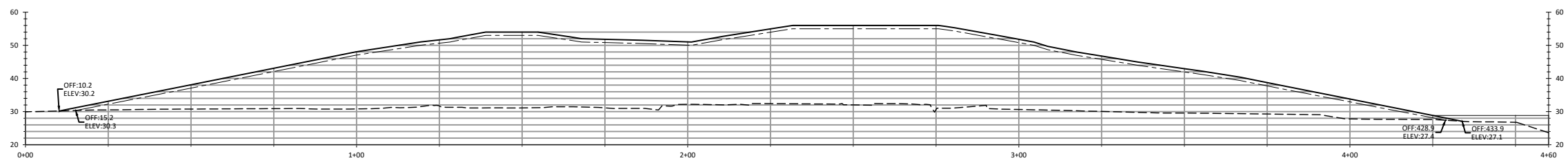
**GRADING PLAN - FILL AREA**



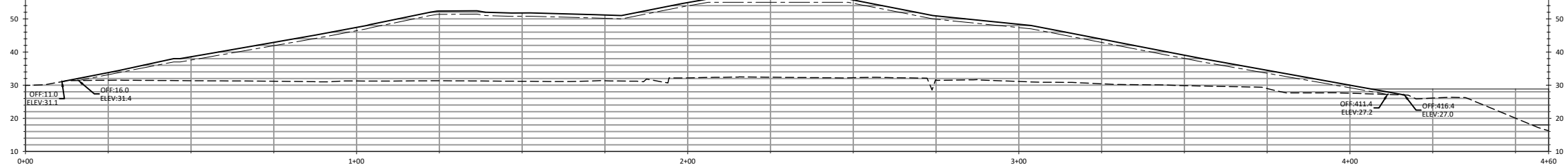
GRADING CROSS-SECTION - FILL AREA STA. 0+00



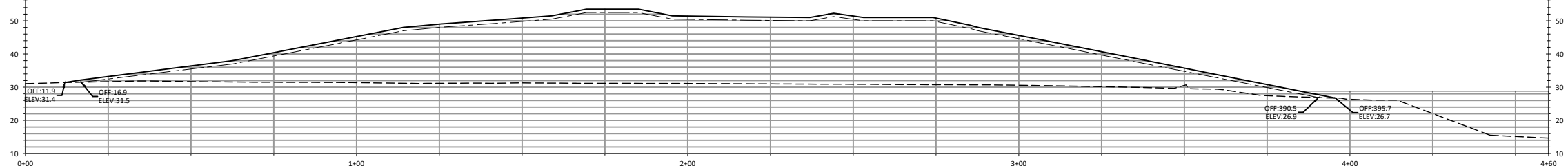
GRADING CROSS-SECTION - FILL AREA STA. 1+00



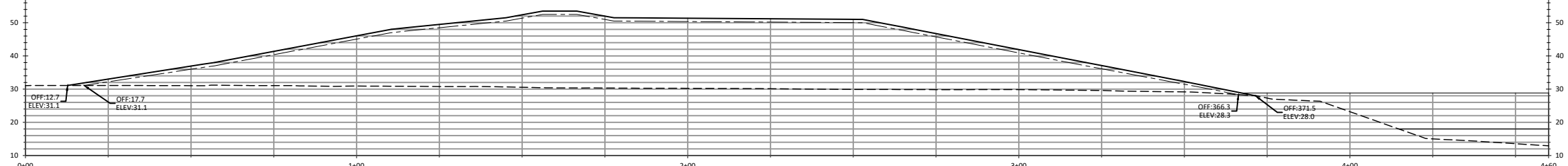
GRADING CROSS-SECTION - FILL AREA STA. 2+00



GRADING CROSS-SECTION - FILL AREA STA. 3+00



GRADING CROSS-SECTION - FILL AREA STA. 4+00



GRADING CROSS-SECTION - FILL AREA STA. 5+00

SCALE: 1" = 20'  
VERTICAL EXAGGERATION

NOTE: ALL PERMANENT FILL GRADING CROSS-SECTIONS REFERENCE TO THE PERMANENT FILL ALIGNMENT. SEE SHEET 24.



NO.	BY	DATE	REVISION DESCRIPTION

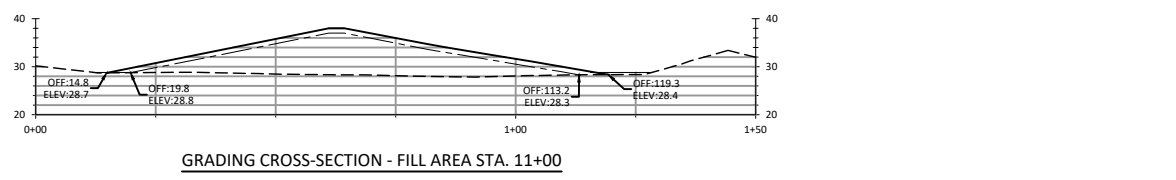
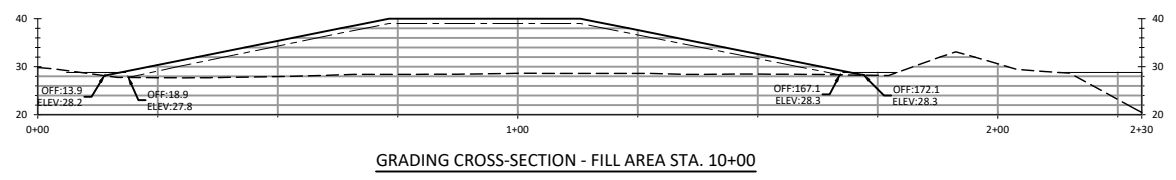
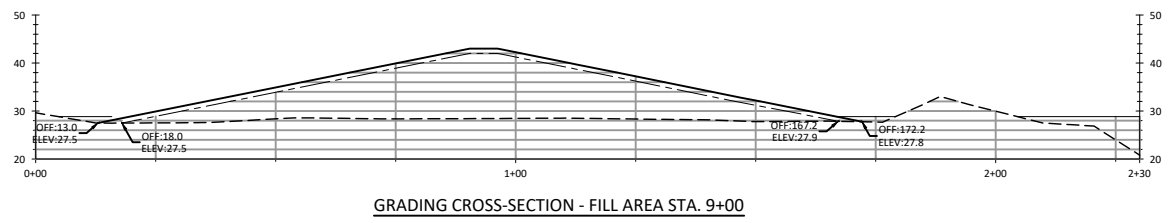
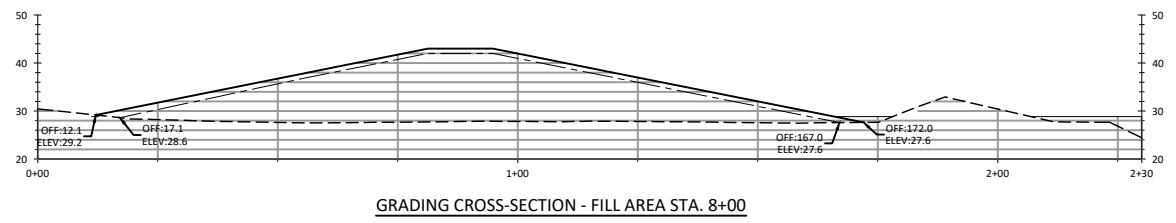
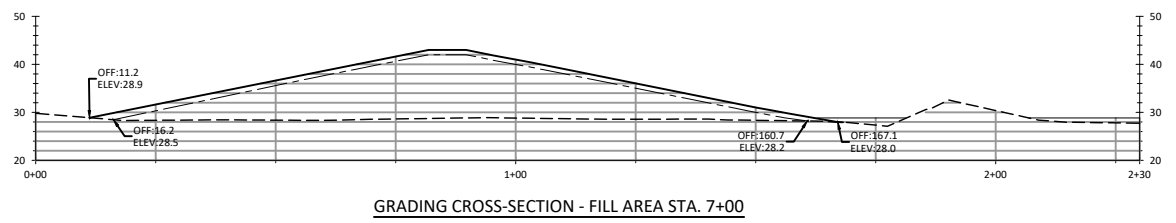
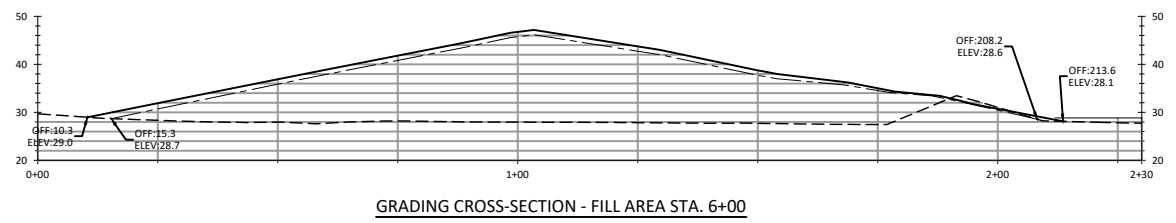
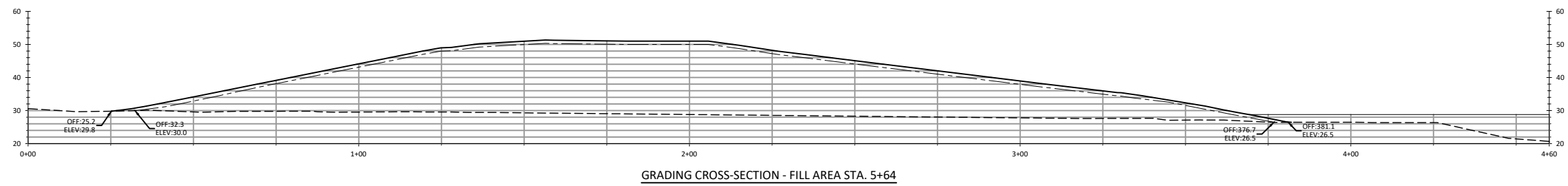
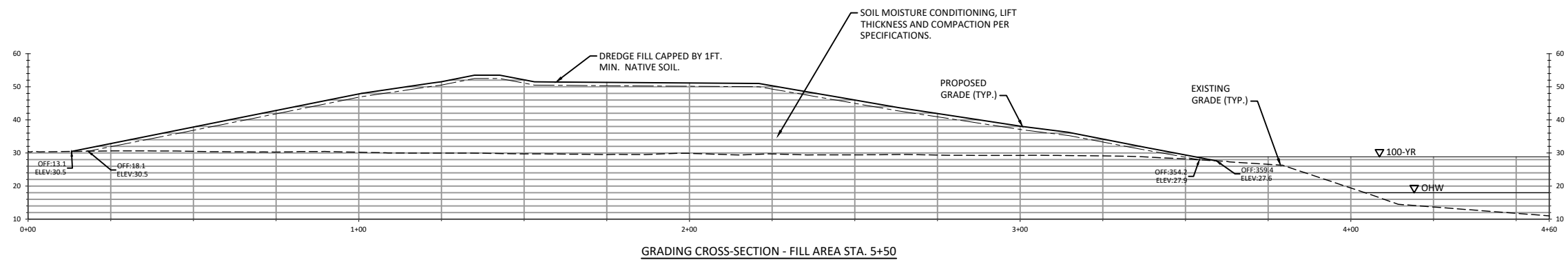
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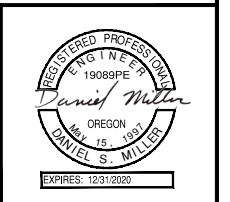
GRADING CROSS-SECTIONS -  
FILL AREA

SHEET  
25 OF 32



VERTICAL EXAGGERATION  
SCALE: 1" = 1'  
SCALE: 1" = 20'

NOTE: ALL PERMANENT FILL GRADING CROSS-SECTIONS REFERENCE TO THE PERMANENT FILL ALIGNMENT. SEE SHEET 24.



NO.	BY	DATE	REVISION DESCRIPTION

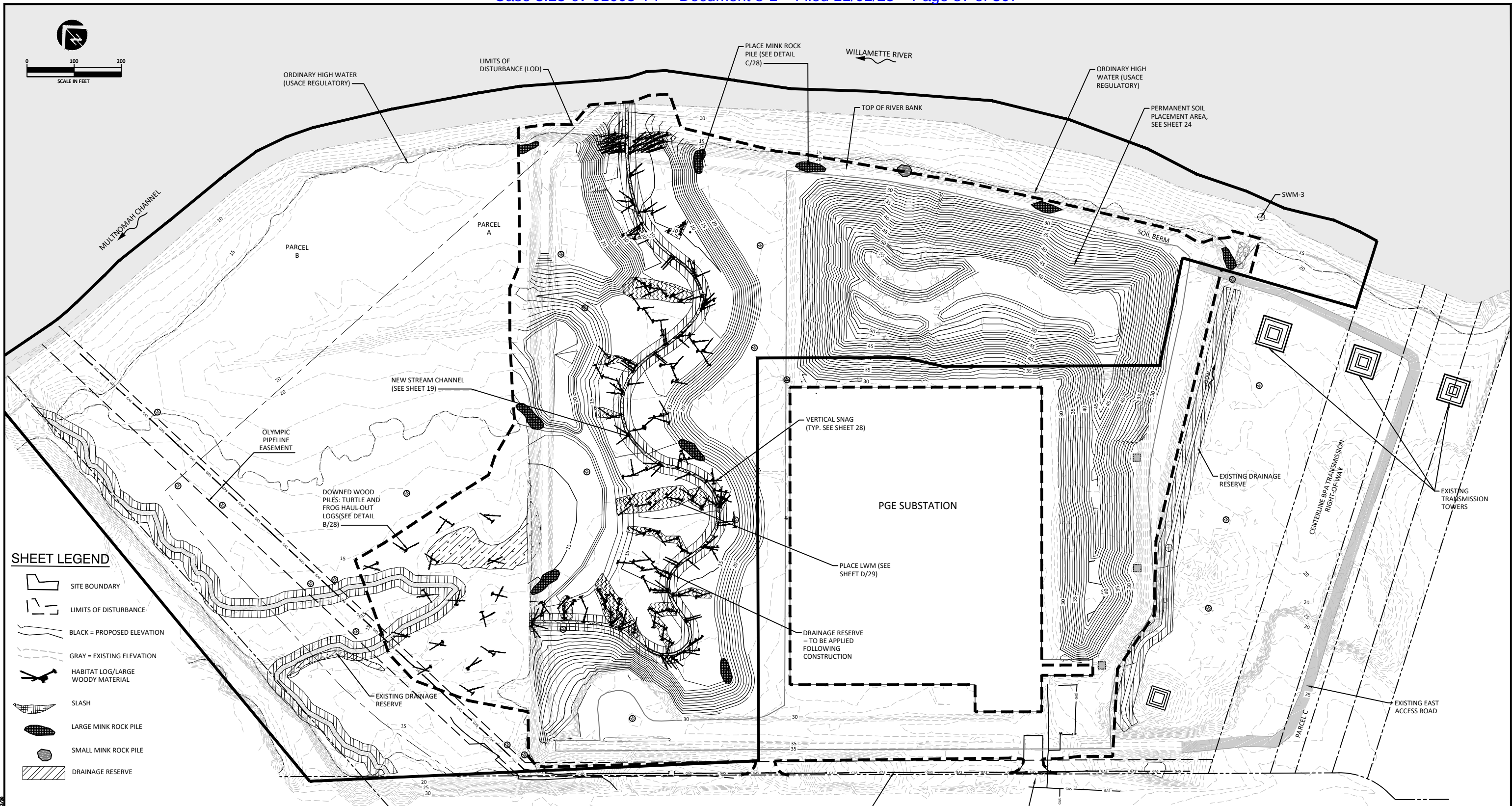
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










GRADING CROSS-SECTIONS -  
FILL AREA

SHEET  
26 OF 32



**SHEET LEGEND**

-  SITE BOUNDARY
-  LIMITS OF DISTURBANCE
-  BLACK = PROPOSED ELEVATION
-  GRAY = EXISTING ELEVATION
-  HABITAT LOG/LARGE WOODY MATERIAL
-  SLASH
-  LARGE MINK ROCK PILE
-  SMALL MINK ROCK PILE
-  DRAINAGE RESERVE

**NOTES:**

1. SEE SHEET 6 FOR SITE ACCESS.
2. SEE SHEET 7 FOR EROSION CONTROL BMP'S.
3. ALL SURFACES SHALL BE ROUGHENED AS SHOWN IN DETAIL E/8, BEFORE APPLICATION OF NATIVE SHORT GRASS.
4. SLOPE STABILIZATION MATTING (NORTH AMERICAN GREEN C125BN), OR APPROVED EQUAL, SHALL BE INSTALLED ON ALL SURFACES >20% SLOPE.
5. SUBSTRATE LAYER SHALL BE PLACED ALONG BOTTOM OF STREAM, SEE SHEET 23.

**SITE PLAN - HABITAT FEATURES**



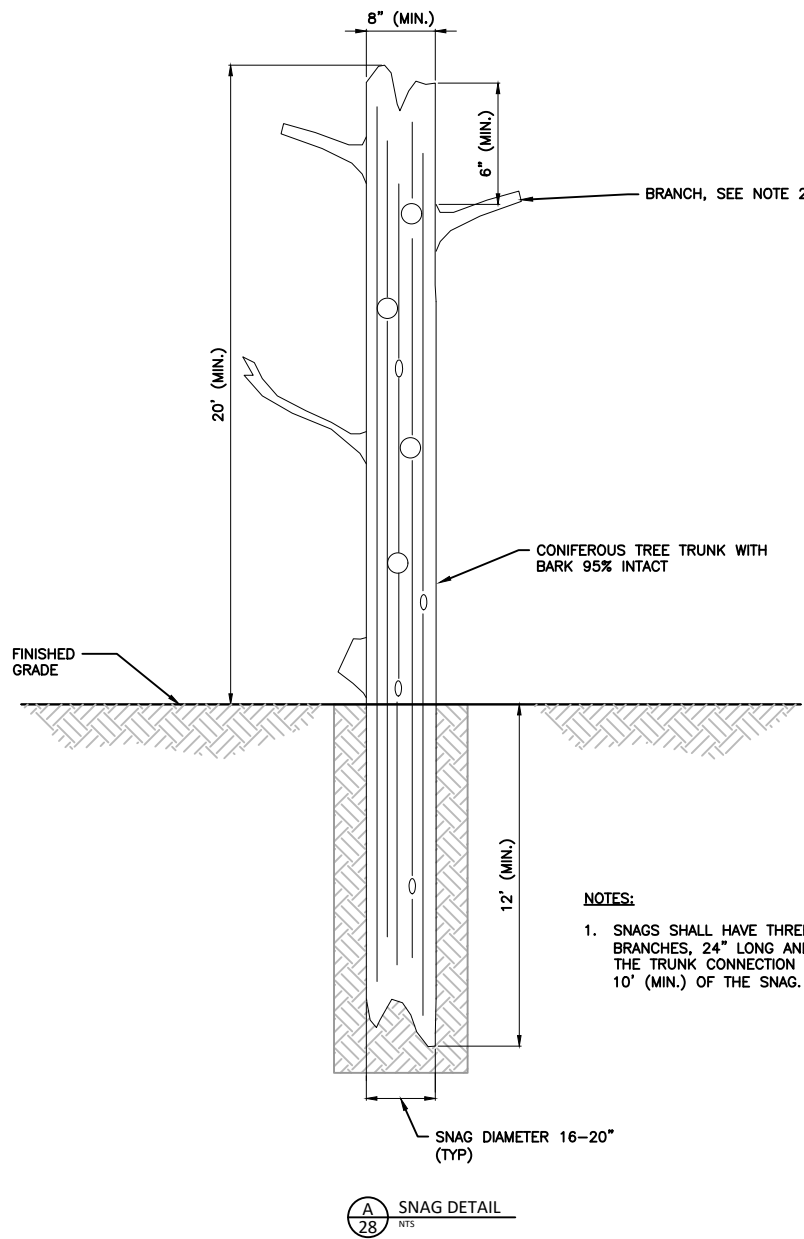
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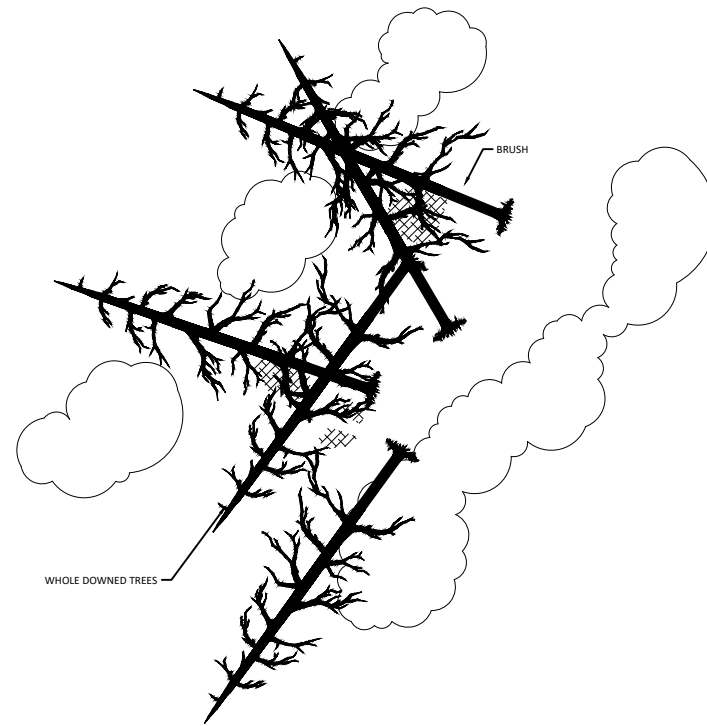


**PLAN VIEW - HABITAT FEATURES**



**NOTES:**

1. SNAGS SHALL HAVE THREE OR MORE BRANCHES, 24" LONG AND 2"Ø AT THE TRUNK CONNECTION IN THE TOP 10' (MIN.) OF THE SNAG.



**B 28 NTS** DOWNED WOOD AND BRUSH PILES

NOTE:  
HABITAT LOGS TO BE PLACED DIRECTLY ON THE GROUND SURFACE IN SUB AREA 4 ONLY. LOGS SHALL BE ANCHORED PER DETAILS F/29 THROUGH I/29. ARRANGE LOGS TO APPEAR NATURALLY DISTRIBUTED, BUT WITH THE MAJORITY OF LOGS ORIENTED ROUGHLY NORTH SOUTH SUCH THAT THE ROOTWAD IS ON THE NORTH END, IN ORDER TO MAXIMIZE SOUTHERN SURFACE EXPOSURE.

**MINK ROCK PILES**

- **LARGE ROCK PILES:** SHALL BE A MINIMUM OF 15-FT LONG, 8-FT WIDE AND 6-FT ABOVE GROUND SURFACE. HEIGHT AND WIDTH CAN VARY SLIGHTLY ALONG THE LENGTH OF PILE IF NECESSARY.
- **SMALL ROCK PILES:** SHALL BE A MINIMUM OF 5-FT DIAMETER AND 4-FT ABOVE GROUND SURFACE.
- **ROCK PILES SHOULD BE CONSTRUCTED OF ROCK OF SUFFICIENT SIZE (GENERALLY 18 TO 36 INCHES) TO CREATE THREE TO SIX INCH OPENINGS. ROCK LESS THAN EIGHT INCHES IN DIAMETER SHALL NOT BE USED.**
- **BASE OF ROCK PILES SHALL BE BURIED AT LEAST 1-FT TO 2-FT (OR DEEPER) BELOW GROUND SURFACE.**
- **ROCK PILES SHALL BE PLACED LENGTHWISE ALONG EXISTING BERMS, ABOVE OHW TO THE EXTENT POSSIBLE.**
- **AS AN OPTION, INCORPORATE A PERCH LOG WITH BRANCHES INTO ROCK PILES, OR PLACE ROCKS OVER AN EXISTING LOG, ESPECIALLY WHERE BERMS ARE UNAVAILABLE.**
- **LARGE MINK ROCK PILES MAY PARTIALLY (25% OR LESS OF TOTAL AREA) EXTEND INTO AREAS EXPECTED TO BE SEASONALLY FLOODED.**

ADAPTED FROM:  
MIKE SZUMSKI AND JEREMY BUCK, DECEMBER 20, 2017. *REFINEMENT OF ROCK PILE GUIDANCE*. U. S. FISH AND WILDLIFE SERVICE ECOLOGICAL SERVICES, OREGON.  
WHICH REFERENCES: MACDONALD, M. 2008. *WSDOT GUIDANCE ON WILDLIFE HABITAT STRUCTURES IN WETLAND MITIGATION SITES*. WASHINGTON STATE DEPARTMENT OF TRANSPORTATION ENVIRONMENTAL SERVICES, NORTHWEST REGION BIOLOGY. 16 PP. AVAILABLE AT [HTTP://WWW.WSDOT.WA.GOV/NR/RDONLYRES/9093EB40-A81E-4094-8AA9-C376435A8D06/0/MIT\\_HABITATSTRUCTURE.PDF](http://www.wsdot.wa.gov/nr/rdonlyres/9093EB40-A81E-4094-8AA9-C376435A8D06/0/MIT_HABITATSTRUCTURE.PDF)

**C 28 NTS** MINK ROCK PILES GENERAL NOTES

**A 28 NTS** SNAG DETAIL



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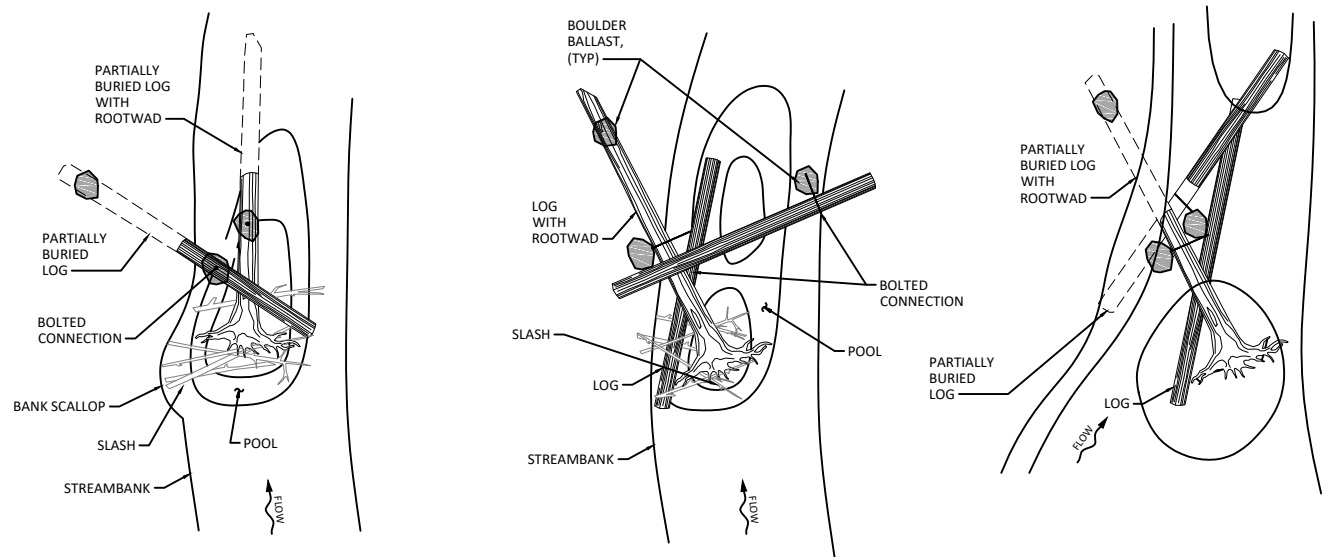
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TYPICAL DETAILS AND NOTES -  
HABITAT FEATURES (SHEET 1)

SHEET  
28 OF 32





**DESCRIPTION:**  
 1. CREATE POOL AND SCALLOP IN BANK.  
 2. PLACE LOG WITH ROOTWAD TO LOOK AND FUNCTION LIKE A TREE THAT HAS FALLEN OVER INTO THE CREEK. PARTIALLY BURY.  
 3. INSTALL SLASH UPSTREAM AND UNDER ROOTWAD.  
 4. HOLD DOWN LOG WITH ROOTWAD BY INSTALLING PARTIALLY BURIED LOG THAT CROSSES OVER.  
 5. BOLT LOG TO BOULDER.

**DESCRIPTION:**  
 1. CREATE POOL.  
 2. PLACE LOG IN POOL.  
 3. PLACE LOG WITH ROOTWAD THAT CROSSES OVER, WITH ROOTWAD IN POOL.  
 4. INSTALL SLASH UPSTREAM AND UNDER ROOTWAD.  
 5. INSTALL A CHANNEL SPANNING LOG.  
 6. BOLT LOG TO BOULDER.

**DESCRIPTION:**  
 1. CREATE POOL.  
 2. PLACE LOG IN POOL.  
 3. HOLD DOWN LOG WITH PARTIALLY BURIED LOG WITH ROOTWAD.

**A**  
 29  
 PLAN VIEW NORTH CHANNEL LWM PLACEMENT  
 NTS

DETAILS B AND C INTENTIONALLY OMITTED

**NOTES**

SPECIFIC ORIENTATION OF LOGS AND BALLAST MATERIALS MAY VARY FROM TYPICAL DRAWINGS DEPENDING ON SIZE AND SHAPE OF MATERIAL DELIVERED OR SALVAGED.

**MATERIALS**

FULLY THREADED RODS SHALL BE 1-1/4" MINIMUM DIAMETER A36 THREADED RODS

BOULDERS SHALL BE NON-FRACTURED BASALT WITH A MINIMUM SPECIFIC GRAVITY OF 2.65.

EPOXY FOR ANCHORING SHALL BE HILTI HIT RE 500 ADHESIVE OR APPROVED EQUAL.

**CONSTRUCTION**

FINAL POSITIONING OF THE ANCHORED LOG STRUCTURES SHALL BE IN THE APPROXIMATE LOCATION AS SHOWN ON THE PLANS AND AS APPROVED IN THE FIELD BY THE OWNERS REPRESENTATIVE.

BALLAST BOULDERS SHALL BE SECURED AS SHOWN ON THE PLANS AND POSITION BELOW FINISHED GRADE.

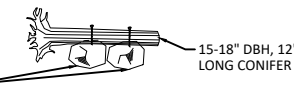
PIN LOG IN PLACE WITH ONE END SUSPENDED OFF THE GROUND. DRILL HOLE THROUGH LOG. MOVE BOULDER INTO PLACE, LEAVING A SMALL SPACE BETWEEN THE LOG AND THE BOULDER. DRILL BOULDER USING A 36" LONG DRILL BIT, PASSED THROUGH THE HOLE IN THE LOG TO DRILL THE BALLAST BOULDER ALONG A CONTINUOUS ALIGNMENT.

DRILL HOLES IN SOLID ROCK AND AVOID ANY CRACKS OR FRACTURES. HOLES SHALL BE 1-3/8" INCH IN DIAMETER. HOLES SHALL BE DRILLED 8 INCHES, MINIMUM, INTO ROCK. HOLES SHALL BE CLEANED OF LOOSE ROCK FRAGMENTS AND POWDER WITH A BRUSH AND WATER. HOLES SHALL BE CLEAN OF ALL DUST, DEBRIS, OIL, AND SOAP RESIDUES. THE HOLES SHALL FLUSH CLEAR TO INSURE NO MATERIAL EXISTS BETWEEN THE FULLY THREADED ROD, EPOXY, AND ROCK SURFACE. INSTALL EPOXY PER MANUFACTURER'S RECOMMENDATIONS.

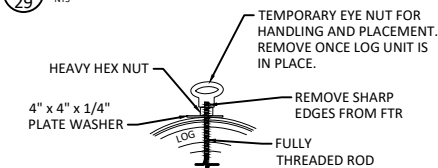
WIPE FULLY THREADED ROD WITH CLEAN ACETONE SOAKED RAG TO REMOVE OILS AND GREASES PRIOR TO INSERTION INTO EPOXY FILLED HOLE. FILL DRILL HOLES ENOUGH TO ENSURE COMPLETE COVERAGE WITH EPOXY. INSERT FULLY THREADED ROD INTO HOLE SO THAT END OF ROD HITS THE BOTTOM OF THE HOLE. ROTATE FULLY THREADED ROD DURING INSERTION TO FILL THREAD VALLEYS WITH EPOXY. EXCESS EPOXY SHOULD COME OUT OF THE TOP OF THE HOLE AS ROD IS SEATED IN DRILL HOLE.

ATTACH A SECOND BOULDER, USING THE SAME METHOD, ON THE SAME SIDE OF THE LOG. ATTACH A HEAVY EYE NUT TO THE END OF EACH FULLY THREADED ROD AND USE THE EYE NUTS TO LIFT THE UNIT AND MOVE INTO PLACE. REMOVE THE EYE NUTS ONCE THE UNIT IS PLACED IN ITS FINAL ALIGNMENT.

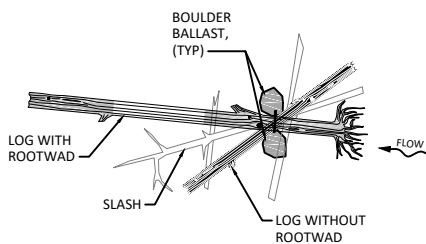
TWO - 32" EQUIVALENT DIAMETER BOULDERS ATTACHED WITH FTR TO SAME SIDE OF LOG



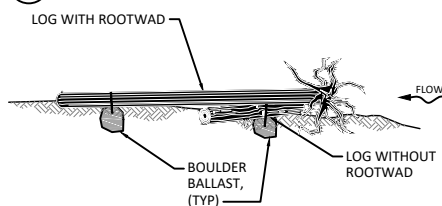
**H**  
 29  
 DETAIL - LOG AND BOULDER CONNECTION  
 NTS



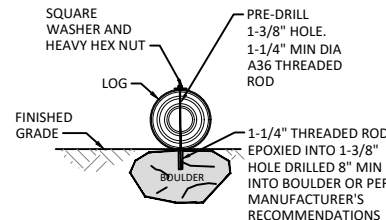
**I**  
 29  
 DETAIL - FULLY THREADED ROD AND EYE NUT  
 NTS



**D**  
 29  
 PLAN - TYPICAL FLOODPLAIN ROUGHNESS LWM  
 NTS



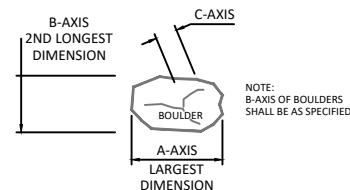
**E**  
 29  
 SECTION - TYPICAL FLOODPLAIN ROUGHNESS LWM  
 NTS



**F**  
 29  
 DETAIL - BOULDER BALLAST  
 NTS

**LOG ANCHORED TO BOULDER**

1. SECURE LOG WITH 1-1/4" MIN DIAMETER A36 THREADED ROD THROUGH LOG EPOXIED INTO BOULDER.
2. INSTALL STEEL PLATE(S) AND HEAVY HEX NUT(S).
3. SECURE NUT(S) BY CHISELING THREADS.
4. FILE OR GRIND OFF SHARP EDGES.



**G**  
 29  
 DETAIL - BOULDER SIZING  
 NTS

NOTE: B-AXIS OF BOULDERS SHALL BE AS SPECIFIED

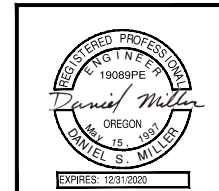
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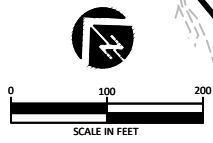
TYPICAL DETAILS AND NOTES -  
 HABITAT FEATURES (SHEET 2)

SHEET  
 29 OF 32



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**SHEET LEGEND**

- ZONE 1 - WETLAND PLANTING (CREATION)
- ZONE 2 - WETLAND PLANTING (ENHANCEMENT)
- ZONE 3 - RIPARIAN PLANTING (CREATION)
- ZONE 4 - RIPARIAN PLANTING (ENHANCEMENT)
- ZONE 5 - UPLAND PLANTING (CREATION)
- ZONE 6 - UPLAND PLANTING (ENHANCEMENT)
- ZONE 7 - SUB STATION VEGETATION SCREEN
- GRASS PLANTING
- DRAINAGE RESERVE
- SUBAREA 4 - REED CANARYGRASS MANAGEMENT AREA

**NOTES:**

1. ALL SURFACES SHALL BE ROUGHENED AS SHOWN IN DETAIL D/8, BEFORE APPLICATION OF NATIVE SHORT GRASS.
2. SEED GRASS ONLY PER SHEET 31. SPECIFIC SEED MIX WILL MATCH THE ZONE IT IS BEING PLACED IN.
3. SUB-AREA 4 REED CANARYGRASS MANAGEMENT AREA TO BE PLANTED AND SEEDED AS NEEDED FOLLOWING MANAGEMENT ACTIONS. PLANTS TO BE SELECTED FROM LISTS SHOWN ON SHEET 31 FOR ZONES 2, 4, AND 6.

**SITE PLAN - PLANTING**



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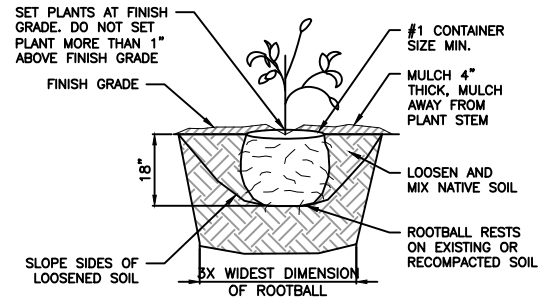
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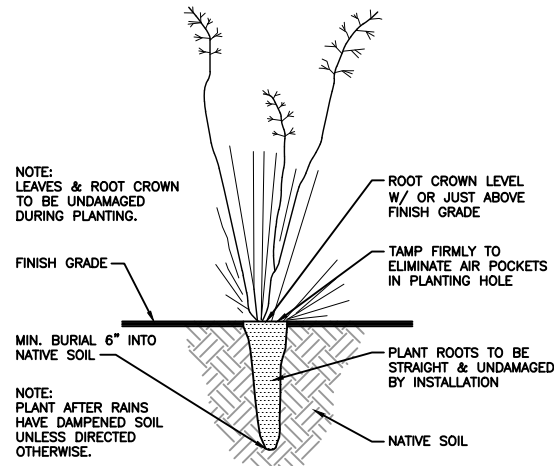


**PLANTING PLAN**

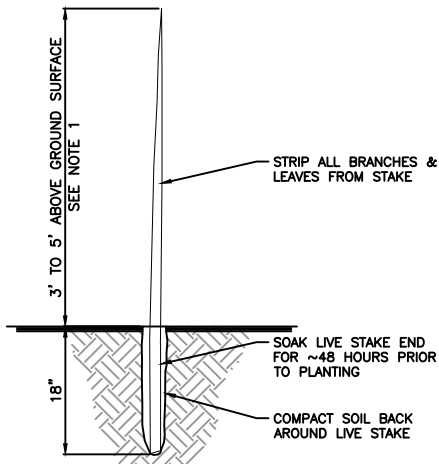
NOTES:  
PLANTINGS SHALL BE INSTALLED BETWEEN OCTOBER 1 AND MARCH 31. IF PLANTINGS ARE INSTALLED PRIOR TO COMPLETION OF CONSTRUCTION, A TEMPORARY BRIGHT ORANGE CONSTRUCTION FENCE SHALL BE PLACED TO PROTECT PLANTINGS FROM CONSTRUCTION ACTIVITIES. ALL TREES REMOVED FOR CONSTRUCTION OF THIS PROJECT, WITH TRUNKS GREATER THAN 12 INCHES IN DIAMETER SHALL BE RETAINED ON THE SITE AND WITHIN THE GREENWAY OVERLAY ZONE. PGE WILL ACCOMPANY A BDS INSPECTOR FOR AN ON-SITE INSPECTION FOLLOWING PLANTING.



A CONTAINER STOCK PLANTING DETAIL  
31 NTS



B PLUG PLANTING DETAIL  
31 NTS



NOTE:  
1. IF PLANTING LOCATION WILL BE SUBMERGED SEASONALLY, INSTALL STAKE THAT IS AT LEAST 2 FEET GREATER THAN WATER SURFACE ELEVATION.

C LIVE STAKE PLANTING  
31 NTS

TEMPORARY IRRIGATION PLAN

NEAR SURFACE GROUND WATER HAS BEEN DOCUMENTED THROUGHOUT THE SITE. RIPARIAN AND WETLAND GRADING DESIGNS ARE NEAR, AT OR BELOW EXPECTED GROUND WATER ELEVATIONS. THEREFORE, NO TEMPORARY IRRIGATION WILL BE REQUIRED FOR PLANTINGS WITHIN WETLAND ZONES. UPLAND FILL DEPOSITS (SUB AREA 2) WILL REQUIRE TEMPORARY IRRIGATION. TO ACCESS THE FILL AREA A TEMPORARY ACCESS PATH WILL BE CONSTRUCTED TO ENABLE A WATER TRUCK TO DRIVE UP THE SPINE OF THE FILL AREA. WATER WILL BE SOURCED FROM A CITY OF PORTLAND FIRE HYDRANT NEAR THE PROPERTY ENTRANCE. THE WATER TRUCK WILL WATER VEGETATION AS NEEDED TO SUSTAIN ESTABLISHMENT, WITH A WHEEL LINE OR PUMPED-TO-SPRINKLER HOSE LINES AT THE CONTRACTORS DISCRETION. CITY OF PORTLAND GREENWAY TREES TO BE PLANTED ADJACENT TO NW MARINA WAY WILL BE WATERED BI-WEEKLY FOLLOWING PLANTING TO ESTABLISH UNTIL WINTER RAINS BEGIN. THE TREES WILL BE WATERED USING A WATER TRUCK SOURCING WATER FROM THE CITY OF PORTLAND FIRE HYDRANT NEAR THE PROPERTY ENTRANCE.

Planting Plan Species Palette (for reference only)						
Scientific Name	Common Name	Type	Wetland Indicator Status	Elevation Range (CPD)	Size	Form
Seed Mixes	Wetland Seed Mix	herb	FAC-OBL	8-16	n/a	seed
	Riparian Seed Mix	herb	FACW-FAC	14-20	n/a	seed
	Upland Seed Mix	herb	FAC-FACU	>20	n/a	seed
<i>Carex obnupta</i>	slough sedge	herb	OBL	10-16	n/a	plug
<i>Eleocharis palustris</i>	creeping spikerush	herb	OBL	10-16	n/a	plug
<i>Sagittaria latifolia</i>	wapato	herb	OBL	8-12	n/a	bulb
<i>Schoenoplectus acutus</i>	hardstem bulrush	herb	OBL	10-16	n/a	corn
<i>Scirpus microcarpus</i>	small-fruited bulrush	herb	OBL	10-16	n/a	plug
<i>Cornus sericea (alba)</i>	red-osier dogwood	shrub	FACW	14-18	1-gal	potted
<i>Corylus cornuta</i>	beaked hazelnut	shrub	FACU	20-30	1-gal	potted
<i>Holodiscus discolor</i>	oceanspray	shrub	FACU	20-30	1-gal	potted
<i>Mahonia aquifolium</i>	tall Oregon grape	shrub	UPL	>20	1-gal	potted
<i>Rosa nutkana</i>	Nootka rose	shrub	FAC	16-20	1-gal	potted
<i>Rubus parviflorus</i>	thimbleberry	shrub	FACU	>22	1-gal	potted
<i>Salix scouleriana</i>	Scouler's willow	shrub	FAC	14-20	4' min	live stake
<i>Salix sitchensis</i>	Sitka willow	shrub	FACW	12-18	4' min	live stake
<i>Sambucus racemosa</i>	red elderberry	shrub	FACU	>22	1-gal	potted
<i>Spiraea douglasii</i>	Douglas' spirea	shrub	FACW	12-18	1-gal	potted
<i>Symphoricarpos albus</i>	common snowberry	shrub	FACU	>22	1-gal	potted
<i>Acer macrophyllum</i>	bigleaf maple	tree	FACU	>22	2-gal/1' dbh	potted/bare root
<i>Alnus rubra</i>	red alder	tree	FAC	15-22	2-gal/1' dbh	potted/bare root
<i>Crataegus douglasii</i>	Douglas hawthorn	tree	FAC	16-22	2-gal/1' dbh	potted/bare root
<i>Frangula purshiana</i>	casacara	tree	FAC	16-20	2-gal/1' dbh	potted/bare root
<i>Fraxinus latifolia</i>	Oregon ash	tree	FACW	15-18	2-gal/1' dbh	potted/bare root
<i>Populus balsamifera</i>	black cottonwood	tree	FAC	14-20	1-gal / 4' min	potted / pole
<i>Quercus garryana</i>	Oregon white oak	tree	FACU	>16	2-gal/1' dbh	potted/bare root
<i>Salix lasianдра</i> var. <i>lasianдра</i>	Pacific willow	tree	FACW	14-18	4' min	live stake
<i>Thuja plicata</i>	western red cedar	tree	FAC	15-20	2-gal	potted

Wetland Seed Mix <sup>1</sup>		
Scientific Name	Common Name	Wetland Indicator Status
<i>Agrostis exarata</i>	spike bentgrass	FACW
<i>Bidens frondosa</i>	beggarstick	FACW
<i>Bromus vulgaris</i>	Columbia brome	FACU
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	miners lettuce	FAC
<i>Festuca rubra rubra</i>	native red fescue	FAC
<i>Hordeum</i>	meadow barley	FACW
<i>Brachyantherum</i>	nodding beggarstick	OBL
<i>Bidens cernua</i>	nodding beggarstick	OBL
<i>Carex obnupta</i>	slough sedge	OBL
<i>Carex stipata</i>	awl-fruit sedge	OBL
<i>Deschampsia caespitosa</i>	tufted hairgrass	FACW
<i>Eleocharis palustris</i>	creeping spikerush	OBL
<i>Festuca rubra rubra</i>	native red fescue	FAC
<i>Glyceria occidentalis</i>	western mannagrass	OBL
<i>Hordeum</i>	meadow barley	FACW
<i>Brachyantherum</i>	nodding beggarstick	OBL
<i>Rumex salicifolius</i>	willow-leaved dock	FACW
<i>Scirpus microcarpus</i>	small-fruited bulrush	OBL

1. Application rate to be determined by seed supplier.

Upland Seed Mix <sup>1</sup>		
Scientific Name	Common Name	Wetland Indicator Status
<i>Achillea millefolium</i>	yarrow	UPL
<i>Bromus carinatus</i>	California brome	UPL
<i>Bromus vulgaris</i>	Columbia brome	FACU
<i>Elymus glaucus</i>	blue wildrye	FACU
<i>Festuca rubra rubra</i>	native red fescue	FAC
<i>Fragaria chiloensis</i>	beach strawberry	FACU
<i>Lotus unifololatus</i>	American bird's-foot trefoil	FACU
<i>Lupinus rivularis</i>	streambank lupine	FAC
<i>Poa pratensis</i>	Kentucky bluegrass	FAC

1. Application rate to be determined by seed supplier.

Riparian Seed Mix <sup>1</sup>		
Scientific Name	Common Name	Wetland Indicator Status
<i>Agrostis exarata</i>	spike bentgrass	FACW
<i>Bidens frondosa</i>	beggarstick	FACW
<i>Bromus vulgaris</i>	Columbia brome	FACU
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	miners lettuce	FAC
<i>Festuca rubra rubra</i>	native red fescue	FAC
<i>Hordeum</i>	meadow barley	FACW
<i>Brachyantherum</i>	nodding beggarstick	OBL
<i>Lupinus rivularis</i>	streambank lupine	FAC
<i>Mertensia perfoliata</i>	littleleaf miners	FAC
<i>Poa pratensis</i>	Kentucky bluegrass	FAC
<i>Tellima grandiflora</i>	trinecup	FACU

1. Application rate to be determined by seed supplier.

Wetland Zone <sup>1</sup>							
Scientific Name	Common Name	Type	Wetland Indicator Status	% of Planting Mix	Spacing (ft on center)		Total Stems
					Zone 1 Creation Areas	Zone 2 Enhancement Areas <sup>3</sup>	
EMERGENT PLUGS <sup>3</sup>							
<i>Carex obnupta</i>	slough sedge	herb	OBL	22	2	3	16650
<i>Eleocharis palustris</i>	creeping spikerush	herb	OBL	19	2	3	13660
<i>Sagittaria latifolia</i>	wapato	herb	OBL	19	2	3	13660
<i>Schoenoplectus acutus</i>	hardstem bulrush	herb	OBL	19	2	3	13660
<i>Scirpus microcarpus</i>	small-fruited bulrush	herb	OBL	22	2	3	16650
SHRUBS/TREES							
<i>Cornus sericea</i>	red-osier dogwood	shrub	FACW	20	6	10	1400
<i>Rosa nutkana</i>	Nootka rose	shrub	FAC	10	6	10	735
<i>Salix scouleriana</i>	Scouler's willow	shrub	FAC	10	6	10	735
<i>Salix sitchensis</i>	Sitka willow	shrub	FACW	20	6	15	735
<i>Spiraea douglasii</i> var. <i>douglasii</i>	Douglas' spirea	shrub	FACW	10	6	15	735
<i>Fraxinus latifolia</i>	Oregon ash	tree	FACW	10	10	15	735
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottonwood	tree	FAC	10			1400
<i>Salix lasianдра</i> var. <i>lasianдра</i>	Pacific willow	tree	FACW	10	10	15	735

- All Wetland Zones to be hydroseeded with Wetland Seed Mix per specifications.
- Spacing in enhancement areas will depend on existing vegetation at site. Shrubs and trees to be planted among existing vegetation.
- Emergent plugs to be planted at lowest elevations of Wetland Zone (10.5-18 ft CPD), along stream channels below Ordinary High Water Line (18 ft CPD).

Riparian Zone <sup>1</sup>							
Scientific Name	Common Name	Type <sup>2</sup>	Wetland Indicator Status	% of Planting Mix	Spacing (ft on center)		Total Stems
					Zone 3 Creation Areas	Zone 4 Enhancement Areas <sup>3</sup>	
SHRUBS/TREES							
<i>Corylus cornuta</i> var. <i>californica</i>	beaked hazelnut	shrub	FACU	10	6	10	2320
<i>Rosa nutkana</i>	Nootka rose	shrub	FAC	10	6	10	2320
<i>Salix scouleriana</i>	Scouler's willow	shrub	FAC	10	6	10	2320
<i>Spiraea douglasii</i> var. <i>douglasii</i>	Douglas' spirea	shrub	FACW	10	6	10	2320
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	common snowberry	shrub	FACU	20	6	10	4640
<i>Alnus rubra</i>	red alder	tree	FAC	15	10	15	3520
<i>Crataegus douglasii</i>	black hawthorn	tree	FAC	5	10	15	1200
<i>Thuja plicata</i>	western red cedar	tree	FAC	10	10	15	2320
<i>Fraxinus latifolia</i>	Oregon Ash	tree	FACW	5	10	15	1200
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottonwood	tree	FAC	5	10	15	1200

- All Riparian Zones to be hydroseeded with Riparian Seed Mix per specifications.
- Trees to be planted only on slopes of permanent soil placement area facing away from the substation.
- Spacing in enhancement areas will depend on existing vegetation at site. Shrubs and trees to be planted among existing vegetation.

Upland Zone <sup>1</sup>							
Scientific Name	Common Name	Type <sup>2</sup>	Wetland Indicator Status	% of Planting Mix	Spacing (ft on center)		Total Stems
					Zone 5 Creation Areas	Zone 6 Enhancement Areas <sup>3</sup>	
SHRUBS/TREES							
<i>Holodiscus discolor</i>	oceanspray	shrub	FACU	15	6	10	1115
<i>Mahonia aquifolium</i>	tall Oregon grape	shrub	UPL	5	6	10	405
<i>Sambucus racemosa</i> var. <i>arborescens</i>	red elderberry	shrub	FACU	10	6	10	810
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	common snowberry	shrub	FACU	20	6	10	1520
<i>Acer macrophyllum</i>	bigleaf maple	tree	FACU	20	15	18	1080
<i>Alnus rubra</i>	red alder	tree	FAC	10	10	15	1050
<i>Frangula purshiana</i>	casacara	tree	FAC	8	10	15	850
<i>Quercus garryana</i>	Oregon white oak	tree	FACU	8	15	18	850

- All Upland Zones to be hydroseeded with Upland Seed Mix, per specifications.
- Trees to be planted only on slopes of permanent soil placement area facing away from the substation. Shrubs can be planted on all slopes.
- Spacing in enhancement areas will depend on existing vegetation at site. Shrubs and trees to be planted among existing vegetation.



NO.	BY	DATE	REVISION DESCRIPTION

RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/23/20 DATE	160218 PROJECT

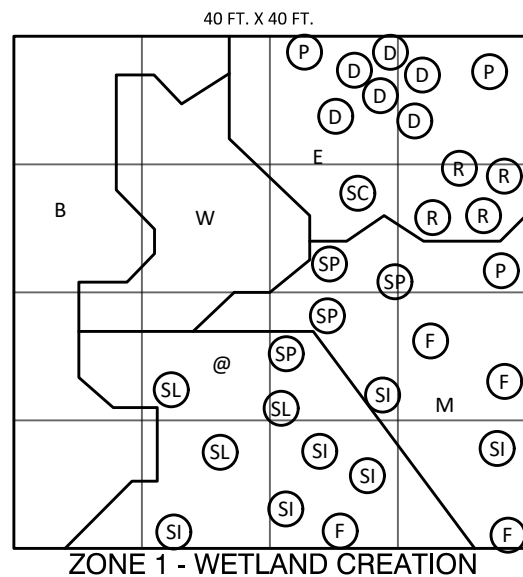
**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**

501 Portway Avenue, Suite 101  
Hood River, OR 97031  
541.386.9003  
www.interfluvio.com

**TYPICAL DETAILS - PLANTING  
AND SEEDING**

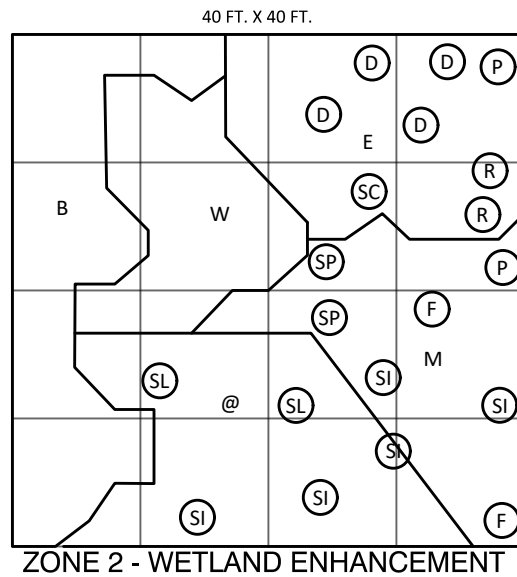
**LEGEND:**

HERB	SCIENTIFIC NAME
B	Schoenoplectus acutus
W	Sagittaria latifolia
@	Carex obnupta
M	Scirpus microcarpus
E	Eleocharis palustris
<b>Shrub/Tree</b>	
D	Cornus sericea
R	Rosa nutkana
SC	Salix scouleriana
SI	Salix sitchensis
SP	Spiraea douglasii
F	Fraxinus latifolia
P	Populus balsamifera
SL	Salix lasiandra



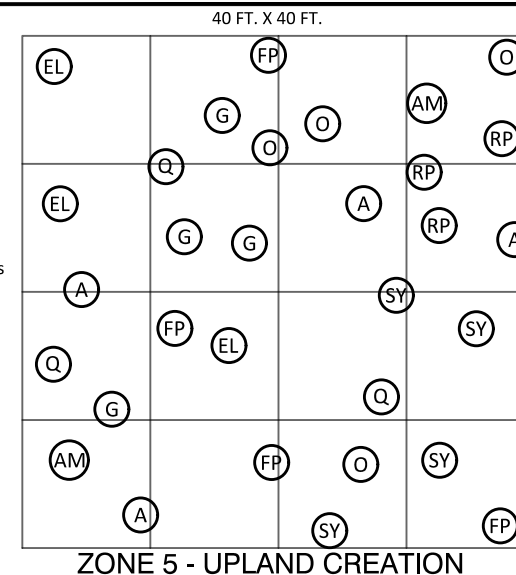
**LEGEND:**

HERB	SCIENTIFIC NAME
B	Schoenoplectus acutus
W	Sagittaria latifolia
@	Carex obnupta
M	Scirpus microcarpus
E	Eleocharis palustris
<b>Shrub/Tree</b>	
D	Cornus sericea
R	Rosa nutkana
SC	Salix scouleriana
SI	Salix sitchensis
SP	Spiraea douglasii
F	Fraxinus latifolia
P	Populus balsamifera
SL	Salix lasiandra



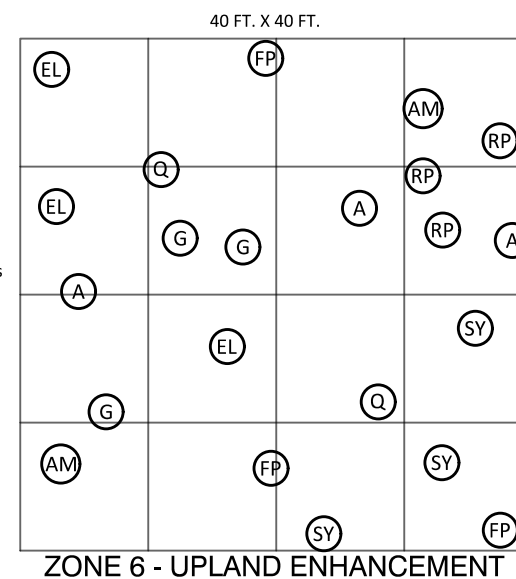
**LEGEND:**

SCIENTIFIC NAME	
O	Holodiscus discolor
G	Mahonia aquifolium
RP	Rubus parviflorus
SY	Symphoricarpos albus
EL	Sambucus racemosa
FP	Frangula purshiana
A	Alnus rubra
Q	Quercus garryana
AM	Acer macrophyllum



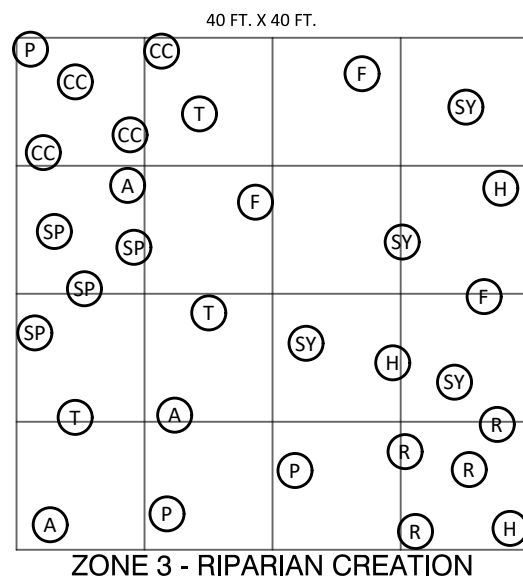
**LEGEND:**

SCIENTIFIC NAME	
O	Holodiscus discolor
G	Mahonia aquifolium
RP	Rubus parviflorus
SY	Symphoricarpos albus
EL	Sambucus racemosa
FP	Frangula purshiana
A	Alnus rubra
Q	Quercus garryana
AM	Acer macrophyllum



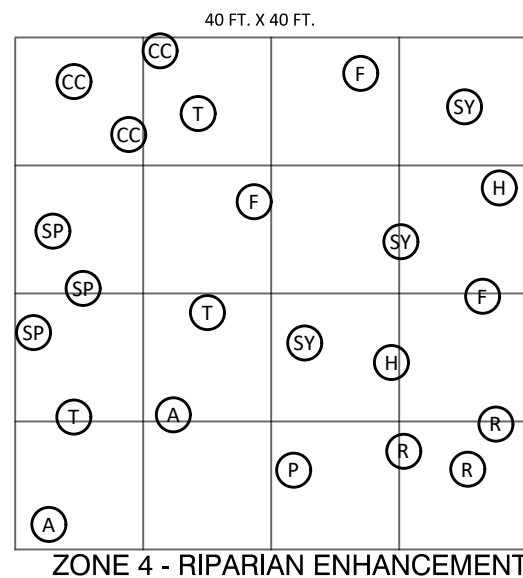
**LEGEND:**

SCIENTIFIC NAME	
CC	Corylus cornuta
R	Rosa nutkana
SP	Spiraea douglasii
SY	Symphoricarpos albus
A	Alnus rubra
H	Crataegus douglasii
T	Thuja plicata
F	Fraxinus latifolia
P	Populus balsamifera



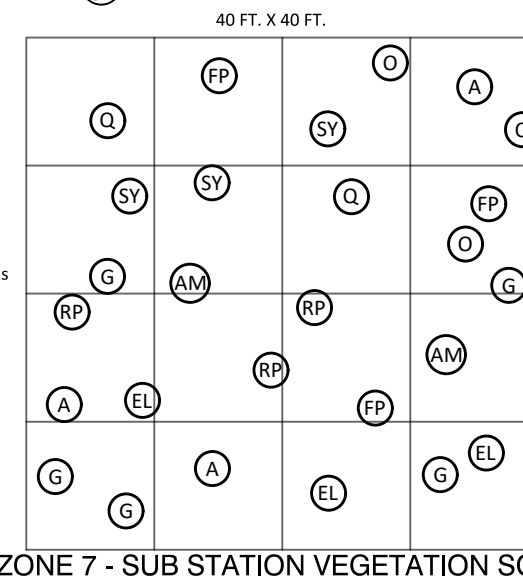
**LEGEND:**

SCIENTIFIC NAME	
CC	Corylus cornuta
R	Rosa nutkana
SP	Spiraea douglasii
SY	Symphoricarpos albus
A	Alnus rubra
H	Crataegus douglasii
T	Thuja plicata
F	Fraxinus latifolia
P	Populus balsamifera



**LEGEND:**

SCIENTIFIC NAME	
O	Holodiscus discolor
G	Mahonia aquifolium
RP	Rubus parviflorus
SY	Symphoricarpos albus
EL	Sambucus racemosa
FP	Frangula purshiana
A	Alnus rubra
Q	Quercus garryana
AM	Acer macrophyllum

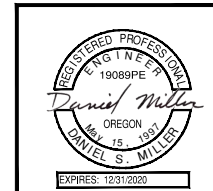


**A** TYPICAL WETLAND ZONE  
32 NTS

**C** TYPICAL UPLAND ZONE  
32 NTS

**B** TYPICAL RIPARIAN ZONE  
32 NTS

**D** TYPICAL SUB STATION VEGETATION SCREEN  
32 NTS



NO.	BY	DATE	REVISION DESCRIPTION

RP, CP	DM, JG, CM	DM, CM
DRAWN	DESIGNED	CHECKED
MB, DM	7/23/20	160218
APPROVED	DATE	PROJECT

**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



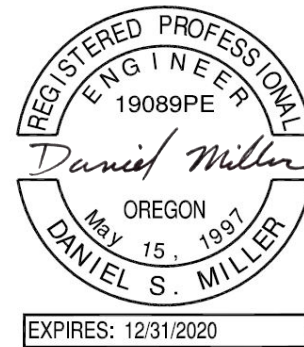
**TYPICAL DETAILS -  
PLANTING LAYOUT**

## **Appendix C – PGE Harborton Stamped 100% Design Specifications**

**PORTLAND GENERAL ELECTRIC (PGE)  
HARBORTON RESTORATION – 100% DESIGN SET**

**TECHNICAL SPECIFICATIONS**

July 6, 2020 revision: Sub Area 1 deleted from project work. Refer to Section 01-00-00.



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DIVISION 1—GENERAL REQUIREMENTS

Section 01 00 00—General Project Description

PART 1 – GENERAL

ADDENDUM

Project Activities and Project Phases within Sub Area 1 have been removed from the Plans and are Not in Contract. Restrictions related to actions in or adjacent to Sub Area 1 shall still be enforced as described in the project specifications.

PROJECT LOCATION

The Portland General Electric (PGE) Harborton site (the site) is located along the Lower Willamette River, between river miles (RM) 2.7 and 3.7, where Multnomah Channel diverges from the Willamette River. The site encompasses 73.8 acres of the west bank of the Willamette River and the south bank of Multnomah Channel. The site lies just inside the Portland city limits. The site is located within the Willamette River’s historic floodplain and tidally-influenced lower reach.

The site is comprised of three tax lots owned by PGE. The site is further divided into Sub Areas 1 through 4. The site is adjacent to the Miller Creek Natural Resources Damages (NRD) restoration project, proposed by Wildlands.

PROJECT TEAM

Lines of Communication: The Contractor and the Contractor’s Representative are to communicate directly with the Contracting Officer or the Contracting Officer’s Representative unless authorized in writing to contact other listed Project personnel.

Owner: Portland General Electric (PGE)

Contracting Officer: PGE

Contracting Officer’s Representative: Inter-Fluve personnel as assigned by PGE

Engineer: Engineer of Record | Inter-Fluve, Inc. | 501 Portway Ave. Suite 101 | (541) 386-9003

Engineer’s Representative: Inter-Fluve personnel as assigned by the Engineer

Trustees: The Portland Harbor Natural Resource Trustee Council and their assignees.

PROJECT ACTIVITIES

PGE proposes to enhance habitat and wetland function at the site through the following activities:



DIVISION 1—GENERAL REQUIREMENTS

## Section 01 00 00—General Project Description

- Removing the fish passage barriers located on the southeastern tributary in Sub Area 1 (Unnamed Stream) and the northwestern tributary in Sub Area 4 (Seasonal Creek) by:
  - Replacing the existing crushed culvert in Sub Area 1, located along the Unnamed Stream with a new fish passage culvert and re-grading the tributary (Unnamed Stream) in Sub Area 1.
  - Construct a new stream channel in Sub Area 3 connecting Sub Area 4 to the Willamette River.
- Place habitat enhancements in and expand portions of Wetland Area #1, located in Sub Areas 4 and 3, to improve habitat for the red-legged frogs present in the area.
- Treat Wetland Area #3 to remove invasive species and improve the function of the existing wetland.
- Control extensive invasive plant species found throughout the site in all Sub Areas through removal of the invasive species, site re-vegetation, and routine maintenance.

Additional ancillary tasks that will be completed to facilitate the restoration activities include making several substation improvements, conducting limited demolition, and placement of materials excavated from Sub Area 3 in Sub Area 2. Under the proposed restoration plan, approximately 45 acres of the site will be disturbed, through excavation within Sub Areas 1, 3, and 4 and placement of excavated on-site materials in Sub Area 2. The current substation footprint in Sub Area 2 will be reduced to approximately 10 acres following construction. Tentatively, in 2018/2019, PGE will relocate the substation from its current location (northeast corner of the distribution yard), moving it to the current Switch Yard Area/West Storage Area and will also install several new transmission towers for overhead power transmission lines that will be routed over the material placed in Sub Area 2. Construction for the restoration project is scheduled to begin with clearing, grubbing and tree removal activities in fall 2016, and earthmoving activities beginning in 2018/2019 and completed by late fall of 2019. Designs and construction documents for the work associated with the substation relocation is being completed by POWER Engineers.

PROJECT PHASES

Specific components of the project are discussed in the following sections. Multiple contractors may be working at the Site simultaneously, so coordination between Contractors and PGE will be essential throughout the project. A general description of the work to be completed is included below. The Contractor shall determine the order in which the work is conducted, and shall conduct the work in a safe and efficient manner.

- Phase I – Project Baseline Monitoring, Reporting and Permitting
- Phase II – Pre-Construction Site Preparation
- Phase III – Project Construction in Sub Area 1

## DIVISION 1—GENERAL REQUIREMENTS

### Section 01 00 00—General Project Description

- Phase IV– Project Construction in Sub Area 2
- Phase V – Project Construction in Sub Areas 3 and 4
- Phase VI – Project Closeout

Portions of the construction work required for Phases II through V may be completed concurrently. The approach to each of the phases is described in more detail below. The information described is based on the most recent project information available at this time. The components specified herein may undergo changes as the permitting processes advance, if the Contractor proposes alternate method for the construction that is acceptable to the Owner, and/or if the existing conditions are found to differ significantly from the current available information at this time.

### PHASE I – PROJECT BASELINE MONITORING, DESIGN AND PERMITTING

The baseline monitoring, reporting, and permitting is being completed by the Contracting Officer's Consultant, on behalf of PGE and will be completed prior to the start of construction. The following subsections describe the general project baseline monitoring, reporting, and permitting work that has been/are being conducted at the site, to support the final project design. Copies of the permits will be available before construction begins.

#### **Geotechnical Analysis**

Multiple geotechnical evaluations of the site were completed in the fall of 2013, 2014 and 2016. The respective reports are available upon request.

Contractor shall refer to *Report of Geotechnical Engineering Services, PGE Harborton Restoration Project* (GeoDesigns, September 14, 2016) for information on Sub Area 3 soils, groundwater conditions and dewatering recommendations.

#### **Environmental Assessment**

An Environmental Assessment was conducted in 2011 to investigate the nature and extent of contamination in the fill and underlying soil, in the proposed excavation areas for the channel design. The results of the Environmental Assessment were used to refine the restoration plan and associated logistics of the construction. The 2011 investigation consisted of collection of soil samples across multiple depths at eight boring locations. The results of the 2011 Environmental Assessment indicated metals, polychlorinated biphenyls, petroleum hydrocarbons, pesticides, and semi-volatile organic compounds were present in fill and native soil samples, with the highest number of detections predominantly found in the fill. The results also indicated there are only minimal risks to human health and ecological receptors through the exposure pathways present at the site. The results of the Environmental Assessment are summarized in the Contaminated Media Management Plan (CMMP). The CMMP also presents additional soil management requirements that will be referenced if unexpected soil conditions or contamination are encountered during construction. A copy of the CMMP is included in the Contract Documents.

## DIVISION 1—GENERAL REQUIREMENTS

### Section 01 00 00—General Project Description

Supplemental environmental data was gathered in 2014 to provide information for the soil in several areas, including the culvert replacement area and unnamed stream in Sub Area 1 and in the vicinity of the wetland areas in Sub Area 4. The additional data was collected to use in evaluating soil management during project implementation through the Sediment Evaluation Framework (SEF) process and also to prepare a Solid Waste Beneficial Use Determination (BUD) for the excavated site. The SEF and BUD determination documentation are available on request. In addition, groundwater samples were collected in an area of known soil impacts, to assess the current groundwater quality at the site. The groundwater samples were submitted for elutriate testing to assess groundwater impacts in the area of impacted soil. Groundwater samples were also collected from groundwater monitoring well MW-03 and were submitted for elutriate testing to provide additional information on constituent partitioning from soil to surface water during restoration implementation in Sub Area 3. The results of the groundwater sampling are also considered in the development of the SEF and BUD. Additional groundwater management requirements to be followed if unexpected groundwater contamination is encountered during construction are presented in the CMMP.

### **Cultural Resource Assessment**

A historic and cultural resources survey was conducted at the site, during the initial geotechnical analysis and summarized in a technical memorandum, dated July 25, 2013, addressed to the State Historic Preservation Office (SHPO). The results of the memorandum indicate construction has the potential to directly impact undiscovered cultural resources through ground disturbance and restoration activities. The site's proximity to the Willamette River and the Multnomah Channel, coupled with its historic slough landform setting, renders it of high archaeological sensitivity. Precontact archaeological evidence may be encountered in subsurface contexts across the site given similar associations noted in neighboring areas, particularly Sauvie Island. Historic archaeological evidence is less likely due to the area being a historic slough inundated for the majority of the year. In December 2015, a Cultural Resources Inventory Report was prepared for the PGE Harborton Site. The report recommended the one multiple component site identified within the project area as not eligible for listing in the National Register of Historic Places

A Cultural Resources Monitoring and Inadvertent Discovery Plan was prepared to describe the procedures that will be followed by PGE and Contractors working at the Harborton Site, in the event that unanticipated human remains, funerary objects, sacred objects, objects of cultural patrimony, and other cultural materials are inadvertently discovered during construction. A copy of the plan is included in the Contract Documents.

### **Ecological Assessment**

The baseline monitoring program at Harborton includes the following:

- Groundwater – Groundwater elevations were measured in nine groundwater monitoring wells/piezometers monthly through December 2014. Standard water quality parameters, including temperature, pH and dissolved oxygen (DO) were measured in surface water present in Wetland Areas #1 and #2.

DIVISION 1—GENERAL REQUIREMENTS

## Section 01 00 00—General Project Description

- Wildlife – Reconnaissance surveys were conducted to monitor site use by wildlife, including bald eagles, breeding birds and mink. Motion-activated wildlife cameras and mink scent stations were installed to photograph mink use in three locations (One location in Sub Area 1 and two locations in Sub Area 4). The reconnaissance surveys were completed in Spring 2014.
- Botany – Botany surveys were conducted to establish permanent sampling transects and to determine the percent cover (herbaceous, shrub, tree, and bare ground), percent native vs. nonnative cover and plant diversity. The botany surveys also included photo documentation of the baseline plant conditions.
- Geomorphology – Geomorphic characteristics of the Unnamed Stream where it flows within Sub Area 1, were conducted in Fall 2015. The geomorphology was used to determine the width-to- depth ratio, channel gradient, and stream bank slopes.
- An inventory of Large Woody Debris (LWD) was conducted for Unnamed Stream's entire length within Sub Areas 1 and throughout Sub Areas 3 and 4 in Summer 2015. Much of the LWD identified on-site will be reused during restoration within habitat features in Sub Area 3.
- Surface Water –Two barometric transducers were deployed to capture data on the surface water depths within Sub Area 1 and Sub Area 4. The transducers were deployed in locations with known elevations to accurately predict water depth within the sub areas of the site, and to correlate with a hydraulics and hydrology assessment of the of surface water inundation throughout the year.

The results of the baseline monitoring program are available on request.

**Restoration Monitoring and Adaptive Management**

PGE is working with their consultant and the Trustees to develop a Monitoring and Adaptive Management Plan. The Final Monitoring and Adaptive Management Plan (MAMP) will be based upon Best Management Practices (BMPs) adopted by local, state, and federal resource management agencies and the best professional judgment of the Contracting Officer's Engineer. The MAMP will include a Long- Term Stewardship Plan. Development of the Final MAMP is anticipated prior to construction, following permit acquisition for the restoration project. A copy of this plan is available on request.

**Permitting**

The local, state, and national permits required for construction are described in Division 1, Section 01 00 10. The Contracting Officer's Consultant will be working with several regulatory bodies during the permitting process to ensure project concerns are addressed and will be completing the local, state, and national permits before beginning construction. Permit information will be included as an Appendix in the Final Design Contract Documents prior to construction.

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PHASE II – PRE-CONSTRUCTION SITE PREPARATION

Early project coordination activities will result in selection of a Contractor to implement the final design at the site. Once selected, the Contractor will begin the pre-construction phase, Phase II, of the project. The Phase II Pre-Construction Site Preparation tasks are described below.

**Pre-Construction Submittal Requirements**

PGE will provide the selected Contractor with a Notice to Proceed (NTP). After NTP, the Contractor shall provide the pre-construction submittals to the Contracting Officer. The pre-construction submittals required for the project are described in Division 1, Section 01 03 00 and include a submittal register, a Health and Safety Plan (HASP), a Work Plan and List of Equipment that will be mobilized to the site, any pertinent ancillary test plans, templates for the daily field report (DFR) and the Weekly Quality Control Form (WQCF) and an updated project construction schedule. Construction submittal requirements, in addition to the pre-construction submittal requirements are required throughout the project and are described in the sections below.

**Pre-Construction Meeting**

Following Contractor selection and Contracting, a pre-construction meeting will be held by the Contracting Officer. The purpose of the preconstruction meeting will be to establish a working understanding between all parties. Project communications, schedule, health and safety, and quality control requirements will also be discussed during the pre-construction meeting. Prior to scheduling the pre-construction meeting, the Contractor shall provide evidence of the necessary training requirements and insurance certifications to the Contracting Officer. The agenda for the Pre-Construction Meeting is also presented in Division 1, Section 01 02 00.

**Contractor Mobilization**

See Section 02 02 00 for Mobilization.

**Implement Site-Wide Construction Erosion and Sediment Control BMPs**

The Erosion and Sediment Control Plan (ESCP) measures shall be installed and maintained by the Contractor, in accordance with the National Pollution Discharge Elimination System (NPDES) 1200-C permit, and the associated plans and specifications, and all local, state, and federal regulations and permit requirements, throughout the construction activities at the site. The ESC measures will include installation of temporary or permanent BMPs. The BMP's shall include, but are not limited to, installation of silt fences, construction terraces, sediment traps, sediment curtains, erosion control matting, vegetation cover, slope stabilization, dust control for exposed stockpiles, and diversion channels. All temporary measures will remain in place and shall be maintained by the Contractor throughout construction, in accordance with the BMPs shown on the Drawings.

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PHASE III – PROJECT CONSTRUCTION IN SUB AREA 1

The following subsections describe the general approach to the project construction in Sub Area 1.

**Grubbing/ in Sub Area 1**

Invasive species will be managed in Sub Area 1 to slow the rate of range expansion and lessen the impacts of invasive species. Enhanced control measures, including treatment of non-native plants with approved herbicides along the creek in Sub Area 1, will be conducted, in accordance with the permits. Herbicide application will be completed using low-impact methods, such as manual application using back-pack sprayers. Manual application is the preferred method because it limits overspray into sensitive habitats.

Multiple applications may be administered, depending on the aggressive nature of certain species. The actual number of applications will be based on performance requirements, identified in the MAMP. A copy of the MAMP is available on request.

All large cottonwood and other trees within the riparian forest along the Unnamed Stream shall be preserved along with medium trees and native shrubs and native vegetation, to the maximum extent possible. Some areas within each of the sub areas shall be seeded with area-specific native seed mixes and planted with shrubs to improve low and mid-level canopy potential and to limit re-establishment of the invasive species.

**Dewatering and Diversion**

Contractor shall execute Dewatering of construction site and soils for placement in Sub Area 2 permanent soil placement area and Diversion to isolate work area from tributaries and the Willamette River. Dewatering and Diversion shall be completed as necessary to comply with applicable permits and regulations.

**Excavation and Soil Management in Sub Area 1**

The Contractor shall remove the upper one (1) foot of soft soil that is within the Unnamed Stream located in Sub Area 1, along the stream, and across the stream bottom as shown on the Drawings. The removal of the upper one (1) foot of soil will extend into the surrounding Wetland #3 area at the southeastern end of the Unnamed Stream to remove invasive species present within the wetland and improve the quality of the seasonal wetland.

The Unnamed Stream will be regraded as shown on the Drawings. Through and below the new culvert, the stream channel will be graded as shown on the Drawings. Replacement of the crushed culvert is described below. The new stream channel will be graded along the length of channel within the new stream floodplain. Clean streambed gravels will be placed across the regraded stream bed, see Drawings for material gradation requirements.

Above the culvert (upper reach), the new stream channel substrate material placed in the stream bed shall meet the gradation requirements shown on the Drawings.

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The soil will be managed by moving the material from Sub Area 1 to pre-determined soil laydown areas. The Contractor shall determine the optimal plan for the soil aeration and dewatering activities. The soil will be managed to meet the modified proctor requirements before final placement within Sub Area 2. The soil shall be dewatered, either using tilling equipment to break up clods and homogenize the soil until it reaches the recommended moisture content or by aerating the soil. Once the optimal moisture content is achieved for the soil it will be removed from the temporary soil laydown areas and placed in Sub Area 2. BMPs shall be used as necessary to control soil erosion from wind and to minimize dust generated during the soil management activities.

If the water is diverted from the soil in the temporary soil laydown area, into any existing wetland area or channel, then the water shall be diverted to a collection area in a lower area or transferred to a series of settlement/weir tanks or ponds. The water management requirements are described in Division 2, Section 02 02 40.

**Culvert Replacement**

The Contractor shall replace the existing crushed culvert that is located below the northern portion of the East Access Road over the Unnamed Creek. As part of the replacement, the Contractor shall remove existing overburden soil, from across the existing crushed culvert, as shown on the Drawings. The excavated overburden soil shall be placed in Sub Area 2. The soil management requirements are described above. The Contractor shall remove the existing crushed culvert and dispose of the culvert material as construction debris. A new open-bottom arch culvert will be placed in the excavation, to connect the upper tributary to the downgradient side of the tributary that connects to the Willamette River. The dimensions of the new arch culvert shall be as shown on the Drawings or as otherwise approved by the Contracting Officer. New stream channel and stream floodplain substrate material will be placed along the stream bed within the culvert, see Drawings for material gradation requirements.

The Contractor shall backfill in the area around the newly placed culvert and reconstruct the roadway above the newly placed culvert, according to the requirements shown on the Drawings.

**Restoration Plan in Sub Area 1**

Stream substrate shall be installed along stream bed and banks. Erosion control matting will be installed from edge of stream channel to outside edge of stream floodplain. Matting will be used to prevent erosion of the new channel floodplain during winter high water and to protect plantings, which will be installed through the matting. Large wood structures will be installed at various locations along the length of the South Channel, generally including root wads and logs. See the Drawings for habitat feature placement plans and details.

Additional restoration in Sub Area 1 consists of replanting along the tributary with emergent and scrub- shrub native vegetation species to increase the shade along the creek and improve riparian habitat, in accordance with the planting plan and details shown on the Drawings. Areas of Sub Area 1 will be seeded with native seed mix and native shrub species to limit invasive species re-establishment, and provide additional shade to further deter invasive species growth.



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PHASE IV – PROJECT CONSTRUCTION IN SUB AREA 2

The following subsections describe the construction activities that will be completed in Sub Area 2.

**Substation Improvements**

The existing substation will be relocated to the Switch Yard and West Storage Yard Areas. The relocation of the existing substation is outside the scope of the restoration project and will be completed by PGE's transmission group and will be conducted concurrently with the restoration work. Ancillary tasks that may be completed as part of this restoration project to accommodate the substation relocation include the following:

- Removal of the any remaining power poles and guy wires (overhead power lines will be removed by PGE) from select areas within Sub Area 2.
- Installation of a new entry gate at the entrance to the site.
- Relocation of three utilities within the South Unused Area including the following:
  - Natural Gas Pipeline: The existing natural gas line section that enters the site and passes across the west side of the West Unused Area, and terminates in a vault, shall be removed and disconnected at the western property boundary and capped. The work shall be conducted in a manner acceptable to and coordinated with Kinder Morgan.
  - Natural Gas Line: The existing natural gas service line that enters the site in the middle of the West Unused Area, shall be disconnected at the western property boundary and capped. The work shall be conducted in a manner acceptable to and coordinated with NW Natural Gas, Company.
  - Fire Suppression System Hydrant: The existing fire suppression system mainline connection shall be discontinued at the site boundary, in accordance with City of Portland requirements. The hydrant will remain available and may be used as a water supply for temporary irrigation and water supply system during the site restoration activities, if needed.

**Grubbing and Invasive Species Management in Sub Area 2**

Invasive species will be managed in Sub Area 2 before construction begins to slow the rate of expansion and lessen the impacts of invasive species along the soil berm, West Unused Area, and the area adjacent to the Former Tank Farm and South Unused Areas. Enhanced management measures will be completed, including treatment of non-native plants with approved herbicides along the soil berm in Sub Area 2. Herbicide application will be completed by others before

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construction begins, using low-impact methods, such as manual application using back-pack sprayers.

Limited grubbing will be completed around the perimeter of Sub Area 2, to accommodate placement of on-site fill material and to provide easy access to the construction site staging areas. The Contractor shall protect all large trees (>10-inch in diameter) within the riparian area along the Willamette River during construction activities within Sub Area 2. The areas to be grubbed are shown on the Drawings.

**Demolition**

See Section 02 02 20 Demolition for scope and requirements.

**Soil Elevation in the Future Substation Area**

The soil surface elevation within the proposed future substation footprint, will be raised and graded as shown on the Drawings. Runoff from the proposed substation area will be directed to newly constructed bioswales located along the boundaries. This work shall be completed by the substation redevelopment contractor.

**Placement of Soil Material**

Soil generated from excavations in Sub Areas 1, 3 and 4 will be placed within Sub Area 2. The proposed soil placement is shown on the Drawings. The substation site improvements and demolition activities will be completed before the excavated soil is placed.

The soil preparation activities will include soil land farming for aeration and dewatering of the soil within a pre-determined soil laydown area before placement of the soil. The soil shall be dewatered, either using tilling equipment to break up clods and homogenize the soil until it reaches the recommended moisture content or by aerating the soil. Once an acceptable moisture content is achieved for the soil it will be removed from the soil laydown area and placed in compacted lifts. BMPs shall be used as necessary to control soil erosion from water and wind and to minimize dust generated during the soil management activities. If the water is diverted from the soil in the laydown areas, into any existing wetland area or channel, then the water shall be diverted to a collection area in a man-made sump or a lower excavated area and transferred to a series of settlement/weir tanks or ponds. The water management requirements are described in Division 2, Section 02 02 40.

Bio-swales, mounds and depressions will be constructed around and within the soil placement area and the proposed substation as shown on the Drawings.

The placement of on-site material shall be in accordance with the details presented on the Drawings and as specified herein. Once the soil preparation activities are completed and the soil meets the optimal moisture content and is sufficiently homogenized, the soil shall be placed in lifts, then graded and compacted in place. Soil entrained with contamination, above human health screening level values, shall be placed at the bottom and center of the on-site fill material placement area to provide a buffer over and around the material to minimize contact with this

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material. The stockpiled soil shall be placed as shown on the Drawings and as required per Division 2 Section 02 03 00 and Section 02 03 15.

### **Restoration Plan in Sub Area 2**

Restoration in Sub Area 2 shall be completed in accordance with the habitat and planting plans and details shown on the Drawings. In general, restoration in the Sub Area 2 on-site fill material placement area consists of hydroseeding the exposed soil within the stockpiles with a native, erosion control, grass seed mixture. Native trees and scrub-shrub vegetation shall be planted to further stabilize the stockpiles and create upland habitat. The planting plan coincides with the current and future plans for overhead power lines and utility corridors.

### **PHASE V – PROJECT CONSTRUCTION IN SUB AREA 3 AND SUB AREA 4**

New habitat will be created in Sub Area 3 and Sub Area 4 by removing soil to create a new channel connection to the Willamette River/Multnomah Channel. The material that will be removed from these areas primarily consists of dredge spoils. The earthwork involves all excavation and soil/bank reshaping along the new channel. The existing soil berm located at the northern end of the new channel will be breached, to connect the new channel to the Willamette River. An existing soil berm along the boundary between Sub Areas 3 and 4 will be removed. Two wetland areas, Wetland #1 and Wetland #2, will be enhanced to provide additional red-legged frog habitat.

### **Tree and Shrub Removal and Grubbing**

See Section 02 02 30 Clearing and Grubbing for scope and requirements.

### **Dewatering and Diversion**

Contractor shall execute Dewatering of construction site and soils for placement in Sub Area 2 permanent soil placement area and Diversion to isolate work area from tributaries, the Willamette River and Multnomah Slough. Dewatering and Diversion shall be completed as necessary to comply with applicable permits and regulations.

### **Excavation of Sub Area 3**

Excavation in Sub Area 3 consists of removing the overburden dredge fill soil to establish a meandering channel with floodplain feature within Sub Area 3 as shown on the Drawings.

The soil excavation activities will be monitored for cultural resources by a registered archeologist in select critical areas, as identified in the inadvertent discovery plan. Large rocks and boulders (>12-inch diameter) will be salvaged, to the maximum extent practicable to be reused for the restoration of the channel, following construction.

### **Soil Management for Sub Area 3**

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Refer to the GeoDesign's 2016 Geotechnical report (available upon request) for recommendations on site dewatering, soil moisture conditioning and placement in Subarea 2.

Currently the soil will be managed by moving the material from Sub Area 3 to soil laydown areas. The Contractor shall determine the optimal plan for the soil aeration and dewatering activities. The soil will be managed to meet the modified proctor requirements before final placement. Initially, the entire placement area can be used for soil management activities. Soil management can also occur in Sub Area 3, as needed.

The soil shall be dewatered, either using tilling equipment to break up clods and homogenize the soil until it reaches the recommended moisture content or using aeration. Once the optimal moisture content is achieved for the soil it will be removed from the soil laydown area and placed in Sub Area 2 as shown on the Drawings. BMPs shall be used as necessary to control soil erosion from water and wind and to minimize dust generated during the soil management activities.

The water management requirements are described in Division 2, Section 02 02 40. It is estimated a very large amount of water may be generated during the soil management process, based on current volume of soil and moisture content of the dryer soil at the uppermost elevations of the excavations and the wet soil encountered in the deeper excavation areas and wetlands.

**Breach of Existing Soil Berm for Channel Connection to Willamette River/Multnomah Channel**

The new stream channel will be connected to the Willamette River/Multnomah Channel to provide seasonal off-channel fish habitat in Sub Area 3. This will be accomplished by removing the existing soil berm along the dike between the new meandering channel and the Willamette River /Multnomah Channel. The location of the breach is identified on the Drawings.

**Restoration Plan in Sub Area 3**

Stream channel substrate material will be installed along the stream bed to the extents shown on the Drawings. Slope stabilization stone will be placed along the lower half of the 5:1 slopes per recommendations in GeoDesigns Sub Area 3 geotechnical report.

Erosion control matting will be installed from edge of stream channel to the width shown on the Drawings. Matting will be used to prevent erosion of the new channel floodplain during winter high water and to protect plantings, which will be installed through the material. Large wood structures will be installed at various locations along the new channel and at the upstream end of the new channel. Other habitat features (large wood boulders, brush piles and tree boles), will be installed as shown on the Drawings.

Restoration in Sub Area 3 will consist of replanting native species of plants to create riparian forest and wetland zones along the new stream channel. The upper areas of the side channel banks have a diverse mix of native plant species to increase the shade along the channel and create off-channel habitat. The planting requirements for this area are shown on the Drawings.

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Woody vegetation is proposed at the stem density shown on the Drawings. Emergent vegetation is proposed at the density shown on the Drawings. The area along the existing Olympic Pipeline utility corridor will be seeded with a native grass mixture, to allow for management of non-native species. Shallow water areas will remain unchanged adjacent to the Willamette River /Multnomah Channel. Planting will be completed in accordance with the planting details and notes provided on the Drawings.

**Restoration Plan in Sub Area 4**

The habitat enhancement plan for Sub Area 4 is presented on the Drawings. Work includes placement of and anchoring slash in deep portions of the existing wetlands. Wetland #1 and Wetland #2 are located west of the existing soil berm that runs parallel along the northwestern border of Sub Area 3.

The Contractor shall provide the means and methods for the work in Sub Area 4, an area that may require working in standing water and soft soils.

Restoration in Sub Area 4 will consist of replanting along the side channel banks of each of the wetland areas, to increase shade and restrict invasive species in each of the Wetland Areas. Supplemental planting will happen throughout Sub Area 4 within the Riparian Forest Zone. The planting areas are shown on the Drawings. The area along the existing Olympic Pipeline utility corridor will be seeded with a native grass mixture, to allow for management of non-native species. The specific seed mixture in this area will match the surrounding zone type.

**PHASE VI – PROJECT CLOSEOUT**

The Project closeout phase will begin after construction Phases II through V, and include the following:

- Engineer’s review for close-out
- Project repairs
- Removal of all refuse, debris and unused materials from the construction
- Contracting Officer’s review for approval
- Demobilization
- Final Construction Reporting

The Contractor will remedy any repairs or deficiencies noted in the Engineer’s review. Following Engineer approval, the Contractor shall send a certificate of final completion to PGE. Following demobilization, the Contractor shall prepare a Draft and Final Construction Completion Report (CCR) for review and approval by the Engineer and Contracting Officer.

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The Contractor will warrant and guarantee that the entire work constructed under the contract fully meets all requirements of the Contract, that all work will be free of deficiencies and defects, and that all sub- contractors/vendors have received full payment for their services and that the Contractor has no outstanding financial liabilities/responsibilities associated with the site, scope of work, and Contract. A certification letter of this warranty will be included in the CCR.

**END OF SECTION**

## **Appendix D – Hydrology and Hydraulics Memo**

# TECHNICAL MEMORANDUM




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**To:** Christopher Bozzini, PE <sup>1</sup>  
**Cc:** Mike Brunfelt, RG <sup>2</sup>  
**From:** John Gaffney, PE <sup>2</sup>, Dan Miller, PE <sup>2</sup>  
**Date:** February 21, 2017 **Project Number:** 16-02-18  
**Re:** Harborton Site Restoration – Project Site Hydrology and Hydraulics

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## Introduction

Inter-Fluve, Inc., on behalf of Portland General Electric (PGE), completed an analysis of the proposed conditions hydrology and hydraulics at the Harborton Site Restoration project located on the west bank of the Willamette River at River Mile (RM) 3.5 near the confluence with the Multnomah Channel (Figure 1) and lies within the Willamette River 5th field Hydrologic Unit Code (HUC) number 17090012 area. The Project Area is within the reach of the Willamette River affected by tides, and flow in the river at the Project Areas is a combination of river flow and tidal flow. Tributary inflow to the project site is from two hill side drainages situated between Miller Creek, to the north, and an un-named creek to the south. The modeling results presented herein helped inform the stream channel, vegetation, bed materials, and habitat element designs. Relevant results include: area of inundation and flow velocities associated with proposed conditions.

The Harborton Restoration project site consists of four distinct hydrologic regions. They are; the dredge-filled area (Sub-Area 3), the developed substation (Sub-Area 2), the North Tributary (Sub-Area 4), and the South Tributary (Sub-Area 1). Proposed work on the project site includes;

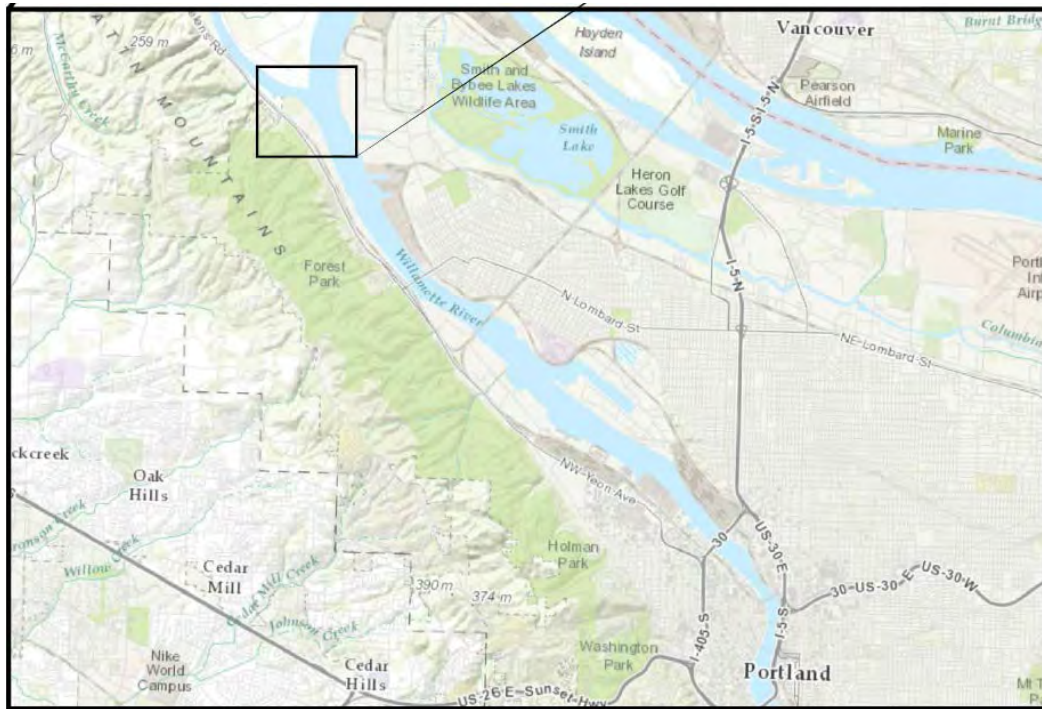
- Excavation of material in Sub-Area 3 to create a channel connecting Sub-Area 4 with the Willamette River.
- Placement of on-site excavated material from Sub-Areas 1 and 3 in Sub-Area 2.
- Minor channel excavations and installation of a new culvert under the access road crossing the stream flowing through Sub-Area 1

The project site hydraulic analysis focuses on the proposed conditions in Sub-Areas 1, 3 and 4. The work completed in Sub-Area 2 is being analyzed for stormwater runoff by Power Engineers. Considerations and any potential influence on the Willamette River base flood elevation was assessed separately using a different model (Inter-Fluve 2016). Supporting work referenced in this memo was completed by AECOM under a prior contract with PGE (AECOM 2015).

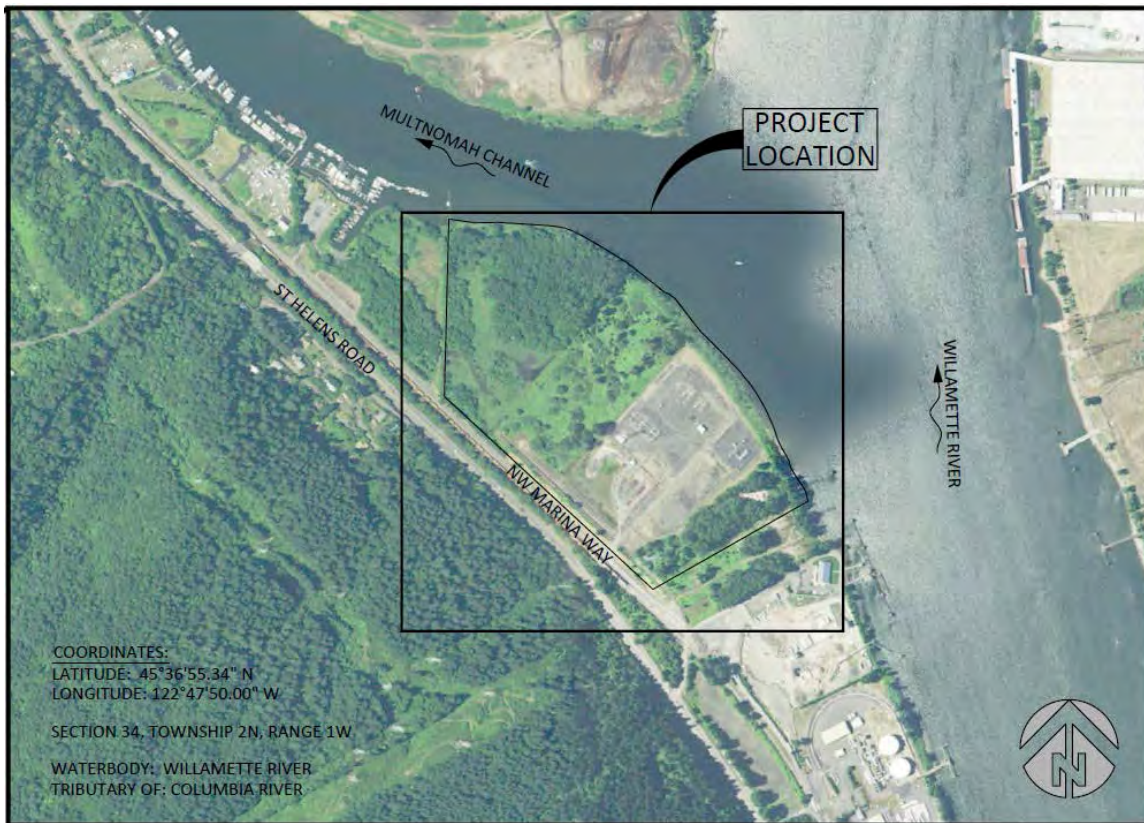
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<sup>1</sup> Manager, Cleanup & Terrestrial Group, Portland General Electric Company, 121 SW Salmon St. Portland OR  
<sup>2</sup> Inter-Fluve, Inc.





VICINITY MAP



SITE MAP

Figure 1 – Project Location Maps (not to scale)

## Project Site Detail

The following sections provide details on the site river levels, hydrology, existing conditions and proposed post project conditions.

### WILLAMETTE RIVER LEVELS

Variations in the river level at the project site are driven by Willamette River discharge, Columbia River discharge, and tidal fluctuations. These three drivers combine at the site to create complex temporal variations in river stage both on a semidiurnal and seasonal basis. Although there is no river stage gage at the site there are a number of nearby gages on both the Willamette and Columbia Rivers (Table 1). Data<sup>3</sup> from these gages was used to interpolate a synthetic river stage record at the site for the period<sup>4</sup> between January 2009 to April 2015.

*Table 1: River/Tide Gages Referenced*

Gage Location	USGS Gage Number	NOAA Gage Number
Willamette River at Portland <sup>1</sup>	14211720	9439221
Columbia River at Vancouver <sup>2</sup>	14144700	9440083
Columbia River at St. Helens <sup>3</sup>	N/A	9439201

*Notes: 1) gage located at the Morrison Bridge, 6 miles upstream of project, 2) gage located at the Interstate 5 Bridge, 5 miles upstream of Willamette confluence, 3) gage located 15 miles downstream of Willamette confluence.*

To interpolate a synthetic river stage record for the site AECOM first used a linear interpolation procedure to estimate the stage at the confluence point of the Willamette and Columbia Rivers. This was accomplished using data from the St. Helens gage and the Vancouver gage. It was assumed that any tidally driven stage timing differences were negligible relative to the overall trend in water surface elevations moving along the river. Using the estimated stage record at the confluence and data from the Portland gage a linear interpolation was then used to estimate a synthetic river stage record for the project site. Key river stage statistics estimated and published at the project site are presented below in Table 2. The full synthetic stage record data<sup>5</sup> is provided in Attachment A as a series of monthly plots showing each year in the period of record. Unless otherwise noted all stage information is presented in City of Portland Datum.

*Table 2: Project Site River Stage Statistics*

MLLW	MLW	MHW	MHHW	OLW	OHW
4.6	4.9	7.5	8.0	5.8*	16.6*

*Notes: 1) Ordinary Low Water (OLW) is derived from USGS data by AECOM 2) Ordinary High Water (OHW) is as published for Portland Harbor (USACE 2004) at the project location (RM 3.5) and converted from NGVD29 to CPD.*

<sup>3</sup> As provided and processed by AECOM.

<sup>4</sup> Period selected where all three gages provided consistent data that could be used in the analysis.

<sup>5</sup> As provided by AECOM.

## TRIBUTARY HYDROLOGY

Hydrologic analysis for the two tributary drainages entering the site from the west included a regional regression analysis to estimate the 2-year and 100-year return period event peak discharges and a regional regression analysis to estimate a number of low flow statistics.

The peak discharge regression equations were obtained from the USGS Rural Regression Equations (USGS 2005). Based on Figure 11 in the USGS Report, the project site is located within Region 2. Region 2A & 2B cannot be separated into discrete areas and are shown as one Region in Figure 11 of the USGS Report. The USGS Report identifies the difference between Region 2A & 2B is the mean elevation of the basin. For basins with a mean elevation above 3,000 feet the region would be Region 2A. The project basins have a mean elevation well below 3,000 feet; as such they are within Region 2B. The Region 2B equations are presented below.

$$Q(2) = 9.136Area^{0.9004}Slope^{0.4695}I24.2^{0.8481}$$

$$Q(100) = 31.85Area^{0.9114}Slope^{0.4501}I24.2^{0.6252}$$

where:

$Q(n)$  = the peak discharge in cubic feet per second

$Area$  = the drainage area in square miles

$Slope$  = mean watershed slope in degrees

$I24.2$  = the 2-year 24-hour precipitation intensity in inches.

In order to estimate the regression equation parameter values for the project site, the two areas of interest were identified and their upstream drainage areas were delineated by AECOM using terrain data. The average basin slopes were calculated by AECOM using automated processes within ESRI's ArcMap software. The values used are shown in Table 1. The 2-year 24-hour precipitation intensity was estimated by AECOM from Figure 15 in the USGS Report to be 2.5 inches for both drainage areas. The delineations of the two watersheds are presented in Figure 2, with the North Tributary area measuring 115 acres (0.18 mi<sup>2</sup>) and the South Tributary at 141 acres (0.22 mi<sup>2</sup>).

*Table 3: Summary of Peak Discharges*

Location	Return Period Peak Discharge (cfs)		Regional Regression Parameter Values	
	2-year	100-year	Area (mi <sup>2</sup> )	Slope (deg.)
North Tributary	23.3	60.6	0.18	37.8
South Tributary	23.1	60.7	0.22	24.3

Low flow regression equations were obtained from the USGS report 2008-5126 (Risely, et. al. 2008). The publication included an Excel workbook for calculating various low flow statistics including monthly 5 and 50 percent exceedance values, the 7 day 2-year low flow and the 7 day 10-year low flow. These values helped establish 0.5 cfs as the lowest discharge that could be reasonably modeled and evaluated for both tributaries. The regression equations also agreed with general site observations that the tributaries typically go dry during the late spring to early summer and do not begin to flow again until the fall.



Figure 2 – Project Site Tributary Watersheds

## **SOUTH TRIBUTARY EXISTING CONDITIONS**

The South Tributary area of the Harborton Property consists of approximately 8 acres of relic floodplain habitat that was partially filled in association with construction of Bonneville Power Administration (BPA) transmission towers, development of the substation, and a rail siding track to service the substation. The South Tributary is an unnamed stream that originates in the Portland West Hills and flows from southwest to northeast across the Harborton property to its confluence with the Willamette River. The intermittent stream has observable discharge between 5 and 8 months of the year and reportedly<sup>6</sup> enters the Property through a 12 inch-diameter corrugated metal culvert. This culvert conveys the stream approximately 400 feet under a rail siding line servicing the Harborton Property, NW Marina Way, and the Oregon State rail line. The outlet of the upstream culvert is a complete barrier to fish passage, as it is reportedly perched in the rail siding fill slope, approximately 3 feet above the stream channel.

From the upstream culvert down the stream flows approximately 1,000 feet through a low gradient (~0.8%), linear channel at the base of the fill slope at the southern edge of the substation. The upper 350 feet of the stream is shallow and broad, lacking a defined channel. In this reach, the stream is surrounded by wetlands that extend southeast beyond the property boundary. The wetlands are dominated by reed canary grass (*Phalaris arundinacea*) and patchy native tree canopy. The stream then enters a more confined reach with defined bed and banks. The banks in this reach are comprised of the substation fill slope to the north and fill associated with the BPA transmission corridor to the south. The stream in the reach is impounded for approximately 400–700 linear feet, depending on season. This impounded reach is caused by a failed culvert which conveys the stream under a service road running parallel to the river. The majority of this impounded reach flows through mature, black cottonwood (*Populus trichocarpa*) riparian forest. While the canopy layer is mature, the understory is dominated by invasive species, primarily reed canary grass and Himalayan blackberry (*Rubus armeniacus*).

The culvert under the service road between the substation and the BPA transmission towers is reportedly a 12 inch-diameter corrugated metal culvert. The road surface is at approximately 24 feet elevation CPD, placing it above the designated Willamette OHW. Stream flow in the tributary is impeded by this downstream culvert, which is partially collapsed and causes water to impound within the channel. This downstream culvert likely also impedes fish passage as both the culvert's inlet and outlet are submerged. Downstream of this culvert, the tributary stream flows approximately 125 feet to the Willamette River in a shallow channel through mature, mixed riparian vegetation. Stream gradient in this portion of the stream is dependent on river stage, ranging from no gradient when river stage is equal to the culvert outlet's invert elevation of approximately 16 feet CPD, to approximately 8 percent gradient when river stage is low.

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<sup>6</sup> Direct observation of this culvert's functionality has not been made by Inter-Fluve staff.

## **NORTH TRIBUTARY EXISTING CONDITIONS**

The area containing the North Tributary within the Harborton property contains the largest extent of remnant natural conditions that are not altered by placement of fill. This approximately 23.6 acre area consists of historic floodplain, mixed riparian forest, mature Oregon ash-dominated upland forest, willow-dominated scrub-shrub wetland, and reed canary grass-dominated herbaceous wetland habitats.

Beginning at the shoreline and proceeding inland to the southwest, the existing topography rises to an elevation ranging from 15 to 23 feet CPD, corresponding with a naturally formed low ridge, or embankment, oriented parallel to the river shoreline and composed of native soil. Moving inland from the crest of the embankment, site elevation decreases, to an average low elevation of 14 feet CPD and small pockets at 13 feet CPD. The low elevation areas correspond with a wetland complex found in the southwestern third of the natural area (URS 2010). Hydrologic inputs to the area include precipitation, infrequent inundation by the Multnomah Channel when river stage exceeds 15.5 feet CPD, groundwater discharge from the diked and filled area to the southwest, and the North Tributary, which enters the property from the Portland West Hills.

The North Tributary is an intermittent stream and a former tributary to Miller Creek, which flowed onto the adjacent Fred's Marina property to the northwest; however, construction of a dike and access road along the Fred's Marina and PGE's property boundary disconnected the stream from its historic channel and connection to Miller Creek. It is unknown if the dike originally included a culvert connection for the tributary, as no direct observation of a culvert was made during site investigations by URS, AECOM or Inter-Fluve. Limited flow does appear to infiltrate through the dike, as wetlands to the west of the dike and within the historic channel are sustained by the water that permeates through the dike (pers. comm. Julie Mentzer, October 11, 2013). As a consequence of being blocked by the dike and disconnected from its historic channel, the tributary's current path is diverted into the low elevation portions of the Harborton property, where it is impounded and has formed an extensive wetland complex between elevations of 13 feet and 16 feet CPD.

The existing stream path and the natural embankment along the shoreline cause the low elevation interior wetlands to be inundated year-round. The extent of inundation and the depth of water in the wetlands varies with the season and corresponds with the stream and precipitation inputs. During late summer and into fall, open water in the wetlands can be reduced to 13-foot elevation pockets; however, low elevation soil conditions remain saturated. During winter and spring, water level in the wetlands can rise in excess of the 15.5-foot embankment low point elevation, creating an open water connection with Multnomah Channel. Such conditions are typically associated with large precipitation. Similarly, when river stage exceeds 15.5 feet CPD, typically during periods of high Columbia River discharge, an open water connection will also form with the interior wetlands. In periods when an open water connection between the interior wetlands and Multnomah Channel does not exist, water is lost from the wetlands via infiltration through and under the natural ridge. Infiltration is concentrated in the northern corner of property, corresponding with the lowest

elevation of the natural ridge. Infiltration is sufficient that a stream channel has formed on the riverward side of the ridge, draining to Multnomah Channel. This 165-foot-long channel varies in width between 8 and 24 inches and is incised up to 24 inches deep with near vertical side walls. The channel has a steep gradient, in excess of 10 percent in places. Consequently, the discharge channel and the natural ridge create a barrier to upstream fish passage when river stage is much below the wetland water level. The embankments, roads and the dredge-filled area to the southeast all act to create a detention-like structure. Other than a 16-inch corrugated metal pipe culvert located on the north side of Northwest Marina Way which only serves to allow upland runoff to enter the area, water only enters the area via direct rainfall or high floodwaters overtopping the natural embankment. Runoff from offsite is primarily introduced to the northern portion of the project site via the 16-inch corrugated metal pipe culvert. The culvert location was field verified and located via GPS by AECOM.

Other notable features in the North Tributary area include the Olympic Pipeline, which crosses through the natural area, running generally parallel to the western property boundary, from NW Marina Way to the Multnomah Channel. The pipeline delivers liquid fuels (diesel, gas, jet fuel) from Puget Sound to storage and distribution facilities in the Portland Harbor. The pipeline is buried within a 30 foot-wide easement across the Harborton property and a 100 foot easement at the Multnomah Channel shoreline. The easement language describes the pipeline as being installed four feet below the ground surface elevation, though depth-of-cover surveys conducted in 2012 indicated that the pipeline varies in depth between 5 and 7 feet below ground surface elevation through the low-elevation interior of the wetlands.

An ash-cottonwood hardwood forest has become established, corresponding with the higher elevations of the natural embankment between Multnomah Channel and the low-elevation interior wetlands. The forest generally occupies elevations ranging from approximately 15 feet to 23 feet CPD. Within the ash-cottonwood forest is a forested wetland. This forested wetland occupies a northwest-southeast oriented swale incised into the surface of the ridge. The wetland hydrology is likely sustained by shallow, seasonally high water table and precipitation. Within the ash-cottonwood forest, canopy cover is very high, while the understory is a mix of native and invasive species. As the forest transitions to scrub-shrub wetland, canopy cover decreases, while invasive species understory increases.

Immediately southeast of the North Tributary area is an area that was filled with dredge spoils in 1986. Since being filled, the area has reverted to riparian shrub, scrub-shrub wetland, and herbaceous wetland habitat. Canopy cover is largely native species, but is patchy, consisting of isolated clumps. Understory vegetation is dominated by invasive grasses and shrubs. This diked and filled area is generally flat to gently sloping, but the microtopography within the sub-area is complex due to the random placement of fill material. Interior elevations range from 20 to 24 feet CPD. Three wetlands were delineated in this area (URS 2010), though wetland expression is more accurately described as a mosaic of wetland and non-wetland conditions. Precipitation and

surface/groundwater discharge from the developed portions of the substation appear to be the principal hydrologic inputs to this area. The dike fronting the Willamette River forms the northeast boundary of the sub-area and was constructed, in part, to contain dredge fill placed within the bermed area. The dike eliminated any surface water connection from the filled area to the river, though groundwater seeps have been observed at the base of the dike, below the riverward face. The dike turns away from the river and extends inland, forming the boundary between the filled area and the natural areas associated with the North Tributary.

#### **SUB-AREA 4 WATER LEVELS**

The water levels in Sub-Area 4 have been monitored with digital level loggers since April 2015. The data loggers were originally installed by AECOM in two locations within Sub-Area 4, one near the west edge of the wetlands (LL1) and a second in the deeper pond area near the Sub-Area 3-4 boundary (LL2). Water level information suggests that the original installations dried out by early June 2015. The data loggers were then reset at new locations and elevations in October 2015 by AECOM. The data loggers were then removed by Inter-Fluve in June 2016 to access the stored data. Following data retrieval Inter-Fluve reinstalled data loggers at the same locations in June 2016. Data from the loggers (Figure 3) shows the seasonal changes in water levels within the Sub-Area 4 wetlands. The water level in the wetland areas was decreasing in April 2015 and 2016 with the water level averaging 13-feet (CPD) by June 2015 and 14-feet (CPD) by June 2016. The water level in the wetland areas was increasing in October and November 2015 with levels reaching just over 15-feet (CPD) by December and holding near that level until April 2016. From April 2016 to July 2016 water levels in Sub-Area 4 decreased from near 15 feet down to 11.5 feet. The water level in Sub-Area 4 remained low until October 2016 when rainfall began to increase. Water levels rose to around 15 feet by December 2016 and then rose again to just over 16 feet in January. At the time the data was collected in February 2017 the water level in Sub-Area 4 was just under 16 feet. The water level logger installed in June 2016 in Sub-Area 1 shows less variability with water levels fluctuating around 16 feet. Water level data will continue to be collected on the site prior to, during and following project implementation.



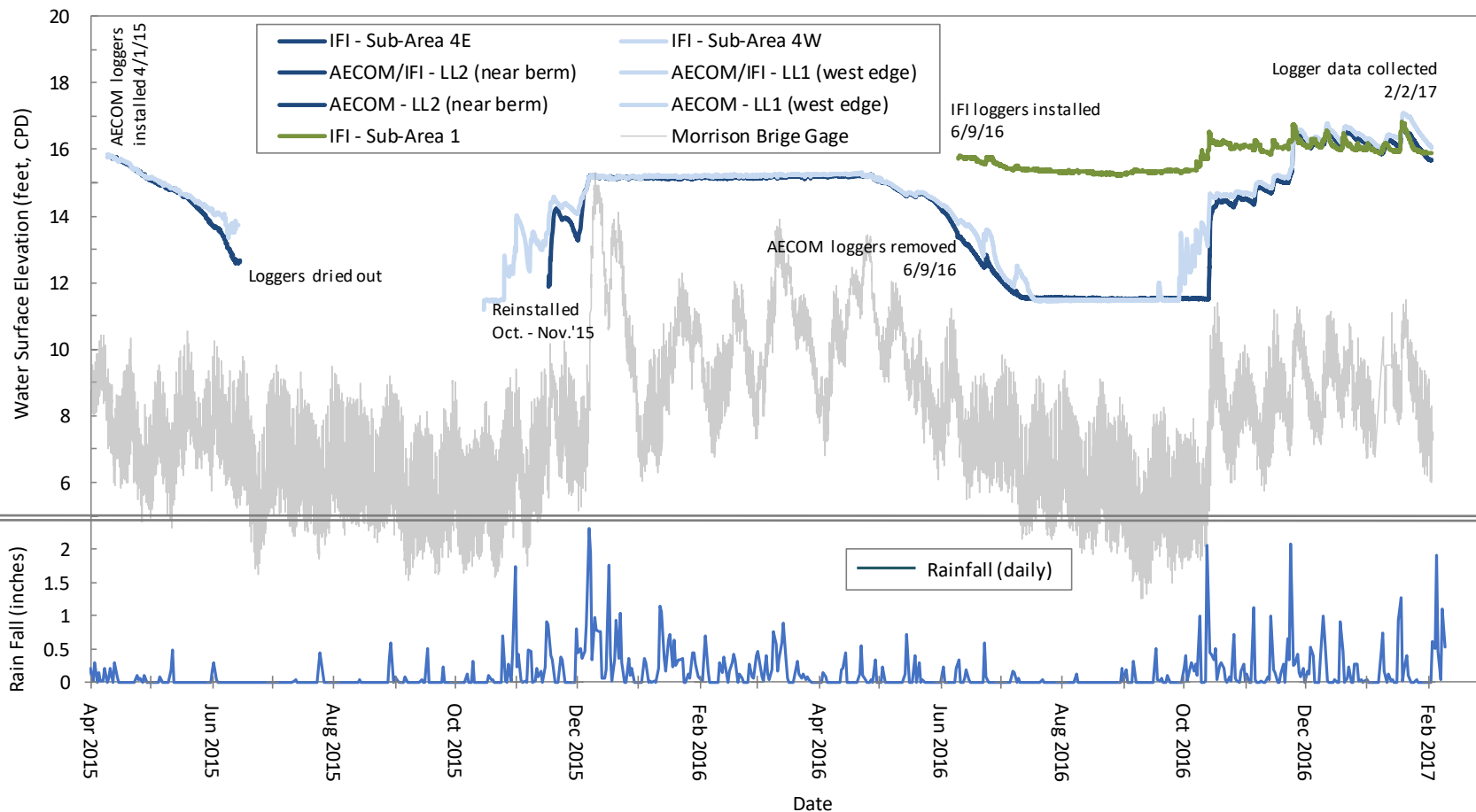


Figure 3 – Sub-Area 4 and Sub-Area 1 Water Levels

Notes:

1) Spring 2015 water elevation established from sensor depth data adjusted using Inter-Fluve’s 4-22-16 survey of the well casing top elevations. 2) Fall 2015 and 2016 water levels established using IFI’s 6-6-16 survey of the water level at each sensor. 3) CPD = City of Portland Datum. 4) Sensor LL2 was located near the berm between sub area 3 and sub area 4 in the core of the frog pond. 5) Sensor LL1 was located near the west edge of the frog pond closer to the berm separating sub area 4 from Miller Creek. 6) Rainfall from the Skyline School Rain Gage - 11536 NW, Skyline Blvd, on the top of the West Hills (Portland HYDRA Rainfall Network). 7) Morrison Bridge Gage (USGS 14211720 WILLAMETTE RIVER AT PORTLAND, OR) water levels converted to CPD by a value of +2.925-feet.

**SOUTH TRIBUTARY PROPOSED CONDITIONS**

Modifications proposed to the South Tributary include; 1) replacement of the failed culvert with a bottomless arch culvert to reconnect the interaction of the river and the stream during high river stage events, 2) excavation of the channel bed and lower banks to remove marginally contaminated material and back with the clean gravel streambed substrate, and 3) clearing and grubbing of portions of the wetlands to remove invasive species followed by intensive replanting with native species. The proposed replacement culvert is a 50 feet long, 6-foot span bottomless arch metal plate culvert. The inlet elevation of the proposed replacement culvert will be 14.85 feet and the outlet at 14.5 feet elevation, resulting in a stream gradient of approximately 0.7%. Erosion protection measures will be installed downstream of the new culvert to reduce the potential for a head cut moving up from the Willamette. See the Drawings for additional Details.

**NORTH TRIBUTARY PROPOSED CONDITIONS**

Changes to the Northern Tributary include; 1) excavation of a new outlet channel from the Sub-Area 4 wetlands to the Willamette River through Sub-Area 3, 2) expansion of the Sub-Area 4 wetland in Sub-Area 3, and 3) enhancement of the wetland conditions in Sub-Area 4. The new North Tributary channel's invert elevation where it discharges to the Willamette River will be 8-feet CPD. The new channel's invert elevation where it discharges from the Sub-Area 4 wetlands has been established at 15.4 feet CPD. The channel will have a bottom width of 3-feet set into a wider floodplain with a 150-foot average width. See the Drawings for additional Details.

## Hydraulic Analysis

In support of the restoration efforts at the Harborton site, a proposed conditions hydraulic model of the area was developed. The modeling efforts provide estimates of the hydraulic characteristics for the site related to flow velocities in the channel as well as potential inundation areas.

### HYDRAULIC MODEL

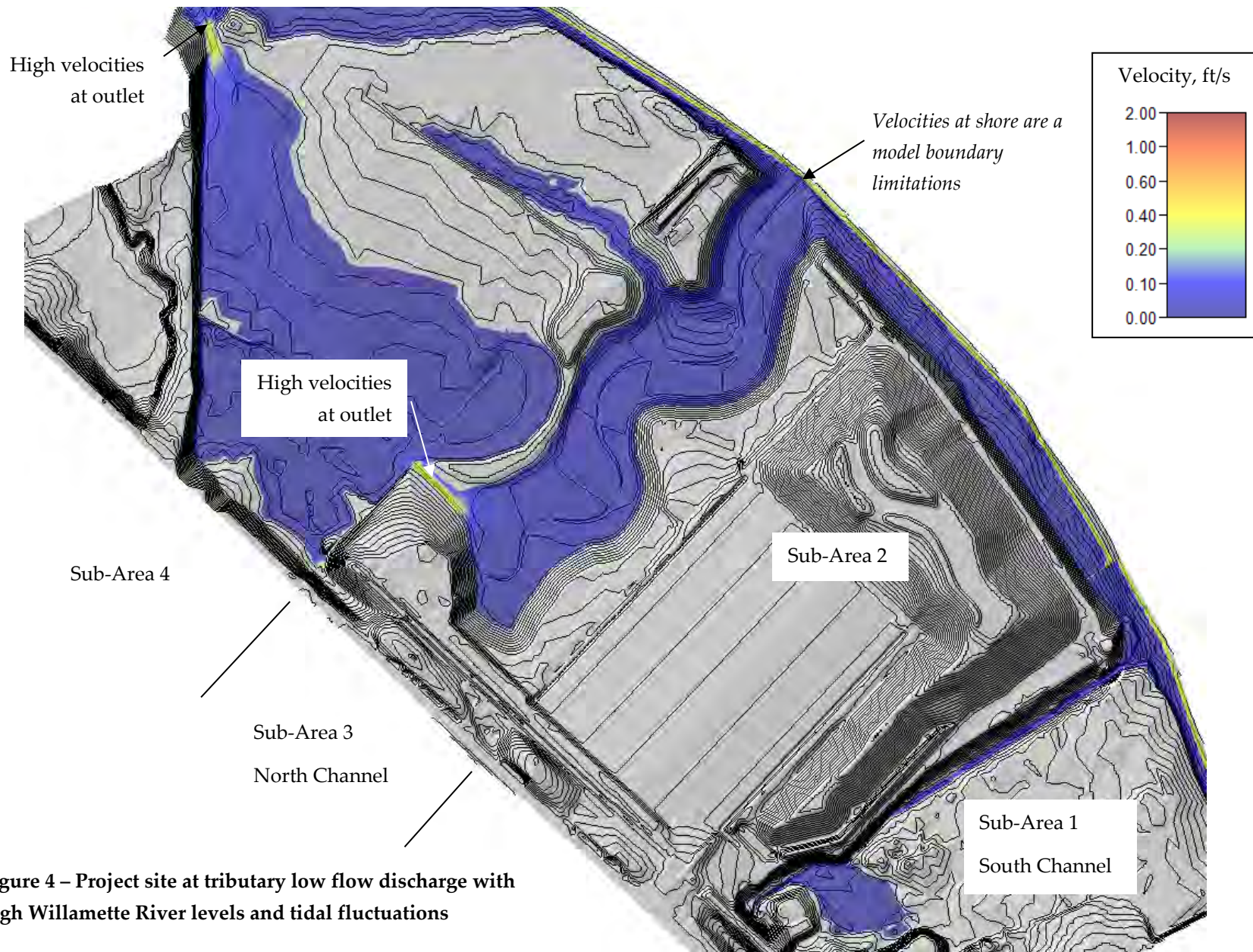
A 2-D hydraulic model for the site was developed using the U.S. Army Corps of Engineers HEC-RAS 5.0 software. HEC-RAS is a computer program that models the hydraulics of water flow through natural rivers and other channels. The program was used in its two-dimensional (2-D) unsteady flow simulation capacity to model the complex flow patterns, on-site water storage, and temporally variable boundary conditions. The 2-D hydraulic model calculates depth averaged water velocities, depths and shear stresses throughout the simulation. The model geometry used the proposed conditions finished grade surface (existing conditions merged with proposed grading work). The roughness values were based on professional judgment of existing and proposed vegetation conditions along with proposed channel complexity features including large woody material. The Manning's n roughness coefficient was set to 0.04 for the channel, with all other areas set to 0.10. As only the proposed conditions were modeled no calibration of the model was possible.

Three simulations were run to evaluate a range of hydraulic conditions and included;

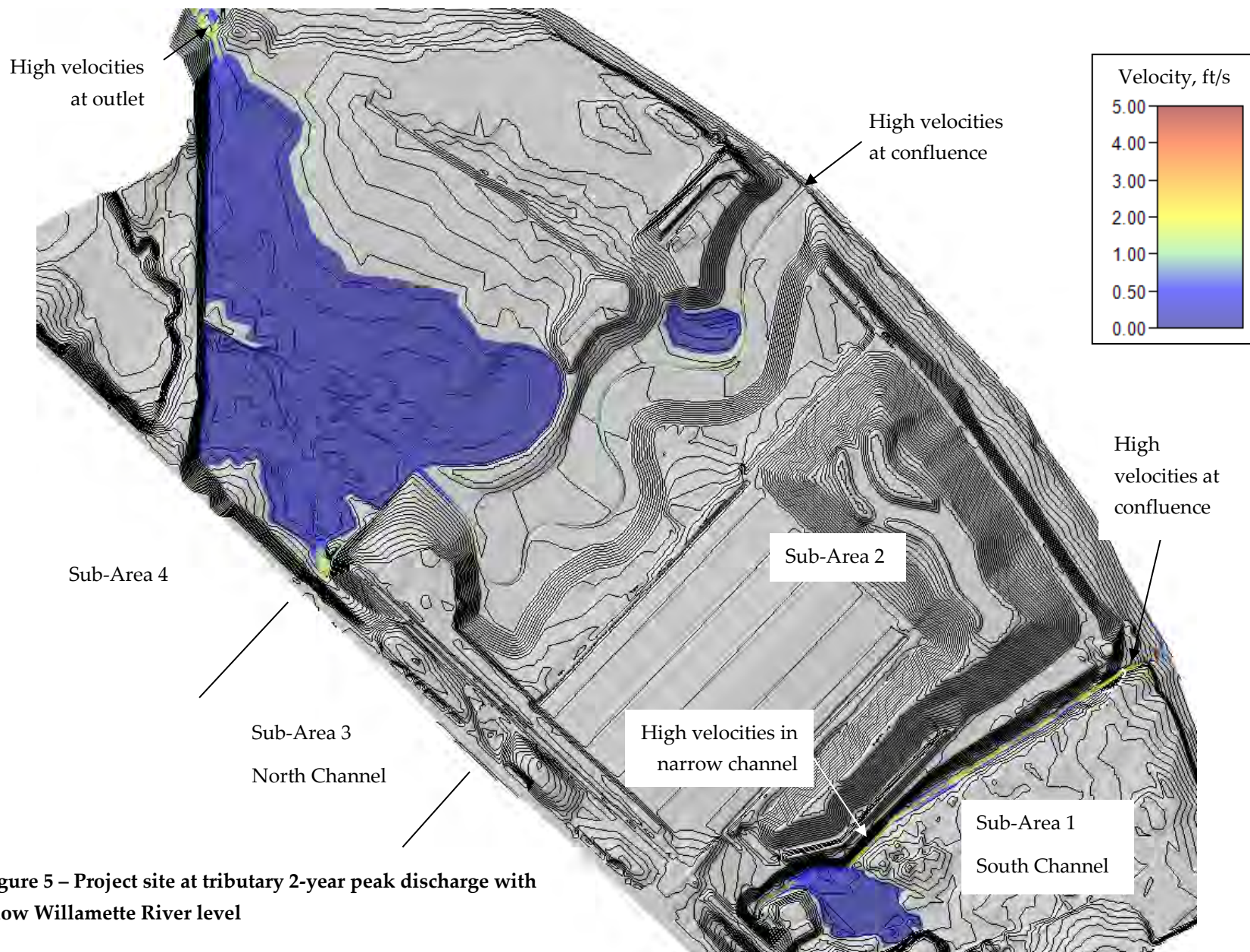
- 1) a constant low discharge of 0.5-cfs during a period of high river stage with semidiurnal tidal fluctuations,
- 2) a synthetic triangular hydrograph representing the 2-year peak discharge event during a period of low tides/river levels, and
- 3) a synthetic triangular hydrograph representing the 100-year peak discharge event during a period of low tides/river levels.

### RESULTS

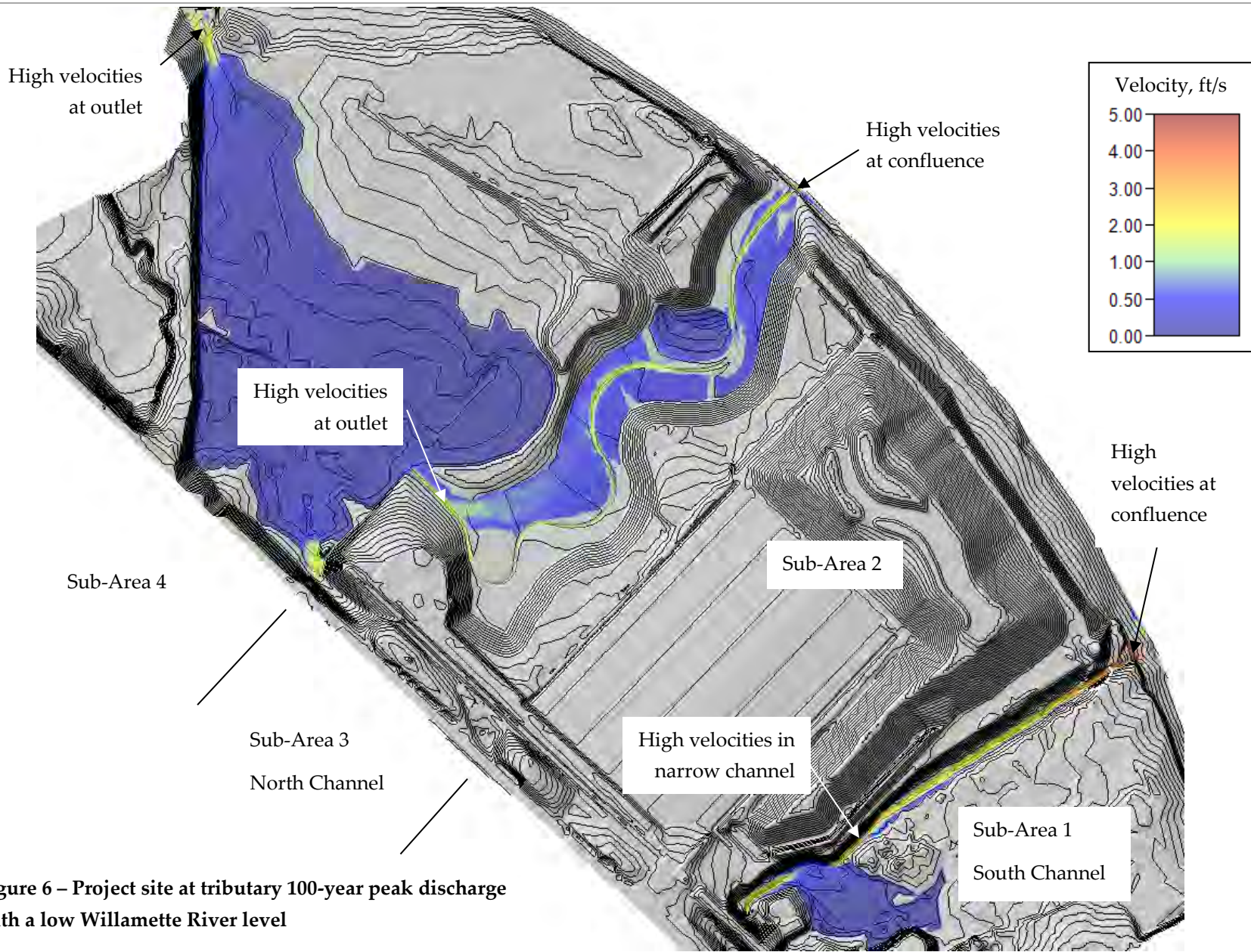
The following figures show the project model at the highest velocity condition for each of the simulations and illustrate the primary focus areas identified by the model results as needing special design considerations. These areas represent locations where the velocities tend to be higher than adjacent areas or have the potential to cause maintenance issues if erosion was not mitigated.



**Figure 4 – Project site at tributary low flow discharge with high Willamette River levels and tidal fluctuations**



**Figure 5 – Project site at tributary 2-year peak discharge with a low Willamette River level**



**Figure 6 – Project site at tributary 100-year peak discharge with a low Willamette River level**

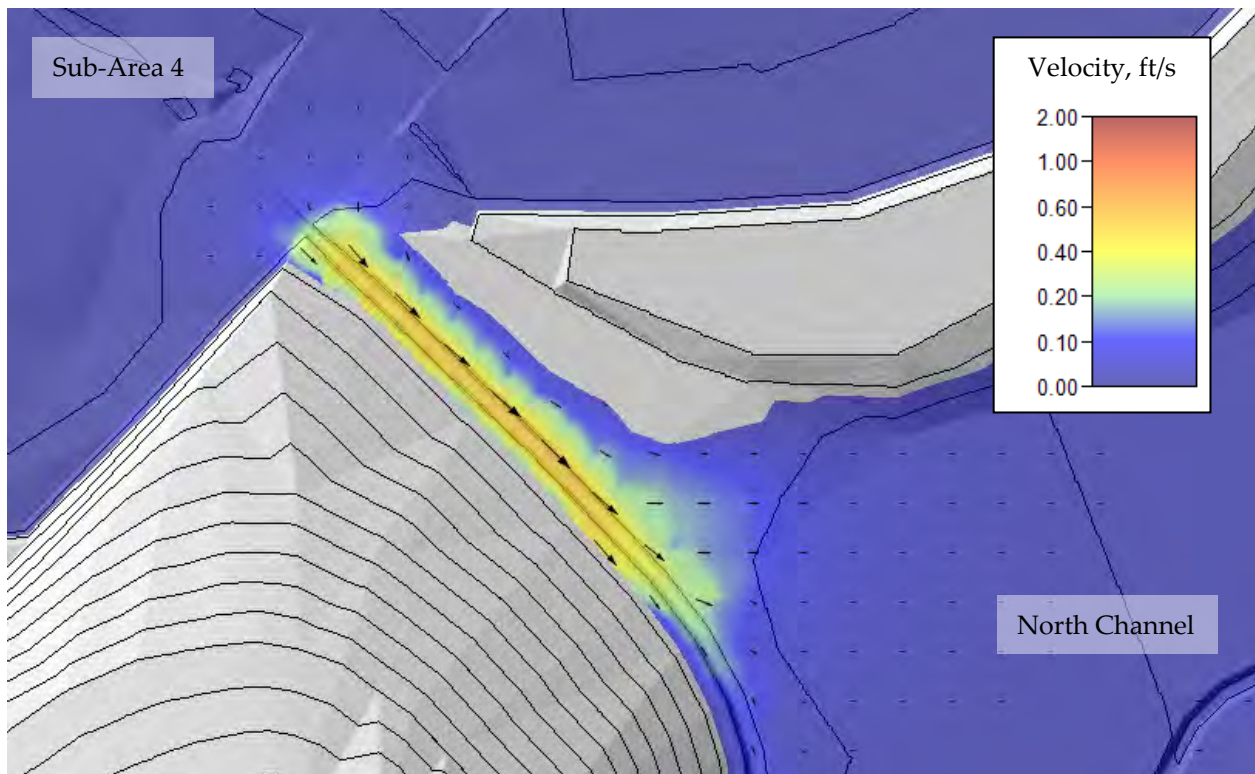


Figure 7 – Sub-Area 4 Outlet to North Channel During Falling High Tides

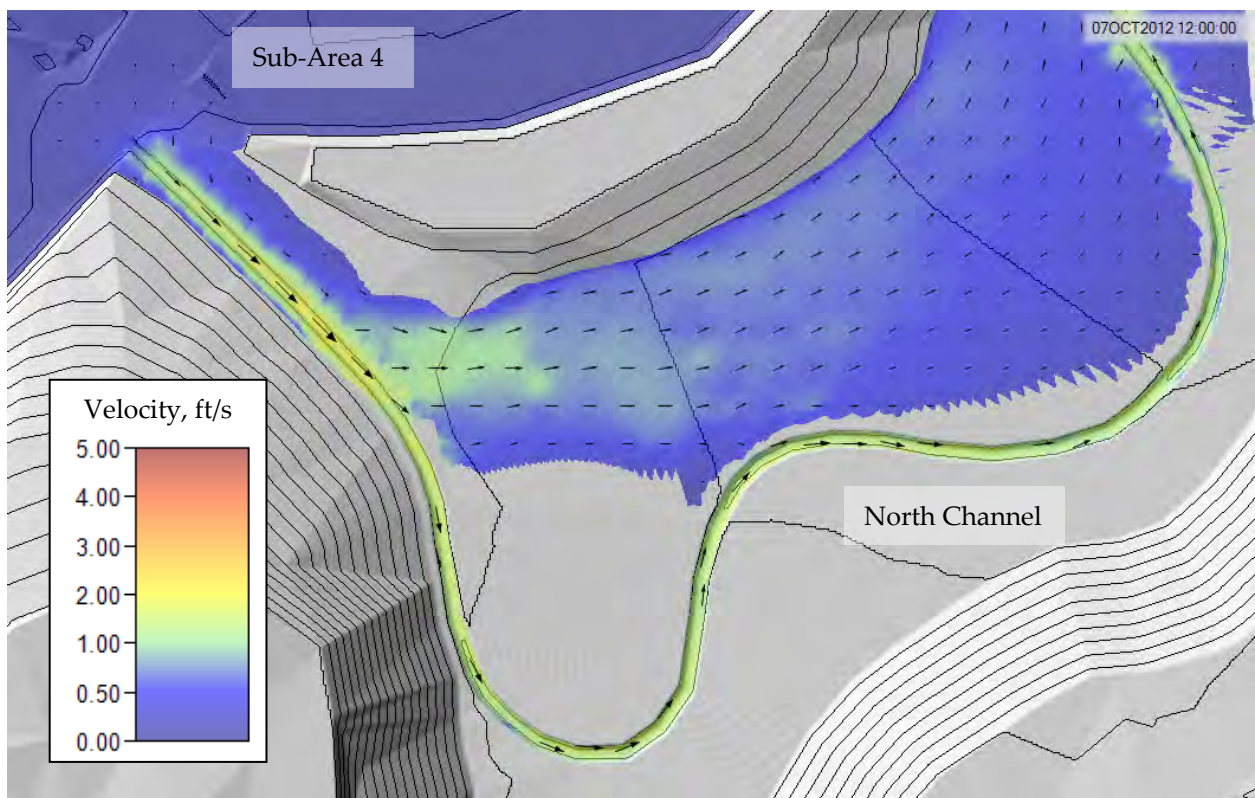


Figure 8 – North Channel at the tributary 100-year peak discharge with low a Willamette River level

## Conclusions

The results of the hydraulic modeling suggest that flow velocities associated with the proposed channels are generally low enough that wide spread erosion will not likely be any issue. However, the modeling does indicate that a number of specific locations will need erosion protection measures to limit the occurrence of scour and the development of head cuts. These locations include; 1) the confluence of each tributary with the Willamette River where the modeling results estimate localized high flow velocities especially during low river stages, 2) the start of the new North Channel at the outlet of the Sub-Area 4 wetland where stored water from tidal fluctuations flows out rapidly as the tide drops, and 3) the new culvert in the Southern Tributary where modeling shows concertation of flow at peak discharges resulting in higher velocities. The high velocities at the existing outlet of Sub-Area 4 are also worth noting. Although no work is proposed at that location the model results indicate high velocities similar to the new proposed outlet into Sub-Area 3. These modeled high velocities at the northern outlet are not likely to represent a change from existing conditions.

To accommodate these areas of higher erosion potential the following treatments are included in the design;

- 1) At and for a distance upstream of each tributaries confluence with the Willamette the channel bed and side slopes will be constructed with a coarser gradation of streambed material. Additional coarse gravel/cobble material may also be installed down the steepest portions of the Willamette River bank to reduce the potential for head cut propagation.
- 2) At the outlet of Sub-Area 4 into the new channel large woody material will be placed to help moderate the exchange flow rate during high tide cycles. The stream bed gravel material for a distance of at least 40 feet will be filled with fines and compacted during construction to reduce the potential for under cutting while helping to maintain surface flows at low tributary discharges and river stages.
- 3) On the left bank bench areas, just downstream of the north channel outlet from Sub-Area 4 slash and large woody material will be placed to increase the roughness and break up the overbank flows reducing the potential for surface erosion to create a new channel at the bench margin along the toe of the slope.
- 4) At the narrow portions of the South Tributary channel short grade control riffles will be installed to backwater flow, decreasing velocities and increasing inundation.
- 5) For the South Tributary culvert replacement, the channel bed will be constructed with a mixture of coarse gravels, cobbles, and boulders lining the culvert margins. This channel bed design will help reduce the potential for scour and protect the culvert footings.



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**REFERENCES**

NOTE: Field work conducted prior to 2016 referred to within this memo was completed by AECOM/PGE unless indicated otherwise. Inter-Fluve field work began in April 2016. Additionally, it should be known that AECOM contributed significantly to the content of structure of this memo while under contract with PGE prior to April 2016.

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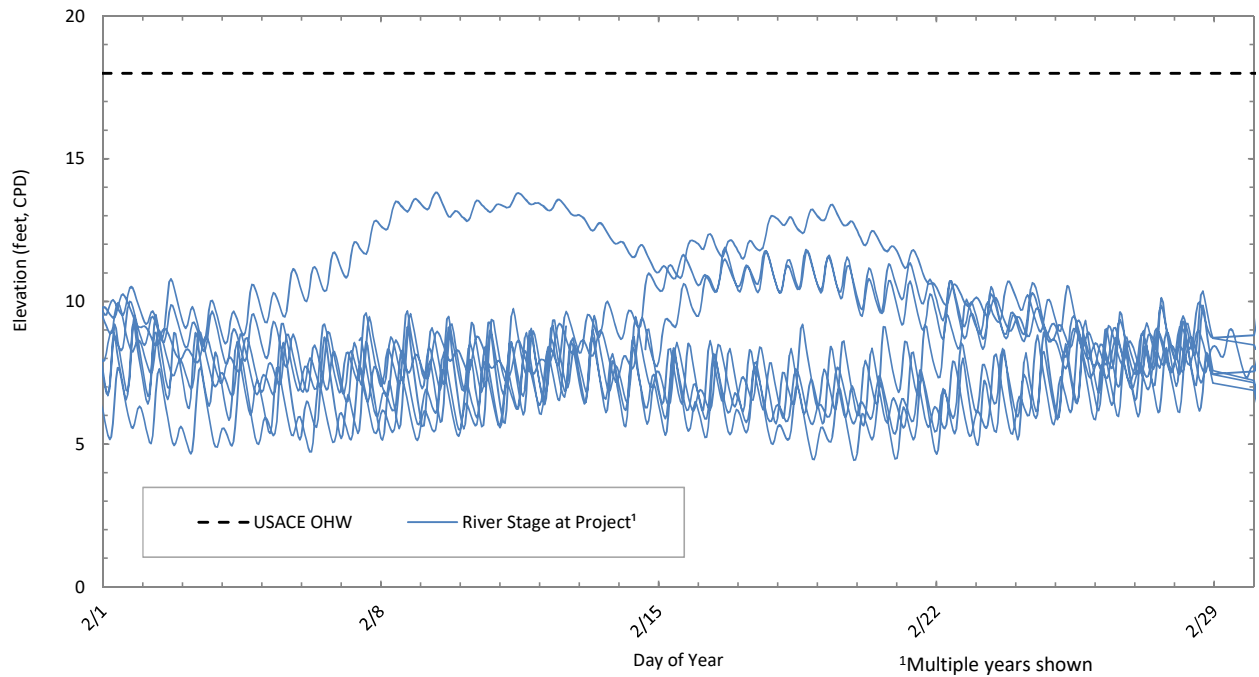
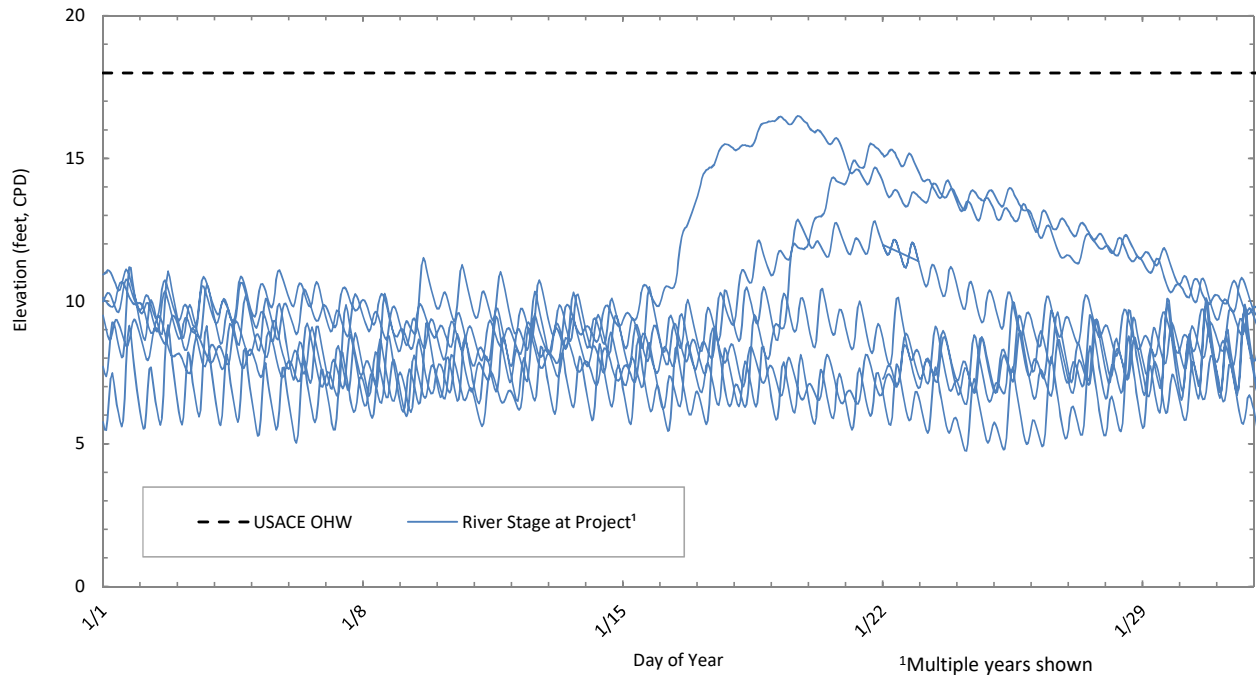
## **ATTACHMENTS**

A | Synthetic River Stage at Project Site

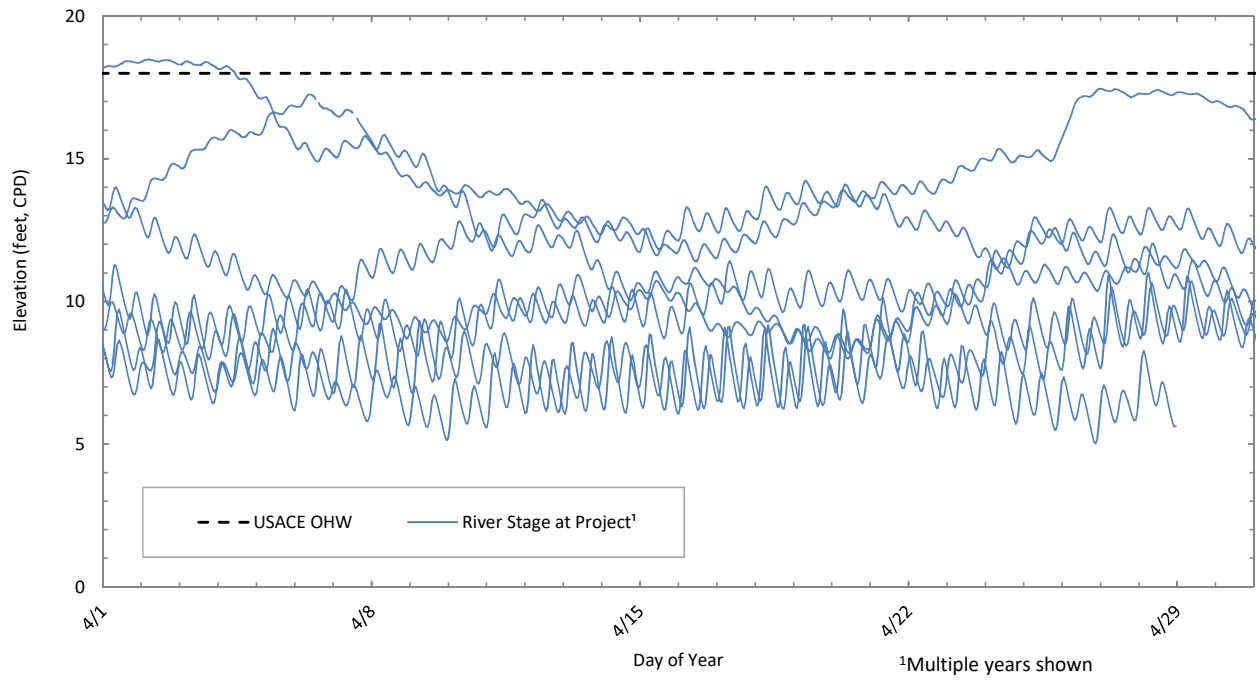
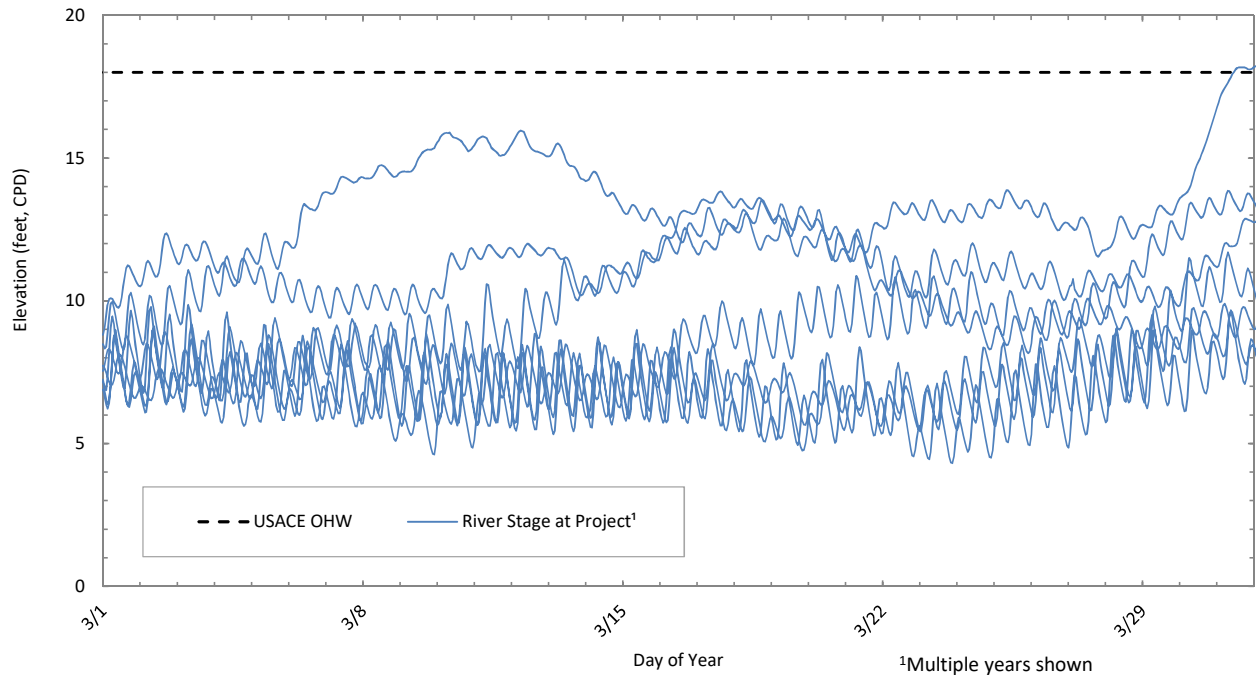
## **ABBREVIATIONS AND ACRONYMS**

RM = River Mile, PGE = Portland General Electric, Q = discharge, Min. = Minimum, Chnl = Channel, Elev = Elevation, E.G. = Energy Grade, ft = feet, Vel = velocity, WSE = Water Surface Elevation

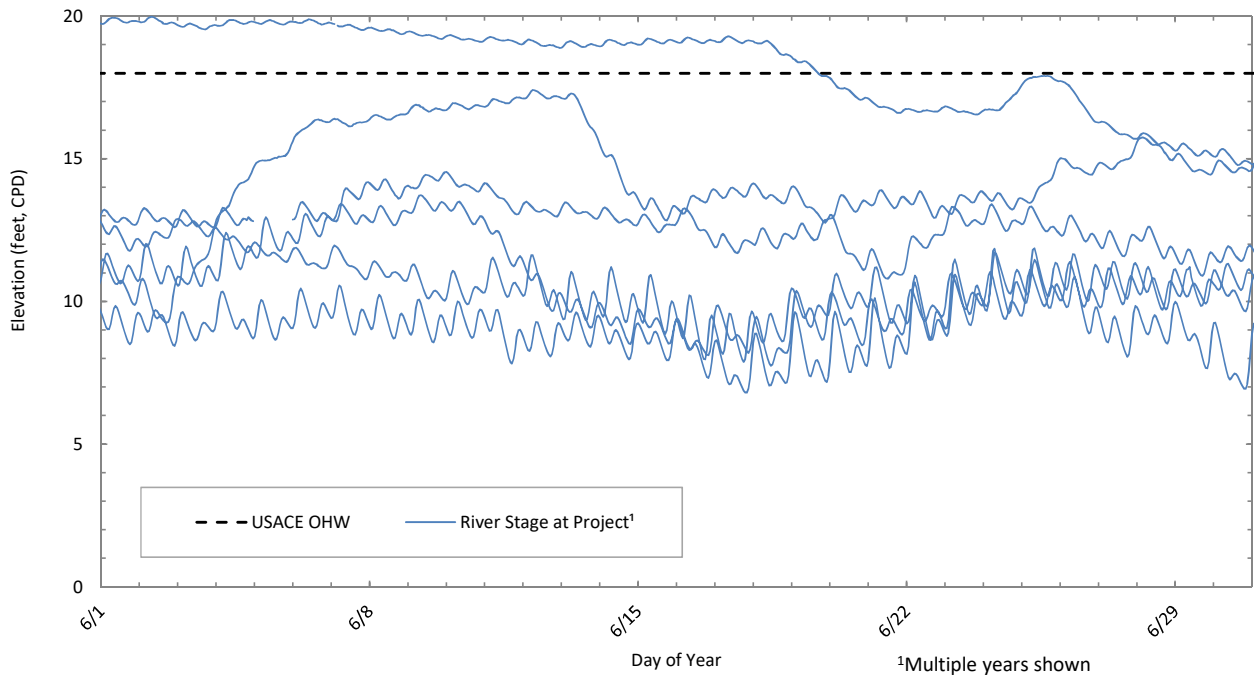
Attachment A | Synthetic River Stage at Project Site



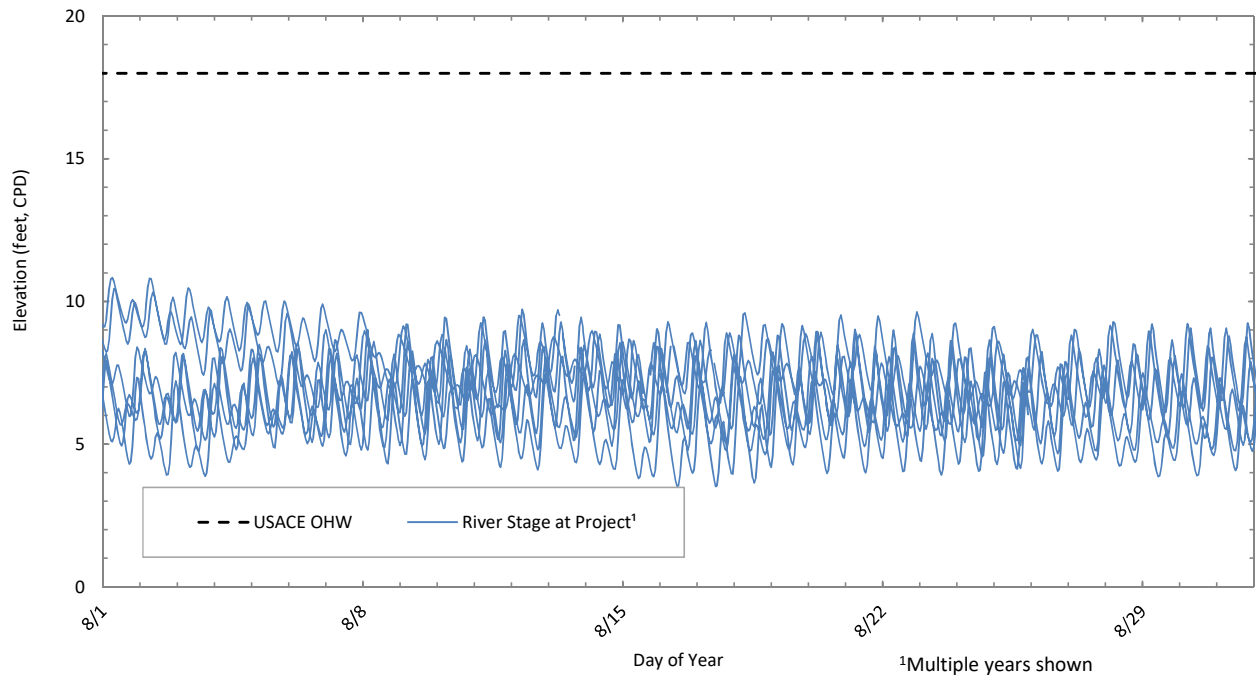
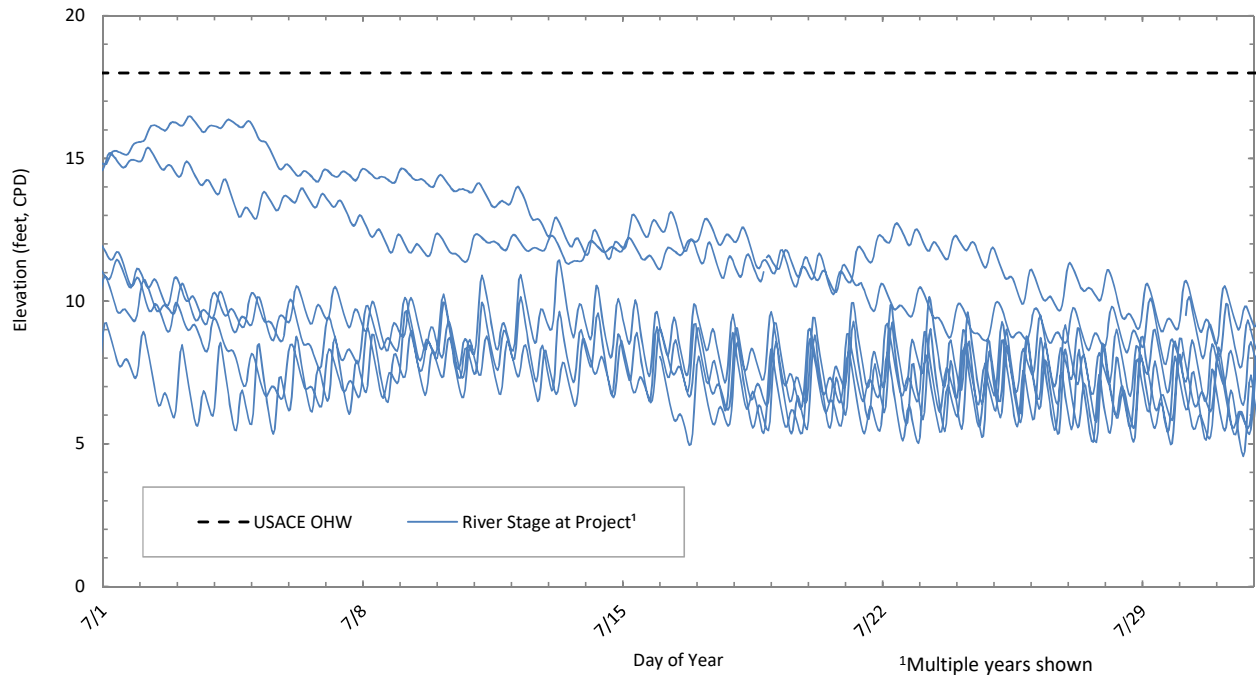
Attachment A | Synthetic River Stage at Project Site



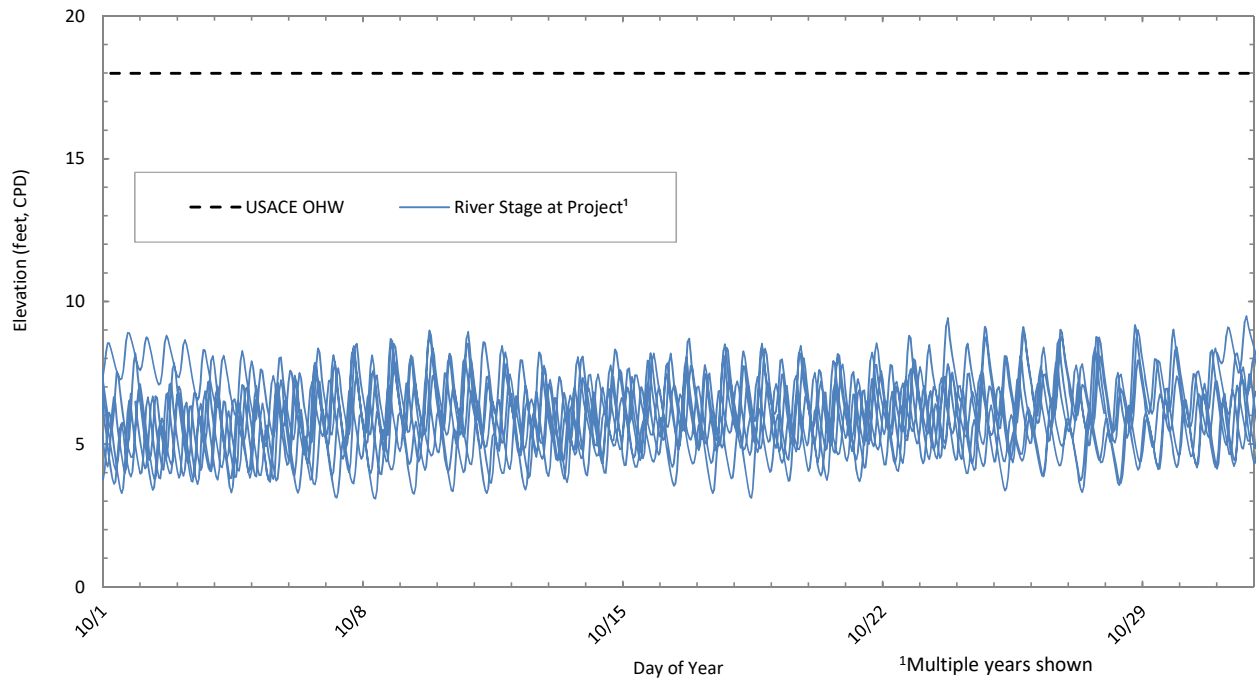
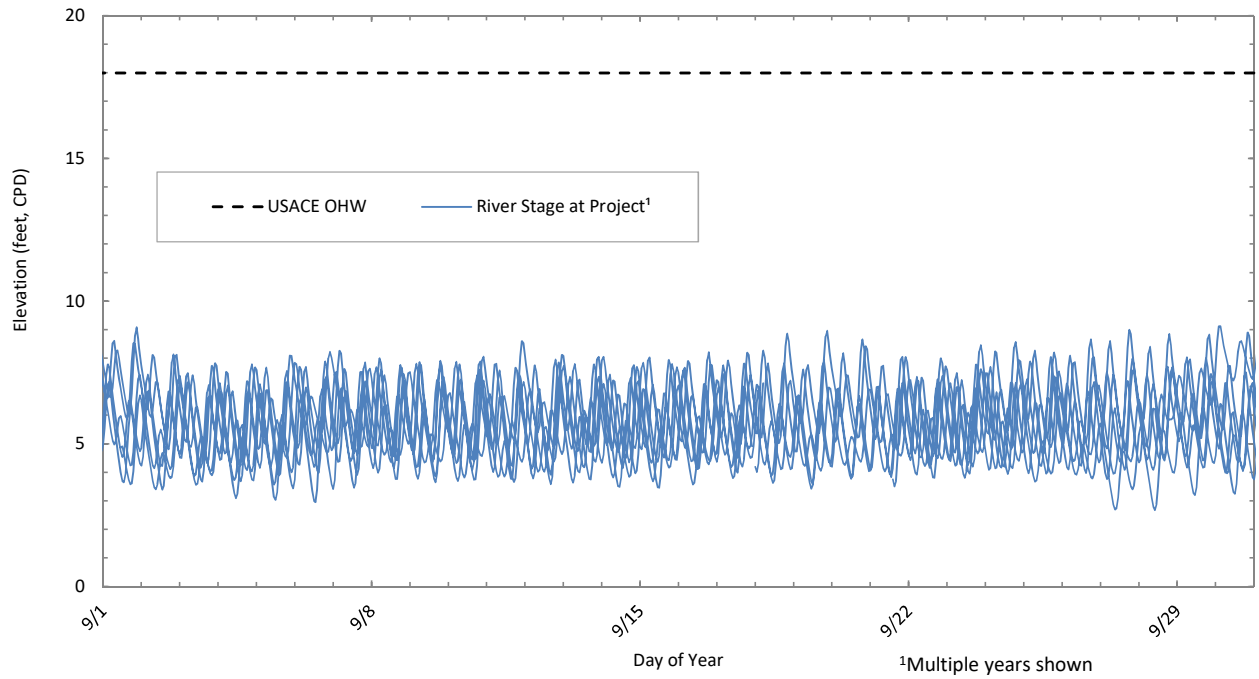
Attachment A | Synthetic River Stage at Project Site



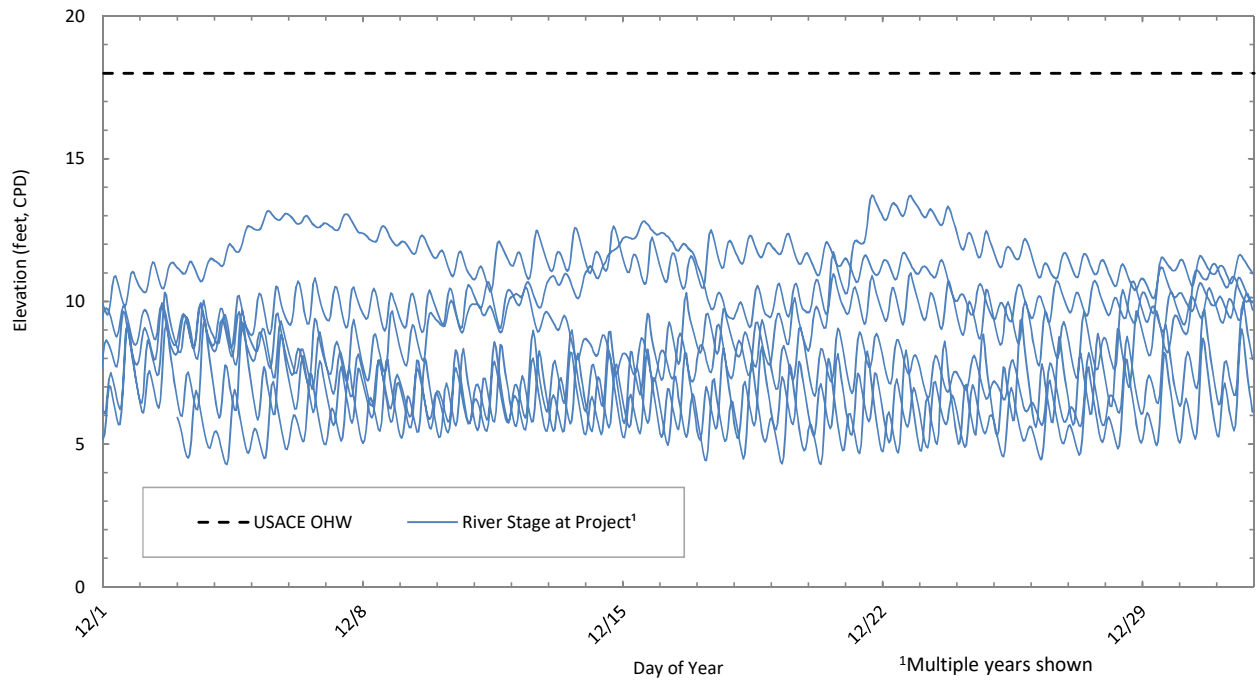
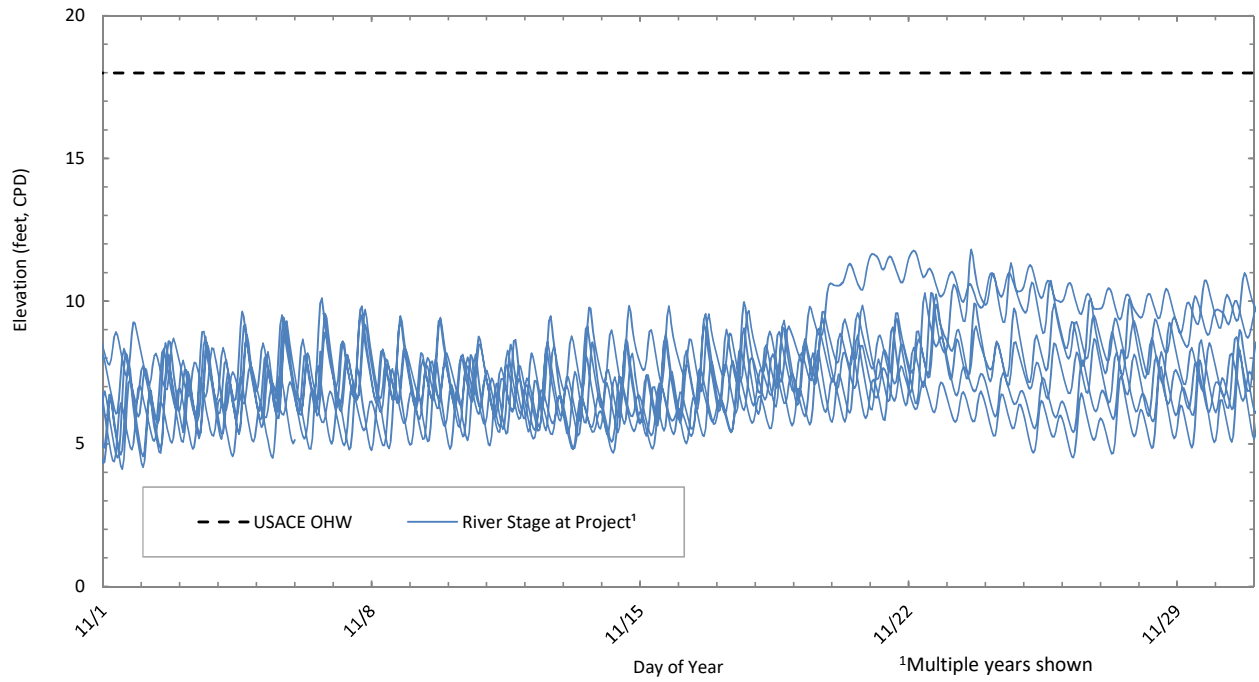
Attachment A | Synthetic River Stage at Project Site



Attachment A | Synthetic River Stage at Project Site



Attachment A | Synthetic River Stage at Project Site





## **Appendix E – Forecast Settlement Credit Value 2 Letter**

PORTLAND HARBOR  
*Natural Resource Trustee Council*



Chris Bozzini  
Portland General Electric  
121 SW Salmon Street  
Portland, OR 97204

November 2, 2020

RE: Second Forecast Settlement Credits Value for Portland General Electric Harborton Restoration Site

Dear Mr. Bozzini:

I am writing on behalf of the Portland Harbor Natural Resource Trustee Council (Trustee Council) to memorialize the Second Forecast Settlement Credits Value (FSCV2) for the Portland General Electric (PGE) Harborton restoration site (Covered Project).

Pursuant to the Memorandum of Agreement (MOA) between PGE and the Trustee Council, we have been exploring the development of a restoration project at the Harborton site. The site is located within the Portland Harbor study area along the western bank of the Willamette River near the confluence of the Multnomah Channel and the Willamette River. In a 2015 letter to PGE, the Trustee Council documented a Forecast Settlement Credit Value (FSCV) for the Covered Project based on our understanding of the project design at that time. The original FSCV for the project was 854.1 discounted service acre years (DSAYs). Since that time, PGE has made changes to the design of the Covered Project such that the current plans represent a substantial deviation from the design upon which the original FSCV was based. For that reason, PGE has requested that the Trustee Council develop a new credit estimate for this project, which will be referred to as the FSCV2. Based on the revised design and the assumptions described in detail below, the Trustee Council has determined that the FSCV2 for the Covered Project is 587.55 DSAYs.

The Trustee Council's current understanding of the proposed design is attached to this letter (Attachment A). The MOA defines the FSCV as follows:

“. . . a determination of the value a habitat restoration project subject to this MOA is expected to generate taking into account the project's anticipated habitat benefits beyond the Project Baseline Condition.<sup>[1]</sup> Forecast Settlement Credits Value will be estimated based on discounted service acre years ("DSAYs"), or such other measurement of value that the Trustees employ for

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<sup>1</sup> As defined MOA at 2-7, ¶ 1.1, Project Baseline Condition is "the habitat conditions at the location of a habitat restoration project taking into account remedial measures that are, or are reasonably anticipated to be, required by the U.S. Environmental Protection Agency under CERCLA."

determining [natural resource damages] NRD for the Site and pursuing claims against liable parties for such damages.” (MOA at 2-7, ¶ 1.3)

The Trustee Council made the following assumptions regarding project design in determining the FSCV2 of the Covered Project (Attachment A):

- Restoration benefits are calculated using Habitat Equivalency Analysis (HEA).
- The FSCV2 estimate assumes the base year is 2011 to stay consistent with the Trustee Council’s injury HEA calculation.
- The earth moving elements of the project will be implemented by the end of 2020. Credit estimate will be reduced by 3% per year if completion is delayed beyond that date.
- The Trustee Council defines active channel margin (ACM) as habitat along the river’s edge below ordinary high water and above ordinary low water.
- The Trustee Council defines riparian habitat as within 200 feet of ordinary high water. According to the Army Corps of Engineers’ analysis, ordinary high water at the site is assumed to be 20.1 feet (NAVD88).
- The following assumptions were made regarding the current conditions of the Covered Project (Attachment A-1 and A-2):
  - The Trustee Council considers the footprint of the habitat restoration project to be 53.4 acres, as identified by PGE in the GIS data of restored habitat conditions provided by email on September 11, 2020.
  - The Trustee Council excluded 4.02 acres of shallow water habitat and 1.45 acres of “ACM; slope < 11, unvegetated” habitat from the analysis due to lack of restoration change in these habitats.
  - The Trustee Council excluded the 1.07-acre footprint of the Olympic Pipeline Easement from the analysis due to uncertainty regarding potential future activities by the easement holder that may affect the value of that habitat.
  - The final area of habitat included in the analysis is 46.75 acres.
  - After discussions with PGE, the Trustee Council classified the current vegetation habitat quality as follows (Attachment A-2). Note that the Trustee Council assumes that 65% of ecological services are provided by the vegetation overstory and 35% by the understory.
    - Habitat areas with <10% native overstory and >40% invasive understory are classified as invasive vegetation, and are assigned the corresponding invasive vegetation adjustment factor (i.e., 0.1 for riparian invasive vegetation within the historic floodplain).
    - Habitat areas with >80% native overstory and >40% invasive understory are considered to have a native overstory and invasive understory. A native vegetation adjustment value was assigned to 65% of the acreage (e.g., to account for the native overstory) and an invasive vegetation adjustment value was assigned to 35% of the acreage (e.g., to account for the invasive understory). For example, 65% of the area of “riparian;

historic floodplain; invasive understory” was assigned the habitat adjustment factor 0.65 to account for the native vegetation, and 35% of the area was assigned the habitat adjustment factor 0.1 for the invasive vegetation.

- Habitat areas with between 10% and 30% native overstory and >40% invasive understory are classified as having a partially degraded native overstory and invasive understory. A partially degraded native vegetation adjustment value of 0.2 (for upland areas inside the floodplain) or 0.1 (for upland areas outside the floodplain) was assigned to 65% of the acreage, and the invasive vegetation adjustment factor of 0.1 (for upland areas inside the floodplain) or 0.05 (for upland areas outside of the floodplain) was assigned to 35% of the acreage.
- Habitat areas with between 30% and 80% native overstory and >40% invasive understory are assumed to have a partially degraded native overstory and invasive understory. A partially degraded native vegetation adjustment value of 0.3 was assigned to 65% of the acreage, and a partially degraded invasive vegetation adjustment factor of 0.1 (for ACM) and the invasive vegetation adjustment factor of 0.1 or 0.05 (for other habitats) was assigned to 35% of the acreage.
- The following additional assumptions were made regarding the restored condition of the site:
  - The Trustee Council has expanded its definition of ACM habitat to include habitat below ordinary high water and above ordinary low water adjacent to flowing water features with regular connectivity to the Willamette River or the Multnomah Channel.
  - 0.77 acres of habitat in Sub-Area 3 near NW Marina Way misidentified as “ACM; slope <11; vegetative native” in the 2015 FSCV are reassigned as “Riparian; Outside floodplain; Forested” in the restored condition (see area identified by dots in Attachment A-3).
  - A portion of Sub-Area 4 that was identified as ACM within the original FSCV does not meet the Trustee Council’s traditional definition of ACM.<sup>2</sup> As a result, we classify 4.91 acres of habitat in Sub-Area 4 as “ACM; slope <11; vegetated native (inland)” in the restored condition, with a value of 0.9 (see area identified by hash marks in Attachment A-3).
  - Within Sub-Area 4, 5.7 acres of wetland habitat of importance to northern red-legged frogs below the 15-foot elevation contour will not be treated to eliminate reed canary grass. The restored condition of this area of the site is assumed to be “ACM < 11; invasive” (see area identified as “ACM; slope <11, vegetated invasive (frog)” in Attachment A-3).

---

<sup>2</sup> As acknowledged in PGE’s draft Monitoring and Adaptive Management Plan (section 3.2.1.2), the Trustee Council has previously defined ACM habitat as existing in the areas between ordinary low water and ordinary high water, adjacent to Channel or Shallow Water habitats.

- Within Sub-Area 4, treatment of reed canary grass will be limited to targeted herbicide application in areas outside of identified northern red-legged frog habitat and generally above an elevation of 15 feet CPD. This credit estimate assumes that treatment will be fully effective to eliminate reed canary grass and achieve a condition of “ACM < 11; vegetated native, less connected.”
- The leave surface of the Covered Project following construction will be free from contamination in concentrations that exceed the Trustee Council’s identified thresholds for contaminants of concern (see Attachment A-4).

Given the above assumptions, we calculated the following DSAY values of the current and future site habitats based on the design in Attachment A-1 to A-4:

- Present Condition = 298.8 DSAYs
- Restored Condition = 886.3 DSAYs

As stated in the MOA at 2-7, ¶ 1.3 and 3-7, ¶ 3.1, the Trustee Council directed Industrial Economics, Incorporated to prepare the attached spreadsheet documenting the FSCV2 for the Covered Project (Attachment B). Assuming the project is implemented no later than 2020, the FSCV2 for the Covered Project is 587.55 DSAYs. This FSCV2 is based on PGE’s proposed design (Attachment A) and the assumptions provided above. Pursuant to the MOA, the FSCV2 for the Covered Project may be adjusted upward or downward to arrive at a Final Settlement Credits Value based on the results of as-built surveys and performance monitoring (MOA at 3-7, ¶ 3.2).

The Trustee Council looks forward to continuing to work with you to develop the Covered Project. We believe this project would benefit numerous species of fish and wildlife as well as other natural resources in the lower Willamette River.

If you have any questions about the FSCV2, please do not hesitate to contact me at 503.225.0777.

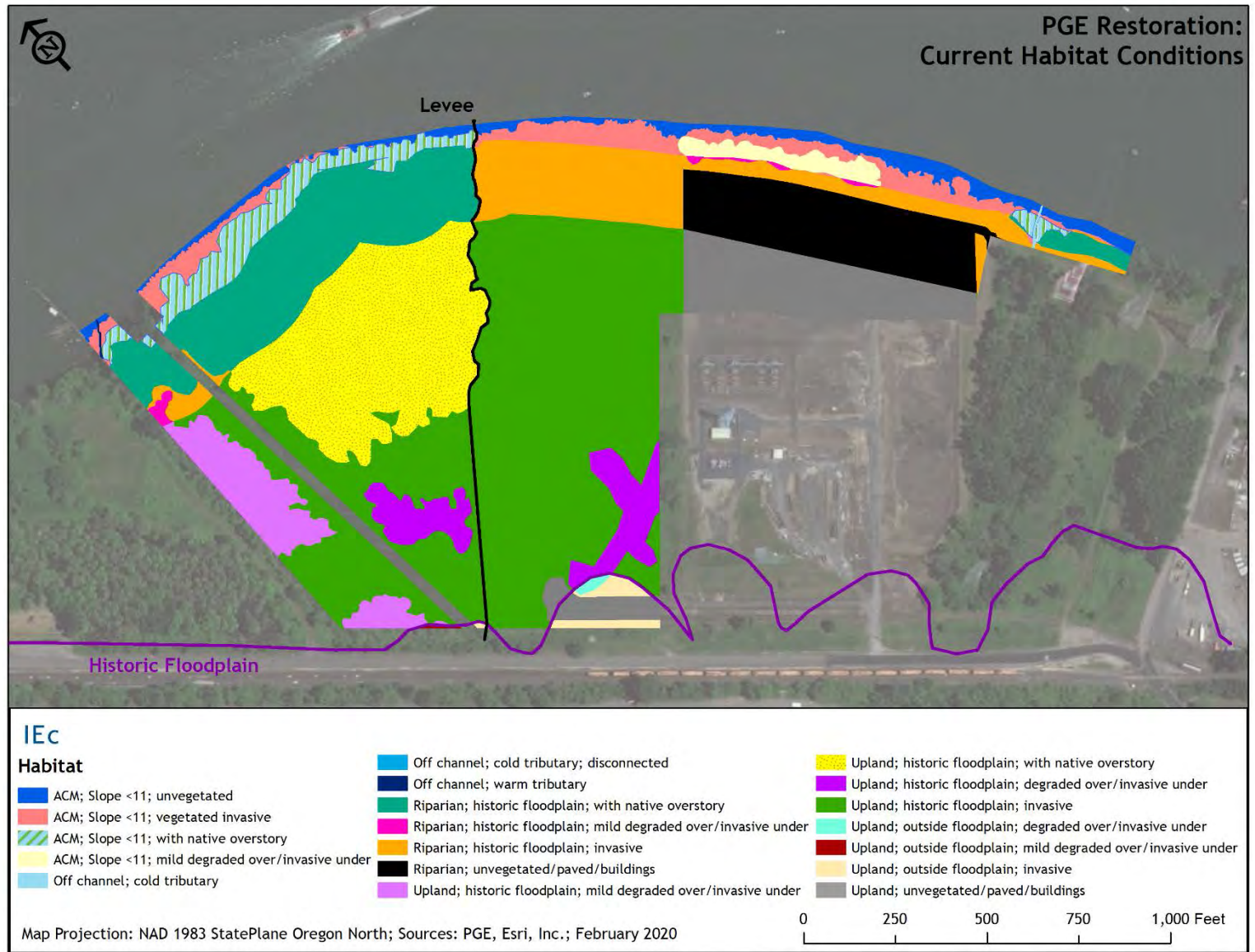
Sincerely,

Julie Weis

cc (via email):

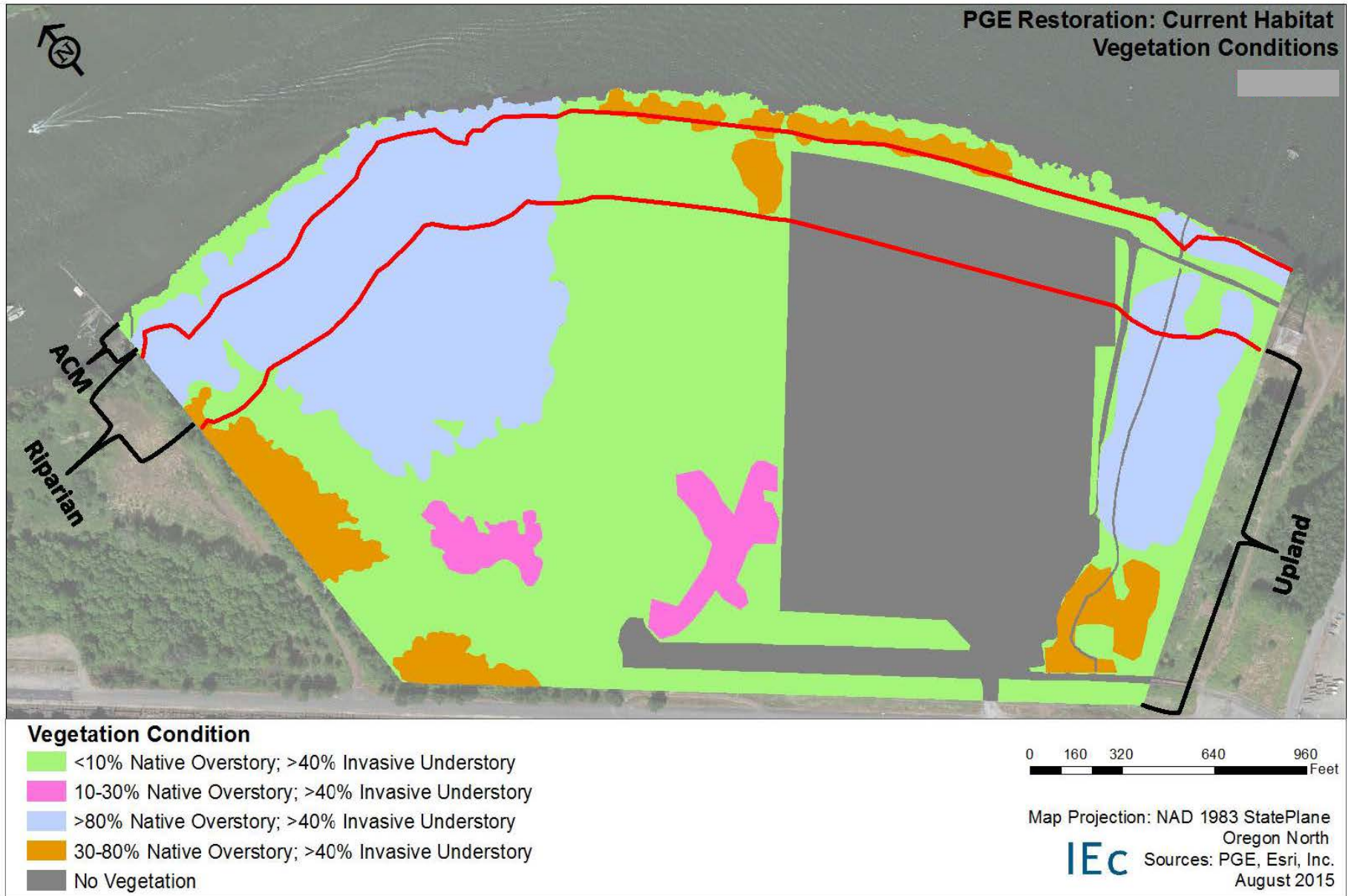
Trustee Council Representatives

ATTACHMENT A-1 PGE HARBORTON CURRENT SITE CONDITIONS

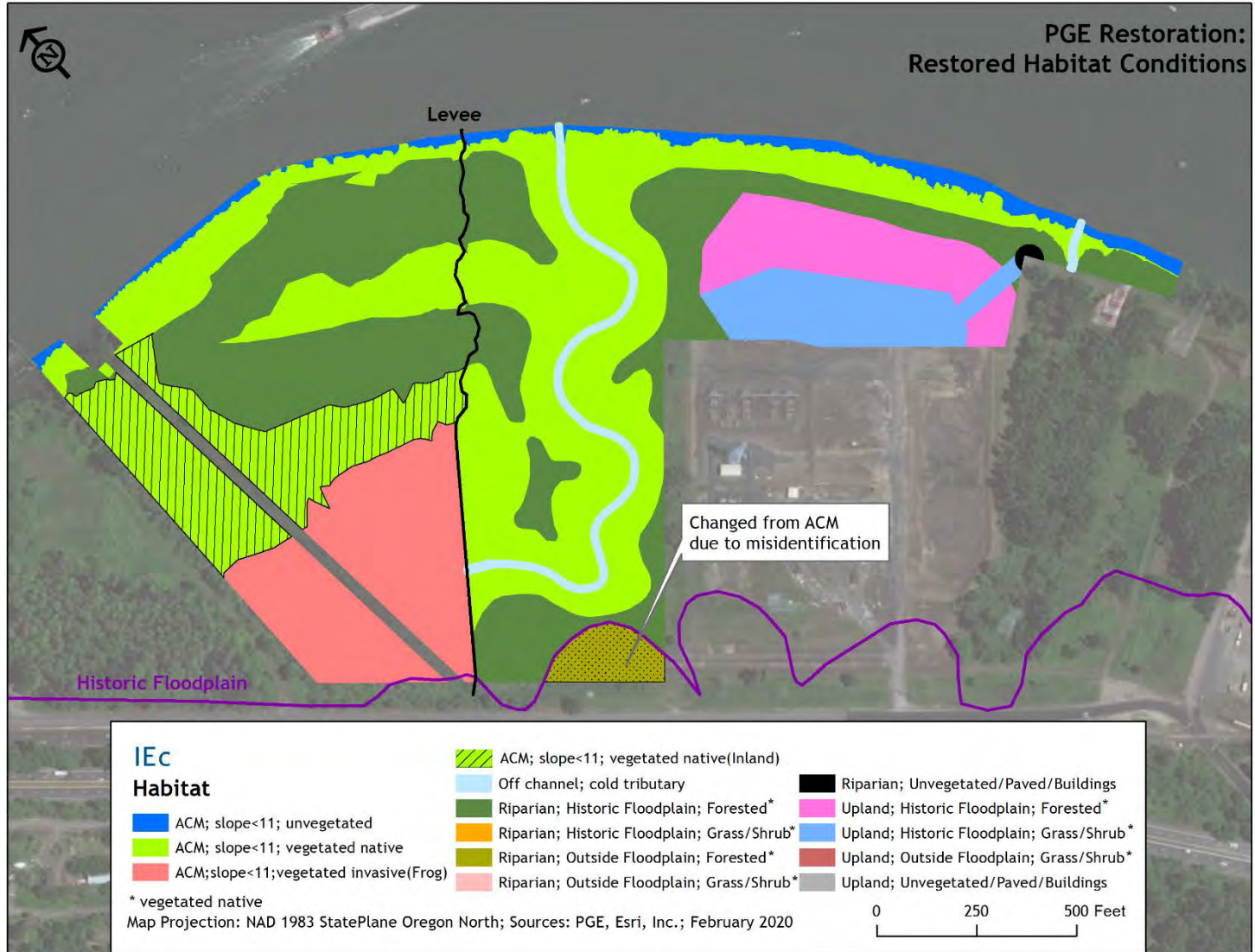


ATTACHMENT A-2

PGE HARBORTON SITE CURRENT VEGETATION CONDITIONS



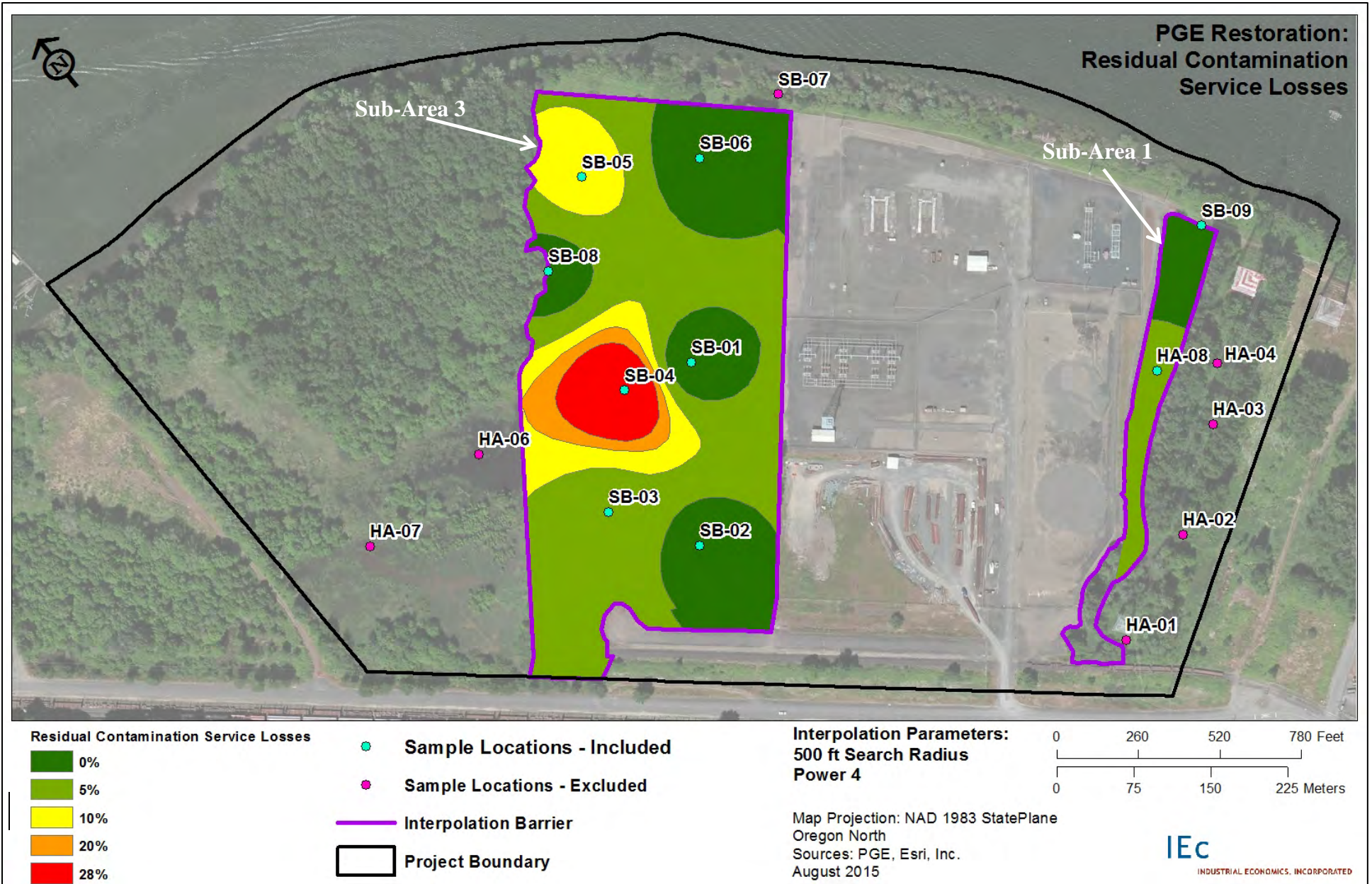
ATTACHMENT A-3 PGE HARBORTON SITE PROPOSED RESTORATION DESIGN





ATTACHMENT A-4

PGE HARBORTON SITE POTENTIAL CONTAMINATION BEFORE PGE RE-DESIGN



ATTACHMENT B

PGE HEA SPREADSHEET

Credit Estimate PGE 2020Oct06

GENERAL INPUTS

3.0%	Discount Rate
2011	Base Year (2011 matches Portland Harbor debit)
2020	Restoration Start Year
2320	Model End Year

0.00176 shallow cover  
0.326 shallow ; gray

Total Acres in site boundary	53.40	DSAYs/acre	11.0
Acres with restoration change	46.76		
% of site modified	87.6%		

Current Habitats

Habitat type	Acres Converted	Habitat quality adj factor	
ACM: slope<11; unvegetated	0.00	0.8	Acreeage removed from HEA because habitat is not improved in restored condition.
ACM: slope<11; vegetated invasive	2.02	0.75	
ACM: slope<11; vegetated native	1.13	1	1.74 (with invasive understory; >80% native and >40% invasive) acres multiplied by 65% because only overstory is native.
ACM: slope<11; vegetated invasive	0.61	0.75	1.74 (with invasive understory; >80% native and >40% invasive ) acres multiplied by 35% because understory is invasive.
ACM: slope<11; vegetated native	0.38	0.3	0.59 (with mixed overstory/invasive understory; 30-80% native and >40% invasive) acres multiplied by 65% because only overstory native; degraded to 0.3.
ACM: slope<11; vegetated invasive	0.21	0.1	0.59 (with mixed overstory/invasive understory; 30-80% native and >40% invasive) acres multiplied by 35% because understory is invasive; degraded to 0.1.
Off channel: cold tributary	0.02	1	Trib before the blockage.
Off channel: cold tributary	0.00	1	No longer exists, was the trib upstream of blockage on South channel.
Off channel: warm tributary	0.01	0.9	Small trib near NE corner of site.
Riparian: Historic Floodplain: Forested	3.52	0.65	5.41 (with invasive understory; >80% native and >40% invasive) acres multiplied by 65% because only overstory is native.
Riparian: Invasive	1.89	0.1	5.41 (with invasive understory; >80% native and >40% invasive) acres multiplied by 35% because understory is invasive.
Riparian: Historic Floodplain: Forested	0.09	0.3	0.14 (with mixed overstory/invasive understory; 30-80% native and >40% invasive) acres multiplied by 65% because only overstory native; degraded to 0.3.
Riparian: Invasive	0.05	0.1	0.14 (with mixed overstory/ invasive understory; 30-80% native and >40% invasive) acres multiplied by 35% because understory is invasive.
Riparian: Invasive	3.96	0.1	
Riparian: Unvegetated/Paved/Buildings	3.34	0	Only includes Riparian/unvegetated with restoration change (i.e., excludes 0.06 acres, which is round area/road turnaround).
Upland: Historic Floodplain: Forested	1.17	0.3	1.80 (with mixed overstory/invasive understory; 30-80% native and >40% invasive) acres multiplied by 65% because only overstory native; degraded to 0.3.
Upland: Historic Floodplain: Invasive	0.63	0.1	1.80 (with mixed overstory/invasive understory; 30-80% native and >40% invasive) acres multiplied by 35% because understory is invasive.
Upland: Historic Floodplain: Forested	4.07	0.65	6.26 (with invasive understory; >80% native and >40% invasive ) acres multiplied by 65% because only overstory is native.
Upland: Historic Floodplain: Invasive	2.19	0.1	6.26 (with invasive understory; >80% native and >40% invasive) acres multiplied by 35% because understory is invasive.
Upland: Historic Floodplain: Invasive	16.04	0.1	
Upland: Historic Floodplain: Forested	1.09	0.2	1.67 (with invasive understory; 10-30% native; >40% invasive) acres multiple by 65% because mixed native overstory; degraded to 0.2
Upland: Historic Floodplain: Invasive	0.58	0.1	1.67 (with invasive understory; 10-30% native; >40% invasive) acres multiple by 35% because only understory invasive.
Upland: Outside Floodplain: Forested	0.01	0.3	0.02 (with mixed overstory/invasive understory; 30-80% native and >40% invasive) acres multiplied by 65% because only overstory native; degraded to 0.3.
Upland: Outside Floodplain: Invasive	0.01	0.05	0.02 (with mixed overstory/invasive understory; 30-80% native and >40% invasive) acres multiplied by 35% because understory is invasive.
Upland: Outside Floodplain: Invasive	0.31	0.05	
Upland: Outside Floodplain: Forested	0.04	0.1	0.06 (with invasive understory; 10-30% native; >40% invasive) acres multiple by 65% because mixed native overstory; degraded to 0.1
Upland: Outside Floodplain: Invasive	0.02	0.05	0.06 (with invasive understory; 10-30% native; >40% invasive) acres multiple by 35% because only understory invasive.
Upland: Unvegetated/Paved/Buildings	3.36	0	

Indicates hardwired values.

	Total Current	298.8
PV DSAYs per acre converted	Quality Adj. PV DSAYs per acre converted	Quality Adj. PV DSAYs
26.3	21.0	-
26.3	19.7	39.9
26.3	26.3	29.8
26.3	19.7	12.0
26.3	7.9	3.0
26.3	2.6	0.5
26.3	26.3	0.5
26.3	26.3	-
26.3	23.7	0.3
26.3	17.1	60.1
26.3	2.6	5.0
26.3	7.9	0.7
26.3	2.6	0.1
26.3	2.6	10.4
26.3	-	-
26.3	7.9	9.2
26.3	2.6	1.7
26.3	17.1	69.6
26.3	2.6	5.8
26.3	2.6	42.2
26.3	5.3	5.7
26.3	2.6	1.5
26.3	7.9	0.1
26.3	1.3	0.0
26.3	1.3	0.4
26.3	2.6	0.1
26.3	1.3	0.0
26.3	-	-

Restored Habitats

Habitat type	Acres Restored	Interpolated Service Loss	Habitat Quality Adj Factor	Combined Habitat Quality & Service Loss Adjustment	Restoration Trajectory	Credit Segment 1 PV DSAYs per acre	Credit Segment 2 PV DSAYs per acre	Credit Segment 3 PV DSAYs per acre	
ACM: slope<11; unvegetated	0.00	0%	0.8	0.8	1	0.8	25.5	-	
ACM: slope<11; vegetated native	15.73	0%	1	1	3	1.5	24.1	-	
Riparian: Outside Floodplain: Forested	0.77	0%	0.5	0.5	10/40	2.8	10.2	8.1	Was mis-identified as ACM in FSCV.
ACM: slope<11; vegetated invasive	4.59	0%	0.75	0.75	1	0.8	25.5	-	Untreated frog habitat
ACM: slope<11; vegetated invasive	0.33	0%	0.75	0.75	1	0.8	25.5	-	Untreated frog habitat. Frog habitat where current is native over invasive under.
ACM: slope<11; vegetated invasive	0.76	0%	0.75	0.75	1	0.8	25.5	-	Untreated frog habitat. Frog habitat where current is mild degraded over/invasive under.
ACM: slope<11; vegetated native	3.89	0%	0.9	0.9	3	1.5	24.1	-	Sub Area 4 less connected ACM habitat. Value reduced to 0.9.
ACM: slope<11; vegetated native	1.02	0%	0.9	0.9	3	1.5	24.1	-	Sub Area 4 less connected ACM habitat. Value reduced to 0.9.
Off channel: cold tributary	0.23	0%	1	1	1	0.8	25.5	-	
Riparian: Historic Floodplain: Forested	14.05	0%	0.65	0.65	10/40	2.8	10.2	8.1	
Riparian: Historic Floodplain: Grass/Shrub	0.00	0%	0.35	0.35	5	2.1	22.7	-	
Upland: Historic Floodplain: Forested	2.91	0%	0.65	0.65	10/40	2.8	10.2	8.1	
Upland: Historic Floodplain: Grass/Shrub	2.48	0%	0.2	0.2	5	2.1	22.7	-	

	Total Restored	886.3
Total PV DSAYs per acre restored	Total Quality Adj. PV DSAYs per acre restored	Quality Adj. PV DSAYs
26.3	21.0	-
25.6	25.6	401.9
21.1	10.6	8.1
26.3	19.7	90.6
26.3	19.7	6.5
26.3	19.7	15.0
25.6	23.0	89.5
25.6	23.0	23.5
26.3	26.3	6.1
21.1	13.7	192.9
24.8	8.7	-
21.1	13.7	40.0
24.8	5.0	12.3

4.91

TOTAL CREDIT 587.55

## **Appendix F – Technical Memorandum: Plan to Reduce Exposure of Target Species to Residual Contamination at the Harborton Restoration Site**



**Portland General Electric**  
121 SW Salmon Street · Portland, Ore. 97204

December 13, 2019

To: Portland Harbor Trustee Council

From: Chris Bozzini, PGE  
Colin MacLaren, PGE  
Amber DiLoreto, PGE

**RE: Harborton – Plan to Reduce Exposure of Target Species to Residual Contamination at the Harborton Restoration Site**

### **Introduction**

Portland General Electric (PGE) has been working with the Portland Harbor Natural Resource Trustee Council's (Trustees or Trustee Council) for years and has had multiple designs for the Harborton restoration project. In August 2015, the Trustees calculated the number of discounted service acre years (DSAYs) based on the current design and how existing contamination adjusted the project's DSAY value. The project design has changed over time and PGE is currently in discussions with the Trustees on finalizing the project design. One aspect of the project is PGE's management of residual soil contamination remaining. PGE has requested the Trustees to rerun the Habitat Equivalency Analysis (HEA) on the current design. This rerun of the HEA will provide an updated DSAY amount also accounting for contamination. Based on the HEA results, the approaches described in this memo may change.

In preparation for the updated HEA, PGE has done some initial comparison of the environmental sampling data to the current design. For areas of the site where the leave elevation may show an impact, PGE proposes no over excavation and sampling at areas that the elevated results have been removed or low-level service loss may remain. PGE believes that obtaining current results based on the actual surface leave is the most appropriate method to evaluate contaminant loss. Samples would be collected for target constituents to confirm current conditions of leave surface.

Sub Area 3 has been divided into 13 decision units (DU). The DU are based on where excavation occurs and the initial sampling, while being sized to provide a reasonable evaluation area. If the design elevation is very wet or under the water table, or if sample results indicate residual contamination, the area would be over excavated by one foot with one foot of clean fill placed.

### **Soil Boring Results**

In 2011 and 2014, URS, now AECOM, performed soil borings to collect soil samples throughout the site. Those results were compared to criteria set by the Trustees in a September 27, 2016 memorandum. That memorandum identified substance of concern along with the concentration and associated service loss.

The boring locations were placed on the current site design. Table 1 summarizes the sampling results and relation to proposed construction. Table 2 summarizes the sampling by decision unit. Sampling is

not proposed for areas that will be inaccessible for salmonids (outside of the active channel margin). Substances of concern that were not detected were assumed to be zero. The substances of concern that resulted in a service loss were two pesticides and total polyaromatic hydrocarbons (PAHs). The following is a description of the area associated with each soil sample.

#### **Sub Area 1**

- HA-08 has a service loss of 5% due to total PAH concentrations of 1.05 mg/kg. The design calls for excavation of one foot and placement of one foot of more suitable material in this area. Executing the design results in the sample remaining two feet below the surface leave, which results in no service loss.

#### **Sub Area 3**

- SB-01 has 10% service loss for both DDD and DDT and 40% service loss for PAHs. The proposed excavation in this area goes to the depth of the sample with service loss, so contamination may be present at the leave elevation. The deeper sample at SB-01 had no service loss. A sample will be collected for DDD, DDT and total PAHs to determine if over excavation is needed.
- SB-02 has 20% service loss for PAHs. The design excavation removes 2.8 feet deeper than the sample with the service loss. The sample below this had no service loss. The excavation will be performed as designed with a confirmatory sample collected for total PAHs.
- SB-03 has a service loss of 10% for total PAHs. Excavation may not get to a clean surface, so the area will be sampled for total PAHs to determine if over excavating with one foot of clean soil as backfill will be needed to prevent service loss.
- SB-04 has 10% service loss for DDD and 20% service loss for PAHs. The design excavation removed 1.5 feet deeper than the sample with service loss. The deeper sample had no service loss. The area will be excavated to the design depth and sampled for DDD and PAHs to determine the leave surface concentration.
- SB-05 has a service loss of 10% for total PAHs. There is no planned excavation and the sample with service loss is roughly 2.5 feet deep, so no service loss is warranted in this area.
- SB-06 has a service loss of 60% for total PAHs. This sample will be removed as the proposed excavation will go six feet below this sample, and below the deeper sample which has no service loss, so no service loss is warranted in this area.
- SB-07 has a service loss of 5% for total PAHs. There is no planned excavation and the sample with service loss is roughly 20 feet deep, so no service loss is warranted in this area.
- SB-08 has no service loss.

#### **Sampling**

All sampling to support the evaluation will be performed by incremental sampling methodology (ISM). ISM is the preferred approach by Oregon Department of Environmental Quality (DEQ) for evaluating sites. ISM is a structured composite sampling and processing protocol that reduces data variability and provides a reasonably unbiased estimate of mean contaminant concentrations in a volume of soil targeted for sampling. ISM provides representative samples of specific soil volumes defined as DU by collecting numerous increments of soil (typically 30–100 increments) that are combined, processed, and subsampled according to specific protocols. A site-specific sampling plan will be prepared for the work. The analytical testing will be focused on the substance of concern that resulted in a service loss.

#### **Erosion Issues**

Subarea 3 is excavated into the Willamette River floodplain and will provide a refuge from river velocities. The flat wetland terrace surfaces on east and west edges of the proposed North Channel include granular material and wetland plant species to provide erosion protection in the event debris or beaver activity redirect flow from the North Channel. The adjacent 5:1 slopes will be vegetated with riparian seed,

shrubs and tree species per the plans. Native grasses are noted to be stable to flow velocities ranging from 4 to 5 fps and grown willow type plants stable to velocities ranging from 3 to 10 fps. These stability thresholds are greater than the anticipated velocities in Subarea 3 as shown in the project model.

#### **Clean fill requirements**

All soil and fill will be tested prior to arriving onsite. The material will be tested for all the substances of concern and be required to meet the concentrations that result in zero service loss.

The backfill soil will consist of native soil excavated from elsewhere within Sub Area 3. As noted above, except for the service loss associated with residual contamination in native soil at boring SB-03, all other native soils samples in Sub Area 3 are not associated with service loss. Therefore, native soil obtained from locations outside the SB-03 over-excavation area is suitable as backfill.

All backfill soil will be placed in 0.5-foot lifts and compacted in place in accordance with the project specifications. The entire over-excavation areas, excluding the stream channel, will be planted following the design planting plan.

#### **Conclusions**

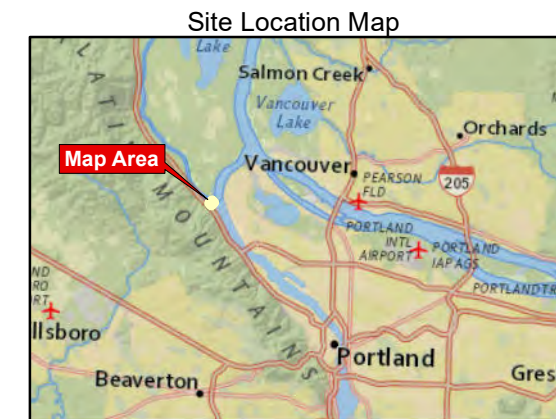
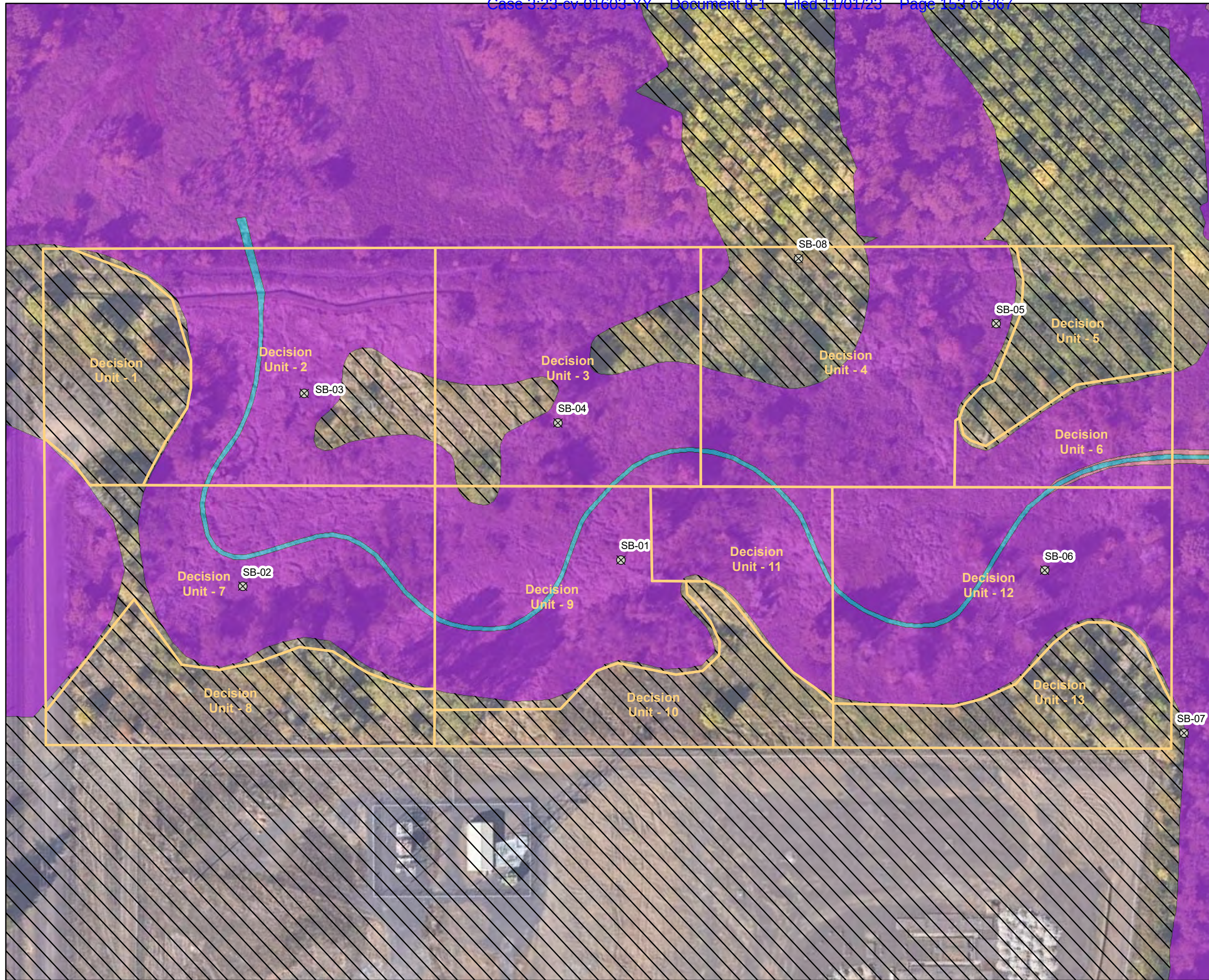
The restoration design modification proposed in this technical memorandum will provide current conditions across a broader area of the site. This information will be used to eliminate all service loss associated with residual contamination after restoration. Sampling and testing will be performed for specific constituents previously detected at the site. Sampling will provide results from the actual leave elevation to ensure protection from the restoration action. Where current soil results indicate, over-excavation of contaminated soil and placement of backfill soil with no associated service loss will eliminate exposure of the target species to residual contamination.

Table 1 – Summary of Soil Borings with Proposed Construction Approach and Associated Management																			
Sub-Area	3																	1	
Boring	SB-1	SB-1	SB-2	SB-2	SB-3	SB-3	SB-4	SB-4	SB-5	SB-5	SB-6	SB-6	SB-7	SB-7	SB-7	SB-8	SB-8	HA-8	HA-8
Sample elevation	16.68	11.43	17.26	10.76	20.24	6.74	14.35	9.85	20.83	14.33	17.2	12.95	17.1	15.1	5.1	21.66	16.66	18.72	17.22
Leave elevation at boring location	17	17	14.5	14.5	14.9	14.9	12.9	12.9	23.33	23.33	11	11	26	26	26	28	28	19.22	19.22
Substance of concern / service loss	DDD/10% DDT/10% PAHs/40%	None	PAHs/20%	None	PAHs/10%	PAHs/5%	PAHs/20%	None	PAHs/5%	None	PAHs/60%	None	None	None	PAHs/5%	None	None	None	PAHs/5%







Non-detects counted as zero

Table 2 – Decision Unit Sampling Parameters														
	Decision Unit													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Associated soil boring	SB-3	SB-3	SB-4	SB-8	SB-5	SB-5	SB-2	SB-2	SB-1	SB-1	SB-1	SB-6	SB-6	
Substance of concern	No sampling due to no exposure	PAH	PAH	No sampling due to no exceedance	No sampling due to no exposure	PAH	PAH	No sampling due to no exposure	PAH/DDT/DDD	No sampling due to no exposure	PAH/DDT/DDD	PAH	No sampling due to no exposure	
Excavation	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	No	

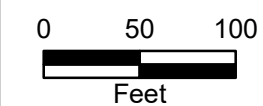




**Map Features**

-  Bore Location
-  Decision Unit
-  ACM\* Vegetated Native
-  ACM Unvegetated
-  Unvegetated Active Channel
-  Area Outside of ACM

\* ACM - Active Channel Margin



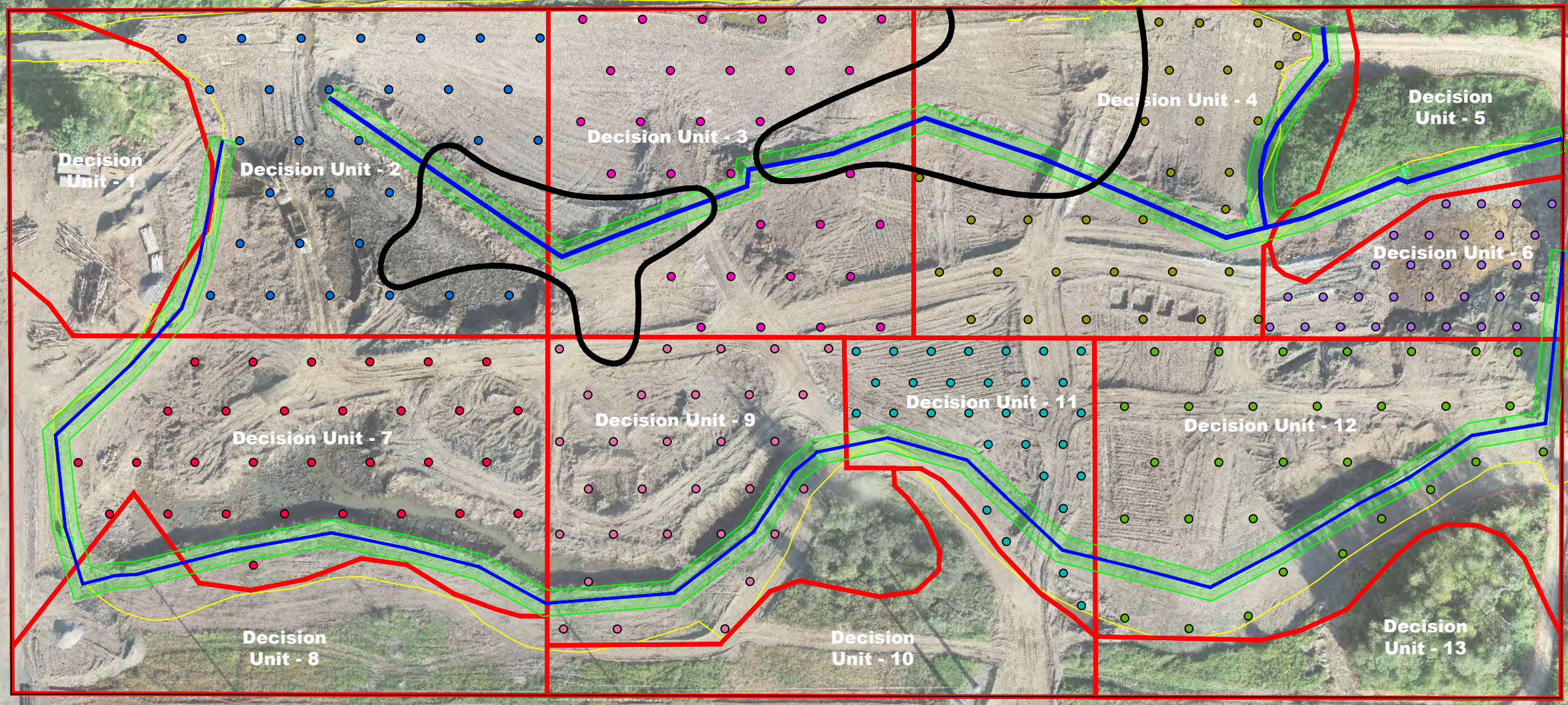
**Portland General Electric**  
Portland, Oregon

**Harborton**  
Future Development  
ACM and Decision Unit  
**PGE Environmental Services**

Date: 12/13/2019	Drawn By: J.B. Hoy	Rev:
Drawing File: J:\Env_Srv\Harborton\Maps\Harborton_ACM_Dec_Unit.mxd		

## **Appendix G – Sampling Plan – Harborton Restoration Project**

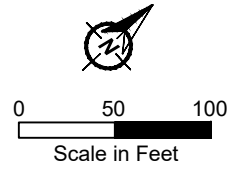
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Resource: Aerial provided by Envirocon

**LEGEND**

- DU-2 Adjusted Sample Sub Grid Location
- DU-3 Adjusted Sample Sub Grid Location
- DU-4 Adjusted Sample Sub Grid Location
- DU-6 Adjusted Sample Sub Grid Location
- DU-7 Adjusted Sample Sub Grid Location
- DU-9 Adjusted Sample Sub Grid Location
- DU-11 Adjusted Sample Sub Grid Location
- DU-12 Adjusted Sample Sub Grid Location
- Pipe
- Dewatering System Corridor
- Decision Unit Boundary



<b>PGE</b>
<b>Harborton</b>
<b>Sampling Subgrids Adjusted Dewatering System</b>

**DALTON  
OLMSTED  
FUGLEVAND**

FIGURE  
2



Portland General Electric

Appendix H

Harborton Restoration Project:  
Monitoring & Adaptive  
Management Plan

**SUBMITTED BY**  
Portland General Electric

May 2021

# Portland General Electric

## Harborton Restoration Project: Monitoring & Adaptive Management Plan



**SUBMITTED BY**

Portland General Electric  
121 SW Salmon Street  
Portland, OR 97204



**PREPARED WITH**

Inter-Fluve, Inc.  
501 Portway Ave., Suite 101  
Hood River, OR 97031

**May 2021**

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## Attachments

- Attachment A. USFWS Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey Harborton Restoration Site (Lamprey Monitoring Plan)
- Attachment B. Evaluation of Portland Harbor Superfund Area Restoration: PGE Harborton Restoration Site Lamprey Monitoring Plan, Sediment Sampling and Analysis Plan
- Attachment C. Lamprey Monitoring Budget
- Attachment D. Harborton Long-term Stewardship Budget Spreadsheet
- Attachment E. Harborton Fish Study Plan
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## 1. Introduction

The Portland Harbor Natural Resource Trustee Council (Trustee Council) developed the Portland Harbor Natural Resource Damage Assessment (NRDA) Monitoring and Stewardship Framework (M&S Framework; Trustee Council 2014) and made it available to Project Implementers (PIs) designing site-specific monitoring and stewardship plans for Natural Resource Damage restoration projects. As part of the guidance, the Trustee Council presented a model detailing the monitoring phases that will be required of PIs (see Figure 1). Under the model, restoration site monitoring is divided into four phases: Baseline Monitoring, Implementation Monitoring, Effectiveness Monitoring (EM), and Long-Term Stewardship Monitoring, which are described by the Trustee Council (2014) as follows:

- Baseline Monitoring occurs before project work commences at the site to document pre-restoration conditions.
- Implementation Monitoring occurs during and following project construction to document that the restoration elements were installed or constructed as proposed. The Implementation Monitoring that occurs after the Project's construction/implementation takes place in the Performance Period, which is the period of time following completion of the Project's construction/implementation until the Trustee Council determines that the Project's performance standards are met or that the Performance Period is otherwise complete, whichever occurs first. The Performance Period is estimated to last for approximately 10 years.
- Effectiveness Monitoring (EM) also takes place during the Performance Period and collects information to determine whether the Project is meeting its performance standards and informs any corrective adaptive management actions to ensure that the Project will meet its performance standards.
- Long-Term Stewardship Monitoring begins after the Performance Period and entails less intense monitoring to ensure restoration goals are stable and habitat functionality persists. A Long-Term Steward is responsible for the Long-Term Stewardship Monitoring.

This Monitoring & Adaptive Management Plan (MAMP) has been prepared for the Portland General Electric (PGE) Harborton Restoration Project (Project). This MAMP discusses the four monitoring phases required by the Trustee Council and is focused primarily on the implementation monitoring and effectiveness monitoring that takes place during the Project's Performance Period. A summary of the monitoring elements included in the Baseline Monitoring Plan is provided in Section 2. The Baseline Monitoring Plan has already been reviewed and accepted. Implementation and Effectiveness Monitoring for the Project are discussed in Sections 3 and 4, respectively. Section 5 of the MAMP discusses PGE's proposed Adaptive Management Plan (AMP) goals, which apply to performance standards specific to the monitoring criteria defined for the Implementation and Effectiveness monitoring phases discussed in this document. The AMP represents a systematic and iterative process during the Performance Period that provides for feedback between monitoring and management actions that will be undertaken so that the Project will achieve its restoration goals (Williams et al. 2009). The Long-Term Stewardship Plan (LSP) is discussed in Section 6. PGE proposes to further develop this LSP near the completion of the Performance Period when data from the EM activities can better inform development of the LSP. All Figures can be found at the end of this document.

The restoration goals of the Project are to restore, enhance, and preserve approximately 53.39 acres of habitat at the Harborton Property (Site) to serve as a Natural Resource Damage restoration site (Figure 2. Harborton Basic Restoration Elements). The activities proposed to achieve the Project's restoration goals are detailed in the Harborton Habitat Development Plan, summarized as follows:

- Excavation and re-grading to provide seasonally available off-channel habitat associated with the new North Channel, and additional upland and wetland riparian habitat buffer areas within the floodplain for out-migrating juvenile Chinook salmon (*Oncorhynchus tshawytscha*).
- Earthwork and/or habitat management of existing upland, primarily to control invasive plant species and re-establish native vegetation, reclaim excavated material and to convert part of the existing substation to upland habitat.
- Construction of a new North Channel through Sub-Area 3 to provide fish passage opportunities between Sub-Areas 3, 4, and the Willamette River.
- Enhancement of aquatic, riparian, and upland habitat characteristics in and proximate to the new North Channel through installation of habitat enhancement features/elements, invasive species management, and re-vegetation with native emergent, herbaceous, shrub, and tree species.
- Preservation of existing wetland in areas utilized by northern red-legged frogs (*Rana aurora aurora*) and other wildlife.
- Creation of new wetland in upland areas adjacent to known northern red-legged frog habitat through excavation and removal of imported fill in Sub-Area 3, installation of aquatic and riparian habitat enhancement features/elements, management of invasive plant species, and re-vegetation with native emergent, herbaceous, shrub, and tree species.
- Enhancement of shoreline, riparian, and upland habitats in all four Sub Areas through invasive species management, re-vegetation with native plantings, and routine maintenance.

This document is organized in sections corresponding to the Baseline Monitoring Period, Implementation Monitoring Period, and Effectiveness Monitoring Period of project development followed by a brief section that discusses the Long-Term Monitoring Plan. Organization generally follows the topics presented in the Trustee Council's M&S Framework, except for detailed descriptions of the existing Site conditions and proposed restoration activities, which are documented in the *Harborton Habitat Development Plan* (HDP) (PGE 2020a). Each section identifies the physical and ecological attributes that will be monitored or assessed for each monitoring element. A monitoring element is the created or enhanced habitat condition that is being assessed through the monitoring activity. A monitoring attribute is the indicator that is monitored to determine how the monitoring element is changing over time (e.g., native vegetative cover as an indicator of habitat recovery and overall habitat quality/suitability). The monitoring method is the specific manner in which a monitoring attribute will be assessed and may vary from a simple inventory to a defined methodology. Most monitoring elements have specific criteria established by the Trustee Council, which will be summarized for each monitoring element as follows:

- **Monitoring Attributes:** identification of the specific habitat or species indicator that will be monitored for ecological change and recovery at the Site.
- **Monitoring Techniques:** the methodology that will be employed to assess changes in specified monitoring attributes.

- **Sampling Location:** the area(s) or habitat types where the monitoring techniques will be employed.
- **Sampling Timing:** the scheduled years in which assessment of a monitoring element will occur during the EM Period.
- **Sampling Frequency:** the rate or recurrence interval at which a monitoring attribute is assessed during a given sampling year (e.g., weekly, monthly, etc.).
- **Applicable Habitat(s):** the habitat category/categories in which the monitoring element will be implemented.
- **Performance Standard:** the target goal established for the monitoring attribute at the end of the EM Period. A performance standard may not be required for all monitoring elements.

In addition to the above information, a narrative will be presented for each monitoring element, detailing how it will be applied to the Site and any deviations from the methods or performance standards presented in the M&S Framework. While not specifically defined in the M&S Framework, interim performance standards (IPS) will be recommended for those monitoring attributes when applicable. This document uses capitalization to distinguish between habitat categories used generally (e.g., riparian, wetlands, uplands, etc.) and those specifically defined by the Trustee Council's Habitat Equivalency Analysis (HEA) (Trustee Council 2012). Reference to the HEA habitat categories (e.g., Riparian, Upland, Channel, etc.) will be capitalized.

Finally, Section 5 describes the adaptive management process to ensure that the performance standards are attained by the end of the Performance Period. The AMP identifies the triggers that may necessitate adaptive management decisions, a framework for the adaptive management process, potential adaptive management actions, and reporting requirements.

## 2. Baseline Monitoring

The Harborton Baseline Monitoring Plan was developed in early 2014, based on technical assistance from the Trustee Council. The purpose of Baseline Monitoring is to capture pre-construction data on specific monitoring elements so that post-restoration data can be compared for analysis. PGE completed most Baseline Monitoring in April 2015, with a supplemental wetland delineation study in May 2016, a benthic invertebrate study in 2016, amphibian egg-mass surveys in 2018 and 2019, and a baseline surface water study for 2018 and 2019 among others. A complete list of baseline monitoring studies is included in Table 1 below.

Baseline Monitoring included monitoring elements that are not required by the Trustee Council, but were assessed to facilitate restoration design and engineering, or were deemed by PGE to be important for post-restoration comparative purposes. For example, surface water and groundwater monitoring elements of the Baseline Monitoring Plan are not required by the Trustee Council but will be monitored until construction implementation to inform design and engineering, and to better calibrate hydraulic models developed for the Project. Table 1 summarizes the monitoring elements and monitoring attributes contained in the Baseline Monitoring Plan.

**Table 1. Harborton Baseline Monitoring Plan: Monitoring Elements and Attributes**

Monitoring Elements	Monitoring Attributes	Monitoring Techniques	Trustee Requirement	Data Purpose	Document
<b>Geomorphic/Structural</b>					
Quantity of existing large woody material (LWM)	Quantity (number) of LWM	Habitat survey	No	Document existing LWM on Site	<i>Draft Baseline Monitoring Plan for the Harborton Natural Resource Damage Restoration Project, URS 2014</i>
Quantity of bald eagle habitat	Quantity (area) and type of bald eagle habitat currently on Site	Habitat survey; mapping	Yes	Document existing quantity and type of bald eagle habitat on Site	URS 2014
Quantity of mink habitat	Quantity (area) and type of mink habitat currently on Site	Habitat survey; mapping	Yes	Document existing quantity and type of mink habitat on Site	URS 2014
Existing fish passage conditions	Fish passage barrier identification/ assessment (egress/ ingress)	Visual survey	No	Document existing fish passage barriers on Site	URS 2014
<b>Hydrology/Hydraulics</b>					
Extent of high flow inundation	Lateral extent of flooding	Surface water elevation gaging tied to Site topography	No	Document existing inundation patterns to refine hydraulic model	<i>Technical Memorandum -Project Site Hydrology and hydraulics, Interfluve 2017</i>  <i>Supplement to Baseline Surface Water Memorandum, PGE 2019c</i>
Water budget	Wetland hydrologic regime	Hydraulic modeling; surface & ground-water monitoring	No	Document existing inundation patterns to refine hydraulic model	Interfluve 2017 PGE 2019c
Groundwater characteristics	Groundwater elevation	Groundwater monitoring stations	No	Document existing groundwater patterns to refine design and engineering	PGE 2019c

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Wetland hydrology	Hydroperiod, extent (area) of open water and depth of wetlands from January through July	Areal extent of open water and depth of wetlands from January through July	No	Document existing wetlands (area, depth and hydroperiod) to compare to post-project wetland conditions (Sub-Area 4)	PGE 2019c
<b>Vegetation</b>					
Vegetative community structure	Diversity, percent cover, density, percent native/invasive	Line-intercept transects, photo-monitoring	No	Determine how Site's existing high-quality habitat scores compare with performance standards	URS 2014
<b>Water Quality</b>					
Existing water quality conditions	Temperature, dissolved oxygen (DO), pH	Hourly temp data, monthly DO & pH sampling	No	Document existing water quality for channel to refine design and engineering	n/a
<b>Fish &amp; Wildlife</b>					
Breeding birds	Assemblage diversity, relative abundance, habitat usage	Point counts, habitat characterization	Yes	Document pre-construction habitat usage by breeding birds	<i>Bald Eagle, Breeding Bird, and Mink Baseline Monitoring Surveys at the Harborton Restoration Site. ABR, Inc. 2014</i>
Bald eagle	Bald eagle presence, habitat usage	Presence/absence, frequency of Site use, behavior surveys, Site elements used, habitat characterization	Yes	Document pre-construction habitat usage by bald eagles	ABR 2014
Northern red-legged frogs/amphibians	Annual egg mass counts (peak: February through March) Tadpole presence/development (June/July)	Portland Metro Amphibian Survey Protocol (2010), as modified and agreed to by the Restoration Committee	Yes	Document pre-construction use by amphibians via abundance of egg masses. Document presence/absence of larval amphibians and general development stage	<i>Technical Memorandum – Harborton Annual Amphibian Egg Mass Survey. PGE 2020b</i>
Mink	Mink presence/absence, abundance, habitat usage	Presence/absence, scat and tracks surveys, photo-monitoring, habitat characterization	Yes	Document pre-construction habitat usage by mink	ABR 2014
For a complete discussion of Baseline Monitoring elements, please refer to the Harborton Baseline Monitoring Plan, submitted March 3, 2014.					

In addition to the monitoring elements in Table 1, baseline lamprey presence, habitat use, and characteristics of the Site were monitored separately by the U.S. Fish and Wildlife Service (USFWS). Baseline lamprey monitoring was completed by USFWS in the fall of 2017 documenting pre-construction use of the Site by lamprey and habitat conditions, to allow for later evaluation of how individual restoration projects affect Pacific lamprey, specifically their colonization and occupancy of restored habitat. USFWS has developed a detailed site-specific Lamprey Monitoring Plan, *Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey Harborton Restoration Site* that outlines sampling locations, monitoring techniques, and objectives (see Attachment A). A supplemental *Sediment Analysis Plan* describes how sediment samples will be

collected by USFWS and analyzed by a third-party lab (see Attachment B). USFWS has provided a Baseline Monitoring report for lamprey to PGE and the Trustee Council.

A Harborton Summary of Baseline Studies memorandum (PGE, 2019b) September 24, 2019, was submitted to the Trustee Council under separate cover.

### 3. Implementation Monitoring

The objective of Implementation Monitoring is to document that the habitat features and elements of the restoration design were implemented and constructed in the locations and quantities proposed. Monitoring will be reported following the schedule described in Section 3.3.

#### 3.1 IMPLEMENTATION ENGINEERING AND MAPPING

A central component of the Implementation Monitoring will be the “as-built” drawings for the Project. As-built drawings consist of an engineering plan set (e.g., grading plans, planting plans, and habitat feature installations) that documents post-construction Site conditions and how features were installed. In addition to the as-built drawings, updated mapping products will be generated to document the new conditions on Site. Mapping products will include post-construction surfaces, reference mapping of installed structural habitat elements (e.g., LWM, streambed gravel, brush piles), and post-construction photography. Table 2 identifies the post-construction engineering and mapping products that will be prepared to document the post-construction Site features.

**Table 2. Harborton Implementation Engineering and Mapping Products**

Monitoring Elements	Explanation / Comment
<b>As-Built Drawings</b>	
Final Grading Plan	Final grades from all excavation and earthwork. Derived from surface survey-based contour base via land-based survey, verified by ground survey
Leave Surface Contamination Identification and Treatment	Map identifying where over-excavation and placement of clean fill was done to address leave surface contamination
Planting Plan & Detail	Planting zones, species mix, planting density, plants installed; plant installation methods
Habitat Features/Elements Plan & Details	Locations and installation methods for LWM, streambed gravel, brush piles, snags, etc.
Maintenance Specifications	Description of maintenance requirements for constructed elements
Irrigation Plan & Specifications	Design and specifications for irrigation system, if required
Monitoring Equipment Plan & Specifications	Location of all fixed monitoring stations and specifications for monitoring equipment deployed
<b>Mapping Products</b>	
Surface Coverage & Contour Base	Site survey-based contour base, land-based post-construction survey

Constructed Habitats Map	Post-construction habitat classification based on final contour base elevations
Photography	Post-construction photos of Project Site at established points/perspectives

### 3.1.1 Leave Surface Contaminant Sampling

Sampling for potential contamination that may remain on the leave surface following construction, and adaptation of the design plans to include over-excavation and placement of clean fill to eliminate potential exposure of Site resources to contamination, is a critical component of Site construction. PGE will conduct sampling of the Site per the process outlined in Appendix G of the HDP. Implementation monitoring will include documentation that the sampling has been completed as planned, and that construction plans have been adapted and implemented accordingly.

### 3.1.2 Reporting to Trustee Council on Implementation Monitoring

PGE will provide the as-built drawings and mapping products along with a narrative summarizing the construction activities and noting any modifications to the original design or restoration plan. This will include confirmation that plans for addressing potential leave surface contamination were implemented per the memorandum from PGE to the Trustee Council dated June 2020 (Appendix F of the HDP). These items will be provided to the Trustee Council within 3 months after construction is complete.

## 3.2 IMPLEMENTATION MONITORING ELEMENTS, ATTRIBUTES, AND METHODS

The following sections detail the Implementation Monitoring elements required by the Trustee Council, consistent with the M&S Framework (Trustee Council 2014). Table 3 summarizes the parameters applicable to the Harborton Site that PGE will monitor. Monitoring elements are grouped by the habitat parameters established in Table 1 of the M&S Framework (Trustee Council 2014). A discussion of each monitoring element, its monitoring attributes, and proposed monitoring methods follows the table.

**Table 3. Harborton Implementation Monitoring Elements, Attributes, Methods, and Documentation**

Monitoring Elements	Monitoring Attributes	Monitoring Techniques
<b>Geomorphic/Structural</b>		
Installed habitat features/elements	LWM/down wood: number, size, and locations (Active Channel Margin (ACM), Riparian, Channel, and Upland) Brush piles: number, size and location (Riparian, Upland) Streambed gravel distribution in channel Mink rock piles: number size of piles, and location of rock piles (Riparian, Upland) Snags: number size, location (Riparian, Upland)	Full Site inventory of habitat features/elements installed, geo-located with GPS. Dimensions and orientation recorded (as applicable). Streambed channel composition as determined by pebble count at transect crossings.
Extent of ACM habitat	Acres of Site in zone extending between 18 feet City of Portland Datum (CPD) down to 5.8 feet CPD and that are inundated from the Willamette and Multnomah Channel during high flows	Surface survey-derived contour base via land-based survey
Extent and stability of channel, streambank and floodplain habitat	Quantity (area/linear feet) of channel habitat Quantity (area/linear feet) of fish accessible channel habitat created/enhanced Channel habitat created/enhanced Channel gradient Width-to-depth ratio Streambank stability Valley bottom and valley wall stability Sediment accretion Retention of clean fill material placed in areas of residual contamination treatment.	Surface survey-derived contour base via land-based survey As-built drawings Field verification survey (cross-section & longitudinal surveys)
Extent of mink habitat	Quantity (acres/linear feet) of ACM, Channel, and Riparian habitat enhanced through installation of features/ elements	Surface survey-derived contour base via land-based survey Assessment of wetland inundation and duration As-built drawings of habitat enhancement features/elements GIS map products



Extent of bald eagle habitat	Quantity (acres/linear feet) of ACM, Riparian, and Channel habitat	Surface survey-derived contour base via land-based survey Assessment of wetland inundation and duration As-built drawings GIS mapping products
Fish Passage /Fish Accessibility	Compliance with National Marine Fisheries Service (NOAA Fisheries) <i>Anadromous Salmonid Passage Facility Design</i> (NOAA Fisheries 2008) as applicable Channel grade Jump height Stream hydrology modeling	Compliance with NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> (NOAA Fisheries 2008) as applicable Surface survey-derived contour base As-built drawings
<b>Hydrology and Hydraulics</b>		
Retention of wetland hydrology/habitat for use by Northern red-legged frogs	Area (acres) of existing open water habitat of sufficient depth for complete frog metamorphosis from January to July1	Continuous surface water monitoring sensors in permanent monitoring station
Hydrology and Hydraulics Criteria/Extent of High Flow Inundation in Channel and ACM Habitat	Water level and extent Surface water duration Surface water discharge	Continuous sensors (Levellogger Edge) set for hourly readings from fixed surface water monitoring stations Standard channel discharge estimating techniques
<b>Vegetation</b>		
Installed vegetation	Number and species composition Spacing and location Adequacy of staging and storage, installation technique and timing	Review of plant material invoices and verification of delivery Inspection of planted areas Documentation of plantings
<b>Water Quality</b>		
Water Quality Criteria in Channel and ACM Habitat	Temperature DO	Continuous surface water temperature sensors (Levellogger Edge) set to collect hourly temperature data from 7 fixed surface water monitoring stations

### 3.2.1 Geomorphic/Structural

This monitoring parameter is organized around specific habitat types and features created or enhanced as part of a restoration project. Monitoring and assessment will employ surface surveys, photography, hydrology, hydraulics, and visual Site inspections to verify that the total quantity of

habitats proposed were constructed, that there are no barriers to fish passage in the channel, and that structural habitat features were installed as designed.

### **3.2.1.1 Installed Habitat Features/Elements**

Implementation Monitoring of installed habitat features and elements will entail a full Site inventory and spatial location record of the habitat feature or element that was installed. The inventory will provide the basis for the as-built plan set documenting installed habitat features/elements.

Restoration activities within much of the shoreline ACM habitat include invasive species management, installation of native plantings, installation of habitat (haul-out/basking) logs in Sub-Area 4, addition of rock piles for mink habitat along shorelines and wetland fringes, and LWM added along the shoreline of the North Channel. The Willamette River and Multnomah Channel shorelines include areas of LWM accumulation (areas fronting the Willamette River) and active LWM recruitment (erosional zone where Multnomah Channel diverges from the mainstem Willamette River). No LWM features/elements are proposed in these areas of the shoreline ACM habitat, and since accumulation and recruitment of LWM is occurring naturally, PGE proposes to exclude the shoreline ACM acreage from the total ACM acreage used in establishing compliance with the LWM performance standard.

ACM habitat and acreage associated with the confluence of the North Channel with the Willamette River comprise a small amount of the shoreline ACM habitat on Site. However, within the confluence of this channel, several habitat features will be installed, primarily for the purposes of grade control for the channel. Anchored LWM will be placed to prevent the North Channel from down-cutting or head-cutting. LWM will be anchored by burying a portion of the LWM feature and/or utilizing large rock to anchor each installed piece of LWM in place. No cabling is proposed in this area. While these features are principally intended to maintain stable channel dynamics in the North Channel, they will also serve to provide habitat to biota. Consequently, such features will be recorded as associated with the channel and not the shoreline of the Site.

Streambed material ranging between sand and cobble-sized clasts will be added to the North Channel to provide an area for aquatic invertebrate growth and development, and forage opportunities for fish. Monitoring streambed material will include documentation of streambed material placement.

- Monitoring Attributes:**
- LWM/down wood: number, size, and locations (ACM, Riparian, Channel, and Upland) of LWM/down wood pieces placed as habitat features/elements
  - Brush Piles: number, size, and locations (Riparian, Upland) of brush piles placed as habitat features/elements
  - Streambed gravel: distribution of gravel placed in the channel
  - Mink rock piles: number, size of piles, and location of rock piles placed as habitat features/elements (Riparian, Upland)
  - Snags: number, size, and locations (Riparian, Upland) of snags placed as habitat features/elements
- Monitoring Techniques:**
- Full Site inventory of habitat features/elements installed, geo-located with GPS. Dimensions and orientation recorded (as applicable).
  - Streambed channel composition as determined by pebble count at transect crossings.

<b>Sampling Location:</b>	Entire Site, excluding substation and shoreline
<b>Sampling Timing:</b>	First fall-winter following construction
<b>Sampling Frequency:</b>	One instance
<b>Applicable Habitat(s):</b>	ACM, Channel, Riparian, Upland
<b>Performance Standard:</b>	ACM habitat: 250 pieces LWM Riparian/Upland habitat: 3-4 habitat features/elements (down wood, brush piles, rock piles, snags) per acre Riparian/Upland habitat

### 3.2.1.2 *Extent of ACM Habitat*

Implementation Monitoring of ACM habitat will be achieved through GIS analysis of final Site contours, established from survey-derived topography. All habitat that occurs between the Ordinary Low Water Elevation (OLWE) for the Site (approximately 5.8 feet elevation CPD) and the Ordinary High-Water Elevation (OHWE) for the Site (approximately 18 feet elevation CPD) and that is inundated from the Willamette and Multnomah Channel during high flows will be counted as ACM habitat, including areas within the wetland habitat of Sub-Area 4 identified as “inland ACM” habitat. The inventory will provide the basis for the as-built plan set documenting installed habitat category acreage.

<b>Monitoring Attributes:</b>	Acres of Site between OLWE and OHWE that are inundated from the Willamette and Multnomah Channel during high flows
<b>Monitoring Techniques:</b>	Surface survey-derived contour base via land-based survey
<b>Sampling Location:</b>	Entire Site
<b>Sampling Timing:</b>	First fall-winter following construction
<b>Sampling Frequency:</b>	One instance
<b>Applicable Habitat(s):</b>	ACM
<b>Performance Standard:</b>	Acres of ACM habitat match restoration proposal

### 3.2.1.3 *Extent and Stability of Channel, Streambank, and Floodplain Habitat*

Implementation Monitoring of channel, streambank, and floodplain habitats will be achieved through development of final Site contours for the as-built plans and assessment of any fish passage grading carried out to remove geomorphic barriers to fish access. Final Site contours will be generated from a surface survey. The survey data will provide the basis for the as-built plan set documenting habitat acreage.

Channel habitat within the Site boundaries will be quantified based on fish accessibility and on direct survey. The habitat created by the North Channel is the result of habitat conversion via excavation and connectivity with inland ACM and Channel habitat categories.

In Sub-Area 3 there are areas that will be over-excavated and clean fill will be placed on top to reduce exposure of fish to contaminants. These areas requiring treatment will be determined by sampling the leave surface during construction, as described in the Sampling and Analysis Plan: Harborton Restoration Project found in Appendix G of the HDP. PGE will identify and document those areas where over-excavation and placement of clean fill was required and completed.

<b>Monitoring Attributes:</b>	Quantity (area/linear feet) of channel habitat Quantity (area/linear feet) of fish accessible channel habitat created/enhanced
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	Channel gradient
	Width-to-depth ratio
	Streambank stability
	Valley bottom and valley wall stability
	Sediment accretion
<b>Monitoring Techniques:</b>	Surface survey-derived contour base via land-based survey
	As-built drawings
	Field verification survey (cross-section & longitudinal surveys)
<b>Sampling Location:</b>	
	North Channel from confluence to upstream end of new channel
<b>Sampling Timing:</b>	First fall-winter following construction
<b>Sampling Frequency:</b>	One instance
<b>Applicable Habitat(s):</b>	Channel, streambank, and floodplain
<b>Performance Standard:</b>	Acres/linear feet of channel habitat match restoration design
	Width-to-depth ratio shall be within +/-20 percent of design ratios

#### **3.2.1.4 Extent of Mink Habitat**

Implementation Monitoring of mink habitat will be achieved through delineating the extent of suitable mink habitat resulting from the installation of habitat features/elements designed to enhance habitat for mink use. The restoration design is not expected to significantly increase the quantity of a specific habitat type used by mink (e.g., beach, shoreline); however, there will be anticipated changes in the quality of such habitats post-construction.

Suitable mink habitat within the Site boundaries will be quantified based on enhancement features that make such habitat more suitable for mink use. Enhancement can occur from habitat conversion from a different habitat type, change in water regime, and installation of habitat features/elements.

<b>Monitoring Attributes:</b>	Quantity (acres/linear feet) of ACM, Channel, and Riparian habitat enhanced through installation of habitat features/elements (e.g., rock piles, LWM, brush piles)
<b>Monitoring Techniques:</b>	Surface survey-derived contour base via land-based survey
	Assessment of wetland inundation and duration, derived from on-Site transducer data and river gage data
	As-built drawings of habitat enhancement features/elements
	GIS map products
<b>Sampling Location:</b>	Suitable mink habitats
<b>Sampling Timing:</b>	First fall-winter following construction
<b>Sampling Frequency:</b>	One instance

**Applicable Habitat(s):** ACM, Riparian, Channel, Upland

**Performance Standard:** Acres/linear feet of mink habitat matches restoration design

### 3.2.1.5 *Extent of Bald Eagle Habitat*

Implementation Monitoring of bald eagle habitat created will be achieved through delineating the extent of suitable bald eagle habitat as a result of the installation of habitat features/elements designed to enhance habitat for eagle use. The restoration design is not expected to significantly increase the quantity of a specific habitat types used by eagles (e.g., perch, nesting, foraging); however, there will be anticipated changes in the quality of such habitats post-construction.

Suitable bald eagle habitat within the Site boundaries will be quantified based on enhancement features that make such habitat suitable for eagles. Enhancement can result from habitat conversion from a different habitat type, change in water regime, and installation of habitat features/elements.

**Monitoring Attributes:** Quantity (acres/linear feet) of shoreline, Shallow Water, Riparian habitat enhanced through installation of habitat features/elements (e.g., LWM, perch structures/snags)

**Monitoring Techniques:** Surface survey-derived contour base via land-based survey  
Assessment of wetland inundation and duration, derived from on-Site transducer data and river gage data  
As-built drawings of habitat enhancement features/elements  
GIS map products

**Sampling Location:** Suitable bald eagle habitats

**Sampling Timing:** First fall-winter following construction

**Sampling Frequency:** One instance

**Applicable Habitat(s):** ACM, Riparian, Channel, Upland

**Performance Standard:** Acres/linear feet of bald eagle habitat matches restoration design

### 3.2.1.6 *Fish Passage*

Implementation Monitoring of the fish passage design feature will be achieved through documenting the establishment of a fish accessible channel and connectivity to the Willamette River via grading. Establishment of this fish accessible channel will be demonstrated through as-built drawings.

**Monitoring Attributes:** Compliance with NOAA Fisheries' *Anadromous Salmonid Passage Facility Design* (NOAA Fisheries 2008) as applicable  
Channel grade  
Jump height  
Stream hydrology modeling

**Monitoring Techniques:** Compliance with the NOAA Fisheries' *Anadromous Salmonid Passage Facility Design* criteria (NOAA Fisheries 2008) as applicable  
Surface-derived survey, contour base, as-built drawings

**Sampling Location:** Identified pre-existing fish passage barrier locations

**Sampling Timing:** First fall-winter following construction

<b>Sampling Frequency:</b>	One instance
<b>Applicable Habitat(s):</b>	Channel
<b>Performance Standard:</b>	Barrier removal (non-structure-related) grading must not create passage barrier, as defined in NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> (NOAA Fisheries 2008)

### 3.2.2 Hydrology and Hydraulics

This monitoring parameter is organized around water level variation in Channel, ACM, and Shallow Water habitats. For projects that reconnect off-channel and floodplain habitats, it is important to monitor water levels and the extent and duration of floodplain inundation during high flows. Water level data will be georeferenced to the Site-specific topographic data and to specific river discharge levels (e.g., OHWE, OLWE, flood stage, and low tide at mean low water [MLW]).

#### 3.2.2.1 Hydrology and Hydraulics Criteria

Implementation Monitoring of hydrology and hydraulics criteria will entail the installation of long-term monitoring sensors in fixed-location surface monitoring stations. Temperature sensors will gather water presence/absence data in hourly intervals. Monitoring will also include assessment of surface discharge at the upstream and downstream end of construction/reworked North Channel at measurable discharges during normal flow conditions.

<b>Monitoring Attributes:</b>	Water level and extent Surface water duration Surface water discharge
<b>Monitoring Techniques:</b>	Continuous sensors (Levellogger Edge or similar) set for hourly readings from fixed surface water monitoring stations Standard channel discharge estimating techniques
<b>Sampling Location:</b>	7 surface water monitoring sites established across Site, upstream and downstream location on Project channel, and in Sub-Area 4 "inland ACM" habitat
<b>Sampling Timing:</b>	Surface water – within 1 month following construction Discharge – beginning at first measurable discharge during normal flow conditions
<b>Sampling Frequency:</b>	Surface water – hourly Discharge – annually, timing dependent on discharge and Willamette River stage
<b>Applicable Habitat(s):</b>	Channel, ACM
<b>Performance Standard:</b>	No more than a 20% reduction in surface discharge from the upstream end of a constructed/reworked channel to the downstream end of a constructed/reworked channel

### 3.2.3 Installed Vegetation

This monitoring parameter focuses on installation of vegetation in accordance with the planting plan.

<b>Monitoring Attributes:</b>	Number and species composition Spacing and location
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	Adequacy of staging and storage, installation technique, and timing.
<b>Monitoring Techniques:</b>	Review of plant material invoices and verification of delivery Inspection of planted areas Documentation of plantings
<b>Sampling Location:</b>	Entire Site
<b>Sampling Timing:</b>	Following installation
<b>Sampling Frequency:</b>	Once
<b>Applicable Habitat(s):</b>	Channel, ACM, Upland, Riparian
<b>Performance Standard:</b>	Varies by habitat and year. See section 4.3.4 for detailed review of vegetation performance standards.

### 3.2.4 Water Quality

This monitoring parameter focuses on geophysical characteristics of water on the Site. Since improvement in stream habitat is a Project restoration goal, water quality data will be collected to ensure restoration actions do not impair temperature in North Channel and ACM (wetlands) habitats.

#### 3.2.4.1 Water Quality Criteria

Implementation Monitoring of water quality criteria will entail the installation of long-term monitoring temperature sensors in fixed-location surface monitoring stations (Figure 5). Temperature sensors will gather temperature data in hourly intervals.

<b>Monitoring Attributes:</b>	Temperature and DO
<b>Monitoring Techniques:</b>	Continuous temperature sensors (Levellogger Edge or similar) set to collect hourly temperature data from fixed surface water monitoring stations
<b>Sampling Location:</b>	7 surface water temperature monitoring sites established across Site
<b>Sampling Timing:</b>	Temperature – within 1 month following construction
<b>Sampling Frequency:</b>	Temperature – hourly
<b>Applicable Habitat(s):</b>	Channel, ACM
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element

## 3.3 REPORTING

PGE will prepare and submit to the Trustee Council an Implementation Monitoring Report, including as-built drawings, mapping products, and narrative within 3 months after construction is complete to document compliance with the Implementation Monitoring requirements. Detailed spatial and tabular data, including location of monitoring, such as transects and sampling locations, and monitoring results will be provided to the Trustee Council. These data will be provided to the Trustee Council in the form of a populated MS Access database/GIS geodatabase.

## 4. Effectiveness Monitoring

The objective of EM is to document the change in habitat conditions on Site occurring as a result of the habitat enhancement completed as proposed in the restoration design. In contrast with

Implementation Monitoring, data collection for most EM elements will occur during multiple events over successive years during the Performance Period, allowing for assessment of change over time. Effectiveness monitoring data collected in the Performance Period will be compared to on-Site reference data collected during the Baseline and Implementation monitoring phases to assess whether Site recovery is occurring as expected and that the Project is achieving its restoration goals. Monitoring will be reported by December 31<sup>st</sup> of each calendar year during the Performance Period.

#### 4.1 EFFECTIVENESS MONITORING PLAN STUDY DESIGN

The EM is designed in accordance with the “Monitoring Plan Study Design” guidance provided by the Trustee Council (Trustee Council 2014). Several of the EM elements will be conducted as a modified line-intercept survey along fixed transects, established at 100-meter intervals across the Site. The EM deviates from the Trustee Council guidance in that base transects are established perpendicular to the Site’s southwest boundary, rather than perpendicular to the floodplain axis. This deviation from the guidance is proposed to provide better spatial cover of the Site. Because the shoreline curves where Multnomah Channel diverges from the Willamette River, transects oriented perpendicular to the floodplain axis would be skewed and potentially cross at their terminus. This would result in oversampling of habitat closer to the southwest side of the Site. By aligning the survey transects to the southwest Property edge, which is generally straight, transects perpendicular to the Property edge create an evenly distributed grid across the Site. This change in survey design from the guidance will result in a similar amount of habitat surveyed.

The line-intercept method is employed in two distinct configurations for the Site: a general habitat assessment configuration (Figure 3) and a stream assessment configuration (Figure 4). The line-intercept methods include the elements described in the following sections.

##### 4.1.1 General Habitat Assessment Configuration

The general habitat assessment configuration will be employed to assess the following monitoring elements:

- Retention of installed habitat features/elements
- Vegetative community development
- Breeding bird use

The general habitat assessment configuration will be established as follows:

- Base transect: 1 base transect oriented (generally) southeast to northwest, parallel to NW Marine Way and the Property’s southwest boundary
- Survey transects will be established perpendicular to the base transect.
  - The first survey transect will have a randomly determined starting location along the base transect, between 0-50 meters from the southeast end of the base transect.
  - Subsequent survey transects will be established 100 meters apart, unless a different spacing is required by a specific monitoring requirement. Each survey transect will extend to the shoreline of either the Willamette River or Multnomah Channel.
- Sampling points will be established along each survey transect and extend riverward from the base transect.



- The first sampling point on each survey transect will have a randomly determined starting location, between 0-50 meters from the intersection of the survey transect and the base transect.

#### 4.1.2 Stream Habitat Assessment Configuration

The stream habitat assessment configuration is a variation on the general habitat assessment configuration that will be employed to capture data specific to the North Channel and riparian zone within and along the created North Channel. The stream habitat assessment configuration will be employed for the following monitoring elements:

- Retention of installed North Channel habitat features/elements (this will be a total count of features across the habitat, not limited to those placed on transects).
- Retention of Channel Habitat
- Stability of streambank
- Stability of floodplain and valley wall slope
- Retention of fish access to the North Channel from the Willamette River
- Sediment composition
- Vegetative community development
- Benthic macroinvertebrate community

The stream habitat assessment configuration will be established as follows:

- Base transects: One base transect oriented along the longitudinal axis of the North Channel
  - The base transect has a fixed location where the North Channel discharges onto the Willamette River beach and extend landward.
- Survey transects will be established roughly perpendicular to the base transect.
  - A survey transect will be established at the mouth of the North Channel to monitor sediment deposition/erosion and fish access conditions.
  - The additional regularly-spaced survey transects will have a randomly-determined starting location along the base transect, between 10-50 meters from where the North Channel discharges onto the Willamette River beach.
  - The distance between subsequent survey transects will be a minimum of 75 meters for the North Channel. A minimum of 10 survey transects will be established for the North Channel.
- Transects in the North Channel will extend from the top of the valley slope to the opposite top of valley slope, centered on and perpendicular to the base transect. Sampling points will be established along each survey transect.
  - In-stream monitoring elements will be conducted in the wetted channel where the survey transect and base transect intersect.
- The North Channel terrestrial sampling starting location will be randomly determined, between 0-15 meters from the intersection of the survey transect and base transect. Sampling points will extend both northwest and southeast of the base transect and will be spaced 25 meters along the survey transect.

#### 4.1.3 Fixed Monitoring Locations

Several monitoring elements are associated with one or more fixed monitoring locations. These monitoring elements will not employ the line-intercept method, but methods specific to the element or attribute being assessed. Most fixed monitoring locations will be established as part of Project implementation and are depicted on Figure 5. Fixed monitoring stations will be employed for the following monitoring elements:

- Preservation of fish passage /fish accessibility
- Extent of high flow inundation
- Wetland depth
- Water quality
- Bald eagle use
- Mink use (camera stations will be at fixed locations; see section 4.3.6.4 for all mink monitoring elements)

#### 4.1.4 Other Monitoring and Assessment Methods

Several monitoring elements are not associated with either fixed location or line-intercept, transect-based assessment approaches. The methods used to assess these monitoring elements will be discussed in each element's specific section. Monitoring elements that will require unique or design-specific methods for assessment include the following:

- Extent of bald eagle habitat
- Extent of mink habitat
- Northern red-legged frog egg mass counts and tadpole presence/development
- Native and non-native fish use

### 4.2 MONITORING ELEMENTS AND ATTRIBUTES SUMMARY

The following sections detailed the EM elements required by the Trustee Council, as detailed in the M&S Framework (Trustee Council 2014). Table 4 summarizes the parameters applicable to the Harborton Site that PGE will monitor, with the exception of monitoring for lamprey, which will be conducted by USFWS. Monitoring elements are grouped by the habitat parameters established in Table 1 of the M&S Framework (Trustee Council 2014).

**Table 4. Harborton Effectiveness Monitoring Elements and Attributes**

Monitoring Elements	Monitoring Attributes	Monitoring Techniques
<b>Geomorphic/Structural</b>		
Retention of installed habitat features/ elements	LWM/down wood: number, size, and locations (ACM, Riparian, Channel, and Upland) Brush piles: number, size and location (Riparian, Upland) Mink rock piles: number size of piles, and location of rock piles (Riparian, Upland) Streambed gravel distribution in channel Snags: number of snags	Full Site inventory of habitat features/elements installed, geo-located with GPS. Dimensions and orientation recorded (as applicable)  Streambed channel composition as determined by pebble count at transect crossings.
Extent of ACM habitat	Acres of Site in zone below 18 feet CPD (OHWE) and above 5.8 feet CDP (OLWE) and that are inundated from the Willamette and Multnomah Channel during high flows	GIS analysis of surface survey-derived final contour base As-built drawings Field verification (habitat survey) Extent of high flow inundation data analysis
Extent and stability of channel, streambank, and floodplain habitat	Quantity (acres/linear feet) of fish accessible channel habitat Surface/Sub-surface visual flow assessment Channel gradient Width-to-depth ratio Streambank stability Sediment accretion Shoreline plant community development Retention of clean fill material placed in areas of residual contamination treatment	Water depths; wetted channel width; wetted channel longitudinal continuity; texture grain size distribution Inventory of habitat features/elements monitoring data Analysis of Site contours generated from surface survey Calculation of width-to depth ratios Collection and analysis of vegetative community development data Assessment of fish accessibility Assessment of sedimentation and erosion via sediment accretion stakes
Extent of mink habitat	Quantity (linear feet/acres) of ACM (shoreline) and ACM (wetland ponds) Quantity (number) of habitat features/ elements retained	Implementation habitat assessment and mapping Assessment of wetland inundation and duration, derived from on-Site transducer data and river gage data As-built drawing of habitat enhancement features/elements Visual inspection of individual mink habitat features

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Extent of bald eagle habitat	Quantity (linear feet) of shoreline available Quantity (acres) of inundated ACM habitat Channel habitat, and Riparian habitat available Quantity (number) of habitat features/ elements retained	Implementation habitat assessment and mapping Assessment of wetland inundation and duration, derived from on-Site transducer data and river gage data As-built drawings of habitat enhancement features/elements
Preservation of fish passage /fish accessibility	Compliance with NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> criteria (MNFS 2008) as applicable Channel gradient Jump height	Compliance with NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> criteria (MNFS 2008) as applicable Surface survey-derived contour base as-built drawings Field verification survey (longitudinal surveys, visual assessment)
<b>Hydrology and Hydraulics</b>		
Retention of wetland hydrology/habitat for use by northern red-legged frog	Acreage of open water habitat of sufficient depth for complete frog metamorphosis from Jan- July-; thus no substantial loss (as defined in the performance standards) in hydrology and inundation period for each of these months relative to baseline.	Continuous surface water monitoring sensors in permanent monitoring station Measured area of open water wetland habitat Comparison of open water depth and extent measurements to baseline measurements
Extent of high flow inundation in Channel and ACM Habitat	Lateral extent and elevation of flooding from the Willamette River and Multnomah Channel Duration of surface water	Continuous surface water monitoring sensors in permanent monitoring stations
<b>Sediment</b>		
Sediment composition	Texture and grain size distribution	Sediment sampling following Peck et al (2001) See 4.3.3.1 for detail
<b>Vegetation</b>		
Vegetative community development	Percent cover by type (herbaceous, shrub, canopy, bare ground) Percent survival Percent native vs. non-native Density (woody stems/acre) Diversity	Line intercept surveys
<b>Water Quality</b>		
Water quality in Channel and ACM Habitat	Temperature DO	Continuous temperature sensors (hourly data) from fixed monitoring stations

		Monthly winter/spring DO testing when juvenile salmonids likely present in off-channel habitat
<b>Fish and Wildlife</b>		
Native (salmonids) and non-native fish use	Juvenile salmonid presence in off-channel habitat during winter out-migration Salmonid size	Visual assessment Fyke net survey Snorkel survey
	Presence, size, and collection of other fish species encountered	
Native fish use (lamprey)	Occupancy and relative abundance Lamprey health and characteristics Habitat usage Habitat characteristics (temp., conductivity, depth) Sediment characteristics (total organic content, grain size, total solids)	Backpack electrofishing Deep-water electrofishing technology Ponar bottom sampler
Breeding bird use	Species presence/absence Habitat usage Relative abundance Species diversity	Modified general habitat assessment configuration of the line-intercept method
Bald eagle use	Species presence/absence Habitat used Observed behavior Frequency of Site use	Fixed monitoring station
Mink use	Species presence/absence Habitat usage Abundance	Monitoring of motion-activated remote cameras Establishment of scent stations Field survey of target habitats for scat and tracks
Northern red-legged frogs	Peak number of egg masses (~late February)  Presence/development stage of tadpoles (June/July)	Metro Amphibian Survey Protocol (2010) Comparison with baseline egg mass counts and egg mass counts at Multnomah Channel Marsh or other regional surveys to determine population trends  Visual survey for presence/absence and development stage of tadpoles

Benthic macroinvertebrate community	Species presence Abundance Diversity/richness	Methods described in <i>Field Operations Manual for Wadable Streams</i> (Peck et al. 2001) Lab taxonomy
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### 4.3 EFFECTIVENESS MONITORING ELEMENTS

The following sub-sections detail each monitoring element that comprises this EM and discuss how monitoring will be conducted. Effectiveness monitoring will begin in 2021 (Year 1). All references to monitoring timing are based upon a Year 1 date of 2021.

#### 4.3.1 Geomorphic/Structural

This monitoring parameter is organized around specific habitat types and features proposed as part of a restoration project. Monitoring and assessment will employ topographic surveys, photography, hydrology, hydraulics, and visual Site inspections to verify that the total quantity of habitats proposed were constructed, that there are no barriers to fish access, and that structural habitat features were installed as designed.

##### 4.3.1.1 Retention of Installed Habitat Features/Elements

EM of installed habitat features and elements will entail a full Site inventory and spatial location record of the habitat feature or element that was installed, depending on the habitat feature/element being monitored, as follows.

- LWM/down wood: number, size, and locations (ACM, Riparian, Channel, and Upland) of LWM/down wood pieces placed as habitat features/elements
- Brush Piles: number, size, and locations (Riparian, Upland) of brush piles placed as habitat features/elements
- Streambed gravel: distribution of gravel placed in the channel
- Mink rock piles: number, size of piles, and location of rock piles placed as habitat features/elements
- Snags: number, size, and locations (Riparian, Upland) of snags placed as habitat features/elements

If the results of monitoring determine that performance standards are not being met, the Project Implementer and Trustee Council will discuss the need for potential adaptive management action.

No habitat features/elements are proposed for the Site's shoreline, either along the Willamette River or Multnomah Channel. Consequently, PGE is excluding shoreline ACM habitat acreage from the performance standard pertaining to the retention of installed habitat features/elements.

**Monitoring Attributes:**

- LWM/down wood: number, size, and locations (ACM, Riparian, Channel, Upland) of LWM pieces placed as habitat features/elements
- Brush Piles: number, size and location of brush piles placed as habitat features/elements (Riparian, Upland)
- Streambed gravel: distribution of gravel placed in the channel

Snags: number of snags placed as habitat features/elements  
(Riparian, Upland)

- Monitoring Techniques:** LWM and in-stream gravel will be monitored using the stream habitat assessment configuration of the line-intercept method
- Down wood and brush piles will be monitored using the general habitat assessment configuration of the line-intercept method
- Unique or individual features will be inventoried as fixed locations
- Comparison with as-built plan set
- Sampling Location:** Entire Site, excluding substation.
- Sampling Timing:** August through October (later summer/fall)
- Sampling Frequency:** One instance in each of Years 1, 3, 5, 7, and 10
- Applicable Habitat(s):** ACM, Channel, Riparian, Upland
- Performance Standard:** Greater than 80% retention of installed elements (including recruitment)

#### **4.3.1.2 Extent of ACM Habitat**

EM of ACM habitat will be achieved through two methods. The first method involves periodic collection of surface survey-derived Site elevation data to allow comparison with data collected during Implementation Monitoring and documented in the Project as-built design set. Surface survey data will be collected in Year 0 (See Implementation Monitoring section 3.2 for more detail) and Years 5 and 10. In each of the specified assessment years, the surface survey data will be used to develop an updated Site contour base for analysis purposes. Changes in Site elevation will be assessed in GIS.

The second approach will be a field survey-derived assessment to observe physical surface conditions within the riparian zone of the North Channel. The survey will employ the stream habitat assessment configuration of the line-intercept method (Figure 4). Observations will include general descriptions of sediment erosion/deposition, channel conditions, and other pertinent observations of physical ACM habitat conditions. Lateral transects along the North Channel will extend from the top of the floodplain valley wall to the opposite top of the valley wall. Observations will be performed in Years 1, 3, and 7.

All habitat created or enhanced that occurs between OLWE and OHWE and that is inundated by the Willamette River and Multnomah Channel during high flows, including “inland ACM” habitat in Sub-Area 4, will be counted as ACM habitat. ACM habitat quality will be assessed through evaluation of vegetative community development, and visual assessment of erosion and deposition characteristics.

- Monitoring Attributes:** Acres of Site between OLWE and OHWE and that is inundated by the Willamette River and Multnomah Channel during high flows
- Monitoring Techniques:** GIS analysis of surface survey-derived final contour base
- As-built drawings
- Field verification (habitat survey)
- High flow Site inundation data analysis

<b>Sampling Location:</b>	Entire Site
<b>Sampling Timing:</b>	August through October (later summer/fall)
<b>Sampling Frequency:</b>	Surface survey-derived assessment, one instance in each of Years 0, 5 and 10 Field survey-derived assessment, one instance in each of Years 1, 3, and 7
<b>Applicable Habitat(s):</b>	ACM
<b>Performance Standard:</b>	Changes of more than 10% in ACM habitat acreage/linear feet from the as-built survey

#### **4.3.1.3 Extent and Stability of Channel, Streambank, and Floodplain Habitat**

EM of the retention and stability of channel habitat and streambank will be achieved through multiple assessment methods. Lineal feet of channel habitat and fish accessible channel habitat will be assessed via GPS survey. Collection and analysis of fluvial geomorphic data will use the stream habitat assessment configuration of the line-intercept methodology (Figure 4). Specific features (e.g., sediment accretion/erosion stakes) will be monitored as fixed location features. Collectively, these methods allow for evaluation of changes in channel form, whether created North Channel habitat is stable, whether enhancement activities are improving channel habitat, whether channel-flow loss through infiltration is negligible (if any), whether fish accessibility is maintained as described in the Habitat Development Plan, and whether fill placed in over-excavated areas to address surface contamination is stable.

<b>Monitoring Attributes:</b>	Quantity (acres/linear feet) of fish accessible channel habitat Surface/sub-surface visual flow assessment Channel gradient Width-to-depth ratio Streambank stability Sediment accretion/erosion Shoreline plant community development
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<b>Monitoring Techniques:</b>	Data collected at North Channel transects include: <ul style="list-style-type: none"> <li>• Water depth;</li> <li>• Wetted channel width;</li> <li>• Wetted channel longitudinal continuity; and</li> <li>• Texture and grain size distribution.</li> </ul> Inventory of habitat features/elements monitoring data Analysis of Site contours generated from surface survey Calculation of width-to-depth ratios Collection and analysis of vegetative community development data in the channel's riparian zone using the stream habitat vegetation assessment configuration of the line-intercept methodology (Note: the North Channel's riparian zone occur within ACM habitat) (Figure 4) Assessment of fish passage and fish accessibility
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Assessment of sedimentation and erosion via sediment accretion stakes

**Sampling Location:**

North Channel from confluence to upstream end of new channel

**Sampling Timing:**

August through October (later summer/fall)

**Sampling Frequency:**

Stream habitat assessment transects: 10 survey transects in the North Channel; completed in Years 1, 3, 5, 7, and 10

Installed habitat features/elements; completed in Years 1, 5, and 10

Surface survey-derived Site contour data; completed in Years 0, 5, and 10

Annual fish passage and fish accessibility, Years 1-10

Sediment accretion stakes: One instance in Years 1, 3, 5, 7, and 10

**Applicable Habitat(s):**

Channel, banks, and floodplain

**Performance Standard:**

Identification of any barriers preventing fish access to channel habitat on the Site (including sediment accretion, sub-surface flow, gradient, or other barriers)

Loss of downstream flow of more than 20% of flow entering Site

Changes of more than 10% in channel habitat acreages/linear feet from the as-built surveys

Width to depth ratio change of greater than +/-50%

Significant erosion in any areas along the North Channel (Shoreline slumping in excess of 10 cubic yards in any areas along the North Channel)

In Sub-Area 3 there are areas that will be over excavated and clean fill will be placed on top to reduce exposure of fish to contaminants. These areas requiring treatment will be determined by sampling the leave surface during construction, as described in the Sampling and Analysis Plan: Harborton Restoration Site found in Appendix G of the HDP.

It is important to track these areas and document any erosion of the clean material that could result in exposure of target species to contamination exceeding the Trustee Council's identified thresholds. After construction is complete, PGE will work with the Trustee Council to determine where additional transects should be monitored to document any erosion of the clean fill.

**4.3.1.4 Extent of Mink Habitat**

EM of mink habitat will be achieved through comparison of implementation delineation/mapping of suitable mink habitat with the same habitat polygons during Year 10 of the Performance Period. Suitable mink habitat within the Site boundaries will be quantified based on simple acreage, and qualitatively assessed based on whether enhancement features/elements and recovery of natural conditions has improved habitat suitability for mink.

**Monitoring Attributes:** Quantity (acres/linear feet) of ACM (shoreline) and ACM (wetland ponds)  
Quantity (number) of habitat features/elements installed.

**Monitoring Techniques:** Implementation habitat assessment and mapping

Assessment of wetland inundation and duration, derived from on-Site transducer data and river gage data

As-built drawings of habitat enhancement features/elements

Visual inspection of individual mink habitat features

**Sampling Location:** Suitable mink habitats

**Sampling Timing:** August through October (later summer/fall)

**Sampling Frequency:** One instance in Year 10

**Applicable Habitat(s):** ACM, Riparian, Channel, Upland

**Performance Standard:** There is no performance standard specified for this monitoring element

#### **4.3.1.5 Extent of Bald Eagle Habitat**

EM of bald eagle habitat will be achieved through comparison of implementation delineation/mapping of suitable bald eagle habitat with the same habitat polygons during Year 10 of the Performance Period. Analysis will rely on assessment of habitat types created/enhanced, habitat features/elements installed, and GIS analysis. Suitable bald eagle habitat within the Site boundaries will be quantified based on simple acreage and qualitatively assessed based on whether enhancement features/elements and recovery of natural conditions has improved habitat suitability for bald eagles.

**Monitoring Attributes:** Quantity (linear feet) of shoreline available; quantity (acres) of inundated ACM habitat available; quantity (number) of habitat features/elements installed

**Monitoring Techniques:** Implementation habitat assessment and mapping

Assessment of wetland inundation and duration, derived from on-Site transducer data and river gage data

As-built drawings of habitat enhancement features/elements

**Sampling Location:** Suitable bald eagle habitats

**Sampling Timing:** August through October (later summer/fall)

**Sampling Frequency:** One instance in Year 10

**Applicable Habitat(s):** ACM, Riparian, Channel, Upland

**Performance Standard:** There is no performance standard specified for this monitoring element.

#### **4.3.1.6 Preservation of Fish Passage /Fish Accessibility**

EM of fish passage design features will be achieved through annual monitoring of fish passable conditions and periodic assessment of North Channel gradient. Assessment of fish passable conditions will be based on observations at the confluence of the North Channel and Willamette River, and the top end of North Channel to look for barriers such as accumulated debris, over-steep gradients or headcuts. Assessment of North Channel gradient will be based on analysis of Implementation Monitoring compared with Site contours generated as part of EM from surface survey data and longitudinal channel surveys.

<b>Monitoring Attributes:</b>	Compliance with NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> (NOAA Fisheries 2008) as applicable Channel gradient
<b>Monitoring Techniques:</b>	Compliance with the NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> criteria (NOAA Fisheries 2008) as applicable Surface survey-derived contour base as-built drawings Field verification survey (longitudinal surveys, visual assessment)
<b>Sampling Location:</b>	Channel gradient assessment on the North Channel
<b>Sampling Timing:</b>	August through October (later summer/fall)
<b>Sampling Frequency:</b>	Channel gradient assessment: one instance in each of Years 1, 3, 5, 7, and 10 Visual monitoring for identification of barriers following high-flow events.
<b>Applicable Habitat(s):</b>	North Channel
<b>Performance Standard:</b>	North Channel grading and subsequent fluvial geomorphic changes do not create passage barrier, as defined in NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> (NOAA Fisheries 2008)

#### 4.3.2 Hydrology and Hydraulics

This monitoring parameter is organized around water level variation in Channel, Off-channel, ACM, and Shallow Water habitat categories. For projects that reconnect off-channel and floodplain habitats, it is important to monitor water levels and the extent and duration of floodplain inundation during high flows and the depth and duration of wetland hydroperiod. Water level data will be georeferenced to the Site-specific topographic data and to specific river discharge levels (i.e., OHWE, OLWE, flood stage, and low tide at MLW).

##### 4.3.2.1 Retention of Wetland Hydrology/Habitat for Use by Northern Red-Legged Frog

EM will be conducted to ensure there was no substantial loss of wetland area, hydroperiod, and function, which is important for the existing population of northern red-legged frogs. EM of wetland hydrology will include measurements to document the depth and areal extent of open water wetlands in Sub-Area 4 through the period of January through July to determine if wetlands persist at sufficient depths to support frog egg-laying and metamorphosis from the tadpole to froglet phase. EM of northern red-legged frog habitat will be achieved through monitoring hydroperiod, wetland/open water area and depth, and duration from Year 1 through Year 10 of the Performance Period. Suitable amphibian habitat within the Site boundaries will be quantified based on assessment of standing water (areal extent, duration and depth) necessary for frog egg-laying and larva metamorphosis (transformation from tadpoles to frogs).

<b>Monitoring Attributes:</b>	Acreage of open water habitat of sufficient depth for complete frog metamorphosis from January through July. Depths should be at least 1.0 foot or deeper until metamorphosis is complete.
<b>Monitoring Techniques:</b>	Continuous surface water monitoring sensors in permanent monitoring station

	Measured area of open water wetland habitat
	Comparison of open water depth and extent measurements to baseline measurements
<b>Sampling Location:</b>	Suitable amphibian habitat in Sub-Areas 3 and 4
<b>Sampling Timing:</b>	January through July: measure surface water and depth, staff gauges and photo points
<b>Sampling Frequency:</b>	Monthly from January through July for the first 4 years post-construction. If no changes in areal extent and depth (as defined in the performance standards below) are documented in the first 4 years, then transition to depth and photo point monitoring in June and July annually concurrent with the tadpole/froglet monitoring.
<b>Applicable Habitat(s):</b>	Sub-Area 3 and 4
<b>Performance Standard:</b>	From January through May, areal extent and depth of the wetland should be no less than 80% of the baseline measurements (<20% change from baseline, defined by pre-project monthly averages). In June, the areal extent and depth of the wetland should be no less than 90% of the baseline measurements, as defined by pre-project weekly median (weeks 23-26 as defined in PGE's November 19, 2019 memo, Tables 5 and 8). If the June performance standards are not met for two consecutive years, PGE will provide a summary to the Restoration Committee of the wetlands hydrology and available frog population monitoring for the previous year (post-construction) relative to the performance standards. Based on that summary, the RC will then determine if additional discussion or actions are needed to ensure the wetlands continue to provide adequate breeding and rearing habitat for frogs.

June Weeks	June Minimum Areal Extent 90% of median open water (acres)	June Minimum Depths- 90% of median depth (ft)
23	2.84	1.4
24	1.76	1.1
25	1.29	0.88

26	1.02	0.75
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### Extent of High Flow Inundation

EM of Site inundation will be monitored through the installation of barometric transducers at fixed locations to monitor water depth. The transducers will be installed in screened well casings, with the sensor just below ground surface elevation. All well casings will be surveyed to determine the elevation of the top of casing and ground surface. The sensors will gather barometric pressure data in hourly intervals. Using the well elevation, barometric pressure, and the surface survey-derived contour base, the depth of surface water can be calculated on an hourly basis throughout the year, and the lateral extent of Site inundation can be calculated by tying the water depth to the as-built final Site contours.

<b>Monitoring Attributes:</b>	Lateral extent of flooding Duration of surface water
<b>Monitoring Techniques:</b>	Continuous surface water monitoring sensors in permanent monitoring stations
<b>Sampling Locations:</b>	7 surface water monitoring station established across Site (Figure 5)
<b>Sampling Timing:</b>	Continuous water surface elevation data collected hourly throughout year
<b>Sampling Frequency:</b>	Continuous (performance standards in Years 1, 3, 7, and 10)
<b>Applicable Habitat(s):</b>	ACM, Channel
<b>Performance Standard:</b>	<20% reduction from baseline

### 4.3.3 Sediment

Sediment composition monitoring will be conducted for the new North Channel on Site. The North Channel will be excavated, and new bed material will be imported to enhance fish habitat and maintain stable habitat characteristics. North Channel substrate is expected to change over time, becoming dominated by fine sediments, similar to other floodplain terrace channel streams.

#### 4.3.3.1 Sediment Composition

EM of sediment composition will be carried out within the North Channel. Substrate texture and grain size will be estimated through visual assessment, and sediment grab samples will be lab analyzed to confirm grain size distribution. Grab samples will be collected at all North Channel survey transects during implementation of the North Channel habitat assessment configuration of the line-intercept methodology (Figure 4) completed for assessment of North Channel habitat. Data will be compared with as-built specifications for the North Channel bed material and with prior years' data collected as part of EM. Analysis of multiple years' data will be used to assess sediment changes over time and anticipated Site progression.

<b>Monitoring Attributes:</b>	Texture and grain size distribution
<b>Monitoring Techniques:</b>	Visual assessment of North Channel substrate at each North Channel survey transect, based on the following criteria (adapted from Peck et al. 2001):

- Assess substrate compositions for wetted North Channel width extending 5 meters upstream from survey transect
- Classify percent representation of each substrate category:
 

▪ Boulder	>250-4,000 mm	Basketball to car size
▪ Cobbles	>64-250 mm	Tennis ball to basketball
▪ Coarse Gravel	>16-64 mm	Marble to tennis ball
▪ Fine Gravel	>2-16 mm	Ladybug to marble
▪ Sand	>0.06-2 mm	Smaller than ladybug size, but visible as particles – gritty between fingers
▪ Fines	<0.06 mm	Silt Clay Muck (not gritty between fingers)
▪ Wood	Not Applicable	Wood & other organic particles
▪ Other	Not Applicable	Concrete, metal, tires, car bodies etc. (describe in comments)

Sediment grab samples will be accomplished by filling a 1-liter Nalgene bottle collected at the survey transect location. Samples will be shipped or delivered to an accredited lab for analysis. Analysis will consist of grain size analysis and distribution for each sample. Standard chain of custody protocols will be followed with collected samples.

- Sampling Locations:** Channel habitat assessment methods: At least 10 survey transects in North Channel
- Sampling Timing:** August through October (later summer/fall)
- Sampling Frequency:** Channel habitat assessment transects completed in Years 1, 3, 5, 7, and 10
- Applicable Habitat(s):** Channel (stream channel)
- Performance Standard:** There is no performance standard specified for this monitoring element.

#### 4.3.4 Vegetation

EM of vegetation will be sampled across the entire Site, as Project goals include establishment, enhancement, and conservation of native vegetation. Random sampling methods will ensure that adequate sampling occurs in all types of vegetation assemblages within the Site, considering both the habitat type and the starting condition of that habitat. Specific sampling protocols will also be employed in stream/riparian enhancement areas, to ensure sufficient monitoring of this habitat type. Results of the monitoring will be compared to performance standards to determine if Project recovery is occurring at the rate projected. Vegetation assemblage/starting conditions that will be monitored, analyzed, and evaluated independently against performance standards include:

- Upland Forest Establishment;
- Upland Scrub-Shrub Establishment;
- Riparian Forest Establishment

- Riparian Forest Enhancement/Conservation
- Wetland (i.e., ACM) Establishment
- Wetland (i.e., ACM) Enhancement/Conservation

Non-native plant species will be characterized based on the current Oregon Department of Agriculture (ODA) Noxious Weed list and the Portland Plant List (Rank A, B, and C lists). The lists are regularly updated, and the most recent versions will be used.

**Monitoring Attributes:** Percent cover by type: herbaceous layer, shrub layer, canopy layer, bare ground

Percent survival

Percent native vs. non-native

Density (woody stems/acre)

Diversity

**Monitoring Techniques:** Line-intercept surveys

**Sampling Location:** Entire Site, excluding substation; North Channel riparian zone

**Sampling Timing:** April through July (late spring/summer)

**Sampling Frequency:** Years 1–5, Years 7 and 10

**Performance Standards:** The performance standards for vegetation development are organized as presented in the M&S Framework (Trustee Council 2014) and so deviate from how previous monitoring elements' performance standards are documented.

Vegetation performance standards are organized based on density, diversity, and cover in different habitat types. Further, different criteria are established at specific monitoring intervals. These different criteria, based on monitoring year, constitute the vegetation monitoring standards for the Project.

PGE proposes to monitor RCG control independent of other non-native vegetation. Consequently, all vegetation monitoring samples will have a percent native/non-native value assessed, but the non-native value will exclude RCG. RCG will be assessed at all vegetation monitoring sample locations but will be evaluated at a Site-wide scale, with performance standards specific to Site-wide percent cover where RCG is likely to occur. This approach is proposed to allow monitoring and assessment of recovery performance while considering the Site-specific constraints that limit effective control methods (e.g., protection of northern red-legged frog habitat, wetlands hydrologic regime, new upstream seed source contributions, etc.).

To minimize disturbance to northern red-legged frogs, the RCG performance standards will not be applied in certain areas within Sub-Area 4 that are below an elevation of 15 feet CPD, with one minor exception identified in Figure 7, as agreed to by the Trustee Council. No work will be done to control RCG in the portion of identified northern red-legged frog habitat below an elevation of 15 feet CPD in Sub-Area 4

shown as “Wetland RCG Area – Not Managed” in Figure 7 to minimize disturbance to northern red-legged frog habitat.

Vegetation monitoring and analysis protocols are described in detail in Attachment F, and are summarized below.

#### **4.3.4.1 Vegetative Community Development**

EM of vegetative community development will be achieved through 2 line-intercept transect approaches. The first approach will collect data on all habitats across the Site equally and will employ the general habitat assessment configuration of the line-intercept methodology (Figure 6). The second approach will gather vegetative data specifically within the riparian zone of the North Channel on Site and will employ the stream habitat assessment configuration of the line-intercept method (Figure 4). Lateral transects along the North Channel will extend from the top of the floodplain valley wall to the opposite top of the valley wall.

#### **4.3.4.2 General Habitat Vegetation Assessment**

The Trustee Council’s M&S Plan guidance document suggests using belt transects to estimate shrub cover. However, PGE proposes to use 100-meter line-intercept sample transects (Bonham 1989) as described below:

Each habitat class will have a minimum of 10 permanent monitoring plots located along linear transects, with the exception of Upland Forest and Upland Scrub-Shrub which will have a combined 10 monitoring plots due to limited acreage. A base transect will be located along the southwestern border of the Harborton Site, parallel to NW Marina Way (Figure 6). Survey transects will be established perpendicular to the base transects, at fixed 100-meter intervals. The location of the first survey transect will be randomly sited between 0-50 meters from the southeastern end of the base transect (Elzinga et al. 1998; Figure 6).

Establishment of specific plot locations will be by systematic sampling along parallel, equally spaced transects. The first plot in the transect will be randomly located and subsequent plots will be spaced at equal intervals along the transect. Interval spacing distance will be adjusted for each habitat class to provide a minimum of 10 plots per class, except as otherwise noted. Figure 6 illustrates approximate plot locations; final permanent plot locations will be accurately located in subsequent monitoring reports.

Visual estimates of percent cover will be employed to measure herbaceous and woody canopy cover. Herbaceous cover will be estimated within a 1-square meter area using a square-framed device laid directly on the ground surface. Woody plants (tree and shrub) canopy cover and density will be estimated in a circular plot with a 5-meter diameter. Each 1-m square plot will be established by placing one corner of the frame on the plot location marker, with frame oriented so that the corner represents the SE corner of the frame. Circular plots will be centered on the permanent marker.

Cover values can change over the course of a growing season, so field monitoring will be performed at approximately the same stage and month of the growing season each year and at a stage when the majority of plant species are well developed, readily identifiable, and pre-senescent (i.e., June - August). Shrub and forested habitat classes are distinguished for stratification based on potential height, not actual height. That is, seedlings and woody sprouts will be counted as shrubs or trees. Areas with a predominance of tree species, regardless of current size, will be considered forested habitat.

Area not covered by vegetation will be recorded as bare substrate. Notation will be made as to whether the bare substrate is open water, litter, duff, wood, bare soil or rock. Total cover in a plot will



be recorded as absolute values and therefore may exceed 100% due to layering. For shrub and tree cover, the crowns are projected vertically. Distinct holes in the canopy will be subtracted from the estimate. Plants overhanging into the sample plot, but that are rooted in an area that does not represent plot conditions or habitat classification, will be subtracted from cover estimates.

In shrub-dominated and forested systems, the number of live stems emerging from the ground for shrubs and the number of live stems for trees will be counted. A plant will be counted if any part of the stem lies within the plot.

Areas covered by water may require alternative sampling methods or timing for monitoring. When sampling in an area with surface water, submerged and exposed vegetation by species will be recorded, with notation identifying submerged vegetative cover. Areas not covered by vegetation will be recorded as open water and considered a special category of bare substrate.

Data for each plot will be entered into an excel spreadsheet that includes the following elements:

- Plot ID
- Plant species
- Plant strata (herb, shrub, tree)
- Plant classification (native, non-native)
- Percent absolute cover
- Number of plants (woody species only)

The sample mean and confidence interval will be reported for each performance standard and compared to the threshold to determine if action is necessary or if the objective has been reached. The objective is to be 80% confident that the estimate reported is within  $\pm 10$  units of the true population. Values for vegetation performance standards (excluding diversity) will be reported as Mean (CI<sub>x</sub> = Y1-Y2), where:

CI = confidence interval  
x = 80% confidence level  
Y1 = low estimate  
Y2 = high estimate

where Y1 and Y2 are calculated as Mean  $\pm$  (standard error \* t-factor 80%). Standard error is calculated as the standard deviation divided by the square root of the number of samples taken in the habitat unit (stdev/sqrt(n)). The t-factor for an 80% confidence level is 1.282.

#### **4.3.4.3 Stream Habitat Vegetation Assessment**

Detailed vegetation data will be collected within the riparian zone of the North Channel. The riparian zone is defined as the vegetation within 15 meters of the North Channel's thalweg and should not be confused with the NRDA Riparian habitat category. The North Channel habitat assessment configuration of the line-intercept method (Figure 4) mirrors the general habitat assessment configuration, but orients the base transect along the North Channel's thalweg. Survey transects are located closer together to ensure data from at least 10 transects are collected for the North Channel. The North Channel survey transects will be spaced no more than 75 meters apart and will extend from top to top of the Sub-Area 3 excavation. Transect orientation will be skewed from perpendicular to the North Channel so that transects do not cross (Figure 4). Sampling points will be established at

a random location along each survey transect. Monitoring methods at each sampling point are identical to those described above under the general habitat vegetation assessment.

#### 4.3.4.4 **Reed Canary Grass Assessment**

Reed canarygrass (RCG; *Phalaris arundinacea*) is widespread across the Site, occurring in ACM, Channel, and Riparian habitats. Within existing wetland and riparian habitats on Site, RCG can exceed 90% cover. Preventing re-establishment is typically a multi-year endeavor and requires the cultivation of habitat-appropriate species that can compete with the RCG. It is extraordinarily difficult to fully eliminate RCG, as it reproduces through seed and rhizome, with seeds able to remain dormant in the soil and sediments for protracted periods (Lipinski 2004). Soil disturbance can activate existing seedbank and new seed can be delivered to a site via wind distribution or from upstream sources of floodwater (Apfelbaum and Sams 1987).

The most effective method to eliminate RCG long-term is to shade or flood the area in which it occurs (Moore, et al. 2000). Effective control methods include herbicide application and removal of the rhizomatous mass through digging or excavation (Dukes 2000). In areas other than Sub-Area 4, RCG control measures may involve both root mass removal and herbicide application. RCG management in Sub-Area 4 will be limited to targeted herbicide application, and will occur only in areas outside of identified northern red-legged frog habitat and generally above an elevation of 15 feet CPD. These areas are identified as Wetland RCG Area – Managed and Upland RCG Area – Managed in Figure 7. No direct action in the form of herbicide application or root mass removal will occur within the area in Figure 7 identified as Wetland RCG Area - Not Managed. In all areas of the Site, an herbicide formulation approved by EPA for use in an aquatic setting, and with known low impacts to amphibians, will be employed.

With the pervasive presence of RCG at the Site, PGE proposes to monitor RCG independent of other invasive or noxious weeds. PGE proposes to monitor all invasive plant species at each general and stream habitat vegetation sample location and will differentiate RCG cover from that of other invasive species. Separate performance standards are proposed for RCG (discussed below).

#### 4.3.4.5 **ACM Emergent**

Detailed vegetation data will be collected within the ACM across the Site, including along the North Channel, along the shoreline, and within the Sub-Area 4 wetlands (except as described below), which extends between the OLWE for the Site (approximately 5.8 feet elevation CPD) and the OHWE for the Site (approximately 18 feet elevation CPD) in areas inundated from the Willamette River and Multnomah Channel during high flows. In addition, vegetation data will be collected in northern red-legged frog habitat below an elevation of 15 feet CPD in Sub-Area 4 to allow comparison to base conditions but will not be subject to the planted area performance standards below.

1. **Density:** 5,000 plugs per acre Created ACM
2. **Diversity:** >5 herbaceous species (occupying >5% cover in at least 10% of sample plots)
3. **Cover:** in Wetland Areas

(i.e., Emergent ACM)

Years 1-5:

- ≥30% native herbaceous
- ≤ 10% non-native herbaceous (excluding RCG)
- Remaining percentage can be comprised of bare ground, rock, or native herbaceous

Year 7:

- ≥50% native herbaceous
- ≤10% non-native herbaceous (excluding RCG)
- Remaining percentage can be comprised of bare ground, rock, or native herbaceous

Year 10:

- ≥70% native herbaceous
- ≤10% non-native herbaceous (excluding RCG)
- Remaining percentage can be comprised of bare ground, rock, or native herbaceous

**4.3.4.6 Riparian Forest, Scrub-Shrub, and Upland Forest (including ACM Scrub-Shrub)**

Detailed vegetation data will be collected in riparian forest, scrub-shrub, and upland forest areas of the Site.

1. **Density:**Years 1-5:

- ≥1,200 native woody plants per acre ACM/Riparian/Upland habitat

2. **Diversity:**Years 1-5:

- ≥3 native tree species (forested habitat)
- ≥5 native shrubs (scrub-shrub and forested habitat)

3. **Cover:**Years 1-5: (Trees/shrubs excluded from percent cover performance standard)

- ≥10% native herbaceous
- ≤10% non-native herbaceous (excluding RCG)
- ≤10% invasive shrubs
- Remaining percentage can be comprised of bare ground, rock, or native herbaceous

Year 7:

- ≥55% native woody species
- ≥10% native herbaceous
- ≤10% non-native herbaceous (excluding RCG)
- ≤5% non-native shrubs
- Remaining percentage can be comprised of bare ground, rock, or native herbaceous

Year 10:

- ≥80% native woody species
- ≥10% native herbaceous
- ≤5% non-native vegetation (excluding RCG)

**4.3.4.7 Reed Canarygrass Across Relevant Habitats**

Detailed data on RCG cover will be collected for all wetland areas at the Site. Performance criteria for RCG cover are given below:

**Years 1-5:** ≤30% RCG

**Year 7:** ≤25% RCG

**Year 10:** ≤20% RCG

**4.3.5 Water Quality**

This monitoring parameter focuses on geophysical characteristics of water on the Site. Because improvement in North Channel habitat is a Project restoration goal, water quality data will be collected to ensure restoration actions do not impair temperature or DO in Channel and ACM (wetlands) habitats.

**4.3.5.1 Water Quality Criteria**

EM of water quality criteria will entail the installation of long-term monitoring temperature sensors in fixed-location surface water monitoring stations. Temperature sensors will gather temperature data in hourly intervals. DO will be measured in surface waters monthly during winter and spring months when out-migrating juvenile salmonids are likely utilizing off-channel habitat on-site. DO monitoring will be co-located in surface waters proximate to surface water monitoring stations so data can be correlated.

<b>Monitoring Attributes:</b>	Temperature; DO
<b>Monitoring Techniques:</b>	Continuous temperature sensors (Levellogger Edge) will collect hourly temperature data from fixed surface water monitoring stations  Monthly winter/spring DO testing when juvenile salmonids likely present in off-channel habitats, using handheld DO meter
<b>Sampling Location:</b>	7 surface water monitoring stations established across Site (Figure 5)
<b>Sampling Timing:</b>	Temperature – continuous, beginning within 1 month of construction  DO – monthly Years 1 and 2; then monthly during winter/spring months after Year 2, corresponding with high river stage and the likely presence of juvenile salmonids
<b>Sampling Frequency:</b>	Temperature – hourly continuous  DO – monthly
<b>Applicable Habitat(s):</b>	Channel, ACM
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element.

**4.3.6 Fish and Wildlife**

EM will be conducted at the Site to determine if the Site is being used by the Trustee Council's target species.

**4.3.6.1 Native Fish Use**

EM of native fish use will be conducted to verify if the restoration Site is being used as off-channel habitat by juvenile salmonids during their outmigration periods and whether lamprey are utilizing the Site for rearing.

**Juvenile Salmonids**

Assessment will rely on three methods. First, a visual survey will be conducted from the streambank along the length of the North Channel. Second, fyke surveys will be conducted within the channel as described in Attachment E. Third, snorkel surveys will be performed as conditions allow. If waters are too turbid, or shallow (or both) for conducting a snorkel survey, the visual survey (first method described) or other potential alternative methods as agreed-upon by PGE and the Trustee Council will be used.

EM of fish usage of the North Channel will be assessed by sampling fish found in the North Channel. PGE is proposing to utilize a stationary fyke trap (trap) as the preferred method to determine occupancy in the Site. Fyke nets oriented for both upstream and downstream fish movement will be deployed 5 consecutive days between November 1 and December 31, and again between February 1 and March 31. Once listed salmonids are captured in the trap, fyke net sampling will be discontinued and visual surveys, snorkeling, or other method agreed to by PGE and the Trustee Council will be used in future sampling events. For a detailed description of the sampling plan, refer to Attachment E – Harborton Fish Study Plan (PGE 2020c).

<b>Monitoring Attributes:</b>	Presence/absence of salmonids in off-channel habitat during winter out-migration
	Salmonid size
	Presence, size, and collection of other fish species encountered fish species and size will also be documented
<b>Monitoring Techniques:</b>	Visual survey from streambank
	Fyke survey
	Snorkel survey
<b>Sampling Location:</b>	North Channel (Figure 5)
<b>Sampling Timing:</b>	Twice monthly from February through May
<b>Sampling Frequency:</b>	Years 1, 3, 5, 7, and 10
<b>Applicable Habitat(s):</b>	Channel
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element; however, documentation reporting the results of presence/absence surveys for salmonids and any other fish species observed will be provided.

**Lamprey**

Lamprey presence and use of the Site will be monitored through a separate effort. Lamprey monitoring will be conducted by USFWS in Years 1-5, 6-8 (as needed to determine whether larval lampreys are stranded in ephemeral tributary.), 10, 15, and 20. The monitoring effort will seek to evaluate how individual restoration projects affect Pacific lamprey (*Lampetra tridentata*), specifically their colonization and occupancy of restored habitat. Channel/slough and confluence (channel or slough mouths within the mainstem) habitats will be sampled in both restoration and reference sites. In wadable habitats, USFWS will use backpack electrofishing to sample for larval lamprey. In non-wadable habitats USFWS will use deep-water electrofishing technology to sample for larval lamprey.

Concurrent to each sampling event a sediment sample will be taken (if possible) from each reach or quadrat by using a Ponar bottom sampler. Analysis of sediment samples will be conducted by a third-party lab. Additional sampling, potentially including mark/recapture techniques, will be employed to evaluate the question of stranding in ephemeral tributary.

USFWS has developed a detailed site-specific Lamprey Monitoring Plan that outlines sampling locations, monitoring techniques, and objectives. The site-specific lamprey monitoring plan, Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey Harborton Restoration Site and supplemental Sediment Analysis Plan can be found in Attachments A and B. An estimated budget for the proposed monitoring is included at Attachment C.

<b>Monitoring Attributes:</b>	Occupancy and relative abundance Lamprey health and characteristics Habitat usage Habitat characteristics (temperature, conductivity, depth) Sediment characteristics (total organic content, grain size, total solids)
<b>Monitoring Techniques:</b>	Backpack electrofishing Deep-water electrofishing technology Ponar bottom sampler
<b>Sampling Location:</b>	North Channel, its confluence with the Willamette River, Sub-Area 1 channel and its confluence with the Willamette River, and the existing Sub-Area 4 confluence with the Willamette River at the Harborton Site (Figure 4) Confluence habitat at the reference site
<b>Sampling Timing:</b>	To be determined by USFWS
<b>Sampling Frequency:</b>	Years 1 - 5, 6-8 (as needed to address lamprey stranding question), 10, 15, and 20
<b>Applicable Habitat(s):</b>	Channel, Confluence
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element.

#### **4.3.6.2 Breeding Bird Use**

EM for breeding bird use will employ a modified version of the general habitat assessment configuration of the line-intercept method. Modifications to the general habitat configuration are made so that sampling effort is consistent with Metro's breeding bird assessment methods (Huff et al. 2000). The modified method is designed to assess and track habitat quality and restoration effectiveness by using breeding birds as bio-indicators.

Metro's survey protocol calls for surveys of breeding birds to be conducted from fixed point-count stations deployed within specific habitats. The protocol includes at least 3 surveys between May 15 and June 30. Point-count stations are to be at least 150 meters apart, with 5 minutes spent at each station (Figure 8). Surveys should be conducted during peak bird activity: approximately sunrise to 10:00 AM. Applying these methods to the general habitat assessment configuration of the line-intercept method, surveyors will locate survey transects along the base transect at 100-meter intervals. To ensure Site coverage, the point-count stations located on adjacent survey transects will be staggered by 75 meters so that they maintain sufficient distance apart, preventing double counting. Figure 8 provides an example of this configuration.

Each point-count station will be monitored for 5 minutes. Birds will be identified by call and by sight (where possible), with their position and distance from the monitoring station noted. Point-count data will be recorded in a geospatial database to identify habitat association. Sampling events will vary starting survey transect to minimize sampling bias.

<b>Monitoring Attributes:</b>	Species presence/absence Habitat usage  Relative abundance Species diversity
<b>Monitoring Techniques:</b>	Modified general habitat assessment configuration of the line-intercept method
<b>Sampling Location:</b>	Line-intercept transects (Figure 8)
<b>Sampling Timing:</b>	3 sampling events, conducted between mid-April and mid-June
<b>Sampling Frequency:</b>	Years 1, 3, 5, and 10
<b>Applicable Habitat(s):</b>	Entire Site, excluding substation
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element; however, documentation reporting the results of breeding bird surveys will be provided.

#### 4.3.6.3 *Bald Eagle Use*

EM for bald eagle use will employ a fixed monitoring station from which eagle monitoring will occur (Figure 5). The selected monitoring location, at the peak of the soil storage pile, will offer unobstructed views of the entire Site. Monitoring will occur weekly, for a total of 1 hour per sampling event from mid-December through August. Sampling events will vary in timing, occurring at either dawn or dusk, coinciding with the periods of highest anticipated activity for eagles. Additionally, data from incidental observations from other survey work outside the species-specific surveys will be recorded.

<b>Monitoring Attributes:</b>	Species presence/absence Habitat used, observed behavior, frequency of Site use
<b>Monitoring Techniques:</b>	Fixed monitoring station
<b>Sampling Location:</b>	Atop the peak of the soil storage pile (Figure 5)
<b>Sampling Timing:</b>	Weekly, mid-December through August
<b>Sampling Frequency:</b>	Year 3, 5, 7, and 10
<b>Applicable Habitat(s):</b>	Entire Site
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element; however, documentation reporting the results of bald eagle surveys will be provided.

**4.3.6.4 Mink Use**

EM for mink includes presence/absence surveys and assessment of usage of select Site habitats. Three scent stations with remote monitoring cameras will be established to capture mink presence. If mink are detected, abundance will be assessed from collected data, and individuals will be monitored based on markings or other physical features to the extent practicable. Twice monthly, target habitats (e.g., mink rock piles, beach, open sandy areas, open muddy areas, and areas along streams and wetlands) will be assessed for tracks and scat. Sampling events will be conducted approximately 1 hour following legal sunrise to minimize corruption of tracks/scat by daytime activity in the monitoring areas.

<b>Monitoring Attributes:</b>	Species presence/absence Habitat usage Abundance
<b>Monitoring Techniques:</b>	Monitoring of motion-activated remote cameras Establishment of scent stations Field survey of target habitats for scat and tracks
<b>Sampling Location:</b>	3 motion-activated remote cameras with scent stations established in likely mink usage areas (Figure 5) Beach and open muddy/sandy areas
<b>Sampling Timing:</b>	Motion-activated remote cameras: continuous recording April through August Establishment of scent stations Field survey of target habitats for scat and tracks: twice monthly between mid-April and mid-July
<b>Sampling Frequency:</b>	Year 3, 5, 7, and 10
<b>Applicable Habitat(s):</b>	ACM, Channel, Riparian, Upland
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element; however, documentation reporting the results of mink surveys will be provided.

**4.3.6.5 Northern Red-Legged Frog Use**

EM of northern red-legged frog use will be achieved through comparison of annual amphibian egg mass trends at the Site to other regional counts from Year 1 through Year 10 of the Performance Period. Egg mass surveys will be used to indicate continued habitat suitability for frogs. These egg mass surveys will occur in February through March to estimate the annual peak egg mass number, consistent with Metro Amphibian Survey Protocol (2010) for egg mass surveys (or other similar protocol as approved by Trustee Council) and compared to other regional surveys. Egg mass counts from year to year will be compared with annual egg mass counts from Metro's Multnomah Channel Marsh survey or other regional surveys. A simple visual survey to document amphibian species presence and stage of development will be conducted in June/July to inform the effectiveness and document amphibian use and development stage.

<b>Monitoring Attributes:</b>	Peak number of egg masses Presence/ development stage of tadpoles
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<b>Monitoring Techniques:</b>	Metro Amphibian Survey Protocol (2010) Comparison with baseline egg mass counts and egg mass counts at Multnomah Channel Marsh or other regional surveys to determine population trends Visual surveys for presence/absence and development stage of tadpoles
<b>Sampling Location:</b>	Suitable amphibian habitat
<b>Sampling Timing:</b>	February through March (count egg masses) June through July (presence/development stage)
<b>Sampling Frequency:</b>	Twice annually (once each period minimum; up to 4 site visits per year if necessary to document amphibian use)
<b>Applicable Habitat(s):</b>	Sub-Area 4
<b>Performance Standard:</b>	There is no required performance standard for this monitoring element; however, documentation reporting the results of northern red-legged frog surveys will be provided.

#### 4.3.6.6 *Benthic Macroinvertebrate Community*

EM of the benthic macroinvertebrate community will be carried out within the North Channel habitat. Macroinvertebrate sampling will employ a modified implementation of the stream habitat assessment configuration of the line-intercept methodology (Figure 4) completed for assessment of channel habitat, and consistent with Peck et al. (2001). One kick sample will be collected with a D-frame net in riffle/run habitat at all survey transects. If the survey transect is within pool habitat, the sample will be collected in the next upstream riffle/run habitat unit. Eight to 10 survey transects will be completed for the channel. All kick samples collected from the channel will be composited and preserved in 90% isopropyl alcohol. Kick samples will be stored in 1-liter Nalgene bottles with labeling both inside and on the bottle. Samples will be shipped or delivered to an accredited lab for identification and analysis. Analysis will consist of species identification (to at least genus level), abundance, and diversity/richness for the channel. Standard chain of custody protocols will be followed with collected samples.

<b>Monitoring Attributes:</b>	Species presence Abundance Diversity/richness
<b>Monitoring Techniques:</b>	Methods as described in the <i>Field Operations Manual for Wadable Streams</i> (Peck et al. 2001). Lab taxonomy
<b>Sampling Location:</b>	Stream habitat assessment methods (Figure 4): 8 to 10 survey transects in the channel
<b>Sampling Timing:</b>	Second quarter (summer), when flow still present in North
<b>Channel Sampling Frequency:</b>	Years 1, 3, 5, 7, and 10
<b>Applicable Habitat(s):</b>	Channel

**Performance Standard:** There is no required performance standard for this monitoring element; however, documentation reporting the results of benthic macroinvertebrate surveys will be provided.

#### 4.4 REPORTING ON IMPLEMENTATION MONITORING

PGE will prepare and submit an Effectiveness Implementation Monitoring Report to the Trustee Council or its designee by December 31 of each year to capture data collected from November 1 through October 31 of the preceding year (the "Reporting Period"). The reports will be prepared for each monitoring year during the Performance Period.

The monitoring and reporting requirements may be revised in cases where adaptive management is required.

Effectiveness Implementation Monitoring Reports will document the methods and results of each of the monitoring elements, including survival and percent cover assessments, wildlife monitoring, and achievement of performance standards. Table 5 summarizes all monitoring elements proposed for the Harborton Site during the Baseline, Implementation, and Effectiveness monitoring phases. PGE will provide the detailed data associated with all monitoring elements (e.g., monitoring results, geographic coordinates, transect locations) in the format specified by the Trustee Council. The Trustee Council shall have the discretion to make public any and all monitoring data and information provided by PGE.

These reports will detail the general Project conditions, include photographs of restored habitats and contain notes on management activities for the monitoring period.

The monitoring reports will provide the Trustee Council or its designee(s) with sufficient information to assess whether the Project is meeting its goals and performance standards, and to determine whether a compliance visit is warranted. PGE will submit monitoring reports electronically. Monitoring reports will include a monitoring report narrative that provides an overview of Project conditions and functions. This monitoring report narrative will be concise and generally less than 10 pages.

Monitoring reports will also include appropriate supporting data to assist the Trustee Council or its designee(s) in determining how the Project is progressing towards meeting its performance standards. Such supporting data may include plans (such as as-built plans), maps, and photographs to illustrate Project conditions, as well as the results of functional, condition, or other assessments used to provide quantitative or qualitative measures of the functions provided by the Project.

The monitoring report narrative will include the following:

##### 1. Project Overview

- a. Project name.
- b. Name of party(ies) responsible for conducting the monitoring and the date(s) the inspection was conducted. All persons who prepared the report, did the monitoring, and/or wrote or edited the text will be listed.
- c. Written description of the location, any identifiable landmarks of the Project including information to locate the Project perimeter(s), and coordinates of the restoration Site (expressed as latitude, longitudes, UTM's, state plane coordinate system, etc.).
- d. Dates any planting commenced and/or was completed.
- e. Overview of monitoring conducted during the monitoring year, including monitoring that is not specifically tied to performance standards (e.g., wildlife monitoring).
- f. Short statement on whether the performance standards are being met.

- g. Dates of any recent corrective or maintenance activities conducted since the previous report submission, including within the Set-Aside Area.
- h. Specific recommendations for any additional corrective actions.

## **2. Requirements**

List the monitoring requirements and performance standards, as specified in this plan and evaluate whether the Project is successfully achieving the approved performance standards or trending towards success. A table is a recommended option for comparing the performance standards to the conditions and status of the developing Project.

## **3. Summary Data**

Summary data will be provided to substantiate the success and/or potential challenges associated with the Project. The data will be provided in excel or similar format and/or entered into the MS Access database provided by the Trustee Council. Photo documentation may be provided to support the findings and recommendations referenced in the monitoring report and to assist the Trustee Council or its designee(s) in assessing whether the Project is meeting applicable performance standards for that monitoring period. Submitted photos should be formatted to print on a standard 8½-inch by 11-inch piece of paper, dated, and clearly labeled with the direction from which the photo was taken. The photo location points should also be identified on the appropriate maps.

## **4. Maps and Plans**

Maps should be provided to show the location of the Project relative to other landscape features, habitat types, locations of photographic reference points, transects, sampling data points, and/or other features pertinent to the monitoring plan. In addition, the submitted maps and plans should clearly delineate the Project perimeter(s), which will assist the Trustee Council or its designee(s) in locating the planting area(s) during subsequent Project inspections. Each map or diagram should be formatted to print on a standard 8½-inch by 11-inch piece of paper and include a legend and the location of any photos submitted for review. As-built plans may be included. Shapefiles or a geodatabase of mapped data should be provided.

## **5. Conclusion**

A general statement should be included that describes the conditions of the Project. If performance standards are not being met, a brief explanation of the difficulties and potential corrective actions proposed by PGE, including a timetable, will be provided.

Following the achievement of all performance standards, the final Effectiveness Implementation Monitoring Report will be completed and submitted to the Trustee Council or its designee(s). This report will detail the general condition of the Project at the end of the Performance Period and will address overall performance of the Project's habitat development and success of management activities related to the following:

- Hydrologic function;
- Sedimentation and erosion;
- Plant community development;
- Condition of Project facilities (gates, access roads, etc.);
- Trash and debris management;
- Wildlife survey results summary; and
- Fish sampling results summary.

**Table 5. Monitoring Elements Summary**

Monitoring Attribute	Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
<b>Geomorphic/Structural</b>				
<b>Retention of installed habitat features/elements</b>				
Quantity of existing features/elements	Baseline	Once	ACM, Riparian, Channel, Upland	None
Installed habitat features /elements (LWM, brush piles, gravel distribution, rock piles, snags)	Implementation	As-built	ACM, Riparian, Channel, Upland	250 LWM pieces in ACM 3-4 hab. features/acre in riparian 3-4 hab. features/acre in upland
Retention of installed habitat features/elements (LWM, brush piles, gravel distribution, rock piles, snags)	Effectiveness	Once during Years 1, 3, 5, 7, 10	ACM, Riparian, Channel, Upland	>80% retention
<b>Extent of ACM habitat</b>				
Acres of Site in zone extending between 18 feet City of Portland Datum (CPD) down to 5.8 feet CPD and that are inundated from the Willamette and Multnomah Channel during high flows	Implementation	As-built	ACM	Built as designed
Acres of Site in zone extending between 18 feet City of Portland Datum (CPD) down to 5.8 feet CPD and that are inundated from the Willamette and Multnomah Channel during high flows	Effectiveness	Once during Years 1, 3, 5, 7, 10	ACM	Changes of more than 10% in ACM habitat acreages/linear feet from the as-built surveys
<b>Extent and stability of channel, streambank and floodplain habitat</b>				

## PGE HARBORTON RESTORATION PROJECT: MONITORING &amp; ADAPTIVE MANAGEMENT PLAN

Monitoring Attribute		Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
Quantity (acres/linear feet) of channel habitat	Implementation	As-built	Channel, banks, floodplain	Built as designed	
Quantity (acres/linear feet) of fish accessible channel habitat created/enhanced					
Channel gradient					
Width-to-depth ratio					
Streambank stability					
Valley bottom and valley wall stability					
Sediment accretion	Effectiveness	Once during Years 1, 3, 5, 7, 10	Channel, banks, floodplain	<p>Identification of any fish barriers preventing fish access to Channel habitat</p> <p>Loss of downstream flow &gt;20%</p> <p>Changes to more than 10% in Channel acreage/linear feet from as-built conditions</p> <p>Width to depth ratio change &gt;+/- 50%</p> <p>Shoreline slumping in excess of 10 cubic yards in any areas along the North Channel</p>	
Quantity (acres/linear feet) of fish accessible channel habitat					
Surface/subsurface visual flow assessment					
Channel gradient					
Width-to-depth ratio					
Streambank stability					
Sediment accretion					
Shoreline plant community development					
Retention of clean fill material placed in areas of residual contamination treatment	Implementation	As-built	ACM, Channel	None	
Retention of clean fill material placed in areas of residual contamination treatment	Effectiveness	TBD	ACM, Channel	None	
<b>Extent of mink habitat</b>					
Quantity (acres/linear feet) of mink ACM (shoreline) and ACM (wetlands) habitat	Baseline	Once	ACM, Channel, Riparian	None	
Quantity (acres/linear feet) of mink ACM (shoreline and channel) and ACM (wetlands) enhanced through installation of habitat features/elements	Implementation	As-built	ACM, Channel, Riparian	None	

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Monitoring Attribute	Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
Quantity (acres/linear feet) of mink ACM (shoreline and channel) and ACM (wetlands) enhanced through installation of habitat features/elements	Effectiveness	Year 10; one event	ACM, Channel, Riparian	None
<b>Extent of bald eagle habitat</b>				
Quantity (acres/linear feet) of bald eagle habitat existing on-Site	Baseline	Once	ACM, Riparian, Channel	None
Quantity (acres/linear feet) of shoreline, ACM, Riparian, and Channel habitat	Implementation	As-built	ACM, Riparian, Channel	None
Quantity (linear feet) of shoreline available Quantity (acres) of inundated ACM habitat Channel habitat and Riparian habitat available Quantity (number) of habitat features/elements installed	Effectiveness	Year 10: One event	ACM, Riparian, Channel	None
<b>Fish passage /fish accessibility</b>				
Number of fish passage barriers	Baseline	Once	Channel	None
Compliance with National Marine Fisheries Service (NOAA Fisheries) Anadromous Salmonid Passage Facility Design (NOAA Fisheries 2008) as applicable Channel grade Jump height Stream hydrology modeling	Implementation	As-built	Channel	Compliance with NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> (NOAA Fisheries 2008) as applicable
Compliance with National Marine Fisheries Service (NOAA Fisheries) Anadromous Salmonid Passage Facility Design (NOAA Fisheries 2008) as applicable Retention of fish accessibility Channel grade	Effectiveness	One event during Years 1-10 (fish accessibility and jump height) One event each of Years 1, 3, 5, 7 and 10 (Chanel grade)	Channel	North Channel grading and subsequent fluvial geomorphic changes do not create passage barrier, as defined in NOAA Fisheries' <i>Anadromous Salmonid Passage Facility Design</i> (NOAA Fisheries 2008)

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Monitoring Attribute		Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
Jump height Stream hydrology monitoring					
<b>Hydrology/Hydraulics</b>					
<b>Retention of wetland hydrology/habitat for use by northern red-legged frogs</b>					
Area (acres) of existing open water habitat and depth from January to July		Baseline	3x between January and July	ACM, Channel	None
Area (acres) of existing open water habitat of sufficient depth for complete frog metamorphosis from January to July		Implementation	Continuous surface water monitoring sensors in permanent monitoring station	ACM, Channel	From January through May, areal extent and depth of the wetland should maintain no less than 80% of the baseline measurements (<20% change from baseline, defined by pre-project monthly averages). In June, the areal extent and depth of the wetland should be no less than 90% of the baseline measurements, as defined by pre-project weekly median.
Area (acres) of existing open water habitat of sufficient depth for complete frog metamorphosis from January to July; thus no substantial loss (as defined in the performance standards) in hydrology and inundation period for each of these months relative to baseline.		Effectiveness	Continuous surface water monitoring sensors in permanent monitoring station	ACM, Channel	From January through May, areal extent and depth of the wetland should maintain no less than 80% of the baseline measurements (<20% change from baseline, defined by pre-project monthly averages). In June, the areal extent and depth of the wetland should be no less than 90% of the baseline measurements, as defined by pre-project weekly median.
<b>Extent of high flow inundation</b>					
Lateral extent of flooding from Multnomah Channel and the Willamette River during high flow		Baseline	Once	ACM, Channel	None
Lateral extent of flooding from Multnomah Channel and the Willamette River, surface water duration and discharge		Implementation	Continuous surface water monitoring sensors in permanent monitoring station	ACM, Channel	None

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Monitoring Attribute	Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
Lateral extent of flooding from Multnomah Channel and the Willamette River; duration of surface water	Effectiveness	Continuous surface water monitoring sensors in permanent monitoring station	ACM, Channel	<20% reduction from baseline
<b>Sediment</b>				
Sediment composition existing on-Site	Baseline	Once	Channel	None
Texture and grain size analysis	Effectiveness	One event during Years 1, 3, 5, 7, 10	Channel	None
<b>Vegetation</b>				
Vegetative community structure existing on-Site (Diversity, percent cover, density, percent native/invasive)	Baseline	Once	ACM, Riparian	None
Vegetation planted per planting plan (Number and species composition, Spacing and location, Adequacy of staging and storage, installation technique and timing)	Implementation	Once	ACM, Riparian, Upland	None
Percent cover by type (herbaceous, shrub, canopy, bare ground) Percent survival Percent native vs. non-native Density (woody stems/acre) Diversity	Effectiveness	One event during Years 1-5, 7, 10	ACM Emergent	5,000 plugs/ac, >5 herbaceous species >5 herbaceous species (>5% cover in 10% of sample plots) <b>Wetlands:</b> ≥30% native herbaceous cover Y2-Y5 ≥50% native herbaceous Y7 ≥70% native herbaceous Y10 ≤10% non-native herbaceous (excluding RCG)



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Monitoring Attribute	Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
			Riparian and Upland Forest-Scrub/Shrub (including ACM Scrub-Shrub)	Y2-5 ≥1,200 native woody plants per acre ACM scrub-shrub/Riparian/Upland habitat Y2-5 ≥3 native tree species (forested habitat) Y2-5 ≥5 native shrubs (scrub-shrub and forested habitat) <u>Years 2-5:</u> ≥10% native herbaceous ≤10% non-native herbaceous (excluding RCG) ≤10% invasive shrubs Remaining percentage can be comprised of bare ground, rock, or native herbaceous <u>Year 7:</u> ≥55% native woody species ≥10% native herbaceous ≤10% non-native herbaceous (excluding RCG) ≤5% non-native shrubs Remaining percentage can be comprised of bare ground, rock, or native herbaceous <u>Year 10:</u> ≥80% native woody species ≥10% native herbaceous ≤5% non-native vegetation (excluding RCG)

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Monitoring Attribute	Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
			RCG	<u>Years 1-5:</u> ≤30% RCG <u>Year 7:</u> ≤25% RCG <u>Year 10:</u> ≤20% RCG
<b>Water Quality</b>				
Water quality parameters existing on-Site (Temperature, dissolved oxygen (DO), pH)	Baseline	Daily – Temperature Monthly - DO	ACM, Channel	None
Water quality parameters post-construction (Temperature, dissolved oxygen (DO))	Implementation	Daily – Temperature Monthly - DO	ACM, Channel	None
Water quality (Temperature, dissolved oxygen (DO))	Effectiveness	Years 1-2: All year Daily – Temperature Monthly - DO Years 3-10: Summer Daily – Temperature Monthly – DO Winter/spring Monthly - DO	ACM, Channel	None
<b>Fish &amp; Wildlife</b>				
<b>Native fish use</b>				
Native fish use (salmonids)- (including simultaneous documentation of other fish species observed & removal of non-native fishes)  Juvenile salmonid presence in off-channel habitat during winter out-migration  Salmonid size  Presence, size, and collection of other fish species encountered	Effectiveness	Years 1, 3, 5, 7, 10: 2x Monthly February through May	Channel	None
Lamprey habitat use existing on Site	Baseline	To be determined by USFWS	Channel, Confluence	None

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Monitoring Attribute	Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
Native fish use (lamprey)	Effectiveness	Years 1- 5, 6-8 (as needed to be determined by USFWS), 10, 15, 20:	Channel, Confluence	None
<b>Breeding birds use</b>				
Breeding bird use, abundance, diversity existing on-Site	Baseline	3x April through June	Entire Site	None
Breeding bird use, abundance, diversity	Effectiveness	Years 1, 3, 5, 7, 10: 3x April through June	Entire Site	None
<b>Bald eagle use</b>				
Bald eagle use, frequency, behavior existing on-Site	Baseline	2x Monthly December through August	Entire Site	None
Bald eagle use, frequency, behavior	Effectiveness	Years 3, 5, 7, 10: Weekly, December through August	Entire Site	None
<b>Mink use</b>				
Mink use, abundance existing on-Site	Baseline	2x Monthly April through July	Entire Site	None
Mink use, abundance existing on-Site	Effectiveness	Years 3, 5, 7, 10: 2x Monthly April through July	Entire Site	None
<b>Northern red-legged frog use</b>				
Quantity of amphibian egg masses	Baseline	Up to 2x (February/March)	Sub-Area 4 Amphibian Habitat	None
Quantity of amphibian egg masses	Effectiveness	Up to 2x (February/March) - Years 1-10	Sub-Area 4 Amphibian Habitat	None
Presence/ development stage of tadpoles	Baseline	Up to 2x (June/July)	Sub-Area 4 Amphibian Habitat	None

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Monitoring Attribute	Monitoring Period	Sampling Frequency <sup>1</sup>	Applicable Habitats	Performance Standard
Presence/ development stage of tadpoles	Effectiveness	Up to 2x (June/July) Years 1-10	Sub-Area 4 Amphibian Habitat	None
<b>Benthic macroinvertebrate community</b>				
Species presence, abundance, diversity/richness	Effectiveness	Years 1, 3, 5, 7, 10: Once Annually	North Channel	None
<p>Note</p> <p>1. Effectiveness monitoring will begin in 2021. All references to monitoring years will be interpreted based upon a Year 1 date of 2021. For example, Year 2 for the PGE Harborton Restoration Project monitoring is 2022, Year 5 will be 2026, and Year 10 will be 2031.</p>				

## 5. Adaptive Management Plan

### 5.1 INTRODUCTION

Adaptive management is a systematic and iterative process that provides for feedback between monitoring and management actions (Williams et al. 2009). The feedback mechanism is engaged when monitoring data are analyzed and the results are used to adjust project operations in a way that makes progress towards meeting project goals. Monitoring data showing that the Project is not meeting its performance standards or is otherwise not on track to meet its ultimate goals and will trigger use of this AMP.

Adaptive management employs a structured approach but is also a flexible tool that can adjust to a dynamic environment and an evolving project. Therefore, adaptive management can keep a project moving toward meeting its goals, despite the variability inherent in dynamic, natural systems over spatial and temporal scales. Adaptive management assists managers in responding to unanticipated changes in the various components of a project such as hydrology, target habitat development, or changes in the species' response along a restoration trajectory (Williams et al. 2009).

### 5.2 GOALS AND OBJECTIVES OF THE ADAPTIVE MANAGEMENT PLAN

This AMP describes the elements of the adaptive management process specific to the Project. PGE acknowledges that its ability to achieve the overall Project goals and performance standards may be influenced by on and off-site factors that are beyond PGE's control. This plan, therefore, does not commit PGE to any specific adaptive management actions. PGE will work closely with the Trustee Council to select and appropriately scope the level of effort required to implement adaptive management actions to ensure the selected actions are cost-effective and have a reasonable likelihood of meeting the Project goals and objectives.

The following critical elements are integral to a successful AMP:

- Specify the responsibilities of the Adaptive Management Team (Management Team).
- Identify triggering mechanisms that will be used to alert the Management Team of the need to take action.
- Identify potential adaptive management actions once trigger thresholds have been reached.
- Develop an appropriate conceptual model of the adaptive management process, which will:
  - Outline a feedback loop between adaptive management actions and monitoring
  - Inform the Management Team
  - Select adaptive management actions
  - Refine the on-going monitoring program

### 5.3 APPROACH

Two key elements of this AMP are as follows:

- A description of the organizational structure for the Management Team that will develop and implement the adaptive management process; and
- A conceptual model of the adaptive management process itself.

This AMP also provides descriptions of the roles and responsibilities of the Management Team, monitoring activities, management triggers and actions, and other elements that together constitute a functional AMP.

Adaptive management is an iterative process wherein monitoring of an action results in the collection of information which informs the next step of management (Figure 9). The entire process is driven by the Project's restoration goals and performance standards together with the regulatory permit requirements. This AMP incorporates the performance standards described in Section 4 which establish the triggers that would initiate a management response and describes a range of potential adaptive management actions. If monitoring determines that a performance standard is not being achieved, then there are three possible but not mutually exclusive response pathways:

1. Determine that more data is required and continue (or modify) monitoring.
2. Identify and implement a corrective action.
3. Modify Project goals and objectives (this option would only be considered as a last resort and upon careful consideration by and consensus of the Management Team).

There may be multiple corrective or management action options when a performance standard is not achieved, depending on a variety of factors such as how far the Project is from achieving a specific standard, whether the situation is an imminent threat to local infrastructure, ecosystem services/functions or Site stability, etc. The adaptive management process applies to the Project Site, but management actions can be identified and implemented on individual sub-areas, or resources, as needed. The process is flexible because it allows for a wide range of management actions, but just as importantly imposes a structured approach as management actions must derive from monitoring results. The adaptive management process also accommodates different physical and temporal scales for management actions.

#### **5.4 ADAPTIVE MANAGEMENT TEAM**

The Management Team will include the Trustee Council and PGE. The Management Team is responsible for ensuring that the Project's goals and performance standards are met during the Performance Period. This includes day-to-day and long-term decision-making and ensuring that adaptive management decisions are implemented. PGE will be responsible for funding monitoring and maintenance during the Performance Period. PGE and the Trustee Council will agree on an Adaptive Management Set Aside Escrow Agreement (Appendix M to the Harborton Habitat Development Plan) from which adaptive management activities will be funded, including, but not limited to, additional monitoring and maintenance actions, as decided by the Management Team. The Management Team will also be responsible for any ongoing communication that needs to be distributed to other parties, such as reports, e-mails, newsletter, and website materials.

#### **5.5 PROCESS**

This AMP is intended to act on different levels. At the larger scale, it evaluates the progress of the Project towards achieving overall Project restoration goals. At the finer level, the AMP assists with evaluation of performance standards for specific resources. The basic pattern of the adaptive management cycle is the same for each of these (Figure 9) but works at a different level of detail depending on the focus of that particular monitoring effort. Depending on the question to be evaluated, the AMP can be refined to address highly specific questions (e.g., Why is gravel size changing on the Site?) to very broad topics (e.g., Is non-native vegetation control successful?). Each step of the adaptive management process is briefly described below.

### 5.5.1 Design and Implementation

At the larger scale, design and implementation includes the overall restoration project (construction, grading, etc.) as it is designed to meet specific goals. At the finer level, it includes any corrective or adaptive management actions necessary over time to address specific issues designed to support achievement of the Project's restoration goals and performance standards. Design includes creating a plan for implementing the adaptive management actions and monitoring responses resulting from the actions. The Management Team will agree on an appropriate timescale in which indicator response is expected, including prevention of further deteriorating conditions that would have occurred if no actions were taken.

### 5.5.2 Monitoring

Monitoring will allow the Management Team to collect the information necessary to assess how adaptive management actions affect monitoring indicators. Monitoring may include routine monitoring established in the Monitoring portion of this document, or supplemental monitoring specific to an adaptive management action. Monitoring will also determine if actions were implemented as planned and may detect unusual events. Examples of unusual events may include significant erosion soon after construction following a high-intensity rain event or prolonged period of rain, or high mortality of new plantings.

### 5.5.3 Evaluation

The goal of the NRDA program is "to restore, rehabilitate, replace, or acquire the equivalent of those natural resources injured as the result of hazardous substance and oil releases within the Portland Harbor Superfund site" (Trustee Council 2014). While consistent with this broad goal, the Project's goals are specific to the Harborton Site and are measured at a much more refined level of analysis. The Project will be evaluated on whether the proposed restoration design was implemented and whether ecological recovery (because of Project implementation, monitoring, and maintenance) is achieved through assessment of performance standards. Performance standards are the quantitative statements of desired outcomes, allowing evaluation of how well the goals are being achieved. Monitoring results will be assessed in context of the performance standards and will be compared to the final performance standards for each monitoring element, as outlined in the monitoring section of this document. This assessment will evaluate the original criteria and performance standards given current site-specific knowledge to determine if the Project is progressing along a trajectory toward meeting the Project's overall goals and performance standards.

Analysis, synthesis, and evaluation of the management actions and monitoring are critical for improving understanding of the effect of actions on achievement of performance standards and Project goals.

Analysis and synthesis will incorporate information on how conditions on the Site have changed, expectedly and unexpectedly, because of the overall Project and any adaptive management actions. Because measurable change might not occur on short timescales, evaluations will also examine whether adaptive management actions prevented further deteriorating conditions that would have occurred if no actions were taken.

The evaluation will examine whether the performance standards are being met because of the implemented actions, and if so, why. If a performance standard is not met, the potential reasons why it was not met will be identified. As data becomes available, analyses will assess whether the probability of the desired outcome has changed and, if so, how this affects decisions about the

action. The evaluation will explain why results occurred and include recommendations for future action. The evaluation will, in some cases, allow for predictive assessment of whether the adaptive management action will result in the monitored element to meet its interim and final performance standards within the specified time frame.

#### 5.5.4 Adjustment & Force Majeure

The Management Team will be made aware of any failure to meet performance standards set forth in this AMP through annual monitoring reports or as otherwise agreed to in the MAMP. In the case of the identification of a fish passage problem, or other situation potentially requiring immediate intervention, PGE will notify the Management Team within 48 hours of the discovery of the problem.

The Management Team will discuss and recommend potential adaptive management actions and modifications that may be implemented to get the Project back to meeting the specific monitoring element's performance standards or design and implementation requirements. Possible next steps could include selecting an alternative action for design and implementation, redefining the problem statement, refining monitoring methods, or modifying Project goals and objectives. If corrective actions are judged by the Management Team to be feasible, appropriate and cost-effective, PGE will implement such corrective actions upon the Trustee Council's written recommendation. If not, final credit value may be adjusted.

"Force majeure" is defined as any event arising from causes beyond PGE's control (including the control of PGE's contractors and sub-contractors and any other entity controlled by PGE) that delays or prevents the performance of PGE's obligations despite its best efforts to fulfill the obligation. The requirement that PGE exercise "best efforts to fulfill the obligation" includes using best effort to anticipate any force majeure event and use best efforts to address the effects of any potential force majeure event (1) as it is occurring and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force majeure" does not include financial inability to fulfill the obligation. The requirement that PGE exercise "best efforts to fulfill the obligation" also includes, where necessary, the filing of legal actions to compel performance in accordance with the design and schedule approved by the Trustee Council.

If any event occurs or has occurred that may delay the PGE's performance of any performance obligation, PGE shall notify the Trustee Council within 14 days of when PGE first knew that the event might cause a delay. Within 30 days after notifying the Trustee Council, PGE shall provide a written explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; and the rationale for attributing such delay to a force majeure event (if PGE intends to assert such claim). PGE shall include with any notice all available documentation supporting its claim that the delay was attributable to a force majeure event.

If the Trustee Council agrees that the delay or anticipated delay is attributable to a force majeure event, the Trustee Council will extend time for performance obligations that are affected by the force majeure event for such time as is necessary. An extension of the time for performance obligation affected by the force majeure event shall not, of itself, extend the time for performance for any other obligation. If the Trustee Council does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, the Trustee Council will notify PGE in writing of its decision.



In the event of conflict between this language and language in a future consent decree regarding force majeure, the language in the consent decree prevails.

## 5.6 DESCRIPTION OF SUMMARY TABLES

A series of adaptive management summary tables have been developed to provide descriptions of how the AMP process will be used to evaluate progress toward achieving performance standards and the Project's goals (Section 5.7 - Tables 6-9). Each table is organized following guidance provided in the M&S Framework (Trustee Council 2014), with separate tables provided for the following monitoring parameters:

- Geomorphic/Structural Habitat Elements
- Hydrology and Hydraulics
- Sediment
- Vegetation

A general description of each of the columns in the adaptive management summary tables is provided here. However, it should be noted that the proposed approach under each of these columns in the tables is also subject to the adaptive management process and can be modified (or even eliminated) by the Management Team as the implemented Project evolves and additional data are gathered. These tables are intended to provide examples of adaptive management triggers and potential management actions. They are not intended to comprehensively capture the complete suite of management options that may be applied in a given circumstance.

### 5.6.1 Monitoring Attribute

This category describes the attributes or features within a monitoring element that will be monitored over the Performance Period. For example, percent vegetative cover is an attribute of the vegetation monitoring element, and temperature and DO are attributes of water quality. Each monitoring attribute is directly linked to a specific, measurable performance standard.

### 5.6.2 Performance Standard/Indicator and Management Trigger

Performance standards represent measurable desired outcomes used to define progress towards the Project's goals. Final performance standards have been established for each monitoring attribute. All final performance standards must be met at the end of the Performance Period in order for PGE to receive full restoration credit. IPS have been established for some monitoring attributes to track progress toward meeting the final performance standard. Some IPS have target goals that change over the Performance Period, reflecting the fact that Site conditions are improving over time. However, some IPS will remain constant throughout the Performance Period.

Management triggers define the specific point or threshold where monitoring data indicate that the monitored attribute is not achieving or is not likely to achieve the stated IPS and/or final performance standards by the end of the Performance Period. At these points, adaptive management actions may be necessary to ensure that the Project meets performance standards or overall Project goals. The Management Team's first step in evaluating conditions when a management trigger is not met is to determine whether the underachievement is a result of the Project (e.g., improper weed control) or of outside factors (e.g., climate change, large-scale regional flooding, or adjacent landowner practices). If the Management Team determines that the performance standard is not being met for a Project-

controllable reason (e.g., improper weed control), specific management actions will be developed and implemented based on the prescriptions spelled out in this AMP and Project permits and compliance requirements.

### 5.6.3 Rationale

It is important for the Management Team to understand the reason(s) why a performance standard or Project goal is or is not being met. If a performance standard or performance goal is being achieved, the management action(s) being taken are working and indicate it is likely the restoration goal(s) will be achieved during the Performance Period. If a performance standard is not being met, the Management Team will review the reasons why the performance standard is not met to inform what adaptive management actions can or should be taken to move the Project toward meeting the performance standard or Project goal. The reasons provided in the tables are not an exhaustive list but are intended to allow the Management Team a starting point for discussions when determining why a performance standard was not met.

### 5.6.4 Potential Management Actions

Once the Management Team determines that a performance standard is not being met, there are a range of possible management options. Examples include the following:

- It may be determined that no management action is necessary.
- Additional monitoring may be required to better understand the issue and decide whether adaptive action is required.
- Monitoring methods are not collecting the necessary data and modification to monitoring methods may be necessary to evaluate change relative to a performance indicator.
- Monitoring results indicate that adaptive management action is required.
- Careful consideration of monitoring results (likely over several years after exhausting optional management strategies) indicates that the original goal was unrealistic or unattainable and that the performance standard may need to be modified and credit value modified accordingly. In the case of the latter, this is considered a last resort that would require careful consideration and consensus by the Management Team.

Potential management actions listed in the adaptive management tables (Tables 6-9) represent a select range of possible options given the current knowledge of the Site and anticipated management actions. The examples provided are not a comprehensive list of options that may be considered. The details on the timing and degree of each of these actions are equally dependent upon the monitoring results. If adaptive management actions are necessary, the Management Team will expeditiously make the final decision on the appropriate actions to be taken in a given year.

## 5.7 ELEMENTS

Natural ecosystems are dynamic and subject to change over time. Adaptive management may be necessary to achieve the performance standards defined for the Project. Those performance standards that could require adaptive management were consolidated to fit into the following four categories so that similar objectives could be described within the same context. These categories correspond to those elements defined in the Trustee Council M&S Framework (2014):

- Geomorphic/Structural Habitat Elements
- Hydrology and Hydraulics

- Sediment
- Vegetation

The following sections describe restoration actions proposed for specific areas of the Harborton Site. To aid in the description, the Site has been sub-divided into four areas based on existing ecological conditions and the degree of pre-restoration disturbance (e.g., fill). These sub-areas are informally referred to herein as Sub-Areas 1 through 4. The sub-areas were delineated by ecological characteristics and/or development features, which guided development of specific restoration actions within each sub-area. The sub-areas are identified on Figure 2, along with existing Site features.

### 5.7.1 Geomorphic/Structural Habitat Elements

This section of the AMP includes the geomorphic and structural habitats on the Project Site.

Quantifying the geomorphic and structural habitat elements will allow the Management Team to determine whether the goals of sustaining a dynamic stream channel with optimal flow, allowing fish passage, and improving vegetation conditions is on a trajectory that will meet the performance standards at the end of the Performance Period.

Restoration activities in Sub-Area 1 will consist of installation of a mink rock pile and invasive plant species control and re-establishment of native vegetation. A new stream channel will be constructed in Sub-Area 3 (North Channel) with the primary goals of providing fish passage, creating riparian habitat, and increasing the frequency of hydrologic connectivity between the North Channel and interior wetlands in Sub-Area 4 and the Willamette River.

A degree of erosion and deposition is expected in the North Channel as it reaches a state of equilibrium after construction. Significant erosion requiring adaptive management would include erosion that undermines the integrity of the restored channel bank and causes a significant loss of existing and planted streamside vegetation, or that exposes sub-surface contamination. Significant erosion, deposition, or treefalls would be anticipated to take place during periods of heavy or prolonged rain or high stream flow. Seven monitoring attributes have been defined for geomorphic and structural habitat elements (Table 6).

Table 6. Geomorphic/Structural Habitat Elements

Performance Standard/Indicator, Management Trigger	Rationale	Potential Management Actions
<b>Monitoring Attribute: Installed Habitat Features (LWM/Brush Piles/etc.)</b>		
ACM habitat: <80% retention of placed material (includes naturally recruited material) Riparian and upland: <3 installations per acre	Wood floated away Flooded site Stolen Decayed Animal activity	Add LWM Improve anchoring systems Second survey
<b>Monitoring Attribute: Stream Gradient</b>		

Performance Standard/Indicator, Management Trigger	Rationale	Potential Management Actions
As-built profile: >10% change from the as-built surveys in ACM and side-channel habitat	Large wood recruitment Erosion Sediment deposition Head cutting	Grade control structures in the North Channel  Regrade  Change planting palette to retain more sediment/reduce erosion
<b>Monitoring Attribute: Retention of Wetland Hydrology/Habitat for Use by Northern Red-legged Frog</b>		
As built  From January through May, areal extent and depth of the wetland should maintain no less than 80% of the baseline measurements (<20% change from baseline, defined by pre-project monthly averages). In June, the areal extent and depth of the wetland should be no less than 90% of the baseline measurements, as defined by pre-project weekly median.	Loss of wetland function to support frog life cycle.  Shallow or no surface water in January through June.	Regrade North Channel inlet to reduce outflow from Sub-Area 4  Regrade Sub-Area 4 near existing outlet channel to reduce outflow from Sub-Area 4
<b>Monitoring Attribute: Width to Depth Ratio</b>		
As-built profile: >20% change from the as-built surveys in ACM and side-channel habitat	LWM recruitment Erosion Sediment deposition Head cutting	Grade control structures in the North Channel  Regrade  Change planting palette to retain more sediment/reduce erosion
<b>Monitoring Attribute: Elevation stability</b>		
As-built profile: >10% change from the as-built surveys in ACM, channel habitat, and valley walls  Loss of >80% of material in areas overexcavated and backfilled due to soils contamination	LWM recruitment Erosion Sediment deposition Head cutting  Off-site, upstream contributing channel failure Slope failure Exposed contaminated soils	Grade control structures in the North Channel  Regrade  Change planting palette to retain more sediment/reduce erosion  Stabilize slope Import clean fill to cover exposed contaminated areas  Overexcavate and backfill to remove residual contamination
<b>Monitoring Attribute: Sediment accretion</b>		

Performance Standard/Indicator, Management Trigger	Rationale	Potential Management Actions
As-built profile: >20% change from the as-built surveys in ACM and side-channel habitat	LWM recruitment Erosion Sediment deposition Head cutting Culvert failure	Grade control structures in the North Channel Regrade Change planting palette to retain more sediment/reduce erosion Move accretion monitoring stake location
<b>Monitoring Attribute: Fish Passage Barriers</b>		
Maximum drop at any feature: greater than 6 inches is a new fish passage impediment	Erosion/downcutting within the channel LWM or other feature (e.g., beaver dam) blocking passage	Remove fish barrier Evaluate barrier status during periods of fish use

### 5.7.2 Hydrology and Hydraulics

In the context of this Project, hydrology and hydraulics refer to how water moves through the Site and the extent and duration of flooding and inundation. Seasonal flooding is one of the primary goals of the Project because it creates off-channel habitat that is extremely important to juvenile salmon as they travel towards the ocean. Flooding also provides habitat for northern red-legged frogs, salamanders, and a host of other wildlife. The water inundating the Site will help support native vegetation. Connectivity of the North Channel (Sub-Area 3) to its adjacent floodplain and the Willamette River is critical to the successful restoration of off-channel habitat in Sub-Areas 3 and 4. Success in the realm of hydrology and hydraulics is determined by the extent and duration of flooding, which is primarily achieved by establishing appropriate elevations during site grading, making channel improvements, and establishing proper connections to the Willamette River. Two monitoring attributes have been defined for hydrology and hydraulics elements (Table 7).

**Table 7. Hydrology and Hydraulics**

<b>Performance Standard/Indicator, Management Trigger</b>	<b>Rationale</b>	<b>Potential Management Actions</b>
<b>Monitoring Attribute: Lateral Extent of Flooding</b>		
As-built modeling conditions: >20% change from as-built in extent and duration of flooding	<p>Inadequate connection to the river</p> <p>Floodplain sedimentation</p> <p>Beaver dams blocking on-flow</p> <p>Permanent, year-round surface water</p>	<p>Change river connection point</p> <p>Grade floodplain</p> <p>Install or alter water elevation control structure in channel</p> <p>Remove or alter beaver dams</p>
<b>Monitoring Attribute: Extent of Off-Channel Habitat</b>		
As-built modeling conditions: >20% change from as-built	<p>Inadequate connection to the river</p> <p>Floodplain sedimentation</p> <p>Beaver dams blocking on-flow</p>	<p>Change river connection point</p> <p>Grade floodplain</p> <p>Install water elevation control structure in channel</p> <p>Remove or alter beaver dams</p>
<p>Wetland hydrology change causes shortened hydro-period or loss of adequate depth and wetland area (shallow standing water) needed for amphibian larval incubation period (January through June); Triggers from January through May would be a change from baseline conditions in terms of any of the following parameters as follows:</p> <p>-wetland area extent</p> <p>-wetland depth</p> <p>From January through May, areal extent and depth of the wetland should maintain no less than 80% of the baseline measurements (&lt;20% change from baseline, defined by pre-project monthly averages). In June, the areal extent and depth of the wetland should be no less than 90% of the baseline measurements, as defined by pre-project weekly median.</p>	<p>Inadequate hydrology leading to loss of wetland habitat and function for red legged frogs, such as reduced hydro-period and lack of shallow standing water necessary for frog larva to complete development (e.g., change from tadpoles to frogs); primary concern is maintaining wetland hydroperiod during the driest months (June/July) to allow for complete metamorphosis .</p>	<p>Revise Sub-Area 4 outlets to reduce outflow and increase Sub-Area 4 hydroperiod duration and extent</p> <p>Create additional low-lying areas to increase hydroperiod duration and extent</p>

### 5.7.3 Sediment

Sediment is an indicator of how much energy is moving through a stream channel or the exposed banks along the Willamette River. Depending on the energy and gradient, sediment sizes can range from very fine silt to large rock. All the sediment types provide a variety of habitat functions that support target management species and ecosystem functions. Gravel and larger cobble provide refugia habitat for small fish and invertebrate prey production while also protecting streambanks from erosive forces. Finer material supports a different array of invertebrates and is more conducive to

plant growth while also being somewhat more erodible. Deposition of sediment can change channel and floodplain depths, alter the extent and duration of floodplain inundation, fill in pools, reduce available habitat, and support undesirable species of plants. Success in managing sediment is primarily achieved through proper site design, installation of a grade control structure to allow sediment deposition where it is desired, and maintenance of higher-energy streams to move material off-site. The performance standards in this section focus on substrate size and composition; floodplain depths and stream characteristics are evaluated in the previous sections.

**Table 8. Sediment**

Performance Standard/Indicator, Management Trigger	Rationale	Potential Management Actions
<b>Monitoring Attribute: Substrate Grain Size and Texture</b>		
Substrate size and >20% overall deviation from Project design.	Gradient too steep Gradient too flat Encroaching vegetation is causing deposition Upstream source of sediment	Change gradient control structure in North Channel Remove encroaching vegetation Change vegetation

#### 5.7.4 Vegetation

The Project goals for vegetation across all sub-areas are designed to maximize floodplain habitat complexity by establishing, enhancing, or conserving vegetation and habitat types. These goals will be achieved through invasive species removal and control and re-establishment of native vegetation through planting, reductions in competition from non-native species, and through natural recruitment (Figure 10). Minimizing invasive species throughout the Project area will contribute to increased native plant species diversity and habitat complexity. Species for which adaptive management may be necessary include RCG, Himalayan blackberry, non-native plant species on the current ODA Noxious Weed list and the Portland Plant List (Rank A, B, and C lists), and “early detection and rapid response” species identified by the Multnomah County and the Soil and Water Conservation District.

Post-construction vegetation monitoring and management for habitat areas in the Project area are discussed above in Sections 3.0 and 4.0. The AMP elements pertaining to habitat development address the broader issues of long-term adequacy and sustainability in attaining Project goals and performance standards (Table 9).

**Table 9. Vegetation Performance Standard/Indicator**

	<b>Performance Standard/Indicator, Management Trigger</b>	<b>Rationale</b>	<b>Potential Management Actions</b>
<b>Emergent Marsh (ACM)</b>	<b>Monitoring Attribute: Cover</b>		
	<p><u>Years 2-5</u></p> <p>&gt;30% <i>native</i> herbaceous: &lt;30% native herbaceous</p> <p>&lt;10% non-native herbaceous (excluding RCG): &gt;10 percent non-native herbaceous (excluding RCG)</p> <p>&lt;35 percent RCG (of areas Site-wide likely to support RCG): &gt;30% RCG (of areas Site-wide likely to support RCG)</p>		<p>Replant native vegetation</p> <p>Increase frequency or type of weed control</p>
	<p><u>Year 7</u></p> <p>&gt;50% <i>native</i> herbaceous: &lt;50% native herbaceous</p> <p>&lt;10% non-native herbaceous (excluding RCG): &gt;10% non-native herbaceous (excluding RCG)</p> <p>&lt;25% RCG (of areas likely to support RCG Site-wide): &gt;25% RCG (of areas Site-wide likely to support RCG)</p>	<p>Flooded and drowned</p> <p>Dried out</p> <p>Browsed by animals</p> <p>Crowded out by non-native species</p> <p>Pest infestations</p>	<p>Targeted herbicide application</p> <p>Change planting palette for specific locations</p> <p>Install larger plants</p> <p>Install fencing</p> <p>Irrigation</p>
	<p><u>Year 10</u></p> <p>&gt;70% <i>native</i> herbaceous: &lt;70% native herbaceous</p> <p>&lt;10% non-native herbaceous (excluding RCG): ≥20% non-native herbaceous (excluding RCG)</p> <p>&lt;20% RCG (of areas likely to support RCG Site-wide): &gt;20% RCG (of areas Site-wide likely to support RCG)</p>		<p>Change hydrology (e.g., depth and duration of surface water).</p>
	<b>Monitoring Attribute: Density</b>		
	<p>5,000 plugs per acre: &lt;5,000 plugs per acre</p> <p>&lt;5,000 plugs per acre</p>	<p>Flooded and drowned</p> <p>Dried out</p> <p>Browsed by animals</p> <p>Crowded out by non-native species</p> <p>Pest infestations</p>	<p>Replant native vegetation</p> <p>Increase frequency or type of weed control</p> <p>Change planting palette for specific locations</p> <p>Install larger plants</p> <p>Install fencing</p> <p>Irrigation</p>
	<b>Monitoring Attribute: Diversity</b>		



	<p>5 herbaceous species occupying &gt;5% cover and minimum 10% sample plots (ACM): &lt;5 herbaceous species occupying &gt;5% cover and 10% sample plots</p>	<p>Flooded and drowned Dried out Browsed by animals Crowded out by non-native species Pest infestations</p>	<p>Replant native vegetation Increase frequency or type of weed control Change planting palette for specific locations Install larger plants Install fencing Irrigation</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Riparian Forest, Scrub-Shrub, and Upland Forest</b></p>	<p><b>Monitoring Attribute: Cover</b></p>		
	<p><u>Years 2-5</u> &gt;10% native herbaceous: &lt;10% Native herbaceous &lt;10% non-native herbaceous (excluding RCG): &gt;10% non-native herbaceous (excluding RCG)  &lt;35% RCG (of areas Site-wide likely to support RCG): &gt;35% RCG (of areas Site-wide likely to support RCG)</p> <p><u>Year 7</u> &gt;55% native woody species: &lt;55% native woody species &gt;10% native herbaceous: &lt;10% native herbaceous &lt;10% non-native herbaceous (excluding RCG): &gt;10% non-native herbaceous (excluding RCG) &lt;5% non-native shrubs: &gt;5% non-native shrubs &lt;25% RCG (of areas Site-wide likely to support RCG): &gt;25% RCG of areas Site-wide likely to support RCG)</p> <p><u>Year 10</u> &gt;80% native woody species: &lt;80% native woody species &gt;10% native herbaceous: &lt;10% native herbaceous &lt;10% non-native vegetation (excluding RCG): &gt;10% non-native herbaceous (excluding RCG) &lt;20% RCG (of areas Site-wide likely to support RCG): &gt;20% RCG (of areas Site-wide likely to support RCG)</p>	<p>Flooded and drowned Dried out Browsed by animals Crowded out by non-native species</p>	<p>Replant native vegetation Increase frequency or type of weed control Change planting palette for specific locations Install larger plants Install fencing Increase frequency and duration of watering Irrigation Increase depth and duration of surface water</p>
	<p><b>Monitoring Attribute: Density</b></p>		

<p>&gt;1,200 native woody plants per acre: &lt;1,200 native woody stems per acre</p>	<p>Flooded and drowned Dried out Browsed by animals Crowded out by non-native species Pest infestations</p>	<p>Replant native vegetation Increase frequency or type of weed control Change planting palette for specific locations Install larger plants Install fencing Irrigation</p>
<p><b>Monitoring Attribute: Diversity</b></p>		
<p><u>Years 2-5</u> &gt;3 native tree species in forested habitat: &lt;3 native tree species in forest habitats  &gt;5 native shrub species in scrub-shrub and forested habitat: &lt;5 native shrub species in scrub-shrub and forested habitat</p>	<p>Flooded and drowned Dried out Browsed by animals Crowded out by non-native species Pest infestations</p>	<p>Replant native vegetation Increase frequency or type of weed control Change planting palette for specific locations Install larger plants Install fencing Irrigation</p>

### 5.7.5 Fish and Wildlife

The Project incorporates elements to provide beneficial wildlife habitat which will serve as a surrogate for assessing Project benefits to specific species. While there are species-use surveys proposed, they have no performance standards that must be achieved. Consequently, Project success for specific species will be assessed based on the Project’s ability to meet habitat-associated performance standards. As such, no adaptive management triggers or management actions are proposed to address species’ absence from the Harborton Site. However, given the importance of the northern red-legged frog population currently at the Site, it is anticipated that the frogs will persist at the Harborton Site and population trends for the Harborton population will be consistent with other northern red-legged frogs surveys from regionally-appropriate sites. Should significant declines in the Harborton population occur, PGE will meet with the Trustee Council to evaluate whether actions by PGE could be negatively affecting the frogs and identify additional actions (if appropriate and necessary) to mitigate the issue.

## 6. Harborton Long-Term Stewardship

Long-term stewardship is the planned monitoring, maintenance, and adaptive management of a restoration project in perpetuity. At the Harborton Project Site, long-term stewardship will begin after the Performance Period which will include active monitoring and maintenance. The Performance Period will end when the Trustee Council determines that the Year 10 performance standards have been met, or that the Performance Period is complete, whichever occurs first. Prior to Year 10 of the Performance Period, PGE will work with the Steward and/or Conservation Easement Holder to develop a site-specific LSP for the Project, with review and approval from the Trustee Council.

## 6.1 FRAMEWORK

The LSP framework presented here describes PGE's and the Trustee Council's expectations and commitments for long-term stewardship of the Project and includes four main parts: an Initial Site Assessment, annual stewardship activities, long-term decision making and adaptive management, and documentation and reporting. Each is presented in detail below.

Long-term stewardship will involve tasks such as:

- Regularly scheduled site visits to observe and document site conditions
- Managing invasive vegetation
- Maintaining fences and gates
- Ensuring any public uses are appropriate and any illegal or incompatible uses are addressed
- Long-term monitoring of parameters such as vegetation survival and maintenance of habitat characteristics to support northern red-legged frogs
- Clean-up and debris removal
- Maintaining positive relationships with adjacent landowners and interested community members
- Any other tasks required to maintain project effectiveness and full functionality of a given NRDA restoration project.

The goal of long-term stewardship is to ensure that the Project continues to meet the goals and objectives outlined in this document in perpetuity. In addition to active stewardship of the Site through the types of activities listed above, the Trustee Council expects that the Project's conservation features be permanently, legally protected through a Conservation Easement prior to the end of the Performance Period.

### **Need for Long-Term Stewardship**

The HEA model used to calculate ecological credit for an NRDA restoration project assumes that a given site will continue to provide ecological benefit to injured resources at least 300 years into the future. In practice, a variety of natural and anthropogenic phenomena threaten the ecological value of a project throughout its existence. Newly disturbed soils may activate a fallow seed bank that includes invasive species. Major flood events may occur 5, 15, or 50 years after a project is installed and severely alter habitat element locations, elevations, or features. Decades in the future, project ownership or land ownership may be questioned or challenged by new land uses, new community members, or shifting management priorities. An LSP, a stewardship fund, and permanent legal protection of the Site through a Conservation Easement are needed to ensure that a restoration project's ecological integrity is maintained in perpetuity.

### **Stewardship Roles and Selection of Roles**

The Trustee Council has identified up to 6 roles that may be involved in long-term stewardship at any given Portland Harbor NRDA restoration project:

- Long-Term Steward
- Conservation Easement Holder
- Stewardship Fund Manager
- Landowner

- Project Implementer
- Trustee Council and/or its designee(s)

Some of these roles overlap in the case of the Project. For example, PGE is both the Landowner and the Project Implementer at this Site. A single entity may serve certain roles for multiple Portland Harbor NRDA restoration projects. For example, the Trustee Council has expressed a preference towards having a single entity serve as the Long-Term Steward or Stewardship Fund Manager for all Portland Harbor NRDA restoration projects.

### **Long-Term Steward**

The Long-Term Steward (Steward) is the entity responsible for monitoring and maintaining the restoration Site after the Performance Period ends. The Performance Period ends when the Trustee Council determines that the Year 10 performance standards have been met, or that the Performance Period is complete, whichever occurs first. Once the Performance Period closes, long-term stewardship begins and extends into perpetuity. The Steward will conduct ongoing on-the-ground monitoring and maintenance activities such as regular site visits, invasive species management, fence maintenance, and trash clean up. The Steward will also be responsible for administrative activities such as development of the LSP (prior to beginning on-the-ground stewardship activities), development of annual maintenance plans, and reporting to the Trustee Council or its designee(s). The Steward will also be expected to coordinate with the Easement Holder, Landowner, Stewardship Fund Manager, and others as needed. Adequate funding to cover the Steward's responsibilities will be provided in the Long-Term Stewardship Funding Plan (see Section 5.2).

### **Steward Selection**

The Steward will be determined by the Trustee Council in cooperation with the Landowner and Conservation Easement Holder. This decision will be made before the Long-Term Stewardship Phase begins. Likely candidates for the role of Steward may be the Landowner or a third-party group, such as a non-profit organization with a natural resource conservation-oriented mission and restoration project management expertise. Although there may be significant temptation to allow various Project Implementers, Landowners, or potentially responsible parties to provide long-term stewardship at individual restoration projects, the Trustee Council has a strong preference towards employing a single, outside entity to provide long-term stewardship services at all Portland Harbor NRDA restoration projects to ensure objectivity, maximum efficiency, and consistency among the projects. The initial agreement between the Trustee Council and the Steward may be termed in order to allow for a trial period to make sure that the Steward is a proper fit for the needs of the restoration project. The Steward may choose to subcontract with other organizations for work crews, specialized technical assistance, or other activities as needed.

### **Conservation Easement Holder**

The Conservation Easement Holder (Easement Holder) shall be an organization qualified under ORS 271.715 (3) to hold a conservation easement. The Easement Holder's duties may include, but are not limited to the following tasks:

- Receive conveyance of a permanent conservation easement; perform annual conservation easement monitoring to ensure that the terms of the easement are not violated;
- Coordinate with the Trustee Council or its designee(s), Landowner, Project Implementer, Long-Term Steward, and Stewardship Fund Manager;
- Conduct enforcement or legal defense of the easement as required by circumstances at the restoration project; and

- Report to the Trustee Council or its designee(s) and partners on compliance with terms of the conservation easement and use of stewardship funds.

Adequate funding to cover the cost of holding a conservation easement for the Project will be provided by the stewardship fund. To minimize risk, the Trustee Council recommends that Easement Holders investigate the possibility of getting insurance to support easement enforcement. Terrafirma is an example of an insurance program available to Land Trust Alliance members.

#### **Conservation Easement Holder Selection**

Prior to the end of the Performance Period, the Harborton Site will be permanently protected with a conservation easement. A permanent Easement Holder shall be approved by the Trustee Council, in cooperation with PGE or successor Landowner, prior to the close of the Performance Period. Once the permanent Easement Holder is approved, a conservation easement deed running with the land and restricting the uses of the Project consistent with the restoration plan, performance standards, and conservation values expressed therein shall be recorded to ensure the protection of the Project in perpetuity.

In limited cases, a deed restriction may be used in lieu of a conservation easement to protect the conservation value of a restoration project. Such instances may include projects where the property is publicly owned, owned by a conservation-missioned organization, or other instances where the conservation values of the property are already otherwise reasonably protected in perpetuity. A deed restriction may also be required during the Performance Period as an interim method of land protection until a conservation easement can be secured for the property. PGE plans to use an interim deed restriction until it enters into a conservation easement deed that will permanently protect the Harborton Site.

#### **Stewardship Fund Manager**

The Stewardship Fund Manager (Fund Manager) will be responsible for managing the stewardship fund as a non-wasting fund that accrues sufficient interest to finance annual stewardship activities in perpetuity. The Fund Manager will be responsible for providing financial documentation and reporting to the Trustee Council or its designee(s) on a regular basis. The Fund Manager will be expected to coordinate with the Steward and Easement Holder for each restoration project. If the Steward and Easement Holder for a given project are different entities, the Fund Manager may need to track and disperse funds to these entities separately. Given the Trustee Council's preference to pool stewardship funds from all Portland Harbor NRDA restoration sites into a single fund, the Fund Manager may also need to track expenses and income across multiple projects.

#### **Stewardship Fund Manager Selection**

The Trustee Council will select a Fund Manager before the Long-Term Stewardship Phase begins. Likely candidates for the role may be a non-profit organization with a natural resource conservation-oriented mission and stewardship fund management expertise or a third-party investment management and advisory firm. The Trustee Council has a strong preference towards employing a single, outside entity to provide stewardship fund management services for all Portland Harbor NRDA restoration projects to ensure objectivity, maximum efficiency, and consistency among the projects.

#### **Landowner**

The entity or entities that hold fee title to the land where the restoration project is occurring (in the case of the Harborton Site, PGE is currently the Landowner). PGE is working with Multnomah County to adjust the boundaries of the two tax lots at Harborton so that the Harborton Site will be entirely within a single, contiguous tax lot. PGE is seeking to transfer ownership by Q2 of 2021.

PGE or the successor Landowner will need to work closely with the Easement Holder and Steward to clarify roles and responsibilities, allow access, and coordinate activities during the Long-Term Stewardship Phase of the project. Before the first release of restoration credits, the Trustee Council requires that a deed restriction be in place restricting the uses of the Harborton Site for conservation purposes. The Trustee Council also requires that the deed restriction be superseded by a conservation easement no later than the close of the Performance Period. Among other things, these property protections will ensure that the conservation values of the Harborton Site will be sustained when land ownership changes in the future.

### **Project Implementer**

The Project Implementer is the entity implementing the restoration project to compensate for natural resources damages from the Portland Harbor Assessment Area (Harbor); in the case of the Project, PGE is the Project Implementer. The Project Implementer is responsible for the project during the Performance Period and will be an essential contributor during the transition phase when an Easement Holder, Steward, and Stewardship Fund Manager are selected. Unless the Project Implementer also serves in one of the other roles outlined here, the Project Implementer's role will terminate at the Long-Term Stewardship Phase of the Project.

### **Trustee Council**

The Trustee Council (or its designee(s)) will provide oversight of Portland Harbor NRDA restoration projects during the Long-Term Stewardship Phase. The Trustee Council or its designee(s) may review and oversee regular reporting of monitoring results, site visits, maintenance activities, qualitative monitoring results (observational and photographic), enforcement issues, financial management, adaptive management activities, and descriptions of community involvement that will be provided to the Trustee Council or its designee(s) by the Steward.

### **Long-Term Stewardship Tasks**

Long-term stewardship tasks at the Project will include:

- Monitoring
- Maintenance
- Program Management
- Community Relations and Enforcement
- Reporting, Documentation, and Data Management

Some key long-term stewardship tasks specific to the Project are outlined below.

#### **6.1.1 Initial Site Assessment**

Long-term stewardship begins at the end of the Performance Period with the assessment of the Site or when initial performance standards have been met. For the Site, the implementation of the Project includes the following attributes:

- Construction of a new North Channel stream channel to re-establish a hydraulic connection between Sub-Area 3 and the Willamette River.
- Enhancement of fish habitat and riparian habitat characteristics in and along the new North Channel.
- Excavation and re-grading of portions of the Site to provide seasonally available off-channel habitat within the floodplain.

- Preservation and enhancement of wetland area utilized by northern red-legged frogs.
- Control of invasive plant species found throughout the Site through removal, Site revegetation, and routine maintenance.
- Enhancement of shoreline, riparian, and upland habitats, through native revegetation plantings and maintenance.

The Initial Site Assessment will document each attribute identified above through site visit observations, notes, photo documentation, and mapping as needed to establish baseline conditions. These baseline conditions will establish what has been agreed to and what should be maintained or adaptively managed through time. The Long-Term Steward will be responsible for performing this work.

## 6.1.2 Stewardship Funding Plan

### **6.1.2.1 Stewardship Funding Assumptions**

The Long-Term Stewardship Framework, Funding Plan, and budget assumes that the following Project attributes will be established during the Performance Period:

- Construction of a new North Channel stream channel to re-establish a hydraulic connection to the Willamette River.
- Enhancement of fish habitat and riparian habitat characteristics in and along the new North Channel.
- Excavation and re-grading of portions of the Site to provide seasonally available off-channel habitat within the floodplain.
- Preservation and enhancement of wetland area utilized by northern red-legged frogs, including excavation within wetland areas to enhance amphibian (northern red-legged frog) habitat.
- Control of invasive plant species found throughout the Site through removal, Site revegetation, and routine maintenance.
- Enhancement of shoreline, riparian, and upland habitats, through native revegetation plantings and maintenance.

The roles and responsibilities for each partner will be varied. Currently, PGE is the Project Implementer and current Landowner. PGE is responsible for coordinating with the Trustee Council, construction of the Project and monitoring and maintenance during the Performance Period. The Steward and Conservation Easement Holder have not been identified but are anticipated to take on management of the Project at the close of the Performance Period. PGE will adjust the Property boundaries to create a parcel with the Restoration Project separate from the parcel with the substation facility. In the future, PGE intends to transfer the parcel with the Restoration Project to a successor Landowner. The Land Steward (to be determined) will complete or manage the inspection and maintenance of the Site. Specific and more detailed tasks are described in Section 6.1. Prior to the end of the Performance Period, PGE will work with the Steward and/or Conservation Easement Holder, and the successor Landowner to develop a site-specific LSP for the Project, with review and approval from the Trustee Council.

### **6.1.2.2 Proposed Management**

The proposed management tasks are outlined in the Long-Term Stewardship Framework (Section 6.1) and include site assessment, stewardship activities, and reporting. Details including level of effort and unit costs are included in the Stewardship Funding Budget table (Attachment D). Below is a description of specific stewardship tasks expected to occur at the Project:

- **Monitoring:** Annual monitoring of the Site will be conducted by the Site Steward and Conservation Easement Holder. An annual survey is assumed for vegetation and habitat monitoring, invasive species and other information as necessary (e.g., stormwater, geotechnical, etc.)
- **Maintenance:** Basic maintenance for signage, trash collection and fence maintenance on a quarterly basis
- **Habitat maintenance:** Annual maintenance for invasive species, brush management, erosion control, tree, major flood cleanup, plantings, and revegetation
- **Program Management:** Administrative costs including computers, internet, office supplies, insurance, legal, accounting and general management
- **Community Relations and Enforcement:** Public services including annual community meetings, quarterly patrolling, working with law enforcement addressing encampments and any other issues
- **Reporting, Documentation, and Data Management:** One-time stewardship plan, 5-year updates to the plan, annual maintenance plan, annual monitoring report, annual fiscal report, GIS mapping and website management
- **Administration:** 25% of the all task subtotals was assumed for administration costs

### 6.1.2.3 Cost Estimate

PGE reached out to the Columbia Land Trust who provided the stewardship/property analysis record spreadsheet for estimating annual costs during stewardship. The spreadsheet produced an annual cost of \$130,382.00. The estimate includes items for monitoring, maintenance, program management, community relations, reporting administration, and a contingency. Assuming a 5% rate of return and calculating the present value of perpetuity funding (annual cost divided by rate of return), the stewardship fund will require \$2,607,640.00 in initial funding (see Attachment D).

The stewardship funding will come from the sale of DSAY credits. Prior to the funding of the stewardship account, this money will be held in the account created and approved by the Public Utility Commission of Oregon's (PUC) Order 17-017, dated March 2, 2017 (PUC Order). This account is called the Portland Harbor Environmental Restoration Account (PHERA).

For each credit sold, for the first 50 percent of credits sold, PGE will set aside \$8,870.00 in the PHERA.<sup>2</sup> This money will be protected in anticipation of its future transfer to the long-term stewardship fund and PGE will create a separate tracking account within the PHERA to verify that a portion of each DSAY credit sale for the first half of the credits sold were utilized to fund long-term stewardship. If the long-term stewardship account does not hold at least \$2,607,640.00 by Year 8 of the Performance Period, PGE shall fund the difference between the account value and \$2,607,640.00 to ensure that the long-term steward's funding is adequate.

The PUC Order also adopted PGE's requests to:

- Restore a parcel along the Willamette River and generate and sell environmental remediation credits (DSAYs) from the Project;
- Implement a new environmental rate schedule (PGE Rate Schedule 149, Environmental Remediation Costs Recovery Adjustment), as part of the PHERA Remediation Account.
  - Rate Schedule 149 is used to recover from customers the costs (net of revenues) associated with the Portland Harbor Superfund site, the Natural Resource Damages

<sup>2</sup> \$2,607,640.00 (total required long-term stewardship funding) ÷ by 294 DSAYs (half of the projected DSAY value of the Project) = \$8,870 (the proportion of each DSAY that must be set aside to ensure complete long-term stewardship funding by the time half of the value of the project is sold).



obligation, the Downtown Reach portions of the Willamette River and the Project. These costs and revenues include construction, environmental permitting and design, legal expenses caused by pursuing historical insurers, Discount Service Acre Year (DSAY) credit sales revenues, insurance proceeds, and other potential revenues.

- Defer associated costs and revenues; and
- Place restrictions and conservation easements on the Harborton Site regarding future use.

The PHERA is designed to allow PGE to establish a separate account and funding (including holding of insurance proceeds) for cleanup, remediation, and restoration costs. The PHERA will also act as a place to hold DSAY revenues over the life of the Project and the expected remediation period, which will help PGE offset the costs paid out of the PHERA. The stewardship funds in the PHERA will be held in a sub-account designated only for long-term stewardship of the Harborton Project and will not be used for other cleanup, remediation, or restoration activities by PGE. The long-term stewardship funds will be tracked within the general ledger for the PHERA account.

Under the PHERA, PGE submits quarterly and annual reports to the PUC that include the tracking of the associated costs and revenues. PGE's actions under the PHERA are subject to PUC annual prudence review to ensure responsible management and proper use of rate-payer funds. PGE will provide copies of these reports to the Trustee Council with the relevant accounts or amounts highlighted. These reports will include tracking of deposits into the long-term stewardship fund as well as documentation of the balance of long-term stewardship funding at the end of the reporting period. If long-term stewardship funds are found to have been erroneously used for another Portland Harbor-related purpose, those funds will be repaid into the PHERA by PGE.

In Year 8, the long-term stewardship funds in the account will be turned over to the Long-Term Steward to perform their stewardship activities.

### 6.1.3 Annual Stewardship Plan (activities)

The Long-Term Steward will complete or manage the inspection and maintenance of the Site. Several tasks are described below. The focus and detail of some tasks are presently unknown but will be clarified as post-implementation Project conditions become established and finalized when the Initial Site Assessment is completed. The Initial Site Assessment will be performed following completion of Project construction by the Long-Term Steward.

Annual site visits will document changes considered to be a reduction in the structure and function of the created habitat. Recommendations for management actions required to bring deficiencies back to acceptable standards would then be completed and implemented. The following are inspection/monitoring and maintenance duties the Harborton Steward may undertake or contract once the Long-Term Stewardship Phase begins. Some of the inspections will require knowledge of plant ecology, fish and wildlife biology, hydrology, geomorphology and engineering, to understand the original intent of the work, identify future changes in habitat condition and function, and recommend maintenance actions.

The Steward will also visit and inspect the Site following the occurrence of a 100-year flood event or after a significant local seismic event. The 100-year flood event in the lower Willamette River is defined as a river stage of 32.2 feet NAVD 88 (30.1 feet CPD) or a river discharge of 375,000 cubic feet per second (2014). A significant local seismic event is defined as an earthquake in excess of magnitude 6.

**6.1.3.1 Vegetation Management**

A major component of the Project is the removal of invasive plant species and the replanting of native plants throughout the Site. Native plantings and invasive plant control will include upland, shoreline, riparian, and wetland zones throughout the Site. Controlling invasive plants will be a continual process on the Site and will likely require on-going maintenance into the future. Invasive plant control may include mechanical or chemical treatments, as well as other treatments, as needed to control invasive species, other than in certain identified areas within Sub-Area 4 (see Section 4.1.3.4 of the Habitat Development Plan, and Section 4.3.4.4 of this document) , where mechanical and chemical treatments should not be employed to protect the red-legged frog breeding cycle.

Vegetation management also includes vegetation growth (native or invasive) which may reduce safety and access. Overgrown areas that prevent access to easements would need to be cut back to maintain access.

**6.1.3.2 Northern Red-legged Frog Habitat Preservation and Enhancement**

Another important part of the Project is preservation and enhancement of northern red-legged frog habitat along the western edge of the Site. To achieve this goal, the eastern edge of existing wetland pond area will be expanded laterally into Sub-Area 3 by excavating adjacent uplands (e.g., existing levee) to lower the surface elevation thereby increasing the area of amphibian (northern red-legged frog) habitat. To enhance existing habitat, structures will be placed in Sub-Area 4.

Frog habitat enhancement areas will be included in the inspection and maintenance program. Physical habitat conditions (areal extent, depth monitoring, photo points) in January through July, egg mass numbers in February through March and presence/development of tadpoles in June through July will be examined annually. Annual egg-mass counts will be compared to Sub-Area 4 baseline conditions (average of 2018, 2019, and data to be collected in Year 0). Annual egg-mass counts by others from Multnomah Channel Marsh or other regionally appropriate sites will also be evaluated for use in gauging annual variation in egg mass numbers. Egg mass counts and low-water inundation estimates could provide opportunities for the Steward to develop a partnership with interested community groups to monitor the Site and document northern red-legged frog presence and habitat use.

**6.1.3.3 North Channel Re-construction and Fish Access**

To re-establish fish access and rearing, the North Channel will be created beginning at the existing ponded wetland along the western edge of the Site. LWM creating fish cover habitat will be constructed within the North Channel. The goal is to re-establish a hydraulic connection to the Willamette River where juvenile anadromous salmon can access and feed within the new channel during high water stage. Wetland and riparian plants will be established within the margin of the North Channel. Long-term stewardship inspection will require a channel walk annually to inspect fish access and use, LWM condition, native plant health, and invasive plant species presence.

**6.1.3.4 Elevational Integrity of Fill Areas Overexcavated to Address Surface Contaminants**

Surface erosion may occur as a result of fluvial and/or geomorphological processes. Maintaining fill over areas with known pollutants will require knowledge of those areas and annual field observation to ensure cover is maintained. Long-term stewardship will include monitoring and, if necessary, regrading or adding material to these areas to re-establish adequate cover over contaminated areas.

**6.1.3.5 General Habitat Inspection and Maintenance Need**

Habitat degradation or uplift could occur slowly over time or rapidly during a flood event. In the coming decades, comparison to the Initial Site Assessment will provide guidance as to when

intervention is required to maintain habitat or when natural processes that slowly change habitat should be allowed to continue.

#### 6.1.4 Community Relations and Enforcement

##### **6.1.4.1 Infrastructure Maintenance, Inspection and Clean-up**

Access to the Site brings with it the need to control public use and movement. Fences, gates, access roads and trails will all require inspection and maintenance when or where they exist. Trespassing, dumping, or other illegal activities may occur at the Site and would require time and labor to manage. The Conservation Easement Holder, Landowner, or Trustee Council or its designee(s) will assume the responsibility of taking legal actions on enforcement issues as part of its ongoing management at the Site. The Long-Term Steward will, as appropriate, bring to the attention of the Trustee Council and/or its designees, Landowner, and/or Conservation Easement Holder, any issues requiring potential enforcement action and will cooperate with those parties as necessary. The Steward will document and be responsible for repair or cleanup resulting from public use.

##### **6.1.4.2 PGE Substation Activities**

PGE is in the process of adjusting the current Property boundaries of the two tax lots at Harborton so that the substation and associated PGE utility infrastructure falls within a single, contiguous tax lot. The second of the two lots will be comprised of the Restoration Project. Maintenance and routine activities at the PGE substation will be infrequent due to the nature of the facility. Necessary activities associated with the facility will be confined to the fenced compound, existing distribution poles, stormwater facility and access road. Activities will be infrequent (approximately 1 time per month) and would consist of maintaining plants in the stormwater bioswale and checking substation equipment. Above ground utility lines cross the Site. Public or private utilities, including electric, telephone, or other communications services over the Site, are permitted, provided that such utilities over the Site must be installed, maintained, repaired, removed, or replaced within their existing right-of-way consistent with prudent utility practices. Any impacts to conservation values caused by utility repair, maintenance, installation, removal, or replacement over the Restoration Area shall be addressed by the Landowner consistent with the Harborton Restoration Plan. When conducting aerial utility line maintenance, installation, repair, removal, or replacement, use of aircraft will be minimized to the extent feasible during bird nesting season from March 15th to August 15th to avoid disturbance of nesting and foraging waterfowl and other migratory birds. Specific to eagle nest(s) located in the Restoration Area, aircraft will adhere to the National Bald Eagle Management Guidelines for allowable activities and are prohibited within 1,000 feet of such nest(s) from January 1st to August 15th unless otherwise authorized by permit.

The Long-Term Steward will, as appropriate, bring to the attention of the Trustee Council and/or its designees, Landowner, and/or Conservation Easement Holder, any issues requiring potential review for habitat functions and longevity.

#### 1. Pre-Existing Easements

There are easements that cross the restoration Site in the form of a petroleum pipeline and telecommunications line (Figure 2). These easements and rights have been in place for decades prior to Project implementation with no impacts and should only have limited short-term impacts to the Project in the future. Easements require the removal of trees that colonize easement areas and allow the removal and/or control of weedy plant species consistent with other practices around the Site (e.g., limited or no herbicide use). The Landowner shall use best efforts to ensure that pre-existing easement holders' activities on the Site are consistent with their rights and obligations under their easement agreements. To the extent easement holders' permitted activities have an impact to the ecological values of the Site, the Landowner shall work to restore affected areas to equal or better condition. The Landowner will coordinate with Trustees and/or the Long-Term Steward and

Conservation Easement Holder to address impacts to the Site caused by pre-existing easement holders' activities.

These key stakeholders would be the Long-Term Steward and Conservation Easement Holder.

#### **6.1.4.3 Adjacent Land Uses**

As part of the long-term stewardship of the Project, nearby activities and their impact to the Site will be considered. In general, there should be few impacts to the Site from adjacent property uses. Another potential restoration project, the Miller Creek Restoration Project, may be implemented adjacent to the Project to the north and the two projects may connect to each other. If this comes to pass, there will be common goals that will make working together easy and possibly the same Steward will be responsible for both sites.

PGE will continue to operate its Harborton substation adjacent to the Site. There are no actions related to substation operation that would require on-the-ground entry into the Site, and no substation functions that would affect the restoration Project. Bonneville Power Administration (BPA) owns the property to the south of the Harborton Site. This property serves as a transmission line corridor. There should be no activities that would require BPA to enter the Harborton Site. Marina Way and then Highway 30 border the Site to the west. There will be no impacts from those roads to the Site.

#### **6.1.4.4 Neighborhood Communication**

Long-term Project success will depend on local community support of restoration actions. Local Project interest and access could aid the Steward by providing accounts of illegal activity or physical problems at the Site in-between Steward site visits. Problems identified by the local community could be addressed quickly and more efficiently, potentially reducing environmental loss and repair costs. Building and maintaining this type of community relationship will require reaching out to local interest groups through email, meeting attendance, and/or personal communications.

### **6.1.5 Documentation and Annual Reporting**

All entities involved with long-term stewardship of the Project will provide documentation of monitoring, adaptive management, and stewardship tasks to the Trustee Council or its designee(s) and other interested parties on a regular basis. At a minimum, the documents outlined in Table 10 will be provided to the Trustee Council or its designee(s) as they are developed or on an annual basis, depending on their frequency. The Trustee Council or its designee(s) shall have discretion to make such documentation available to the public.

Restoration Site information and data will be made available to the public in the form of a website, online database, and/or online mapping feature so that the general public can access information about the Project and stay involved in events such as work parties and community discussions.

**Table 10. Documentation and Reporting for Long Term Stewardship**

<b>Product</b>	<b>Purpose</b>	<b>Frequency</b>
Initial Site Assessment	Describe baseline condition of site when long-term stewardship begins.	One time
LSP	Provides prioritization methodology and actions among sites.	Once at the beginning and then update periodically as needed.
Monitoring Report	Provides current condition information and management and maintenance recommendations for the following year.	Annual
Fiscal Report	Document interest accrual, spending, and overall standing of Long-Term Stewardship Fund.	Annual
Notification of Enforcement Issue	Notify the Trustee Council or its designee(s) of enforcement issue and whether assistance is needed to resolve the problem.	As needed

### 6.1.6 Program Management

The Long-Term Steward will be required to provide program management. These activities include the labor and overhead for the Steward. Items include office space and supplies, insurance, communications, travel, contracting, accounting, etc.

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## Figures

- Figure 1. Portland Harbor NRDA Site Monitoring and Stewardship Model
- Figure 2. Harborton Basic Restoration Elements
- Figure 3. General Habitat Monitoring Transect Map
- Figure 4. North Channel Habitat Monitoring Transect Map
- Figure 5. Fixed Monitoring Stations
- Figure 6. Sample Line Intercept Vegetation Assessment Plot
- Figure 7. Sub-Area 4 Reed Canarygrass Treatment Map
- Figure 8. Breeding Bird Monitoring Transect Map
- Figure 9. Conceptual Adaptive Management Cycle
- Figure 10. Planting Zones



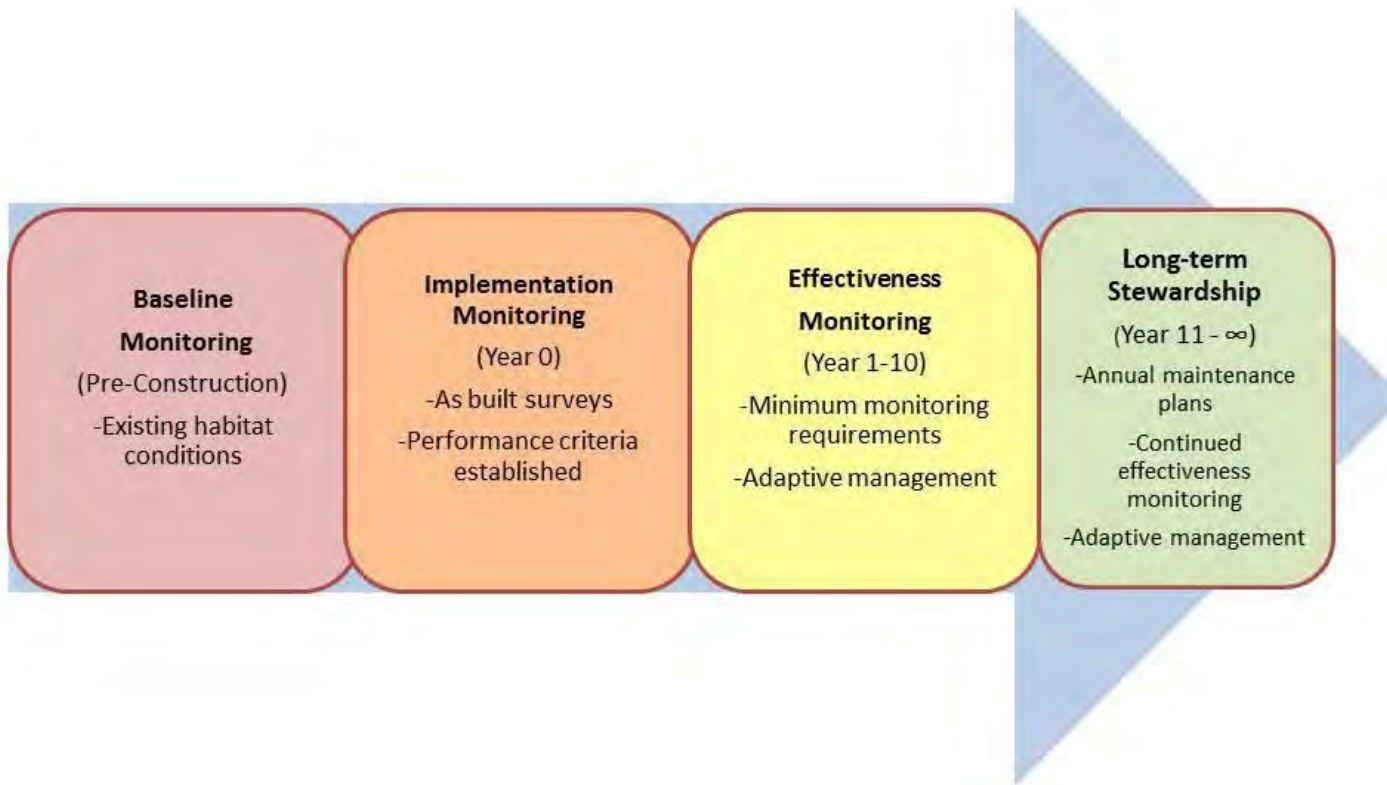
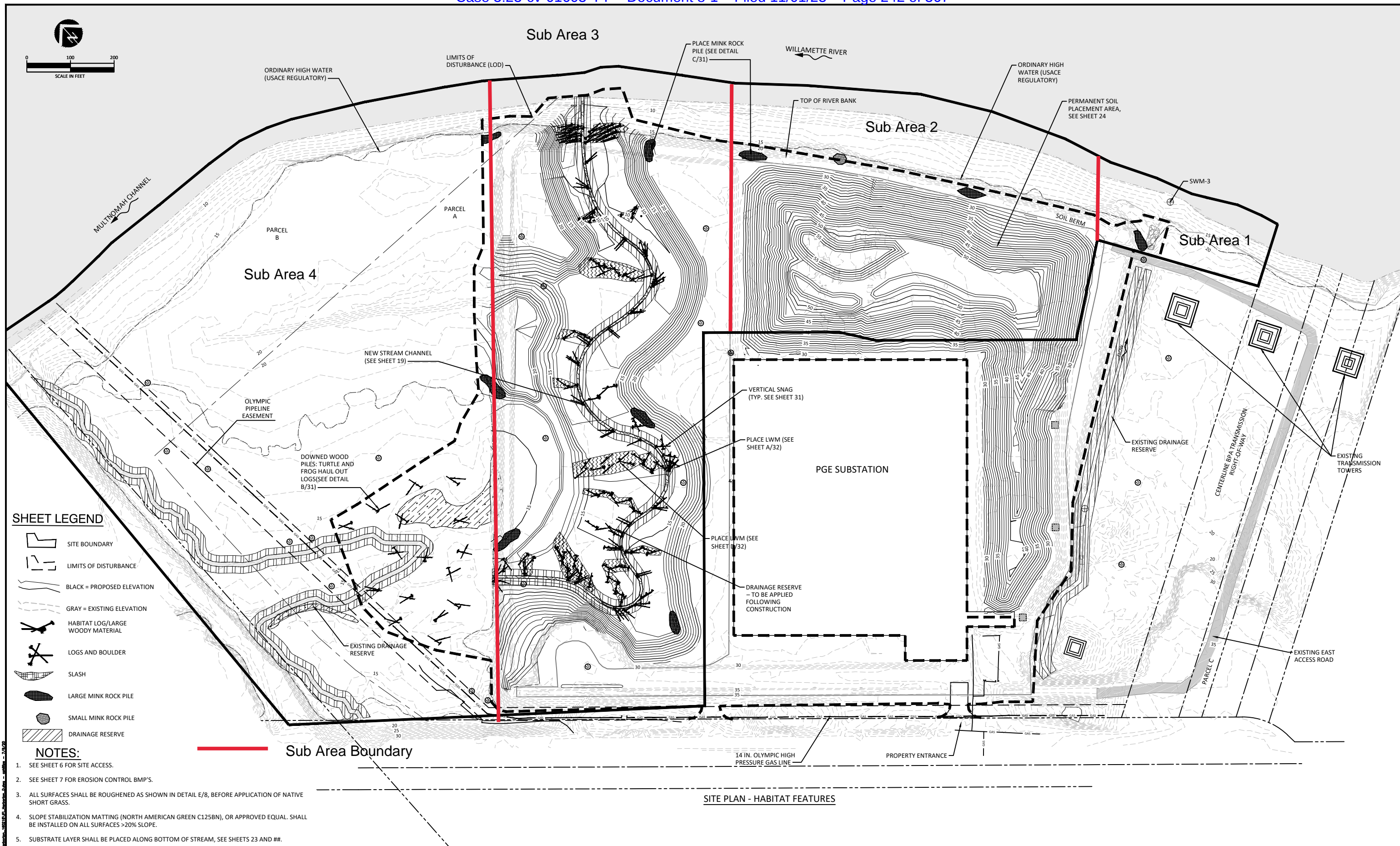


FIGURE 1 – Portland Harbor NRDA Site Monitoring and Stewardship Model



NO.	BY	DATE	REVISION DESCRIPTION

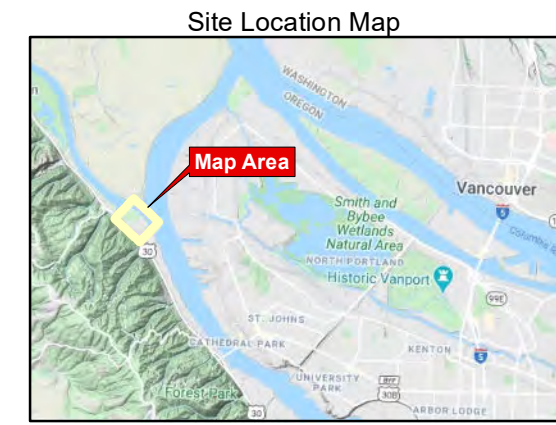
RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
MB, DM APPROVED	7/6/20 DATE	160218 PROJECT

PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON









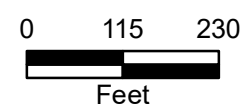
HARBORTON BASIC  
RESTORATION ELEMENTS

FIGURE  
2



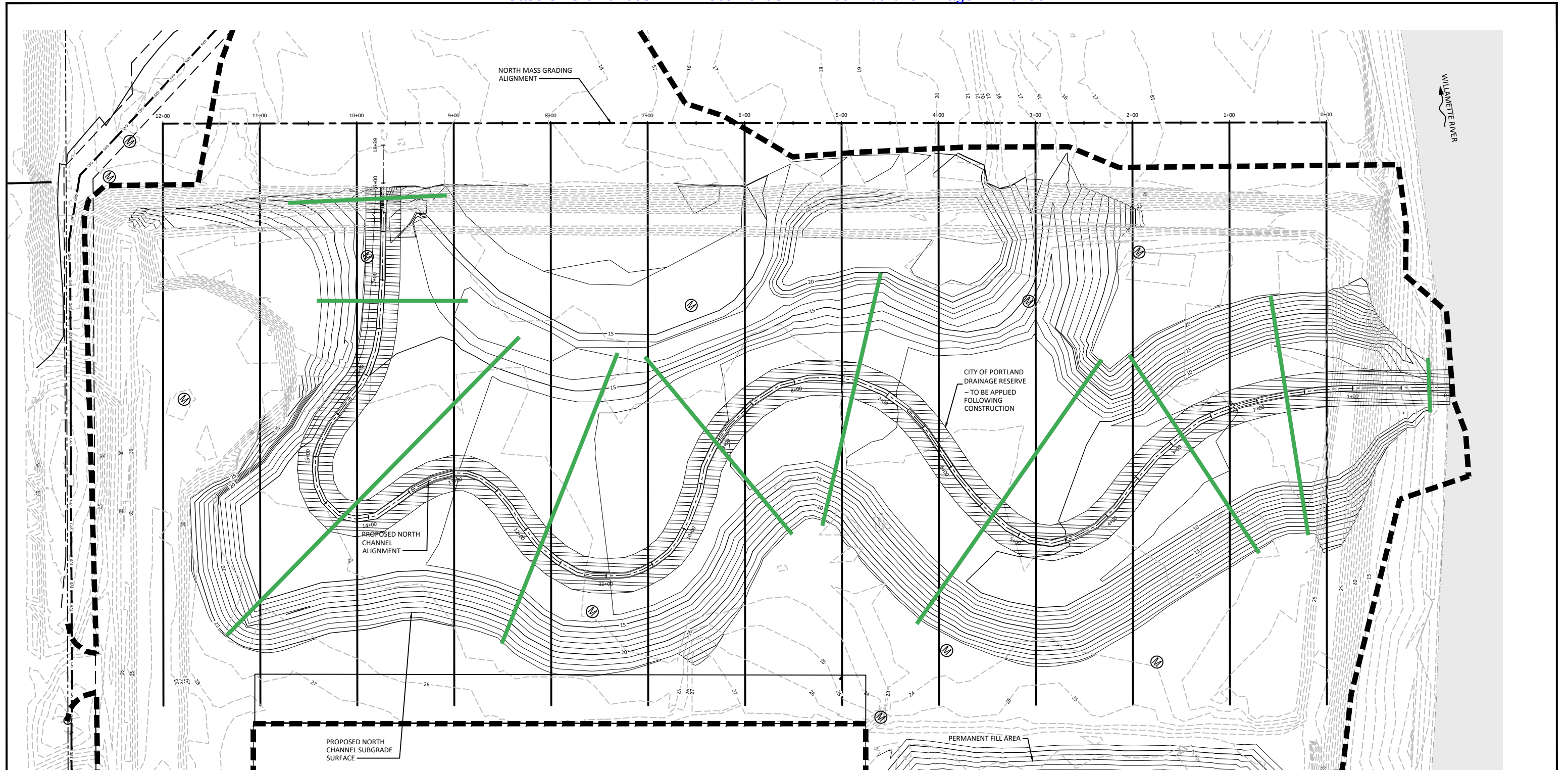
**Map Features**

-  Habitat Area
-  Non-Habitat Area
-  Survey Transect
-  Property Line
-  Olympic Pipeline
-  Sub-Area Boundary



**Portland General Electric**  
Portland, Oregon

**Figure 3**  
**General Habitat**  
**Monitoring Transect Map**  
**Harborton Restoration Project**

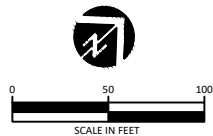


**SHEET LEGEND**

- MONITORING TRANSECT
- LIMITS OF DISTURBANCE
- BLACK = PROPOSED ELEVATION
- GRAY = EXISTING ELEVATION
- DRAINAGE RESERVE

**NOTES:**

1. SEE SHEET 6 FOR SITE ACCESS.
2. SEE SHEET 7 FOR EROSION CONTROL BMP'S.



PI Station	Northing	Easting
0+00.00	719,549.02	7,614,601.26
0+51.97	719,510.48	7,614,566.39
0+78.95	719,490.80	7,614,547.93
1+11.48	719,466.61	7,614,526.19
1+37.42	719,446.52	7,614,509.78
1+63.59	719,425.20	7,614,494.60
1+90.67	719,402.24	7,614,480.24
2+16.72	719,379.28	7,614,467.94
2+42.73	719,355.38	7,614,457.67
2+62.96	719,336.29	7,614,450.97
2+93.81	719,305.56	7,614,448.35
3+20.75	719,278.63	7,614,447.37
3+53.83	719,245.76	7,614,451.00

PI Station	Northing	Easting
3+86.66	719,213.42	7,614,456.71
4+14.38	719,185.71	7,614,457.23
4+40.86	719,160.17	7,614,450.23
4+64.56	719,139.24	7,614,439.11
4+87.35	719,124.85	7,614,421.44
5+13.80	719,116.42	7,614,396.37
5+39.06	719,114.05	7,614,371.22
5+61.42	719,113.41	7,614,348.87
5+88.05	719,115.28	7,614,322.30
6+18.77	719,120.08	7,614,291.96
6+47.16	719,124.25	7,614,269.88
6+73.80	719,124.78	7,614,237.25
7+03.62	719,119.19	7,614,207.95

PI Station	Northing	Easting
7+36.46	719,105.63	7,614,178.05
7+59.83	719,090.59	7,614,160.16
7+84.88	719,071.89	7,614,143.48
8+16.35	719,044.26	7,614,128.44
8+49.01	719,012.09	7,614,122.74
8+81.98	718,979.12	7,614,123.14
9+09.85	718,951.84	7,614,128.83
9+32.38	718,930.86	7,614,137.04
9+57.81	718,910.30	7,614,152.01
9+90.96	718,880.58	7,614,166.70
10+13.92	718,858.83	7,614,174.04
10+29.04	718,843.91	7,614,176.45
10+46.74	718,826.28	7,614,174.84

PI Station	Northing	Easting
10+62.09	718,811.46	7,614,170.84
10+77.40	718,797.39	7,614,164.81
10+94.48	718,784.17	7,614,153.99
11+12.89	718,770.96	7,614,141.17
11+29.80	718,760.94	7,614,127.54
11+54.25	718,753.67	7,614,104.20
11+81.69	718,750.46	7,614,076.95
12+08.64	718,752.87	7,614,050.10
12+29.69	718,756.65	7,614,029.40
12+51.48	718,757.45	7,614,007.62
12+70.91	718,754.00	7,613,988.50
12+86.51	718,746.79	7,613,974.67
12+99.68	718,737.48	7,613,965.35

PI Station	Northing	Easting
13+20.98	718,718.60	7,613,955.49
13+43.84	718,696.57	7,613,949.38
13+62.02	718,678.52	7,613,947.26
13+92.31	718,648.53	7,613,943.01
14+12.99	718,631.38	7,613,931.15
14+31.67	718,620.56	7,613,916.23
14+52.77	718,619.87	7,613,895.14
14+70.15	718,625.41	7,613,878.67
14+86.36	718,635.03	7,613,865.62
15+00.77	718,645.30	7,613,855.50
15+13.54	718,656.55	7,613,849.47
15+36.73	718,678.44	7,613,841.80
15+54.58	718,696.06	7,613,838.97

PI Station	Northing	Easting
15+71.69	718,712.87	7,613,835.75
15+88.00	718,729.03	7,613,833.60
16+05.37	718,745.53	7,613,828.16
16+26.87	718,764.50	7,613,818.06
16+48.10	718,781.46	7,613,805.27
16+78.93	718,804.01	7,613,784.25
17+01.84	718,820.66	7,613,768.52
17+22.31	718,834.75	7,613,753.67
17+76.94	718,872.54	7,613,714.22
18+39.07	718,914.77	7,613,668.64

RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED
APPROVED	DATE	PROJECT
		160218

**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**

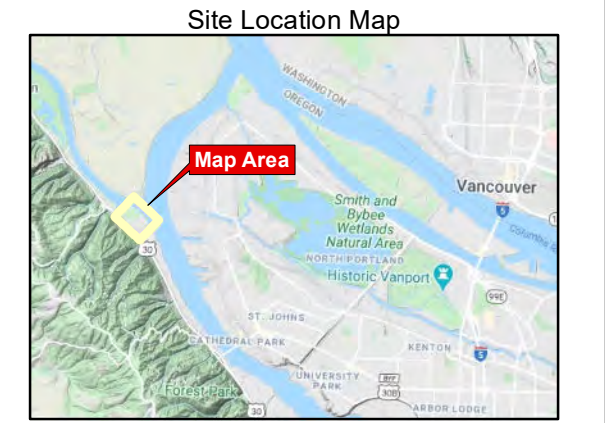


**MONITORING TRANSECTS -  
NORTH CHANNEL**

**FIGURE  
4**

NO.	BY	DATE	REVISION DESCRIPTION





- Map Features**
- Habitat Area
  - Non-Habitat Area
  - Survey Transect
  - Property Line
  - Olympic Pipeline
  - ◆ Macroinvertebrate Monitoring Stations Wetland
  - + Surface Water Level / Water Quality Station
  - 🐟 Fish Passage Structure/Fish Accessibility
  - ⊘ Bald Eagle Monitoring Station
  - 🐕 Mink Scent Station/ Photomonitoring
  - Mink Track and Scent Monitoring Routes
  - Extent of High Flow Inundation



**Portland General Electric**  
Portland, Oregon

Figure 5  
**Fixed Monitoring Stations**  
**Harborton Restoration Project**

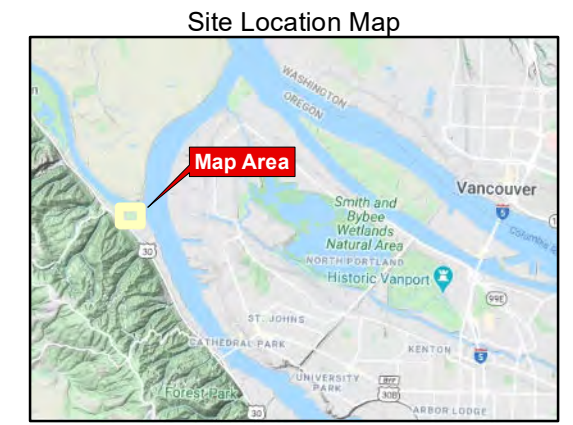


- Map Features**
- Survey Transect
  - Habitat Area
  - Non-Habitat Area
  - Upland Forest Establishment
  - Upland Scrub-Shrub Establishment
  - Riparian Forest Establishment
  - Riparian Forest Enhancement/Conservation
  - Wetland (i.e., ACM) Establishment
  - Wetland (i.e., ACM) Enhancement/Conservation
  - Property Line
  - Olympic Pipeline
  - Sample Plot Location (approximate)



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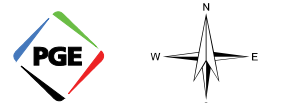
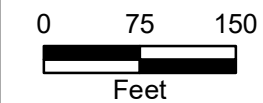
Figure 6  
**Sample Line-intercept  
Vegetation Assessment Plots**  
**PGE Environmental Services**



**Map Features**

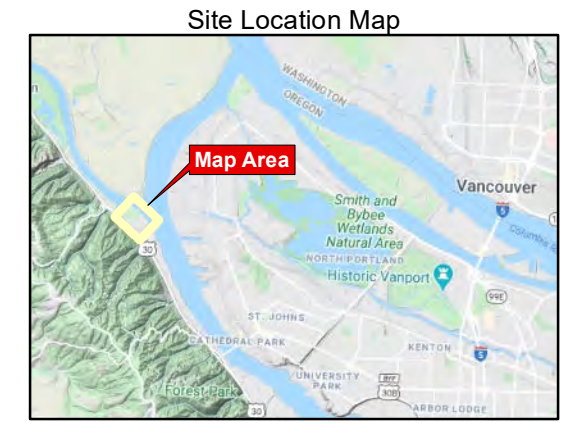
- 15 ft Elevation
- Property Line
- Olympic Pipeline
- Sub-Area 4
- Upland RCG Area - Managed
- Wetland RCG Area - Managed
- Wetland RCG Area - Not Managed
- Red-legged Frog Breeding Habitat

Treatment	Acres
Upland RCG Area - Managed	1.97
Wetland RCG Area - Managed	2.84
Wetland RCG Area - Not Managed	5.18



**Portland General Electric**  
Portland, Oregon

**Figure 7**  
**Sub-Area 4 RCG Treatment and Non-Treatment Area**  
**Harborton Restoration Project**



- Map Features**
- Monitoring Point
  - Survey Transect
  - ▭ Habitat Area
  - ▭ Non-Habitat Area
  - - - - - Property Line
  - Olympic Pipeline
  - - - - - Extent of High Flow Inundation



**Portland General Electric**  
 Portland, Oregon

**Figure 8**  
**Breeding Bird Monitoring**  
**Transect Map**  
**Harborton Restoration Project**



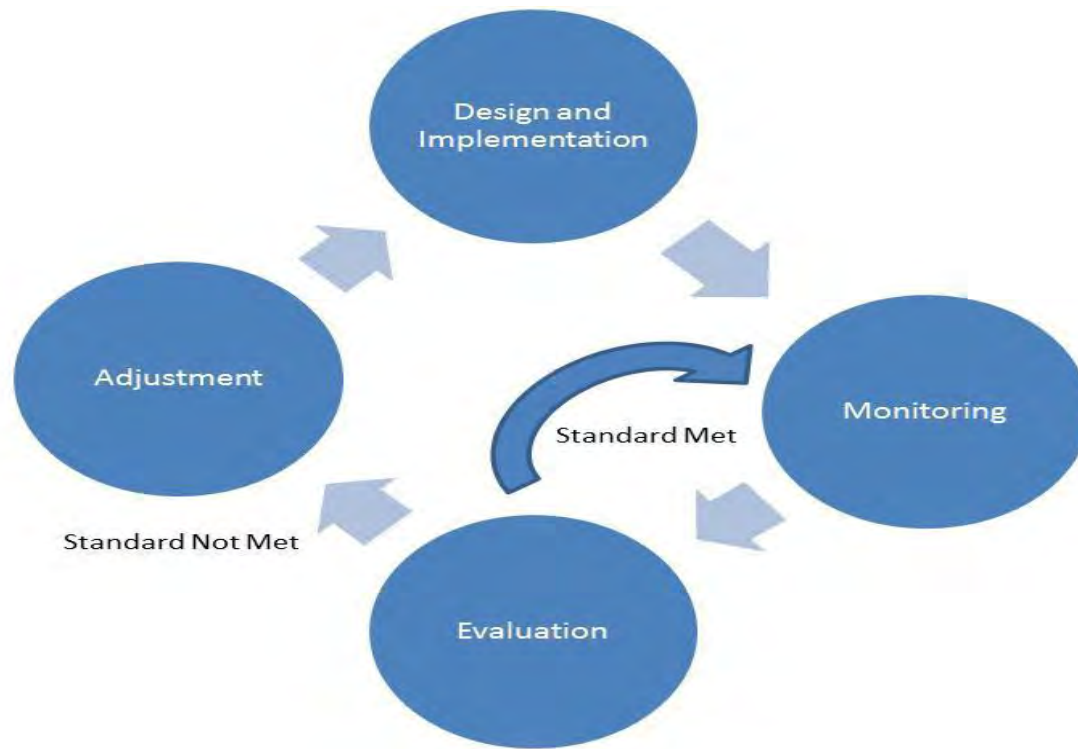
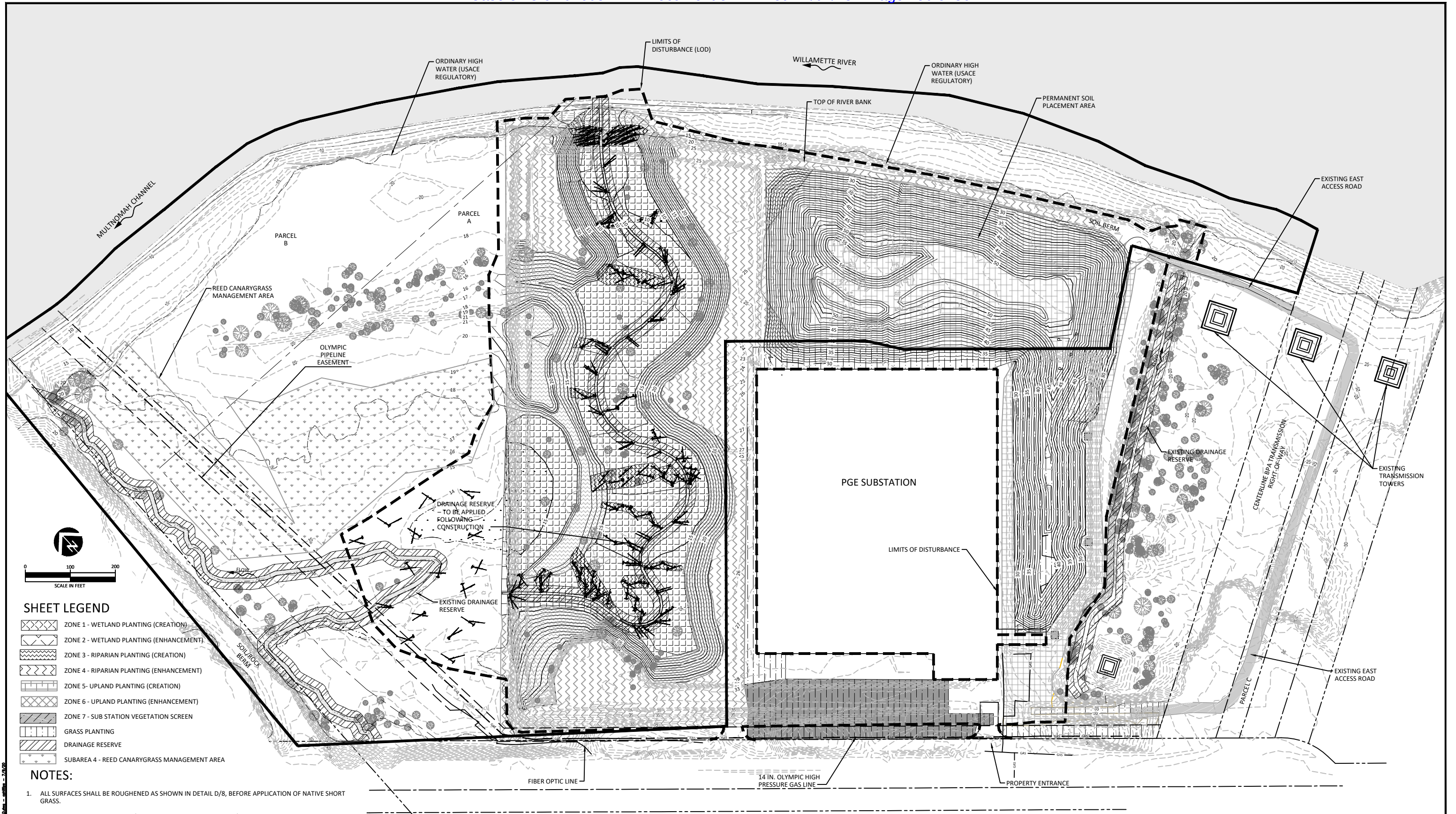


FIGURE 9 – Conceptual Adaptive Management Cycle



**SHEET LEGEND**

- ZONE 1 - WETLAND PLANTING (CREATION)
- ZONE 2 - WETLAND PLANTING (ENHANCEMENT)
- ZONE 3 - RIPARIAN PLANTING (CREATION)
- ZONE 4 - RIPARIAN PLANTING (ENHANCEMENT)
- ZONE 5 - UPLAND PLANTING (CREATION)
- ZONE 6 - UPLAND PLANTING (ENHANCEMENT)
- ZONE 7 - SUB STATION VEGETATION SCREEN
- GRASS PLANTING
- DRAINAGE RESERVE
- SUBAREA 4 - REED CANARYGRASS MANAGEMENT AREA

**NOTES:**

1. ALL SURFACES SHALL BE ROUGHENED AS SHOWN IN DETAIL D/8, BEFORE APPLICATION OF NATIVE SHORT GRASS.
2. SLOPE STABILIZATION MATTING (NORTH AMERICAN GREEN C125BN), OR APPROVED EQUAL SHALL BE INSTALLED ON ALL SURFACES >20% SLOPE, SEE DETAIL E/29.
3. SEED GRASS ONLY PER SHEET 34. SPECIFIC SEED MIX WILL MATCH THE ZONE IT IS BEING PLACED IN.
4. SUB-AREA 4 REED CANARYGRASS MANAGEMENT AREA TO BE PLANTED AND SEEDED AS NEEDED FOLLOWING MANAGEMENT ACTIONS. PLANTS TO BE SELECTED FROM LISTS SHOWN ON SHEET 35 FOR ZONES 2, 4, AND 6.

NO.	BY	DATE	REVISION DESCRIPTION

RP, CP DRAWN	DM, JG, CM DESIGNED	DM, CM CHECKED	
APPROVED	7/14/20 DATE	160218 PROJECT	

**PORTLAND GENERAL ELECTRIC  
HARBORTON RESTORATION PROJECT  
PORTLAND, OREGON**



## ATTACHMENT A – USFWS Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey Harborton Restoration Site (Lamprey Monitoring Plan)

**Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey  
Harborton Restoration Site**

Investigators

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(360) 604-2500

For the period 1 April 2016 to 30 June 2041

Revised January 2021

## Project Summary

### A. Goal

The goal of this investigation is to evaluate how individual restoration projects affect larval Pacific lamprey, specifically their colonization or occupancy of restored habitat.

### B. Objectives

1. Determine whether larval lampreys occupy restoration and reference sites.
2. Determine the types of habitat available and in which types larvae are detected.
3. Characterize species and life history stage that occupy a site.
4. Evaluate the health of larval lamprey detected at each site.

### C. Methodology

We propose to determine whether larval lamprey occupy various sites in the Superfund reach of the Willamette River. In general, tributary/slough, confluence (tributary or slough mouths within the mainstem) and shoreline habitat types will be sampled in both restoration and reference sites. Sites will be sampled pre-implementation as well as years 1-5, 10, 15 and 20 post-implementation. In wadeable habitats, we will use backpack electrofishing to sample for larval lamprey. In non-wadeable habitats we will use deep-water electrofishing technology to sample for larval lamprey. Using a similar approach as that in Jolley et al. (2012a), previously applied to a study of larval lamprey use of the Lower Willamette River, we will determine occupancy within several explicit scales. Generally, slough or tributary areas of interest will be divided into 25-50 m reaches for subsampling. If a slough or tributary is sufficiently short, the entire length will be sampled. Mainstem river areas of interest (e.g., shoreline or confluence habitats) will be divided into 30 m x 30 m quadrats for subsampling. A generalized random tessellation-stratified (GRTS) technique will be used to select sample reaches or quadrats in a random, spatially-balanced order. This approach generates an unbiased sample design that allows the probability of presence to be quantified when lamprey are not captured, detection probabilities to be calculated when lamprey occupy an site, and allows statistical evaluation of temporal changes.

*For this proposal, locations include the Harborton restoration site (tributary/slough and confluence habitat) and Columbia Slough reference site (confluence habitat).*

### D. Relevance

Pacific lamprey numbers have declined to a remnant of those for historical populations. As a result, Pacific lamprey has become a species of concern for federal and state agencies, Native American tribes, and the local public (Close et al. 2002; Luzier et al. 2011). In 2003, Pacific lamprey was petitioned for listing under the Endangered Species Act, and Oregon and Idaho currently list Pacific lamprey as a species of concern. Water and sediment quality was identified as a major threat for Pacific lamprey in the Pacific Lamprey Assessment and Template for Conservation Measures (Luzier et al. 2011). A Conservation Agreement was signed in 2012 by tribal, state, federal, and local agencies as a cooperative effort to reduce threats to Pacific lamprey and improve their habitats and population status (USFWS 2012). Monitoring the effectiveness of research and conservation actions is a primary objective of the Conservation Agreement.

The Portland Harbor Natural Resource Trustee Council Tribal Working Group (TWG) has found sufficient evidence that lamprey have been injured due to the release of hazardous substances in Portland Harbor and require compensation for these injuries. While restoration of habitat will most likely benefit lamprey as well as other species, additional compensation is appropriate to offset the lost services provided by lamprey due to their unique importance to tribes. Injury to larval lamprey due to contamination was identified through preliminary toxicity testing performed by the Trustee Council. The lost use of lamprey due to contamination was identified through interviews with Tribal members. During two workshops with Tribal and Trustee lamprey experts, the TWG learned that not enough is known about the types of habitat that lamprey prefer in large river systems or what habitat features would be most effective in the design of

restoration projects targeted at benefiting lamprey. The TWG, with the help of the lamprey experts, decided that the best use of resources at this time is to incorporate a comprehensive lamprey monitoring program into the harbor-wide restoration monitoring plan, rather than design restoration projects specifically for lamprey. The purposes are to evaluate whether the restoration projects designed to benefit salmon and other species also benefit lamprey, and to gather data about habitat use by larval lamprey that may be used by the Tribal Trustees and others in the future to improve the design of restoration projects for lamprey.

Patterns of occupancy, abundance, and habitat use by larval Pacific lamprey in restored sites that are in or adjacent to relatively large rivers has been largely unexplored. Recent findings indicate potentially widespread occupancy of larval lamprey in a variety of mainstem (large river) habitats (Jolley et al. 2010, 2011, 2012a; 2012b). Information from the proposed study can be used to help inform whether restoration of the Superfund Area is beneficial to lamprey. Learning if and how lampreys recolonize and use restored sites in or near mainstem habitats is essential for understanding of the effects of Superfund Area restoration on larval lamprey.

## Project Description

### A. Background

Pacific lamprey *Entosphenus tridentatus* in the Columbia River Basin (CRB) and other areas have experienced a great decline in abundance (Close et al. 2002) and have been given protected status within Oregon (Kostow 2002). Lamprey are culturally important to Native American tribes, are ecologically important within the food web, and are an indicator species whose decline provides further insight into the impacts of human actions on ecological function (Close et al. 2002). Much information is lacking on the basic biology, ecology, and population dynamics that is required for effective conservation and management.

Pacific lampreys have a complex life history that includes a multiple year larval (ammocoete), migratory juvenile (macrophthalmia), and adult marine phase (Scott and Crossman 1973). Larvae and juveniles are strongly associated with stream and river sediments. Larvae live burrowed in stream and river sediments for multiple years after hatching, where they filter feed detritus and organic material (Sutton and Bowen 1994). Larvae metamorphose into juveniles from July to December (McGree et al. 2008) and major migrations are made downstream to the Pacific Ocean in the spring and fall (Beamish and Levings 1991). The sympatric western brook lamprey *Lampetra richardsoni* does not have a major migratory or marine life stage although adults may locally migrate upstream before spawning (Renaud 1997). For both species, the majority of the information on habitat preference of larvae comes from CRB tributary systems (Moser and Close 2003; Torgersen and Close 2004; Stone and Barndt 2005; Stone 2006) and coastal systems (Farlinger and Beamish 1984; Russell et al. 1987; Gunckel et al. 2009).

Larval lamprey are known to occur in sediments of low-gradient streams (<5<sup>th</sup> order [1:100,000 scale]; Torgersen and Close 2004) but their use of larger river habitats in relatively deeper areas is less known. Downstream movement of larvae, whether passive or active, occurs year-round (Nursall and Buchwald 1972; Gadowski and Barfoot 1998; White and Harvey 2003). Sea lamprey *Petromyzon marinus* ammocoetes have been documented in deepwater habitats in tributaries of the Great Lakes, in proximity to river mouths (Hansen and Hayne 1962; Wagner and Stauffer 1962; Lee and Weise 1989; Bergstedt and Genovese 1994; Fodale et al. 2003a), and in the large, connecting St. Marys River (Young et al. 1996). References to other species occurring in deepwater or lacustrine habitats are scarce (American brook lamprey *Lampetra appendix*; Hansen and Hayne 1962). In the Pacific Northwest, anecdotal observations exist regarding larval lamprey occurrence in large river habitats, mainly at Columbia River hydropower facilities (Moursund et al. 2003; CRITFC 2008), impinged on screens associated with juvenile bypass facilities, or through observation during dewatering events. These occurrences are thought to be associated with downstream migration and specific collections of apparently migrating ammocoetes have been made in large river habitats (Beamish and Youson 1987; Beamish and Levings 1991). More recently, evaluations of larval Pacific lamprey occupancy and distribution in mainstem river habitats have suggested widespread occurrence in certain areas of the Columbia River and Willamette River mainstem (Jolley et al. 2011; Jolley et al. 2012b).

A portion of the mainstem of the lower Willamette River that is known to be occupied by larval Pacific and western brook lamprey (Jolley et al. 2012) was declared a Superfund Site in 2000 by the U.S. Environmental Protection Agency. The Superfund study reach extends from river kilometer 3.2 to river kilometer 18.9 and has a broader focus area extending from the Columbia River to Willamette Falls (Figure 1). To mitigate for past environmental damage being identified through the Natural Resource Damage Assessment (NRDA) process, these areas are subject to various restoration activities as well as assessments of the effectiveness of any restoration. It is unclear whether any of the proposed aquatic restoration activities, which are primarily focused on salmonids, will improve conditions for Pacific lamprey. As such, there is interest in monitoring the effectiveness of the restoration, in part, relative to larval Pacific lamprey.

A lamprey monitoring plan (LMP) was developed based on a set of monitoring goals and objectives that were identified by Trustee Council lamprey biologists over two workshops held in the fall of 2011. This LMP was developed to simultaneously monitor the impact of restoration actions on lamprey populations and health in Portland Harbor by gathering information about larval lamprey life history, biology, and habitat use. This information may be used by the Trustee Council in the future to design and evaluate lamprey-specific

restoration projects. Since lamprey biology and life history are very different from other biota, the overlap between the LMP and the general restoration monitoring and stewardship plan is not extensive. The LMP differs from the general restoration monitoring and stewardship plan, in part, because the lamprey monitoring is proposed to continue for a period of 20 years. In most cases, the metrics proposed for collection as part of the lamprey monitoring effort need to be co-located with lamprey sampling. To maximize efficiencies, the Trustee Council will use the data collected as part of the lamprey monitoring plan for the general restoration monitoring and stewardship effort as much as possible. Biologists recommended monitoring lamprey for 20 years, with the goal of capturing data for 1 to 2 complete generations. Pre-implementation monitoring will be conducted at each restoration site. Lampreys may colonize habitats rapidly. Therefore, monitoring will be conducted on a yearly basis for the first five years, and every five years thereafter.

Here we propose to investigate and document patterns of larval lamprey occupancy and habitat use in or near a restoration site. Understanding larval lamprey usage of habitats in and adjacent to restoration sites is critical to understanding the effectiveness of restoration actions. At present, little specific information is available on whether larvae colonize restored habitats, which life stages may use these habitats, or how quickly and for how long they use these sites. In general, the proposed work is guided by the LMP. However, due to site-specific conditions and constraints, the specific metrics and timing of monitoring proposed for any given site may differ slightly from those outlined in the LMP. Our specific objectives for this phase of NRDA restoration monitoring are as follows:

## B. Objectives

1. Determine whether lampreys occupy restoration and reference sites.
2. Determine the types of habitat available at each site and in which types lamprey are detected.
3. Characterize lamprey species and life history stage that occupy each site.
4. Evaluate the health of lamprey detected at each site.

## C. Study Area

### Restoration Site

*There is a proposed action to improve habitat at the Harborton site (Multnomah County, OR). The Harborton site is located on the west side of the Willamette River, across from Sauvie Island. Currently the site has slough or tributary habitat as well as a confluence area and associated shoreline. Larval lamprey are known to occur in nearby areas of the mainstem Willamette River (Jolley et al. 2012b), and have access to and the potential to occur in or occupy the tributary/slough, confluence, and shoreline habitats of the proposed restoration site. However, it is unknown whether lamprey currently occur in or occupy the tributary/slough, confluence, or shoreline habitats at this site. The originally proposed restoration site can be seen in Figure 2 and the modified design is shown in Figure 3. Proposed actions include improvements to the tributary/slough habitat. Pre- and post-restoration monitoring is required to understand the effects of the restoration. In the case of the Harborton site, this proposal includes monitoring tributary/slough habitat (since this habitat is currently believed to be inaccessible to fish, monitoring would be post restoration only) and the confluence habitat (pre and post restoration).*

### Reference Sites

*The Columbia Slough confluence habitat is proposed as a specific reference site to complement the Harborton restoration. Since the Harborton restoration site currently has confluence habitat, to assess the restoration, the inclusion of a reference site with confluence habitat is appropriate for a before-after-control-impact (BACI) approach. A BACI approach to monitoring would provide some ability to make inferences about the effect of the restoration activity.*

*Multiple reference sites have been identified within the broader Superfund Area. These include the Columbia Slough as well as habitat associated with Ross Island, Cemetery Creek, Oswego Creek, McCarthy Creek, Miller Creek and Multnomah Channel. The combination of these reference sites contains*



*representative tributary/slough, confluence, and shoreline habitats. Combined information from all reference sites will allow for a relatively rigorous and thorough BACI evaluation. Monitoring at the Ross Island and Cemetery Creek sites began in 2014 and 2015, respectively. Starting in 2016, the USFWS will monitor habitat areas of all six reference sites. For monitoring at reference sites and/or habitat areas that are not being funded as part of a particular restoration activity, the USFWS will provide a cost share match to ensure that all reference sites and habitat areas are monitored. As long as budgets permit, the USFWS will incur the expense of the reference site monitoring that is not covered by a restoration sponsor. If, at some point in the future, the USFWS is unable to fund the monitoring of the reference sites, the associated cost will be distributed as directed by the Trustee Council.*

## **D. Methods**

### Sample framework

To make inferences about whether changes observed at the restoration site are the result of the restoration action, we propose to use a BACI approach. Thus, we propose to determine whether larval Pacific lamprey occupy the restoration and reference sites both prior to and after restoration actions. In general, restoration and reference sites are likely to have one or more of three distinct habitat types, 1) tributary or slough, 2) confluence and 3) shoreline areas. Tributaries or sloughs would typically be (braided networks of) wadeable water. Confluence areas are being defined as 100 m radius arcs of mainstem habitat (in the Willamette River or Multnomah Channel), with the arc center originating near the midpoint of the tributary or slough mouth intersection with the mainstem. Shorelines are being defined as 100 m wide bands in the mainstem (Willamette River or Multnomah Channel) that are adjacent and parallel to the shoreline. Where possible and appropriate, each of these areas will be sampled to determine occupancy.

For each tributary or slough area longer than 400 m, we will develop a layer of 50 m reaches. For the two types of mainstem areas (shoreline and confluence), we will develop a layer of 30 m x 30 m quadrats using ArcMap 10.3 (ESRI [Environmental Systems Research Institute], Redlands, California) which will be overlaid on these areas. We will use a generalized random-tessellation stratified (GRTS) approach scripted in Program R (R Core Team 2013) to select sample reaches or quadrats in a random, spatially-balanced order (Stevens and Olsen 2004). The GRTS approach produces an unbiased sample design that allows for quantifying detection probabilities and determining the likelihood that an area is occupied if larvae are not observed. As they are selected in the GRTS approach, the reaches or quadrats are ordered sequentially and the lower numbered reaches or quadrats are given highest priority for sampling. Unfeasible reaches or quadrats (e.g., dewatered, inaccessible, physical impediment, excessive depth for our configuration, unsuitable hydraulics) will be eliminated from the sample through reconnaissance surveys and all subsequent reaches or quadrats will be increased in priority. Generally, reaches or quadrats in which the UTM center point is wetted will be considered feasible.

We propose to use a sampling effort (number of sample reaches or quadrats) that, in the case they are not detected, we estimate would allow us to be at least 80% certain that larval lamprey do not occupy a sample area (20% occurrence) (see Bayley and Peterson 2001, Peterson and Dunham 2003). The amount of effort is based, in part, on estimates from reach-specific (see Silver et al. 2010) and quadrat-specific (see Jolley et al. 2012b) probabilities of detection generated from previous work. Sample effort was also dependent, in part, on total area. For tributaries or sloughs, if the area of interest is less than 400 m in length, we propose to sample all reaches (contiguous 50 m reaches). If the area of interest is 400 m or longer, we propose to sample seven reaches. For mainstem areas (shorelines and confluence), if the area is such that fewer than 10 quadrats exist, we propose to sample all quadrats. If the area is such that 10 or more quadrats exist, we propose to sample 10 quadrats.

*At the Harborton restoration site, we anticipate the sample effort will correspond to 6-8, 50 m tributary reaches in the newly constructed tributary (post restoration only) and 10 confluence quadrats in each of three confluence areas (pre and post restoration) (Figure 3). In the Columbia Slough reference site,*

we anticipate the sample effort will correspond to 10 confluence quadrats.

#### Sample technique - fish

For tributary or slough (wadeable) areas, a sampling event will consist of using an AbP-2 backpack electrofisher (ETS Electrofishing, Madison, WI; Silver et al. 2010) in a 50 m reach. Initially, the electrofisher delivers three DC pulses per second at 25% duty cycle, 125 V, with a 3:1 burst pulse train (i.e., three pulses on, one pulse off). This current is designed to stimulate burrowed ammocoetes to enter the water column. Once a larva is observed in the water column, 30 pulses/second are applied to temporarily immobilize the larva for capture in a net.

For confluence and shoreline areas, sampling will be conducted using a boat-mounted deep-water electrofisher (Bergstedt and Genovese 1994, Jolley et al. 2012a; Figure 4) in a 30 m x 30 m quadrat. This quadrat size was selected based on the previous experience of sea lamprey researchers in the Great Lakes (M. Fodale, USFWS, personal communication) as their sampling evolved from a systematic to adaptive approach (Fodale et al. 2003b). Each sampling event consists of a single drop of the deepwater electrofisher within a quadrat (Bergstedt and Genovese 1994; Jolley et al. 2012). The deepwater electrofisher is comprised of a pyramid-shaped fiberglass bell (or hood; 0.61 m<sup>2</sup> in area) with stainless steel plate electrodes on its bottom surface. The electrodes are wired to a modified AbP-2 electrofisher which delivers three pulses DC per second at 10% duty cycle, with a 2:2 pulse train (i.e., two pulses on, two pulses off). Output voltage will be adjusted at each quadrat to maintain a peak voltage gradient between 0.6 and 0.8 V/cm across the electrodes. The bell is lowered to the river bottom where it sits flat, allowing electrical stimulus to be delivered from the electrofisher into the substrate to induce larval lamprey emergence. The bell is coupled (by 3" vinyl water hose) to a gasoline-powered hydraulic pump which brings emergent larvae to the surface for collection. Pumping is started approximately 5 seconds prior to shocking to purge air from the suction hose. Suction from the bell is produced by directing flow from the pump through a hydraulic eductor, which allows larvae to be collected in a mesh basket (27 x 62 x 25 cm; 2 mm wire mesh) while preventing them from passing through the pump. A 60 second pulse delivery is followed by an additional 60 seconds of pumping to help ensure displaced larvae cycle through the hose and into the collection basket. The sampling techniques are described in detail by Bergstedt and Genovese (1994) and were similar to those used in the Great Lakes region (Fodale et al. 2003) and the Willamette River (Jolley et al. 2012).

Collected lampreys will be anesthetized in a solution of buffered tricaine methanesulfonate (MS-222), identified to genus (*Entosphenus*, i.e., Pacific lamprey or *Lampetra* spp. i.e., western brook/river lamprey) according to caudal pigmentation (if greater than 60 mm TL; Figure 5; Goodman et al. 2009), classified according to developmental stage (i.e., ammocoete, macrophthalmia, or adult), and measured for total length (TL in mm). Caudal fin tissue will be collected and preserved in 100% ethanol for potential, subsequent genetic analysis to confirm identification. Any physical anomalies (lesions, suspected bird strikes, etc.) will be recorded for all larvae. If larvae with tumors are collected, they will be euthanized and preserved for potential evaluation at a later date. In addition, any observations of juveniles, adults, or suspected Pacific lamprey nests will also be recorded. Lampreys will be placed in a recovery bucket of fresh river water and released after they can maintain an upright position and resume swimming behavior. Previous use of these methodologies (for example, see Jolley et al. 2010) suggests that captured larval lamprey experience little or no injury and mortality.

#### Sample technique - habitat

Concurrent to each sampling event a sediment sample will be taken (if possible) from each reach or quadrat by using a Ponar bottom sampler (16.5 cm x 16.5 cm). Each sample will be mixed thoroughly and approximately two, 250-500 ml subsamples will be transferred to containers provided by a contracted (nonUSFWS) laboratory. Each sample will be labeled with the sample site number, replicate number and date, placed on ice, returned to the USFWS station and subsequently handled per the instructions provided

from the contracted laboratory. All sediment samples will be made available to the contracted laboratory for subsequent analysis.

Water temperature (°C), conductivity (µS/cm) and water depth will be measured (tributaries or sloughs in cm, mainstem areas in m) in each sample reach or quadrat. In general, larval lamprey habitats have been classified as Type I, II, or III, and it is widely accepted that larvae appear to most prefer Type I and least prefer Type III (see Slade et al. 2003). As such, we will estimate the proportion of Type I, II, and III habitat in each of the wadeable sample reaches.

### Analysis

*Occupancy:* The probabilistic sampling approach will provide a basis for using a BACI approach to make inferences about the utility of the restoration. If Pacific lamprey larvae are detected, the area of interest will be defined as occupied. Using detection probabilities estimated from previous work (Silver et al. 2010; Jolley et al. 2012a), if larvae are not detected we would estimate at least an 80% level of certainty that they do not occupy at least 20% of the area. Occupancy will be summarized and compared between the restoration and reference sites.

*Relative Abundance:* When possible, detection probabilities will be calculated. While absolute abundance may be difficult or impossible to calculate, detection probability may be useful as an index of relative abundance. When possible, detection probabilities will be summarized and compared between the restoration and reference sites. In addition, when possible, sample effort in wadeable areas will be tracked and CPUE will be calculated. When possible, CPUE will be summarized and compared between the restoration and reference sites.

*Grain size, grain type, sediment contaminant concentrations, organic content:* Sediment samples and associated data will be provided to a contracted laboratory for analysis of these variables. The laboratory will provide any results to the FWS for inclusion in the final report.

*Water temperature, conductivity, and depth:* Water temperature, conductivity, and depth characteristics will be summarized and compared between the restoration and reference sites.

*Total Length:* The size-structure of captured lamprey will be described (i.e., mean TL, length-frequency histograms) and be related to published studies of size and age (e.g., Meeuwig and Bayer 2005). Size structure will also be compared between the restoration and reference sites.

*Species composition:* Population composition will be described (i.e., proportion *Entosphenus tridentatus*, and *Lampetra* spp.) and be related to published studies of population composition in mainstem areas of the Willamette River (e.g., Jolley et al. 2012b). Population composition will also be compared between the restoration and reference sites.

*Qualitative health assessment:* Physical anomalies will be described (i.e., proportion of larvae with lesions) and compared between the restoration and reference sites.

*Habitat:* The proportion of each habitat type (I, II, III) in a reach as well as at the site will be summarized. The relationship between the proportion of each habitat type in a reach or site and whether or not larvae were detected in that reach or site will be characterized.

*Life history stage:* The presence of various life stages will be described (i.e., number of Pacific lamprey nests observed) and compared between the restoration and reference sites.

### Inference and Expectations

The ability to make a specific inference about the effect of a given restoration activity will be influenced, in part, by sample design, variability in the metrics as well as whether or not lamprey are detected. For many of the metrics listed above, what variability will be encountered and whether lamprey will be detected is unknown and difficult to predict. There is a finite set of likely occupancy outcomes

(Table 1). One anticipated outcome (for example) is that prior to restoration, larvae will not occupy project areas but will occupy reference sites whereas sometime after restoration, larvae will occupy both project and reference sites. This outcome would support an inference that restoration, at least in part, allowed lamprey to colonize or occupy the restored site. An alternative outcome (for example) is that prior to and after restoration, larvae will not occupy project or reference sites. This outcome would not allow for any (or very limited) inference to be made about the utility of the restoration for larval lamprey. For additional discussion concerning inference, see Section C (above), Study Area.

#### Work locations and schedule \*

*Restoration site: Harborton.*

*Reference site: Columbia Slough.*

*Estimated sample period: May-October, 2016 (pre-restoration).*

*Outyears: 2021-2025, 2030, 2035, 2040 (post-restoration).*

\*Schedule may be adapted as necessary

#### **E. Facilities and Equipment**

The field sampling will be carried out by staff of the Columbia River Fisheries & Wildlife Conservation Office (CRFWCO). Currently, the CRFWCO has vehicles, a backpack electrofisher, a deep-water electrofishing configuration, boat, and boat trailer as well as office resources necessary to conduct this study. The boat is equipped with appropriate safety equipment and operators have been trained through the Department of Interior, Motorboat Operator Certification Course.

#### **F. Biological Impacts**

The proposed project should not have any significant impact on the population health or status of Pacific lamprey. All collected lamprey will be released. The collection methods should not affect any other listed species (i.e. no take of other native species).

#### **G. Key Personnel**

**Joe Skalicky**, is a Fishery Biologist with the U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office.

**Monica Blanchard**, is a Fishery Biologist with the U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office.

**Christina Wang**, (M.Sc.) is a Fishery Biologist with the U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office.

**Tim Whitesel** (Ph.D.), is a Supervisory Biometrician with the U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office.

Project planning, administration, and reporting: C. Wang, T. Whitesel

Work plan preparation, protocols, permits: J. Skalicky, M. Blanchard, T. Whitesel

Field sampling of larval lamprey: J. Skalicky, M. Blanchard

Analysis of data and preparation of report segments: J. Skalicky, M. Blanchard, T. Whitesel

#### **H. Information Transfer**

Information and analyses from this study will be transferred in the form of written and/or oral reports.

Appropriate findings may be published in technical journals and presented at regional or national professional society symposia. Special efforts will be made to provide information to managers as needed.

*Products timeline*

March 31, 2017 – draft final report for pre-restoration monitoring

June 30, 2017 – final report for pre-restoration monitoring

March 31, 2022 – draft final report for post-restoration monitoring, year 1

June 30, 2022 – final report for post-restoration monitoring, year 1

**I. Estimated Budget<sup>1</sup>**

**2016: Estimated budget for pre-restoration sampling (one event)**

Pre-monitoring planning:

Personnel – 2,250  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 969  
 Total – 3,219

Harborton restoration site sampling:

*Shoreline Areas*

Personnel – 0  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 0  
 Total – 0

*Confluence Areas*

Personnel – 1,910  
 Non-personnel – 265  
 Contingency – 106  
 O/H – 982  
 Total – 3,263

*Slough and Tributary Areas*

Personnel – 0  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 0  
 Total – 0

Analysis and information exchange:

Personnel – 5,225  
 Non-personnel – 106  
 Contingency – 0  
 O/H – 2,296  
 Total – 7,627

Columbia Slough reference site sampling:

*Shoreline Areas*

Personnel – 0  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 0  
 Total – 0

*Confluence Areas*

Personnel – 955  
 Non-personnel – 133  
 Contingency – 53  
 O/H – 491  
 Total – 1,632

*Slough and Tributary Areas*

Personnel – 0  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 0  
 Total – 0

GRAND TOTAL: 12,522

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<sup>1</sup> This budget reflects costs to FWS for one sampling event, but is not reflective of all costs related to lamprey monitoring. For example, it does not include the costs of sediment analyses or related contingency, or costs related to potential equipment replacement.

**Outyears: Estimated budget for post-restoration sampling (one event, each year) (based on expanded sampling in tributaries as well as an annual inflation rate of 3%).**

2021: 15,925  
 2022: 16,403  
 2023: 16,895  
 2024: 17,402  
 2025: 17,924  
 2030: 20,779  
 2035: 24,088  
 2040: 27,925  
 2041: 14,672 (overall data summary and analysis, completion report)

**2021: OUTYEAR EXAMPLE of estimated budget for post-restoration sampling (one event)**

Harborton restoration site sampling:

Columbia Slough reference site sampling:

*Shoreline Areas*

Personnel – 0  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 0  
 Total – 0

*Shoreline Areas*

Personnel – 0  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 0  
 Total – 0

*Confluence Areas (3)*

Personnel – 2,214  
 Non-personnel – 307  
 Contingency – 123  
 O/H – 1,139  
 Total – 3,783

*Confluence Areas*

Personnel – 1,107  
 Non-personnel – 154  
 Contingency – 61  
 O/H – 569  
 Total – 1,892

*Slough and Tributary Areas (1)*

Personnel – 769  
 Non-personnel – 154  
 Contingency – 61  
 O/H – 424  
 Total – 1,408

*Slough and Tributary Areas*

Personnel – 0  
 Non-personnel – 0  
 Contingency – 0  
 O/H – 0  
 Total – 0

Analysis and information exchange:

Personnel – 6,057  
 Non-personnel – 123  
 Contingency – 0  
 O/H – 2,662  
 Total – 8,842

GRAND TOTAL: 15,925

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Figure 1. Harborwide restoration focus area, outlined in red and yellow.



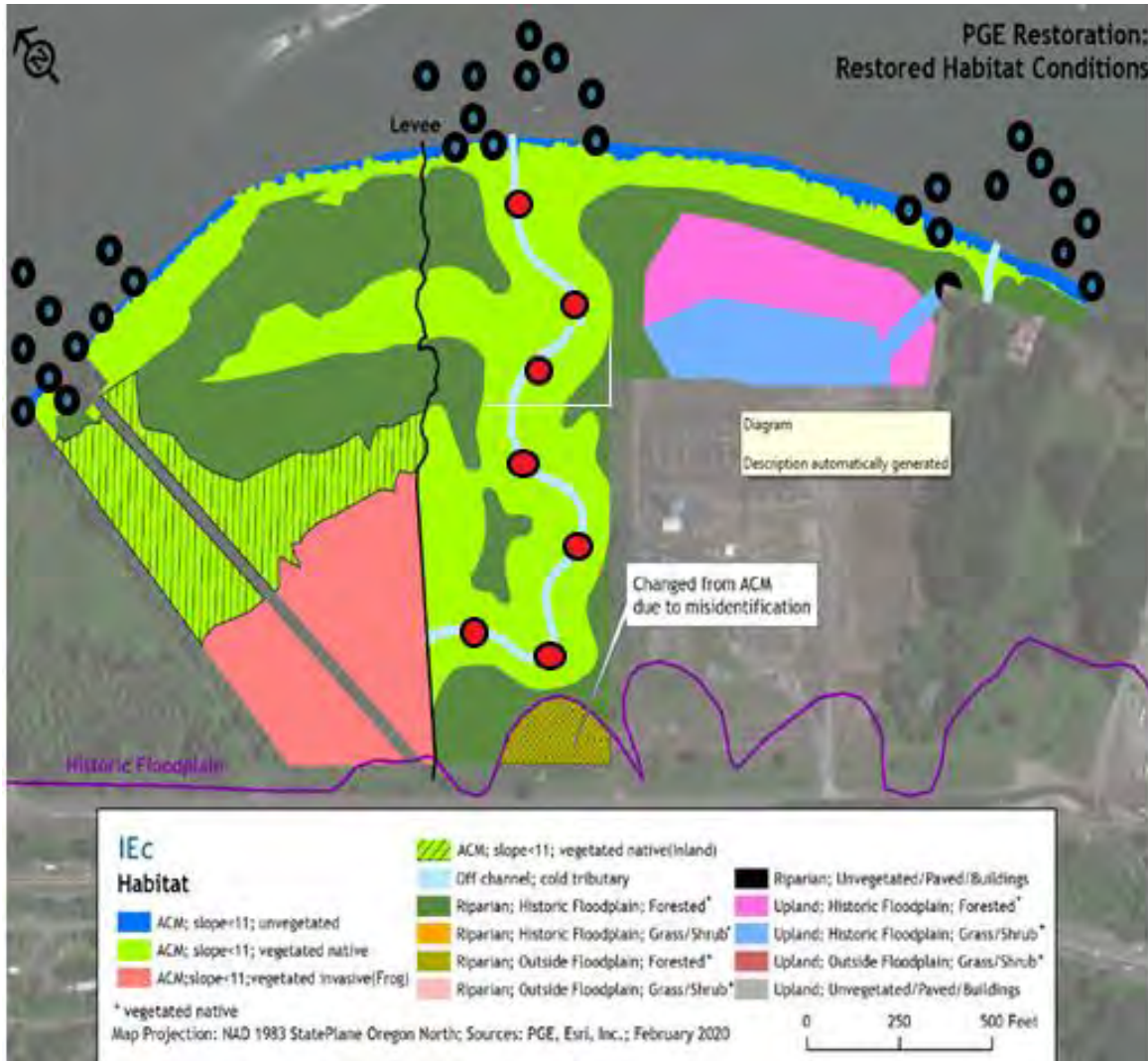


Figure 3. Proposed monitoring design at the Harborton restoration project site. A new tributary is represented by the light blue line. Proposed sample quadrats at confluence areas are identified by blue/black points (sampled pre and post restoration). Proposed sample reaches in tributary areas are represented by red/black points (sampled post restoration). This figure is for illustrative purposes. For example, the specific tributary and the exact locations of sample points will be determined after applying the GRTS approach. The two existing tributaries will not be sampled pre or post restoration (as they are not believed to have been or will be accessible to fish).

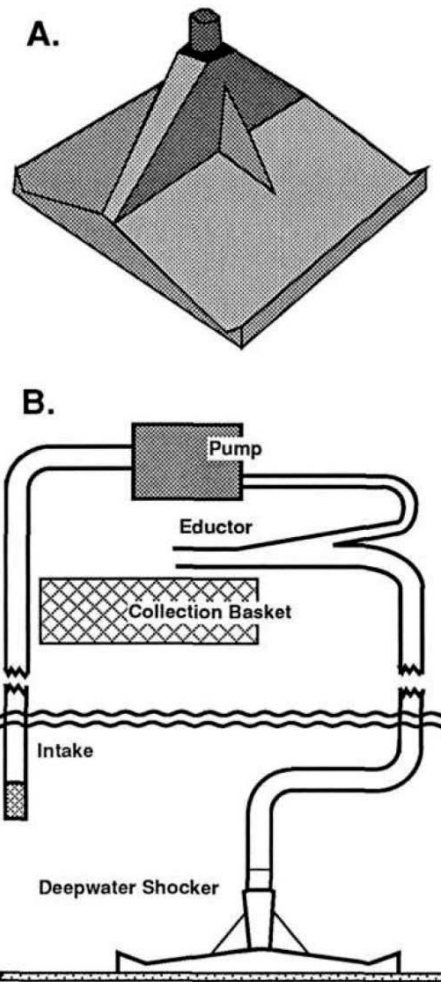


Figure 4. (A) Deepwater electrofishing device for driving lamprey larvae from the bottom and (B) the pumping system used to move them to the surface for collection. Figure taken from Bergstedt and Genovese (1994).

**Lamprey Ammocoete I.D. Guide**

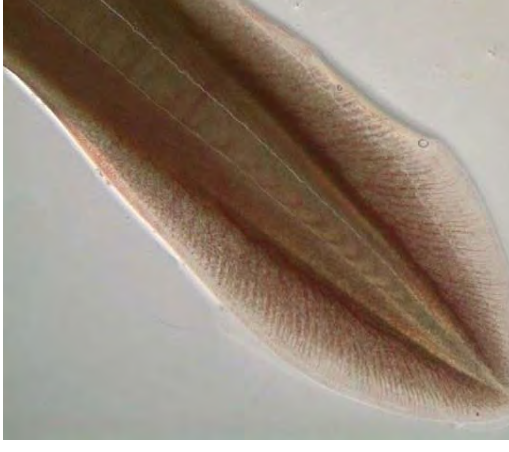

Species	Pacific Lamprey <i>Entosphenus tridentatus</i>	Western Brook Lamprey (River Lamprey) <i>Lampetra richardsoni</i> ( <i>Lampetra ayresi</i> )
<b>Picture</b>		
<b>Caudal Ridge</b>	Light pigmentation	Dark, even pigmentation
<b>Caudal Fin</b>	Darker pigmentation (hard to see w/ bare eyes)	Translucent or peppered pigmentation
<b>Ventral (Belly)</b>	Light pigmentation	Dark, even pigmentation
<b>Myomere Counts</b>	Higher counts	Lower counts

Figure 5. Larval lamprey identification guide.

Table 1. Description of possible occupancy scenarios, by site (Reference or Restoration) and time period (Before or After restoration); O = Occupied; U = Unoccupied. Using the BACI approach, to attribute a response to a restoration action, it will be necessary to see a change at the restoration site and for that change to be different than any change seen at the reference site.

	<b>Before Restoration</b>	<b>After Restoration</b>
<b>Restoration Site</b>	O or U	O or U
<b>Reference Site</b>	O or U	O or U



## Addendum A

### B. Objectives

5. Determine whether larval lampreys are stranded in ephemeral tributaries

#### Stranding in the Tributary Area of the Restoration Site

*There is a proposed action to improve habitat at the Harborton site (Multnomah County, OR). A schematic of the proposed restoration can be seen in Figures 2 and 3 above. Once the restoration is complete, tributaries will flow north and east through the restoration area and confluence with either the Willamette River or Multnomah Channel. One or all of these tributaries are expected to be ephemeral, drying up in the summer months. As such, if lamprey occupy the newly constructed tributary, the potential exists for these fish to be stranded in the new habitat as the tributary dries up. Thus, if and when larval lamprey are detected occupying (have colonized) the new tributary area of the restoration site, we will evaluate the fate of these larvae.*

*It is unclear whether tributaries will dry up in a manner such that a) they become disconnected from the Willamette River or Multnomah Channel before going completely dry or b) they dry homogeneously and maintain continuous connection to the Willamette River or Multnomah Channel. If larvae are detected in the new tributary (the only one to which they will presumably have access), we will continue to sample that tributary for occupancy by backpack electrofishing. Sampling will occur approximately once every two weeks from June 15 through August 15 (as drying occurs). During sampling, we will determine whether larvae continue to occupy the tributary and we will evaluate the manner in which the tributary is drying.*

*If the tributary loses connection with the mainstem before the tributary is completely dry (a), one (1) possible outcome is that larvae occupy the remaining water and become stranded in the tributary. Another possible outcome (2) is that larvae do not occupy the remaining water and are not stranded in the tributary. If the tributary does not lose connection with the mainstem before the tributary is completely dry (b), one possible outcome (3) is that, prior to it completely drying up, larvae are not detected in the tributary (they have moved out). If larvae are not detected in two consecutive sampling events, we will use that as evidence that they left the tributary prior to getting stranded. It is also possible that, prior to it completely drying up, larvae continue to be detected in the tributary. In this case, we will evaluate the movement of larvae out of the tributary. Approximately two weeks before the tributary will be completely dry, a larval electrofishing survey will be conducted. Larvae that are captured will be marked with an elastomer tag. A fine-mesh (designed to retain larval lamprey) fyke net will be installed near the mouth of the tributary. This trap will be monitored daily, until the tributary is dry. One possible outcome (4) is that larval lamprey are captured leaving the tributary. This would provide evidence that some lamprey leave the tributary and are not stranded. Another possible outcome (5) is that larval lamprey are not captured leaving the tributary. This would provide evidence that some lamprey do not leave the tributary and are stranded. Tagged larvae will allow us to estimate the proportion that leave the tributary. For example, if all tagged lamprey are captured in the fyke net, that would provide some evidence that larvae were not stranded in the tributary.*

*Evaluation of the fate of potentially stranded fish would only occur the first three years that larvae are detected occupying a tributary.*

**Estimated Budget<sup>2</sup>**

Occupied tributary area sampling:

Personnel – 5,272  
Non-personnel – 750  
Contingency – 301  
O/H – 2,725  
Total – 9,048

GRAND TOTAL: 9,048

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<sup>2</sup> Based on 2016 rates, this budget reflects costs to FWS for one sampling event, if necessary and appropriate, to evaluate the fate of larvae which occupy ephemeral habitat. This budget does not include the costs of year 2 or year 3 (if necessary and appropriate) or costs related to potential equipment replacement.

## ATTACHMENT B – Evaluation of Portland Harbor Superfund Area Restoration: PGE Harborton Restoration Site Lamprey Monitoring Plan, Sediment Sampling and Analysis Plan

## EVALUATION OF PORTLAND HARBOR SUPERFUND AREA RESTORATION: PGE HARBORTON RESTORATION SITE LAMPREY MONITORING PLAN

### SEDIMENT SAMPLING AND ANALYSIS PLAN

FINAL | 03 MARCH 2021

#### A. Goal

Describe habitat conditions at specific locations within the PGE Harborton restoration site and associated Columbia Slough reference site to supplement information collected by FWS under the central monitoring plan for this site, “Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey Harborton Restoration Site.”

#### B. Methodology

Concurrent with the lamprey sampling event described in the central monitoring plan entitled “Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey – Harborton Restoration Site,” sediment samples will be collected and analyzed for grain size, total solids, and organic content from each lamprey sampling location. Where possible, sediment will be collected using a Ponar bottom sampler. After the sampler is deployed and retrieved, the Ponar will be emptied into a stainless steel bucket or pan and thoroughly mixed with a stainless steel spoon. Debris such as rocks and sticks or wood chunks will be removed from the sample material before filling sample containers. From the collected sample, 1-8 oz. sample container and 1-4 oz sample container (provided by the contracted laboratory) will be filled with sediment, minimizing the amount of free-standing water in the jar to the extent practical. Sample jars will be labeled with the sample site number, date and time, type of analysis, and then placed on ice and transferred to an on- or off-site, access- controlled building. Chain of custody forms provided by the contracted lab will be completed for all samples. Samples will then be refrigerated at 4 +/- 2°C until transfer to the contracted laboratory. Equipment contacting sediment (Ponar, spoon, and bucket or pan) will be rinsed with water between samples.

At both the restoration site (Harborton) and the reference site (Columbia Slough), up to three habitat types will be sampled for lamprey as described in the “Evaluation of Portland Harbor Superfund Area Restoration: Larval Pacific Lamprey Harborton Restoration Site.” At both the Harborton restoration site and Columbia Slough reference site, sampling will occur in the confluence habitats in all years. Additionally, sampling will occur at the Harborton restoration site in the slough/tributary habitat in all years following the baseline year (year 0). Table 1 identifies the habitat types to be sampled at each site respectively, as well as the number of reaches or quadrats (i.e., sample locations) that will be sampled for lamprey and sediment within each habitat type.

Table 1. Sediment Sampling Plan by Site and Habitat Type.

HABITAT TYPE	YEARS SAMPLED	TOTAL LAMPREY SAMPLE LOCATIONS	TOTAL SEDIMENT SAMPLES TO BE COLLECTED
<b>HARBORTON RESTORATION SITE</b>			
Shoreline	Not applicable	Not applicable	Not applicable
Slough/Tributary	1-5, 10, 15, 20	6-8	6-8
Confluence	0-5, 10, 15, 20	30	30
<b>COLUMBIA SLOUGH REFERENCE SITE</b>			
Shoreline	Not applicable	Not applicable	Not applicable
Slough/Tributary	Not applicable	Not applicable	Not applicable
Confluence	0-5, 10, 15, 20	10	10

### C. Analysis and Data Reporting

All samples collected by FWS will be picked up by the contracted laboratory for analysis. As noted above, the contracted laboratory will analyze all samples for grain size, total solids, and total organic carbon. Results of these analyses will be provided to the entity designated by the Trustee Council. Then the designated entity will transmit results to FWS for inclusion in the annual monitoring report.

### D. Process for Modification

This sampling and analysis plan applies to years 0 through 20 of the 20-year monitoring period. However, following the baseline and year one data collection and analysis events and interpretation of results, the Trustees and FWS will determine whether the sediment sample collection and analysis plan described above warrants modification. Revised plans, if warranted, will be included as an addendum to this plan.

## ATTACHMENT C – Lamprey Monitoring Budget

PGE Harborton Site

Revised Updated Final Estimated Budget for Lamprey Monitoring Efforts - March 9, 2021

Cost Elements	MONITORING YEAR												TOTAL:
	Pre-implementation 2017	1 2021	2 2022	3 2023	4 2024	5 2025	6 2026	7 2027	8 2028	10 2030	15 2035	20 2040	
<b>Inflation Factor (no investment return)</b>	<b>1.03</b>	<b>1.16</b>	<b>1.19</b>	<b>1.23</b>	<b>1.27</b>	<b>1.30</b>	<b>1.34</b>	<b>1.38</b>	<b>1.43</b>	<b>1.51</b>	<b>1.75</b>	<b>2.03</b>	
<b>RESTORATION PROJECT MONITORING</b>													
Personnel	\$ 1,967	\$ 2,983	\$ 3,072	\$ 3,164	\$ 3,259	\$ 3,357	\$ 7,085	\$ 7,298	\$ 7,517	\$ 3,892	\$ 4,512	\$ 5,230	\$ 53,336
Non-personnel	\$ 273	\$ 461	\$ 475	\$ 489	\$ 504	\$ 519	\$ 1,008	\$ 1,038	\$ 1,069	\$ 602	\$ 697	\$ 809	\$ 7,944
Overhead	\$ 1,011	\$ 1,562	\$ 1,609	\$ 1,657	\$ 1,707	\$ 1,758	\$ 3,662	\$ 3,772	\$ 3,885	\$ 2,038	\$ 2,363	\$ 2,739	\$ 27,765
Organic content & Total Solids (\$50/sample)	\$ 1,545	\$ 2,203	\$ 2,269	\$ 2,337	\$ 2,407	\$ 2,479	\$ -	\$ -	\$ -	\$ 2,874	\$ 3,332	\$ 3,862	\$ 23,307
Grain size (\$125/sample)	\$ 3,863	\$ 5,507	\$ 5,672	\$ 5,842	\$ 6,017	\$ 6,198	\$ -	\$ -	\$ -	\$ 7,185	\$ 8,329	\$ 9,656	\$ 58,267
Lab-related admin costs	\$ 811	\$ 1,156	\$ 1,191	\$ 1,227	\$ 1,264	\$ 1,302	\$ -	\$ -	\$ -	\$ 1,509	\$ 1,749	\$ 2,028	\$ 12,236
Plan development/ implementation	\$ 3,316	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,316
Annual Data Compilation	\$ 7,856	\$ 8,842	\$ 9,107	\$ 9,380	\$ 9,662	\$ 9,952	\$ -	\$ -	\$ -	\$ 11,537	\$ 13,374	\$ 15,504	\$ 95,213
Equipment Replacement Cost	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 15,204	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 15,204
Sampling Contingency	\$ 109	\$ 184	\$ 189	\$ 195	\$ 201	\$ 207	\$ 405	\$ 417	\$ 429	\$ 240	\$ 278	\$ 322	\$ 3,176
Lab Contingency (20% of total analytical cost)	\$ 1,082	\$ 1,542	\$ 1,588	\$ 1,636	\$ 1,685	\$ 1,735	\$ -	\$ -	\$ -	\$ 2,012	\$ 2,332	\$ 2,704	\$ 16,315
<b>TOTAL</b>	<b>\$ 21,832</b>	<b>\$ 24,439</b>	<b>\$ 25,172</b>	<b>\$ 25,927</b>	<b>\$ 26,705</b>	<b>\$ 42,711</b>	<b>\$ 12,160</b>	<b>\$ 12,525</b>	<b>\$ 12,900</b>	<b>\$ 31,887</b>	<b>\$ 36,966</b>	<b>\$ 42,854</b>	<b>\$ 316,079</b>
<b>REFERENCE SITE MONITORING</b>													
Personnel	\$ 984	\$ 1,107	\$ 1,140	\$ 1,175	\$ 1,210	\$ 1,246	\$ -	\$ -	\$ -	\$ 1,445	\$ 1,675	\$ 1,941	\$ 11,922
Non-personnel	\$ 137	\$ 154	\$ 159	\$ 164	\$ 168	\$ 174	\$ -	\$ -	\$ -	\$ 201	\$ 233	\$ 270	\$ 1,660
Overhead	\$ 506	\$ 569	\$ 586	\$ 604	\$ 622	\$ 641	\$ -	\$ -	\$ -	\$ 743	\$ 861	\$ 998	\$ 6,129
Organic content & Total Solids (\$50/sample)	\$ 515	\$ 580	\$ 597	\$ 615	\$ 633	\$ 652	\$ -	\$ -	\$ -	\$ 756	\$ 877	\$ 1,016	\$ 6,242
Grain size (\$125/sample)	\$ 1,288	\$ 1,449	\$ 1,493	\$ 1,537	\$ 1,583	\$ 1,631	\$ -	\$ -	\$ -	\$ 1,891	\$ 2,192	\$ 2,541	\$ 15,605
Lab-related admin costs	\$ 270	\$ 304	\$ 313	\$ 323	\$ 333	\$ 343	\$ -	\$ -	\$ -	\$ 397	\$ 460	\$ 534	\$ 3,277
Sampling Contingency	\$ 55	\$ 61	\$ 63	\$ 65	\$ 67	\$ 69	\$ -	\$ -	\$ -	\$ 80	\$ 93	\$ 108	\$ 662
Lab Contingency (20% of total analytical cost)	\$ 361	\$ 406	\$ 418	\$ 430	\$ 443	\$ 457	\$ -	\$ -	\$ -	\$ 529	\$ 614	\$ 711	\$ 4,369
<b>TOTAL</b>	<b>\$ 4,114</b>	<b>\$ 4,631</b>	<b>\$ 4,770</b>	<b>\$ 4,913</b>	<b>\$ 5,060</b>	<b>\$ 5,212</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 6,042</b>	<b>\$ 7,004</b>	<b>\$ 8,120</b>	<b>\$ 49,866</b>
<b>TOTAL PROJECT SITE PLUS REFERENCE SITE</b>	<b>\$ 25,947</b>	<b>\$ 29,070</b>	<b>\$ 29,942</b>	<b>\$ 30,840</b>	<b>\$ 31,765</b>	<b>\$ 47,922</b>	<b>\$ 12,160</b>	<b>\$ 12,525</b>	<b>\$ 12,900</b>	<b>\$ 37,929</b>	<b>\$ 43,971</b>	<b>\$ 50,974</b>	<b>\$ 365,944</b>
<b>FWS Elements</b>	<b>\$ 16,213</b>	<b>\$ 15,924</b>	<b>\$ 16,401</b>	<b>\$ 16,893</b>	<b>\$ 17,400</b>	<b>\$ 33,126</b>	<b>\$ 12,160</b>	<b>\$ 12,525</b>	<b>\$ 12,900</b>	<b>\$ 20,777</b>	<b>\$ 24,086</b>	<b>\$ 27,922</b>	<b>\$ 226,327</b>
<b>Sediment Analysis Elements</b>	<b>\$ 9,734</b>	<b>\$ 13,146</b>	<b>\$ 13,541</b>	<b>\$ 13,947</b>	<b>\$ 14,365</b>	<b>\$ 14,796</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 17,153</b>	<b>\$ 19,885</b>	<b>\$ 23,052</b>	<b>\$ 139,618</b>

Bond amounts

Years 1-10	\$ 245,053	Years 15, 20	\$ 94,944
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Notes:

- This budget is based on the project design as of March 2021, described in the signed design plans for the project, "Portland General Electric Harborton Restoration Project, Portland, OR" dated July 23, 2020.
- The cost estimates provided in this budget reflect our best estimates of the costs of lamprey monitoring over the life of the plan (20 years). While the budget does account for inflation in estimating costs beyond year 0, it is not possible to predict with certainty whether and to what extent certain costs may change over time. As such, the specific amount of funds required in any given year may differ from what is presented herein, as directed by the Trustee Council or its representative.
- Costs included in the category "Equipment Replacement Costs" reflect the cost of major equipment required for carrying out lamprey monitoring activities that FWS is initially providing at no cost. Should any or all of the equipment require replacement during the course of lamprey monitoring on NRDA restoration sites, some or all of the replacement costs may be divided among all active restoration sites. The Trustee Council will make every attempt to identify options for sharing costs with other on-going, non-NRDA research activities. Project developers will not be charged for the costs of equipment replacement unless and until those costs are necessarily incurred. This budget assumes those funds will be requested in year 5. However, they may, in part or in total, be requested sooner, later, or not at all.
- Site-specific conditions require that FWS collect data to inform the fate of lamprey amocoetes that may colonize newly accessible off-channel habitat. This additional sampling will begin in the year following confirmation of lamprey colonization in tributary habitat, and may be repeated for up to two additional years. If lamprey amocoetes are not found to be present in the tributary during regular sampling events, these additional sampling events will not be necessary. For this budget, that sampling is assumed to occur in years 6, 7 and 8. However, it may occur sooner, later or not at all.

## ATTACHMENT D – Harborton Long-term Stewardship Budget Spreadsheet



Table 1

**Portland Harbor NRDA Restoration Project Long-term Stewardship Budget Template**

**PGE Harborton Restoration**

Stewardship Task	Relevant PAR Task	SubTask	Specific Description	Unit	Number of Units	Cost/Unit	Annual Cost	Frequency	Cont %	Total Cost
Corresponding task in stewardship	Corresponding task in PAR software	Specific task	provide detailed info	hrs, #, etc.	number of hours or items	cost per hour or number	# of units * cost/unit		Contingency percentage	annual cost * years * contingency
<b>Monitoring &amp; Maintenance</b>										\$ 20,460.00
annual survey	Biotic Surveys									
		Plant Ecologist	annual survey	hrs	60	100	\$ 6,000.00	1	10%	\$ 6,600.00
		Wildlife Biologist	annual survey	hrs	60	100	\$ 6,000.00	1	10%	\$ 6,600.00
		Biologist (Other)	annual survey	hrs	16	100	\$ 1,600.00	1	10%	\$ 1,760.00
		Hydrologist	annual survey	hrs	16	100	\$ 1,600.00	1	10%	\$ 1,760.00
		Conservation Easement Monitoring Engineer	annual survey	hrs	8	150	\$ 1,200.00	1	10%	\$ 1,320.00
			annual survey	hrs	8	150	\$ 1,200.00	1	10%	\$ 1,320.00
	Monitoring Equipment									
		Camera (35mm lens)	camera every 3 years	each	1	200	\$ 200.00	3	10%	\$ 73.33
		Vehicle	three day survey	day	3	100	\$ 300.00	1	10%	\$ 330.00
		Boat	NA		0	0	\$ -	0	10%	
		GPS	GPS every 3 years	each	1	1000	\$ 1,000.00	3	10%	\$ 366.67
		Sampling Equipment	miscellaneous	each	2	100	\$ 200.00	1	10%	\$ 220.00
		Shovels & other tools	miscellaneous	each	1	100	\$ 100.00	1	10%	\$ 110.00
										\$ 36,344.00
	General Maintenance									
		Trash container	4x/yr	each	4	100	\$ 400.00	1	10%	\$ 440.00
		Trash Bags	4x/yr	each	4	10	\$ 40.00	1	10%	\$ 44.00
		Dumpster	4x/yr	each	4	500	\$ 2,000.00	1	10%	
		Fence Maintenance	2x/yr	each	2	500	\$ 1,000.00	1	10%	\$ 1,100.00
		Trail Maintenance	NA				\$ -	0	10%	
		Maintain Signage	2x/yr	each	2	250	\$ 500.00	1	10%	\$ 550.00
		Travel	4	day	2	100	\$ 200.00	1	10%	\$ 220.00
	Habitat Maintenance once/yr									
		Exotic Plant Control	once/yr	each	1	10000	\$ 10,000.00	1	10%	\$ 11,000.00
		Seed Collection	NA				\$ -		10%	
		Trapping permit	once per 5 years	each	1	500	\$ 500.00	5	10%	\$ 110.00
		Brush Management	once/yr	each	1	2500	\$ 2,500.00	1	10%	\$ 2,750.00
		Erosion Control	once/yr	each	1	2500	\$ 2,500.00	1	10%	\$ 2,750.00
		Exotic Animal Control	once per 5 years	each	1	500	\$ 500.00	5	10%	\$ 110.00
		Maintain Safe Trees	once/yr	each	1	1000	\$ 1,000.00	1	10%	\$ 1,100.00
		Major Flood Clean-up	every 10 yr	each	1	10000	\$ 10,000.00	10	10%	\$ 1,100.00
		Plant Procurement	every other year	each	1	10000	\$ 10,000.00	2	10%	\$ 5,500.00
		Remove Trash	once/yr	each	1	500	\$ 500.00	1	10%	\$ 550.00
		Revegetation	every other year	each	1	5000	\$ 5,000.00	2	10%	\$ 2,750.00
		Geomorphic Inspection	once/yr	each	1	1000	\$ 1,000.00	1	10%	\$ 1,100.00
		Stormwater Inspection	4x/yr	each	4	500	\$ 2,000.00	1	10%	\$ 2,200.00
		Travel	5	day	5	100	\$ 500.00	1	10%	\$ 550.00

\*example costs

Maintenance Equipment once/yr	Wood for Fence or trail Maintenance	4x/yr	each	4	250	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Tools for maintenance	4x/yr	each	4	100	\$	<b>400.00</b>	<b>1</b>	10%	\$	440.00
	Erosion control materials	4x/yr	each	4	200	\$	<b>800.00</b>	<b>1</b>	10%	\$	880.00
<b>Program Management</b>											<b>\$17,911.67</b>
Office Maintenance											
	Computer (based on % used for this prc replace every 3 yrs		each	1	1500	\$	<b>1,500.00</b>	<b>3</b>	10%	\$	550.00
	Internet	annual	yr	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Office supplies	annual	yr	1	250	\$	<b>250.00</b>	<b>1</b>	10%	\$	275.00
	Meeting rooms	annual	yr	1	500	\$	<b>500.00</b>	<b>1</b>	10%	\$	550.00
Operations											
	Insurance	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	Legal & Emergency fund	every 3 years	each	1	10000	\$	<b>10,000.00</b>	<b>3</b>	10%	\$	3,666.67
	Research	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Communications/Meeting	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Supervisor Site Visit	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Travel	5	day	1	100	\$	<b>100.00</b>	<b>1</b>	10%	\$	110.00
	Accounting Services	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	Contracting Services	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	Succession Planning	annual	each	1	100	\$	<b>100.00</b>	<b>1</b>	10%	\$	110.00
<b>Community Relations and Enforcement</b>											<b>\$ 9,240.00</b>
Public Services											
	Patrolling	quarterly	each	4	500	\$	<b>2,000.00</b>	<b>1</b>	10%	\$	2,200.00
	Working with Volunteers	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Community Meetings	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
Enforcement											
	Working with Law enforcement	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Addressing illegal operations	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Cleaning up illegal operations	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Addressing Encampments	annual	each	1	1000	\$	<b>1,000.00</b>	<b>1</b>	10%	\$	1,100.00
	Travel	4	day	4	100	\$	<b>400.00</b>	<b>1</b>	10%	\$	440.00
<b>Reporting, Documentation, and Data Management</b>											<b>\$20,350.00</b>
Reporting											
	Stewardship Plan (Development)	one time	each	1	10000	\$	<b>10,000.00</b>		10%	included at end	
	Stewardship Plan (Update)	every five years	each	1	5000	\$	<b>5,000.00</b>	<b>5</b>	10%	\$	1,100.00
	Annual Maintenance Plan	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	Annual Monitoring Report	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	Annual Fiscal Report	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	Database/Geodatabase Management	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	GIS mapping	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	GPS mapping	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
	Website Management	annual	each	1	2500	\$	<b>2,500.00</b>	<b>1</b>	10%	\$	2,750.00
<b>Subtotal</b>											<b>\$ 104,305.67</b>
<b>Administration (25%)</b>											<b>\$ 26,076.42</b>
<b>Total</b>											<b>\$ 130,382.08</b>

monitoring	\$	20,460
maintenance	\$	36,344
program management	\$	17,912
community relations	\$	9,240
reporting, documentation	\$	20,350
administration	\$	26,076
total	\$	130,382
rate of return		5.0%
stewardship fund	\$	2,607,642
initial stewardship plan	\$	10,000.00
<b>total</b>	<b>\$</b>	<b>2,617,642</b>

## ATTACHMENT E – Harborton Fish Study Plan

**STUDY PLAN:  
INVESTIGATING SALMONID OCCUPANCY AT THE HARBORTON  
RESTORATION SITE**

**Prepared by:**

**Portland General Electric**

**December, 2020**

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1	Purpose of the Plan.....	2
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## 1 Purpose of the Plan

The objective of this study plan is to determine if the Harborton restoration site (hereafter “site”) is used as off-channel habitat by juvenile salmonids during their outmigration. A secondary objective is to determine use of off-channel habitat by other native and non-native fish species.

## 2 Methods

PGE proposes to use a stationary fyke trap (trap) as the preferred method to determine occupancy in the site. Fyke traps are known as “maze traps,” in which a fish enters the trap on its own but is unable to find its way out (Eyo and Akpati, 1995; Figure 1).

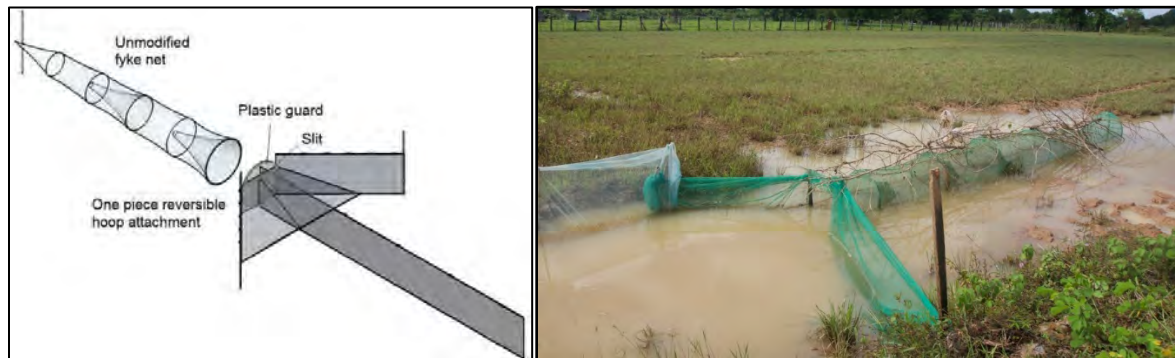


Figure 1. Schematic and photograph of a fyke net deployed in a floodplain (photo credit: Fishbio)

The fyke net is the preferred option because it should minimize impacts to ESA listed fish and reduce gear selectivity and associated biases relative to active sampling (seining/electro-fishing). Further, the site characteristics (physical dimensions, flow, silt, and debris) are more conducive to using a passive capture method (such as a fyke trap) than an active capture method (electrofishing/seining). PGE proposes to install two fyke traps in opposing fashion near the middle of the 600-meter side channel to sample fish in the site (Figure 2). Should this location not be conducive to trapping, alternate sites will be explored. The traps will have exclusion (wing) nets anchored to each bank to improve trap efficiency and reduce the likelihood of failure due to debris loading.



**Figure 2. Map of the Harborton restoration site with approximate location of the proposed trap(s) location (red box).**

As the site lacks a perennial tributary, salmonid occupancy will likely be dependent on high water events to facilitate colonization. Flooding in the Willamette creates strong currents and provides juvenile (salmonid) access to floodplains that contain slower moving water (Schroeder et al. 2014). Friesen et. al. (2007) noted that naturally produced salmonids were present in the lower Willamette River in December and January and that densities increased sharply in February (Figure 3). In the lower reaches of Tryon Creek (a lower Willamette River tributary) densities of juvenile Chinook were found to be the highest in December (Silver et al. 2006; Figure 4). Therefore, PGE recommends sampling for one week between November 1<sup>st</sup> - December 31<sup>st</sup> and one week between February 1<sup>st</sup> - March 31<sup>st</sup> following a flow event exceeding 50,000 cubic feet per second (cfs) at the USGS gage #14211720 (Morrison Bridge Gage - Portland, OR). Incorporating fish periodicity and inundation events (i.e. high-water event) should increase the likelihood salmonid occupancy is documented at the site. Should discharge not exceed the 50,000 cfs threshold in the aforementioned time period(s), sampling will be postponed until the scheduled time period in the subsequent water year.

Traps will be deployed on a Monday, checked daily, and removed the following Friday, yielding a total of 16 trap-nights (8 per trap) per sampling season (water year). Data collection will occur every other season (water year) over 10 years to inform the Trustee Council and PGE if the project is achieving its restoration goals. Once listed salmonids are captured in the trap, fyke net sampling will be discontinued and visual surveys, snorkeling, or other method agreed to by PGE and the Trustee Council will be used in future sampling events.



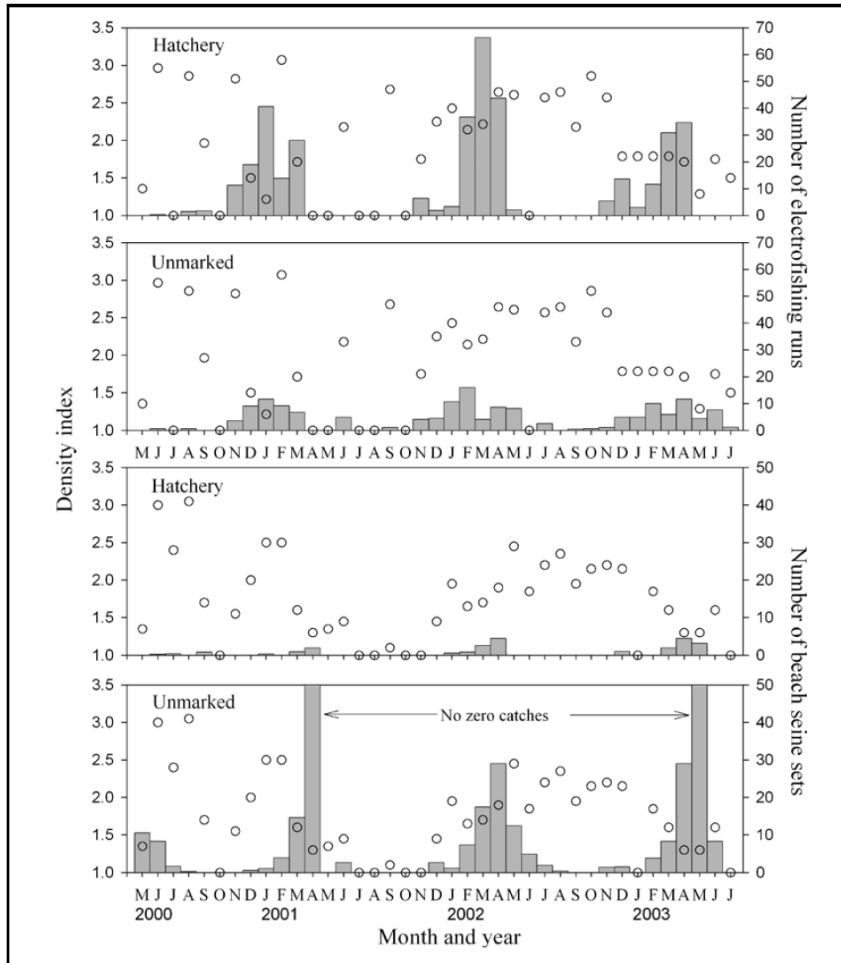


Figure 3. Monthly relative densities for juvenile Chinook salmon (hatchery and unmarked) captured by electrofishing (top panels) and beach seining (lower panels) in the lower Willamette River, 2000-2003 (Friesen, 2007).

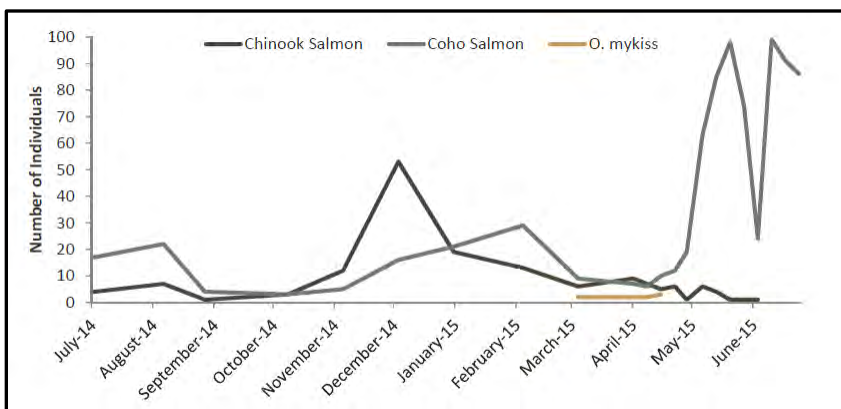


Figure 4. Number of wild migratory salmonids sampled below Highway 43 Culvert on Tryon Creek (Silver, 2016).

Each day captured fish will be removed from the traps and placed in a 5-gallon bucket with aeration for identification. Once fish are identified, they will be released near the side channel's confluence with the Willamette River to reduce recapture rates in the trap.

### **3 Documentation and Interpretation of Results**

Results will be presented annually, following that in which sampling occurs, to PGE and the Trustees for the duration of the study. The evaluation will begin in the winter of 2021-2022 and the first annual report related to this study will be submitted by December 31<sup>st</sup> of 2022.

#### 4 Literature Cited

Eyo, J.E., Akpati, C.I. 1995. Fishing Gears and Fishing Methods. Proceedings for the UNDP-Sponsored Training Workshop on Artisanal Fisheries Development. Held at University of Nigeria, October 29-November 12, 1995.

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Schroeder, K., B. Cannon, L. Whitman, and P. Olmsted. 2014. Willamette Spring Chinook: Life in the River. Corvallis, OR.

Silver, B.P., J.M. Hudson, T.A. Whitesel. 2016. Tryon Creek Restoration Monitoring, City of Portland FY 2015 Progress Report. U.S. Fish and Wildlife Service, Columbia River Fish and Wildlife Conservation Office, Vancouver, WA. 85 pp.  
[www.fws.gov/columbiariver/publications.html](http://www.fws.gov/columbiariver/publications.html)

**Table B-1.** Comments provided by the Trustees on the review draft of the plan to Evaluate Salmonid Occupancy at the Harborton Restoration Site.

Entity	Date	Comment Type	Comment

**Distribution of the draft of the plan**

## ATTACHMENT F – Harborton Vegetation Monitoring Protocol Memo



December 15, 2020

To: Harborton Trustee Council

From: Colin MacLaren, PGE

RE: Harborton – Vegetation Monitoring Protocol

The following memorandum is to document vegetation monitoring protocol that will be used during the Harborton Habitat Development project (Harborton). This memorandum is intended as a supplement to PGE's Monitoring and Adaptive Management Plan (MAMP), which describes basic vegetation monitoring protocol.

***Comment: Identify the individual vegetation type/starting condition groupings that will be monitored and analyzed independently***

Vegetation monitoring will be conducted at the Harborton site to document success of vegetation establishment and ongoing habitat management activities. Monitoring will employ permanent plots and visual estimates to measure vegetative cover, woody species density and species diversity within six habitat cover types.

*Monitoring Area Delineation*

Six habitat types are expected to be present at the Harborton site following construction. Figure 6 identifies the anticipated post-construction boundaries of the six habitat areas, which include:

- Upland Forest Establishment;
- Upland Scrub-Shrub Establishment;
- Riparian Forest Establishment;
- Riparian Forest Enhancement/Conservation;
- Wetland (i.e., ACM) Establishment;
- Wetland (i.e., ACM) Enhancement/Conservation

***Comment: provide a sampling scheme/monitoring plot layout that reflects adequate coverage of those habitat groupings***

### *Monitoring Plot Layout*

Each habitat class will have a minimum of 10 permanent monitoring plots located along linear transects, with the exception of Upland Forest and Upland Scrub-Shrub which will have a combined 10 monitoring plots due to limited acreage. Establishment of specific plot locations will be by systematic sampling along parallel, equally spaced transects. The first plot in the transect will be randomly located and subsequent plots will be spaced at equal intervals along the transect. Interval spacing distance will be adjusted for each habitat class to provide a minimum of 10 plots per class. Figure 6 illustrates approximate plot locations; final permanent plot locations will be accurately located in subsequent monitoring reports.

Monitoring plots will include 1-square-meter plots for measuring herbaceous cover. These will be nested within circular plots with a 5-meter diameter for woody cover. Plot centers will be permanently marked by flagged stakes and by aluminum tags etched with the unique plot identification.

### *Monitoring Methods*

Visual estimates of percent cover will be employed to measure herbaceous and woody canopy cover. Herbaceous cover will be estimated within a 1-square meter area using a square-framed device laid directly on the ground surface. Woody plants (tree and shrub) canopy cover and density will be estimated in a circular plot with a 5-meter diameter. Each 1-m square plot will be established by placing one corner of the frame on the plot location marker, with frame oriented so that the corner represents the SE corner of the frame. Circular plots will be centered on the permanent marker.

Cover values can change over the course of a growing season, so field monitoring will be performed at approximately the same stage of the growing season each year and at a stage when the majority of plant species are well developed, readily identifiable, and pre-senescent (i.e., June -August).

Shrub and forested habitat classes are distinguished for stratification based on potential height, not actual height. Areas with a predominance of tree species, regardless of current size, will be considered forested habitat.

Area not covered by vegetation will be recorded as bare substrate. Notation will be made as to whether the bare substrate is open water, litter, duff, wood, bare soil or rock. Total cover in a plot will be recorded as absolute values and therefore may exceed 100% due to layering. For shrub and tree cover, the crowns are projected vertically. Distinct holes in the canopy will be subtracted from the estimate. Plants overhanging into the sample plot, but that are rooted in an area that does not represent plot conditions or habitat classification, will be subtracted from cover estimates.

In shrub-dominated and forested systems, the number of live plants for shrubs and the number of live stems for trees will be counted. A plant will be counted if any part of the stem lies within the plot. Areas covered by water may require alternative sampling methods or timing for monitoring. When sampling in an area with surface water, submerged and exposed vegetation by species will be recorded, with notation identifying submerged vegetative cover. Areas not covered by vegetation will be recorded as open water and considered a special category of bare substrate.

### ***Comment: describe how data will be analyzed***

Data for each plot will be entered into an excel spreadsheet that includes the following elements:

- Plot ID
- Plant species



- Plant strata (herb, shrub, tree)
- Plant classification (native, non-native)
- Percent absolute cover
- Number of plants (woody species only)

The sample mean and confidence interval will be reported for each performance standard and compared to the threshold to determine if action is necessary or if the objective has been reached. The objective is to be 80% confident that the estimate reported is within  $\pm 10$  units of the true population. Values for vegetation performance standards (excluding diversity) will be reported as Mean (CI<sub>x</sub> = Y1-Y2), where:

CI = confidence interval  
x = 80% confidence level  
Y1 = low estimate  
Y2 = high estimate

where Y1 and Y2 are calculated as Mean  $\pm$  (standard error \* t-factor 80%). Standard error is calculated as the standard deviation divided by the square root of the number of samples taken in the habitat unit (stdev/sqrt(n)). The t-factor for an 80% confidence level is 1.282.

***Comment: how will baseline vegetation conditions be documented?***

Baseline vegetation was documented by AECOM in 2014 and by the City of Portland in 2013.



- Map Features**
- Survey Transect
  - Habitat Area
  - Non-Habitat Area
  - Upland Forest Establishment
  - Upland Scrub-Shrub Establishment
  - Riparian Forest Establishment
  - Riparian Forest Enhancement/Conservation
  - Wetland (i.e., ACM) Establishment
  - Wetland (i.e., ACM) Enhancement/Conservation
  - Property Line
  - Olympic Pipeline
  - Sample Plot Location (approximate)



**Portland General Electric**  
Portland, Oregon

Figure 6  
**Sample Line-intercept  
Vegetation Assessment Plots**  
**PGE Environmental Services**

## **Appendix P – Stewardship Funding Agreement**

*The following Funding and Management Agreement for the Harborton Restoration Project (“the Agreement”) is included in the Harborton Habitat Development Plan to serve only as an example for one possible approach for long term stewardship funding management. However, the management approach for the long-term stewardship funds will need to be negotiated and finalized following the selection of a qualified steward. Trustee Council and PGE acknowledge and agree that the amount of PGE’s funding obligation specified in section 3 shall not be changed unless mutually agreed in writing.*

## **STEWARDSHIP FUNDING AND MANAGEMENT AGREEMENT FOR THE HARBORTON RESTORATION PROJECT**

THIS STEWARDSHIP FUNDING AND MANAGEMENT AGREEMENT (“Agreement”) is made and entered into on \_\_\_\_\_, 202\_ (the “Effective Date”), by and among **PORTLAND GENERAL ELECTRIC COMPANY**, an Oregon business corporation, (“Restoration Implementer”), and the **NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (“NOAA”)**, on behalf of the Department of the Commerce, the **UNITED STATES FISH AND WILDLIFE SERVICE (“USFWS”)**, on behalf of the Department of Interior, the **OREGON DEPARTMENT OF FISH AND WILDLIFE (“ODFW”)**, the **CONFEDERATED TRIBES OF THE GRAND RONDE COMMUNITY OF OREGON**, the **CONFEDERATED TRIBES OF SILETZ INDIANS**, the **CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION**, the **CONFEDERATED TRIBES OF THE WARM SPRINGS INDIAN RESERVATION OF OREGON** and the **NEZ PERCE TRIBE** (collectively the “Trustee Council”), the \_\_\_\_\_ (the “Manager”) and \_\_\_\_\_ (the “Steward”). The Restoration Implementer, the Trustees, Steward, and the Manager are collectively referred to herein as the “Parties.”

### RECITALS

WHEREAS, the Restoration Implementer has received technical assistance from the Trustee Council to develop a restoration project known as the Harborton Restoration Project (“Harborton Restoration Project”) located on certain real property commonly referred to as 12500 NW Marina Way in Multnomah County, Oregon. The fifty three and 39/100 acre portion of the property that constitutes the Harborton Restoration Project is more particularly described in **Exhibit A**, attached hereto and incorporated herein by this reference.

WHEREAS, the Harborton Habitat Development Plan (“Harborton Habitat Development Plan”) requires that Restoration Implementer fund an account for the long-term stewardship of the Harborton Restoration Project.

WHEREAS, the Manager is an appropriate institution with which to establish and manage such a stewardship fund.

WHEREAS, under this Agreement, the Restoration Implementer is required to fund the endowment, and starting Year Eight of the performance period for the Harborton Restoration Plan, as identified in the Harborton Long-Term Stewardship Plan (“Stewardship Plan”), the Manager is required to manage the stewardship fund and make payments to the Steward who is

required to utilize the payments from the stewardship fund for long term management, maintenance, and monitoring of the Harborton Restoration Project; and

WHEREAS, the Restoration Implementer and Trustee Council desire, and the Manager is willing and able, to create and manage such endowment stewardship fund, subject to the terms and conditions hereof;

NOW THEREFORE, for valuable consideration the receipt and adequacy of which is hereby acknowledged, the Parties agree as follows:

1. NAME OF STEWARDSHIP FUND. There is hereby established in the Manager, and as a part thereof, a fund designated as the Harborton Restoration Project Stewardship Fund (“Fund”) to receive contributions in the form of money placed into the Fund held by the Manager by Year Eight of the performance period for the Harborton Restoration Project as identified in the Stewardship Plan, and to administer the same.

2. PURPOSE. The primary purpose of the Fund shall be to fund Steward’s management, maintenance, and monitoring as described in the Monitoring and Adaptive Management Plan for the Harborton Restoration Project, and the Stewardship Plan, [*to be developed* ] attached, as **Exhibit B** to the Agreement and incorporated by reference.

3. FUNDING. Per the Harborton Habitat Development Plan, Restoration Implementer is required to provide Two Million, Six Hundred Seventeen Thousand, Six Hundred Forty-Two dollars (\$2,617,642.00) as the principal amount (“Principal Amount”) of the Fund for the Harborton Restoration Project. All grants, bequests, and devises to this Fund shall be irrevocable once accepted by the Manager. For the avoidance of doubt, nothing contained in this Section 3 shall preclude a transfer of the Fund to an alternate management entity that has been approved by both the (i) Trustee Council or the Trustee Council members’ designee(s) and (ii) the Restoration Implementer. Restoration Implementer shall fund the Fund in the following manner:

a. Provided that this Agreement has been executed, the Principal Amount will be placed into the Fund held by the Manager by Year Eight of the performance period for the Harborton Restoration Project, as identified in the Stewardship Plan.

b. The funding of the Principal Amount will come from the proceeds of a portion of the sales of discounted service acre year credits (“DSAY Credits”) by Restoration Implementer that are available for sale from the Harborton Restoration Project, consistent with the Stewardship Plan.

4. DISTRIBUTION. Upon full funding of the Fund at the Principal Amount, the annual earnings allocable to the Fund, net of the fees and expenses shall be committed, granted or expended solely for the purposes of the endowment as set forth in Section 3 above. The Annual Fee shall be paid to the Manager per Section 12 below.

a. Payments. \_\_\_\_\_

i. \_\_\_\_\_

ii. \_\_\_\_\_

iii. \_\_\_\_\_

iv. The Manager shall issue a check to the Steward in the agreed upon amount no later than \_\_\_\_\_ of each year or at such time as is agreed to by Steward and Manager.

v. In the case of emergencies or unforeseen funding needs, the Steward may submit a request for additional disbursement at any time during the year, which amount shall generally be as requested, except where the requested amount would jeopardize the Principal Amount, which is not permitted per Section 11 below.

vi. The Manager shall provide the Restoration Implementer, Steward, and the members of the Trustee Council or their designee(s) with an annual accounting of the Fund that includes the rate of return received, the payments distributed, and remaining total on \_\_\_\_\_ of each year.

b. Commencement of Payment. Payments to the Steward shall not commence until \_\_\_\_\_.

5. VARIANCE. If the Manager proposes to dissolve, if the Manager files for bankruptcy, if the Endowment is dissolved, or if this Agreement is terminated, the assets of the Fund shall be distributed to a qualified third-party entity designated by the Trustee Council or the Trustee Council members' designee(s) in agreement with the Restoration Implementer and the Steward. Bankruptcy shall include (i) the filing of a voluntary petition under any federal or state law for the relief of debts; (ii) the continued pendency of an involuntary proceeding under any such law on the sixtieth day after its filing, or the entry of an order for relief under any such involuntary proceeding, whichever occurs first; (iii) the making of a general assignment for the benefit of the Manager's creditors; (iv) the seizure by a sheriff, receiver, or trustee of a substantial portion of the Manager's assets.

6. ADMINISTRATIVE PROVISIONS. Notwithstanding anything herein to the contrary, the Manager shall hold the Fund, and all contributions to the Fund, subject to the provisions of the applicable federal and Oregon laws, and the Manager's Articles of Incorporation and Bylaws.

Upon request by Restoration Implementer, Trustee Council or the Trustee Council's designee(s), or the Steward, the Manager agrees to provide a copy of the annual examination of the finances of the Manager as reported on by independent certified public accountants.

7. AMENDMENT. This Agreement may be amended only by written agreement of the Parties.

8. CONDITIONS FOR ACCEPTANCE OF FUNDS. The Parties agree and acknowledge that the Fund is subject to such terms and conditions, including but not by way of limitation, provisions from:

a. The Harborton Habitat Development Plan for the Harborton Restoration Project; and

b. The Declaration of Restrictions and Grant of Entry, dated \_\_\_\_\_, 202\_, and any future Conservation Easements as recorded in the official records of Multnomah County.

9. NOT A SEPARATE TRUST. The Fund shall be a component part of the Manager. All money and property in the Fund shall be held as permanently restricted general assets of the Manager, but shall not be segregated as trust property of a separate trust. For the avoidance of doubt, nothing contained in this Section 9 shall preclude a transfer of the Fund to an alternate management entity that has been approved by both the Trustee Council and the Restoration Implementer.

10. ACCOUNTING. The receipts and disbursements of this Fund shall be accounted for separately and apart from any other funds handled by the Manager.

11. INVESTMENT OF FUNDS. The Manager shall:

a. Have all powers necessary to carry out the purposes of the Fund, including, but not limited to, the power to retain, invest, and reinvest the Fund; provided that the Manager shall use these powers only as consistent with the investment objectives set forth in paragraph 11.c below.

b. Have a duty as provided in paragraph 11.e to invest the Fund prudently with the objective that the Principal Amount shall not be invaded and the Fund does not suffer financial loss. However, the Fund may suffer an investment loss from time to time; and, provided that the Fund was prudently invested, the Manager is not responsible or liable for such loss of the Principal Amount.

c. Implement the following investment objectives for the Fund: (1) preserving the real (after inflation) value of the Fund portfolio assets; and (2) growing the total value of the assets. The Manager's primary investment objective is the preservation of principal with investment growth being secondary. While an objective, the Parties do not guarantee that the Fund will produce without exception an annual revenue stream adequate to support the costs of the Stewardship Plan's expenses.

i. If the Steward, Restoration Implementer, or the Trustee Council or the Trustee Council members' designee(s) are concerned that the Manager is not achieving a sufficient rate of return to support the primary purpose set forth in Section 2 while preserving the Principal Amount, then at the request of the Steward, Restoration Implementer, or the Trustee Council or the Trustee Council members' designee(s), the Manager, Steward, Restoration Implementer, and the Trustee Council or the Trustee Council members' designee(s) shall discuss adjusting the asset allocation of the Fund in order to achieve a better rate of return. The Manager shall consider in good faith any suggestions by the Steward, Restoration Implementer, or the Trustees or the Trustees' designee(s) for asset reallocation.

d. Credit the Fund for all interest earned and, as appropriate, re-invest all such interest.

e. Discharge its duties with respect to the Fund with the care, skill, prudence, and diligence under the circumstances then prevailing, which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims, and shall exercise wise and prudent investment strategies in order to minimize risk, while maximizing the value of the Fund.

12. ANNUAL FEE. It is understood and agreed that the Manager shall require \_\_\_\_\_ as an annual fee to administer the Fund upon such time as the Fund is fully funded, which fee shall be charged annually against the Fund, and shall be withdrawn on \_\_\_\_\_ of each year. Until the principal of the Fund is funded at the Principal Amount pursuant to Section 3 above, the Restoration Implementer shall be responsible for paying the annual fee to the Manager.

13. TERMINATION. This Agreement may be terminated under the following circumstances:

a. Upon mutual written agreement of the Manager, the Trustee Council or the Trustee Council's designee(s), and the Steward.

b. If either the Manager or the Steward fails to observe the terms and conditions of this Agreement, any other Party, subject to prior notification to and upon receipt of concurrence from the Trustees or the Trustees' designee(s), may terminate this Agreement upon thirty (30) days written notice of termination. Any notice for termination of this Agreement for default shall specify the nature of the default. The defaulting Party shall have thirty (30) days following the receipt of such notice to cure the specified default. Timely cure of a specified default will avoid termination for the default described in the written notice.

c. If the Restoration Implementer, Steward and/or the Trustee Council determines that the Fund as managed by the Manager has failed to achieve a sufficient rate of return, consistent with Section 11.c, to support the primary purpose set forth in Sections 2 and 4.a while preserving the Principal Amount over a two-year period:

i. The Restoration Implementer, Steward and/or Trustee Council shall send a written notice of such a determination, and within twenty (20) days, the Manager, Restoration Implementer, Steward, and the Trustee Council or the Trustee Council members' designee(s) shall discuss adjusting the asset allocation of the Fund in order to achieve a better rate of return. The Manager, Restoration Implementer, Steward, and the Trustee Council or the Trustee Council members' designee(s) shall work collaboratively during this discussion, and the Manager shall consider in good faith any suggestions by the Restoration Implementer, Steward and the Trustee Council or the Trustee Council's designee(s) for asset reallocation. The Manager shall have thirty (30) days following this discussion to implement the agreed upon suggestions to improve the rate of return of the Fund.

ii. If after six (6) months from the date of the written notice issued under Section 13.c.i the rate of return of the Fund has not improved to achieve a sufficient rate



consistent with Section 11.c, to support the primary purpose set forth in Sections 2 and 4.a while preserving the Principal Amount, the Steward with written approval of the Restoration Implementer and Trustee Council or the Trustee Council's designee(s) may terminate this Agreement, provided that the Steward has identified a qualified third-party entity who is qualified to hold and shall accept the Fund. Any third-party successor Manager identified by the Steward pursuant to this Section, Section 13.c.ii, is subject to the approval of the Restoration Implementer and the Trustee Council or the Trustee Council's designee(s) and such approval shall not be unreasonably withheld.

**[Section 14, below, may be included in the event either an Interim Manager or an Interim Steward is designated. Provisions applicable to Interim Manager and/or Interim Steward to be used as appropriate.]**

14. TRANSFER PROVISIONS FOR INTERIM MANAGER and/or INTERIM STEWARD.

a. Interim Manager - The Parties acknowledge that \_\_\_\_\_ as the Interim Manager is intended initially to act as an interim manager of the Fund and that the Parties desire to identify a long-term manager for the Fund. The Trustee Council or the Trustee Council members' designee(s) and the Restoration Implementer may elect to transfer the Fund from \_\_[interim manager]\_\_ to a third-party manager subject to the written approval of the Trustee Council or the Trustee Council's designee(s) and the Restoration Implementer, which shall not be unreasonably withheld, and written notice to the Interim Manager. The provisions contained in Section 13, above, are not applicable in the event the Trustees and Restoration Implementer elect to transfer the Fund from \_\_[interim manager]\_\_. In the event the Trustees and the Restoration Implementer deliver written notice of their election to transfer the Fund, the Interim Manager shall cooperate and promptly transfer the Fund as directed in the notice within a reasonable period of time.

b. Steward - The Parties acknowledge that the Trustee Council desires to identify a long-term Steward for the Harborton Restoration Project. Nothing contained in this Agreement shall preclude a transfer of the funding of the long-term stewardship activities to a subsequently approved Steward, subject to the written approval of the Trustee Council and the Restoration Implementer. Such written approval shall not be unreasonably withheld.

15. GOVERNING LAW / JURISDICTION. The validity of this Agreement and any of its terms as well as the rights and duties of the Parties hereunder, shall be governed, interpreted and enforced in accordance with the laws of the State of Oregon and the United States of America. Any action, lawsuit, or proceeding that may arise pursuant to this Agreement must be instituted in the U.S. District Court for Oregon.

16. NOTICE. Any notice required or permitted by the Agreement and the shall be in writing and shall be deemed to have been duly given if personally delivered; or upon delivery if sent by nationally-recognized overnight courier service; or three days after mailing if sent by certified mail, postage prepaid; or upon confirmed receipt if sent by facsimile transmission.

Such notice in each case shall be sent to the following address (until another address is provided in writing by such Party to the other Party):

- a. Restoration Implementer:
- b. Trustee Council:
- c. Steward:
- d. Manager:

17. ENTIRE AGREEMENT. The Agreement along with any exhibits and attachments or other documents affixed hereto or referenced to herein represent the entire understanding of the Parties with respect to the subject matter addressed herein. There are no other prior or contemporaneous agreements, either written or oral, among the Parties with respect to this subject.

18. WARRANTY OF AUTHORITY. Each of the individuals signing this Agreement on behalf of a party hereto warrants and represents that such individual is duly authorized and empowered to enter into this Agreement and bind such party hereto.

-- *Signature Page Follows* --

***IN WITNESS WHEREOF, the Parties hereto have executed this Stewardship Funding and Management Agreement as of the Effective Date set forth above.***

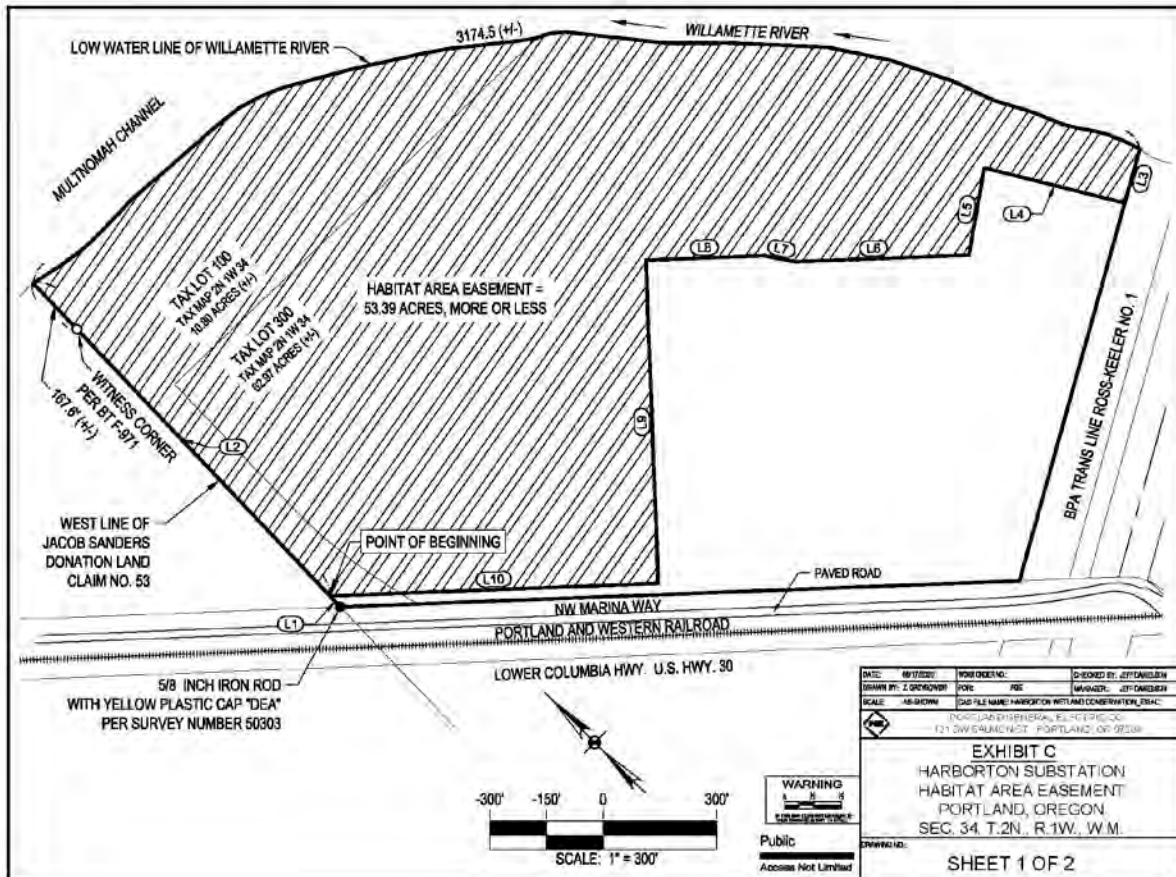
**[ SIGNATURE LINES TO BE INSERTED HERE ]**

**Exhibit A**  
**Harborton Restoration Area**

A parcel of land in a portion of all that property described in Book 646, Page 1178, Multnomah County deed records, Section 34, Township 2 North, Range 1 West, Willamette Meridian and in the Jacob Sanders Donation Land Claim (DLC No.53), City of Portland, Multnomah County, Oregon more particularly described as follows:

Commencing at a 5/8 inch iron rod with a yellow plastic cap inscribed "DEA INC" set in survey number 50303 per Multnomah County survey records, at the intersection of the northeasterly right-of-way line of Northwest Marina Way, being 55.00 feet northeasterly of the centerline when measured at right angles, and that certain compromise line for the west line of the Jacob Sanders Donation Land Claim (DLC No. 53); thence North 1°29'34" East along said West DLC line, 39.94 (L1) feet to a point being the southwesterly corner of said Parcel and also being at the intersection of said west DLC line and a line 30.00 feet from and parallel with said northeasterly right-of-way line of Northwest Marina Way and its prolongation, said point also being the Point of Beginning of said Parcel; thence along said west line of the Sanders DLC line North 1°29'34" East, 1139.83 feet (L2), more or less to a point on the low water line of the Willamette River said point bears North 1°29'34" East, 167.6 feet (+/-) from the Witness Corner to the Northwest Corner of said Sanders DLC No. 53 said point being monumented with a 2 inch iron pipe with a 4-1/4 inch brass disk; thence easterly along said low water line of the Willamette River 3174.5 feet (+/-) to a point at the intersection of said low water line and the easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records also being tax lot 300 and the westerly line of the Bonneville Power Administration Ross-Keeler No. 1 Transmission line right-of-way; thence along the easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records South 60°34'58" West, 148.39 feet (L3); thence leaving easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records North 30°58'04" West, 383.00 feet (L4); thence South 54°59'18" West, 233.68 feet (L5); thence North 47°11'42" West, 459.78 feet (L6); thence North 34°09'15" West, 84.54 feet (L7); thence North 47°11'42" West, 312.04 feet (L8); thence South 42°48'18" West, 854.84 feet (L9) to a point on a line 30.00 feet northeasterly from and parallel with said northeasterly right-of-way line of Northwest Marina Way and it's prolongation; thence along said line 30.00 feet northeasterly from and parallel with said northeasterly right-of-way line of said Northwest Marina Way and it's prolongation North 47°11'57" West, 868.46 feet (L10) to the Point of Beginning.

The above described parcel of land contains 53.39 acres more or less.



**Exhibit B**

**Harborton Long-Term Stewardship Plan – to be developed**

## **Appendix Q – Trustee Monitoring and Oversight Budget**

Portland Harbor NRDA Restoration - PGE Harborton Site  
Monitoring and Stewardship Trustee Council Oversight Budget

Year	Task	NOAA	State of Oregon	USFWS/DOI	Nez Perce	Umatilla	Siletz	Warm Springs	Grand Ronde	TOTAL
0	Credit release process and tracking (Lamprey) ReviewMonitoring/CostDoc/Budget-Contract/ConfCall	\$1,665.72	\$503.88	\$507.02	\$1,306.00	\$1,153.00	\$1,728.80	\$1,072.65	\$3,596.78	\$11,533.85
1	Participate in community outreach activities Review annual monitoring reports Site visits: 5 over 10 years Recommend and approve adaptive management actions as needed Revisit HEA using As-Builts Credit release process and tracking (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/ConfCall	\$9,699.91	\$1,599.37	\$3,453.39	\$2,844.58	\$2,583.92	\$3,098.90	\$2,883.72	\$7,291.84	\$33,455.63
2	Participate in community outreach activities Review annual monitoring reports Site visits: 5 over 10 years Recommend and approve adaptive management actions as needed (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/ConfCall	\$6,243.91	\$1,253.03	\$2,796.30	\$1,686.87	\$1,740.10	\$2,384.89	\$1,659.72	\$6,387.19	\$24,152.00
3	Participate in community outreach activities Review annual monitoring reports Site visits: 5 over 10 years Recommend and approve adaptive management actions as needed Credit release process and tracking (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/ConfCall	\$7,263.17	\$1,547.95	\$3,125.43	\$2,211.61	\$2,265.96	\$2,891.74	\$2,131.71	\$7,058.45	\$28,496.02
4	Participate in community outreach activities Review annual monitoring reports Recommend and approve adaptive management actions as needed (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/ConfCall	\$5,266.94	\$1,184.34	\$2,128.41	\$1,758.76	\$1,814.26	\$2,486.52	\$1,785.39	\$6,659.38	\$23,083.99
5	Participate in community outreach activities Review annual monitoring reports Site visits: 5 over 10 years Recommend and approve adaptive management actions as needed Review and development of conservation easements Confirm IMCS can be released (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/SiteVisit	\$10,291.05	\$2,173.81	\$4,140.05	\$4,490.81	\$3,198.51	\$4,661.26	\$4,209.45	\$9,056.19	\$42,221.13
6	Participate in community outreach activities Review annual monitoring reports Recommend and approve adaptive management actions as needed Credit release process and tracking (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget	\$6,195.09	\$413.15	\$576.94	\$1,117.58	\$1,291.17	\$1,098.55	\$1,715.76	\$6,365.78	\$18,774.03
7	Participate in community outreach activities Review annual monitoring reports Recommend and approve adaptive management actions as needed (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget	\$5,360.85	\$584.93	\$1,329.38	\$963.90	\$1,141.15	\$861.75	\$1,452.38	\$6,159.04	\$17,853.37
8	Participate in community outreach activities Review annual monitoring reports Review and approve Initial Long Term Stewardship Framework (only Year 8) Recommend and approve adaptive management actions as needed (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget	\$9,018.49	\$199.09	\$452.47	\$1,165.21	\$1,346.20	\$1,145.37	\$1,542.73	\$6,536.36	\$21,405.90
9	Participate in community outreach activities Review annual monitoring reports Recommend and approve adaptive management actions as needed	\$5,589.30	\$135.52	\$308.01	\$462.01	\$646.81	\$271.05	\$716.12	\$631.66	\$8,760.48
10	Participate in community outreach activities Review annual monitoring reports Site visits: 5 over 10 years Recommend and approve adaptive management actions as needed Confirm IMCS can be released (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/SiteVisit	\$7,902.36	\$1,071.82	\$2,619.95	\$2,326.98	\$2,512.39	\$2,179.80	\$2,344.37	\$7,953.81	\$28,911.48
11	Credit release process and tracking Stewardship Oversight	\$7,121.10	\$317.28	\$319.26	\$192.68	\$192.68	\$282.60	\$325.63	\$370.64	\$9,121.86
12	Stewardship Oversight	\$5,890.27	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,890.27
13	Stewardship Oversight	\$5,697.95	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,697.95
14	Stewardship Oversight	\$5,494.93	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,494.93
15	Stewardship Oversight (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/SiteVisit	\$5,280.84	\$0.00	\$0.00	\$1,849.83	\$1,846.18	\$1,805.15	\$1,436.60	\$7,853.00	\$20,071.60
16	Stewardship Oversight	\$5,055.33	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,055.33
17	Stewardship Oversight	\$4,818.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$4,818.00
18	Stewardship Oversight	\$4,568.46	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$4,568.46
19	Stewardship Oversight	\$4,306.29	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$4,306.29
20	Stewardship Oversight (Lamprey) Coord&ReviewMonitoring/CostDoc/Budget/Contract/ConfCall	\$3,664.62	\$0.00	\$0.00	\$1,138.70	\$1,138.70	\$1,457.54	\$1,154.64	\$7,596.83	\$16,151.03
<b>TOTALS</b>		<b>\$126,394.58</b>	<b>\$10,984.16</b>	<b>\$21,756.61</b>	<b>\$23,515.52</b>	<b>\$22,871.04</b>	<b>\$26,353.91</b>	<b>\$24,430.86</b>	<b>\$83,516.95</b>	<b>\$339,823.61</b>



**CONSENT DECREE APPENDIX G2**  
**(Performance Guarantees for the Harborton Restoration**  
**Project)**

**CONSENT DECREE APPENDIX G2-a**  
**(Construction Letter of Credit for the Harborton**  
**Restoration Project)**

**Construction Completed, Construction Letter of Credit**  
**has been released**

**CONSENT DECREE APPENDIX G2-b**  
**(Letter of Credit for Adaptive Management for the**  
**Harborton Restoration Project)**



**IRREVOCABLE STANDBY LETTER OF CREDIT:  
ADAPTIVE MANAGEMENT**

**DATE OF ISSUE:** February 5, 2021

**LETTER OF CREDIT NO.:** SLCPPDX08185

**ISSUER:**

U.S. Bank National Association  
Global Documentary Services  
555 S.W. Oak Street, Suite 400-P  
Portland, Oregon U.S.A. 97204  
Fax: (503) 464-4125  
Phone: (503) 464-3700

**EXPIRY DATE:** February 5, 2022

**AMOUNT:** \$1,105,621.25

**BENEFICIARY:**

National Oceanic and Atmospheric  
Administration ("NOAA")

**APPLICANT:**

Portland General Electric Company

**Street Address (for couriers):**

National Oceanic and Atmospheric Administration  
Restoration Center  
National Marine Fisheries Service,  
Oregon Field Office NOAA  
1201 NE Lloyd Blvd.  
Portland, OR 97232-2182  
Attn: Megan Callahan-Grant

**Street Address:**

1 WTC0506  
121 SW Salmon Street  
Portland, OR 97204

Dear Sir or Madam:

Issuer hereby establishes this Irrevocable Letter of Credit No. **SLCPPDX08185** in favor of the National Oceanic and Atmospheric Administration ("NOAA") ("Beneficiary") on behalf of the members of the Portland Harbor Natural Resource Trustee Council ("Trustee Council") at the request and for the account of Portland General Electric Company, an Oregon business corporation, 1 WTC0506 121 SW Salmon Street, Portland, OR 97204 ("Applicant") up to the maximum amount of ONE MILLION ONE HUNDRED FIVE THOUSAND SIX HUNDRED TWENTY ONE DOLLARS AND TWENTY FIVE CENTS (\$1,105,621.25) ("Maximum Amount"), available upon presentation of:

1. Beneficiary's sight draft, bearing reference to this letter of credit No. **SLCPPDX08185**, together with
2. Beneficiary's signed statement declaring that the amount of the sight draft is payable pursuant to regulations issued under the authority of NOAA, in the form attached hereto as **Exhibit A - Form of Sight Draft**.

Issuer has been advised by the Applicant that the Maximum Amount is based upon financial assurance requirements set forth in the Harborton Habitat Development Plan for construction of the Harborton Restoration Project ("the Project") in accordance with approved 100% design documents for the Project ("100% Design") and specifications further detailed in the Harborton Habitat Development Plan. The Maximum Amount has been

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\*\*\*THIS PAGE FORMS AN INTEGRAL PART OF CREDIT SLCPPDX08185\*\*\*



mutually agreed upon by the Applicant and NOAA, acting as a representative member of the Trustee Council for purposes of this letter. The Maximum Amount helps ensure that the Project is constructed in accordance with the 100% Design.

This Irrevocable Letter of Credit is effective as of February 5, 2021 and will expire one year from the date of issuance, on February 5, 2022 (the "Initial Expiration Date"), but such expiration date will be automatically extended for a period of one year from the Initial Expiration Date and on each successive expiration date, unless, at least 120 days before the current expiration date, Issuer notifies NOAA at the address identified above, with a copy of such notice sent to Applicant at the address identified above by certified mail or receipted courier that Issuer elects not to extend the Letter of Credit beyond the current expiration date. In the event Beneficiary is so notified, any unused portion of the credit will be available upon presentation of Beneficiary's sight draft for 120 days after the date of receipt by NOAA as shown on the signed return receipt or until the expiration date of this letter of credit, whichever is later.

Whenever this letter of credit is drawn on, under, and in compliance with the terms of this credit, Issuer will duly honor such draft upon presentation to us, and Issuer will pay to an account identified by NOAA to be used solely for construction of the Harborton Restoration Project. Wire instruction must include the account name, account number, and the ABA routing number of a named bank.

All notifications, requests, and demands required or permitted hereunder shall be given in writing by NOAA to Issuer, indicate the Letter of Credit number, identify the site, and provide a contact person (and contact information).

Multiple and partial draws on this letter of credit are expressly permitted, up to an aggregate amount not to exceed the Maximum Amount. Whenever this letter of credit is drawn on, under, and in compliance with the terms hereof, Issuer shall duly honor such draft upon presentation to Issuer, and Issuer shall deposit the amount of the draft in immediately available funds directly into such account or accounts as may be specified in accordance with Beneficiary's instructions.

All banking and other charges under this letter of credit are for the account of the Applicant.

I hereby certify that I am authorized to execute this letter of credit on behalf of U.S. Bank National Association.

This letter of credit is subject to the Uniform Customs and Practice for Documentary Credits Publication 600, published by the International Chamber of Commerce.

Sincerely,

**ISSUER:** U.S. Bank National Association

A handwritten signature in black ink that reads "Marcela Menchero". The signature is written in a cursive style and is positioned above a horizontal line.

Authorized Signature

M. Marcela Menchero  
Assistant Vice President

\*\*\*THIS PAGE FORMS AN INTEGRAL PART OF CREDIT SLCPPDX08185\*\*\*



Exhibit A - Form of Sight Draft  
[NOAA LETTERHEAD]

SIGHT DRAFT

TO: [Insert name of issuing institution]  
[Insert name and title of contact  
person(s)] [Insert address]

RE: Letter of Credit No. **SLCPPDX08185**

DATE: [Insert date on which draw is made]

TIME: [Insert time of day at which draw is made]

This draft is drawn under your Irrevocable Standby Letter of Credit No. **SLCPPDX08185**. I certify that the amount of the draft is payable pursuant to that certain Harborton Habitat Development Plan between the Trustees of the Portland Harbor Natural Resource Trustee Council, which is made up of the United States, represented by the National Oceanic and Atmospheric Administration and the Department of the Interior, the State of Oregon, the Nez Perce Tribe, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Warm Springs Reservation of Oregon and Portland General Electric Company, entered into by the parties thereto in accordance with the authority of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675, relating to the Portland Harbor Natural Resource Damage Assessment.” Pay to the order of the United States Department of Commerce, in immediately available funds, the amount of \$[insert dollar amount of draw] or, if no amount certain is specified, the total balance remaining available under such Irrevocable Standby Letter of Credit.

Pay such amount as is specified in the immediately preceding paragraph by [insert payment instructions as appropriate, such as: “Fedwire EFT, referencing Site/Spill ID Number [insert number] [and DJ Number [insert number]]. The Fedwire EFT payment must be sent as follows:

INSERT PAYMENT INSTRUCTIONS

The total amount paid shall be deposited by the National Oceanic and Atmospheric Administration in the Portland Harbor Natural Resource Damage Assessment Account to be retained and used to conduct or finance restoration actions at or in connection with the Harborton Restoration Project.

This Sight Draft has been duly executed by the undersigned, an authorized representative or agent of the National Oceanic and Atmospheric Administration, whose signature hereupon constitutes an endorsement.

By [signature]: \_\_\_\_\_  
Printed name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
Contact information: \_\_\_\_\_

\*\*\*THIS PAGE FORMS AN INTEGRAL PART OF CREDIT SLCPPDX08185\*\*\*





U.S. BANK NATIONAL ASSOCIATION  
GLOBAL DOCUMENTARY SERVICES PD-OR-P4CE  
555 SW OAK STREET, SUITE 400-P  
PORTLAND, OR 97204 USA

SWIFT: USBKUS44PDX  
TOLL FREE: 866-359-2503  
FAX: 503-464-4125

05/13/21

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AMENDMENT TO IRREVOCABLE STANDBY LETTER OF CREDIT

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APPLICANT:  
PORTLAND GENERAL ELECTRIC  
1WTC0506  
121 SW SALMON STREET  
PORTLAND OR 97204

---

LETTER OF CREDIT NUMBER: SLCPPDX08185 AMENDMENT NO. 01

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BENEFICIARY:  
NATIONAL OCEANIC AND ATMOSPHERIC  
ADMINISTRATION ("NOAA")  
RESTORATION CENTER  
NATIONAL MARINE FISHERIES SERVICE,  
OREGON FIELD OFFICE NOAA  
1201 NE LLOYD BLVD.  
PORTLAND, OR 97232-2182  
ATTN: MEGAN CALLAHAN-GRANT

---

WE HEREBY AMEND STANDBY LETTER OF CREDIT AS FOLLOWS:

+ THE FOLLOWING PARAGRAPH IS HEREBY REPLACED:

ISSUER HAS BEEN ADVISED BY THE APPLICANT THAT THE MAXIMUM AMOUNT IS BASED UPON FINANCIAL ASSURANCE REQUIREMENTS SET FORTH IN THE HARBORTON HABITAT DEVELOPMENT PLAN FOR CONSTRUCTION OF THE HARBORTON RESTORATION PROJECT ("THE PROJECT") IN ACCORDANCE WITH APPROVED 100% DESIGN DOCUMENTS FOR THE PROJECT ("100% DESIGN") AND SPECIFICATIONS FURTHER DETAILED IN THE HARBORTON HABITAT DEVELOPMENT PLAN. THE MAXIMUM AMOUNT HAS BEEN MUTUALLY AGREED UPON BY THE APPLICANT AND NOAA, ACTING AS A REPRESENTATIVE MEMBER OF THE TRUSTEE COUNCIL FOR PURPOSES OF THIS LETTER. THE MAXIMUM AMOUNT HELPS ENSURE THAT THE PROJECT IS CONSTRUCTED IN ACCORDANCE WITH THE 100% DESIGN.

+ THE PARAGRAPH WILL NOW READ:

ISSUER HAS BEEN ADVISED BY THE APPLICANT THAT THE MAXIMUM AMOUNT IS BASED UPON FINANCIAL ASSURANCE REQUIREMENTS SET FORTH IN THE HARBORTON DEVELOPMENT PLAN TO ENSURE SUFFICIENT FUNDS TO CONDUCT ADAPTIVE MANAGEMENT ACTIVITIES FOR THE HARBORTON RESTORATION PROJECT (THE "PROJECT"). THE MAXIMUM AMOUNT HAS BEEN MUTUALLY AGREED UPON BY THE

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APPLICANT AND NOAA, ACTING AS A REPRESENTATIVE MEMBER OF THE TRUSTEE COUNCIL FOR THE PURPOSES OF THIS LETTER. THE MAXIMUM AMOUNT HELPS ENSURE THAT THE PROJECT MEETS THE POST-CONSTRUCTION PERFORMANCE STANDARDS SET FORTH IN THE HARBORTON HABITAT DEVELOPMENT PLAN.

BENEFICIARY IS REQUESTED TO INDICATE ACCEPTANCE OR REJECTION OF THE ABOVE TERMS OF THIS AMENDMENT ON A COPY OF THIS LETTER AND SIGN AND RETURN THE COPY TO US URGENTLY. PLEASE INDICATE (BY 'X') CHOICE.

THE REFERENCED AMENDMENT TO THE LETTER OF CREDIT IS ACCEPTABLE

THE REFERENCED AMENDMENT TO THE LETTER OF CREDIT IS REJECTED

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ("NOAA")

\_\_\_\_\_  
NAME:

\_\_\_\_\_  
TITLE:

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

U.S. BANK NATIONAL ASSOCIATION  
A MEMBER OF THE FEDERAL RESERVE SYSTEM

STANDBY LETTERS OF CREDIT

M. Marcela Menchero  
Assistant Vice President

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1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. Fold the printed label at the solid line below. Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. GETTING YOUR SHIPMENT TO UPS

Customers with a Daily Pickup

Your driver will pickup your shipment(s) as usual.

Customers without a Daily Pickup

Take your package to any location of The UPS Store®, UPS Access Point™ location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.

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422 NW 13TH AVE  
PORTLAND ,OR 97209

UPS Access Point™  
PARK AVENUE MARKET  
1503 SW PARK AVE  
PORTLAND ,OR 97201

FOLD HERE

<p>EMILY BOWE 5034644173 U.S. BANK 355 SW OAK ST PORTLAND OR 97204</p> <p><b>SHIP TO:</b> ATTN: MEGAN CALLAHAN-GRANT NATIONAL OCEANIC &amp; ATMOSPHERIC ADMIN OREGON FIELD OFFICE NOAA 1201 NE LLOYD BLVD. <b>PORTLAND OR 97232-1202</b></p>	<p>1.0 LBS LTR      1 OF 1</p> <p><b>OR 972 9-17</b></p> 	<p><b>UPS NEXT DAY AIR SAVER 1P</b></p> <p>TRACKING #: 1Z 872 RF6 13 2195 6272</p> 	<p><b>BILLING: P/P</b></p> <p>Reference # 1: 3002020547 Pkg Unique Identifier: SLCPDXX08185.8186.8187 <small>US 22.6.13. WRTN158 45.0A 04/2021</small></p> 
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**CONSENT DECREE APPENDIX G2-c**  
**(Letter of Credit for Years 15 and 20 Lamprey**  
**Monitoring for the Harborton Restoration Project)**



**IRREVOCABLE STANDBY LETTER OF CREDIT:  
YEARS 15 AND 20 LAMPREY MONITORING SECURITY**

**DATE OF ISSUE:** February 5, 2021

**LETTER OF CREDIT NO.:** SLCPDX08187

**ISSUER:**

U.S. Bank National Association  
Global Documentary Services  
555 S.W. Oak Street, Suite 400-P  
Portland, Oregon U.S.A. 97204  
Fax: (503) 464-4125  
Phone: (503) 464-3700

**EXPIRY DATE:** February 5, 2022

**AMOUNT:** \$106,699.00

**BENEFICIARY:**

National Oceanic and  
Atmospheric Administration ("NOAA")

**APPLICANT:**

Portland General Electric Company

**Street Address (for couriers):**

National Oceanic and Atmospheric Administration  
Restoration Center  
National Marine Fisheries Service,  
Oregon Field Office NOAA  
1201 NE Lloyd Blvd.  
Portland, OR 97232-2182  
Attn: Megan Callahan-Grant

**Street Address:**

1 WTC0506  
121 SW Salmon Street  
Portland, OR 97204

Dear Sir or Madam:

Issuer hereby establishes this Irrevocable Letter of Credit No. **SLCPDX08187** in favor of the National Oceanic and Atmospheric Administration ("NOAA") ("Beneficiary") on behalf of the members of the Portland Harbor Natural Resource Trustee Council ("Trustee Council") at the request and for the account of Portland General Electric Company, an Oregon business corporation, 1 WTC0506 121 SW Salmon Street, Portland, OR 97204 ("Applicant") up to the maximum amount of **one hundred six thousand six hundred ninety-nine U.S. dollars and zero cents (\$106,699.00)** ("Maximum Amount"), available upon presentation of:

1. Beneficiary's sight draft, bearing reference to this letter of credit No. **SLCPDX08187**, together with
2. Beneficiary's signed statement declaring that the amount of the sight draft is payable pursuant to regulations issued under the authority of NOAA, in the form attached hereto as **Exhibit A -Form of Sight Draft**.

Issuer has been advised by the Applicant that the Maximum Amount US \$106,699.00 is based upon financial assurance requirements for site-specific lamprey monitoring for Years 15 and 20 as detailed in the

\*\*\*THIS PAGE FORMS AN INTEGRAL PART OF CREDIT SLCPDX08187\*\*\*



Harborton Habitat Development Plan and Harborton Lamprey Monitoring Plan for the Harborton Restoration Project (the "Project"). The Maximum Amount has been mutually agreed upon by the Applicant and NOAA, acting as a representative member of the Trustee Council for purposes of this letter. This Maximum Amount helps ensure that funding for site specific lamprey monitoring of the Project during Years 15 and 20 is available.

This Irrevocable Letter of Credit is effective as of February 5, 2021 and will expire one year from the date of issuance, on February 5, 2022 (the "Initial Expiration Date"), but such expiration date will be automatically extended for a period of one year from the Initial Expiration Date and on each successive expiration date, unless, at least 120 days before the current expiration date, Issuer notifies NOAA at the address identified above, with a copy of such notice sent to Applicant at the address identified above by certified mail or receipted courier that Issuer elects not to extend the Letter of Credit beyond the current expiration date. In the event Beneficiary is so notified, any unused portion of the credit will be available upon presentation of Beneficiary's sight draft for 120 days after the date of receipt by NOAA as shown on the signed return receipt or until the expiration date of this letter of credit, whichever is later.

Whenever this letter of credit is drawn on, under, and in compliance with the terms of this credit, Issuer will duly honor such draft upon presentation to us, and Issuer will pay to an account identified by NOAA to be used solely for interim management plus contingencies and site-specific lamprey monitoring. Wire instruction must include the account name, account number, and the ABA routing number of a named bank.

All notifications, requests, and demands required or permitted hereunder shall be given in writing by NOAA to Issuer, indicate the Letter of Credit number, identify the site, and provide a contact person (and contact information).

Multiple and partial draws on this letter of credit are expressly permitted, up to an aggregate amount not to exceed the Maximum Amount. Whenever this letter of credit is drawn on, under, and in compliance with the terms hereof, Issuer shall duly honor such draft upon presentation to Issuer, and Issuer shall deposit the amount of the draft in immediately available funds directly into such account or accounts as may be specified in accordance with Beneficiary's instructions.

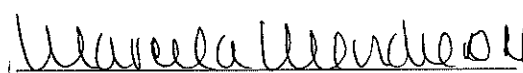
All banking and other charges under this letter of credit are for the account of the Applicant.

I hereby certify that I am authorized to execute this letter of credit on behalf of U.S. Bank National Association.

This letter of credit is subject to the Uniform Customs and Practice for Documentary Credits Publication 600, published by the International Chamber of Commerce.

Sincerely,

**ISSUER:** U.S. Bank National Association

  
Authorized Signature

M. Marcela Menchero  
Assistant Vice President

\*\*\*THIS PAGE FORMS AN INTEGRAL PART OF CREDIT SLCPPDX08187\*\*\*



Exhibit A - Form of Sight Draft  
[NOAA LETTERHEAD]

SIGHT DRAFT

TO: [Insert name of issuing institution]  
[Insert name and title of contact  
person(s)] [Insert address]

RE: Letter of Credit No. **SLCPPDX08187**

DATE: [Insert date on which draw is made]

TIME: [Insert time of day at which draw is made]

This draft is drawn under your Irrevocable Standby Letter of Credit No. **SLCPPDX08187**. I certify that the amount of the draft is payable pursuant to that certain Harborton Habitat Development Plan between the Trustees of the Portland Harbor Natural Resource Trustee Council, which is made up of the United States, represented by the National Oceanic and Atmospheric Administration and the Department of the Interior, the State of Oregon, the Nez Perce Tribe, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Warm Springs Reservation of Oregon and Portland General Electric Company, entered into by the parties thereto in accordance with the authority of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675, relating to the Portland Harbor Natural Resource Damage Assessment.” Pay to the order of the United States Department of Commerce, in immediately available funds, the amount of \$[insert dollar amount of draw] or, if no amount certain is specified, the total balance remaining available under such Irrevocable Standby Letter of Credit.

Pay such amount as is specified in the immediately preceding paragraph by [insert payment instructions as appropriate, such as: “Fedwire EFT, referencing Site/Spill ID Number [insert number] [and DJ Number [insert number]]. The Fedwire EFT payment must be sent as follows:

INSERT PAYMENT INSTRUCTIONS

The total amount paid shall be deposited by the National Oceanic and Atmospheric Administration in the Portland Harbor Natural Resource Damage Assessment Account to be retained and used to conduct or finance restoration actions at or in connection with the Harborton Restoration Project.

This Sight Draft has been duly executed by the undersigned, an authorized representative or agent of the National Oceanic and Atmospheric Administration, whose signature hereupon constitutes an endorsement.

By [signature]: \_\_\_\_\_  
Printed name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
Contact information: \_\_\_\_\_

\*\*\*THIS PAGE FORMS AN INTEGRAL PART OF CREDIT SLCPPDX08187\*\*\*

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2. Fold the printed label at the solid line below. Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.
3. **GETTING YOUR SHIPMENT TO UPS**  
**Customers with a Daily Pickup**  
 Your driver will pickup your shipment(s) as usual.

**Customers without a Daily Pickup**


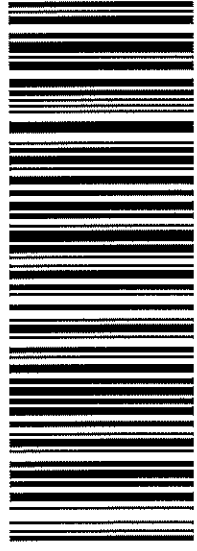
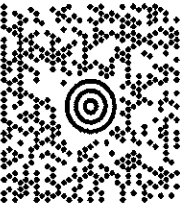
Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.  
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 PARK AVENUE MARKET  
 1503 SW PARK AVE  
 PORTLAND, OR 97201

FOLD HERE

<p style="text-align: right;"><b>1.5 LBS LTR</b>      <b>1 OF 1</b></p> <p>MARIA MENCHERO                  503.464.3604                  U.S. BANK                  555 SW OAK ST                  PORTLAND, OR 97204</p> <p><b>SHIP TO:</b>                  MEGAN CALLAHAN-GRANT                  NATIONAL OCEANIC AND ATMOSPHERIC AD                  1201 NE LLOYD BLVD.  <b>PORTLAND OR 97232-1202</b></p>	<p style="font-size: 2em; font-weight: bold;">OR 972 9-17</p> 	<p style="font-size: 2em; font-weight: bold;">UPS NEXT DAY AIR SAVER <b>1P</b></p> <p>TRACKING #: 1Z 872 RF6 13 1857 6242</p> 
		<p style="text-align: right;"><b>BILLING: P/P</b></p> <p style="font-size: 0.8em;">Reference # 1: 3002020547                  Pkg Unique Identifier: SLCP PDX08188_08187_08186,08185                  CS 253.12 WNTNNS0420A 07/2021™</p>



U.S. BANK NATIONAL ASSOCIATION  
GLOBAL DOCUMENTARY SERVICES PD-OR-P4CE  
555 SW OAK STREET SUITE 400-P  
PORTLAND, OR 97204 USA

SWIFT: USBKUS44PDX  
TOLL FREE: 866-359-2503  
FAX: 503-464-4125

05/13/21

=====
AMENDMENT TO IRREVOCABLE STANDBY LETTER OF CREDIT
=====

BENEFICIARY:
NATIONAL OCEANIC AND ATMOSPHERIC
ADMINISTRATION ("NOAA")
RESTORATION CENTER
NATIONAL MARINE FISHERIES SERVICE,
OREGON FIELD OFFICE NOAA
1201 NE LLOYD BLVD.
PORTLAND, OR 97232-2182
ATTN: MEGAN CALLAHAN-GRANT

APPLICANT:
PORTLAND GENERAL ELECTRIC
1WTC0506
121 SW SALMON STREET
PORTLAND OR 97204

=====
LETTER OF CREDIT NUMBER SLCPPDX08187 AMENDMENT NO. 1
=====

WE HEREBY AMEND IRREVOCABLE STANDBY LETTER OF CREDIT AS FOLLOWS:

+ L/C AMOUNT IS DECREASED BY USD 11,755.00
MAKING THE NEW AMOUNT USD 94,944.00

BENEFICIARY IS REQUESTED TO INDICATE ACCEPTANCE OR REJECTION OF THE
ABOVE TERMS OF THIS AMENDMENT ON A COPY OF THIS LETTER AND SIGN AND
RETURN THE COPY TO US URGENTLY. PLEASE INDICATE (BY 'X') CHOICE

- \_\_\_ THE REFERENCED AMENDMENT TO THE LETTER OF CREDIT IS ACCEPTABLE
\_\_\_ THE REFERENCED AMENDMENT TO THE LETTER OF CREDIT IS REJECTED

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ("NOAA")

NAME: TITLE:

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

THIS AMENDMENT IS TO BE CONSIDERED PART OF THE LETTER OF CREDIT
AND MUST BE ATTACHED THERETO.

U.S. BANK NATIONAL ASSOCIATION
A MEMBER OF THE FEDERAL RESERVE SYSTEM

[Handwritten Signature]
STANDBY LETTERS OF CREDIT

M. Marcela Menchero
Assistant Vice President

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<p>EMILY BOWE                  503.644.613                  U.S. BANK                  555 SW OAK ST                  PORTLAND OR 97204</p> <p><b>1.0 LBS LTR</b></p> <p><b>1 OF 1</b></p> <p><b>SHIP TO:</b>                  ATTN: MEGAN CALLAHAN-GRANT                  NATIONAL OCEANIC &amp; ATMOSPHERIC ADMIN                  OREGON FIELD OFFICE NOAA                  1201 NE LLOYD BLVD.  <b>PORTLAND OR 97232-1202</b></p>	<p><b>OR 972 9-17</b></p>  	<p><b>UPS NEXT DAY AIR SAVER 1P</b></p> <p>TRACKING #: 1Z 872 RF6 13 2195 6272</p> 	<p><b>BILLING: P/P</b></p>  <p>Reference # 1: 3002020547                  Pkg Unique Identifier: SLCPD08185.8186.8187  <small>CS 2.2.B.13. W/NPN/58 45.0A 24/2021</small></p>
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**CONSENT DECREE APPENDIX G2-d**  
**(Letter of Credit for Interim Monitoring and Contingency**  
**and Years 1-10 Lamprey Monitoring for the Harborton**  
**Restoration Project)**



**IRREVOCABLE STANDBY LETTER OF CREDIT:  
INTERIM MANAGEMENT AND CONTINGENCY AND YEARS 1-10 LAMPREY  
MONITORING SECURITIES**

**DATE OF ISSUE:** February 5, 2021

**LETTER OF CREDIT NO.:**SLCPPDX08186

**ISSUER:**

U.S. Bank National Association  
Global Documentary Services  
555 S.W. Oak Street, Suite 400-P  
Portland, Oregon U.S.A. 97204  
Fax: (503) 464-4125  
Phone: (503) 464-3700

**EXPIRY DATE:** February 5, 2022

**AMOUNT:** \$1,619,541.50

**BENEFICIARY:**

National Oceanic and  
Atmospheric Administration (“NOAA”)

**APPLICANT:**

Portland General Electric Company

**Street Address (for couriers):**

National Oceanic and Atmospheric Administration  
Restoration Center  
National Marine Fisheries Service,  
Oregon Field Office NOAA  
1201 NE Lloyd Blvd.  
Portland, OR 97232-2182  
Attn: Megan Callahan-Grant

**Street Address:**

1WTC0506  
121 SW Salmon Street  
Portland, OR 97204

Dear Sir or Madam:

Issuer hereby establishes this Irrevocable Letter of Credit No. **SLCPPDX08186** in favor of the National Oceanic and Atmospheric Administration (“NOAA”) (“Beneficiary”) on behalf of the members of the Portland Harbor Natural Resource Trustee Council (“Trustee Council”) at the request and for the account of Portland General Electric Company, an Oregon business corporation, 1WTC0506 121 SW Salmon Street, Portland, OR 97204 (“Applicant”) up to the maximum amount of **one million six hundred nineteen thousand five hundred forty-one U.S. dollars and fifty cents** (\$1,619,541.50) (“Maximum Amount”), available upon presentation of:

1. Beneficiary’s sight draft, bearing reference to this letter of credit No. **SLCPPDX08186**, together with
2. Beneficiary’s signed statement declaring that the amount of the sight draft is payable pursuant to regulations issued under the authority of NOAA, in the form attached hereto as **Exhibit A - Form of Sight Draft**.

Issuer has been advised by the Applicant that the Maximum Amount US \$1,619,541.50 is based upon financial assurance requirements for interim management and contingency security as well as site-specific lamprey monitoring for Years 1-10 as detailed in the Harborton Habitat Development Plan and the Harborton Lamprey Monitoring Plan for the Harborton Restoration Project (the “Project”). This Maximum Amount has been mutually agreed upon by the Applicant and NOAA, acting as a representative member of the Trustee Council for purposes of this letter. This amount helps ensure that funding for interim management and

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**COPY**



monitoring, including site specific lamprey monitoring, of the Project during the performance period is available.

This Irrevocable Letter of Credit is effective as of February 5, 2021 and will expire one year from the date of issuance, on February 5, 2022 (the "Initial Expiration Date"), but such expiration date will be automatically extended for a period of one year from the Initial Expiration Date and on each successive expiration date, unless, at least 120 days before the current expiration date, Issuer notifies NOAA at the address identified above, with a copy of such notice sent to Applicant at the address identified above by certified mail or receipted courier that Issuer elects not to extend the Letter of Credit beyond the current expiration date. In the event Beneficiary is so notified, any unused portion of the credit will be available upon presentation of Beneficiary's sight draft for 120 days after the date of receipt by NOAA as shown on the signed return receipt or until the expiration date of this letter of credit, whichever is later.

Whenever this letter of credit is drawn on, under, and in compliance with the terms of this credit, Issuer will duly honor such draft upon presentation to us, and Issuer will pay to an account identified by NOAA to be used solely for interim management plus contingencies and site-specific lamprey monitoring. Wire instructions must include the account name, account number, and the ABA routing number of a named bank.

All notifications, requests, and demands required or permitted hereunder shall be given in writing by NOAA to Issuer, indicate the Letter of Credit number, identify the site, and provide a contact person (and contact information).

Multiple and partial draws on this letter of credit are expressly permitted, up to an aggregate amount not to exceed the Maximum Amount. Whenever this letter of credit is drawn on, under, and in compliance with the terms hereof, Issuer shall duly honor such draft upon presentation to Issuer, and Issuer shall deposit the amount of the draft in immediately available funds directly into such account or accounts as may be specified in accordance with Beneficiary's instructions.

All banking and other charges under this letter of credit are for the account of the Applicant.

I hereby certify that I am authorized to execute this letter of credit on behalf of U.S. Bank National Association.

This letter of credit is subject to the Uniform Customs and Practice for Documentary Credits Publication 600, published by the International Chamber of Commerce.

Sincerely,

**ISSUER:** U.S. Bank National Association

A handwritten signature in black ink, appearing to read "M. Marcela Menchero". The signature is written in a cursive style and is positioned above a horizontal line.

Authorized Signature

M. Marcela Menchero  
Assistant Vice President

\*\*\*THIS PAGE FORMS AN INTEGRAL PART OF CREDIT SLCPPDX08186\*\*\*



Exhibit A - Form of Sight Draft  
[NOAA LETTERHEAD]

SIGHT DRAFT

TO: [Insert name of issuing institution]  
[Insert name and title of contact person(s)]  
[Insert address]

RE: Letter of Credit No. **SLCPPDX08186**

DATE: [Insert date on which draw is made]

TIME:[Insert time of day at which draw is made]

This draft is drawn under your Irrevocable Standby Letter of Credit No. **SLCPPDX08186**. I certify that the amount of the draft is payable pursuant to that certain Harborton Habitat Development Plan between the Trustees of the Portland Harbor Natural Resource Trustee Council, which is made up of the United States, represented by the National Oceanic and Atmospheric Administration and the Department of the Interior, the State of Oregon, the Nez Perce Tribe, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Warm Springs Reservation of Oregon and Portland General Electric Company, entered into by the parties thereto in accordance with the authority of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675, relating to the Portland Harbor Natural Resource Damage Assessment.” Pay to the order of the United States Department of Commerce, in immediately available funds, the amount of \$[insert dollar amount of draw] or, if no amount certain is specified, the total balance remaining available under such Irrevocable Standby Letter of Credit.

Pay such amount as is specified in the immediately preceding paragraph by [insert payment instructions as appropriate, such as: “Fedwire EFT, referencing Site/Spill ID Number [insert number] [and DJ Number [insert number]]. The Fedwire EFT payment must be sent as follows:

INSERT PAYMENT INSTRUCTIONS

The total amount paid shall be deposited by the National Oceanic and Atmospheric Administration in the Portland Harbor Natural Resource Damage Assessment Account to be retained and used to conduct or finance restoration actions at or in connection with, [insert as appropriate: “Consent Decree,” “ [insert name of restoration project habitat development plan] Guaranteed Work”].

This Sight Draft has been duly executed by the undersigned, an authorized representative or agent of the National Oceanic and Atmospheric Administration, whose signature hereupon constitutes an endorsement.

By [signature]: \_\_\_\_\_  
Printed name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
Contact information: \_\_\_\_\_

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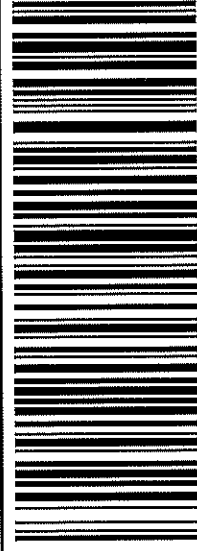

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<p style="text-align: right;"><b>1.5 LBS LTR</b>    <b>1 OF 1</b></p> <p><b>SHIP TO:</b>                  MARIA MENCHERO                  503.464.3604                  U.S. BANK                  555 SW OAK ST                  PORTLAND ,OR 97204</p> <p style="text-align: center;"><b>SHIP TO:</b>                  MEGAN CALLAHAN-GRANT                  NATIONAL OCEANIC AND ATMOSPHERIC AD                  1201 NE LLOYD BLVD.                  PORTLAND OR 97232-1202</p>	<p style="font-size: 2em; font-weight: bold;">OR 972 9-17</p> 	<p style="font-size: 2em; font-weight: bold;">UPS NEXT DAY AIR SAVER <b>1P</b></p> <p>TRACKING #: 1Z 872 RF6 13 1857 6242</p>		<p><b>BILLING: P/P</b></p>	 <p>Reference # 1: 3002020547                  Pkg Unique Identifier: 51C PPD X08188_08187_08186_08185  <small>CS 22.8.12 WNTN18042-0A 01/2021*</small></p>
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GLOBAL DOCUMENTARY SERVICES PD-OR-P4CE  
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SWIFT: USBKUS44PDX  
TOLL FREE: 866-359-2503  
FAX: 503-464-4125

05/13/21

=====
AMENDMENT TO IRREVOCABLE STANDBY LETTER OF CREDIT
=====

BENEFICIARY:
NATIONAL OCEANIC AND ATMOSPHERIC
ADMINISTRATION ("NOAA")
RESTORATION CENTER
NATIONAL MARINE FISHERIES SERVICE,
OREGON FIELD OFFICE NOAA
1201 NE LLOYD BLVD.
PORTLAND, OR 97232-2182
ATTN: MEGAN CALLAHAN-GRANT

APPLICANT:
PORTLAND GENERAL ELECTRIC
1WTC0506
121 SW SALMON STREET
PORTLAND OR 97204

=====
LETTER OF CREDIT NUMBER SLCPPDX08186 AMENDMENT NO. 1
=====

WE HEREBY AMEND IRREVOCABLE STANDBY LETTER OF CREDIT AS FOLLOWS:

+ L/C AMOUNT IS INCREASED BY USD 189,506.50
MAKING THE NEW AMOUNT USD 1,809,048.00

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

THIS AMENDMENT IS TO BE CONSIDERED PART OF THE LETTER OF CREDIT
AND MUST BE ATTACHED THERETO.

U.S. BANK NATIONAL ASSOCIATION
A MEMBER OF THE FEDERAL RESERVE SYSTEM

[Handwritten signature]
STANDBY LETTERS OF CREDIT

M. Marcela Menchero
Assistant Vice President

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<p>EMILY BOWE                  5034644613                  U.S. BANK                  355 SW OAK ST                  PORTLAND OR 97204</p> <p><b>SHIP TO:</b>                  ATTN: MEGAN CALLAHAN-GRANT                  NATIONAL OCEANIC &amp; ATMOSPHERIC ADMIN                  OREGON FIELD OFFICE NOAA                  1201 NE LLOYD BLVD.  <b>PORTLAND OR 97232-1202</b></p>	<p><b>1.0 LBS LTR</b> 1 OF 1</p> <p><b>OR 972 9-17</b></p> 	<p><b>UPS NEXT DAY AIR SAVER 1P</b></p> <p>TRACKING #: 1Z 872 RF6 13 2195 6272</p> 	<p><b>BILLING: P/P</b></p> <p>Reference # 1: 3002020547                  Pkg Unique Identifier: SLCPPDX08185.8186.8187  <small>© 2023 UPS of America, Inc. All rights reserved.</small></p> 
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**CONSENT DECREE APPENDIX G3**  
**(Credit Release Schedule for the Harborton Restoration**  
**Project)**

**Credit Release Schedule  
for  
Harborton Restoration Project**

Upon PGE's compliance with all applicable requirements set forth in this section and verification of completion of said requirements by the Trustee Council, credits will be released for transfer in accordance with the schedule set forth herein. The actual number of credits shall be determined by the Trustee Council based upon: verification that the project was constructed as designed, acceptance of the results of the contamination review following implementation of the during-construction sediment sampling event, and attainment of the final Performance Standards. The Harborton Habitat Development Plan, Section 6, *Release of Credits and Credit Sales*, identifies the process for applying for Credits as well as maintaining a registry of all credit transactions.

1	<p>Release to PGE of 15% of the Harborton Restoration Project DSAY Credits upon:</p> <ul style="list-style-type: none"> <li>• Removal of the Mortgage of Indenture from the Project Property;</li> <li>• Recording of the Declaration of Covenants, Conditions, and Restrictions and Grant of Irrevocable License;</li> <li>• Execution of the Adaptive Management Letter of Credit and full funding of the associated Adaptive Management Set-Aside Letter of Credit;</li> <li>• Establishment of the Construction Letter of Credit*</li> <li>• Establishment of the Interim Management, Contingency Security, and Years 1 – 10 Lamprey Monitoring Letter of Credit; and</li> <li>• Establishment of the Lamprey Monitoring Years 15 and 20 Letter of Credit.</li> </ul>
2	<p>Release to PGE of 35% of the Harborton Restoration Project DSAY Credits upon acceptance of the as-built and as-planted drawings, including: documentation of site contaminant sampling, associated construction response, and additional requested information to document compliance with construction, planting plans, and other aspects of project completion required by the Harborton Habitat Development Plan.</p>
3	<p>Release to PGE of 30% of the Harborton Restoration Project DSAY Credits upon achievement of Year 3 performance standards identified in the Harborton Habitat Development Plan: Appendix G, Monitoring &amp; Adaptive Management Plan, Sections 4 and 6.</p>
4	<p>Release to PGE of 10% of the Harborton Restoration Project DSAY Credits upon achievement of Year 5 performance standards identified in the Harborton Habitat Development Plan: Appendix G, Monitoring &amp; Adaptive Management Plan, Sections 4 and 6.</p>
5	<p>Release to PGE of 10% of the Harborton Restoration Project DSAY Credits upon:</p> <ul style="list-style-type: none"> <li>• Achievement of Year 10 performance standards identified in the Harborton Habitat Development Plan: Appendix G, Monitoring &amp; Adaptive Management Plan, Sections 4 and 6;</li> <li>• Recordation of a Conservation Easement Deed (if not already in place) in a substantially similar form to sample approved by the Trustee Council;</li> <li>• Trustee Council approval of long-term stewardship plan (developed by PGE in coordination with the Trustee Council and Long-Term Steward/Conservation Easement Deed Holder) for the Harborton Restoration Project consistent with the</li> </ul>

	<p>Harborton Habitat Development Plan: Appendix G, Monitoring &amp; Adaptive Management Plan, Section 6;</p> <ul style="list-style-type: none"> <li>• PGE fully funding the Harborton Restoration Project Stewardship Fund; and</li> <li>• Advance payment by PGE for years 15 and 20 of lamprey monitoring in accordance with the Lamprey Monitoring Plan and Lamprey Monitoring Budget.</li> </ul>
	<p>* If construction of the Project is completed and the Trustee Council has approved the as-built and as-planted drawings prior to PGE’s application for its first credit release, the requirement that PGE establish a Construction Letter of Credit may be waived.</p>
	<p><b>Bonus Credit:</b></p>
6	<p>Release to PGE of bonus DSAY credits (up to 10% of the total credits generated by the Harborton Restoration Project). Bonus credit contingent upon the Harborton Restoration Project: 1) achievement of connectivity with an adjacent restoration project, and 2) demonstration of additional restoration value based upon such connectivity. See “Connectivity Bonus Criteria” below.</p>

### Connectivity Bonus Criteria

- In order to receive bonus credits based on connectivity with adjacent restoration projects, the project proponents must complete the following and receive Trustee Council verification and approval:
  - Provide a joint presentation to the Trustee Council Restoration Committee with the adjacent project implementer to detail the restoration projects’ connectivity;
  - Submit 60% restoration project design and as-built drawings to the Trustee Council Restoration Committee. The design and as-built drawings must demonstrate how the adjacent restoration projects will achieve connectivity that will provide benefit to fish and/or wildlife and ensure that neither project will result in adverse effects on the adjacent site; and,
  - At the request of the Trustee Council Restoration Committee, provide any additional information needed to sufficiently demonstrate that the projects are designed to ensure connectivity.
- The 10% connectivity bonus cannot be released until after both projects’ Year 10 performance standards are met. Until the project is functioning to the fullest extent practicable and, thus, the Portland Harbor Natural Resource Trustee Council (“Trustee Council”) can calculate the total restoration credits the project is providing, it is impossible to accurately calculate a 10% connectivity bonus. Approved bonus credits shall be added to the Harborton Restoration Project DSAY Credits.
- A natural resource damages (“NRD”) restoration project is eligible for the 10% connectivity bonus only when an adjacent restoration project is also implemented to generate restoration credits for natural resource damages in Portland Harbor. If a restoration project or the adjacent project are implemented to generate habitat credits for more than one regulatory regime, e.g., wetlands mitigation in addition to NRD restoration credits, the Trustee Council will review the project(s) and work with the project proponent(s) to determine the project(s)’ eligibility for the connectivity bonus and, if appropriate, calculate the connectivity bonus.
- In order to obtain release of the connectivity bonus credits, the project proponents must demonstrate that both projects have been implemented according to project design and that connectivity is achieved.

- In addition to the forgoing criteria, to receive connectivity bonus credits, the connected project that implements last, (i.e., is the second of the two connected projects to begin implementation), must begin implementation before the first project meets its Year 10 performance standards.

**CONSENT DECREE APPENDIX G4**  
**(Deed Restrictions and Conservation Easement for the**  
**Harborton Restoration Project)**

# CONSENT DECREE APPENDIX G4-a

## (Deed Restrictions for the Harborton Restoration Project)

Multnomah County Official Records E Murray, Deputy Clerk	<b>2021-095831</b>
	06/21/2021 09:31:10 AM
COVE-COVE Pgs=8 Strn=25 ATRA \$40.00 \$5.00 \$11.00 \$10.00 \$60.00	<b>\$126.00</b>

**RECORDING REQUESTED BY  
AND WHEN RECORDED MAIL TO:**

Portland General Electric Company  
Attn: Property Manager  
121 SW Salmon Street, 1WTC 1302  
Portland, OR 97204-9951

**DECLARATION OF COVENANTS, CONDITIONS, AND RESTRICTIONS  
AND GRANT OF IRREVOCABLE LICENSE**

**Property Address:** 12500 NW Marina Way  
Multnomah County  
Portland, OR 97231

**Tax Parcel IDs:** 2N1W34-00300 (Property ID: R325472)  
2N1W34-00100 (Property ID: R325467)

Portland General Electric Company (“Declarant”) is the fee-simple owner of the Harborton property in Multnomah County, Oregon, commonly referred to as 12500 NW Marina Way, Portland, Oregon (“Property”).

The Declarant implemented a natural resource damage assessment restoration project known as the Harborton Natural Resource Damage Assessment Restoration Project (“Harborton Restoration Project”) on approximately 53.39 acres of the Property, as depicted and described in the attached Exhibit A (“Restoration Area”).

The Harborton Restoration Project is intended to restore, preserve, and enhance native species and their habitats consistent with conservation purposes and performance standards more particularly described in the Harborton Natural Resource Damage Assessment Habitat Development Plan (“Harborton Restoration Plan”). The Harborton Restoration Plan has been reviewed and recognized by the Portland Harbor Natural Resource Trustee Council (“Trustee Council”).<sup>1</sup> As required by the Harborton Restoration Plan and the Trustee Council, Declarant has agreed to enter into and abide by this Declaration of Covenants, Conditions, and Restrictions and Grant of Irrevocable License (“Deed Restriction”).

<sup>1</sup> The Trustee Council includes the National Oceanic and Atmospheric Administration on behalf of the Department of Commerce, the United States Department of Interior, the Oregon Department of Fish and Wildlife on behalf of the State of Oregon, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe.

The Declarant and the Trustee Council agree that the Harborton Restoration Plan shall govern the use and occupancy of the Restoration Area during the term of this Deed Restriction.

NOW, THEREFORE, Declarant does hereby covenant, condition, restrict, and grant as follows:

A. INCORPORATION:

The Exhibit, referenced herein and attached hereto, and the Harborton Restoration Plan, referenced herein, are incorporated into this Deed Restriction by reference. The above recitals are likewise incorporated herein by reference and made a part of this Deed Restriction.

B. RESTRICTIONS:

This Declaration is subject to any and all pre-existing easements, covenants and restrictions of record affecting the Restoration Area. The Restoration Area is and will continue to be encumbered with a pre-existing underground pipeline easement granted to Olympic Pipe Line Company as well as an associated service pipeline (the "Pipeline"), dated July 22, 1964 and recorded on July 23, 1964 in Book 91 on Page 360, as amended by Clarification of Easement, dated October 5, 1970 and recorded on October 12, 1970 in Book 755 on Page 27 ("Pipeline Easement"); and adjacent communication conduit easement granted to Pacific Fiber Link, L.L.C., dated September 28, 1998 and recorded on October 5, 1998 under Recording No. 98-179150 ("Conduit Easement"). Declarant shall address, consistent with the Harborton Restoration Plan, any impacts to restored habitat caused by activities associated with the pre-existing easements.

Above ground utility lines cross the Restoration Area. Public or private utilities, including electric, telephone, or other communications services over the Restoration Area, are permitted, provided that such utilities over the Restoration Area must be installed, maintained, repaired, removed, or replaced within their existing right-of-way consistent with prudent utility practices. Any impacts to conservation values caused by utility repair, maintenance, installation, removal, or replacement over the Restoration Area shall be addressed by the Landowner consistent with the Harborton Restoration Plan. When conducting aerial utility line maintenance, installation, repair, removal, or replacement, use of aircraft will be minimized to the extent feasible during bird nesting season from March 15th to August 15th to avoid disturbance of nesting and foraging waterfowl and other migratory birds. Specific to eagle nest(s) located in the Restoration Area, aircraft will adhere to the National Bald Eagle Management Guidelines for allowable activities and are prohibited within 1,000 feet of such nest(s) from January 1st to August 15th unless otherwise authorized by permit.

Further, all rights accruing from Declarant's ownership of the Property, including but not limited to, exclusive possession of the Property, the right to transfer or assign Declarant's interest, or any portion thereof, in same that is otherwise subject to and complies with the terms of this Deed Restriction, and the right to engage in or permit or invite others to engage in all uses of the Property that are not prohibited herein and are not inconsistent with the purposes of Harborton Restoration Plan are reserved to Declarant and Declarant's successors and assigns. If



Declarant transfers or assigns Declarant's Property interest, Declarant's successors and assigns assume all obligations and agree to and be bound by the terms, conditions and covenants of this Deed Restriction and Declarant is relieved of any obligations and liabilities under this Deed Restriction.

The Declarant hereby restricts, as set forth below, the uses to which the Restoration Area may be put. The Declarant declares that these restrictions shall constitute covenants that run with the land, as provided by applicable law, and said restrictions shall continue in perpetuity or for the maximum period allowed by law, unless terminated as set forth herein. The restrictions on the Restoration Area's use under this Deed Restriction shall be binding on the Declarant and its successors, assigns, lessees, licensees, and invitees, and any subsequent person or entity claiming an interest in the Property.

Uses of the Restoration Area shall be restricted to the following:

1. Uses furthering natural resource damage assessment restoration objectives consistent with the Harborton Restoration Plan. The term "natural resource" shall be defined pursuant to 42 U.S.C. § 9601 (16).
2. Implementation of the Harborton Restoration Plan consistent with and pursuant to the terms of the Harborton Restoration Plan, as agreed to by and between the Trustee Council and the Declarant.
3. Activities and uses compatible with the preservation and enhancement of native species and their habitats in a manner consistent with the conservation purposes and performance standards set forth in the Harborton Restoration Plan.
4. Any activity for which entry is authorized pursuant to the "Grant of Irrevocable License" section of this Deed Restriction and otherwise consistent with the Harborton Restoration Plan.

Prohibited uses of the Restoration Area, in so far as they are not reserved herein or identified as permitted by the Harborton Restoration Plan, include, but are not limited to, the following:

1. Construction, reconstruction, or placement of any permanent building or structure.
2. Unseasonable watering; use of fertilizers, biocides, or other agricultural chemicals; incompatible fire protection activities; and any and all other uses which may adversely affect the Harborton Restoration Plan conservation objectives and performance standards.
3. Grazing and agricultural activity of any kind.
4. Commercial or industrial uses.

5. Depositing or accumulating soil, trash, ashes, refuse, waste, bio-solids, or any other material.
6. Filling, dumping, excavating, draining, dredging, mining, drilling, removing, exploring for or extracting minerals, loam, gravel, soil, rock, sand, or other material on or to a depth of 100 feet below the surface of the Property, or granting or authorizing surface entry for any of these purposes.
7. Altering the surface or general topography of the Restoration Area, including building roads, paving, or otherwise covering the Restoration Area with concrete, asphalt, or any other impervious material.
8. Removing, destroying, or cutting trees, shrubs, or other vegetation, except for actions to maintain features and vegetation addressed in the Harborton Restoration Plan, such as removing invasive vegetation.
9. Use of motorized vehicles on the Restoration Area, except as required for maintaining the features and vegetation identified in the Harborton Restoration Plan.
10. Transferring any water, mineral, or air rights necessary to maintain or restore the biological resources of the Restoration Area.
11. Planting, introduction, or dispersal of invasive or exotic plant or animal species.
12. Manipulating, impounding, or altering any natural watercourse, body of water, or water circulation on the Property, other than those actions set forth under the Harborton Restoration Plan, and any activities or uses detrimental to water quality, including but not limited to degradation or pollution of any surface or sub-surface waters.
13. Permitting a general right of access to the Restoration Area other than the Irrevocable License granted herein.
14. Hunting.
15. Trapping of native species, other than as permitted by the Harborton Restoration Plan.

For avoidance of doubt, nothing contained herein is intended to limit or restrict in any fashion any right of Declarant or any subsequent owner of that portion of the Property which is not specifically included within the Restoration Area to use such Property.

The Restoration Area shall not be used for any purposes inconsistent with the Harborton Restoration Plan and the perpetual protection and conservation of the Restoration Area as provided in the Harborton Restoration Plan.

C. GRANT OF IRREVOCABLE LICENSE:

The Declarant hereby grants the Trustee Council or its designee(s) an irrevocable license, during the term hereof, to enter the Restoration Area at reasonable times, subject to giving the Declarant's manager for the Harborton Restoration Project 48-hours' advance notice (except in cases where the Trustee Council or its designee(s) reasonably determines that immediate entry is required to preserve the conservation values of the Restoration Area consistent with the Harborton Restoration Plan) to monitor the Declarant's compliance with the terms of this Deed Restriction and for other purposes consistent with this instrument; provided that the Trustee Council or its designee(s) shall not unreasonably interfere with the Declarant's authorized use and quiet enjoyment of the Restoration Area or Declarant's use and quiet enjoyment of Declarant's property which is not included in the Restoration Area and shall comply with all reasonable safety, security, and operational rules of Declarant.

E. NO DEDICATION; NO RIGHT OF PUBLIC USE:

The provisions of this Deed Restriction do not constitute an offer or dedication for public use nor do the provisions provide for public access to the Property or any portion thereof.

F. ENFORCEMENT:

The Declarant hereby grants the Trustee Council and its designee(s), as a third party beneficiary, the right to enforce the terms of this instrument and prevent any activity or use of the Restoration Area that is inconsistent with the terms of this instrument or the Harborton Restoration Plan and, thus, detrimental to the interests of the Trustee Council and its designee(s). Any such action by less than all of the members of the Trustee Council shall be on behalf of the Trustee Council as a whole and Declarant shall not be subjected to successive or multiple actions regarding the same subject matter. Further, consistent with the forgoing grant of a right of enforcement, the Declarant and its successors and assigns hereby recognizes the Trustee Council and its designee(s)' standing to specifically enforce the terms of this instrument.

Declarant, at the written request of a member of the Trustee Council or its authorized designee(s), agrees to promptly execute and deliver all such further documents or instruments, and promptly to take and forbear from all such actions, as may be reasonably necessary or appropriate in order to more effectively confirm or carry out the provisions of this Deed Restriction and the rights granted herein.

G. TERMINATION:

This instrument shall automatically terminate upon conveyance by Declarant of a Conservation Easement Deed to an authorized holder, which is appurtenant to the Restoration Area and that has previously been approved by Trustee Council. Notwithstanding the foregoing, Declarant and the Trustee Council shall prepare and record any instruments that are reasonably necessary to remove any cloud on title to the Property which is inconsistent with the Harborton Restoration Plan other than the interests noted in Section C hereof and Indenture.

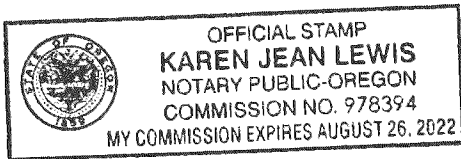
IN WITNESS WHEREOF, the undersigned, being duly authorized by the Declarant herein, has executed this instrument on behalf of the Declarant on 17 day of June, this 2021.

FOR DECLARANT,  
PORTLAND GENERAL ELECTRIC COMPANY *KMI*

Marie M. Pope  
Name: Marie M. Pope  
Title: President and CEO

STATE OF OREGON  
COUNTY OF Multnomah

This instrument was acknowledged before me on this 17 of June, 2021 by Marie M. Pope of Portland General Electric Company, an Oregon corporation, on behalf of the company.



Karen Jean Lewis  
NOTARY PUBLIC FOR OREGON  
Print Name: Karen Jean Lewis  
My Commission Expires: August 26, 2022

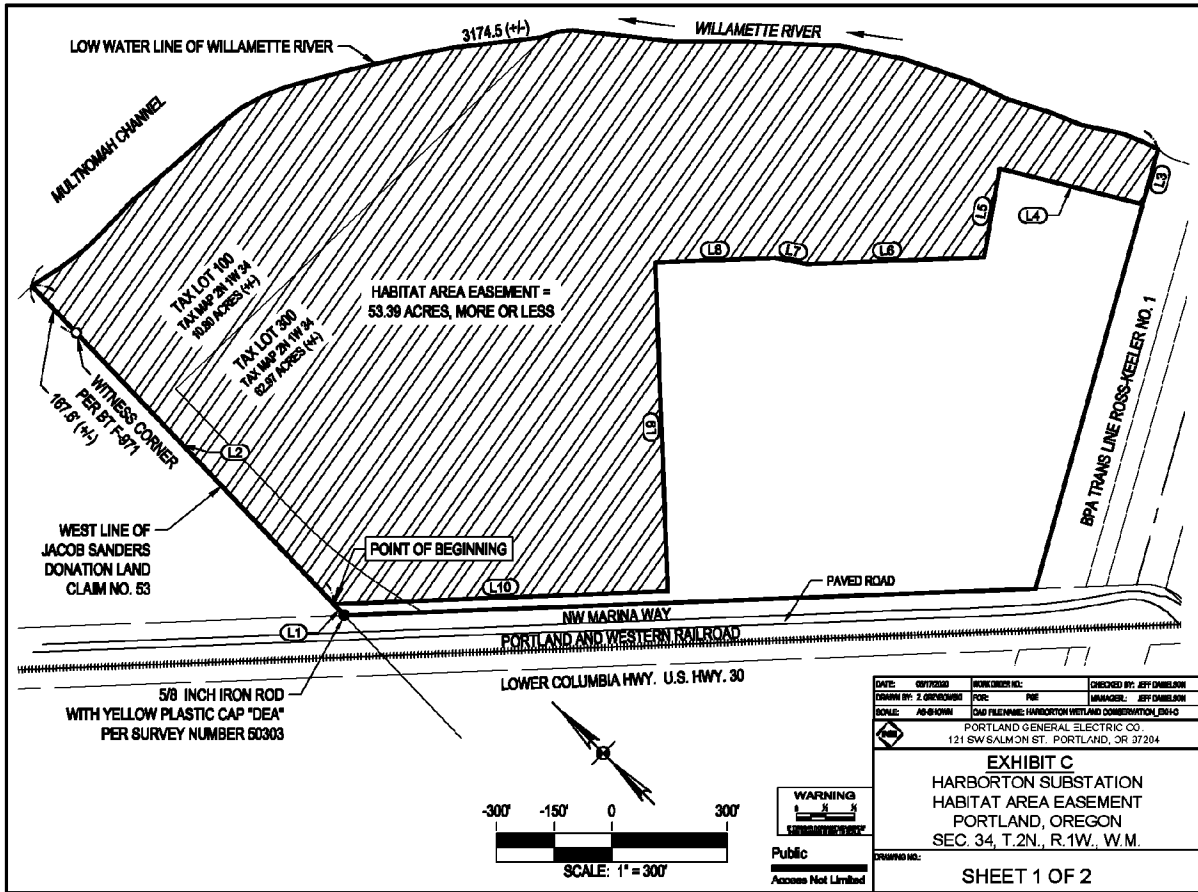
## Exhibit A

### Legal Description – Restoration Area

A parcel of land in a portion of all that property described in Book 646, Page 1178, Multnomah County deed records, Section 34, Township 2 North, Range 1 West, Willamette Meridian and in the Jacob Sanders Donation Land Claim (DLC No.53), City of Portland, Multnomah County, Oregon more particularly described as follows:

Commencing at a 5/8 inch iron rod with a yellow plastic cap inscribed “DEA INC” set in survey number 50303 per Multnomah County survey records, at the intersection of the northeasterly right-of-way line of Northwest Marina Way, being 55.00 feet northeasterly of the centerline when measured at right angles, and that certain compromise line for the west line of the Jacob Sanders Donation Land Claim (DLC No. 53); thence North 1°29’34” East along said West DLC line, 39.94 (L1) feet to a point being the southwesterly corner of said Parcel and also being at the intersection of said west DLC line and a line 30.00 feet from and parallel with said northeasterly right-of-way line of Northwest Marina Way and its prolongation, said point also being the Point of Beginning of said Parcel; thence along said west line of the Sanders DLC line North 1°29’34” East, 1139.83 feet (L2), more or less to a point on the low water line of the Willamette River said point bears North 1°29’34” East, 167.6 feet (+/-) from the Witness Corner to the Northwest Corner of said Sanders DLC No. 53 said point being monumented with a 2 inch iron pipe with a 4-1/4 inch brass disk; thence easterly along said low water line of the Willamette River 3174.5 feet (+/-) to a point at the intersection of said low water line and the easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records also being tax lot 300 and the westerly line of the Bonneville Power Administration Ross-Keeler No. 1 Transmission line right-of-way; thence along the easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records South 60°34’58” West, 148.39 feet (L3); thence leaving easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records North 30°58’04” West, 383.00 feet (L4); thence South 54°59’18” West, 233.68 feet (L5); thence North 47°11’42” West, 459.78 feet (L6); thence North 34°09’15” West, 84.54 feet (L7); thence North 47°11’42” West, 312.04 feet (L8); thence South 42°48’18” West, 854.84 feet (L9) to a point on a line 30.00 feet northeasterly from and parallel with said northeasterly right-of-way line of Northwest Marina Way and it’s prolongation; thence along said line 30.00 feet northeasterly from and parallel with said northeasterly right-of-way line of said Northwest Marina Way and it’s prolongation North 47°11’57” West, 868.46 feet (L10) to the Point of Beginning.

The above described parcel of land contains 53.39 acres more or less.



**CONSENT DECREE APPENDIX G4-b**  
**(Conservation Easement for the Harborton Restoration**  
**Project)**

**EXAMPLE DOCUMENT:  
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**RECORDING REQUESTED BY  
AND WHEN RECORDED MAIL TO:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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**Conservation Easement Deed  
for the  
Harborton Restoration Project**

THIS CONSERVATION EASEMENT DEED (“Conservation Easement”) is made this \_\_\_\_\_ day of \_\_\_\_\_ by and between (“Grantor”), and [QUALIFIED ENTITY WHOSE PURPOSE IS TO PROTECT NATURAL RESOURCES] (“Grantee”).

**RECITALS**

A. Grantor is the sole owner in fee simple of certain real property containing approximately 77 acres in the County of Multnomah, State of Oregon, commonly referred to as 12500 NW Marina Way, Portland, Oregon (the “Property”). Grantor desires to grant the Conservation Easement over a 53.39 acre portion of the Property (the “Restoration Area”). The Restoration Area is more particularly described in Exhibit “A”, which is attached hereto and incorporated herein.

B. Grantee is an organization qualified by ORS 271.715(3) to hold conservation easements.

C. This agreement is a conservation easement as provided for by ORS 271.715 to 271.795 and will run with the land.

D. This Conservation Easement is being executed and delivered pursuant to the Harborton Natural Resource Damage Assessment Habitat Development Plan (the “Harborton Restoration Plan”). Grantor and Grantee each have a copy of the Harborton Restoration Plan, which is incorporated herein by reference.

E. The Restoration Area provides significant ecological and habitat values that benefit endangered, threatened, and other species, as set forth in the Harborton Restoration Plan, including Chinook salmon, Coho salmon, Chum salmon, Sockeye salmon, Steelhead, Eulachon, and North American Green Sturgeon (collectively “Conservation Values”).



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F. The Portland Harbor Natural Resource Trustee Council consists of the following members: the National Oceanic and Atmospheric Administration (“NOAA”) on behalf of the United States Department of Commerce, the United States Department of the Interior, represented by the United States Fish and Wildlife Service (“USFWS”), the Oregon Department of Fish and Wildlife (“ODFW”) on behalf of the State of Oregon, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe. As referenced in this Conservation Easement, “Trustee Council” means all of the above listed Trustee Council members. The Trustee Council conducted a damage assessment for the Portland Harbor Superfund site, and anticipates bringing claims for injuries to natural resources under the Comprehensive Environmental Response Compensation and Liability Act, 42 U.S.C. §§ 9601, *et seq.* (“CERCLA”), the Oil Pollution Act of 1990, 33 U.S.C. §§ 9601, *et seq.*, and other applicable federal and state laws.

G. Additionally, NOAA and USFWS exercise jurisdiction with respect to the conservation, protection, restoration, enhancement, and management of threatened and endangered species and habitat pursuant to various federal laws including the Endangered Species Act, 16 U.S.C. §§ 1531 *et seq.* (“ESA”), the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661-666c, the Magnuson-Stevens Act (“MSA”) as amended (16 U.S.C. §§ 1801 *et seq.*), and the Fish and Wildlife Act of 1956 (16 U.S.C. §§ 742(f) *et seq.*).

H. Grantor intends to convey to Grantee the right to preserve, protect, sustain, enhance, and/or restore the Conservation Values of the Restoration Area in perpetuity.

**COVENANTS, TERMS, CONDITIONS, AND RESTRICTIONS**

NOW, THEREFORE, in consideration of the above recitals and the mutual covenants, terms, conditions, and restrictions contained herein, and pursuant to the laws of the United States and the State of Oregon, Grantor hereby voluntarily grants and conveys to Grantee this Conservation Easement in perpetuity over the Restoration Area, consistent with the Harborton Restoration Plan, to the extent hereinafter set forth.

1. Purpose. The purpose of this Conservation Easement is to ensure that the Restoration Area will be retained forever in a condition contemplated by the Harborton Restoration Plan and to prevent any use of the Restoration Area that will significantly impair or interfere with the Conservation Values of the Restoration Area. Grantor intends that this Conservation Easement will confine the use of the Restoration Area to such activities including, without limitation, those involving the preservation and enhancement of native species and their habitats in a manner consistent with the conservation purposes of this Conservation Easement and the Harborton Restoration Plan. This Conservation Easement does not convey a general right of access to the public

2. Rights of Grantee. To accomplish the purposes of this Conservation Easement, Grantor hereby grants and conveys the following rights to Grantee, along with the right of

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enforcement to the Trustee Council, its individual members, or its/their designee(s) as third party beneficiaries hereof as specified herein, consistent with the Harborton Restoration Plan:

A. The power to preserve, protect, sustain, enhance, and/or restore the Conservation Values of the Restoration Area.

B. The right to enter upon the Restoration Area at reasonable times, subject to giving Grantor forty-eight (48) hours' advance notice, except in cases where Grantee reasonably determines that immediate entry is required to prevent, terminate, or mitigate a breach of the Conservation Easement, to monitor Grantor's compliance with and to otherwise enforce the terms of this Conservation Easement; provided that Grantee shall not unreasonably interfere with Grantor's authorized use and quiet enjoyment of the Restoration Area and Grantee shall comply with all reasonable safety, security and operational rules of Grantor.

C. The authority to prevent any activity on or use of the Restoration Area that is materially inconsistent with the habitat conservation purposes of the Harborton Restoration Plan and this Conservation Easement and to require the restoration of such areas or features of the Restoration Area that may be damaged by any act, failure to act, or any use or activity that is inconsistent with the purposes of this Conservation Easement.

D. All mineral, air, and water rights of appurtenant to the Restoration Area necessary to preserve, protect, and sustain the biological resources and Conservation Values of the Restoration Area, unless and to the extent specifically excluded from this Conservation Easement, including Grantor's right, title, and interest in and to any waters consisting of: (a) any riparian water rights appurtenant to the Restoration Area; (b) any appropriative water rights held by Grantor to the extent those rights are appurtenant to the Restoration Area; (c) any waters, the rights to which are covered under contract between the Grantor and any irrigation or water district, to the extent such waters are customarily applied to the Restoration Area; and (d) any water from wells that are in existence or may be constructed in the future on the Restoration Area (collectively, "Easement Waters"). The Easement Waters and water rights are limited to the amount of such waters reasonably required to maintain the Conservation Values of the Restoration Area.

E. All present and future development rights, except as set forth in Section 3 below.

Prohibited Uses. Any activity on or use of the Restoration Area materially inconsistent with the conservation purposes of this Conservation Easement and the Harborton Restoration Plan is prohibited, except that the Restoration Area is and will continue to be encumbered with a pre-existing underground pipeline easement granted to Olympic Pipe Line Company, dated June 10, 1965 ("Pipeline Easement") as well as an associated in service pipeline (the "Pipeline"); and adjacent communication conduit easement granted to Pacific Fiber Link, L.L.C., dated September 28, 1998 ("Conduit Easement") and an associated in service communication conduit (the "Conduit"); and above ground utility lines crossing the Restoration Area. Public or private utilities, including electric, telephone, or other communications services over the Restoration Area, are permitted, provided that such utilities over the Restoration Area must be installed, maintained, repaired, removed, or replaced within their existing right-of-way consistent with

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prudent utility practices. Any impacts to conservation values caused by utility repair, maintenance, installation, removal, or replacement over the Restoration Project shall be addressed by the Landowner consistent with the Harborton Restoration Plan. When conducting aerial utility line maintenance, installation, repair, removal, or replacement, use of aircraft will be minimized to the extent feasible during bird nesting season from March 15th to August 15th to avoid disturbance of nesting and foraging waterfowl and other migratory birds. Specific to eagle nest(s) located in the Harborton Site, aircraft will adhere to the National Bald Eagle Management Guidelines for allowable activities and are prohibited within 1,000 feet of such nest(s) from January 1st to August 15th unless otherwise authorized by permit.

Without limiting the generality of the foregoing, Grantor, its successors, assigns, employees, agents, lessees, licensees and invitees are expressly prohibited from doing or permitting any of the following on the Restoration Area unless reserved herein or specifically authorized by the Grantee or the Harborton Restoration Plan:

- A. Construction, reconstruction or placement of any permanent building or structure.
- B. Unseasonable watering; use of fertilizers, biocides, or other agricultural chemicals; incompatible fire protection activities; and any and all other uses which may adversely affect the conservation purposes of this Conservation Easement.
- C. Grazing and agricultural activity of any kind.
- D. Commercial or industrial uses.
- E. Depositing or accumulating soil, trash, ashes, refuse, waste, bio-solids or any other material.
- F. Filling, dumping, excavating, draining, dredging, mining, drilling, removing, exploring for or extracting minerals, loam, gravel, soil, rock, sand or other material on or to a depth of 100 ft. below the surface of the Restoration Area, or granting or authorizing surface entry for any of these purposes of the Restoration Area, or granting or authorizing surface entry for any of these purposes.
- G. Altering the surface or general topography of the Restoration Area, including building roads, paving or otherwise covering the Restoration Area with concrete, asphalt, or any other impervious material.
- H. Removing, destroying, or cutting trees, shrubs or other vegetation.
- I. Use of motorized vehicles, except as required for maintaining the features and vegetation identified in the Harborton Restoration Plan.
- J. Transferring any water right necessary to maintain or restore the biological resources of the Restoration Area.

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- K. Planting, introduction, or dispersal of invasive or exotic plant or animal species.
- L. Manipulating, impounding or altering any natural watercourse, body of water or water circulation on the Restoration Area and any activities or uses detrimental to water quality, including but not limited to degradation or pollution of any surface or sub-surface waters.
- M. Permitting a general right of access to the Restoration Area.
- N. Hunting.
- O. Trapping of native species, other than as permitted by the Harborton Restoration Plan.

Provided, however, the above restrictions, including the above list of prohibited uses, shall not prohibit any use, action, or measure necessary to assess, repair, maintain replace or operate the Pipeline and/or Conduit, consistent with the terms of the Pipeline Easement and Conduit Easement, respectively.

3. Grantor's Duties. Grantor shall undertake all reasonable actions to prevent the unlawful entry and trespass on the Restoration Area by persons whose activities may degrade or harm the Conservation Values of the Restoration Area and are inconsistent with the Harborton Restoration Plan.

4. Grantor's Reserved Rights. All rights accruing from Grantor's ownership of the Restoration Area, including but not limited to, the exclusive possession of the Restoration Area, the right to engage in or permit or invite others to engage in all uses of the Restoration Area that are not prohibited herein and are not inconsistent with the purposes of this Conservation Easement, are reserved to Grantor and Grantor's successors, personal representatives, heirs, and assigns.

5. Remedies for Breach and Corrective Action. If Grantee, Grantor, or the Trustee Council or the Trustee Council's designee(s) determines there is a breach by the Grantee or Grantor of the terms of this Conservation Easement or that a breach of this Conservation Easement by Grantee or Grantor is threatened, written notice of such breach and a demand for corrective action sufficient to cure the breach shall be given to Grantor or Grantee. Within ten (10) days of the receipt of written notice of such breach, the breaching party shall provide a written response to each of the parties to this Conservation Easement, including the Trustee Council or the Trustee Council's designee(s), pursuant to Section 12 of this Conservation Easement. In any instance, measures to cure the breach shall be reviewed and approved by the Trustee Council or the Trustee Council's designee(s). If a breach is not cured within thirty (30) days after receipt of Trustee's approval, or if the cure reasonably requires more than thirty (30) days to complete and there is failure to begin the cure within the thirty-day period or failure to continue diligently to complete the cure, the parties shall first engage in the following dispute resolution process to resolve any disputes arising related to the breach and cure. The Grantor, Grantee, or Trustee Council or the Trustee Council's designee(s), shall issue a written Notice of

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Deficiencies to all parties, detailing the claimed deficiencies concerning the breach and cure. The Notice of Deficiencies shall identify a higher-level administrative officer within the issuing party's organization who shall represent the party in the dispute resolution process ("Dispute Resolution Representative"). The Notice of Deficiencies shall include the Dispute Resolution Representative's contact information. Within fourteen (14) days of the receipt of the Notice of Deficiencies, the remaining parties shall identify corresponding Dispute Resolution Representatives within their respective organizations and communicate to schedule a joint conference to be held at the earliest opportunity. The Dispute Resolution Representatives shall engage in a reasonable, good-faith effort to review the dispute and decide upon a mutually agreeable cure, which shall be diligently implemented. If, after a reasonable period of time, the Dispute Resolution Representatives are unable to reach agreement, the Grantor, Grantee, or the Trustee Council or the Trustee Council's designee(s) may bring an action at law or in equity against the breaching party in a court of competent jurisdiction, in accordance with Section 19 of this Conservation Easement, to enforce compliance with the terms of this Conservation Easement, to recover any damages to which Grantee, Grantor, or the Trustee Council or the Trustee Council's designee(s) may be entitled for breach of the terms of this Conservation Easement or for any injury to the Conservation Values of the Restoration Area, or for other equitable relief, including the restoration of the Restoration Area to the condition in which it existed prior to any breach or injury. Without limiting the breaching party's liability therefore, any damages recovered may be applied to the cost of undertaking any corrective action on the Restoration Area.

5.1 Injunctive Relief. If Grantee, Grantor, or the Trustee Council or the Trustee Council's designee(s), in each its sole discretion, determines that circumstances require immediate action to (i) prevent or mitigate significant damage to the Conservation Values of the Restoration Area or (ii) protect against substantial interference with Grantor's right to use the Restoration Area as provided herein, Grantee, Grantor, or the Trustee Council or the Trustee Council's designee(s) may pursue its remedies under this Section without prior notice or without waiting for the period provided for cure to expire to enjoin the breach, ex parte as necessary, by temporary or permanent injunction without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies, and (i) to require the restoration of the Restoration Area to the condition that existed prior to any such injury or (ii) to restore Grantor's right to use the Restoration Area as provided herein, as applicable. The remedies described in this Section shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity. The failure of Grantee, Grantor, the Trustee Council or the Trustee Council's designee(s) to discover a breach or to take immediate legal action shall not bar taking such action at a later time.

5.2 Standing. If at any time Grantee, Grantor, or any successor in interest or subsequent transferee of an interest in this Conservation Easement uses or threatens to use the Restoration Area for purposes not in conformance with the Conservation Values, or releases or threatens to abandon this Conservation Easement in whole or in part, then, the Trustee Council or the Trustee Council's designee(s) shall have standing as an interested party in any proceeding affecting this Conservation Easement.

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5.3 Costs of Enforcement. All reasonable costs incurred in enforcing the terms of this Conservation Easement including, but not limited to, costs of suit and attorneys' fees, and any costs of restoration, caused by breach or negligence under the terms of this Conservation Easement shall be borne by the breaching or negligent party.

5.4 Enforcement Discretion. Enforcement of the terms of this Conservation Easement shall be at the discretion of Grantee, Grantor, or the Trustee Council or the Trustee Council's designee(s), and any forbearance to exercise rights of enforcement under this Conservation Easement in the event of any breach of any term of this Conservation Easement shall not be deemed or construed to be a waiver of such term or of any subsequent breach of the same or any other term of this Conservation Easement or of any rights under this Conservation Easement. No delay or omission in the exercise of any right or remedy upon any breach shall impair such right or remedy or be construed as a waiver.

5.5 Catastrophic Acts Beyond Grantee's or Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee, Grantor, or the Trustee Council or the Trustee Council's designee(s) to bring any action for any injury to or change in the Restoration Area resulting from causes beyond Grantee or Grantor's control, including, without limitation, fire, flood, storm, and earth movement ("Catastrophic Event"), or from any prudent action taken by Grantee or Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Restoration Area resulting from such causes. The Grantor, Grantee, and Trustee Council or the Trustee Council's designee(s) shall be notified of the Catastrophic Event within forty-eight (48) hours of its discovery. In the interim, the Grantee shall continue to the fullest extent practicable to manage and maintain the Restoration Area consistent with the conservation purposes of the Conservation Easement and Harborton Restoration Plan.

5.6 Third Party Beneficiary Right of Enforcement. All rights and remedies conveyed under this Conservation Easement shall extend to and are enforceable by the Trustee Council or its designee(s) as a third party beneficiary. These rights of enforcement are in addition to, and do not limit, the rights of enforcement under the Conservation Agreement.

6. Costs and Liabilities. Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership (but excluding the operation, upkeep, and maintenance of the Restoration Area) of the Restoration Area, including transfer costs, costs of title and documentation review, and maintenance of adequate liability insurance coverage. Grantor remains solely responsible for obtaining any applicable permits and approvals required for any activity or use permitted on the Restoration Area by this Conservation Easement, and any such activity or use shall be undertaken in accordance with all applicable federal, state, local and administrative agency laws, statutes, ordinances, rules, regulations, orders and requirements.

6.1 Taxes; No Liens. Grantor shall pay before delinquency all taxes, assessments, fees, and charges of whatever description levied on or assessed against the Restoration Area by competent authority (collectively, "taxes"), including any taxes imposed upon, or incurred as a result of, this Conservation Easement, and shall furnish Grantee with satisfactory evidence of payment upon request. Grantor shall keep Grantee's interest in the

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Restoration Area free from any liens arising out of any obligations incurred by Grantor for any labor or materials furnished or alleged to have been furnished for Grantor at or for use on the Restoration Area.

6.2 Hold Harmless. Grantor shall hold harmless, indemnify, and defend Grantee, the Trustee Council or the Trustee Council's designee(s), and their respective members, directors, officers, employees, agents, and contractors and the successors, and assigns of each of them (collectively, "Indemnified Parties"), from and against all liabilities, penalties, costs, losses, damages, expenses, causes of action, claims, demands, orders, liens, or judgments, including, without limitation, reasonable attorneys' fees, to the extent arising from or in any way connected with: (a) injury to or the death of any person, or physical damage to any property located within the Restoration Area, resulting from any negligent act or omission occurring on or about the Restoration Area, unless due to the negligence of any of the Indemnified Parties, and, (b) the obligations, covenants, representations, and warranties of this Conservation Easement set forth in this Section 6.

6.3 No Hazardous Materials Liability. Grantor represents and warrants that it has no knowledge of any release or threatened release of hazardous materials in, on, under, about, or affecting the Restoration Area. Without limiting the obligations of Grantor as otherwise provided in this instrument, Grantor agrees to indemnify, protect, and hold harmless the Indemnified Parties against any and all claim against the Indemnified Parties arising from or connected with any hazardous materials present, released in, on, from or about the Property, at any time, of any substance now or hereafter defined, listed, or otherwise classified pursuant to any federal, state, or local law, regulation, or requirement as hazardous toxic, polluting, or otherwise contaminating the air, water, or soil in any way harmful or threatening to human health or the environment, except to the extent cause solely by any of the Indemnified Parties.

7. Best and Most Necessary Use. The habitat conservation purposes of the Conservation Easement are presumed and intended by the Parties to be the best and most necessary public use.

8. Conservation Easement Assignment or Transfer. This Conservation Easement may be conveyed by Grantee or any successor in interest upon written approval of the Trustee Council or its designee(s) and Grantor, which approval shall not be unreasonably delayed, conditioned, or withheld. Grantee shall give Grantor and the Trustee Council or the Trustee Council's designee(s) written notice of its intent to transfer any interest in this Conservation Easement at least thirty (30) days prior to the date of such transfer. Grantee or any successor in interest may convey Grantee's interest in this Conservation Easement only to an entity or organization qualified under ORS 271.715(3) to hold conservation easements and approved by the Trustee Council or the Trustee Council's designee(s) and Grantor. As a condition of such conveyance, Grantee shall require that the conservation purposes of this Conservation Easement and the Harborton Restoration Plan are carried out and notice of such restrictions, including the Conservation Easement, shall be recorded in the County where the Property is located. The failure of Grantee to perform any act required by this Section shall not impair the validity of this Conservation Easement or its enforcement in any way.

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9. Subsequent Restoration Area Transfer. This Conservation Easement may be assigned or transferred by Grantor or any successor in interest upon written approval of the Trustee Council or its designee(s), which approval shall not be unreasonably delayed, conditioned, or withheld. Grantor agrees to give Grantee and the Trustee Council or the Trustee Council's designee(s) written notice of its intent to transfer this Conservation Easement at least thirty (30) days prior to the date of such transfer and shall require the assignee or transferee agree in writing to the obligations of the Grantor under this Conservation Easement. Grantor or any successor in interest may transfer fee title to the Restoration Area only to an entity or organization as approved by the Trustee Council or its designee(s), which approval shall not be unreasonably delayed, conditioned, or withheld. Grantor and Grantee further agree to incorporate by reference the terms of this Conservation Easement in any deed or other legal instrument by which Grantor or Grantee divests itself of any interest in all or a portion of the Restoration Area, including, without limitation, a leasehold interest. Grantor, Grantee or the Trustee Council or the Trustee Council's designee(s) shall have the right to prevent subsequent transfers in which prospective subsequent claimants or transferees are not given notice of the terms, covenants, conditions and restrictions of this Conservation Easement or whenever a subsequent Restoration Area transfer will result in a merger of the Conservation Easement and the Restoration Area in a single Restoration Area owner (thereby extinguishing the Conservation Easement) if no method or mechanism deemed adequate to preserve, protect, and sustain the Restoration Area in perpetuity has been established. The failure of Grantor or Grantee to perform any act required by this Section shall not impair the validity of this Conservation Easement or limit its enforcement in any way.

10. Estoppel Certificates. Grantee and Trustee Council or its designee shall, within 30 business days after receiving Grantor's request therefore, execute and deliver to Grantor a document certifying, to the best knowledge of the person executing the document, that Grantor is in compliance with any obligation of Grantor contained in this Conservation Easement, or otherwise evidencing the status of such obligation to the extent of Grantee's knowledge thereof, as may be reasonably requested by Grantor.

11. Notices. Any notice, demand, request, consent, approval, or other communication that Grantor, Grantee, or the Trustee Council or the Trustee Council's designee(s) desires or is required to give to the others shall be in writing and either served personally or sent by first-class mail, postage prepaid or by recognized overnight courier that guarantees next-day delivery addressed as follows:

**To Grantor:**

Portland General Electric Company  
121 SW Salmon Street  
Portland, OR 97204  
Attn: General Counsel

**To Grantee:**

[Grantee Information]



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**To Trustee Council:**

NOAA  
Restoration Center  
1201 NE Lloyd Blvd., Suite 1100  
Portland, OR 97232

United States Fish and Wildlife Service  
Pacific Region  
ATTN: Field Supervisor  
911 NE 11th Ave. # 1  
Portland, OR 97232

Oregon Department of Fish and Wildlife  
3406 Cherry Avenue N.E.  
Salem, OR 97303

Confederated Tribes of the Grand Ronde  
Community of Oregon  
Portland Office  
4445 S.W. Barbur Blvd.  
Portland, OR 97239

Confederated Tribes of Siletz Indians  
ATTN: Natural Resources Manager  
P.O. Box 549  
Siletz, OR 97380

Confederated Tribes of the Umatilla Indian  
Reservation Nixyaawii  
Governance Center  
ATTN: Office of Legal Counsel  
46411 Timine Way  
Pendleton, OR 97801

Confederated Tribes of the Warm Springs  
Reservation of Oregon  
1107 Wasco Street  
Warm Springs, OR 97761

Nez Perce Tribe  
P.O. Box 305  
Lapwai, ID 83540

or to such other address as a party shall designate by written notice to the others. Notice shall be deemed effective upon delivery in the case of personal delivery or delivery by reputable

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overnight courier or, in the case of delivery by certified or registered mail and postage prepaid, five (5) days after deposit into the United States mail.

12. Recordation. Grantor shall submit an original, signed and notarized Conservation Easement to Grantee, and Grantee shall promptly sign and record this instrument in the official records of the County in which the Property is located, and shall thereafter promptly provide a conformed copy of the recorded Conservation Easement to the Grantor and to the Trustee Council or the Trustee Council's designee(s). Grantee may re-record in the official records of the County in which the Property is located at any time as may be required to preserve its rights in this Conservation Easement.

13. Amendment. This Conservation Easement may be amended by Grantor and Grantee only by mutual written agreement and written approval by the Trustee Council or the Trustee Council's designee(s). Any such amendment shall be consistent with the purposes of this Conservation Easement and shall not affect its perpetual duration, and Grantee shall promptly record this amended instrument in the official records of the County in which the Property is located, and shall thereafter promptly provide a conformed copy of the recorded amended Conservation Easement to the Grantor and to the Trustee Council or its designee(s).

14. No Warranty; AS IS. Grantee agrees, for itself, successors, and assigns, that it is accepting this grant on an AS IS basis, without reliance upon any representation or warranty of Grantor, and relying solely upon Grantee's own expertise, experience and investigation of the Restoration Area and Grantee expressly disclaims, waives and releases any warranty or representation, express or implied, by Grantor or any representative of Grantor, relating to the Property including as to title, condition, or suitability for any particular purpose.

15. Additional Interests. Except for another conservation easement and/or restrictive covenant established in accordance with the Harborton Restoration Plan and which is not adverse to the Conservation Easement established herein, Grantor shall not grant any additional interest in the Restoration Area that is not subordinate to this Conservation Easement, nor shall Grantor grant, transfer, abandon, or relinquish any water or water right appurtenant to the Restoration Area, including without limitation any Easement Waters, without the prior written authorization of Grantee and the Trustee Council or the Trustee Council's designee(s). Such consent may be withheld if the proposed interest or transfer is inconsistent with the purposes of the Harborton Restoration Plan or will impair or interfere with the Conservation Values of the Restoration Area. This Section shall not prohibit the transfer of a fee title, leasehold or other interest in the Restoration Area that is otherwise subject to and complies with the terms of this Conservation Easement.

16. Third-Party Beneficiaries and Access. Grantor and Grantee acknowledge that the Trustee Council and its designee(s) are third-party beneficiaries of this Conservation Easement with rights of access to the Restoration Area for monitoring or conservation activities contemplated by this Conservation Easement or the Harborton Restoration Plan. Except in cases where the Trustee Council or its designee(s) reasonably determine that immediate entry is required to prevent, terminate, or mitigate a breach of the Conservation Easement, such access is subject to providing the Grantor and Grantee with forty-eight (48) hours' notice, and with rights

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to enforce all of the provisions of this Conservation Easement. Except as otherwise provided to Trustee Council and its designee(s), no other person other than the parties to this Conservation Easement has any rights or remedies under this Conservation Easement.

17. Condemnation. If all or any part of the Restoration Area is the subject of an eminent domain proceeding, Grantor and Grantee will take reasonable actions to defend the Restoration Area and the Conservation Values associated with it. In the event that said efforts are unsuccessful, Grantor and Grantee shall take all reasonable and appropriate actions to recover the full value of the taking and all incidental or direct damages resulting from the taking (the "Proceeds"). Disagreements regarding the appropriate response under this Section shall be resolved in accordance with the dispute resolution provision of Section 6 in this Conservation Easement.

18. General Provisions.

19.1 Controlling Law; Venue. The interpretation and performance of this Conservation Easement shall be governed by the laws of the State of Oregon and applicable Federal law including the ESA. The exclusive jurisdiction and venue for litigation arising under this Conservation Easement shall be the state or federal courts in Multnomah County, Oregon.

18.2 Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Conservation Easement shall be liberally construed in favor of the purposes of this Conservation Easement. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purposes of this Conservation Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

18.3 Severability. If any provision of this Conservation Easement or the application thereof is found to be invalid the remaining provisions of this Conservation Easement or the application of such provisions other than that found to be invalid shall not be affected thereby.

18.4 Entire Agreement. This Conservation Easement and the Harborton Restoration Plan incorporated by reference herein, including all of the exhibits thereto, together set forth the entire agreement of the parties and supersede all prior discussions, negotiations, understandings, or agreements relating to the Conservation Easement, all of which are merged herein. No alteration or variation of this instrument shall be valid or binding unless contained in an amendment in accordance with the provisions herein.

18.5 No Forfeiture. Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

18.6 Successors. The covenants, terms, conditions, and restrictions of this Conservation Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall constitute a servitude running in perpetuity with the Restoration Area. This Conservation Easement shall remain valid consistent with the terms of ORS 271.745.

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18.7 Termination of Rights and Obligations. A party's rights and obligations under this Conservation Easement terminate upon transfer of the party's interest in the Conservation Easement or Restoration Area, except that liability for acts, omissions or breaches occurring prior to transfer shall survive transfer.

18.8 Captions. The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon its construction or interpretation.

18.9 Counterparts. The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

19. No Merger. This Conservation Easement shall be of perpetual duration, it being the express intent of the parties that this Conservation Easement not be extinguished by, or merged into, any other interest or estate in the Restoration Area now or hereafter held by Grantee or any other party.

[ *Signature Page Follows* ]

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IN WITNESS WHEREOF, Grantor has executed and delivered this Conservation Easement Deed as of the day and year first above written.

GRANTOR:

PORTLAND GENERAL ELECTRIC COMPANY

By: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

GRANTEE:

By: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

STATE OF OREGON

COUNTY OF \_\_\_\_\_

This instrument was acknowledged before me on \_\_\_\_\_ (date) by \_\_\_\_\_ of Portland General Electric Company, an Oregon corporation, on behalf of the company.

\_\_\_\_\_  
NOTARY PUBLIC FOR OREGON

Print Name: \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

STATE OF OREGON

COUNTY OF \_\_\_\_\_

This instrument was acknowledged before me by [GRANTEE REPRESENTATIVE] on the \_\_\_ of \_\_\_\_\_ (date), on behalf of the [CHARITABLE ENTITY WHOSE PURPOSE IS TO PROTECT NATURAL RESOURCES].

\_\_\_\_\_  
NOTARY PUBLIC FOR OREGON

Print Name: \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

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**EXHIBIT A  
Restoration Area**

A parcel of land in a portion of all that property described in Book 646, Page 1178, Multnomah County deed records, Section 34, Township 2 North, Range 1 West, Willamette Meridian and in the Jacob Sanders Donation Land Claim (DLC No.53), City of Portland, Multnomah County, Oregon more particularly described as follows:

Commencing at a 5/8 inch iron rod with a yellow plastic cap inscribed "DEA INC" set in survey number 50303 per Multnomah County survey records, at the intersection of the northeasterly right-of-way line of Northwest Marina Way, being 55.00 feet northeasterly of the centerline when measured at right angles, and that certain compromise line for the west line of the Jacob Sanders Donation Land Claim (DLC No. 53); thence North 1°29'34" East along said West DLC line, 39.94 (L1) feet to a point being the southwesterly corner of said Parcel and also being at the intersection of said west DLC line and a line 30.00 feet from and parallel with said northeasterly right-of-way line of Northwest Marina Way and its prolongation, said point also being the Point of Beginning of said Parcel; thence along said west line of the Sanders DLC line North 1°29'34" East, 1139.83 feet (L2), more or less to a point on the low water line of the Willamette River said point bears North 1°29'34" East, 167.6 feet (+/-) from the Witness Corner to the Northwest Corner of said Sanders DLC No. 53 said point being monumented with a 2 inch iron pipe with a 4-1/4 inch brass disk; thence easterly along said low water line of the Willamette River 3174.5 feet (+/-) to a point at the intersection of said low water line and the easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records also being tax lot 300 and the westerly line of the Bonneville Power Administration Ross-Keeler No. 1 Transmission line right-of-way; thence along the easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records South 60°34'58" West, 148.39 feet (L3); thence leaving easterly line of said parcel described in Book 646, Page 1178, Multnomah County deed records North 30°58'04" West, 383.00 feet (L4); thence South 54°59'18" West, 233.68 feet (L5); thence North 47°11'42" West, 459.78 feet (L6); thence North 34°09'15" West, 84.54 feet (L7); thence North 47°11'42" West, 312.04 feet (L8); thence South 42°48'18" West, 854.84 feet (L9) to a point on a line 30.00 feet northeasterly from and parallel with said northeasterly right-of-way line of Northwest Marina Way and it's prolongation; thence along said line 30.00 feet northeasterly from and parallel with said northeasterly right-of-way line of said Northwest Marina Way and it's prolongation North 47°11'57" West, 868.46 feet (L10) to the Point of Beginning.

The above described parcel of land contains 53.39 acres more or less.

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