Port of Portland
Willamette River Basin
Total Maximum Daily Load
Implementation Plan

Update Prepared for

Oregon Department of Environmental Quality
September 3, 2022

DEQ Comments Addressed December 1, 2022

Effective through December 31, 2023

Prepared by

Blake Hamalainen, Port of Portland and

Brown and Caldwell

PORT OF PORTLAND

Brown AND Caldwell

Port of Portland
Willamette River Basin
TMDL Implementation Plan

Update Prepared for

Oregon Department of Environmental Quality
Portland, Oregon

September 3, 2022

DEQ Comments Addressed December 1, 2022

Effective through December 31, 2023

Brown AND Caldwell

6500 S Macadam Avenue, Suite 200
Portland, OR 97239
T: 503.244.7005

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AC	Advisory Circular
AOA	Air Operations Area
BES	Bureau of Environmental Services
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CAC	Community Advisory Committee
City	City of Portland
CWA	Federal Clean Water Act
DEQ	Department of Environmental Quality
DMA	Designated Management Agency
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FLIR	Forward Looking Infrared
LA	Load allocation
MeHg	organic methylmercury
IGA	Intergovernmental Agreement
MCDD	Multnomah County Drainage District
NPDES	National Pollutant Discharge Elimination System
ORS	Oregon Revised Statutes
PAH	Polycyclic Aromatic Hydrocarbon
PDX	Portland International Airport
PIC	Portland International Center
RP	Responsible Party
ROD	Record of Decision
RP	Responsible Party
SCM	Source Control Measures
SWMP	Stormwater Management Plan
TIP	TMDL Implementation Plan
TMDL	Total Maximum Daily Load
USB	Urban Services Boundary
WHA	Wildlife Hazard Assessment
WHMP	Wildlife Hazard Management Plan
WLA	Waste Load Allocation
WQMP	Water Quality Management Plan

Section 1

Introduction

1.1 TMDL Regulatory Background

The Federal Clean Water Act (CWA) of 1977 gave authorization to the United States Environmental Protection Agency (EPA) to restore and maintain water quality in all water bodies within the United States. In response to the CWA, the EPA designated certain state agencies, the Oregon Department of Environmental Quality (DEQ) for the State of Oregon, to develop water quality standards, perform water quality monitoring to understand current conditions, determine sources of pollution, issue permits to limit discharges, and develop Total Maximum Daily Loads (TMDLs) for impaired water bodies as a tool to improve water quality and restore the beneficial uses of surface waters. When water quality standards are not met in a waterbody, DEQ places the waterbody on the 303(d) list as an impaired water body and the development of a TMDL follows.

A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and it allocates pollutant loadings among point and nonpoint sources, background levels, reserves for future growth, and a margin of safety. Point sources are typically defined as those sources that enter surface waters through a pipe or defined conveyance system (e.g., municipal stormwater, industrial stormwater, and wastewater). Waste Load Allocations (WLAs) are provided in the TMDL for these point sources. Nonpoint sources are typically defined as those sources that enter surface waters through more diffuse and dispersed overland flow (e.g., surface runoff from agricultural and forested lands). Load Allocations (LAs) are provided in the TMDL for nonpoint sources.

1.2 TMDL Implementation

Total Maximum Daily Loads address both point and nonpoint sources of pollution. Implementation strategies are prepared by DEQ for each TMDL. Total Maximum Daily Loads implementation activities are carried out under existing regulatory authorities, programs and water quality restoration plans as well as by TMDL implementation plans developed to meet the requirements of a TMDL. Compliance associated with point sources of TMDL pollutants are addressed under DEQ-issued water quality permits. For the Port of Portland, these permits include three 1200Z National Pollutant Discharge Elimination System (NPDES) permits (for Terminal 2, Terminal 6, and one for dredging operations), an Individual NPDES waste discharge permit for the Portland International Airport (PDX) (which also includes an attached 1200Z permit and associated requirements), and a NPDES Municipal Separate Storm Sewer System (MS4) permit. Nonpoint source pollutant reductions are administered by Designated Management Agencies (DMAs) as outlined in TMDL Implementation Plans.

DMAs are responsible for implementation of a TMDL. Under Division 42 of the Oregon Administrative Rules (OAR), a DMA is “a federal, state or local governmental agency that has legal authority of a sector or source contributing pollutants and is identified as such by the Department of Environmental Quality in a TMDL.” In 1998, the Port of Portland, and specifically PDX were identified as point sources for the Columbia Slough TMDL. In 2006, the Port of Portland (Port) was named a DMA for point and/or nonpoint sources of bacteria, mercury and temperature in the Willamette River TMDL for the Lower Willamette Sub-basin which includes the Columbia Slough. Given limited data available during development of the Willamette River TMDL, LAs and WLAs were not provided for

mercury at that time. In 2019, the Willamette River TMDL was revised to include LAs and WLAs for mercury and the Port was named a DMA for the revised TMDL.

Sections 1.3 and 1.4 of this TMDL Implementation Plan describe the framework for how the Port meets its obligations for each TMDL parameter. Although this TMDL Implementation Plan is intended to meet the requirements for nonpoint source load allocations as required under OAR -340-042-0080, it also serves to consolidate or reference information that provides a more comprehensive view on how the Port is also complying with TMDL obligations for point sources. Figure A below summarizes the Port's TMDL sources covered by TMDLs through WLAs and implemented through permit conditions, and sources covered by TMDLs through LAs and implemented through TMDL Implementation Plans (or TIPs).

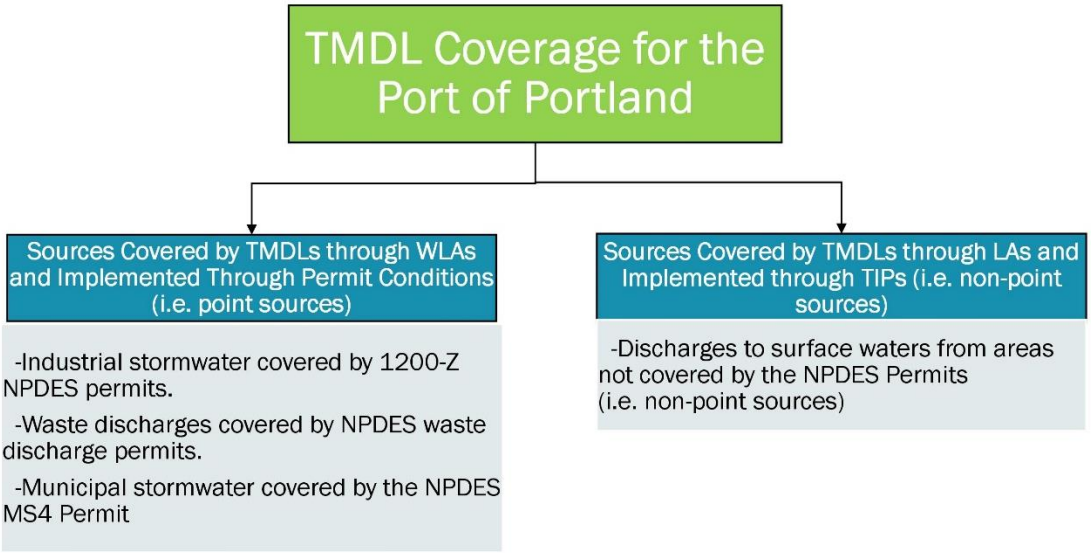


Figure A: TMDL Coverage for the Port of Portland

Table 1 lists the TMDLs and associated watershed subbasins (Columbia Slough and Lower Willamette River Sub-basin) that are applicable to the Port of Portland.

Table 1: Port of Portland TMDLs

Basin	TMDL Subbasins (applicable to the Port)	Date	Pollutant	WLA	LA	TMDL Season	Surrogate
Columbia Slough[1]	Columbia Slough	1998	DDT/DDE	3.24 x10^{-6} kg/day	NA	Annual	TSS[2]
			Dieldrin	9.6 x10^{-6} kg/day	NA	Annual	TSS[2]
			Dioxin	1.31 x10^{-9} kg/day	NA	Annual	TSS[2]
			PCBs	5.3 x10^{-6} kg/day	NA	Annual	TSS[2]
			Lead, dissolved	TMDL[3] – Table 14	NA	Annual	
			Phosphorus	TMDL[3] – Table 5	NA	Spring through Fall	
			Dissolved oxygen	TMDL[3] – Table 2	NA	Annual	BOD_5
			pH	TMDL[3] – Table 5	NA	Spring through Fall	Phosphorus
			Chlorophyll a	TMDL[3] – Table 5	NA	Spring through Fall	Phosphorus
			Bacteria	TMDL[3] – Table 10	NA	Annual	E. coli
Willamette Basin[1]	Lower Willamette – All tributaries not otherwise specified.	2006	Mercury[4]	NA	NA	NA	NA
			Temperature	NA	NA[5]	Annual	Effective Shade
			Bacteria	78% reduction[6]	46% reduction	Annual	E. Coli
	Columbia Slough		Temperature	NA	NA[5]	Annual	Effective Shade
Willamette Basin	Lower Willamette – All tributaries.	2019	Mercury[4]	97% reduction	75% reduction	All Seasons	TSS[2]
	Columbia Slough			75% reduction	88% reduction		

1 The Willamette Basin TMDLs (2006 and 2019) include the Columbia Slough subbasin for temperature and mercury only. Per the 2006 Willamette Basin TMDL, p. 5-13, for all other parameters, "the 1998 TMDL established for the Slough remains in effect."

2 While not specifically called out as a surrogate in the TMDLs, TSS has been used as an accepted surrogate for these parameters based on analyses showing relationships between these parameters and TSS.

3 WLA tables in the TMDL specify allowable loads based on instream flows.

4 The 2006 mercury TMDL was a phased TMDL that applied to all the Lower Willamette and tributaries. Reduction targets were set in 2006, but LAs and WLAs were not established. In 2019 WLAs were established in the new Willamette River Mercury TMDL. The WLAs are implemented through the benchmarks in the MS4 Phase I Permit.

5 Shade curves are provided in the TMDL for addressing temperature issues.

6 The WLA in the TMDL includes two conflicting numbers. One is in the narrative on page 2-29 (46%), and one is in the Table of page 2-30 (78%).

1.3 Columbia Slough TMDL

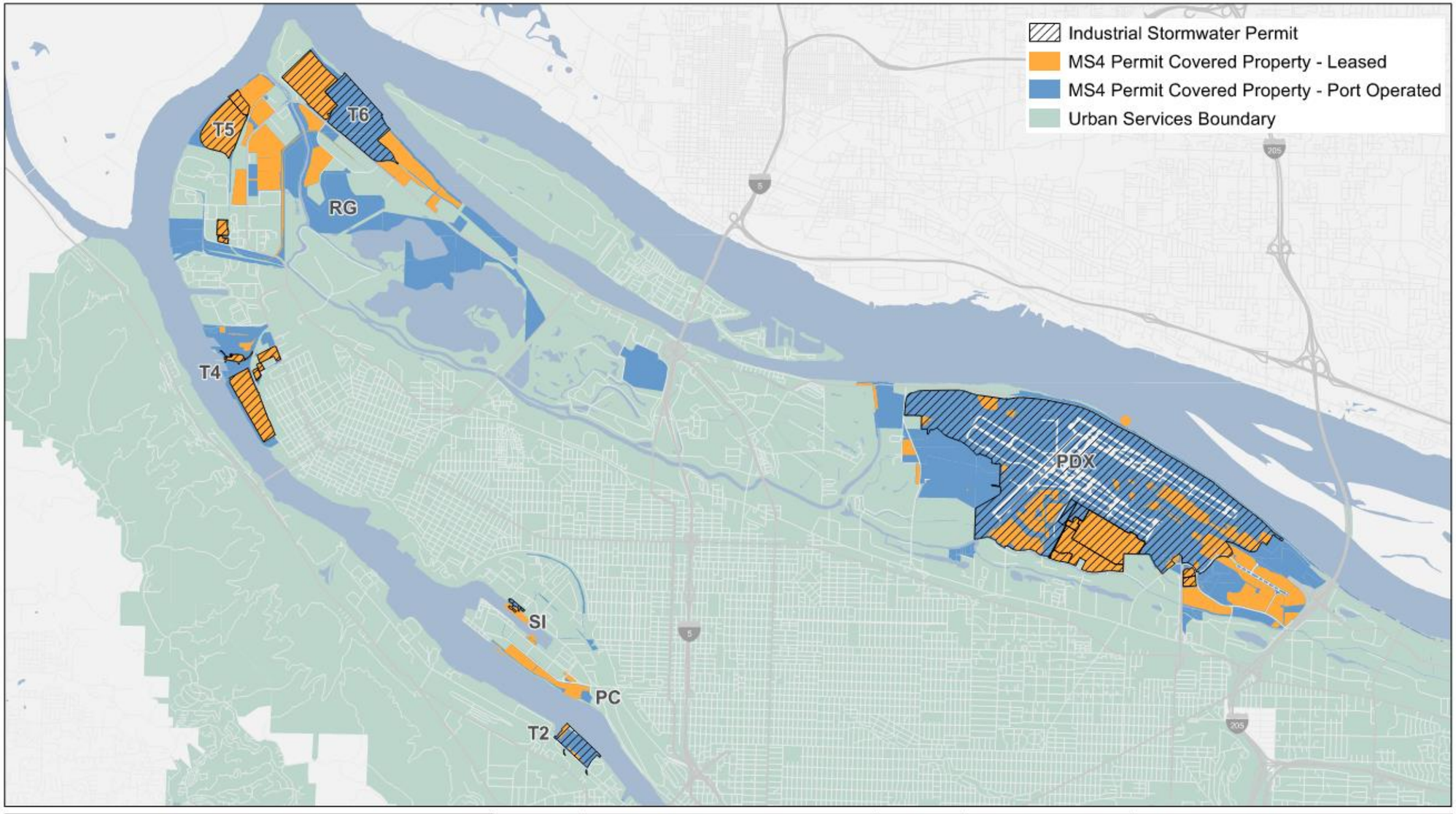
In 1998, the DEQ issued a TMDL for the Columbia Slough Watershed. The Port of Portland, including, Portland International Airport (PDX), is located within the Columbia Slough Watershed and is required to meet the TMDL control strategies for Biochemical Oxygen Demand (BOD5), eutrophication (pH and nutrients), bacteria, and toxics (lead, DDT/DDE, dieldrin, dioxin, PCBs). These requirements are addressed through compliance with five National Pollutant Discharge Elimination System (NPDES) Permits issued by DEQ: one for the individual waste and stormwater discharges at the airport, a second 1200Z permit for stormwater discharges from Terminal 2, a third 1200Z permit for stormwater discharges from a Terminal 6 basin, a fourth 1200Z permit for dredging operations, and a fifth permit for Municipal Separate Storm Sewer (MS4) discharges Port-wide. The Port is a co-permittee with the City of Portland (City) for the NPDES MS4 Phase I Permit. To support implementation of conditions in the NPDES MS4 Permit the Port has entered an Intergovernmental Agreement (MS4 IGA) with the City's Bureau of Environmental Services (BES). The MS4 IGA clarifies Port and BES responsibilities to meet NPDES MS4 Phase I Permit and TMDL obligations.

The Individual NPDES Waste and Stormwater Discharge Permit Number 101647 (Individual Permit) covers waste discharge from treatment of deicing/anti-icing and industrial stormwater discharges from PDX. The primary permittee is the Port of Portland and co-permittees include:

1. All commercial aircraft carriers operating at PDX
2. All air cargo carriers operating at PDX
3. Oregon Air National Guard (for deicing only, they have their own 1200Z for industrial stormwater discharges)
4. Fixed based operators involved in deicing operations
5. Ground Service Providers
6. Other tenants with industrial activities exposed to stormwater

The Deicing requirements of the Individual Permit address the TMDL control strategies for BOD. The NPDES 1200-Z Industrial Stormwater General Permit for PDX is incorporated into the Port's Individual Permit as Attachment A. The 1200-Z requirements address the control strategies for eutrophication (pH and nutrients), bacteria, and toxics (lead, DDT/DDE, dieldrin, dioxin, PCBs). The 1200-Z also requires monitoring for total suspended solids as a surrogate for DDT/DDE, dieldrin, dioxin, and PCBs to evaluate organics loading. The 1200-Z requires monitoring for phosphorus as the eutrophication surrogate to evaluate nutrient loading. At the Portland Airport, the phosphorus benchmark has been challenging to meet and the Port has been exempted from permit requirements for corrective actions while a study is being conducted to better identify sources.

The Port's NPDES MS4 Phase I Individual Permit Number 101314 (effective October 1, 2021, expires September 30, 2026) also requires permittees to implement strategies to address eutrophication (pH and nutrients), bacteria, toxics, dissolved oxygen, chlorophyll a/pH, E.coli and mercury. The Port's Stormwater Management Plan (SWMP), required by the NPDES MS4 Phase I Permit, outlines strategies, in the form of Best Management Practices (BMPs), used to reduce concentrations of the above targeted TMDL pollutants. These BMPs and strategies are summarized in Table D.1 of the Port's NPDES MS4 Phase I Permit 2010 SWMP and are also included in this document for reference in Section 6.0 regarding point sources, and in Appendix D. The Port's NPDES MS4 Phase I Permit SWMP can be found on the Port's website: https://www.portofportland.com/Environment/StormwaterManagement. The coverage area of the NPDES MS4 Phase I Individual Permit is shown in Figure B below.



Port of Portland geospatial data is gathered, maintained and primarily used for internal reference and analysis, and is only updated as resources permit. Geospatial data refers to data and information referenced to a location on the Earth's surface such as maps, charts, air photos, satellite images, cadastre and land and water surveys, in digital or hard copy form. Geospatial data may be gathered and maintained by more than one person or department within the Port, and data distributed by one person or department may not reflect the most recent data available from the Port or from other sources. Port geospatial data is not intended for survey or engineering purposes or to describe the authoritative or precise location of boundaries, fixed human works, or the shape and contour of the earth. The Port makes no warranty of any kind, expressed or implied, including any warranty of merchantability, fitness for a particular purpose, or any other matter with respect to its geospatial data. The Port is not responsible for possible errors, omissions, misuse, or misrepresentation of its geospatial data. Port geospatial data is not intended as a final determination of such features as existing or proposed infrastructure, conservation areas, or the boundaries of regulated areas such as wetlands, all of which are subject to surveying or delineation and may change over time. No representation is made concerning the legal status of any apparent route of access identified in geospatial data.

N:\Projects\GIS_Program\Work\20190812_MS4_Calculations_Peterson\MXD\MS4_2019_Map.mxd

PORT OF PORTLAND
Portland, Oregon

0 0.5 1 2 miles

N

Geographic Data Standards

Projected Coordinate System:
NAD 1983 HARN State Plane, Oregon North, Intl Feet
Map Projection Name:
Lambert Conformal Conic

Figure B
Port of Portland MS4 Permit Area
Port Property within City of Portland Urban Services Boundary

August 2022
Prepared for Blake Hamalainen, Environmental Operations

Figure B: Coverage area of the NPDES MS4 Phase I Individual Permit

The MS4 IGA is by and between the City of Portland (Agreement No. 30003325), and the Port of Portland (Agreement No. 2013-039), and is authorized by Oregon Revised Statutes (ORS)190.010. It allows the parties to cooperate on implementation of the NPDES MS4 Phase I Permit conditions with appropriate actions, resources, and programs. The MS4 IGA terminates upon expiration of the NPDES MS4 Phase I Permit. If the NPDES MS4 Phase I Permit is extended or renewed, the term is extended automatically. The parties must negotiate amendments to the agreement or separate agreements as necessary to ensure NPDES MS4 Phase I Permit compliance.

1.4 Willamette River TMDL

In September 2006, DEQ issued a TMDL for the entire Willamette River Basin to protect and restore the beneficial uses of the Willamette River. Chapter 14 of the TMDL includes a Water Quality Management Plan (WQMP), which provides the framework of management strategies to attain and maintain water quality standards. In 2019, DEQ issued the final revised Water Quality Management Plan (WQMP) for mercury as part of DEQ's Final Revised Willamette Basin Mercury Total Maximum Daily Load (Chapter 13). Many Port-owned facilities are in the Lower Willamette sub-basin of the Willamette River Basin and thus the Port is listed as a DMA in both the 2006 and 2019 WQMPs. The Willamette River TMDL is the largest TMDL in Oregon and pertains to all sub-basins in the 11,500 square mile watershed, including 12 major sub-basins. Mercury, bacteria, and temperature are the three main pollutants addressed in the Willamette River TMDL. With respect to complying with the TMDLs, these parameters are addressed by the Port as follows:

Temperature: The 2006 Willamette River TMDL specifically states that temperature is not considered to be a stormwater issue covered by the NPDES MS4 Phase I Permit. Therefore, as a DMA, the Port is responsible for developing and implementing a TMDL Implementation Plan that describes the management strategies the Port will undertake to address this nonpoint source parameter. These management strategies with respect to temperature are focused on enhancing vegetation of riparian corridors to increase shade and are covered in Section 5.0 of this TMDL Implementation Plan.

Bacteria and Mercury: For the Port of Portland, bacteria and mercury are identified as stormwater pollutants. Given that the Port implements its' NPDES MS4 Phase I Permit-required SWMP jurisdiction-wide, the strategies outlined in the SWMP are implemented to address these TMDL pollutants. The 2019 WQMP for mercury specifically states that "the Port of Portland's NPDES MS4 permit can serve as the implementation plan for the mercury TMDL for the NPDES MS4 permit applicable service area." This is the approach that the Port also takes with the bacteria TMDL. The Port's NPDES MS4 Phase I Permit requirements and responsibilities are summarized in Section 6, Appendix D, and the Port's SWMP.

The 2019 Willamette River Mercury TMDL also states that the six minimum measures outlined in Table 2 below apply to the Port for areas outside the MS4 permit coverage area. Given the Port applies the NPDES MS4 Phase I Permit-required SWMP jurisdiction-wide, these minimum measures are addressed through implementation of the SWMP. Mercury loads in urban stormwater are believed to be predominantly associated with atmospheric deposition and adherence to sediments. As a result, management measures to address mercury are focused on reducing the discharge of sediments. Table 2 shows the relevant BMPs from the Port's SWMP that are implemented to address these minimum measures.

In addition, for Port areas that discharge directly to waterbodies without entering the MS4, the reduction of sediment discharges occurs through management strategies that are also used to address temperature. This includes strategies such as the Airport Futures Natural Resource Enhancement Program, the Revegetation Program, the Mitigation Management Program, the

Riverbank Management Program, and the Portland Harbor Superfund Site Cleanup Program. These management strategies are summarized in Section 5.

Table 2: Correlation Between Six Minimum Stormwater Control Measures for Nonpoint Sources of Mercury and Phase I NPDES MS4 Permit Requirements

Minimum Stormwater Control Measure	Minimum Stormwater Control Measure Requirements Summary	Phase I NPDES MS4 Permit Reference and Associated 2010 SWMP BMPs
1. Pollution Prevention and Good Housekeeping for Municipal Operations	• Operate and maintain facilities to reduce the discharge of mercury-related pollutants. • Ensure DMA-owned and operated facilities with industrial activities have coverage under a 1200-Z permit and conduct operations and maintenance activities to protect water quality.	See BMPs listed for Schedule A.4.b.ii, and A.4.g and A.4.h in Appendix D.
2. Public Education and Outreach	• Conduct an ongoing education and outreach program to inform the public. • Track implementation of public education and outreach and assess progress including a qualitative evaluation of one activity.	See BMPs listed for Schedule A.4.d in Appendix D.
3. Public Involvement and Participation	• Implement a public involvement and participation program to provide the public with opportunities to participate in the development of control measures.	See BMPs listed for Schedule A.4.e in Appendix D.
4. Illicit Discharge Detection and Elimination	• Implement and enforce a program to detect and eliminate illicit discharges. • Develop and maintain a current map of the conveyance system. • Prohibit non-stormwater discharges through enforcement of an ordinance or other legal mechanism.	See BMPs listed for Schedule A.4.a in Appendix D.
5. Construction Site Runoff Control	• Refer project sites to DEQ or agent to obtain 1200-C permit coverage. • Require construction site operators to complete and implement an Erosion and Sediment Control Plan for construction project sites that result in a min. land disturbance of 0.5 acres or more. • Require erosion controls, sediment controls, and waste materials management for qualifying construction projects. • Develop, implement, and maintain escalating enforcement and response procedures.	See BMPs listed for Schedule A.4.c. in Appendix D.
6. Post Construction Site Runoff for New and Redevelopment	• Develop, implement, and enforce a program to reduce the discharge of pollutants from new and redevelopment project sites (0.25 acres or more). • Target natural or predevelopment hydrologic function to retain rainfall onsite and treat the remainder of runoff.	See BMPs listed for Schedule A.4.f in Appendix D.

In addition to this TMDL Implementation Plan and the Port's SWMP, the Port's Individual NPDES Permit Number 101647 for PDX requires the Port to submit a Mercury Minimization Plan for the waste discharge portion of the permit consistent with the Willamette Basin WQMP and implementation strategies for mercury reduction. In February 2021, the Port finalized its Mercury Minimization Plan and submitted it to DEQ.

Through discussions with DEQ and following a thorough review of both the Individual NPDES Permit and the NPDES MS4 Phase I Permit and associated Plans, the Port believes they will meet the TMDL requirements for both point sources and nonpoint sources (e.g., bacteria and mercury) through the implementation of these Permits and Plans as they cover the Port's jurisdiction. The focus of this TMDL Implementation Plan is on implementation strategies to address temperature as a nonpoint source. Section 5 provides the Port's temperature strategies. Section 6 is provided for reference only and includes a summary of how point sources of TMDL parameters are addressed through permit coverage. Section 6 is included to ensure a complete understanding of the Port of Portland's TMDL compliance.

1.5 Port of Portland Implementation Plan Scope

The Port submitted its initial TMDL Implementation Plan in 2008 to DEQ. Per DEQ guidance, the TMDL Implementation Plan is required to be revised every five years. This document presents the 2022 revision of the Port's TMDL Implementation Plan. The revision is focused on including a reference to how mercury is addressed as described in Section 6. Only minor changes and updates have been made to the temperature strategy. The DEQ encourages DMAs to work cooperatively to address TMDL requirements when such an approach would be advantageous (DEQ 2006, DEQ 2019). In the past, the Port and the City worked cooperatively under an IGA (Columbia Slough Revegetation IGA 2002-080) to implement revegetation projects in the Columbia Slough watershed. While this IGA expired in 2005, the Port continues to manage and maintain the sites under the Mitigation Management Program (Port of Portland - Mitigation Management). The Port also collaboratively works with the City of Portland and Columbia Slough Watershed Council to identify and implement habitat, water quality and revegetation projects through the Airport Futures Natural Resources Enhancement Program. This program is discussed further in Section 5.1 of this Implementation Plan.

In addition, the Port continues to collaborate with the EPA, DEQ, METRO, City of Portland, and other third parties to develop restoration sites as part of the Portland Harbor Superfund Site work. Sections 5.1.5 and 9.2 describe the restoration and enhancement projects that the Port has completed, funded, or planned to fund in the future.

Section 2

TMDL Implementation Plan Requirements and Effectiveness Review

2.1 TMDL Implementation Plan Requirements

DEQ developed a WQMP for the Willamette Basin TMDL in 2006 to provide the framework of management strategies to attain and maintain water quality standards. The framework is designed to work in conjunction with other detailed management plans, such as a SWMP. In 2019, DEQ developed a new, standalone WQMP for mercury which was included with the EPA Final Revised Willamette Basin Mercury TMDL (2021). The purpose of both the 2006 and 2019 WQMPs is to provide the framework for management strategies to help attain and maintain water quality standards for TMDL pollutants within the Willamette River Basin (OAR 340-042-0040-(4)). Per the WQMPs, these strategies which are focused on nonpoint sources are to be submitted by DMAs to the DEQ in a TMDL Implementation Plan.

Oregon Administrative Rule (OAR) 340-042-0080(3) requires the TMDL Implementation Plan to cover the following five components:

1. Management strategies that the DMA or other responsible person will use to achieve load allocations and reduce pollutant loading
2. A timeline and schedule to achieve measurable milestones
3. A plan to monitor performance and conduct periodic review and revision of the implementation plan
4. Evidence of compliance with applicable statewide land use requirements
5. Any other analyses or information as specified in the WQMPs

Section 3.0 of this plan provides a description of the Port's legal authority for implementing the TMDL Implementation Plan, a requirement associated with the items above. Section 4.0 provides a summary and overview of the Port's jurisdictional area. Section 5.0 provides the Implementation Plan for nonpoint sources of temperature with respect to Items 1 and 2 listed above. While a TMDL Implementation Plan is not required for point sources (e.g., bacteria and mercury), Section 6.0 has been provided for reference purposes to include a brief summary of how point source TMDLs are addressed by the Port including the updated mercury TMDL. Section 7.0 addresses Item 3 above. Section 8.0 addresses Item 4 related to compliance with land use requirements; and Section 9.0 addresses Item 5 above, and specifically addresses the following:

- Determine how best to provide for public involvement
- Provide a fiscal analysis to ensure funding for the implementation of proposed strategies in the TMDL Implementation Plan
- Protection of cold water refugia

2.2 Effectiveness Review

Through review of the annual TMDL progress reports and consideration of the TMDL Implementation Plan requirements, the Port's temperature related implementation efforts are effectively maintaining, enhancing, and restoring habitat. These actions are beneficial to addressing the temperature TMDL. As of 2021, the Port completed 13,460 linear feet of riparian restoration projects. Projects completed in 2021 included compliance monitoring for Year 5 (2021) of the Dahl Beach Mitigation Project, and construction of two stormwater structural source control measures (SCMs) at the Port's Terminal 4 marine facility. In addition, revegetation and planting was completed at the Linnton Mill Restoration Site in the spring of 2020. These habitat enhancement and restoration efforts also help address some of the point source issues described in Section 5 given vegetated areas reduce sediment transport, and hence, pollutants that bind to sediments such as mercury.

This plan includes a strong focus on cold water refugia by including Portland Harbor Super Fund site projects and tracking metrics to quantify restoration efforts. Over the next five years of implementation, the Port will continue to prioritize restoration projects that provide or enhance cold water refugia. Strategies for implementing cold water refugia projects are discussed in Section 9.2. Portland Harbor Super Fund Site restoration projects have been added to the Existing Activities under Section 5.0.

For nonpoint sources (temperature), annual progress reports include, as applicable, total acreage of restored habitat, linear feet of stream restoration, number of restoration projects and total acreage of mitigation sites.

For point source pollutants, the Port will include in the NPDES MS4 Phase I Permit annual report documentation of implementation of BMPs and other actions to address these pollutants (see Section 6.0). Section 7.0 provides information on performance monitoring and review for nonpoint sources.

Section 3

Legal Authority

The TMDL Implementation Guidance requests a brief description of legal authorities used to carry out the management strategies in the TMDL Implementation Plan. The Port has limited legal authority over others to administer TMDL management strategies. The Port does not have land-use jurisdiction over sector or sources of nonpoint source pollution. The Port is not a Federal Land Management Agency, and the Port is not a permitting agency. Rather, the Port is chartered by the State of Oregon to promote maritime, shipping, aviation, commercial and industrial interests of the region. The Port's authority over others is solely as a landlord in fulfillment of this mission.

Land use activities such as development and redevelopment within the Port's jurisdictional area, including activities by the Port, its tenants, and users of Port facilities, are regulated by the City of Portland, METRO, and Multnomah County. The Port and its tenants must comply with requirements imposed by the City of Portland and others, such as riparian planting, landscape requirements and Willamette River Greenway code requirements and LUCS reviews.

One exception exists at PDX where the Port is subject to Federal Aviation Administration (FAA) requirements and restrictions. Certain portions of the Columbia Slough and its surrounding riparian areas are within the Primary and Secondary zones of the airport. These areas are subject to the PDX Wildlife Hazard Management Plan (Env_WildfireHzdMgtPrgm_PDX.pdf (portofportland.com)), and other safety requirements under Federal Aviation Regulation (FAR) 14 CFR, Part 77 (i.e., governing vertical intrusion into airspace) that restrict the amount and type of revegetation that can occur. These requirements are not expected to negatively affect erosion control and associated mercury discharges. Implementation of the TMDL pursuant to other local jurisdiction plans, such as the City of Portland, must consider limitations on altering habitat in this area. The PDX legal restriction is described further in Section 5.3.

Section 4

Port Property

As described in Section 1.3, much of the Port's jurisdictional area is located within the boundary of the Lower Willamette Sub-basin and is defined based on Port ownership. While some properties discharge directly to the Willamette River, a significant portion of the drainage from the Port properties in this area enters the Columbia Slough or Columbia Slough tributaries (Whitaker Slough, Alderwood Slough, and McBride Slough) and eventually discharges to the Willamette River. Some Port properties discharge directly to the Columbia River, however, those discharges are not included in the Willamette River Basin, and are, therefore, not discussed in this Plan. Figure 1 in Appendix A shows the extent of Port property in proximity to the neighboring waterbodies.

Port property in the Lower Willamette River Basin includes PDX, four marine terminals (Terminals 2, 4, 5 and 6), and the Swan Island, Rivergate, Portland International Center, and Cascade Station business and industrial parks (Appendix A, Figures 2 through 4). The Port also owns several undeveloped properties within the basin that include open space, mitigation areas, and industrial parcels for future development.

The marine terminals and industrial parks are partially occupied by tenants, and the Port manages those tenant properties through lease agreements. Property owned by the Port in the Lower Willamette Sub-basin is primarily zoned for commercial and industrial use.

The Port owns approximately 5,476-acres within the City Urban Services Boundary (USB). Port property is divided into three primary Business Lines under the Operations Division:

1. Aviation
2. Marine
3. Industrial Development

Within the City USB, the Aviation Business Line consists of PDX, the Marine Business Line includes Marine Terminals 4, 5 and 6, and the Industrial Development Business Line consists of Terminal 2 and the following industrial parks: Swan Island, Rivergate, Cascade Station, and Portland International Center (PIC). The following sections (Sections 4.1 and 4.2) describe the individual properties owned by the Port.

4.1 Marine Terminals

The Port has four active terminals that are managed by the Port's Marine and Industrial Development Division. The terminals collectively occupy approximately 1,009-acres along the Willamette (Terminals 2, 4, and 5) and Columbia (Terminal 6) Rivers. These areas handle the shipping, receiving, and temporary storage of finished goods, agricultural products, and raw materials. In addition to typical Port activities that occur at the terminals, several properties located at the terminals are leased to tenants. There are no navigable waterways draining through any of these terminals. All drainage is through pipes or open ditches that discharge directly to the Willamette River, Columbia Slough, or the Columbia River.

4.1.1 Terminals 2, 4, and 5

Terminal 2 is covered by a 1200Z permit for stormwater discharges. Terminal 2 was previously a multi-purpose cargo facility located on the Willamette River. The facility is currently being marketed for other industrial uses. Previously, the primary activity that occurred at Terminal 2 was the storage and transfer of breakbulk cargo to and from ships, rail, and trucks. Typical operations involve the interaction of commercial semi-trucks, gantry cranes, ships at berth, and rail transports. The asphalt dock surface, adjacent paved areas, and several warehouses are used for the temporary storage of materials in transit. The United States Army Corps of Engineers also leases property at T2 to support their dredging operations. Terminal 2 is 49-acres in size and has approximately eight acres of pervious surface, which includes landscaped areas surrounding the administration building parking lot and riverbank.

Terminal 4 is a 261-acre multi-purpose facility on the Willamette River that features seven ship berths capable of handling a variety of cargo including grain, autos, forest products, steel, and dry and liquid bulk materials. Tenants located on Terminal 4 are covered by their own 1200Z NPDES permits for industrial stormwater discharges as applicable.

Terminal 5 is located on the north edge of the Port's Rivergate Industrial District. The 183-acre facility features a rapid-handling grain elevator and a mineral bulk exporting facility that handles potash, a bulk commodity.

4.1.2 Terminal 6

Terminal 6 is a 522-acre facility located between the Columbia River and the Columbia Slough near the confluence of the Willamette and Columbia Rivers. The two primary activities at the terminal are the storage and transfer of cargo in containers, to and from ships, rail, and trucks, and the storage and transfer of automobiles from ships to trucks and railcars. The Port has a 1200Z NPDES permit for one of the Terminal 6 basins and tenants also have their own 1200Z permits as applicable.

4.2 Portland International Airport

Portland International Airport (PDX), owned and operated by the Port, is the 31st busiest in the country based on passenger enplanements. PDX is located on approximately 2,803-acres of Port-owned land northeast of downtown Portland, Oregon. PDX is situated on the south shore of the Columbia River and is bounded on the south by the Columbia Slough that runs parallel to the Columbia River. The airfield consists of two primary parallel runways and one cross wind runway, associated taxiways, roadways and buildings including hangars, the terminal building, concourses, parking structures and an air traffic control tower.

4.3 Industrial Park Properties

The Port’s Industrial Development Business Line manages the Port-owned industrial parks, Rivergate, Swan Island, Cascade Station, and Portland International Center (PIC), totaling approximately 1,460-acres.

4.3.1 Rivergate Industrial Park

Rivergate Industrial Park is approximately 990-acres and is Portland's largest industrially zoned area. Near the confluence of the Willamette and Columbia Rivers, the area is designed for warehousing, distribution, manufacturing, and processing facilities linked to the Port's marine terminal facilities.

4.3.2 Swan Island Industrial Park and Navigation

The Port owns approximately 93-acres at the Swan Island Industrial Park. Most of the property on Swan Island is leased to tenants. The Port's Navigation facility, which has its own 1200Z permit and is the base for dredge operations, is located on Swan Island.

4.3.3 Portland International Center and Cascade Station

Portland International Center is a mix of office space, flex-space warehousing, and light manufacturing on approximately 315-acres. Cascade Station provides 124-acres of commercial property for retail, hospitality, and office uses. Both are located immediately adjacent to the eastern edge of PDX.

Section 5

TMDL Management Strategies for Nonpoint Sources

In 2006, the TMDL issued by DEQ for the Lower Willamette River Sub-basin addressed temperature for the Willamette River and associated tributaries including the Columbia Slough. DEQ established allowable stream temperatures consistent with the fish-use designation in the Lower Willamette watershed. Per Appendix 14.A in Section 14 of the Willamette River TMDL, rearing and migration needs of native salmon and steelhead trout is deemed the most sensitive beneficial use, and therefore the stream temperature standard for the Lower Willamette including the Columbia Slough is 18° C (64.4°F).

Temperature is not considered to be a stormwater parameter and is not addressed as a point source under the NPDES MS4 Phase I or Individual Stormwater Permits, therefore, jurisdictions (including the Port) have not established BMPs for compliance with their NPDES Permits to specifically target heat (temperature) as a pollutant of concern. The bulk of stormwater runoff occurs when ambient air temperature is sufficiently low that the stormwater does not transport excess heat load. However, temperature is considered a nonpoint source pollutant that DEQ monitors and regulates through a TMDL. Many jurisdictions enforce ordinances to protect and preserve drainage ways and riparian corridors to reduce pollutant loads and protect habitat from impacts associated with anthropogenic activities such as urban and rural development, agricultural practices, forest management, and associated developments such as transportation systems. The City of Portland's Environmental Overlay Zones, Greenway Overlay Zones, and the Willamette River Greenway code can have the effect of increasing riparian shading, in turn reducing heat gain from solar radiation and providing benefits related to temperature. The Port complies with all such ordinances, as required by the City of Portland.

Since 1998, at the time of the release of the Columbia Slough TMDL, the Port has both internally and with the help of the City of Portland and other agencies, implemented voluntary programs. These programs are designed, in addition to other benefits, to improve instream temperature conditions in the Willamette Basin, particularly the Columbia Slough and associated tributaries. Since then, a significant amount of riparian planting has been conducted. Maps are included in Appendix A to illustrate the locations of existing revegetation and/or mitigation efforts by the Port.

5.1 Existing Activities

Existing Port programs to address temperature (nonpoint sources) include the Airport Futures Natural Resource Enhancement Program, Revegetation Program, the Mitigation Management Program, the Riverbank Management Program, and the Portland Harbor Superfund Site Cleanup Program. Each program is described in Sections 5.1.1 through 5.1.5, along with specific project descriptions.

5.1.1 Airport Futures Natural Resource Enhancement Program

In 2011, the Port and the City of Portland signed an Inter-Governmental Agreement for natural resources related to the Airport Futures Project, a collaborative effort to create an integrated long-range development plan for PDX. The IGA requires that the Port mitigate for 300 acres of upland grassland resources in lieu of having four PDX properties (totaling approximately 268 acres) zoned as environmental overlays. With respect to the Lower Willamette Basin, and more specifically the Columbia Slough watershed, the Port agreed to undertake the conversion of the 6.2 acre Portland International Center Wetland Enhancement Site from a mixed wetland and upland area to an area with native shrub cover. The site was planted in 2014 and seeded in 2017. Plantings included 14 different species of native shrubs and wildflowers.

5.1.2 Port Revegetation Program

Based on DEQ's designation of the Columbia Slough as 303(d) water quality limited under the CWA, the Port entered into an IGA (2002-80) with the City of Portland BES in 2000 to fund work to revegetate portions of the Columbia Slough, primarily in areas owned by the Port. The Port provided funds to BES to conduct revegetation between 2000 and 2004 on a total of 73.5-acres of property to improve water quality within the Columbia Slough and adjacent branches (Appendix A, Figures 2 through 4).

The goal of the revegetation projects was to make substantial vegetative improvements along the banks of the slough to:

- provide shading to reduce surface water temperature
- help filter stormwater runoff
- provide diversity in vegetation providing food and shelter for wildlife
- establish connectivity between open/natural spaces
- provide continuity of cover and wildlife corridors
- reduce water velocities and potential erosion

A site analysis was performed at potential locations to assess the extent of the area suitable for revegetation. The site analysis included:

- slope steepness and stability
- quantity of existing native vegetation
- coordination and compatibility with future projects, accessibility, potential impacts on developable land
- identification of potential conflicts with existing infrastructure and connectivity to adjacent open space or natural areas

Some portions of the Slough owned by the Port were not recommended for planting due to operational, regulatory and/or litigation issues. Section 5.3 contains more information on constraints to revegetation on Port properties.

Revegetated sites were initially managed and monitored by the City of Portland BES following completion of each planted area. Per the IGA which expired in 2005, BES was required to monitor for a minimum of five years following completion of the vegetation efforts. Invasive and non-native vegetation were removed annually during the growing season. Watering was conducted as needed based on the discretion of BES staff. The monitoring period began following initial inspection and acceptance of work by the Port. The performance standard was designated at 50% survival (including desirable recruits). Data collected during annual monitoring includes species, quantity, height, vigor, ground cover, weed species, wildlife observations, and any comments on the condition

of the project area. BES prepared a monitoring summary at the end of the first year following initial planting and provided documentation of vegetation survival in annual reports for the five-year monitoring period. Most revegetation activities were initiated either in 2000 or 2001. During the five-year monitoring period for these sites, Port mitigation staff conducted inspections to ensure performance standards were being met and conducted supplemental maintenance when necessary and replanting was conducted based on information from annual monitoring visits. Following the five-year monitoring period, Port staff has continued to inspect each site annually during the growing season to evaluate planting effectiveness and maintenance needs. Replanting and maintenance are conducted on an as-needed basis. This work is documented in the tracking matrix included in Appendix B and provided in the Port's bi-annual Mitigation Program status report. Descriptions of each revegetation site are provided on the maps provided in Appendix A. The Mitigation Management Program Site Status Report (last updated July 2021) is available on the Port's webpage https://www.portofportland.com/Environment/Mitigation.

5.1.3 Port Mitigation Management Program

The Port's Mitigation Management Program (Port of Portland - Mitigation Management) was initiated in 1997 to respond to ongoing and proposed mitigation requirements from various regulatory agencies. The Port of Portland manages over 900 acres of wetland and upland mitigation and enhancement sites. The mitigation sites are designed to provide several wildlife and community benefits including:

- increased wildlife value by enhancing nesting, foraging, and resting habitat
- creating and enhancing riparian zone functions
- improving connectivity between wildlife areas
- improving or restoring wetland hydrological functions
- reducing and controlling the spread of invasive weeds
- providing valuable 'greenspace' in a highly urbanized area.

The Mitigation Management Program is continually evolving and is influenced by the development of new or improved management techniques, increased coordination with other regional partners and conservation organizations, and changes in federal, state, and local regulations. More detail on each project can be found in the Port's Mitigation Management Program Site Status Report (July 2021).

The Port's mitigation and revegetation sites play a critical compliance role with respect to the Willamette Basin temperature TMDL. The Port TMDL Implementation Plan requires the continued management of these sites to prevent invasive plants from impacting maturation of native plantings. As sites mature, they will help increase the amount of shade and stormwater infiltration contributing to lower water temperatures in the lower Columbia Slough. This metric is tracked through documentation of the annual inspections, site maintenance and herbicide use on these sites. These activities constitute the core of the Port's TMDL temperature implementation strategy and are included in the Port's TMDL annual progress reports (January 31 annually) to DEQ.

Most permit requirements specify monitoring of mitigation sites for five years, however, the functions and values of mitigation sites may not match those of natural sites after such a short period of time. To meet the Port's objective to achieve sites that are self-sustaining and self-maintaining, the Port will continue to maintain and monitor the mitigation sites as part of ongoing property management to ensure habitat integrity continues to improve and that the sites sustain their enhanced condition with minimal intervention. The award-winning Vanport Wetlands is one good example of the Port's successes with mitigation projects. Since the Port purchased the 90-acre site in 1999, over 180 different bird species, eighteen mammals, and eight herpetofauna (frogs, salamanders, snakes, and turtles) have been observed. This site now provides important resting, feeding, and nesting habitat

for many species within a regionally significant, highly urbanized landscape. The Port continues to manage Vanport Wetlands as a habitat area by controlling invasive species, ensuring plant survival, and increasing native plant diversity throughout the site.

Mitigation areas are shown and described on the maps in Appendix A, and although some mitigation areas are not close to open channel waterways, they do provide an inherent water quality benefit, including benefits to temperature by promoting increased infiltration to enhance summer base flows.

5.1.4 Port Riverbank Management Program

The Port manages a wide variety of constructed and natural riverbanks and has initiated a Riverbank Management Program to address riverbank conditions in association with its other programs. Many riverbank projects involve voluntary vegetation enhancements or stabilization improvements. Maintenance of the vegetation and control of invasive weed species are performed by the Port's Landscape Maintenance Department in consultation with Port Natural Resources staff. Natural Resources staff provide technical advice on plant species selection for vegetation diversity and wildlife value, monitor the sites for performance and compliance with the permits, provide guidance for adaptive management and prepare the monitoring reports for submittal to agencies or for internal records. Riparian management projects located close to the Willamette River are shown and described on the maps in Appendix A.

5.1.5 Portland Harbor Superfund Site Cleanup Program

The Portland Harbor Superfund site is an 11-mile stretch of the Willamette River located between the Broadway Bridge and its confluence with the Columbia River. The Portland Harbor was listed on EPA's National Priorities List (Superfund) in December 2000. Shortly after the initial listing, the Port was listed as a potentially Responsible Party (RP) for the Portland Harbor Superfund Site Cleanup Program. Since that time, the Port has proactively initiated remediation and restoration efforts throughout the Portland Harbor. On January 6, 2017, the Portland Harbor Superfund Site reached a key milestone when the EPA released its Record of Decision (ROD), the final plan for cleanup. The Port is currently working with the EPA, DEQ, RPs and others to implement the ROD.

Through the cleanup program, the Port has enhanced directly or purchased habitat restorations credits for approximately 13,460 linear feet of riparian habitat to date. These habitat enhancement and restoration efforts also directly benefit the temperature TMDL by decreasing temperature and are identified in the Ports TIP as key elements.

The Port has also completed several riparian restoration projects and is planning more in the next five years. Project locations are included in the Appendix A, site maps and future projects are discussed in Section 5.2.2. Section 9.2 discusses recently completed projects that provide benefits to cold water refugia (CWR).

2021 Program Efforts

The Port conducted compliance monitoring for Year 5 (2021) of the Dahl Beach Mitigation Project, which was implemented to provide compensatory mitigation for impacts to salmonid critical habitat incurred because of shoreline stabilization activities conducted during the Terminal 4 Phase I Removal Action within Wheeler Bay of the lower Willamette River in 2008. The monitoring program is intended to remain in effect for a 5-year period to ensure that the site functions as designed. The Year 5 monitoring results indicate that the site has been successful in providing the function and area of habitat as initially designed.

5.2 Future Activities

5.2.1 Vegetation Management Program (Revegetation, Mitigation, and Riverbank Sites)

The Port will continue to inspect and maintain existing vegetation, mitigation, and riparian enhancement areas as described in Section 5.1. Site inspections are conducted monthly during the growing season for mitigation sites and a minimum of twice annually for revegetation and riverbank sites. Monitoring protocols are followed to document the conditions. This work provides the necessary feedback to mitigation staff, so remedies can be implemented when necessary.

5.2.2 Identification of Project Sites

In 2000, the Port conducted an evaluation of potential locations for Columbia Slough revegetation projects. As part of that analysis, a list of constrained areas was developed and applied to available sites. These constraints are listed in Section 5.3. The Port's work with the City completed revegetation of the viable opportunities at that time.

As a result of the Airport Futures Natural Resources Enhancement Program, implemented in 2010, the Port now can fund and implement projects on property owned by others. The City of Portland has mapped the remaining revegetation project opportunities on the Slough. The unconstrained projects identified during this process were added to a master list of potential projects for future consideration by the CAC.

The Columbia Slough Watershed Council has also developed a draft stewardship action plan for the Slough. A list of top priority projects and programs is included in this plan. The watershed council is an active participant in the CAC subcommittee and has been proposing these priority projects for Airport Futures funding.

The Port replanted the banks of McBride Slough following a clean-up of contaminated sediments in 2018 and 2019. This replanting replaced trees that had to be removed for the clean-up to occur. The Port planted additional trees and shrubs to enhance the area that was impacted by the project.

The Port conducted an oak woodland planting project on a property south of PDX adjacent to NE 82nd Avenue and north of Columbia Blvd. The property is directly south, and adjacent to, Whitaker Slough. Approximately two acres were planted with Oregon white oak as well as oak woodland associated understory vegetation. This was a project conducted by the Port to enhance habitat in the Slough wildlife corridor. Site prep was done winter 2019 and planting was conducted in Fall 2019. This project also included significant trash removal.

The Port created native pollinator habitat in a one-acre field at the Vanport Wetland Mitigation Site and a three-acre field at the Buffalo St Mitigation Site. Native flowering shrubs were planted, and the sites were seeded with native pollinator species. Native shrubs were installed on the islands of the Ramsey Lakes Mitigation Site, the upland forested area of the Elrod mitigation site and phase I and II of the PIC wetland conversion project. Supplemental planting of the PDX and Portland International Center sites and Dahl Beach also occurred. All projects were completed Spring, 2019.

As part of the Portland Harbor Superfund Site Cleanup program, the Port completed two projects that had a positive impact on reducing temperature and mercury. The Willamette Cove Restoration project and the Terminal 4 water quality improvement project are described below. See Appendix A for locations.

Terminal 4 Water Quality Improvement Project

The Terminal 4 water quality improvement project involved constructing stormwater infiltration basins. The infiltration basins include vegetation and other treatment media to remove contaminants prior to infiltrating runoff to the subsurface. The total drainage area treated is approximately 40 acres, consisting of three separate outfalls or drainage areas. The Port worded with the Oregon Department of Environmental Quality and U.S. Environmental Protection Agency on the planning and implementation of these source control projects. Project construction was initiated in 2020 and the projects have been completed.

Willamette Cove Restoration Project

The Willamette Cove Restoration project will restore approximately 27-acres of upland and riparian area. Preliminary plans include the removal of invasive species, bank grading and planting of native species. Currently, the project is aiming for a 2023 start date.

5.3 Constraints

Revegetation projects on Port-owned property along the Columbia Slough are constrained by several factors, specifically factors related to FAA regulations and guidance related to compatible land use on and adjacent to airports.

5.3.1 Federal Aviation Administration Regulations and Guidance

Federal Aviation Administration Advisory Circular (AC) No. 150/5200-33B "Hazardous Wildlife Attractants On or Near Airports" provides FAA guidance to airport operators on the recommended locations of certain land uses that have the potential to attract hazardous wildlife relative to the location of the airport. It also provides guidance on airport development projects including construction, expansion, and renovation projects affecting aircraft movements near hazardous wildlife attractants.

For an airport serving turbine-powered aircraft such as PDX, AC 150/5200-33B recommends that "hazardous wildlife attractants" be separated from the airport's air operations area (AOA) by 10,000-feet. This AC also recommends that the approach, departure, and circling airspace be separated from hazardous wildlife attractants by five statute miles if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

AC 150/5200-33B defines wildlife attractants as "any human-made structure, land use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace of the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, and wetlands." AC 150/5200-33B discusses land-use practices having the potential to attract hazardous wildlife and provides guidance on whether these land-use practices are compatible or incompatible with safe airport operations if located within specified separation distances from the airport. The guidance also provides recommendations on alternatives for incompatible land uses, and suggestions on managing or correcting incompatible land uses to discourage the attraction of hazardous wildlife to airport facilities.

In accordance with the Grant Assurances, the Port must adhere to the guidance in AC 150/5200-33B on Port-owned property to ensure that proposed activities, including habitat modification and mitigation activities, are consistent with the recommendations provided in the circular. Most of Port-owned property adjacent to the Columbia Slough are within 10,000 feet of the AOA and therefore, any revegetation that occurs must comply with this guidance to ensure that is it is not creating or enhancing a wildlife attractant for species that are hazardous to aviation.

Federal Aviation Regulation (FAR) 14 CFR, Part 77 establishes the standards for determining obstructions in navigable airspace. These standards are used to create airport imaginary surfaces that are used to evaluate potential obstructions into navigable airspace. Imaginary surfaces are established specifically for an airport and each runway. Obstructions that penetrate these surfaces can be hazardous to safe aircraft operations. Therefore, these surfaces must also be considered when proposing a revegetation project adjacent to an airport, as trees can grow into these surfaces and become an obstruction.

5.3.2 PDX Wildlife Hazard Management Plan

The PDX Wildlife Hazard Management Plan (Env_WildfireHzdMgtPrgm_PDX.pdf (portofportland.com)) fulfills the requirements of the FAA federal code, 14 CFR part 139.337 and based on the findings from the airport specific Wildlife Hazard Assessment (WHA). The need for a WHA at an airport is triggered by one or more of the following:

1. An air carrier aircraft experiences multiple wildlife strikes
2. An air carrier aircraft experiences substantial damage from striking wildlife
3. An air carrier aircraft experiences an engine ingestion of wildlife
4. Wildlife of a size, or in numbers, capable of causing an event described above is observed to have access to any airport flight pattern or aircraft movement area

The overall objective of the PDX WHMP is to implement an integrated and adaptive program to effectively manage risk at PDX by reducing the probability of occurrence of wildlife/aircraft collisions. Bird strikes present a high risk for aircraft at PDX, especially during the critical phases of departure and landing operations. Consequently, the risk evaluation process outlined in the WHMP focuses on avian wildlife. It is recognized that the risk of a bird strike at PDX can never be completely eliminated, given the eco-regional location of the airport on both the Pacific flyway and at the confluence of two major river systems, all of which serve as major movement corridors for both migratory and resident species of birds. However, the underlying premise of the WHMP is that it is possible to manage the risk to an acceptable level, and it is the intent of the WHMP to provide the necessary direction to do so, in a scientifically sound manner, utilizing non-lethal means wherever possible.

Habitat modification is a key risk management strategy outlined in the WHMP that attempts to address wildlife in the airfield environment and wildlife's conflict with aircraft operations. Strategies include the physical manipulation or complete removal of features or characteristics (both natural and constructed) that are attractive to wildlife species of concern and are located such that they draw these species into or across the critical flight paths. Therefore, the design and installation of structures and overall best management practices (vegetation removal, limited vegetation enhancement) described in the WHMP are intended to exclude wildlife species of concern from the airfield or from specific features on the airfield.

5.3.3 Other Constraints

The 2002 Columbia Slough Revegetation IGA (2002-080) between the Port and the City of Portland identified opportunities and constraints for revegetation efforts on Port-owned property. As part of the site analysis performed for each proposed revegetation location, some sites were deemed not appropriate for revegetation efforts based on operational, regulatory and/or litigation issues. As shown on the maps in Appendix A, several areas not included in the revegetation efforts are identified as constrained. Some of these areas are located along marine terminals, within railroad corridors, and adjacent to areas with limited accessibility. Several Port-owned properties that have revegetation constraints have been noted on the maps (Appendix A, Figures 2 through 5). Below is a

brief description of the factors prohibiting, or eliminating the need for, revegetation projects at a particular site. The numbers correspond to numbers shown on the maps.

- Constraint 1: Multnomah County Drainage District (MCDD) holds an easement at this location for boat launch activities.
- Constraint 2: This site is already densely vegetated.
- Constraint 3: This area has poor site conditions including access, slope, and safety.
- Constraint 4: This area is constrained by FAA Advisory Circular (AC) No. 150/5200-33A. In addition, this property is included in the development footprint.
- Constraint 5: This site already consists of mature cottonwoods and other native trees and shrubs.
- Constraint 6: This area is a wildlife corridor with a wetland scrub/shrub habitat and is under the management of METRO.
- Constraint 7: This area is a powerline corridor under management of Bonneville Power.
- Constraint 8: This area is a powerline access road.
- Constraint 9: A ship dock is located at this site.
- Constraint 10: This property was acquired by the Port for a leasehold expansion. Greenway planting may be considered in the future as part of a future development project.

5.4 Timeline and Schedule

As described in Section 5.1, the Port is participating in the Airport Futures Natural Resources Enhancement Program. Projects are recommended by the CAC each fall for implementation the following summer. The Port will also continue to conduct the annual inspections and maintenance for the Revegetation, Mitigation Management, and Riverbank Management Programs.

Section 6

Stormwater Management Strategies for Point Sources

TMDL Implementation Plans are required for nonpoint sources of pollutants only. All the Columbia Slough and Willamette River TMDL parameters (other than temperature) are addressed by the Port under permits regulating point sources of pollution within the Port's jurisdiction. Specifically, the Port's SWMP, required by the NPDES MS4 Phase I Permit, is implemented jurisdiction-wide and outlines BMPs used to address eutrophication (pH and nutrients) bacteria, toxics (lead, DDT/DDE, dieldrin, dioxin, PCBs), dissolved oxygen, chlorophyll a/pH, E.coli and mercury. Even where there are discharges directly to waterbodies without first draining through an MS4 system, these nonpoint source areas are covered by activities in the Port's SWMP and treated as if they are point sources under the MS4 permit. This section regarding point sources provides a summary of the NPDES MS4 Phase I Permit required strategies for reference purposes only.

6.1 Existing Activities

As described in Section 1.3, the Port is successfully implementing their NPDES MS4 Phase I Permit. DMAs that have NPDES MS4 Permits are addressing their TMDL point source pollutants through implementation of their NPDES MS4 Phase I Permit conditions. The Port is currently in the process of updating their SWMP which is due November 1, 2022. In addition, as part of the NPDES MS4 Phase I Permit requirements, the Port will be developing a mercury minimization assessment that is also due on November 1, 2022. As part of the mercury minimization assessment, the Port will be assessing and potentially refining BMPs to address sediment control as the most effective way to reduce mercury in runoff.

The Port's SWMP currently includes specific strategies and BMPs to reduce mercury runoff through sediment transport with a timeline for implementation of the management strategies. These BMPs and implementation of management strategies are summarized in Table D.1 (in Appendix D) of the Port's NPDES MS4 Phase I Permit Stormwater Management Plan (SWMP).

In addition to the BMPs summarized in Table D.1 which include erosion control, stormwater quality design standards, sweeping, system cleaning, etc., the Port also maintains water quality facilities and recently constructed two stormwater structural source control measures (SCMs) at the Port's Terminal 4 marine facility. Both stormwater SCMs are infiltration basins that infiltrate stormwater runoff to help reduce pollutants discharging to the lower Willamette River. The two infiltration basins will reduce and treat runoff from over 27 acres at Terminal 4. Oregon DEQ approved of the design of the SCMs in 2020 and both stormwater SCMs were operational by the end of 2021.

6.2 Future Activities

6.2.1 Applicability

The requirements outlined in this section apply to the Port's MS4 discharges to receiving water with established TMDLs or to receiving waters with new or modified TMDLs approved or issued by the EPA within three-year of the issuance date of the current NPDES MS4 Phase I Permit. Pollutant

discharges for the parameters listed in the TMDL with applicable WLAs must be reduced to the maximum extent practicable through the implementation of BMPs and an adaptive management process.

6.2.2 Willamette Basin Mercury TMDL Requirements

Over the Permit term, the Port will be actively working on addressing the TMDL related requirements specifically for mercury as listed below:

- Develop and submit a mercury minimization assessment with the NPDES MS4 Permit annual report due November 1, 2022, that documents the current actions, such as BMPs implemented, that reduce the quantity of solids discharged into and from the permitted MS4 system (similar to the actions currently required in Schedule A).
- Continue implementation of the BMPs and other actions described in the mercury minimization assessment that are effective for mercury reduction, along with documentation of implementation in each subsequent annual report.
- Include an analysis of the effectiveness of implemented BMPs at reducing mercury and any other actions taken and qualitative pollutant load reductions achieved in the next NPDES MS4 Permit Renewal Application Package. Due to data limitations, mercury benchmarks are not applicable in the first permit cycle after the TMDL is finalized.
- Collect paired total mercury and total suspended solids samples, as described in Schedule B of the NPDES MS4 Phase I Permit (this will be conducted by the City of Portland on behalf of the Port as agreed to in the IGA)
- Submit paired mercury and total suspended solids monitoring data in the appropriate DEQ data submission template (this will be conducted by the City of Portland on behalf of the Port as agreed to in the IGA). Given the lack of sufficient mercury data, pollutant load reduction evaluations, benchmarks, and waste load allocation attainment analyses for mercury will not be required in this permit cycle.

6.2.3 Evaluation of TMDL Pollutant Load Reduction and Establishment of Reduction Benchmarks

In addition, with respect to other TMDL parameters that are point sources, the following will be conducted as specified in the NPDES MS4 Phase I Permit to comply with TMDLs:

- Evaluate and report on progress towards reducing pollutant loads using a pollutant load reduction empirical model, water quality status and trends analysis, and other appropriate qualitative or quantitative evaluation approaches identified by the co-permittees. The results of this TMDL pollutant load reduction evaluation will be submitted to DEQ with the NPDES MS4 Phase I Permit Renewal Application Package (this exercise does not include mercury due to insufficient data volume as stated in the NPDES MS4 Phase I Permit).
- Evaluate whether TMDL WLAs for stormwater are being met. If the Port estimates that TMDL WLAs are achieved with existing BMP implementation, the Port will provide a statement supporting this conclusion.
- For TMDL parameters where WLAs are estimated as not being achieved, develop updated pollutant load reduction benchmarks. The benchmarks will include the identification of additional or modified BMPs to be implemented over the next NPDES MS4 Phase I Permit term that will result in further reductions in the discharge of the applicable TMDL pollutants. The TMDL pollutant reduction benchmarks must be submitted with the NPDES MS4 Permit Renewal Application Package (mercury is exempt from this requirement).

Section 7

Performance Monitoring and Review for Nonpoint Sources

Every five years or in a different interval agreed to by DEQ and the Port, the Port will review the TMDL Implementation Plan to determine progress towards meeting performance goals. Based on the results of both implementation and effectiveness monitoring (described in Sections 7.1 and 7.2), changes to the management strategies will be proposed.

7.1 Implementation Monitoring

For temperature, as described in Section 4.2, shade is considered a surrogate measure for heat load allocations, and shade is developed through the revegetation of the channel banks. Temperature benefits are also achieved through projects to further enhance groundwater recharge. The Port will monitor, and report projects implemented through the Airport Futures Natural Resources Enhancement Program that help achieve these goals. The Port will also continue to conduct annual monitoring and maintenance of Port-owned revegetation, mitigation and riverbank management sites, as well as progress made implementing Superfund Early Action Restoration projects and submit an implementation tracking matrix (Table B-1; Appendix B) as part of the annual progress report to DEQ.

7.2 Effectiveness Monitoring

Friends of Trees, the Columbia Slough Watershed Council, and other project proponents that receive funds from the Port are required to provide annual reports for Slough enhancement and canopy projects. Annual progress reports will include, as applicable, total acreage of restored habitat, linear feet of stream restoration, number of restoration projects and total acreage of mitigation sites.

Section 8

Evidence of Compliance with Land Use Requirements

Oregon Administrative Rule 340-042-0080(3)(a)(D) defines one of the required elements of a TMDL Implementation Plan to be evidence of compliance with applicable statewide land use requirements. Per the TMDL Implementation Plan Guidance Document, this would consist of the following items:

1. Identify applicable acknowledged local comprehensive plan provisions and land use regulations
2. Explain how the Implementation Plan is consistent with these local planning requirements or what steps will be taken to make the local planning requirements consistent with the Implementation Plan.

As applicable, the Port operates under the City of Portland's 2035 Comprehensive Plan (amended through March 2020) because the Port has no land-use or planning authority. As a result, comparison of the Port's TMDL Implementation Plan was made with the City of Portland's 2035 Comprehensive Plan provisions.

Per Item #1 above, the City's 2025 Comprehensive Plan is meant to provide a guide towards future development and redevelopment. Policies and objectives outlined in the 2035 Comprehensive Plan have been amended into City code by Ordinance. The last Comprehensive Plan update was fully adapted and implementation in 2018 and amended in March 2020. The Port's TMDL Implementation Plan is consistent with the City's 2035 Comprehensive Plan elements, specifically Goal 7 which addresses the environment and watershed health.

Per Item #2 above, while the Port complies with all applicable City Codes and policies, it's important to note that Policy 8.6, Interagency Coordination, states that the City will, "maintain interagency coordination agreements with neighboring jurisdictions and partner agencies that provide urban public facilities and services within the City of Portland's Urban Services Boundary to ensure effective and efficient service delivery." The Port of Portland is listed as an agency that the City conducts interagency coordination with related to stormwater, water quality, and water resource management. Goal 7 of the 2035 Comprehensive Plan aligns with specific components of the TMDL Implementation Plan, as the two documents contain similar goals and methods for improving the environment and water quality.

In summary, the City of Portland's 2035 Comprehensive Plan contains goals and strategies that coincide with the management strategies contained in this TMDL Implementation Plan. Based on reviewing the City's 2035 Comprehensive Plan and existing interagency agreements, this TMDL Implementation Plan is compatible with the land-use requirements as set forth in the City of Portland's 2035 Comprehensive Plan.

Section 9

Additional Requirements

The Port complies with their NPDES 1200Z, NPDES Waste Discharge and NPDES MS4 Phase I permits which cover the majority of the TMDL requirements. In addition to recently updating the Port's construction standards to exclude mercury containing electric equipment and addressing temperature through multiple projects and programs, Section 9.0 addresses additional requirements and how they are being met.

9.1 Fiscal Analysis

The Port's mission is to enhance the region's economy and quality of life by providing efficient cargo and air passenger access to global and national markets. In support of this mission, the Port annually undertakes budget and business planning to identify areas of focus and actions needed to address them. An annual budget document is prepared to reflect how the Port will allocate resources to meet the Port's mission.

The Port derives almost all revenue from business transactions with the users and tenants of its facilities. A small proportion (approximately three percent) of the Port's overall revenue is from property tax. These transactions generally occur between the Port's three Business Lines, Marine, Industrial Development, and Aviation (Commercial Aviation and General Aviation), and associated users and tenants of those properties. Revenue from the Industrial Development Business Line comes from property sales at the industrial parks. In addition to leases and fees, the Marine Business Line receives revenue from the U.S. Army Corps of Engineers for dredging services.

The Aviation Business Line consists of Commercial Aviation (PDX) and General Aviation (Hillsboro and Troutdale). Revenue from General Aviation is primarily derived from business transactions and fees and may be supplemented from the Port's general fund which receives funds from property taxes collected by Multnomah County. Commercial Aviation (PDX) resources are derived solely from charges to passengers and cargo airline customers, airport parking, rental car revenue, passenger facility charges, Federal grants, and tenant fees. PDX resources cannot be commingled with any other resources of the Port and are restricted for use at Aviation facilities by bond ordinances and Federal Aviation Administration (FAA) regulations. The Airport Futures Natural Resources Enhancement Program will be funded by the Aviation Business Line through 2035 and projects selected by this program must provide a direct benefit to PDX to meet environmental requirements.

The Port annually budgets resources to fund projects and programs identified in the Strategic Plan. Program expenses are allocated among departments and divisions involved in implementation of the program. The Environmental Operations Department continues to direct maintenance of mitigation and revegetation sites (see Section 4). The Port's revegetation projects represent a total investment of over 10 million to date. Annual operating costs of mitigation and revegetation sites for fiscal year 2021-2022 are expected to exceed $350,500. Staff resources are continually evaluated to ensure recommended site actions are being carried out effectively and efficiently while at the same time ensuring that other needs are also addressed.

9.2 Cold Water Refugia

Per the Willamette River TMDL WQMP, Implementation Plan, areas below river mile 50 of the Willamette mainstem "shall look at identifying existing cold water refugia and provide options for protecting or enhancing such areas". Cold Water Refugia (CWR) can be described as patches of water within a stream that are cooler than the surrounding ambient stream temperature due to in-flow from tributaries and/or upwelling of groundwater. Studies indicate that CWR may provide critical habitat for salmonids in basins affected by warm temperatures (Bartholow, 2006). CWR are associated with different aspects of stream morphology, including side channels, alcoves, lateral seeps, and floodplain spring brooks (Ebersole 2003). In 2011, Forward Looking Infrared (FLIR) imagery was collected and analyzed for the Columbia Slough as part of a study funded by the City of Portland. The report generated by this study is referenced by the Port to help identify and prioritize potential CWR projects. Additionally, the Port is continually assessing opportunities to partner with the Columbia Slough Watershed Council (CSWC) to identify CWR projects and hiring experts to further assess the watershed to identify projects that have the potential to enhance CWR.

As part of the Portland Harbor Superfund early action restoration agreements, the Port has helped to fund, by purchasing habitat credits, three restoration sites that will provide CWR, the Linnton Habitat Bank, Dahl Beach restoration, and the Rinearson Creek/Meldrum Bar Park restoration. The Linnton Habitat Bank converted 25-acres of industrial riverfront to a restoration site that includes a new off-channel habitat as well as restored active shallow water, active channel margin, riparian, and upland habitat (RestorCap publication).

9.3 Public Involvement

DEQ has encouraged DMAs to involve public groups and individuals having interest with the TMDL Program when implementing TMDL plans. The Airport Futures Natural Resources Enhancement Program is a good example of the Port's continued collaboration in this area. In addition, the Port is involved in numerous stakeholder groups including the CSWC where information on Port projects and programs is regularly shared and discussed. The Port has participated in the CSWC Technical Team that is working to develop the CSWC Stewardship Action Plan. The Port will continue to work with the CSWC and other stakeholders to implement this plan. The Port is also a member of the Smith and Bybee Advisory Committee and is an active participant.

Additionally, the Port is actively involved in discussions related to aquatic invasive species occurring in the slough which have the potential to negatively impact temperature. Aquatic invasive species groups with which the Port participates includes the Four County Weed Management Association and the Willamette Aquatic Invasive Network. The Port also maintains dialog with METRO, Multnomah County Drainage District (MCDD), and the City of Portland regarding best management practices related to aquatic invasive species management.

9.4 Reporting

The TMDL Guidance Document requires DMAs to submit two separate reports to DEQ on a regular basis: 1) an annual progress report, and 2) a five year implementation plan review report. The progress report will provide the results of implementation and effectiveness monitoring, as described in Section 7.0. The progress report will be submitted to DEQ annually on January 31. The Implementation Plan Review Report will evaluate TMDL Implementation Plan effectiveness. If the Plan and associated management strategies are not adequate, then modifications will be considered. The implementation plan review report will be submitted to DEQ once every five years. Important reporting dates are provided in Table 3 below.

Table 3: Important Reporting Dates

2019 TIP Implementation	3/1/19 - 12/31/23
2022 Mercury Update to the TIP	Due 9/3/22
2022 Updated TIP Implementation	9/3/22 - 12/31/23
TIP Five-year Review	Due 1/31/24
2024 TIP Update	Due 12/31/23
2024 TIP Implementation	1/1/24 – 12/31/28
Annual Reports	Due January 31 each year (except 2024)

Section 10

References

Bartholow, J.M. and J.A. Henriksen. 2006. Assessment of Factors Limiting Klamath River Fall Chinook Salmon Production Potential Using Historical Flows and Temperatures. USGS Open File Report 2006-1249. 111 p.

City of Portland. 2035. City of Portland Comprehensive Plan. Portland, Oregon.

Ebersole, Joseph L., William J. Liss, and Christopher A. Frissell. 2003. Cold Water Patches I Warm Streams: Physiochemical Characteristics and the Influence of Shading. Journal of the American Water Resources Association (JAWRA) 39(2):355-368.

Oregon Department of Environmental Quality. 1998. Columbia Slough TMDL.

Oregon Department of Environmental Quality. 2006. Willamette Basin TMDL, Chapter 5, Chapter 14.

Oregon Department of Environmental Quality. 2007. TMDL Implementation Plan Guidance for State and Local Government Designated Management Agencies.

Oregon Department of Environmental Quality. 2019. TMDL for Mercury in the Willamette Basin.

Oregon Department of Environmental Quality Implementation of Methylmercury Criterion in NPDES Permits (DEQ12-WQ-0011-IMD, 2013).

Port of Portland. 2021. Mercury Minimization Plan. Portland, Oregon.

Port of Portland. 2012. Mitigation Management Program. Marine and Industrial Development Annual Report. Portland, Oregon.

Port of Portland. 2004. Portland International Airport Wildlife Hazard Management Plan. 2004 Update, Portland, Oregon.

Port of Portland. 2021. TMDL Annual Report for Temperature. Portland, Oregon.

Appendix A: Revegetation, Mitigation and Riparian Enhancement Project Maps

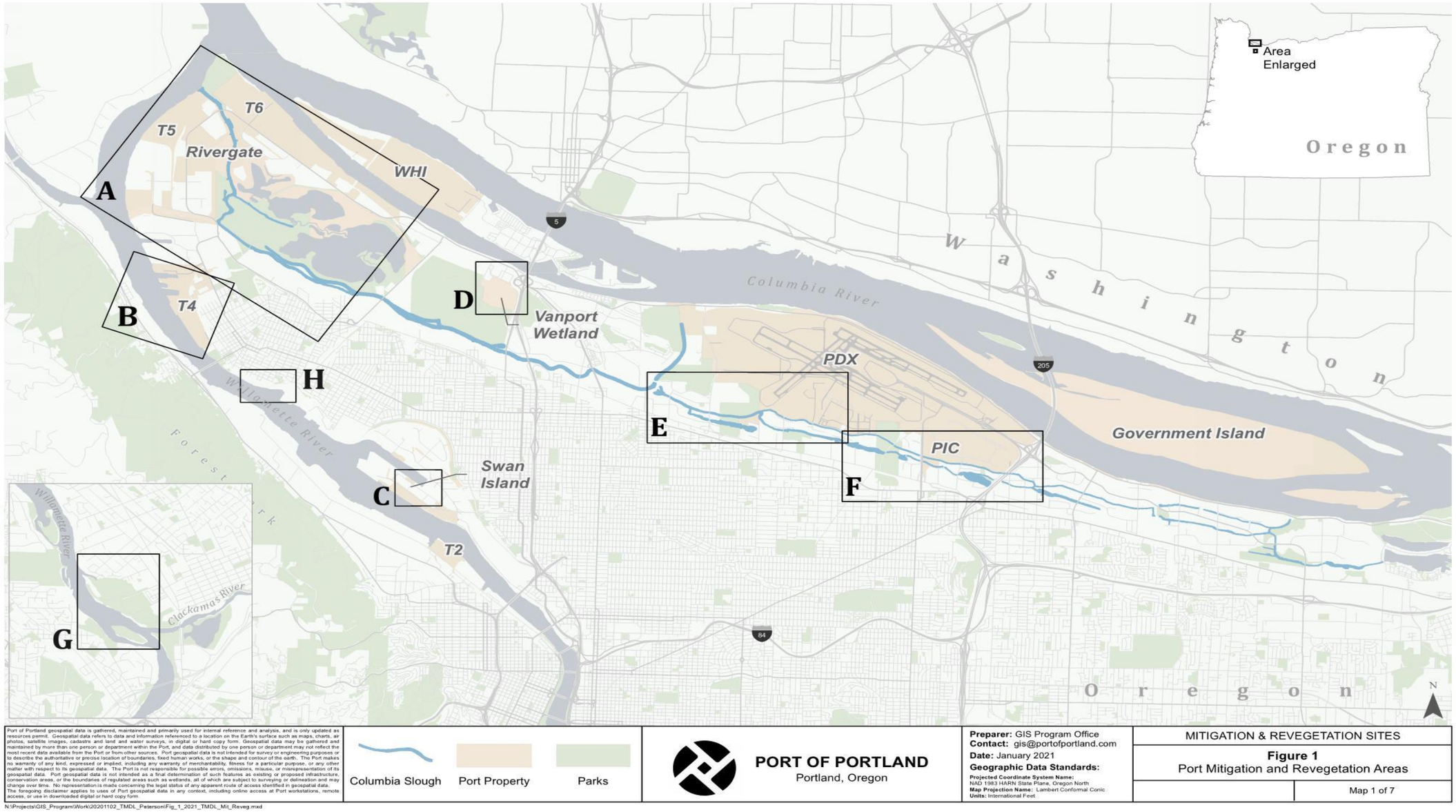


Figure 1. Port Mitigation and Revegetation Areas

1. Columbia Grain Revegetation Project, 2000: Revegetated south bank of the Columbia Slough from the mouth of the Willamette River to the Union Pacific rail line (3 ac, 1,050 LF, 100' wide).

8. N Marine Dr Overpass Reveg Project, 2000: Currently maintains abutment from base of slope to top of bank (0.2 ac).

13. Rail Bridge to North Slough, 2001-02: Revegetated from top of bank landward to the Leadbetter slope on north side of Slough (30 ac). **2002-03:** Revegetated adjacent to the 40 mile loop trail (5,274 LF).

21. Terminal 5, Powerline and West Wye Mitigation Sites, 1995: Restored wetlands in a corridor connecting the Willamette River to Smith and Bybee wetlands (10.5 ac). **2002:** Installed an additional 205 native plants in the Willamette Greenway (1.3 ac).

24. Rivergate Enhancement - North and South Slough Mitigation Site 2002-2004: Removed invasive species and revegetated area from top of bank to ordinary high water (4.5 ac). Constructed 800 ft bioswale and established riparian forest (5.21 ac), scrub-shrub (3.56 ac), and emergent habitat (0.53 ac) (3,297 LF).

25. Rivergate Enhancement - Leadbetter Peninsula Mitigation Site, 2003: Construction of 1,500 ft of 10-foot wide bioswale; establishment of 4.28 acres of riparian forest, 1.46 acres of scrub-shrub community, 8.69 acres of emergent habitat, and incorporated LWD within the emergent community (3,381 LF). **2021:** Planted 50 native plants at the Sedge Meadow site.

26. Ramsey Lake Mitigation Site, 1988: Created three separate ponds totaling 16 acres of surface area. Fringe and upland areas were planted with native vegetation. **2004:** Constructed 2,000 ft of swales connected to the Slough at both ends, established (8.04 ac) riparian forest and (1.3 ac) grassland habitat. Removed culvert and performed associated work to stabilize, replant, and re-establish proper hydrology. **2021:** Planted 1,100 native plants at the Islands and Lake Buffer sites.

28. Rivergate Enhancement - 40-Mile Loop Trail Mitigation Site, 2004: Established forested wetland, removed invasive species.

33. Terminal 5, Berth 503 Bank Stabilization/ Revegetation Project, 1997-2001: Reconstructed and revegetated Willamette River bank, beaver protection installed and supplemental plantings in 2000 and 2002 (476 LF).

Port of Portland geospatial data is gathered, maintained and primarily used for internal reference and analysis, and is only updated as resources permit. Geospatial data refers to data and information referenced to a location on the Earth's surface such as maps, charts, air photos, satellite images, cadastre and land and water surveys, in digital or hard copy form. Geospatial data may be gathered and maintained by more than one person or department within the Port, and data distributed by one person or department may not reflect the most recent data available from the Port or from other sources. Port geospatial data is not intended for survey or engineering purposes or to describe the authoritative or precise location of boundaries, fixed human works, or the shape and contour of the earth. The Port makes no warranty of any kind, expressed or implied, including any warranty of merchantability, fitness for a particular purpose, or any other matter with respect to its geospatial data. The Port is not responsible for possible errors, omissions, misuse, or misrepresentation of its geospatial data. Port geospatial data is not intended as a final determination of such features as existing or proposed infrastructure, conservation areas, or the boundaries of regulated areas such as wetlands, all of which are subject to surveying or delineation and may change over time. No representation is made concerning the legal status of any apparent route of access identified in geospatial data.

N:\Projects\GIS_Program\Work\20201102_TMDL_Peterson\Fig_2_2020_TMDL_Mit_Reveg_T6_T5_RG_updates.mxd

Mitigation Sites

Revegetation Sites

PORT OF PORTLAND
Portland, Oregon
0 1,000 2,000 feet

Preparer: GIS Program Office
Contact: gis@portofportland.com
Date: January 2022
Geographic Data Standards:
Projected Coordinate System Name: NAD 1983 HARN State Plane, Oregon North
Map Projection Name: Lambert Conformal Conic
Units: International Feet

MITIGATION & REVEGETATION SITES

Figure 2
Terminal 5, Terminal 6, and Rivergate

Map 2 of 7

Figure 2. Terminal 5, Terminal 6, and Rivergate

30. Terminal 4, Berth 408, 2001-02: Stabilized and replanted (0.07 ac).

31. Terminal 4, Pier 2 (Terminal 4, Pier 2, Rail Yard Improvements (Willamette Greenway), 2007: Installed two stormwater filter strips (0.71 ac) and planted trees and shrubs in the Willamette Greenway (0.83 ac).

32. Terminal 4, Toyota Riverbank Restoration Project, 2001-04: Revegetated the riverbank with native plants, installed bioswales and irrigation system (11.2 ac, 5,250 LF).

34. Terminal 4, Berth 401 Riverbank Rehabilitation Project, 2000: Stabalized bank to reduce erosion; planted native vegetation (2 ac).

35. Terminal 4, Slip 3 Remediation and Revegetation Project, 2004: Revegetated with native shrubs and trees (0.5 ac).

41. Linnton Mitigation Bank, 2019: The project converted 25-acres of industrial riverfront to riparian and upland habitat, created new off-channel habitat with a cold water tributary, restored shallow water and the active channel margin.

42. T4 Infiltration, 2021: Stormwater from 27 acres at Terminal 4 is infiltrated through constructed infiltration basins.

43. Willamette Cove, 2023: Restoration of approximately 27 acres of upland and riparian area. Removal of invasive species, bank grading and planting of native species.

46. Wheeler Bay Bank Stabilization Project, 2008: 800-feet of riverbank enhancement included: Bank grading, removal of concrete debris, vegetation, and miscellaneous debris; Placement of armor stone at the bottom of the shoreline and covered it with sand/gravel and wooded debris; Placed topsoil and planted cottonwood and willow trees, and grasses above the armor; Installed large wood structures within the active channel margin.

49. T4 Infiltration, 2021: Stormwater from approximately 3.6 acres at Terminal 4 is infiltrated through constructed infiltration basins.

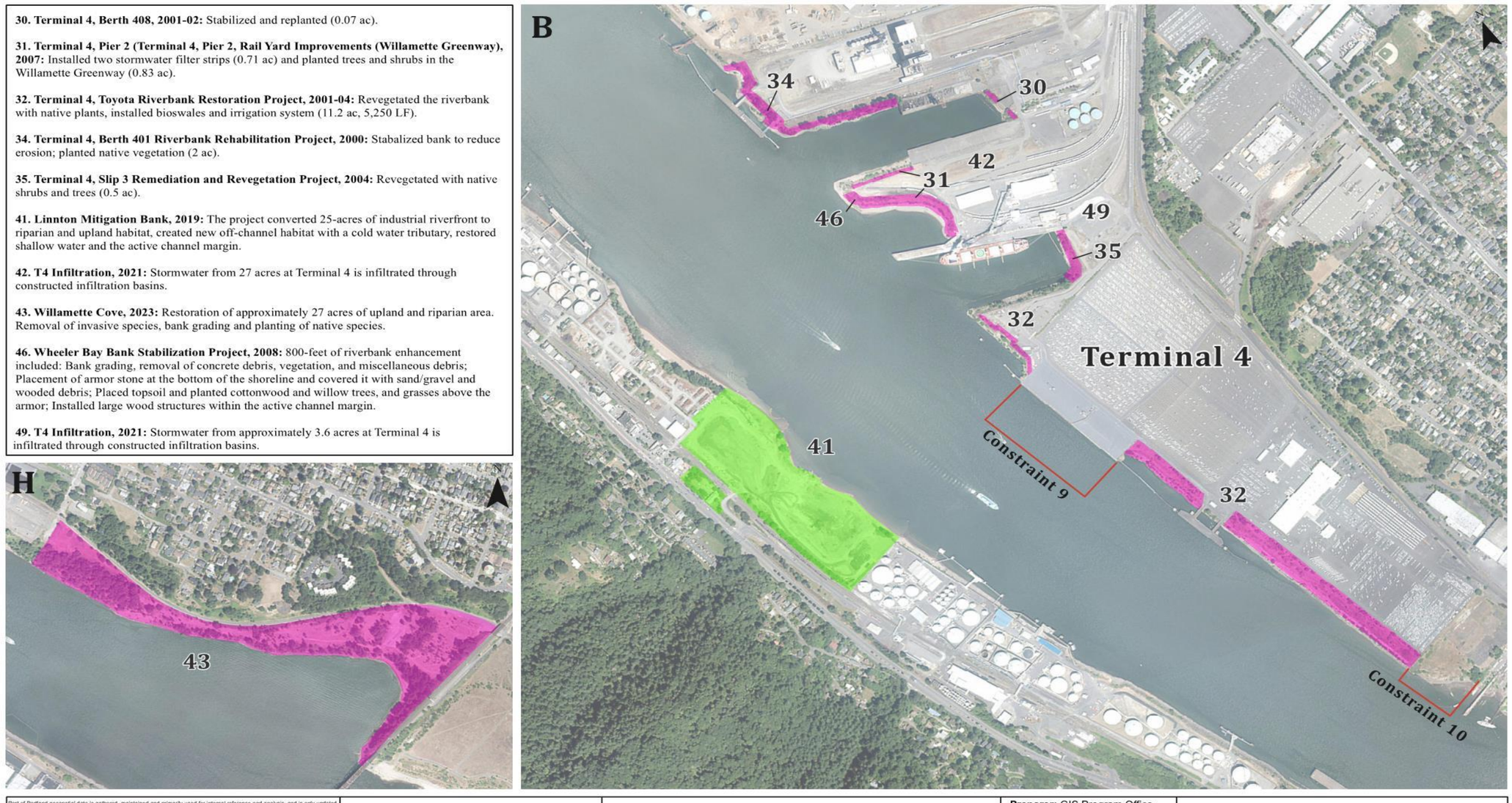


Figure 3. Terminal 4

22. Swan Island Boat Ramp Mitigation Project, 1999: Removed invasive species (2 ac) and planted natives (0.7 ac).

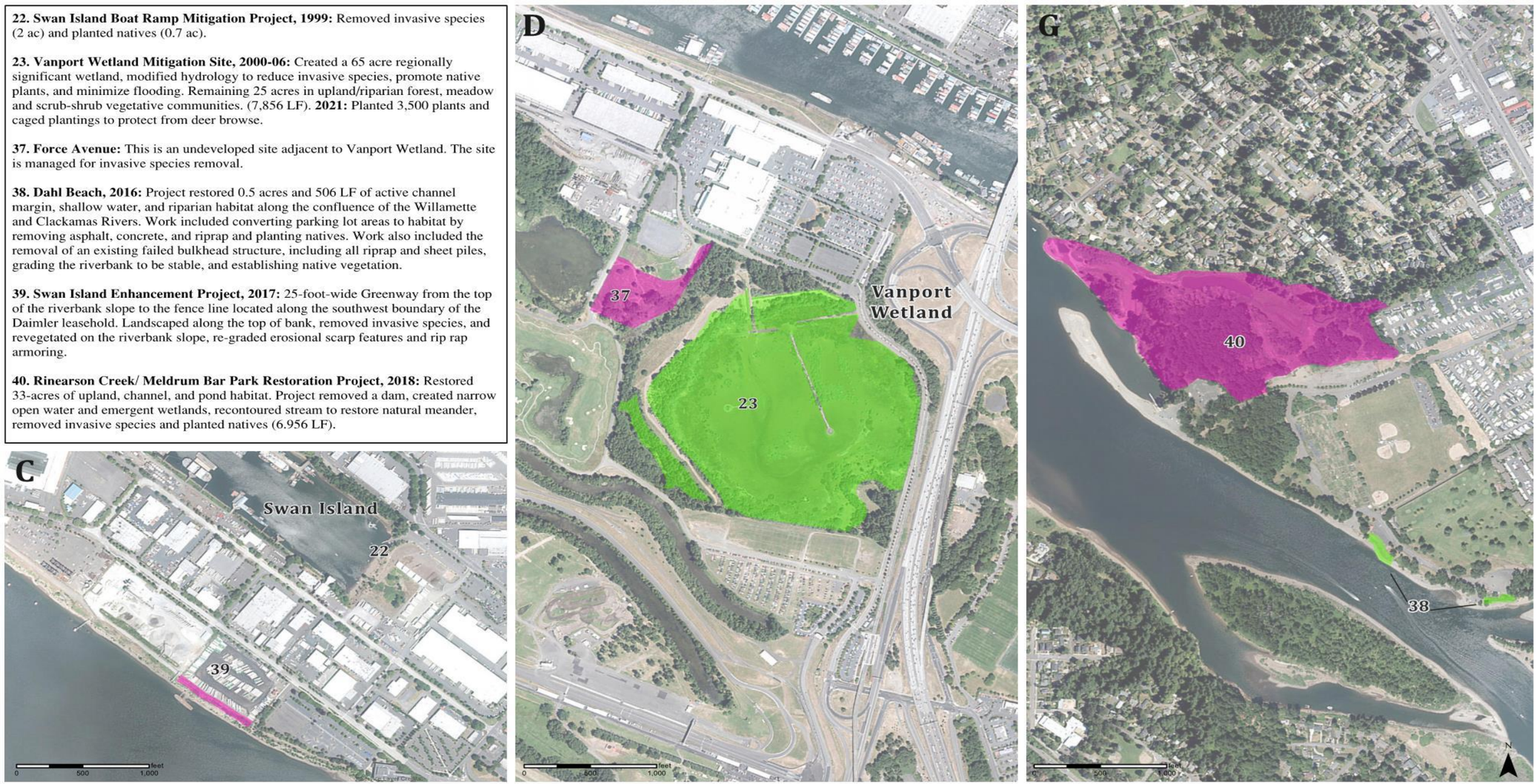
23. Vanport Wetland Mitigation Site, 2000-06: Created a 65 acre regionally significant wetland, modified hydrology to reduce invasive species, promote native plants, and minimize flooding. Remaining 25 acres in upland/riparian forest, meadow and scrub-shrub vegetative communities. (7,856 LF). **2021:** Planted 3,500 plants and caged plantings to protect from deer browse.

37. Force Avenue: This is an undeveloped site adjacent to Vanport Wetland. The site is managed for invasive species removal.

38. Dahl Beach, 2016: Project restored 0.5 acres and 506 LF of active channel margin, shallow water, and riparian habitat along the confluence of the Willamette and Clackamas Rivers. Work included converting parking lot areas to habitat by removing asphalt, concrete, and riprap and planting natives. Work also included the removal of an existing failed bulkhead structure, including all riprap and sheet piles, grading the riverbank to be stable, and establishing native vegetation.

39. Swan Island Enhancement Project, 2017: 25-foot-wide Greenway from the top of the riverbank slope to the fence line located along the southwest boundary of the Daimler leasehold. Landscaped along the top of bank, removed invasive species, and revegetated on the riverbank slope, re-graded erosional scarp features and rip rap armoring.

40. Rinearson Creek/ Meldrum Bar Park Restoration Project, 2018: Restored 33-acres of upland, channel, and pond habitat. Project removed a dam, created narrow open water and emergent wetlands, recontoured stream to restore natural meander, removed invasive species and planted natives (6.956 LF).



Port of Portland geospatial data is gathered, maintained and primarily used for internal reference and analysis, and is only updated as resources permit. Geospatial data refers to data and information referenced to a location on the Earth's surface such as maps, charts, air photos, satellite images, cadastre and land and water surveys, in digital or hard copy form. Geospatial data may be gathered and maintained by more than one person or department within the Port, and data distributed by one person or department may not reflect the most recent data available from the Port or from other sources. Port geospatial data is not intended for survey or engineering purposes or to describe the authoritative or precise location of boundaries, fixed human works, or the shape and contour of the earth. The Port makes no warranty of any kind, expressed or implied, including any warranty of merchantability, fitness for a particular purpose, or any other matter with respect to its geospatial data. The Port is not responsible for possible errors, omissions, misuse, or misrepresentation of its geospatial data. Port geospatial data is not intended as a final determination of such features as existing or proposed infrastructure, conservation areas, or the boundaries of regulated areas such as wetlands, all of which are subject to surveying or delineation and may change over time. No representation is made concerning the legal status of any apparent route of access identified in geospatial data.The foregoing disclaimer applies to uses of Port geospatial data in any context, including online access at Port workstations, remote access, or use in downloaded digital or hard copy form.

N:\Projects\GIS_Program\Work\20201102_TMDL_Peterson\Fig_4_2021_TMDL_Mit_Reveg_SI_VW.mxd

Mitigation Sites

Revegetation Sites

PORT OF PORTLAND
Portland, Oregon

Preparer: GIS Program Office
Contact: gis@portofportland.com
Date: January 2022
Geographic Data Standards:
Projected Coordinate System Name: NAD 1983 HARN State Plane, Oregon North
Map Projection Name: Lambert Conformal Conic
Units: International Feet

MITIGATION & REVEGETATION SITES

Figure 4
Swan Island, Vanport Wetland, and Confluence of Willamette and Clackamas Rivers

Map 4 of 7

Figure 4. Swan Island, Vanport Wetland, and Confluence of Willamette and Clackamas Rivers

3. 82nd to 92nd Ave Revegetation Project, 2000: Removed invasive species and revegetated Columbia Slough from 92nd Ave, west to 82nd Ave from the waterline to the top of the bank (1.6 ac) and from top of bank to edge of transition zone or edge of tenant landscaping (2,600 LF Total).

4. 92nd Ave to I-205 Revegetation Project 2000-01: Removed invasive species and revegetated Columbia Slough from 92nd Ave to I-205 from the waterline to top of bank (0.78 ac) and from top of bank to edge of 50' transition zone (2.69 ac, 2,850 LF total). **2003-04:** Revegetated along the regraded bank (1.6 ac).

5. Cornfoot Rd West of 47th Ave to AMC Building Revegetation Project, 2000: Removed invasive species and revegetated area from the waterline to top of bank (1.25 ac; 915 LF).

6. PDX Port Maintenance Bldg Revegetation Project (Meyers Marx), 2000: Revegetated area on south side of Slough from 82nd Ave to Port property boundary and on north side of Whitaker Slough from 82nd Ave to Port property boundary; removed invasive species and re-vegetated from the waterline to top of bank and 50' E-zone (3.7 ac; 2,400 LF).

7. Cornfoot Rd - NE 63rd to NE 55th Ave Revegetation Project, 2000: Planted trees (4.3 ac; 3,550 LF) and modified planting plan based on factors including steep slope, utility cable at top of bank, subsurface drainage undermining bank, and a waterline on top of bank.

9. Buffalo Street Mitigation Site, 1995, 2003: Installed 100 beaver protection cages around alder and cottonwood trees on the Buffalo street site. **2000:** Removed invasive species and revegetated from waterline to top of bank (2.3 ac; 1,970 LF).

10. Elrod Rd Mitigation Site, 1994: Enhancement of woodland and shrub-scrub habitat adjacent to a Slough tributary (10 ac). **2000:** Revegetated from the waterline to top of bank (1 ac; 1,300 LF).

11. Alderwood Slough Revegetation Project, 2000-01: Revegetated Alderwood Slough between 82nd Ave and Alderwood Rd from water-line to 10' landward of top of bank on north and south sides (1.7 ac).

12. Alderwood Corner Revegetation Project, 2000-01: Revegetated Alderwood Slough at corner of Alderwood Rd and 82nd Ave (1.5 ac).

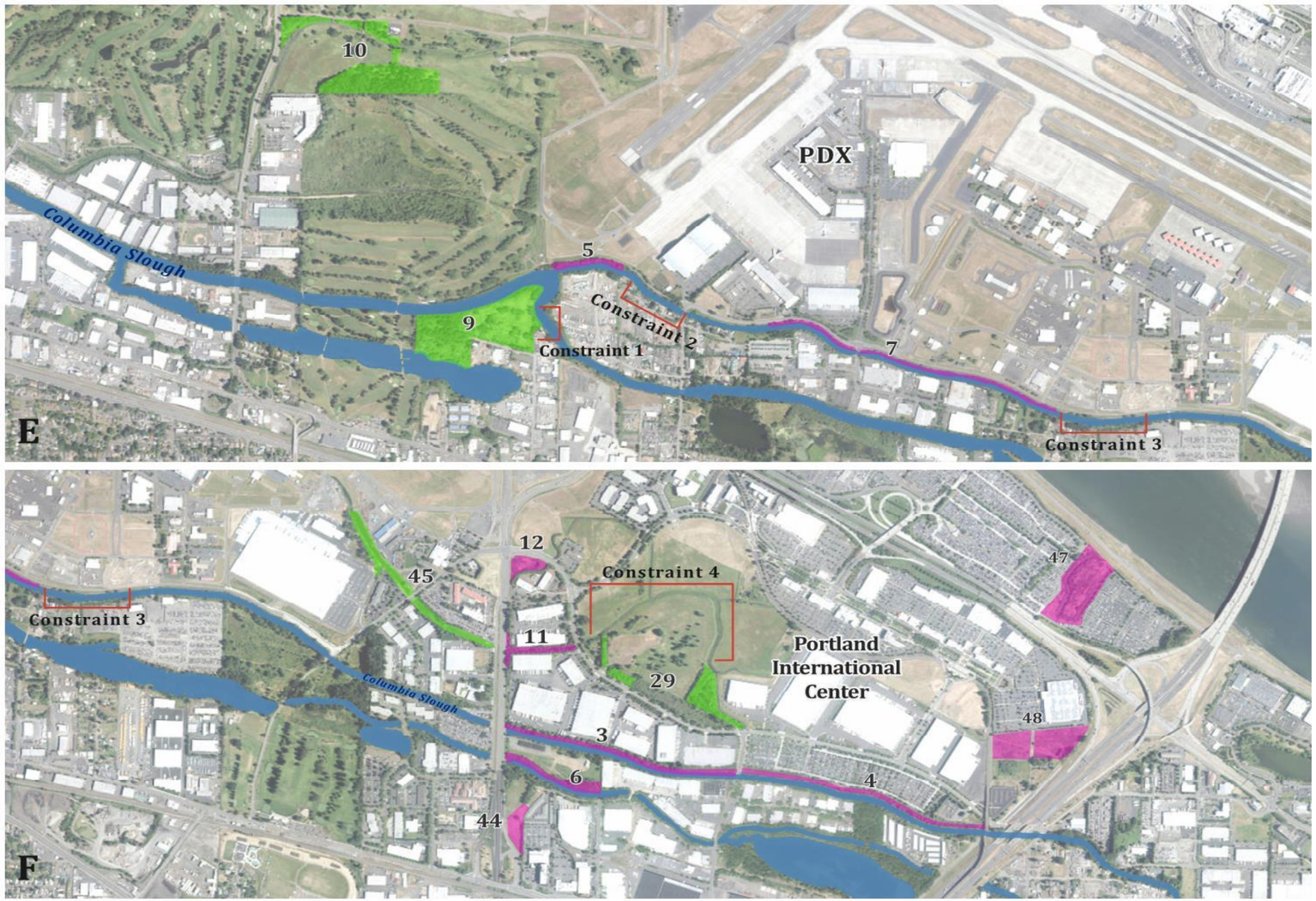
29. PIC E-zone Mitigation Site, 2000-02: Revegetated riparian and upland willow scrub-shrub habitat (2.6 ac). Added an additional 6.8 acres to the Env Protection Zone.

44. 82nd Ave. Oak Woodland Planting, 2019: Planted 2 acres with Oregon white oak and oak woodland understory vegetation.

45. McBride Slough, 2019: Removed invasive species. Replanted trees that were removed for the clean-up to occur (2,369 LF). **2020:** Additional trees and shrubs were planted to enhance the area that was impacted by the project west of NE Alderwood Rd. Removed non-native vegetation east of NE Alderwood Rd (2,060 LF).

47. PDX Economy Lot E-zone Conversion Project, 2019: Removed invasive species (9.0 acres).

48. PIC Wetland Enhancement, 2019: Removed invasive species and planted 800 native shrubs and trees (6.2 acres). **2020:** Planted 2050 native shrubs.



Port of Portland geospatial data is gathered, maintained and primarily used for internal reference and analysis, and is only updated as resources permit. Geospatial data refers to data and information referenced to a location on the Earth's surface such as maps, charts, air photos, satellite images, cadastre and land and water surveys, in digital or hard copy form. Geospatial data may be gathered and maintained by more than one person or department within the Port, and data distributed by one person or department may not reflect the most recent data available from the Port or from other sources. Port geospatial data is not intended for survey or engineering purposes or to describe the authoritative or precise location of boundaries, fixed human works, or the shape and contour of the earth. The Port makes no warranty of any kind, expressed or implied, including any warranty of merchantability, fitness for a particular purpose, or any other matter with respect to its geospatial data. The Port is not responsible for possible errors, omissions, misuse, or misrepresentation of its geospatial data. Port geospatial data is not intended as a final determination of such features as existing or proposed infrastructure, conservation areas, or the boundaries of regulated areas such as wetlands, all of which are subject to surveying or delineation and may change over time. No representation is made concerning the legal status of any apparent route of access identified in geospatial data.

N:\Projects\GIS_Program\Work\20201102_TMDL_Peterson\Fig_5_2021_TMDL_Mit_Reveg_PDX_PIC.mxd

Mitigation Sites

Revegetation Sites

PORT OF PORTLAND
Portland, Oregon

feet
0 1,000 2,000

Preparer: GIS Program Office
Contact: gis@portofportland.com
Date: January 2021
Geographic Data Standards:
Projected Coordinate System Name: NAD 1983 HARN State Plane, Oregon North
Map Projection Name: Lambert Conformal Conic
Units: International Feet

MITIGATION & REVEGETATION SITES

Figure 5
PDX and Portland International Center

Map 5 of 7

Figure 5. PDX and Portland International Center

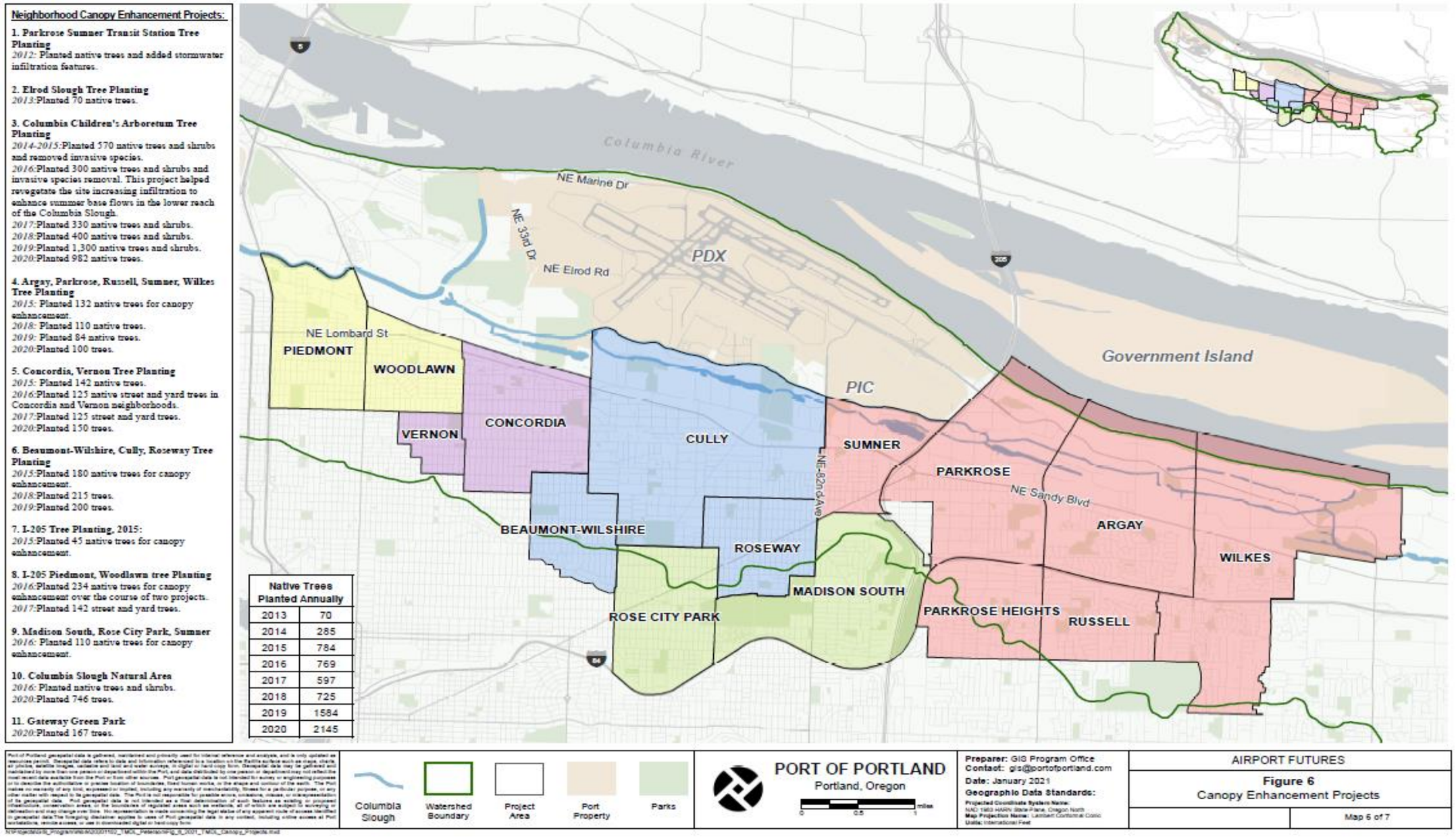


Figure 6. Canopy Enhancement Projects

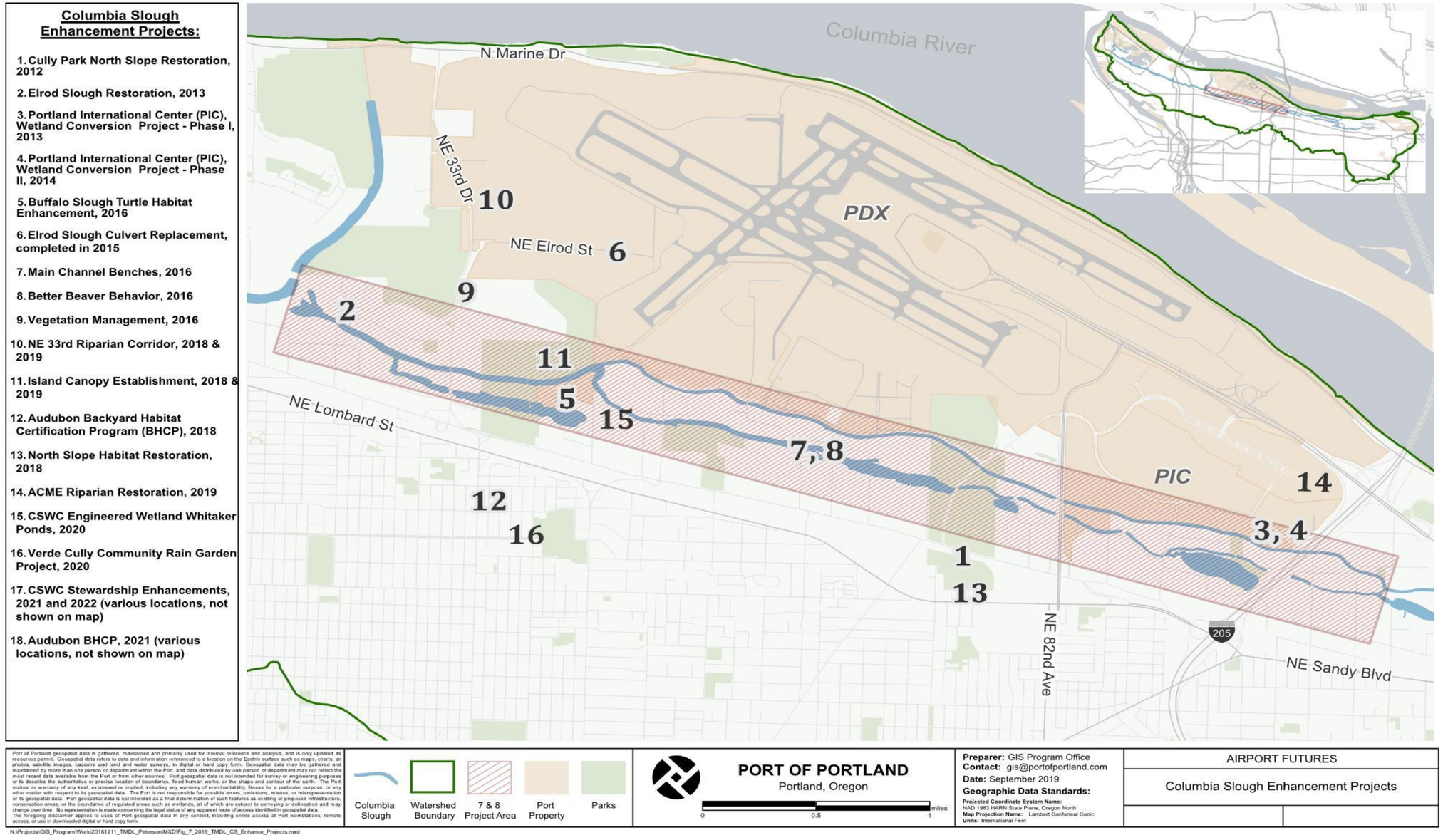


Figure 7. Columbia Slough Enhancements Projects

Appendix B: Revegetation, Mitigation, and Riparian Enhancement Site

Inspection and Maintenance Tracking Matrix

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
1	Columbia Grain Revegetation Project	2000	Maintenance did not occur at this site in 2021.	N/A
2	Kelley Point Park Revegetation Project	2000	Maintenance did not occur at this site in 2021.	N/A
3	82nd Avenue to 92nd Avenue Revegetation Project	2000	Maintenance did not occur at this site in 2021.	N/A
4	92nd Avenue to I-205 Revegetation Project	2000	Maintenance did not occur at this site in 2021. More than 200 trees will be caged along the trail to prevent beaver damage in winter 2021-22.	N/A
5	Cornfoot Road West of 47th Avenue to AMC Building Revegetation Project	2000	Maintenance did not occur at this site in 2021.	N/A
6	PDX Port Maintenance Building Revegetation Project (Meyers Marx)	2000	Maintenance did not occur at this site in 2021.	N/A
7	Cornfoot Road - NE 63rd to NE 55th Avenue Revegetation Project	2000	Maintenance did not occur at this site in 2020.	N/A
8	North Marine Drive Overpass Revegetation Project	2000	Maintenance did not occur at this site in 2021.	N/A
9	Buffalo Street Revegetation Project	2000	General maintenance and invasive species control was conducted in October 2021.	Spot treatment (backpack) of planted area. Species treated: field mustard (Brassica rapa), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), common mullein (Verbascum thapsus), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) (April). Hand cut (brush) open field areas for: American pokeweed (Phytolacca americana), chicory (Cichorium intybus), field mustard (Brassica rapa), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), mullein, common (Verbascum thapsus), mullein, moth (Verbascum blattaria), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), Queen Anne’s lace (Daucus carota), tansy, common (Tanacetum vulgare), tansy ragwort (Senecio jacobaea), thistle, bull (Cirsium vulgare) and thistle, Canada (Cirsium arvense) (August). Sprayed through planted field for:

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
				sowthistle (Sonchus asper), thistle, bull (Cirsium vulgare) and thistle, Canada (Cirsium arvense) (October).
10	Elrod Road Revegetation Project	2000	Maintenance did not occur at this site in 2021.	N/A
11	Alderwood Slough Revegetation Project	2000	Maintenance did not occur at this site in 2021.	N/A
12	Alderwood Corner Revegetation Project	2000	Maintenance occurred in August 2021.	Cut and stem herbicide treatment of Himalayan blackberry (Rubus armeniacus) and Sign installation/repair (August).
13	Rail Bridge to North Slough Revegetation Project	2001	Maintenance did not occur at this site in 2021.	N/A
14	Trail South of Railroad Bridge Revegetation Project	2002	Maintenance did not occur at this site in 2021.	Fallen branches and trees were cleared from the trail.
15	Rivergate Bridges Bank Revegetation Project	2002	Maintenance did not occur at this site in 2021.	N/A
16	Bonneville Pond Revegetation Project	2006	This site is no longer actively inspected or maintained.	N/A
17	92nd Avenue to I-205 Bank Stabilization/ Revegetation Project	2003	Maintenance did not occur at this site in 2021.	More than 200 trees will be caged along the trail to prevent beaver damage in winter 2021-22.
18	Buffalo Street Mitigation Site	1994 & 2003	Maintenance occurred in August 2021.	Spot treatment (backpack) of planted area. Species treated: field mustard (Brassica rapa), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), common mullein (Verbascum thapsus), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) (April). Hand cut (brush) open field areas for: American pokeweed (Phytolacca americana), chicory (Cichorium intybus), field mustard (Brassica rapa), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), common mullein (Verbascum thapsus), moth mullein (Verbascum

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
				blattaria), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), Queen Anne's lace (Daucus carota), common tansy (Tanacetum vulgare), tansy ragwort (Senecio jacobaea), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) (August). Sprayed through planted field for: sowthistle (Sonchus asper), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) (October).
19	**PDX Economy Lot E-zone Conversion Project**	Ongoing	Maintenance occurred in August 2021.	Brushcut around plantings. Species cut: Himalayan blackberry (Rubus armeniacus), poison hemlock (Conium maculatum), tall oatgrass (Arrhenatherum elatius), common tansy (Tanacetum vulgare), bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense) and velvet grass (Holcus lanatus) (August). Stump cutting small diameter cottonwood, cherry and holly trees (November).
20	Elrod Road Mitigation Site	1994	Maintenance did not occur at this site in 2021.	N/A
21	Terminal 5 Powerline Mitigation Site	1995-2001	Maintenance occurred in August 2021.	T5 Powerline: Treated weeds through dried up Turtle Pond - mainly reed canary grass. Other species treated included: Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), mullein, common (Verbascum thapsus) and reed canarygrass (Phalaris arundinacea) (June). West Wye: Cut reed canary grass on the eastern field (June). Stump cut blackberry on the western side. Treated the eastern field with triclopyr for broadleaves (mainly blackberry and thistle). Stump cut blackberry out of the southern tree/shrub line. Treated with grass specific herbicide for reed canary grass in the eastern field (July). Sprayed through eastern field with Transline and Vastlan. Dead headed and treated purple loosestrife through cattails in ponds. Other species treated included: bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), nightshade, climbing (Solanum dulcamara), pennyroyal (Mentha pulegium), poison hemlock (Conium maculatum), purple loosestrife (Lythrum salicaria), thistle, bull (Cirsium vulgare) and thistle, Canada (Cirsium arvense) (August).
22	Swan Island Boat Ramp Mitigation Project	1999	The City of Portland maintains this site.	N/A
23	Vanport Wetlands Mitigation Site	2000-06	Maintenance occurred in October 2023.	Fence repair (January). Began planting the north field and replanted the western edge of the wetland (March) Species planted: 100 Acer macrophylum, 200 Crataegus douglasii, 300 Fraxinus latifolia, 300 Lonicera involucrata, 100 Mahonia aquifolium, 300 Oemleria cerasiformis, 300 Oemleria cerasiformis, 400 Physocarpus capitatus, 200 Rhamnus purshiana, 100 Rosa pisocarpa, 100 Rubus parviflorus, 300 Rubus spectabilis, 100 Salix fluviatilis, 100 Salix lasiandra, 100 Salix sitchensis, 200 Sambucus cerulea, 200 Sambucus racemosa and 400 Symphoricarpos albus (March). Cut poison hemlock stalks to prevent seeding. Spot treated throughout planting area. Other species treated included: Fuller's teasel (Dipsacus fullonum), nightshade, black (Solanum nigrum), thistle, bull (Cirsium vulgare) and thistle, Canada (Cirsium arvense). Cut flowering stems of poison hemlock to prevent seeding (mostly occurs along forested edges), Treated all non-native species of broadleaf and grasses. Used Vastlan, Transline and glyphosate where appropriate in planting area. Species treated included: American pokeweed (Phytolacca americana), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), mullein, common (Verbascum thapsus), mullein, moth (Verbascum blattaria), nightshade, climbing (Solanum dulcamara), oxeye daisy (Leucanthemum vulgare), prickly lettuce (Lactuca serriola), reed canarygrass (Phalaris arundinacea), thistle, bull (Cirsium vulgare), thistle, Canada (Cirsium arvense) and velvet grass (Holcus lanatus). Treated teasel and thistle along

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
				slough and forest edges with ATV mounted spray gun (June). Removed trash, hand cut Himalayan blackberry (Rubus armeniacus) and reed canarygrass (Phalaris arundinacea) in the SE corner and cut thistle and canary grass along the western wetland edge (July). Light touch up spray through planting area with Transline and Vastlan. Sprayed through cut areas for thistles and canary grass in the northern wetland areas. Other species treated included: Fuller's teasel (Dipsacus fullonum), mullein, common (Verbascum thapsus), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea), thistle, bull (Cirsium vulgare) and thistle, Canada (Cirsium arvense). Sprayed heavily infested reed canary grass and thistle in SE corner. Spot sprayed teasel and spray out areas of heavy infestations of reed canary grass, velvet grass, blackberries, and thistles in the SE corner. Sprayed out reed canary grass and thistle through the western wetland edge (September). Treated Himalayan blackberry (Rubus armeniacus) and poison hemlock (Conium maculatum) along the northern ditch (October).
24	Rivergate Enhancement, North and South Slough Mitigation Site	2003	Maintenance did not occur at this site in 2021.	N/A
25	Rivergate Enhancement, Leadbetter Mitigation Site	2003	Maintenance occurred in August 2021.	Broadcast sprayed entire "RCG restoration site". Species treated included: Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), Ludwigia (Ludwigia peploides), common mullein (Verbascum thapsus), black nightshade (Solanum nigrum), pennyroyal (Mentha pulegium), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), purple loosestrife (Lythrum salicaria), reed canarygrass (Phalaris arundinacea), sowthistle (Sonchus asper), tansy ragwort (Senecio jacobaea), bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense) and yellowflag iris (Iris pseudacorus) (June). Dead headed, bagged and treated purple loosestrife along the shoreline. Small amounts of spot treatments for thistles and canary grass regrowth in the "RCG restoration site". Treated Ludwigia throughout the site. Very large, dense patches in drier areas. Very little seen in the water itself. Species treated included: bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Ludwigia (Ludwigia peploides), prickly lettuce (Lactuca serriola), reed canarygrass (Phalaris arundinacea) and thistle, Canada (Cirsium arvense). Treated the NW corner for Ludwigia (August).
26a	Rivergate Enhancement, Ramsey	2004	Maintenance occurred in August 2021.	Treated Himalayan blackberry (Rubus armeniacus), reed canarygrass (Phalaris arundinacea) on the islands and east edge of the site (February). Planted islands with wetland/riparian species, planted forest openings and edges with upland species. Species planted: 100 Cornus stolonifera, 100 Crataegus douglasii, 100 Fraxinus latifolia, 100 Physocarpus capitatus, 100 Rhamnus purshiana, 100 Rubus parviflorus, 100 Salix hookeriana, 100 Salix scouleriana, 100 Salix sitchensis, 100 Spiraea douglasii and 100 Symphoricarpos albus. Grass specific spray of reed canarygrass (Phalaris arundinacea) around lake margins and through enhancement areas where grass had been cut. Spot treatment of Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) on the islands (March). Cut all non-native grasses and broadleafs through planted areas to prepare for fall treatments. Species treated included: bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), mullein, common (Verbascum thapsus), mullein, moth (Verbascum blattaria), pennyroyal (Mentha pulegium), perennial ryegrass (Lolium perenne), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), reed

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
				canarygrass (Phalaris arundinacea), sowthistle (Sonchus asper), tansy, common (Tanacetum vulgare), tansy, ragwort (Senecio jacobaea), thistle, bull (Cirsium vulgare), thistle, Canada (Cirsium arvense), velvet grass (Holcus lanatus) and yellow glandweed (Bellardia viscosa). Hand cut bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), common mullein (Verbascum thapsus), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea), sowthistle (Sonchus asper), common tansy (Tanacetum vulgare), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) on islands. Cut bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea) and thistle, Canada (Cirsium arvense) on the islands. Cut reed canarygrass (Phalaris arundinacea) within the north wetland area and deadheaded purple loosestrife (July). Treated previously cut areas with Transline. Spot treatment (backpack) of islands for: bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), poison hemlock (Conium maculatum), purple loosestrife (Lythrum salicaria), sowthistle (Sonchus asper), common tansy (Tanacetum vulgare), bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense) and white waterlily (Nymphaea odorata) (August).
26b	Ramsey Lake Mitigation Site	1988	Maintenance occurred in August 2021.	Treated Himalayan blackberry (Rubus armeniacus), reed canarygrass (Phalaris arundinacea) on the islands and east edge of the site (February). Planted islands with wetland/riparian species, planted forest openings and edges with upland species. Species planted: 100 Cornus stolonifera, 100 Crataegus douglasii, 100 Fraxinus latifolia, 100 Physocarpus capitatus, 100 Rhamnus purshiana, 100 Rubus parviflorus, 100 Salix hookeriana, 100 Salix scouleriana, 100 Salix sitchensis, 100 Spiraea douglasii and 100 Symphoricarpos albus. Grass specific spray of reed canarygrass (Phalaris arundinacea) around lake margins and through enhancement areas where grass had been cut. Spot treatment of Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) on the islands (March). Cut all non-native grasses and broadleafs through planted areas to prepare for fall treatments. Species treated included: bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), mullein, common (Verbascum thapsus), mullein, moth (Verbascum blattaria), pennyroyal (Mentha pulegium), perennial ryegrass (Lolium perenne), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), reed canarygrass (Phalaris arundinacea), sowthistle (Sonchus asper), tansy, common (Tanacetum vulgare), tansy, ragwort (Senecio jacobaea), thistle, bull (Cirsium vulgare), thistle, Canada (Cirsium arvense), velvet grass (Holcus lanatus) and yellow glandweed (Bellardia viscosa). Hand cut bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), common mullein (Verbascum thapsus), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea), sowthistle (Sonchus asper), common tansy (Tanacetum vulgare), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) on islands. Cut bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea) and thistle, Canada (Cirsium arvense) on the islands. Cut reed canarygrass (Phalaris arundinacea) within the north wetland area and deadheaded purple loosestrife (July). Treated previously cut areas with Transline. Spot treatment (backpack) of islands for: bird's-foot trefoil (Lotus corniculatus), Fuller's teasel (Dipsacus fullonum), poison hemlock (Conium maculatum), purple loosestrife (Lythrum salicaria), sowthistle (Sonchus asper), common tansy

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
				(Tanacetum vulgare), bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense) and white waterlily (Nymphaea odorata) (August).
27	Rivergate Enhancement, Culvert Removal and Visual Buffer	2004	Maintenance did not occur in 2021.	N/A
28	Rivergate Enhancement, 40-Mile Loop Trail Mitigation Site	2004	Maintenance occurred in August 2021.	Cleared trail of tree limbs to allow for vehicle access (August).
29	PIC E Zone Mitigation Site	2000-02	Maintenance occurred in June 2021.	Spot treated (backpack) Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), reed canarygrass (Phalaris arundinacea), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) throughout the site (June).
30	Terminal 4, Berth 408	2001-02	Periodically maintained by Port Marine Maintenance.	N/A
31	Terminal 4, Pier 2, Rail Yard Improvements (Willamette Greenway)	2007	Periodically maintained by Port Marine Maintenance.	N/A
32	Terminal 4, Toyota Riverbank Restoration Project	2003	Periodically maintained by Port Marine Maintenance.	N/A
33	Terminal 5, Berth 503 Bank Stabilization/ Revegetation Project	1997-2001	Periodically maintained by Port Marine Maintenance.	N/A
34	Terminal 4, Berth 401 Riverbank Rehabilitation Project	2000	Periodically maintained by Port Marine Maintenance.	N/A
35	Terminal 4, Slip 3 Remediation and Revegetation Project	2004	Periodically maintained by Port Marine Maintenance.	N/A

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
36	T-5 Greenway Planting Revegetation Project	2002	Periodically maintained by Port Marine Maintenance.	N/A
37	Force Avenue	2009	Maintenance occurred in late summer 2021.	Site was mowed in late summer.
38	**Dahl Beach**	2016	Maintenance was conducted in July and August 2021.	Watered plantings (July and August). Backpack treated invasive species (July).
39	**Swan Island Enhancement Project**	2017	No maintenance was conducted in 2021.	Construction at this site was completed in 2017. This enhancement project was mitigation for the Swan Island Operable Unit 2 Upland Source Control work.
40	**Rinearson Creek/Meldrum Bar Park Restoration Project**	2018	No maintenance was conducted in 2021.	Construction at this site was completed in 2018. This site is part of the suite of restoration sites under the Portland Harbor Superfund Natural Resource Damage Assessment. Port purchased credits at this site in 2019.
41	**Linnton Mitigation Bank**	2019	No maintenance was conducted in 2021.	Construction at this site was completed in 2019. This site is part of the suite of restoration sites under the Portland Harbor Superfund Natural Resource Damage Assessment. Port purchased credits at this site in 2019.
42	**T4 Infiltration**	2020	Annual inspection and maintenance will be ongoing.	Stormwater Treatment Facilities constructed for Basin M and Basin K1. Both facilities reduce pollutant loading to the river by infiltrating 90% of the runoff.
43	**Willamette Cove**	2023	Maintenance was conducted in March 2021.	DEQ Record of Decision issued in March 2021 for final cleanup. Site is in the remedial design phase. Restoration will commence after cleanup.

Table B.1. Port Managed Mitigation and Revegetation Projects -

Location Number	*Project Name*	*Year completed*	*Recent Inspections and Maintenance*	
			Timing	*Activities*
44	**82nd Avenue Oak Woodland Planting**	2019/2020	Maintenance was conducted in the summer of 2021.	Site mowed in late summer; plantings watered every other week during the summer.
45	**McBride Slough**	2019/2020	Maintenance was conducted in May 2021.	Spot sprayed aggressive weeds through planted areas. Species treated: field mustard (Brassica rapa), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), mullein, common (Verbascum thapsus), nightshade, climbing (Solanum dulcamara), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea), tansy, common (Tanacetum vulgare), tansy, ragwort (Senecio jacobaea), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) (May).
46	**Wheeler Bay Bank Stabilization Project**	2008	Periodically maintained by Port Marine Maintenance.	N/A
47	**PIC Wetland Enhancement**	2017	Maintenance was conducted in November 2021.	Cut field mustard in phase II. Other species treated included: Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), common mullein (Verbascum thapsus), poison hemlock (Conium maculatum) and reed canarygrass (Phalaris arundinacea) (April). Cut remaining tall and dead herbaceous vegetation in planting areas. Species cut: Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), meadow foxtail (Alopecurus pratensis), poison hemlock (Conium maculatum), Canada thistle (Cirsium arvense) and velvet grass (Holcus lanatus) (October). Cut field mustard flower heads in phase II. Other species treated included: Fuller's teasel (Dipsacus fullonum), common mullein (Verbascum thapsus), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), reed canarygrass (Phalaris arundinacea), sowthistle (Sonchus asper), bull thistle (Cirsium vulgare) and Canada thistle (Cirsium arvense) (May). Cut area of poison hemlock to prevent going to seed. Transline treatment through Phase I for Fuller's teasel (Dipsacus fullonum), bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense) and milk thistle (Silybum marianum) (June). Cut all herbaceous vegetation in open areas for fall spray. Cut several small open areas amongst the dense shrubs for fall treatments and potential planting/seeding areas. Species cut: field mustard (Brassica rapa), Fuller's teasel (Dipsacus fullonum), meadow foxtail (Alopecurus pratensis), poison hemlock (Conium maculatum), reed canarygrass (Phalaris arundinacea), common tansy (Tanacetum vulgare) and velvet grass (Holcus lanatus) (August). Sprayed large open areas on west side field for thistles, blackberry, and field mustards. Sprayed openings on eastside field for thistles, reed canary grass, velvet grass to open areas for more plantings. Species treated: field mustard (Brassica rapa), Fuller's teasel (Dipsacus fullonum), Himalayan blackberry (Rubus armeniacus), poison hemlock (Conium maculatum), prickly lettuce (Lactuca serriola), bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense) and velvet grass (Holcus lanatus) (October). Collected: 50 spirea, 150 twinberry, 325 dogwood, 375 willow (no Pacific willow), 28 5' large willow poles to be installed at West Sundial Wetlands (November).

Appendix C: TMDL Implementation Plan Tracking Matrix

Table C.1 TMDL Implementation Plan Tracking Matrix			POLLUTANT: Temperature				
SOURCE What sources of this pollutant are under your jurisdiction?	**STRATEGY** What is being done, or what will you do, to reduce and/or control pollution from this source?	**HOW** Specifically, how will this be done?	**FISCAL ANALYSIS** What is the expected resource need? Are there existing resources budgeted? If not, where will the resources come from?	**MEASURE** How will you quantitatively or qualitatively demonstrate successful implementation or completion of this strategy?	**TIMELINE** When do you expect it to be completed?	**MILESTONE** What intermediate goals do you expect to achieve, and by when, to know progress is being made?	**STATUS** Include summary and date.
1. Land use activities under the Port's jurisdiction.	a. Continued maintenance of Port-owned revegetation and mitigation sites to prevent invasive plants from impacting maturation of native plantings.	Annual inspection and maintenance of these sites.	Existing resources are budgeted annually for this work.	Annual maintenance activities for each site are recorded.	Annually.	Completion of necessary maintenance to minimize impact of invasive plants on project sites annually.	On-going. ***See Appendix B for work completed in 2021. Ongoing work is reported in the Annual Progress Report in Appendix B.**
	b. Fund Airport Futures Natural Resources Enhancement Projects that address temperature in the Columbia Slough. This funding can be used for projects on Port properties and properties not owned by the Port. The implementing agreement is the Airport Futures Natural Resources IGA between the Port and the City of Portland.	The Port is working with a broad stakeholder group to develop and implement a list of potential Columbia Slough watershed projects. Projects are selected by the Community Advisory Committee (CAC) consisting of the Port, City of Portland, Columbia Slough Watershed Council, and other stakeholders. In 2021, $65,868 was used for canopy enhancement ($26,095) and for slough enhancement ($39,773). Funding can be carried over from one year to the next to fund larger projects. Funding can be carried over from one year to the next to fund larger projects. Slough enhancement and canopy enhancement funding can be combined in one project if both criteria are met. Potential project completion is dependent on property owner approval and available funding.	Existing resources are budgeted for projects through 2035, with an annual 3% escalation rate.	Document the projects completed during the previous year and provide information on the projects approved for the next year.	Canopy enhancement projects in the watershed will be completed annually. New Columbia Slough enhancement projects will be completed when property owner approval and full funding can be obtained.	Development of a prioritized potential project list. Project completion (based on property owner approval).	The project list was completed in 2012 and is revisited annually to select projects and add any new projects that are identified. Implementation of available projects is on-going. All unconstrained Port revegetation sites on the Columbia Slough were addressed in 2001 and are now managed under item a. above. Future project sites will primarily be located on properties not owned by the Port. **All current and future projects are listed in the Appendix A maps.**

Appendix D: Port of Portland NPDES MS4 Permit Requirements and Responsibilities

NOTE: No changes have been made at this time to reflect the requirements of the 2021 NPDES MS4 Permit for this TMDL Implementation Plan (March 2022). A SWMP update to meet the requirements of the 2021 NPDES MS4 Permit is due to DEQ November 1, 2022.

Table D.1: Port of Portland 2011 NPDES MS4 Permit Requirements and Responsibilities

NPDES MS4 Permit SWMP Requirements	MS4 Service Areas Not Covered Under Industrial Stormwater Permits		MS4 Service Areas With Industrial Stormwater Permits	
	Tenants	Port Operations	Tenants	Port Operations
Schedule A.4.a Illicit Discharge Detection and Elimination.				
i. Prohibit, through ordinance or other regulatory mechanism, illicit discharges	BMP: Implement the Illicit Discharge Detection and Elimination Program			
ii. Describe enforcement response procedures	BMP: Implement the Illicit Discharge Detection and Elimination Program			
iii. Develop pollutant parameter action levels	BMP: Conduct Dry-Weather Field Screening			
iv. Conduct annual dry weather inspection activities including field screening	BMP: Conduct Dry-Weather Field Screening			
v. Identify response procedures to investigate portions of the MS4 where relevant information indicates the likely presence of illicit discharges	BMP: Conduct Dry-Weather Field Screening			
vi. Maintain a system for documenting and procedures for responding to illicit discharges	BMP: Conduct Dry-Weather Field Screening			
vii. Appropriate action for illicit discharge removal	BMP: Implement the Illicit Discharge Detection and Elimination Program		Spill response activities address employee reporting and are covered under 1200-Z and individual permits[1] BMP: Implement the Illicit Discharge Detection and Elimination Program	
viii. Spill prevention and response	BMP: Implement a Spill Response Program for Port Operated Property		Covered under 1200-Z permits[2]	
ix. Notify affected municipality of illicit discharge originating within the permittee's permit area	BMP: Implement the Illicit Discharge Detection and Elimination Program			
x. Notify responsible municipality of illicit discharge affecting the permittee, originating outside of the permittee's permit area	BMP: Implement the Illicit Discharge Detection and Elimination Program			
xi. Maintain maps showing major MS4 outfalls	BMP: Conduct Dry-Weather Field Screening			
xii. Unless identified as a significant source of pollutants, the following non-stormwater discharges are not considered illicit discharges (see Schedule A.4.a.xii)	BMP: Implement a Water Line Flushing Procedure			
Schedule A.4.b Industrial and Commercial Facilities				
i. Screen existing and new industrial facilities	BMP: Screen Existing and New Industrial Facilities		These areas are already covered by an industrial stormwater NPDES permit	
ii. Notify DEQ and facility if subject to an industrial NPDES permit	BMP: Screen Existing and New Industrial Facilities		These areas are already covered by an industrial stormwater NPDES permit	
iii. Inspection of industrial or commercial areas identified as significant sources of pollutants	BMP: Implement an Inspection Program for Significant Pollutant Source Areas			
Schedule A.4.c Construction Site Runoff Control				
i. Ordinance that requires erosion and sediment controls	Implemented through the City of Portland's erosion control ordinance; may also be covered under a 1200-C permit	Implemented through the Port's 1200-CA Permit, the City of Portland's erosion control program and related contract specifications.	Implemented through the City of Portland's erosion control ordinance; may also be covered under a 1200-C permit	Implemented through the Port's 1200-CA Permit and related contract specifications
ii. Require construction site operators to develop site plans and implement erosion and sediment control BMPs				
iii. Require construction site operators to prevent/ control non-stormwater waste				
iv. Erosion control site plan review				
v. Perform on-site inspections				
vi. Maintain enforcement response procedures				
Schedule A.4.d Education and Outreach				

i. Implement a documented public education and outreach strategy	BMP: Implement Public Education Measures to Protect Stormwater Quality.			
ii. Provide educational material to the community or conduct equivalent outreach activities	BMP: Implement a Tenant Stormwater BMP Program	N/A	BMP: Implement a Tenant Stormwater BMP Program	N/A
	BMP: Implement Public Education Measures to Protect Stormwater Quality			
iii. Provide public education on pesticide, herbicide, fertilizer, and other chemicals	BMP: Require Training and Licensing for Staff Conducting Pest Management Activities BMP: Implement a Tenant Stormwater BMP Program			
iv. Provide public education on proper operation and maintenance of privately-owned/ operated stormwater quality facilities	BMP: Implement a Tenant Stormwater BMP Program BMP: Implement a Program for the Tracking and Maintenance of Private Structural Controls			
v. Provide notice to construction site operators regarding training for erosion and sediment control	BMP: Provide Erosion Prevention and Sediment Control Training for Construction Inspectors			
vi. Conduct/ participate in a public education effectiveness evaluation	BMP: Participate in a Public Education Effectiveness Evaluation			
vii. Include training for municipal employees involved in MS4 activities	BMP: Implement a Spill Response Training Program. BMP: Implement a Municipal Staff Training Program for Stormwater Pollution Prevention BMP: Require Training and Licensing for Staff Conducting Pest Management Activities		Covered under 1200-Z permits[3]	
viii. Promote, publicize, and facilitate public reporting of illicit discharges	BMP: Implement the Illicit Discharge Detection and Elimination Program			
Schedule A.4.e Public Involvement and Participation				
e. Implement a public participation process for receiving and considering comments on the SWMP and TMDL benchmarks	BMP: Provide for Public Participation with SWMP and Benchmark Submittals			
e. Implement a public participation approach that provides opportunities for the public to effectively participate in the implementation of the co-permittee's stormwater management program	BMP: Implement a Public Participation Approach that Provides Opportunities for the Public to Effectively Participate in the Implementation of the Stormwater Management Program			
Schedule A.4.f Post-Construction Site Runoff				
i. Implement a post-construction stormwater pollutant and runoff control program	BMP: Develop, Adopt, and Implement New Port-Specific Post-Construction Runoff Control Standards			
ii. Identify, and where practicable, minimize or eliminate ordinance, code and development standard barriers	BMP: Develop, Adopt, and Implement New Port-Specific Post-Construction Runoff Control Standards			
iii. Develop or reference an enforceable post-construction stormwater management manual	BMP: Develop, Adopt, and Implement New Port-Specific Post-Construction Runoff Control Standards			
vi. Review, approve, and verify proper implementation of post-construction site plans	BMP: Develop, Adopt, and Implement New Port-Specific Post-Construction Runoff Control Standards			
v. Require off-site stormwater management for locations limited in their ability for on-site stormwater capture and treatment or flow reduction	BMP: Develop, Adopt, and Implement New Port-Specific Post-Construction Runoff Control Standards			
vi. Describe inspection and enforcement response procedures to address compliance issues with post-construction stormwater management performance standards	BMP: Develop, Adopt, and Implement New Port-Specific Post-Construction Runoff Control Standards			
Schedule A.4.g Pollution Prevention for Municipal Operations				

i. Operate and maintain public streets, roads, and highways	The City of Portland is responsible for operation and maintenance of the public right-of-way			
	BMP: Implement a Street and Vehicle Maneuvering Area Cleaning and Maintenance Program			
ii. Implement a program to control the use and application of pesticides	BMP: Limit Landscape Maintenance Activities Impact on Stormwater BMP: Require Appropriate Training and Licensing for Pest Management Activities BMP: Implement a Tenant Stormwater BMP Program			
iii. Inventory, assess, and implement a strategy to reduce the impact of stormwater runoff from facilities that treat, store, or transport municipal waste, not already covered by a 1200 series permit	No tenant properties currently accommodate municipal facility waste	The Port does not operate any facilities that fall under this requirement and are not covered under a 1200 series permit.	N/A	N/A
iv. Implement controls to limit infiltration of seepage from the municipal sanitary system	BMP: Implement a Program to limit infiltration from Port-owned sanitary sewer system to the MS4			
v. Implement a strategy to prevent or control the pollutant discharge from firefighting training activities	The only firefighting training facility is located at PDX, which is covered by an individual permit			
vi. Retrofitting flood control facilities	The City of Portland manages water quality improvements on a master planning level. Any potential flood control retrofits will be considered as part of the Retrofit Analysis			
Schedule A.4. h Structural Stormwater Controls Operations and Maintenance				
i. Implement a program to verify structural control facilities and controls are inventoried, mapped, inspected, operated, and maintained Operate and maintain public streets, roads, and highways	BMP: Implement a Stormwater System Cleaning and Maintenance Program BMP: Implement a Program for Tracking and Maintenance of Private Structural Controls		Covered under 1200-Z and individual permits[4]	Covered under 1200-Z and individual permits[4]
ii. Develop and implement a plan or approach to guide the long-term maintenance and management of all publicly-owned and privately owned stormwater facilities	BMP: Implement a Stormwater System Cleaning and Maintenance Program BMP: Implement a Tenant Stormwater BMP Program.		Covered under 1200-Z and individual permits[4]	Covered under 1200-Z and individual permits[4]
Schedule A.6.c Stormwater Retrofit Project				
ii. Identify one stormwater quality improvement project, at a minimum, to be initiated constructed and/or implemented during the permit term	BMP: Develop, Adopt, and Implement New Port-Specific Post-Construction Runoff Control Standards			
Schedule B1-B4 Monitoring Component Requirements				
The Port must assist with monitoring efforts in conjunction with requirements as stated in Table B-1, Schedule B.1.b	Pursuant to an IGA, the Port of Portland and the City of Portland have a joint monitoring program conducted by the City to meet the requirements specified under Schedule B			

Notes:

[1]The 1200-Z and the PDX Individual Permit cover this requirement in Schedule A under “Non-Stormwater Discharges.”

[2]The 1200-Z and the PDX Individual Permit cover this requirement in Schedule A under “Spill Prevention and Response Procedure.”

[3]The 1200-Z and the PDX Individual Permit cover this requirement in Schedule A under “Spill Prevention and Response Procedure” and “Employee Education.”

[4]The 1200-Z and the PDX Individual Permit cover this requirement in Schedule A under “Preventative Maintenance”, “Control Measures for Technology Based Effluent Limits” and “Required (SWPCP) Elements”