APPENDIX A
TMDL Implementation Plan Annual Report

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City of Portland, Oregon

Total Maximum Daily Load (TMDL) Implementation Plan

ANNUAL STATUS REPORT NO. 13

Fiscal Year 2021-2022

(July 1, 2021, to June 30, 2022)

Prepared for:

Oregon Department of Environmental Quality

Submitted by:

City of Portland

Submitted on:

November 1, 2022

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Acronym List

BES	Bureau of Environmental Services
City	City of Portland
DEQ	Department of Environmental Quality
DMA	Designated Management Agency
EDT	Ecosystem Diagnosis and Treatment
FY	fiscal year
IPM	integrated pest management
LID	low impact development
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
P2O	Pollution Prevention Outreach
SWMM	stormwater management manual
SWMP	stormwater management plan
TIP	TMDL Implementation Plan
TIR	thermal infrared
TMDL	Total Maximum Daily Load

Section 1
Introduction

This Total Maximum Daily Load (TMDL) annual status report (annual report) summarizes key activities and accomplishments in accordance with the City of Portland's 2019 *TMDL Implementation Plan* (TIP). This TMDL annual report summarizes the implementation status of the City of Portland's (City's) activities and management strategies to reduce TMDL pollutants in local water bodies during fiscal year (FY) 2021–22 (July 1, 2021, through June 30, 2022).

A multitude of environmental programs and activities are employed by the City to address both point and nonpoint sources of pollutants.[1] Therefore, many activities outlined in this TMDL annual report are also conducted to fulfill obligations under the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit No. 101314 (MS4 Permit). A separate annual report is submitted to the Oregon Department of Environmental Quality (DEQ) for compliance with the City's MS4 Permit and associated Stormwater Management Plan (SWMP). This annual report is included as an appendix to the City's MS4 annual report and refers to that report for stormwater-related topics and implementation of select management strategies identified in the TIP. Temperature-related strategies to specifically address load allocations are detailed in this annual report as well.

1.1 Background and Applicability

The City is a listed Designated Management Agency (DMA) in Portland-area TMDLs, developed by the DEQ and approved by the U.S. Environmental Protection Agency (EPA). DMAs are required to develop a TIP, report on implementation progress annually, provide a summary of overall progress every 5 years, and update the TIP as necessary.

The City's 2019 TIP identifies management strategies the City uses to reduce pollutants from nonpoint sources to restore and protect water quality in local waterways and the Willamette River. It reflects an update of the City's previous TIP (March 2014) following completion of DEQ's 5-year lookback survey, which reported on progress over the last 5 years. The survey provided an opportunity to identify improvements to management strategies.

In accordance with the EPA's approval of the Revised Willamette Basin Mercury TMDL in February 2021, the City updated the 2019 TIP and submitted it to DEQ in August 2022. The updated (2022) TIP meets the new requirements in the revised TMDL and Water Quality Management Plan, developed by DEQ, but the management strategies and the implementation plan cycle remain consistent with the 2019 TIP.

[1] TMDLs divide a total allowable pollutant load into allocations to point sources (called "waste load allocations") and nonpoint sources (called "load allocations") and several other input factors. Waste load allocations established in TMDLs are implemented through NPDES permits.

Pending DEQ approval, the City will implement strategies identified in the 2022 TIP within its jurisdiction during the 5-year implementation plan cycle (March 1, 2019, to December 31, 2023) of the original 2019 TIP.

1.2 Report Organization

This annual TMDL report covers implementation actions and accomplishments that occurred during FY 2021–22. The report is organized into the following sections:

- Section 2: Adaptive Management and Reporting
- Section 3: Management Strategies
- Section 4: Temperature-Related Activities

Section 2
Adaptive Management and Reporting

The City uses an adaptive management approach to identify whether the TIP needs to be modified for improved effectiveness. This includes both an annual process and a more comprehensive longer-term process. Public involvement and reporting activities are conducted throughout the implementation period.

2.1 Adaptive Management

The City conducts an annual adaptive management process in conjunction with its annual MS4 report and TMDL report preparation. This annual review process is used to determine if the City's TMDL programs are being implemented in accordance with the TIP and to identify whether any adjustments are needed.

In addition, every 5 years, DEQ requires DMAs to evaluate the implementation of management strategies contained in their TIPs. The resulting 5-year "look-back" report indicates whether the TIP is adequately meeting pollution reduction goals. As part of this process, the City reviews the TIP to assess its strategies and progress toward meeting goals and to propose changes as appropriate. Existing strategies are reviewed and refined to reflect progress made over the last 5 years, and the TIP is updated accordingly, if needed.

2.2 Public Involvement and Reporting

Annual reports are prepared and submitted to DEQ each year by November 1, outlining activities and accomplishments conducted to comply with identified strategies, performance monitoring metrics, and implementation timelines reflected in the TIP. The report summarizes implementation of strategies and identifies programmatic issues or modifications needed.

The City's 2019 TIP, the 2022 TIP, annual reports, 5-year evaluations, and other relevant information are posted online and made publicly available. A contact number is provided for those who have questions or want to provide input on the City's plans, strategies, and other environmental program activities.

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Section 3
Management Strategies

Many management strategies listed in the City's 2019 TIP are conducted to comply with the City's NPDES MS4 permit and associated SWMP. It is the City's intent to maintain consistency between the SWMP and the TIP, as most of these programs are applied citywide regardless of regulatory applicability.

Table 3.1 summarizes management strategies identified in the 2019 TIP to reduce TMDL pollutants and improve water quality. Management strategies listed in Table 3.1 are generally applied citywide and reduce TMDL pollution from point and nonpoint sources.

Table 3.1 lists all management strategies and provides references to the relevant annual report locations (MS4 annual report, monitoring annual report, or TMDL annual report) where information can be obtained for each. Because many identified management strategies are related to the City's NPDES MS4 permit and associated SWMP, such **stormwater** management strategies are considered ongoing and will be implemented throughout and likely beyond the 5-year TIP cycle. **Temperature** management strategies are discussed in detail in Section 4.

For this reporting year, the City is implementing its 2011 SWMP to comply with its NPDES MS4 permit. However, the City is updating and resubmitting its SWMP to DEQ in November 2022, in accordance with the compliance schedule in the reissued (2021) NPDES MS4 permit. As such, updates to the SWMP may result in future adjustments of Table 3.1 in future TMDL annual reports.

Table 3.1: Management Strategies to Address TMDL Pollutants

ID	Management Strategy	Annual Report Reference (BMP and Section Number, as applicable)
EO1	Clean Rivers Education Programs. Provide water quality classroom and field science education programs for K–12 students.	MS4 Report: PI-1, Section 2.1
EO2	Outreach and Social Media. Educate the public about stormwater and surface water quality, pollution prevention, and riparian and wetland protection via the web, blogs, mailings, and social media.	MS4 Report: PI-1, Section 2.4
EO3	Watershed Education and Stewardship. Support and conduct watershed-specific public education and stewardship activities, events, workshops, and restoration projects.	MS4 Report: PI-1, Section 2.3
EO4	Citywide Education and Stewardship. Conduct public education and stewardship activities focused on urban trees, green streets, and vegetation citywide.	MS4 Report: PI-1, Section 2.3
EO5	Pet Waste Management. Promote and facilitate proper disposal of pet waste in City parks and site dog parks away from waterways.	MS4 Report: PI-1, Section 2.5
EO6	Alternative Transportation. Promote carpooling, public transportation, and alternative commuting strategies to reduce emissions with toxic pollutants and support climate action.	MS4 Report: PI-1, Section 2.6
EO7	Regional Education. Support and participate in education and outreach programs with regional partners and jurisdictions.	MS4 Report: PI-1, Section 2.7
EO8	Community Stewardship Grants Program. Distribute grant monies to citizens and organizations to engage watershed protection projects and promote public involvement.	MS4 Report: PI-1, Section 2.2
EO9	Public Involvement in TMDL Program. Post the TMDL Implementation Plan and annual reports on the City website.	TMDL Report: Adaptive Management and Reporting, Section 2.2
OM1	City Stormwater System O&M. Conduct condition assessment activities and maintain and repair City stormwater collection, conveyance, and treatment systems.	MS4 Report: OM-1, Section 3.2
OM2	Stormwater O&M Practices. Review stormwater O&M practices, procedures, and manual(s) and update as necessary.	MS4 Report: OM-1, Section 3.2
OM3	City Stormwater System Inventory and Mapping. Maintain and update systems to track and map City stormwater conveyance and treatment assets.	MS4 Report: OM-1, STR-1, Section 3.1, 11.2
OM4	Stormwater System Planning. Implement a Stormwater System Plan to assess system risks related to capacity, condition, service needs, water quality, and stream impacts.	MS4 Report: STR-1, Section 11.1
OM5	Private Stormwater Facilities O&M. Conduct inspection and technical assistance activities of privately owned stormwater management and treatment facilities.	MS4 Report: ND-2, Section 10.2
OM6	Street Cleaning and Debris Removal. Implement cleaning and/or debris removal activities on City streets to reduce the discharge of pollutants in stormwater.	MS4 Report: OM-2, Section 4.1

Table 3.1: Management Strategies to Address TMDL Pollutants

ID	Management Strategy	Annual Report Reference (BMP and Section Number, as applicable)
OM7	Street Deicing. Implement City deicing practices that minimize environmental impacts as much as practicable during snow and ice events.	MS4 Report: OM-2, Section 4.2
OM8	Employee Training. Provide employee training on operation, maintenance, and construction practices to protect water quality.	MS4 Report: OM-2, ND-1 Section 4.3, 9.3
OM9	Integrated Pest Management. Implement an Integrated Pest Management (IPM) program to minimize the use and application of fertilizers, herbicides, and pesticides in City parks and natural areas.	MS4 Report: OM-3, Section 5.2.1
OM10	Sustainable City Fleet. Incorporate electric, hybrid, and fuel-efficient vehicles into the City's transportation fleet to reduce emissions with toxic pollutants and support climate action.	MS4 Report: OM-3, Section 5.6
OM11	City Maintenance Facilities. Employ structural and nonstructural BMPs at City maintenance facilities.	MS4 Report: OM-3, Section 5.1
OM12	Salmon-Safe Certification. Engage City operations, maintenance, and other property management practices to maintain citywide Salmon-Safe Certification.	MS4 Report: OM-3, Section 5.5
OM13	Water Conservation. Implement irrigation principles at City parks that conserve water, minimize runoff, increase infiltration, and optimize fertilizer use.	MS4 Report: OM-3, Section 5.2.2
IND1	Industrial and Commercial Stormwater. Implement a program to reduce and control pollutants in stormwater runoff from industrial and commercial facilities.	MS4 Report: IND-1, Section 6.1
IND2	Pollution Prevention Outreach (P2O). Support and participate in regional P2O efforts that promote business and public pollution prevention and mercury minimization practices.	MS4 Report: IND-2, Section 7.1, 7.2, 7.3
IND3	Wellhead Protection. Support and provide technical assistance to businesses in the Columbia South Shore Wellhead Protection area to implement BMPs and prevent harmful releases to the well field.	MS4 Report: IND-2, Section 7.4
IND4	Pollution Source Control. Impose pollution control requirements for "high-risk" or pollutant-generating development activities.	MS4 Report: ND-2, Section 10.3
ILL1	Sewer Connections. Require new development or properties with nonconforming sanitary sewers to connect to the City sanitary sewer system if available.	MS4 Report: ILL-1, Section 8.2
ILL2	Sanitary Sewer Repair. Identify and repair sanitary sewer problems that cause seepage to the MS4 and surface waters.	MS4 Report: ILL-1, Section 8.3
ILL3	Illicit Discharge Detection and Elimination. Identify, investigate, enforce, and eliminate illicit connections and discharges to the MS4.	MS4 Report: OM-3, ILL-1, Section 5.3, 8.1, 8.1.2, 8.1.3
ILL4	Dry-Weather Field Screening. Conduct dry-weather field screening of MS4 outfall basins to identify and eliminate illicit discharges.	MS4 Report: ILL-1, Section 8.1.1

Table 3.1: Management Strategies to Address TMDL Pollutants

ID	Management Strategy	Annual Report Reference (BMP and Section Number, as applicable)
ILL5	Portable Restrooms. Place portable restrooms at City parks for public and sporting events where necessary and near homeless encampments where possible and appropriate.	MS4 Report: ILL-1, Section 8.4
ILL6	Curbside Collection Services. Implement solid waste and recycling programs to prevent illegal dumping of solid and liquid wastes.	MS4 Report: ILL-1, Section 8.1
ND1	Construction Runoff Control Program. Implement erosion and sediment control plan review, technical assistance, and site inspections for ground-disturbing activities.	MS4 Report: ND-1, Section 9.1
ND2	Erosion Control Manual and Legal Authority. Maintain and update as needed the legal authority and guidance manual requiring erosion and sediment controls for active development construction sites.	MS4 Report: ND-1, Section 9.1
ND3	Hillside and Slope Protection. Implement a hillside development protection code to minimize erosion and soil mass-wasting.	MS4 Report: ND-1, Section 9.2
ND4	Post-Construction Runoff Control Program. Implement SWMM plan review, technical assistance, and inspection activities for new and redevelopment projects to treat and control post-development stormwater runoff.	MS4 Report: ND-2, Section 10.2
ND5	Onsite Stormwater Retention. Require stormwater management practices for new and redevelopment that optimize onsite retention and target natural surface and predevelopment functions as much as practicable.	MS4 Report: ND-2, Section 10.1
ND6	Low Impact Development (LID). Prioritize and promote the use of LID and green infrastructure techniques for new and redevelopment.	MS4 Report: ND-2, Section 10.1
ND7	Green Streets. Promote and incorporate the use of green street facilities in public and private development.	MS4 Report: ND-1, STR-1, Section 10.1, 10.2, 11.4
ND8	Stormwater Management Manual and Legal Authority. Maintain and update as needed the legal authority and manual requiring post-construction runoff controls from new and re-development.	MS4 Report: ND-2, Section 10.1
ECO1	Floodplain Protection. Implement and maintain as needed the legal authority to protect floodways and floodplains.	MS4 Report: NS-1, Section 12.8 TMDL Report: Temperature-Related Activities, Section 4
ECO2	Riparian and Wetland Protection. Implement programs to protect riparian buffers and corridors, headwaters, natural springs, wetlands, and native vegetation.	MS4 Report: NS-1, Section 12.2 TMDL Report: Temperature-Related Activities, Section 4
ECO3	Riparian Revegetation. Restore riparian corridors by removing invasive species and planting native trees and shrubs.	MS4 Report: NS-1, Section 12.3, 12.4 TMDL Report: Temperature-Related Activities, Section 4

Table 3.1: Management Strategies to Address TMDL Pollutants

ID	Management Strategy	Annual Report Reference (BMP and Section Number, as applicable)
ECO4	Invasive Species Management and Treatment. Implement invasive species assessment, removal, treatment, and management programs to restore hydrologic and ecological functions to riparian and upland areas.	MS4 Report: NS-1, Section 12.4, 12.7 TMDL Report: Temperature-Related Activities, Section 4
ECO5	Tree Protection. Implement and maintain as needed the legal authority for tree preservation to provide stormwater benefits and mitigate urban heat-island effects.	MS4 Report: NS-1, Section 12.2
ECO6	Upland Tree Planting. Implement and support upland and street tree planting programs to expand the City's urban forest canopy.	MS4 Report: NS-1, Section 12.5 TMDL Report: Temperature-Related Activities, Section 4
ECO7	Restoration and Planting Partnerships. Support and coordinate with volunteers, nonprofits, and community partners to engage tree planting and natural area restoration activities.	MS4 Report: NS-1, Section 12.4, 12.6 TMDL Report: Temperature-Related Activities, Section 4
ECO8	Hydrologic Connectivity. Restore and protect hydrologic functions and floodplain connectivity through land-acquisition, culvert replacement, and supporting projects.	MS4 Report: STR-1, NS-1, Section 11.4, 12.1 TMDL Report: Temperature-Related Activities, Section 4, Table 4.2
ECO9	Stream, Floodplain, and Wetland Restoration. Enhance watershed ecosystem functions through stream and wetland restoration projects.	MS4 Report: NS-1, Section 12.4 TMDL Report: Temperature-Related Activities, Section 4, Table 4.2
ECO10	Cold Water Refugia. Identify and protect cold water refugia.	TMDL Report: Temperature-Related Activities, Section 4, Table 4.1
ECO11	Natural Resource Inventory (NRI). Use and support updates to the NRI to protect riparian and wildlife corridors and inform zoning and planning activities.	N/A: Pending
ECO12	Climate Change Planning. Implement and maintain as needed the Climate Action Plan and supporting strategies to reduce local carbon emissions and build resilience to the projected impacts of climate change.	MS4 Report: NS-1, Section 12.2.1

Table 3.1: Management Strategies to Address TMDL Pollutants

ID	Management Strategy	Annual Report Reference (BMP and Section Number, as applicable)
RF1	City Stormwater System Retrofits. Design and construct treatment and green infrastructure retrofits to the City's storm drainage system.	MS4 Report: STR-1, Section 11.4
RF2	Stormwater System Planning Retrofit Priorities. Prioritize treatment and green infrastructure retrofit projects based on identified water quality risks and asset management planning.	MS4 Report: STR-1, Section 11.1, 11.4
RF3	Retrofit Funding Mechanisms. Implement "% for Green" and payment-in-lieu activities to fund green street and water quality retrofit projects.	MS4 Report: ND-2, STR-1, Section 10.4, 11.3, 11.5
RF4	Property Retrofits. Provide technical assistance, incentives, and grants to encourage onsite private property retrofits and water quality improvements for existing development.	MS4 Report: STR-1, Section 11.3
PM1	Annual Reporting. Develop an annual report by November 1 that summarizes the City's TMDL Implementation Plan activities and accomplishments.	TMDL Report: Adaptive Management and Reporting, Section 2.2
MON1	Watershed Monitoring. Implement watershed monitoring activities to evaluate trends and assess progress toward meeting TMDLs.	Monitoring Report: Evaluation of Trends, Section 4
MON2	Effective Shade and Stream Habitat Assessment. Conduct effective shade evaluation and stream habitat surveys to inform current-state riparian conditions.	TMDL Report: Temperature Management, Table 4.1
MON3	Ecosystem Diagnosis and Treatment Analysis. Develop a model to evaluate the availability of existing stream habitat and restoration project benefits to support endangered salmonids.	TMDL Report: Temperature Management, Table 4.1
MON4	Watershed Restoration Effectiveness Monitoring. Collect data to evaluate restoration projects relative to site-specific and citywide restoration targets.	TMDL Report: Temperature Management, Table 4.1
MON5	Time-Series Monitoring. Evaluate time-series data collected from Columbia Slough water quality data loggers to assess status and trends and to inform adaptive management of the monitoring effort.	N/A: Pending separate deliverable

Section 4
Temperature-Related Activities

The City conducts multiple activities to address elevated stream temperatures in local streams and rivers. Restoration and the protection of riparian vegetation are the primary methods for increasing stream shading and addressing nonpoint source load allocations to achieve system potential shade conditions.[1] The City uses a combination of these temperature strategies, ranging from planning, resource protection, land acquisition, active restoration and planting, monitoring, and public outreach.

As noted in Section 3, many of the City's key management strategies to reduce TMDL pollutants and improve water quality are conducted to address requirements of the City's NPDES MS4 Permit and associated SWMP. However, specific goals and targets identified in the TIP to assess progress toward meeting nonpoint source temperature load allocations are considered unaffiliated with stormwater or the MS4 permit and represent the focus of the TIP and TMDL annual report.

Temperature-related goals and targets are summarized below in Table 4.1. Each goal includes a timeline, performance metrics, interim milestones, and a description of implementation activities conducted during FY 2021–22 to meet the identified interim milestones or performance metrics. Specific projects to meet TIP Goal #14 (TIP-14) related to hydrologic conductivity and watershed restoration are referenced in Table 4.2.

[1] System potential vegetation for the Willamette River subbasins, as defined in Appendix C, Chapter 2 – Potential Near-Stream Land Cover in the Willamette Basin for TMDLs, is the potential near-stream land cover condition. Potential near-stream land cover can grow and reproduce on a site given proper climate, elevation, soil properties, plant biology, and hydrologic processes. System potential does not consider management or land use as limiting factors**.** In essence, system potential is the design condition used for TMDL analysis that meets the temperature standard by minimizing human-related warming.

- System potential is an estimate of the condition where anthropogenic activities that cause stream warming are minimized.
- System potential is not an estimate of pre-settlement conditions. Although it is helpful to consider historic land cover patterns, channel conditions, and hydrology, many areas have been altered to the point that the historic condition is no longer attainable given drastic changes in stream location and hydrology (channel armoring, wetland draining, urbanization, etc.).

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Appendix A: TMDL Implementation Plan Status Report for FY 2021-22

Table 4.1: Goals and Targets for Temperature TMDL Strategies

Goal ID	Category	Target/Description	Timeline (Goal)	Performance Metrics	Interim Milestones and Timelines	Reporting Activities
TIP-01	**Effective Shade Assessment**	Conduct a geospatial assessment of riparian conditions within Portland and progress toward meeting the TMDL nonpoint source load allocations.	Complete by 2021	Completed assessment	1. FY 2019–20: LiDAR acquisition. 2. FY 2019–20: Process LiDAR and GIS datasets and complete modeling. 3. FY 2020–21: Compile effective shade results. 4. FY 2021-22: Report effective shade results.	1. Completed FY 2019–20: Preliminary geospatial assessment of riparian conditions using historic LiDAR data. 2. Completed FY 2020–21: 2019 LiDAR delivery occurred at the end of FY 2020-21. Initial refinements of the preliminary geospatial assessment of riparian conditions were conducted using the 2019 dataset. 3. Completed FY 2021-22: Final report and effective shade results were shared with DEQ in Spring 2022 to assist with DEQ's development of the Willamette temperature TMDL.
TIP-02	**Stream Habitat Assessment**	Conduct stream habitat surveys for all perennial streams identified as priorities in the Stormwater System Plan.	Complete by 2021	Completed surveys	1. FY 2018–19: Secure intergovernmental agreement with Oregon Department of Fish and Wildlife. 2. FY 2019–20: Complete surveys for 50% of identified stream reaches. 3. FY 2020–21: Complete surveys for additional stream reaches. 4. FY 2021-22: Complete surveys for remaining stream reaches.	1. Completed FY 2018–19: Executed an Intergovernmental agreement with Oregon Department of Fish and Wildlife to conduct stream habitat surveys in the Portland area. 2. Completed FY 2019–20: 71 stream miles surveyed (63%). 3. Completed FY 2020–21: 21 stream miles surveyed (cumulative total 82%). 4. Completed FY 2021–22: 20 stream miles surveyed (cumulative total 100%)
TIP-03	**Ecosystem Diagnosis and Treatment Analysis**	Generate an Ecosystem Diagnosis and Treatment (EDT) model for the Columbia Slough, Johnson Creek, and Tryon Creek areas of interest.	Complete by 2020	Completed model	1. Implementation is scheduled for completion during FY 2019–20.	1. Completed FY 2018–19: EDT models for the Columbia Slough, Johnson Creek, and Tryon Creek were developed and calibrated ahead of schedule. Results are available online: https://ecosystems.azurewebsites.net/EDT/Portland/Restoration.
TIP-04	**Floodplain, Riparian, and Wetland Protection**	Complete the Environmental Overlay Zone Map Correction Project.	Anticipate public hearings in 2020 and adoption in 2021	Updated Overlay Zone Map	1. FY 2018–19: Release draft maps of the revised environmental overlay zones for Johnson Creek. 2. FY 2019–20: Release draft maps of the revised environmental overlay zones for East Buttes, Northwest Hills, Southwest Hills, and Columbia Slough/Columbia River. 3. FY 2020–21: Public hearings on the revised environmental overlay zones. 4. FY 2021-22: Complete the Environmental Overlay Zone Map Correction Project.	1. Completed FY 2018–19: Draft maps of the revised environmental overlay zones for Johnson Creek. 2. Completed FY 2019–20: Released draft maps of the revised environmental overlay zones for East Buttes, Northwest Hills, and Southwest Hills. The Columbia Slough/Columbia River requires additional analysis. 3. Completed FY 2020–21: Conducted public hearings on the revised environmental overlay zones. The first public hearing was conducted in July 2020. 4. Completed FY 2021-22: Completed the Environmental Overlay Zone Map Correction Project. City Council voted to adopt the Project zone changes on May 27, 2022; the changes went into effect on October 1, 2022.
TIP-05	**Onsite Stormwater Retention and Low Impact Development (LID)**	Revise and update the *Stormwater Management Manual* (SWMM).	Within the next MS4 permit term	Updated SWMM	N/A – Schedule is outlined in accordance with provisions of the SWMP and renewed Phase I NPDES MS4 permit.	N/A
TIP-06	**Invasive Species Management and Treatment**	Perform management, assessment, and treatment of invasive species on 5,550 acres.	By the end of the TMDL Implementation Plan (TIP) cycle	Acres managed, assessed, and treated	Perform management, assessment, and treatment of invasive species on 1,110 acres each year on average.	**Acres** / **2018–19** / **2019–20** / **2020–21** / **2021–22** / **2022–23** **Annual** / 1,201 / 1,363 / 1,015 / 1,044 / - **Cumulative** / 1,201 / 2,564 / 3,579 / 4,623 / - **% of Goal** / 21.6% / 46.2% / 64.5% / 83.3% / - For more information, see MS4 Annual Report: NS-1, Section 12.7.
TIP-07	**Invasive Species Management and Treatment**	Survey the Lower Columbia Slough for invasive aquatic macrophytes and treat where identified. Total extent is 9.4 miles on center or 18.8 miles along left and right banks.	Annually for 80% or more of total extent	Linear miles surveyed	Survey the Lower Columbia Slough for invasive aquatic macrophytes and treat where identified. Work to cover 80% or more of the total extent: at least 7.5 miles on center or 15 miles at banks.	**Miles** / **2018–19** / **2019–20** / **2020–21** / **2021–22** / **2022–23** **On Center** / 8.4 / 8.5 / 8.3 / 8.1 / - **At Banks** / 16.9 / 18.6 / 18.4 / 15.4 / - **% of Goal** / 112.7% / 124% / 123% / 106%- / -

Appendix A: TMDL Implementation Plan Status Report for FY 2021-22

Table 4.1: Goals and Targets for Temperature TMDL Strategies

Goal ID	Category	Target/Description	Timeline (Goal)	Performance Metrics	Interim Milestones and Timelines	Reporting Activities
TIP-08	**Ecosystems**	Develop an inventory of watershed restoration projects and track information such as cost, location, project goals, and outcomes.	By the end of the TIP cycle	Completed inventory	1. FY 2018–19: Initiate effort internally with subject matter experts. 2. FY 2019–20: Complete an inventory of all active projects. 3. FY 2020–21: Populate the inventory with all recently completed projects.	1. Completed FY 2018–19: Internal effort to develop and populate an inventory of restoration projects. 2. Completed FY 2019–20: Completed the inventory of all active projects and developed an interactive web tool to share the inventory content. 3. Completed FY 2020–21: Populated the inventory with all recently completed projects and launched a public-facing web tool for sharing the inventory content: https://pdx.maps.arcgis.com/apps/webappviewer/index.html?id=807ed51bb0314f9cbd31815c73ff9b6e. 4. Completed FY 2021-22: Maintained the inventory, including the addition of newly completed projects.
TIP-09	**Riparian Revegetation**	Plant 100,000 native trees and shrubs in identified natural and riparian areas.	By the end of the TIP cycle	Plantings (#)	Plant 20,000 native trees and shrubs in identified natural and riparian areas each year on average.	**Plantings** / **2018–19** / **2019–20** / **2020–21** / **2021–22** / **2022–23** **Annual** 17,312 37,297 55,913 28,645 - **Cumulative** 17,312 54,609 110,522 139,167 - **% of Goal** 17.3% 54.6% 110.5% 139.2% - For more information, see MS4 Annual Report: NS-1, Section 12.3.
TIP-10	**Land Acquisition**	Acquire 50 acres of land for strategic restoration and protection of watershed hydrology.*	By the end of the TIP cycle	Acres acquired (#)	Initiate the due diligence review process for 10 new acres of property each year to enable land acquisition.	**Acres** / **2018–19** / **2019–20** / **2020–21** / **2021–22** / **2022–23** **Annual** 23.8 9.6 1.3 1.7 - **Cumulative** 23.8 33.4 34.7 36.4 - **% of Goal** 47.6% 66.8% 69.4% 72.8% - For more information, see MS4 Annual Report: NS-1, Section 12.1.
TIP-11	**Upland Tree Planting**	Plant 7,500 upland trees during the plan term through partnerships with nonprofits, community members, businesses, and schools.	By the end of the TIP cycle	Trees planted (#)	Plant an average of 1,500 upland trees each year during the plan term through partnerships with nonprofits, community members, businesses, and schools.	**Trees** / **2018–19** / **2019–20** / **2020–21** / **2021–22** / **2022–23** **Annual** 2,777 2,915 2,615 1,782 - **Cumulative** 2,777 5,692 8,307 10,089 - **% of Goal** 37.0% 75.9% 110.8% 134.5% - For more information, see MS4 Annual Report: NS-1, Section 12.5.
TIP-12	**Watershed Restoration Effectiveness Monitoring**	Develop a comprehensive monitoring manual to support the City's stream and floodplain restoration projects.	Complete by 2021	Completed manual	1. FY 2018–19: Draft of the monitoring manual completed. 2. FY 2019–20: Internal review of the draft monitoring manual completed. 3. FY 2020–21: Monitoring manual finalized.	1. Completed FY 2018–19: Draft project effectiveness monitoring manual. 2. Completed FY 2019–20: Internal review of draft monitoring manual. 3. Completed FY 2019–20: Finalized monitoring manual.
TIP-13	**Cold Water Refugia**	Evaluate and update an inventory and mapping of cold water refugia in the Lower Willamette River.	By the end of the TIP cycle	Confirmation of program continuation and/or providing status updates	1. FY 2018–19: Participate in DEQ's expert panel. 2. FY 2019–20: Continue to participate in DEQ's expert panel.	Completed FY 2020–21: DEQ finalized the Lower Willamette River Coldwater Refuge Plan and submitted it to the National Marine Fisheries Service in March 2020.
TIP-14	**Hydrologic Connectivity (Watershed Restoration)**	Implement five restoration projects: Canopy cover, enhancing refugia, heat source due to water impoundment, groundwater recharge, and/or protecting springs/cold water sources.	By the end of the TIP cycle	Projects planned, designed, and/or constructed (#)	Advance one project per year to the next project phase.	See Table 4.2 below for a list of projects, including status and description for each.

Table 4.2: Projects for Temperature Goal TIP-14 Hydrologic Connectivity (Watershed Restoration)

Project Name	Status* (Previous Report Year → Current Report Year)	Description and Benefits
Oaks Bottom Habitat Enhancement Project *Willamette River*	Construction complete in 2018	Restored 75 acres of wetland habitat in 2018 at the Oaks Bottom Wildlife Refuge. Replaced the existing undersized 5-foot culvert with a 16-foot box culvert (a.k.a. "The Salmon Subway"), allowing fish to pass between the Willamette River and the refuge. Improved Willamette River's tidal flow in and out of the refuge, providing fish with access to cold springs. Excavated tidal slough channels, installed large wood, and improved wetland habitats to provide resting and rearing habitat. Removed invasive vegetation, such as purple loosestrife, and revegetated with native species within the construction footprint. *Benefits: Cold water refugia, passage barrier removal, channel form, large wood, rearing habitat, riparian shading, invasive species management, native plantings.*
Luther Road Creek Restoration Project *Johnson Creek*	Construction complete in 2019	Erosion caused by large storm events in 2016 eroded the creek bed and banks, exposing part of the 76-inch-diameter Lents Interceptor sewer pipe that crosses Johnson Creek. Exposure increases the risk of pipe damage during high flows and blocked fish passage during low flows. Reburying pipe near SE 73rd Avenue and Luther Road reduces risk of sewage releases, protecting public health and the environment. Includes the addition of large wood to enhance habitat and riparian plantings to increase shade. *Benefits: Sanitary sewer repair, passage barrier removal, large wood, instream cover, native plantings.*
Springwater Corridor Trail Bridge Replacement *Johnson Creek*	Construction complete in 2019	The Springwater Corridor Trail bridge over Johnson Creek near SE 45th Avenue and Johnson Creek Boulevard is the original wooden trestle bridge from the Springwater Division Line rail developed in the early 1900s, with footings in Johnson Creek. The project will replace the wooden bridge with a new bridge that will be constructed with steel and concrete and include footings that will allow for clearer passage of Johnson Creek. The new bridge design reduces trash and debris accumulation and improve habitat for fish and wildlife. *Benefits: Enhanced instream habitat.*
Boones Ferry Culvert Replacement Project *Willamette Tributaries*	Construction complete in 2020	Removed one of two major fish passage barriers on the mainstem of Tryon Creek and restoring access upstream of SW Boones Ferry Road to Upper Tryon Creek and Arnold Creek. Replaced an undersized 60-inch, 140-foot-long corrugated metal pipe culvert with a single span bridge. Provided safer crossing for pedestrians and wildlife. Includes habitat enhancements to Tryon and Arnold Creeks upstream of the project. *Benefits: Passage barrier removal, access to spawning and rearing habitat, native plantings.*
Cedar Crossing Floodplain Restoration Project *Johnson Creek*	Construction in 2022	Located near the covered bridge on SE Deardorff Road in East Portland. Reconnects Johnson Creek to its floodplain, allowing for overbank flows and restored ecosystem services of flood storage and added habitat for fish and wildlife. Includes the addition of large wood and native riparian plantings to increase shade. In the 1930s, the Works Progress Administration rock-lined the stream channel that disconnected the floodplain, straightening and hardening the banks to reduce local flooding, but the effort increased flooding downstream and eliminated floodplain habitats. The rock lining will be removed from the stream bed and banks as part of the project. *Benefits: Floodplain connectivity, channel form, large wood, instream cover, invasive species management, native plantings.*
West Lents Floodplain Restoration Project *Johnson Creek*	30% design	Reconnecting a straightened reach of Johnson Creek to its historic floodplain in Southeast Portland. The project will improve stream habitat complexity and hydraulics by returning the channel pattern to follow its historic meander and adding large wood. Includes invasive species treatment and riparian plantings. BES has already successfully purchased 13 private properties in the project area and removed the buildings in the floodplain. *Benefits: Floodplain connectivity, channel form, large wood, instream cover, invasive species management, native plantings.*
Johnson Creek Oxbow Restoration Project *Johnson Creek*	30% design	The Johnson Creek Oxbow Restoration Project is part of a broad City effort to improve habitat conditions and reduce the impacts of flooding along Johnson Creek. It will build upon four previous restoration projects in the area: Tideman-Johnson (2006), Errol Heights Wetlands (2007), Errol Creek Confluence (2009), and the Johnson Creek Oxbow Scour Repair (2019). These efforts to restore Johnson Creek focus on returning it to a more natural state by removing the Works Progress Administration levee to reconnect and restore the surrounding floodplains, restore instream habitat in Johnson and Errol Creeks, and improve fish passage through the existing fish ladder. *Benefits: Floodplain connectivity, channel form, large wood, instream cover, invasive species management, native plantings, fish passage.*
Brookside Wetland Retrofit Project *Johnson Creek*	Conceptual Design	Located along SE Foster Road near the intersection with SE 110th Avenue, the existing Brookside Wetland includes a relatively shallow inline pond that contributes warm water to Johnson Creek. A sediment bar has formed across the mouth of the pond exacerbates the warming by impounding creek flow and creating stagnant open water conditions. This project will improve summertime temperature conditions in Johnson Creek, as well as high-flow conditions to protect against erosion and remove safety risks associated with nuisance camping in flood-prone areas. *Benefits: Floodplain connectivity, large wood, instream cover, invasive species management, native plantings, reduced stream temperature.*
Eastbank Crescent *Willamette River*	Conceptual design	The City is working with partners on the Eastbank Crescent project, a large riverbank restoration effort on the Willamette River near the Oregon Museum of Science and Industry. The Eastbank Crescent Plan was approved by the City Council in June 2017, and the City is exploring funding the project as a mitigation bank. While the project does not have direct cold-water inputs, it will include large wood structures installed into a laid-back bank with native vegetation, creating micro-refugia and shaded riverbanks. The City's strategy is derived from sampling at Sellwood Park that found high densities of juvenile salmonids in areas of submerged vegetation, even when cold water inputs are absent. The project has potential as a pilot for how to create (versus enhance existing) cold water refugia, given its similarity to habitat conditions common throughout Portland. *Benefits: Cold water refugia, large wood.*

Table 4.2: Projects for Temperature Goal TIP-14 Hydrologic Connectivity (Watershed Restoration)

Project Name	Previous Report Year / Status* / Current Report Year	Description and Benefits
Crystal Springs Lake *Johnson Creek*	Conceptual design 	The City is actively working with the U.S. Geological Survey to model temperatures in Crystal Springs Lake—a known heat source located at the headwaters of the Crystal Springs Creek. The City will be using the results of the lake temperature modeling to develop restoration scenarios to reduce heat loads to the stream and keep the entire 2.3 miles of Crystal Springs Creek below 18°C year-round. *Benefits: Cold water refugia, salmon sanctuary, removal of heat sources.*

* Design is typically comprised of four phases: Conceptual, 30%, 60%, and 90%.

Gray markers indicate status in the previous report year.

Black arrows indicate status in the current report year.