CITY OF SALEM, OREGON

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT

(Permit Number 101513, File Number 108919)

ANNUAL REPORT
FY 2021-22

October 24, 2022

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Mark Becktel, AICP, Operations Division Manager — Date: 10/27/2022

Prepared by
City of Salem Public Works Department

CITY OF Salem AT YOUR SERVICE

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Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

LIST OF ACRONYMS

ACWA	Association of Clean Water Agencies
APWA	American Public Works Association
BMP	Best Management Practice
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
COE	U.S. Army Corps of Engineers
CON	Construction-related BMPs
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
EPSC	Erosion Prevention and Sediment Control
ES	Environmental Services (City of Salem)
FEMA	Federal Emergency Management Act
GIS	Geographic Information System
IDEP	Illicit Discharge Elimination Program
IGA	Inter-governmental Agreement
ILL	Illicit discharge-related BMPs
IND	Industrial-related BMPs
MEP	Maximum Extent Practicable
mg/L	Milligrams per Liter
MOA	Memorandum of Agreement
MS4	Municipal Separate Storm Sewer System
MWOG	Mid-Willamette Valley Outreach Group
ODA	Oregon Department of Agriculture
ODOT	Oregon Department of Transportation
PSFA	Private Stormwater Facility Agreement
ppm	Parts per million
RC	Residential and commercial area-related BMPs
SDC	System Development Charge
SKAPAC	Salem/Keizer Area Planning Advisory Committee
SRC	Salem Revised Code
SSORP	Sanitary Sewer Overflow Response Plan
SWMP	Stormwater Management Plan
TMDL	Total Maximum Daily Load

1 INTRODUCTION

1.1 Permit Background

In 1990, the United States Environmental Protection Agency (EPA) published its Phase I regulations governing stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) program of the Clean Water Act. In Oregon, the EPA has delegated the permitting of NPDES municipal separate storm sewer system (MS4) discharges to the Oregon Department of Environmental Quality (DEQ).

Under the EPA's initial Phase I implementation of the program, municipalities having a population greater than 100,000 were required to obtain an NPDES MS4 permit. The City of Salem (City) passed that threshold with the 1990 Census and was included in the program by the DEQ, with the Oregon Department of Transportation (ODOT) originally designated as a co-permittee with Salem.

The regulations established a two-part application process for obtaining a NPDES Permit to discharge municipal stormwater to "waters of the state." The City submitted the Part 1 NPDES stormwater permit application in April 1994. The supplemental Part 2 application and associated Stormwater Management Plan (SWMP) were subsequently finalized and submitted to DEQ in July 1996. DEQ issued the City's initial NPDES MS4 permit in December 1997, with an expiration date of September 2002.

An application for permit renewal was submitted to the DEQ in April 2002, and the City's second MS4 permit was issued in March 2004. The next permit renewal application was submitted to the DEQ in 2008. This application included a revised SWMP (2008 SWMP) that was developed in part using the EPA document *Municipal Separate Storm Sewer System Program Evaluation Guidance* (January 2008). Following permit negotiations, the 2008 SWMP was further revised and submitted to the DEQ on August 13, 2010.

The City's renewed (third) MS4 permit was issued on December 30, 2010. Consistent with requirements of Schedule D.6 of the renewed MS4 permit, the City resubmitted the SWMP (revised 2010 SWMP) to DEQ on March 17, 2011. The EPA conducted an inspection of the City's MS4 program from July 31, 2012, through August 2, 2012, to assess compliance with the NPDES MS4 permit. The results of the audit were released during the FY 2013-14 reporting period and indicated that the City was deficient in meeting its construction site runoff control requirements. An EPA Administrative Compliance Order by Consent (Consent Order) was issued for the City to: 1) develop and document its construction site plan review procedures; 2) develop and document inspection procedures for construction sites; and 3) submit a separate report of all construction site inspections annually through the expiration of the current MS4 permit. The City remedied the deficiencies in its construction site erosion control program within 90 days of the Consent Order, submitted its first annual construction site inspection report on November 1, 2013, and met all requirements of the NPDES MS4 permit and the EPA Consent Order through the end of the third permit term.

The City's third permit had an expiration date of December 29, 2015. A renewal application was submitted in December 2015 (per the conditions listed under Schedule F, Section A.4) and the DEQ confirmed (in a letter dated March 1, 2016) that the permit was administratively extended.

The City was issued its fourth MS4 permit on September 15, 2021, and it went into effect on October 1, 2021. The City has been operating under that permit since. This report includes the elements necessary to meet requirements of the third and fourth permits, including the latest summary of best management practice (BMP) implementation for the 2021-2022 fiscal/reporting year according to the pre-existing 2010 SWMP, an updated 2022 Stormwater Management Program Document that was open to public comment for 30 days, and a mercury minimization assessment. This is the final annual report for the 2010 SWMP.

Waste load allocations related to the 2021 permit follow:

- Final Revised Willamette Basin Mercury TMDL/WQMP (2019-DEQ)
- TMDL for Mercury in Willamette Basin, OR (2019-EPA)
- Willamette Basin Mainstem Bacteria TMDL (2006)
- Mollalla-Pudding TMDL (2008) for Bacteria, Iron, DDT, Dieldrin, TSS and including Little Pudding subbasin and tributaries

1.2 Purpose and Scope

The MS4 permit area is defined as the area included within the city limits (encompassing 47 square miles), as exhibited in Figure 1. The City has responsibility for implementing its stormwater management program in that defined area. Land use within the permit area is exhibited in Figure 2.

This NPDES MS4 Annual Report summarizes stormwater-related activities listed in the 2010 SWMP that were completed during the period of July 1, 2021, through June 30, 2022. The information presented in this report is based on the requirements listed in Schedule B.5 of the 2010 MS4 Permit (see Table 1).

Table 1. Annual Reporting Requirements for the MS4 Permit

2010 Permit Section	Reporting Requirement	Location in Annual Report
B(5)(a)	The status of implementing the stormwater management program and each SWMP program element, including progress in meeting the measurable goals identified in the SWMP.	Section 2
B(5)(b)	Status or results, or both, of any public education program effectiveness evaluation conducted during the reporting year and a summary of how the results were or will be used for adaptive management.	Section 2 (RC 5-1)
B(5)(c)	A summary of the adaptive management process implementation during the reporting year, including any proposed changes to the stormwater management program (e.g., new BMPs) identified through implementation of the adaptive management process.	Section 1.3
B(5)(d)	Any proposed changes to SWMP program elements that are designed to reduce TMDL pollutants.	Section 1.3
B(5)(e)	A summary of total stormwater program expenditures and funding sources over the reporting fiscal year, and those anticipated in the next fiscal year.	Section 3
B(5)(f)	A summary of monitoring program results, including monitoring data that are accumulated throughout the reporting year and/or assessments or evaluations.	Section 2 (MON 1-1, 1-2, and 1-3), Attachment 1
B(5)(g)	Any proposed modifications to the monitoring plan that are necessary to ensure that adequate data and information are collected to conduct stormwater program assessments.	Attachment 1
B(5)(h)	A summary describing the number and nature of enforcement actions, inspections, and public education programs, including results of ongoing field screening and follow-up activities related to illicit discharges.	Section 2 (ILL 2-4)
B(5)(i)	An overview, as related to MS4 discharges, of concept planning, land use changes and new development activities that occurred within the Urban Growth Boundary (UGB) expansion areas during the reporting year, and those forecast for the following year including the number of new post-construction permits issued, and the estimate of the total new or replaced impervious surface area related to new development and redevelopment projects commenced during the reporting year.	Section 5
B(5)(j)	Results of ongoing field screening and follow-up activities related to illicit discharges.	Section 2 (ILL 2-4), Attachment 1

1.3 Adaptive Management

The stormwater management program that is described in the City's 2010 SWMP is the result of adaptively managing (e.g., implementing, evaluating, and adjusting) the program since first being issued an MS4 permit in 1997. The history of this adaptive management approach may be found in Section 2 of the City's "National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permit Renewal (September 2, 2008)," and describes how the 2010 SWMP meets the "maximum extent practicable" requirement. By adaptively managing its stormwater management program, the City continues to reduce the discharge of pollutants from its stormwater system.

Consistent with Schedule D.4 of the 2010 MS4 permit, City staff submitted an "Adaptive Management Approach" to DEQ on October 24, 2011. This approach involves both an annual review of BMP activities and collected data, as well as a comprehensive assessment of BMP activities in preparation for MS4 permit renewal.

Per the Adaptive Management Approach, a series of 12 meetings were held with staff across the City in reporting year (FY 2014-15) to review BMP activities completed over the permit term, information received through the annual adaptive management process, and to complete a comprehensive assessment of BMP activities listed in the 2010 SWMP. Information collected through this assessment informed the proposed SWMP modifications that were submitted to DEQ as part of the MS4 Permit Renewal Package in December 2015. The proposed revisions were posted on the City's website for an open public comment period prior to submittal to DEQ.

In preparation of the Stormwater Management Program (SWMP) Document update that is due to DEQ November 1, 2022, information provided in previous years' adaptive management process was reviewed and used to update the new SWMP Document.

Figure 1. Permit Area Map

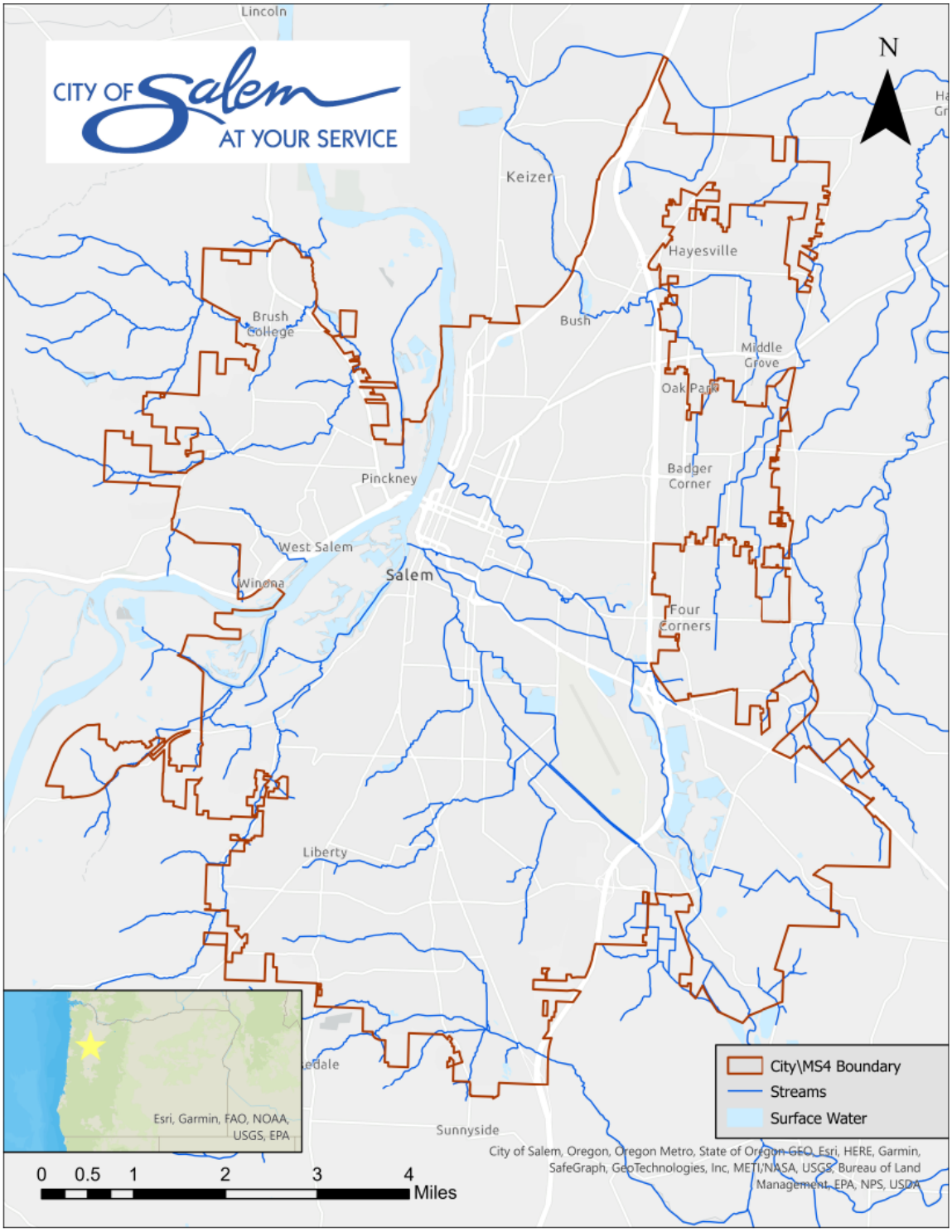
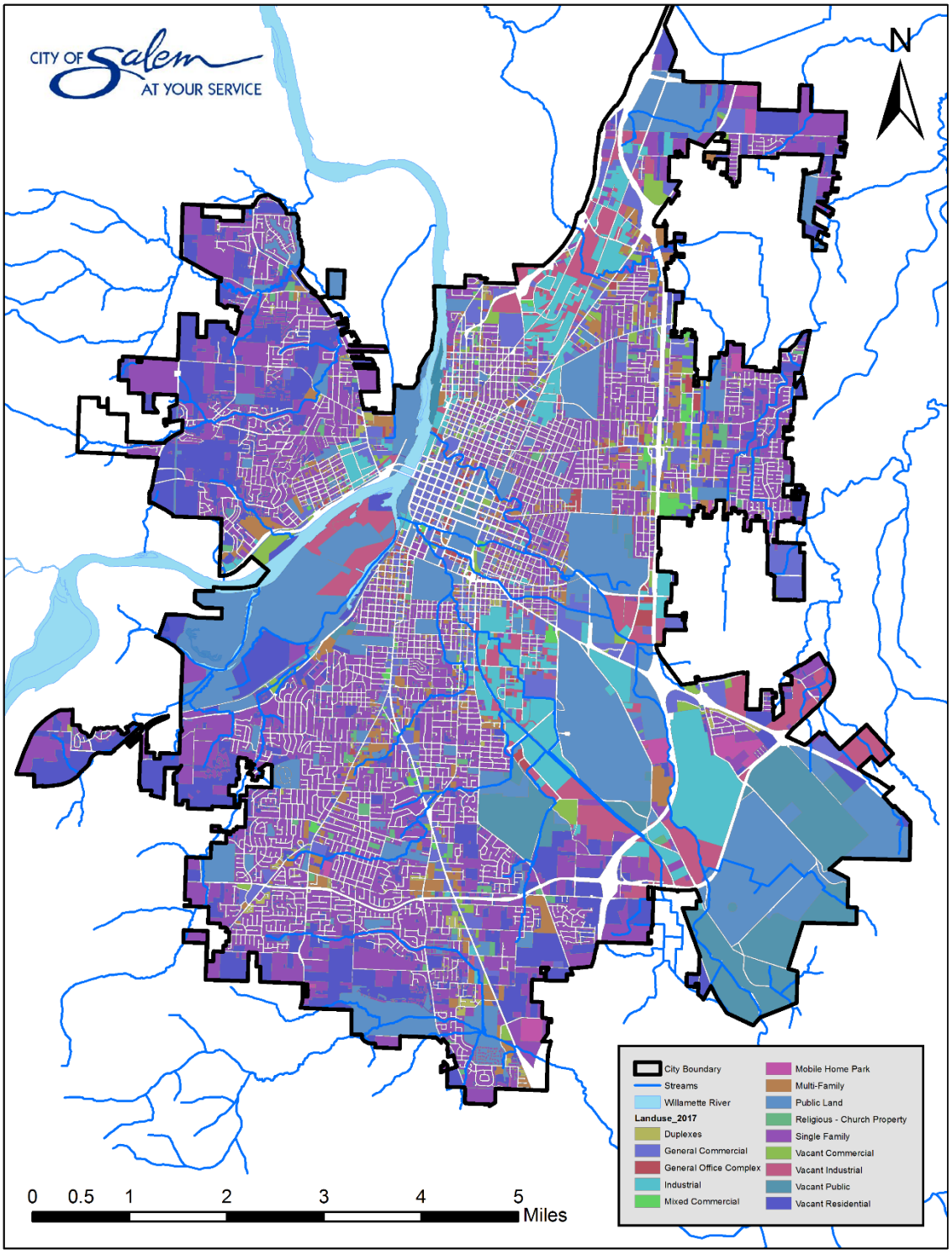


Figure 2. Land Use



2 STATUS OF THE STORMWATER MANAGEMENT PLAN

The primary objective of the SWMP is to provide an outline of City activities that will satisfy the NPDES MS4 Phase I stormwater permit regulatory requirements [40 CFR 122.26(d)(2)(iv)]. The intent of the regulations is to allow each permittee the opportunity to design a stormwater management program tailored to suit the individual and unique needs and conditions of the permit area and reduce the discharge of pollutants from the stormwater sewer system to the maximum extent practicable.

The status of BMP activities listed in the 2010 SWMP is discussed in this section of the Annual Report. BMPs within the SWMP have been categorized into five types:

1. Structural and source controls for residential and commercial areas (RC);
2. A program for the control of illicit discharges and improper disposal into the storm drainage system (ILL);
3. A program to monitor and control pollutants from industrial facilities, hazardous waste treatment, storage and disposal facilities, and municipal landfills (IND);
4. A program to implement and maintain structural and non-structural BMPs to reduce pollutants from construction sites (CON); and
5. A program to conduct water quality monitoring activities within the MS4 drainage system and City waterways (MON).

Each BMP identified in the 2010 SWMP is discussed in this report with the following information:

- A table describing BMP tasks, associated measurable goals, and tracking measures as stated in the 2010 SWMP.
- A summary of activities completed during FY 2021-2022 (July 1, 2021, through June 30, 2022) that demonstrates progress toward meeting the measurable goals and tracking measures.

Table 2. RC1—Planning

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 1-1: Provide City-wide Master Planning for stormwater to address both water quality and water quantity. As part of master planning efforts, continue to evaluate new detention and water quality opportunities within the Urban Growth Boundary (UGB), and consider sites in upstream areas that may affect Salem, and in downstream areas that may be affected by runoff from Salem.	Maintain Master Plan and complete next update within the MS4 permit cycle.	Track schedule for updating Master Plan. Report on Master Plan update actions.	**Ongoing:** The City of Salem Stormwater Master Plan (SWMP) was last amended by City Council in 2020. This was the first phase of a three-phase project of major amendments to the SWMP. Phase 1 addressed three creek basins: Pringle Creek Basin, Mill Creek Basin, and Battle Creek Basin. The second phase is now underway with a consultant on board and surveys being conducted in the next three creek basins: Glenn-Gibson Creek Basin, West Bank Basin, and Upper Claggett Basin. Modeling followed by project identification and prioritization will follow. The project will continue with public outreach leading to Council adoption, which is anticipated in 2023.
RC 1-2: Develop and maintain watershed management plans by developing a prioritized schedule and implementing watershed management plans based on available funding. Develop the Pilot Pringle Creek Watershed Management Plan as a model for the City's other prioritized urban watersheds. Identify capital improvement needs and potential "early action" activities and projects to ensure that the plan has a strong implementation component.	Complete a hydromodification study and retrofit plan by November 1, 2014. Incorporate recommendations and early action items of watershed management plans with completion of hydromodification study and retrofit plan. Develop strategy for completing future watershed management plans by November 1, 2014.	Report on completion of hydromodification study. Report on completion of retrofit plan. Track implementation actions of Pringle Creek Watershed Management Plan. Report on strategy for completing future watershed management plans.	**Completed:** The Hydromodification Assessment and Stormwater Retrofit Plan were completed and submitted to DEQ on October 28, 2014. **Update:** Development of new watershed management plans is addressed in Policy 1.2 of the City of Salem Stormwater Master Plan. No funding is allocated during the current fiscal year to develop new watershed management plans. **Ongoing**: During the reporting period, City staff utilized the stormwater retrofit prioritization tool (completed in 2017/2018) when preparing the annual Capital Improvement Project (CIP) plan. City Council adopted the CIP in June 2021, which includes a total of $5,118,540 for stormwater-related projects, of which $248,730 is allocated specifically for implementing the Stormwater Retrofit Plan.
RC 1-3: City staff will continue to update the official "waterways" map for use by City staff in applying various regulations and standards. As studies are performed that warrant the revision of the designated waterways, including ground truthing, that information will be incorporated into the update process.	Compile database of maps and waterways references. Complete field ground-truthing by end of FY 2011-12. Update map by end of FY 2012-13.	Track completion of ground-truthing and map updates.	**Completed**: All waterway layers were consolidated into one "channels" feature layer in Spatial Database Engine (SDE) as part of the Stormwater utilities migration from Hansen to Infor Public Sector (IPS). This consolidated layer is the master data set for all waterways. **Ongoing**: Regular maintenance is performed, and any updates have been applied to the Channels data as part of our asset management system.
RC 1-4: City staff will meet a minimum of once per year to discuss coordination of efforts relating to stormwater. Topics may include the following, as they are applicable: grant funding, outreach, program review, annual report, monitoring, sharing of data, adaptive management, review/update of documents and programs, training needs, documentation of protocols, coordination of databases, involvement of inspections, maintenance, and operations in plan review and program development, checklists, effective Erosion Prevention and Sediment Control Program including enforcement, strategizing/addressing hotspots, plan review, stormwater BMPs, and development of written enforcement strategy. Provide factsheets/manuals to new City employees to inform them about the City's efforts for pollution prevention. At least annual trainings will be provided to specified City employees involved in MS4-related activities regarding the permit, including its intentions and their responsibilities in relation to the MS4 permit. Feedback for improving processes will be encouraged and brought to the coordination meeting(s). Training needs will be determined by City staff meeting mentioned above. Consider adding stormwater pollution prevention training as an action item of the FY 2011-12 Environmental Action Plan that addresses pollution prevention on a city-wide level.	Conduct annual formal coordination meetings for stormwater, more often if necessary. Conduct annual training of employees involved in MS4-related positions, more often if necessary.	Prepare an annual meeting summary. Track changes made to the implementation of the stormwater program based on coordination discussions. Track major items of coordination. Track training attendance. Share and document training suggestions for MS4 implementation changes.	**Permit renewal and Stormwater Management Plan meetings**: Staff met several times over the reporting year to prepare for operating under the new stormwater permit, to review and update the Stormwater Management Plan, and to review and update standard operating procedures to define stormwater programs. The updated management plan will be submitted with this FY 2021-22 stormwater annual report.

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 1-5: Coordinate with other agencies such as NGOs, private environmental groups, and watershed councils.	Develop a list of contacts and identify issues of coordination.	Document any MOAs.	**Ongoing**: Work with other agencies has continued, but no MOAs were created this reporting year. **Claggett Creek Watershed Council:** Mark Caillier, markcaillier@claggettcwc.org Staff attended virtual monthly meetings and attended the Watershed Council's annual event, Soggy Day in the Park, to do outreach for the Clean Streams Initiative. Event attendance: 250. **Clean Rivers Coalition:** Roy Iwai, Water Resources Specialist, roy.iwai@multco.us Salem staff sits on the steering committee of the Clean Rivers Coalition, a multiagency outreach group, and worked as the lead on the pesticide reduction videos. The highlights for the year include the following: • The CRC completed many marketing items for the Follow the Water Campaign including the website (followthewater.info), Facebook page (https://www.facebook.com/followthewaterPNW), Instagram (https://www.instagram.com/followthewaterPNW/), and YouTube (https://www.youtube.com/channel/UCG63A3K-iykeGrjLp9xu9tA) and are currently undergoing a marketing campaign using the materials. • The creation of the lawn care videos to help owners with lawns reduce their pesticide use. Videos were produced for the different type of maintenance needs of the lawn: low, medium, or high. All three videos can be found on Oregon State University's website: https://extension.oregonstate.edu/mg/metro/whats-your-lawn-style. This project also produced four introductory videos to capture the attention of the public and lead them to the videos. **Friends of Trees**: Michelle Yasutake**,** Green Space Manager, MichelleY@friendsoftrees.org The City of Salem contracted with FOT again this year to assist with riparian and upland tree plantings. Eight events were held, one training event, one tree care event, and six planting events. For the eight events, 235 volunteers provided 979.25 hours of time to plant 195 small stock trees, 1,028 small stock shrubs and ferns, and 175 large stock trees. **Mid-Willamette Outreach Group (MWOG)** MWOG is made up of agency staff from Salem, Keizer, Marion County, and the Marion Soil and Water Conservation District. Staff attends monthly meetings to coordinate on stormwater outreach issues and events. • On January 25, 2022, MWOG hosted their annual Erosion Control and Stormwater Management Summit (Summit). Event registration totaled 120 and participation totaled 107. • The Water Festival was held outdoors and in-person at Cummings Elementary. Three teachers participated for a total of 60 students. **Outdoor School Coalition:** Jon Yoder, Chair, joyoder@wildblue.net Outreach and Education staff coordinated with the Outdoor School Committee to create lessons and activities for outdoor school for Salem/Keizer students. Outdoor School took place in October 2021 for two days with 95 students total and in May 2022 with 118 students total. **Salem Environmental Education**: Jon Yoder, President, joyoder@wildblue.net Staff sits on the board and attends quarterly board meetings that provides overall direction for the organization. The focus for the year was providing an Outdoor School experience to 5th grade students from four local schools. 270 students attended. **Glenn-Gibson Creeks Watershed Council:** Kenneth Bierly, bierlykenneth@gmail.com Staff attended virtual monthly meetings as a City representative. Items include reviewing quarterly newsletters, assistance with outreach planning and activities, assistance with Oak Savannah maintenance, coordination on invasive knotweed treatment, and providing City natural resource related updates on pollinator gardens, the Climate Action Plan, and the beaver strategy.
RC 1-6: The City will work with Marion and Polk Counties and the City of Keizer to coordinate stormwater management programs and activities within the greater Salem-Keizer Urban Growth Boundary. Coordination may include the establishment of appropriate intergovernmental agreements (IGAs) regarding potential uniform stormwater design	Review and update the October 2000 SKAPAC Stormwater Management Agreement by the end of the permit term to reflect each jurisdiction's respective MS4 Permit and SWMP.	Report on significant coordination activities or programs. Report on completion of SKAPAC Agreement and other IGAs.	**Ongoing**: Stormwater staff continued to work with Marion County, the Marion Soil and Water Conservation District, the City of Keizer, the City of Albany, and the City of Corvallis through the Mid-Willamette Valley Outreach Group (MWOG) to coordinate outreach pertaining to Erosion Prevention and Sediment Control and Low Impact Development practices (see RC 5 and CON 1). Staff also participate on a Stormwater Advisory Committee with Marion County and City of Keizer. There were no new IGAs developed during this reporting period; however, staff did meet with Polk County Community

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
standards, operations and maintenance activities, and public education and involvement efforts within the UGB.			Development staff near the end of the reporting year and are starting the process of creating an IGA for assisting with erosion control permits within the Urban Growth Boundary.
RC 1-7: Evaluate existing detention facilities and potential new detention sites for potential conjunctive uses (as water quality facilities and for retrofitting opportunities). Continue to perform facility site searches to locate ponds, wetlands, vegetated swales, and other water quality facilities as existing water quantity and quality facilities are evaluated and potential new sites are identified. Coordinate with RC1-1 and RC1-2.	Complete a retrofit plan before end of year four of the MS4 permit cycle. Develop a strategy to identify and prioritize potential retrofit projects by November 1, 2013. Identify a minimum annual budget for stormwater retrofit projects as part of the retrofit strategy by November 1, 2014.	Report on available budget and completion of retrofit project efforts.	**Completed**: The Stormwater Retrofit Plan was completed and submitted to DEQ on October 28, 2014. **Ongoing**: During Reporting Year 2017/2018 a prioritization tool was refined and went into use for ranking potential retrofits so they could be placed into the City's Capital Improvement Program (CIP). For FY 21-22, $50,000 was budgeted for completion of a retrofit project out of the CIP. Additional money is allocated within the Stormwater Program budget for small-scale retrofit projects that can be done in-house or with assistance from a contractor. **Completed**: During reporting year 2021/2022, no retrofit was completed using the money in the CIP budget. The pool of money will continue to grow and be used for the next retrofit project. Money from the Stormwater Quality budget was used to retrofit a detention basin with water quality media and plants to add treatment along Kuebler Blvd.
RC 1-8: The City will continue to be an active member of the Oregon Association of Clean Water Agencies (ORACWA). The City will use this medium to obtain copies of materials that have been produced by others. City staff will stay current on latest available educational and technical guidance materials.	Attend a minimum of one stormwater-related workshop or conference annually. Attend groundwater-related workshops and conferences as funds allow. Make information obtained at these events available to other City staff.	Report on City participation with ORACWA events.	**Ongoing**: Public Works staff continued to actively participate in Oregon Association of Clean Water Agencies through attendance at regularly scheduled meetings for the Stormwater, Pretreatment, Education, and Water Quality Committees. Staff have also engaged with the Willamette River Mercury TMDL process, and the MS4 phase 1 permit renewal efforts. Staff attended the annual Stormwater Summit in May that was held virtually. Information acquired through ACWA meetings/events is routinely passed on to other City staff, and as much as possible staff that don't normally attend meetings are included on meetings that have information relevant to them.

Table 3. RC2—Capital Improvements

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 2-1: Implement stormwater projects (including stormwater conveyance, quantity, quality, and stream/habitat improvement) based on priorities established under the Capital Improvement Program (CIP) and the Stormwater Master Plan consistent with available funding.	Include a funding line item for CIPs in proposed stormwater budget. Review and prioritize CIPs and budget annually. Implement CIPs based on prioritization and available funding.	Track number and description of projects completed. Report updated CIP list annually.	**Seven projects have been documented for both RC 2.1 and RC 2.2.** **IN PROGRESS** A. Shelton Ditch Bank Stabilization - Design is 60-percent complete and construction is planned for Summer 2023. The work includes construction of stream bank stabilization and mitigation measures in multiple areas along the Shelton Ditch corridor. B. Goldcrest Brook Stormwater Improvements – Design has begun for improvements along portions of Goldcrest Brook to stabilize the channel and banks from erosion and restore habitat function. C. Elderberry Drive Stormwater CIPP – Improvements include repairing a section of an existing 18-inch concrete stormwater pipeline that has collapsed and installation of an 18-inch CIPP liner. Construction to begin soon. **COMPLETE** A. MCCC South Open Space Wetlands B. 2020 Stormwater Improvements C. Fairview and 12th D. Camelia Drive Storm Drainage Improvements
RC 2-2: Continue to coordinate capital improvement projects with the Water Resources Section to integrate multiple resource agency permitting needs. The review is intended to identify integrated opportunities and permitting needs to meet water quality-related requirements.	Review and integrate multiple resource agency permitting needs, including MS4 permit requirements, into 100 percent of CIP projects.	Track number of projects reviewed. Track number of projects permitted.	See RC 2.1 above for information.
RC 2-3: The City continues to acquire physical access-easements for public and private stormwater facilities. This is done by identifying existing facilities for which easements, rights-of-way, or permit-of-entry agreements are needed for stormwater facilities; and developing a plan for acquiring the same, given current funding limitations.	Within one year of completion of the hydromodification study and retrofit plan, prioritize easement acquisitions for stormwater facilities. Following prioritization, identify funding source(s) for inclusion in budget.	Report on easement acquisition and prioritization process.	**Completed**: The Retrofit Plan and Hydromodification Assessment that were submitted to DEQ by the November 1, 2014, deadline identified prioritized areas for stormwater improvement projects. **Prioritization**: The Stormwater Master Plan update specifies projects to be constructed, many of which may require acquisition of easements. As needed, easement acquisitions will be prioritized and pursued as projects are funded. Easement acquisition costs will be factored in and budgeted for along with all other associated project costs.

Table 4. RC3—Update of Stormwater Design Standards

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 3-1: Continue to encourage the use of structural BMPs for stormwater quality improvement and flood peak reduction opportunities. Develop stormwater quality design and associated maintenance standards for new and redevelopment. Continue to evaluate opportunities to provide incentives for alternative stormwater management practices, including Low Impact Development (LID). Maintain and update the Stormwater Management Design Standards after they are developed.	Develop incentives for LID and other stormwater quantity and quality management practices. Develop updated stormwater design standards to include structural stormwater quality BMPs. Maintain Stormwater Management Design Standards and update as needed.	Document revisions made to Stormwater Management Design Standards. Document the development of any incentives for implementation of LID techniques.	**Completed**. Incentives for Low Impact Development (LID) have been incorporated into Salem's Stormwater Utility in the form of credits that allow the impervious surface-based portion of the utility fee to be reduced based on the presence of stormwater quality and quantity facilities on the ratepayer's property. The first phase of the Stormwater Utility fee was implemented in January 2013 and the utility was fully implemented January 1, 2016. Stormwater Design Standards were approved as Administrative Rules completed in late 2013 and have been effective since January 1, 2014. The new standards are consistent with stormwater regulations and include design criteria for green stormwater infrastructure.
RC 3-2: Continue to implement process to identify and remove barriers for implementing LID techniques. Update the Stormwater Management Design Standards and associated Salem Revised Code (SRC) provisions as appropriate.	Within three years of implementing the revised stormwater design standards, review and, as appropriate, modify design standards and SRC to minimize barriers to implementation of LID techniques.	Document the review of design standards and SRC to minimize barriers to implementation of LID techniques.	**Completed**. Barriers to implementing Low Impact Development techniques have been identified and modified through Ordinance 34-13, which was adopted by Salem City Council on November 4, 2013. Updating the Stormwater Management Design Standards related to LID techniques was completed in late 2013 and new standards became effective on January 1, 2014 (see RC3-1).
RC 3-3: City staff is implementing the Water Quality Development Standards set forth by SRC Chapter 141 for all development requiring a Willamette Greenway Permit.	Implement Water Quality Development Standards in Willamette Greenway.	Track number of Willamette Greenway Permits issued, and description of water quality measures employed. Track number of new facilities constructed.	**Ongoing**: Willamette Greenway permits are processed as either conditional uses or as administrative conditional uses, depending on their location. Greenway permits are tracked through AMANDA, the City's permit tracking system. Requirements from SRC 71 (Stormwater Code) and associated Design Standards for use in the Greenway are incorporated as appropriate. **Permitted and constructed:** One greenway permit was issued in FY 2021/22 for an addition to an existing single-family residence. The addition is currently under construction. Conditions of approval were placed on the property to plant a mix of 6 overstory trees, 55 understory shrubs, and native grass as ground cover. No native vegetation in the Willamette Greenway was proposed to be removed.
RC 3-4: Continue to review all residential, commercial, and industrial plans submitted for City-issued building permits for compliance with the City's Stormwater Management Design Standards. Conduct inspections of completed projects prior to the City's acceptance of those projects and project close-out to ensure work was done in accordance with approved plans. Maintain database of plans reviewed and final inspections conducted. See IND1-Task 2 for standards specific to industrial facilities.	Review all residential, commercial, and industrial plans submitted for City-issued permits for compliance with the City's Stormwater Management Design Standards and associated SRC provisions. Conduct inspections once construction is completed to ensure work was done in accordance with approved plans.	Maintain database of plans reviewed and final inspections conducted.	**Ongoing**: All residential, commercial, and industrial plans submitted for City-issued permits are reviewed by Public Works staff for compliance with Stormwater Design Standards. Construction of stormwater-related facilities are inspected by Plumbing Inspectors within Community Development and/or Public Works to ensure that work was done in accordance with approved plans. All plan reviews and inspections are tracked in AMANDA, the City's permit tracking database.

Table 5. RC4—Operations and Maintenance

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 4-1: Continue with the existing street sweeping schedule for all areas, maintaining the record of observations, quantity, and quality of material collected in daily log books. Collect and compile this information for making recommendations for modified methods, schedules, and for NPDES MS4 permit annual reporting and overall program evaluation.	Review street sweeping program annually for effectiveness and any necessary revisions to sweeping schedule. Continue sweeping City streets on four-zone schedule, sweeping heaviest zone eight times per year and lightest zone two to three times per year. Continue sweeping City-owned parking lots as needed.	Record quantity of material collected during sweeping operations. Record number of curb-miles of streets swept. Track and report changes made to sweeping schedule, if any.	**Ongoing**: The City uses three regenerative air sweepers to sweep residential and collector streets that have been categorized as having High, Medium, or Light debris accumulation. Previously only two operators swept residential and collector streets. The heavy debris accumulation zone contains 19 routes and is swept 13 times per year. The medium debris accumulation zone contains 15 routes and is swept eight times per year. The light debris accumulation zone contains eight routes and is swept six times a year. Central Business District (CBD) and Capitol Mall is swept at night on a weekly basis. Heavy debris areas within the CBD are also swept three times per week during summer and twice per week in fall through spring. Arterial streets are swept at night, approximately every four weeks. A fourth machine is operated during peak leaf season or when one of the other machines is broken down. Three operators sweep residential and collector streets during the day and two operators sweep arterial streets during the night. City-owned parking lots are swept on an as-needed basis. The City does not sweep any commercial parking lots. Note: We are in the process of reconfiguring all routes so they are uniform in size and more conducive to avoid garbage days. Note: In October 2021 we launched the street sweeping schedule on the City website. It was well accepted but many suggestions have been made to improve the website. We will strive to make the website more user friendly and easier to understand so residents can know when the sweepers will be in their neighborhoods so they can move vehicles off the street and more curbs can be swept and more debris removed from the street. **Stats**: During this reporting year the City swept a total of 18,797 miles and removed approximately 2,654 cubic yards of leaves.
RC 4-2: The City will continue to perform de-icing operations in a way that minimizes stormwater pollution such as conducting annual inspections and training to ensure proper operation of the de-icing chemical storage facility, utilization of the expanded covered storage areas for de-icing materials, maintaining proper function of sediment traps and catch basins in the storage yard, and coordinating de-icing activities with Airport Operations and their 1200-Z permit. The City is also looking for ways to improve current operations by investigating and evaluating potential cost-effective recycling opportunities for used de-icing sand material.	Continue current de-icing operations to prevent stormwater pollution. Investigate potential cost-effective recycling opportunities for de-icing sand material.	Document review of recycling opportunities. Document dates of activities for annual inspections and training. Document de-icing quantities applied annually.	**Ongoing**: We experienced 12 response days for snow and/or ice, three of which included plowing or sanding. We applied 15,320 gallons of Freezgard Zero liquid deicer (magnesium chloride based) and 732 yards cubic yards of sanding rock was placed during FY 2021-22 over a single event which had a duration of three days. **Training**: Annual training for snow and ice operators occurred on October 19, 2021. Our annual equipment inspection and set up for snow and ice season began in September 2021 and involved inspection of our plows, deicing facility, deicing spray bars, and epoke sanders. Equipment was inspected by our Fleet maintenance department and certified as to its functionality and operability for the upcoming season. Our deicing facility was inspected by staff to ensure the containment area was secure, prox entry for deicer distribution was functioning, and all connections and plumbing lines were free of defects and leaks. Our quantities of deicer materials utilized during snow and ice season are maintained in our Units of Accomplishment database annually. **Reuse:** Currently sanding rock is re-used as fill for old gravel pits that are no longer in use and is not disposed of in a landfill.
RC 4-3: Continue to review and update the O&M practices and activity schedules defined in the Drainage Program Evaluation Notebook (DPEN) (including updating GIS database). Utilize Hansen IMS data to develop and refine work programs. This review will serve as a basis for budgeting and allocating resources; scheduling work; and reporting on and evaluating the performance and costs for the overall O&M program and specific activities.	Update DPEN and IMS database activities and schedules. Create line items in budget for specific O&M activities. Review and update O&M practices and activity schedules every three years.	Track revisions made to O&M practices and activity schedules.	**Ongoing**: DPEN is not used; IPS is the database that provides work orders, scheduling, and data tracking. Program also tracks Service Requests (customer complaints) called in through Dispatch. These requests are either taken care of immediately, or TV cleaning work orders are created as follow up. **Budgeted**: The O&M line-item budget for storm Sewer Pipe Cleaning, Stormwater Open Channel System Maintenance, Stormwater Pipe Inspection, and Stormwater Pipe Maintenance equates to $5,047,443. The budget for all operational line items can be found in Table 17.

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
			Reviewed: O&M stormwater practices, policies, and procedures were reviewed in the previous two years at the City of Salem worked towards becoming accredited by the American Public Works Association (APWA).
RC 4-4: Continue to improve the O&M training program and activities especially with regards to safety and protection of water quality.	Conduct O&M safety meetings twice per month. Attend ACWA committee meetings and workshops as scheduled. Conduct weekly tailgate meetings with Operations crews.	Document reviews and modifications to the O&M training program. Record O&M training activities completed. Document ACWA meetings and workshops attended.	**Training**: Staff received training on the new catch basin inspection application. Application has both increased inspections and provides data for more targeted cleaning for areas with heavy sediment loading. Staff continued tailgate meetings and trainings through Target Solutions as required. Due to Covid, no out of state or in-person training were available for staff to attend. **ACWA Participation**: Staff participated in monthly meetings of the Stormwater Committee, Water Quality Committee, and periodic meetings for MS4 Phase I Working Group. Staff also attended ACWA Stormwater Summit virtually.
RC 4-5: Integrated Pest Management (IPM) Program: Salem Parks Operations Division will continue their program for careful monitoring and management of pesticides, herbicides, and fertilizers, and will provide public information. Review and refine the IPM Program during the permit cycle, ensuring proper handling and storage of pesticides, herbicides, and fertilizers.	Review and refine IPM Program during the MS4 permit cycle. Conduct routine inspections of storage facilities for proper storage of materials and chemicals.	Document revisions made to IPM Program. Document inspections of storage facilities.	**Updating**: Representatives from Stormwater Quality, Parks Operations, and Parks and Natural Resources Planning groups continued in their work as a task force to update the City's IPM Policy and Plan. In FY 2021-22, a new citywide IPM Policy was drafted and went through multiple rounds of internal review. The policy is being reviewed by the City Attorney's Office before being sent to the City Manager's Office for review, approval, and distribution. Once the IPM Policy is adopted, an IPM Coordinator will be assigned to oversee its implementation, including development of an IPM operations guidance manual, coordination of an internal IPM Advisory Committee, training resources, and pesticide tracking app. **Documenting**: An electronic pesticide application reporting form was created using Survey123 to allow for centralized reporting. Public Works staff are already using this form, and it will be available for all City departments and contractors once finalized. **Ongoing Inspections**: City staff conduct quarterly safety inspections that include inspections of facilities that contain pesticides and other potentially hazardous materials. Any improper storage is documented during these inspections and provided to the safety committee for resolution.
RC 4-6: Continue the storm sewer cleaning and TV inspection program, concentrating on known areas of localized flooding complaints (this alerts the City to locations of debris build-up and minimizes erosion potential) and persistent operation and maintenance problems, and looking for potential illicit discharges and seepage from sanitary sewers, see ILL2. Also focus on significant industrial/commercial areas where potential illicit discharges may be of concern.	Concentrate storm sewer cleaning and TV inspection on areas with historical problems and high potential for illicit discharges. Inspect 120,000 LF of conveyance system annually.	Track number of inspections; identify areas with persistent O&M problems. Track number of cross-connections found. Track length of conveyance system cleaned and inspected.	**Ongoing**: Our focus remains on cleaning and inspecting the oldest to newest infrastructure within the older parts of the city. Continued root cutting has played a large roll in minimizing the amount of open trench repair work having to be completed. New cleaning and root cutting nozzles were purchased this fiscal year. **Found and corrected:** Two cross-connections were identified during the reporting year. All have been corrected. **Stats**: Storm lines inspected: 85,595 Linear Ft. Storm lines cleaned: 215,845 Linear Ft.
RC 4-7: Continue supporting annual Stream Cleaning Program. More than one half of the stream miles in the City of Salem are inspected annually by walking each stream segment. Using summer interns, the City inspects the riparian areas and streams, picks up litter and garbage, inspects for illicit discharges (ILL2), addresses potential conveyance concerns, and evaluates areas for stream restoration.	Walk 50 percent of the waterways within the City each year for stream cleanup and enhancement. Complete one stream restoration project each year.	Track length of waterways walked each year. Document stream restoration projects completed each year. Document the amount of litter and garbage removed each year.	**Ongoing:** For reporting year 2020-21, stream crew interns inspected and cleaned 61.3 miles of stream channel within the City limits, removing 11,774 pounds of trash and removing 122 cubic yards of green debris. A restoration project along Glenn Creek on City-owned stream bank was conducted, which included removing invasive species such as ivy and blackberry, adding erosion control matting, and planting native shrubs and ferns.
RC 4-8: Continue to regularly inspect and maintain public structural stormwater control facilities. Coordinate with RC4 Task 9.	Regularly inspect all public detention and water quality facilities.	Track number of public facilities inspected and maintained. Track amount of sediment and debris removed from all facilities.	**Ongoing**: This reporting year, 477 publicly owned stormwater facilities were inspected using ESRI Collector app and Survey123; 29 work orders were needed for detention basins and flow control structures, and 103 work orders were needed for water quality and manufactured treatment technology. **Ongoing**: Staff tracked sediment and debris removal in the City's asset management database, IPS. Crews removed 5,164 cubic feet of sediment and debris from water quality facilities and detention basins during this reporting year.

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 4-9: Develop and implement a long-term maintenance strategy for public and private stormwater control facilities. This strategy will identify procedures and/or priorities for inventorying, mapping, inspecting, and maintaining facilities.	Document and implement a long-term maintenance strategy for public and private stormwater control facilities during the MS4 permit cycle.	Track number of private facilities located, mapped, and inspected. Track progress toward developing a facility long-term maintenance strategy.	**Ongoing**: Facilities located, mapped, and inspected include the following: • 706 total stormwater facilities inspections (451 privately owned and 255 public) • 41 previously unidentified stormwater facilities discovered in the field • 75 mis-typed assets were identified • 211 work orders were needed – 140 private and 71 public (for 28 Detention Basins, 100 Flow Control Structures, 63 WQ Facilities, and 20 Manufactured Treatment Facilities).
RC 4-10: Ditch maintenance is performed to assure adequate conveyance, and consists of two components: **1) Ditch Cleaning – Cleaning consists of removal of sediment in the bottom of roadside ditches only as needed for proper conveyance, with limited vegetation disturbance and the use of straw wattles to reduce sedimentation and erosion within the ditch; and** **2) Ditch Mowing –Mowing is typically conducted by inmate crews using hand-held equipment. Vegetation cutting facilitates conveyance and reduces the risk of potential fires in summer months.**	Regularly inspect and maintain 100 percent of City ditches using appropriate water quality BMPs.	Track length of ditch maintenance performed (cleaning and mowing). Track amount of sediment and debris removed	**Ongoing**: Continued yearly inspections of all roadside drainage ditches during mowing process. Visual inspections determine whether ditches need cleaning. Straw waddles are placed periodically in cleaned ditches for erosion prevention. Drainage ditches are mowed twice yearly to reduce fire risk in summer and flooding risk during the winter. **Stats**: Staff mowed 165,503 linear feet and cleaned 96,601 linear feet of ditch. Amount of sediment and natural debris removed was just over 2,581.16 cubic yards.
RC 4-11: Public catch basins are cleaned on a regular basis with a Vactor truck. During catch basin cleaning activities, inspections are done and repairs are scheduled if needed.	Clean and inspect 75 percent of catch basins annually. Periodically analyze the material removed from the catch basins.	Track the number and percent of catch basins cleaned annually. Report on any analysis of removed material.	**Ongoing**: Staff cleaned and inspected at total of 12,959 catch basins (76 percent), yielding the removal of 277.4 cubic yards of sediment/debris from these structures.
RC 4-12: Continue to refine the maintenance program for public and private stormwater detention and water quality facilities. The City maintains an informational packet outlining ownership and maintenance responsibilities and compliance assurance procedures to encourage owners of private detention and water quality systems to perform maintenance. Coordinate with RC 4 Task 9.	Maintain informational package for ownership maintenance responsibilities for detention and water quality facilities. Implement maintenance activities and requirements identified in long-term maintenance strategy (RC4 Task 9).	Track number of information packets distributed regarding private stormwater control facilities. Track maintenance requirements of long-term maintenance strategy.	**Ongoing**: The City provides informational packets and letters to private residents as needed/requested. All new private stormwater facilities that are being constructed have a Private Stormwater Facility Agreement (PSFA) that is part of the recorded property deed. For the reporting year, 21 new PSFAs were recorded.

Table 6. RC5—Public Education and Participation

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 5-1: Develop and implement a public outreach and education strategy with goals, objectives, identified target audiences, partners, identified target contaminants, and messaging. Conduct a public education program effectiveness evaluation of outreach procedures/efforts. Adjust the program based on the results in year five. (See Table A.1 – Public Outreach Program Matrix, June 2008).	Create two public education campaigns from the Public Outreach Program Matrix. Support outreach and educational activities for other divisions. Conduct an effectiveness evaluation of the outreach program before the end of year four of the MS4 permit cycle.	Document public outreach and involvement activities for two education campaigns. Document outreach activities for other divisions. Document the results of the effectiveness evaluation and subsequent changes to the outreach procedures/efforts.	**Ongoing**: The City continues to conduct outreach campaigns created throughout this permit cycle. In addition, the newest campaign is being developed. A social marketing proposal targeting heavy metal toxins is being revised after target audience research was conducted in 2020 and after further staff input. Other outreach campaigns include the Free Tree Program that took place in spring 2022, targeting temperature by increasing riparian plantings (169 Salem residents picked up 639 plants); promotion of the Capital Canine Club, resulting in 31 new members; promotion of the Storm Drain Marking program, resulting in 72 drains marked; promotion of the WE Pledge, resulting in 46 new pledges; and monthly thematic Facebook posts on the City of Salem's Facebook page. **Ongoing**: Outreach and support of other divisions included promotion of the Mayor's Monarch Pledge to provide pesticide reduction information, support on the Tree Planning Outreach Committee to provide outreach increasing tree canopy throughout Salem, the Fall Leaf Haul for nutrient and composting information, and the Climate Action Plan.

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
			Completed: The effectiveness evaluation was completed and submitted to DEQ prior to November 1, 2014.
RC 5-2: Coordinate activities of various groups within the Public Works Department and other City departments' assigned responsibility for public outreach and citizen contacts on stormwater matters.	Quarterly meetings of various groups assigned responsibility for public outreach and citizen contacts on stormwater matters.	Document quarterly meetings and outcomes.	**Ongoing**: Staff met to discuss content for the annual streamside mailer. Outcome: the annual streamside mailer was sent to over 1,800 streamside residents in June 2022. Topics provided in this year's mailer were stream crew function, introduction to the Urban Streamside Program Coordinator, benefits of riparian areas, how to coexist with beavers, streamside stewardship resources, and Marion-Polk system sign ups. **Ongoing:** The natural resources group meets at least quarterly and continues coordinating many of the projects where multiple workgroups are involved, including the following: • **Ludwigia**: Staff worked to complete the second-year treatment of Ludwigia in the Willamette Slough and to plan and prepare for year three of treatment. The goal is to reduce the population of the invasive plant to that which can be managed through hand pulling. • **Integrated Pest Management Policy and Plan:** Staff continued to work on the IPM policy and plan and sought approvals from internal staff and management. It is anticipated that the policy and plan will be finalized in FY 2022-23. (SEE IPM RC 4.5). • **Beaver Strategy:** Staff continued to work on the beaver strategy to determine how beaver incidents will be handled on City property and in streams neighboring private property. An environmental consultant was contracted to draft a Strategic Operations Plan for Addressing Beaver Activity in Salem. The draft plan has been vetted by relevant staff, state and federal agencies, watershed councils, and other environmental groups, and currently awaits review and approval by the City Attorney's office. • **Tree Planting Events:** Staff shares event updates after the events occur. Both riparian and upland tree-planting events took place. This year introduced a pilot program for yard trees in an area of Salem with low tree canopy. Eight events were held, one training event, one tree care event, and six planting events. The City contracts with Friends of Trees to coordinate and manage tree-planting events and volunteers who participate in the events. • **Community Tree Survey:** Staff worked with a consultant to reach out to property owners to determine their interest in street and yard trees and to help Salem develop a yard tree program and associated communications. The survey was conducted October 2021
RC 5-3: Increase the use of community partnerships to carry out outreach goals.	Develop one new partnership per year to carry out outreach goals.	Document partnerships and outcomes of partnership activities.	**Partnered**: A trash cleanup of the Willamette River took place on April 23, 2022, in partnership with the Mid-Willamette Outreach Group (MWOG) and Willamette Riverkeeper. Twenty-eight volunteers were involved, and Clean Streams information was shared at an outreach booth. Planning was conducted for a cleanup event with Willamette Riverkeeper in July 2022 at Wallace Marine Park in Salem.
RC 5-4: Investigate the use of a stormwater utility to provide an adequate funding base to support expanded public outreach (see RC6-2).	Develop a yearly public education budget. Document public education and outreach needs in the Stormwater Utility Implementation Plan.	Document public education budget and expenditures. Document Utility implementation plan showing public education and outreach needs.	**Budgeted**: The Natural Resources Outreach and Education items budgeted in FY 2021-22 includes personnel services, materials, and services, and totals $575,050. This funding covers staff that provide services for education and outreach related to the City's regulatory permits and plans as well as the Youth Environmental Education Program (YEEP). The Natural Resources Outreach and Education budget for FY 2022-23 is $651,710.

Table 7. RC6—Stormwater Management Program Financing

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 6-1: In conjunction with the updated Stormwater Master Plan (RC1-1), review and update the Stormwater System Development Charge (SDC) methodology to address both stormwater quantity and quality.	Adopt updated Stormwater SDC methodology by the end of the MS4 permit cycle.	Report on update to Stormwater SDC methodology.	**Adopted/Completed**: A review and update of the Stormwater System Development Charge (SDC) methodology was conducted independent of the Stormwater Master Plan. A committee consisting of two City Councilors and representatives of the development community, home builders, and residents met regularly in 2017 and 2018. The committee recommended to Council that major amendments to the Stormwater SDC methodology should be postponed until after completion of the Stormwater Master Plan. City Council adopted the SDC methodology update on February 25, 2019, under resolution 2019-7.
RC 6-2: Implement a new stormwater utility capable of generating stormwater fees historically paid for by water and/or sewer utility customers. The new utility will include incentives to encourage users to implement alternative stormwater management practices such as LID.	Adopt new stormwater utility by the end of the MS4 permit cycle.	Report on adoption of new stormwater utility.	**Completed**: The Stormwater Utility was adopted by Salem City Council in December 2010 and the first of four annual phases implementing the stormwater fee took place in January 2013. The stormwater fee is now fully implemented. The fee structure includes credits that provide for reductions in the impervious surface-based portion of the utility fee for ratepayers who have stormwater treatment and/or flow control facilities on their property. Generally, the credit is higher for facilities that are categorized as green stormwater infrastructure than for more traditional stormwater facilities.
RC 6-3: Identify and pursue grant opportunities for stormwater quality projects, including potential retrofit and LID project opportunities.	Pursue grant opportunities as staff resources allow.	Track number of grants applied for each year. Track number of grants received each year.	**Ongoing**: City staff attended two presentations on the State Revolving Fund. However, no applications were submitted this fiscal year.

Table 8. RC7—Maintain and Update GIS System

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 7-1: Continue maintenance of the GIS database and Hansen IMS database. These ongoing updates will also reflect completion of any stormwater Master Plan capital improvement projects, new facilities added to the system, potential "hot-spots" for illicit discharges, refinement of data for the existing system, updated information on wetlands, perennial streams, waterways, and floodplain/floodway designations, and information updated on a periodic basis for the City's Urban Growth Boundary. The GIS database will be accessible by City departments for review purposes.	Continue performing database updates annually. Create record of GIS maintenance activities.	Record maintenance/updates made to database.	**Update as needed:** All stormwater layers are consolidated in the Spatial Database Engine (SDE) and updated as required. All edits are tracked internally in the database with who last updated and created an asset and corresponding dates. In addition, a log of incoming plan sets is maintained by Technical Services that is entered into GIS. Since GIS and IPS are now synced, only tracking one system is required rather than both. The Stormwater GIS data has been made available to City departments via multiple sources including Salem Maps Online, GeoPlanIT, and the GeoWorks web mapping applications. Stormwater GIS and asset data are also available in future asset management systems.
RC 7-2: Integrate the information in GIS and IMS. The City plans to integrate the data from both the GIS and Hansen IMS databases so that information in the Hansen IMS database can be visualized using the GIS system.	Create an action plan for how the GIS and IMS system will be integrated and updated. Implement action plan to integrate GIS and IMS.	Track completion of action plan items. Track implementation status of database integration.	**Completed**: All pertinent stormwater GIS layers were consolidated into feature layers in SDE (Spatial Database Engine) as part of the Stormwater utilities migration from Hansen to Infor Public Sector (IPS). SDE and IPS assets are fully synchronized. GIS data will continue to be updated in future asset management systems and their history will be available for searching.

Table 9. RC8—City Stormwater Grant Program

Task Description	Measurable Goals	Tracking Measures	FY 2021-22 Activities
RC 8-1: Expand matching grant program for watershed protection and preservation to allow for funding of stormwater-related activities, such as promoting water-wise landscaping, reduction of stormwater discharges, restoring riparian areas, stormwater quantity reduction, stormwater quality/treatment, etc.	Continue to fund $50,000 grant program. Expand matching grant program for watershed protection. Promote the grant program in conjunction with RC5 outreach activities.	Maintain a list of grant awards, tracking funding and projects.	**Budgeted**: The City of Salem provided $50,000 for the grant program for FY 2021-22. **Awarded**: Staff conducted 12 streamside site visits and provided grant information to the streamside landowners. No grant applications were submitted, but two streamside landowners have indicated interest for the following fiscal year. The previously approved grant for the North Santiam Watershed Council's post-fire recovery was implemented and reimbursements were provided this fiscal year. **Completed**: The grant provides for watershed protection projects. **Promoted**: The grant was promoted through site visits, at outreach events and via radio.

Table 10. RC9—Legal/Ordinances

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
RC 9-1: In process of revising the Stormwater Management Design Standards (RC 3 Task 1) and developing a stormwater-dedicated chapter to the SRC (RC 9 Task 3), coordinate with Community Development's effort to adopt a Unified Development Code (UDC). It is envisioned that the stormwater dedicated SRC would be integrated into the UDC framework.	Adopt the UDC and integrate stormwater-related revisions to the SRC by the end of the MS4 permit cycle.	Report on progress for adoption of UDC and integration of stormwater related SRC.	**Completed**: City staff incorporated selected chapters of the Salem Revised Code (SRC) into a single, Unified Development Code (UDC). Led by the Community Development Department. The effort involved grouping related sections and subsections of existing chapters of the SRC into the more cohesive UDC format. The new Unified Development Code went into effect May 14, 2015.
RC 9-2: Continue to enforce the SRC and review and revise it as necessary to reflect the updated Stormwater Management Design Standards that principally focus on requirements associated with on-site water quality facilities for new development or redevelopment (RC3).	Revise SRC (as needed).	Track any MS4 stormwater pertinent revisions made to the SRC.	**Ongoing**: Salem Revised Code (SRC) Chapter 20J (Administrative Rule Making and Contested Case Procedures) contains provisions for enforcement proceedings and civil penalties. Subsections in SRC Chapter 70 (Utilities General) were adopted by City Council in December 2012 that clarify inspection procedures for enforcing the Utility Code and establishes operation and maintenance requirements for owners/operators of private stormwater facilities.
RC 9-3: Develop a new SRC chapter dedicated solely to stormwater management. It is currently envisioned that this will be done after the City's renewed MS4 Permit is issued, and in conjunction with implementation of the new stormwater utility and updated	Adopt the new SRC chapter for stormwater by the end of the MS4 permit cycle.	Report on adoption of the new SRC chapter for stormwater, and processes/milestones en route to formal adoption of the SRC revisions.	**Completed**: A new chapter of the Salem Revised Code (SRC) specific to stormwater was adopted in December 2013 and became effective January 1, 2014. An update

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
Stormwater SDC Methodology (RC6) and the updated Stormwater Master Plan (RC1).			to the City's Public Works Design Standards was completed in December 2013 and became effective January 1, 2014.

Table 11. ILL1—Spill Prevention and Response Program

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
ILL 1-1: Continue to review and refine the existing spill prevention and emergency response program to protect ground and surface water quality. New activities will be proposed and implemented as appropriate, and coordination and cooperation among other relevant agencies and ODOT will be maintained and improved. This review will be coordinated with the deicing activities of Airport Operations and their 1200-Z permit, and possibly the Oregon Air National Guard.	Continue to implement the spill prevention and emergency response program and review and revise as needed.	Document refinements to cleanup procedures for vehicular accidents and structural fires.	**Ongoing**: During FY 2021-22, Salem Fire continued to respond to emergencies related to vehicular crashes, structural fires, and hazardous materials incidents utilizing Salem Fire Standard Operation Guideline (SOG) Tactical Guideline #4.16 – Minor Spill Response. This Tactical Guideline provides guidance on Best Management Practices (BMP) for preventing discharge into storm drains. Salem Fire will continue to respond to any spill or leak of de-icing material at the Salem Airport. Salem Fire continues to use Standard Operation Guideline (SOG) #2.6.3 – Live Fire Training, to incorporate best management practices related to the prevention and/or control of materials related to firefighter training. This guideline includes site surveys and procedures to eliminate runoff/discharge from firefighter training exercises into storm drain systems.
ILL 1-2: Continue to coordinate timely responses to, and clean-up of emergency response sites and structural fires among Fire, Building and Safety, Development Services, and Environmental Services staff. The Fire Department has the lead role for response at emergency response and structural fire sites and all major vehicular accidents. Environmental Services (ES) staff will provide assistance when requested by the on-scene incident commander. One of the ES responsibilities is to make sure that the cleanup activities are conducted in an environmentally sensitive manner.	Develop a review schedule with a checklist for the spill response plan.	Track the number and category of spill events responded to, including an estimate of the amount of spilled materials collected and any associated enforcement actions.	**Ongoing:** The Fire Department staff responded to the following:\ Chemical leaks or spills = 31 Vehicle accidents =736 Fuel or oil spills =170 Salem Fire continues to respond hazardous/chemical spills as requested by their emergency dispatch center. If spills and/or leaks are beyond their capability or exceed the amount of equipment carried on their response vehicles, the Fire Department incident commander will request assistance from Environmental Services.
ILL 1-3: Continue to conduct daily City vehicle and equipment inspections for leaks and repairs as needed. Staff will review current procedures on an ongoing basis and implement improvements as necessary.	Continue to implement the daily equipment inspection program.	Report revisions to the daily inspection program.	**Ongoing**: City staff continued to conduct daily inspections of City vehicles and equipment in FY 2021-22. These inspections are documented on weekly inspection sheets that are routinely submitted to Section Supervisors. Per City policy, if a leak/repair is identified, the vehicle/equipment is promptly turned into Fleet for repair.
ILL 1-4: Develop an updated Operations Pollution Prevention Plan; incorporating new/expanded/relocated Operations-oriented facilities.	Update Operations Pollution Prevention Plan by the end of the MS4 permit cycle. Implement updated Operations Prevention Plan upon completion.	Track progress toward updating Operations Pollution Prevention Plan. Track implementation of Operations Pollution Prevention Plan.	**Ongoing**: Stormwater Staff continue to implement the Operations Pollution Prevention Plan, which includes training provided to all new employees and monthly inspection of the Shops complex using an electronic field data collection form and a smartphone or tablet. Staff will make revisions and updates to the Operations Pollution Prevention Plan as part of the new permit. Stormwater staff continue to oversee the management of an onsite recycling facility, including scheduling staff for clean-up, contacting vendors to get items picked up, corresponding with staff, and updating signage to make sure only things that can be recycled end up at the center.

Table 12. ILL2—Illicit Discharge Elimination Program

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
ILL 2-1: Continue to respond to reports of unusual discharges or suspicious water quality conditions within the stormwater system and urban streams. Where able, identify sources/causes and implement appropriate corrective actions. Utilize database to document associated activities.	Respond to reports of illicit discharges and suspicious water quality conditions. Maintain database to document unusual/suspicious discharges, sources found, and corrective actions taken.	Track calls and mitigation actions taken in database.	**Ongoing**: Environmental Services continues to provide staff to respond, 24/7, to reports of unusual discharges or suspicious water quality conditions. Staff responded to **411** water quality related incidences during the reporting year. All responses and corrective measures were tracked in the database. A summary of enforcement actions and inspections is provided in Section 4 of this report. **Stats**: There were five violations during this reporting period.
ILL 2-2: Environmental Services staff will continue inspections of the City's wastewater users, through the pretreatment program, verifying the proper handling and disposal of both wastewater and stormwater.	Inspect City's wastewater users for proper management of wastewater and stormwater.	Track number of inspections and associated findings.	**Ongoing**: During the reporting year Environmental Services staff continued to inspect wastewater users for proper handling and disposal of wastewater and stormwater. Staff completed the following inspections and business contacts during the reporting year: Business Inspections = **204** New Businesses Identified = **44**
ILL 2-3: Work with Wastewater Collection Services to identify and correct cross-connections between the sanitary sewer and stormwater systems.	Review stormwater and ambient stream monitoring data to identify possible cross-connection discharges into the stormwater system. Maintain communications with Wastewater Collections and other City staff to identify any system cross connection problems.	Document number of cross-connections identified, and corrective actions taken.	**Ongoing**: Wastewater Collections provides smoke and dye inspection of lines to identify cross connections. Two cross-connections were identified during the reporting year. All have been corrected.
ILL 2-4: Develop and update a storm sewer outfall dry weather inspection and monitoring prioritization plan.	Prioritize outfalls for storm sewer outfall inspection and monitoring and inspect annually. Coordinate prioritization process with ILL 2 Task 5.	Document review of outfall monitoring plan. Document priorities established for monitoring and inspection. Track dry weather inspections conducted and results of inspection.	**Ongoing**: The RY 2021-22 dry weather outfall screening effort recorded 84 outfall inspections (outfall structures or the first available upstream manhole), 68 of which had observable flow. Of these inspections, 35 were inspections associated with outfalls identified as priority outfalls in the City's Dry Weather Outfall and Illicit Discharge Screening Plan and 49 are deemed secondary outfalls. Outfalls with chlorine detections are investigated further as resources allow. For further information on the results of the inspections refer to Attachment 1. **Stats**: Of the 84 total outfall inspections, 62 outfalls were tested for chlorine including 16 that had some amount of chlorine present and 15 that received additional analytical sampling for field and/or laboratory parameters.
ILL 2-5: Identify and map contaminated sites in the GIS system. With input from other City departments, identify a list of areas where there either has been a substantial spill or there is the potential for a spill or illicit discharge. These areas are identified based on activities on site, history of problems, or specific industry, for example. These areas will be mapped in the GIS system for use across City departments.	Continue to identify and map contaminated sites in the GIS system.	Track number of contaminated sites added to the GIS system.	**Linked**: City of Salem Geoworks is linked to the Oregon Department of Environmental Quality Facility Profiler database which adds new sites to the GIS mapping system used throughout the City. A variety of sources/activities can lead to site contamination (leaks from storage tanks and process lines, releases during loading or off-loading activities, or discharges during accidents or emergencies).

Table 13. ILL3—Illegal Dumping Control Program

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
ILL 3-1: Continue to sponsor the Adopt-a-Street Program. The program is an effective way to get residents involved in keeping the community's streets clean and consequently preventing trash and debris from entering the storm drainage system.	Continue to support the Adopt-a-Street Program.	Record the miles of adopted streets, number of participating groups, and volume of litter collected through the Adopt-a-Street Program.	**Ongoing:** The Adopt a Street Program is up and running at normal capacity. **Stats**: Miles of adoptable streets: 112.55 Miles of streets adopted (including pending): 97.29 Number of groups: 95 (this number includes some individuals) Number of volunteers: 1,423 Pounds collected in 2021: 16,925 **New applications:** The online application continues to bring in several applications which has helped offset the number of groups that have dropped out of the program. This year we lost 11 groups, but had 16 new applications. At the moment we have ten streets up for adoption, and some of these are in the process of adoption.
ILL 3-2: Continue to provide the 24-hour Public Works Dispatch Reporting Center to receive and respond to calls regarding illegal dumping and other environmental complaints/problems and responses thereto. Continue to advertise hotline on City website, utility bill inserts, business cards, public brochures, and consumer confidence reports. As circumstances warrant, publicly report illicit discharges through use of various media outlets.	Continue to operate the 24-hour Public Works Dispatch Reporting Center. Assign reports to appropriate City staff for action, including actions taken under ILL2-1.	Record number and types of reported illegal dumping incidents. Track media outreach when a discharge warrants.	**Ongoing**: Environmental Services provides staff to respond, 24/7, to reports of illegal dumping and environmental complaints received through both the Public Works Dispatch Center and 911 Dispatch Center. Stormwater provides public education and outreach to inform the public of environmental issues. Actions taken when responding to calls includes the completion of "Service Requests," a computerized record of calls received, and actions taken. This database is in the Public Works Dispatch Center. **Staff responded to 411 incidents** during this reporting period.
ILL 3-3: Continue to support the Adopt-a-Stream program, which involves teachers and students in gathering water quality data from streams, thereby providing water resource education to students through experience. The City supports the program by facilitating projects and providing technical assistance and resources.	Continue to support the Adopt-A-Stream Program.	Maintain a descriptive list of adopt a stream program projects, objectives, outcomes upon completion, and number of participants.	**On Hold**: Due to Covid-19 restrictions, staff did not promote the Adopt-A-Stream program. We are looking to begin offering the program during the 2022-2023 school year.
ILL 3-4: Continue to support Marion County in their efforts to provide convenient alternatives for legal disposal of household hazardous wastes and other recyclable materials.	Continue to support Marion County in providing alternatives for household hazardous waste disposal.	Document frequency and type of support activities.	**Ongoing**: Promotion of Marion County related services included waste reduction, recycling, and composting, and was done virtually via newsletters and Facebook social media posts. **Newsletter:** September 2021 – recycling November 2021 – food waste reduction, composting December 2021 – waste reduction **Facebook:** December 2021 – waste reduction, electronics recycling **Radio:** December 20 – 24, 2021 -- electronics recycling
ILL 3-5: Continue to support the annual yard debris cleanup effort.	Support the annual yard debris cleanup effort.	Record amount of debris cleaned up and level of participation.	**Ongoing**: Two Leaf Haul Events were held during 2021 on November 20 and December 11. In 2020 we chose not to staff the site with volunteers because the safety protocols due to COVID made it too much of a challenge. Instead, we began running it as a self-service event, and we continued that again this year **November 20:** Vehicles counted – 183 Cubic yards of leaves collected = 200 **December 11:** Vehicles counted - 62 Cubic yards of leaves collected = 125 **TOTALS** Cubic yards of leaves collected = 325

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
			Approximately 16 volunteers picked up 251 bags of leaves from the homes of 8 senior citizens.

Table 14. IND1—Industrial Stormwater Discharge Program

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
IND 1-1: Environmental Services will inspect stormwater systems while conducting inspections of City-permitted industrial wastewater users, and work with DEQ to coordinate the permitting and compliance processes for industrial users in the Salem area, including DEQ-issued 1200-Z permitted sources, underground storage tank (UST) removal, and site remediation permits issued by DEQ for sources/sites within the City. Coordination options include receiving information on proposed 1200-Z permits, commenting on proposed permits, and meeting periodically with DEQ on coordination efforts.	Inspect stormwater systems while conducting inspections of City-permitted wastewater users. Develop process to coordinate with DEQ on industrial permits within the City.	Track coordination efforts with DEQ. Include stormwater observations as appropriate on inspection reports and follow-up actions.	**Ongoing:** Environmental Services continues to inspect area stormwater systems as part of facility inspections performed under the industrial pretreatment program. Inspection records are maintained in the Environmental Services database. Salem is not a permitting agent for DEQ's 1200-Z program but has been developing a process (consistent with the MS4 permit) to notify DEQ when a site in Salem is undergoing development which may be subject to State permitting. **Process:** Environmental Services notifies the facility owner or contact person by letter. Regional staff for the DEQ Western Region are contacted by email with a scanned copy of the letter sent to the facility.
IND 1-2: During plan review, review industrial facilities for the potential of requiring pretreatment of stormwater prior to discharge based on the industrial activities of the specific facility. Conduct inspections of industrial facilities requiring stormwater pretreatment to ensure structural controls have been built according to approved plans.	Review industrial plans as necessary for additional stormwater treatment. Conduct inspections once construction is completed to ensure work was done in accordance with approved plans.	Maintain database of plans reviewed and final inspections conducted.	**Ongoing:** Environmental Services staff reviewed and inspected 51 industrial and commercial plans.
IND 1-3: Surveys are sent to applicable business classes (restaurants, metal finishers/platers, radiator shops, dry cleaners, printing shops, photo processors, etc.) as part of the pretreatment business survey database, part of the industrial pretreatment program for wastewater. Customers will be surveyed on major on-site activities to identify potential locations for public education, future sampling, and tracking down illicit discharges. Illicit stormwater discharges from these business groups are address in ILL2.	Send surveys to new customers as accounts are opened. Enter survey results into database – on-going as surveys are returned.	Track number of surveys sent out. Track number of surveys returned and entered into database. Track targeted public education activities for specific industries.	**Ongoing:** Environmental Services continues to send or deliver surveys to newly identified targeted businesses. Businesses failing to return the survey are visited by an inspector to obtain the necessary information. Number of grease surveys sent: 3 Number of grease surveys returned: 0 Number of dental surveys sent: 2 Number of dental surveys returned: 2 **Participated:** Environmental Services staff attended the annual Public Works Day, which resumed in June 2022.
IND 1-4: Continue the semi-annual Technical Bulletin for the City's industrial users and produce other materials for these users. This activity is principally associated with the City's wastewater Pretreatment Program but will be used as a vehicle to address stormwater related issues as well.	Produce two technical bulletins for industrial users each year.	Track published technical materials prepared for industrial users each year.	**Continued:** Targeted and individualized (email and/or direct phone call) communication with permitted industrial users continued during FY 2021-22 in order to better ensure compliance with pretreatment and stormwater regulations. This form of communication has proven more effective than continued production of technical bulletins.

Table 15. CON1—Construction Site Control Program

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
CON 1-1: Continue implementation of the Erosion Prevention and Sediment Control program for developments that meet or exceed the threshold indicated in SRC Chapter 75, which includes the submission of erosion prevention and sediment control plans with structural and non-structural BMPs. Review program experiences annually and implement improvements as appropriate including Code amendments if needed.	Implement SRC 75. Conduct annual program reviews. Implement appropriate improvements and/or Code amendments. Perform plan reviews for erosion control requirements.	Track number of erosion control plans reviewed for compliance with SRC 75.	**Ongoing**: SRC 75 continues to be used as the basis for plan review, inspection procedures, and enforcement. **Completed**: An annual internal program review was completed previously. **Reviewed**: Seven Capitol Improvement and 146 Development ESPC plans were reviewed by City staff. In addition, 429 single-family applications were reviewed.
CON 1-2: Continue to train and educate City staff and private contractors about stormwater pollution at construction sites, with an emphasis on prevention and control BMPs. Provide notice to construction site operators concerning where education and training to meet erosion and sediment control requirements can be obtained.	Provide annual erosion control training to City staff and private contractors.	Track education and training programs conducted and number of staff/public trained.	**Conducted**: With partners of the Mid-Willamette Valley Outreach Group, the annual Mid-Willamette Erosion Control and Stormwater Management Summit training was conducted on January 25, 2022, to provide training for regional area contractors and design consultants. **Continue**: Continue outreach of home builders, contractors, and material suppliers concerning standard construction specifications and standard drawing updates. **Certification**: All inspectors maintain a Certified Erosion and Sediment Control Lead (CESCL) certificate, per DEQ requirement.
CON 1-3: Document and streamline site plan review, inspection, and enforcement procedures for the construction site runoff control program.	Complete documentation of site plan review, inspection, and enforcement procedures before the end of year four of the MS4 permit cycle.	Track completion of documented procedures.	**Ongoing**: Use of Survey 123 software to perform field inspections and document record keeping that streamlined these processes. **Ongoing**: Site plan review procedures and checklists are in place and actively used. Staff continues to update the checklists as procedures change. **Ongoing**: Inspection procedures and reports are in place and actively being followed by Public Works Inspectors. Training and accountability on inspection documentation details and photo integration is ongoing. **Ongoing**: Enforcement procedures are adopted and implemented when appropriate. Training on procedures and practices is ongoing.
CON 1-4: Continue to review and update the Erosion Prevention and Sediment Control Technical Guidance Handbook.	Update Technical Guidance Handbook before the end of year four of the MS4 permit cycle.	Track updates made to the Technical Guidance Handbook.	**No change:** No change from previous year cycle report. City Design Standard, Standard Construction Specifications, and Standard Drawings for erosion prevention and sediment control have been implemented and are continued to be followed for all design and construction activities. These three items have systematically replaced the need for the Technical Guidance Handbook.
CON 1-5: Continue to coordinate with the City's 1200-CA Permit for City construction projects subject to its program.	Requirements for 1200-CA compliance incorporated into City construction plans, specifications, and contract documents. Make erosion prevention and sediment control a key agenda item at all pre-construction conferences. Include inspection of all site erosion prevention and sediment control measures as part of City projects.	Track renewal of 1200-CA permit.	**No change:** No change from previous year cycle report. 1200 CA Permits are included in City contract documents. 1200 CA Permit and EPSC enforcement is key discussion point at pre-construction conferences. Inspector inspects all City 1200 CA permitted projects. Continue implementation of Survey 123 software to track and record erosion control 1200 CA inspection.

Table 16. MON1—Monitoring

Task Description	Measurable Goals	Tracking Measures	FY 2021-2022 Activities
MON 1-1: Continue to install and maintain flow and water quality monitoring stations in City waterways to support selection of capital improvement projects, update the hydrologic-hydraulic computer model, and help direct policies to protect the health of these water bodies. The actual rate of installation and the total number of stations will be based on the maintenance requirements of the stations, available funding, and coordination with urban watershed assessments/plans.	Install additional monitoring stations. Monitor the station alarms in conjunction with the illicit discharge control program (ILL2, Task 1). Follow up on potential hotspots or problem areas as may be identified through data analyses.	Track number of additional monitoring stations implemented.	**Updated**: The Stream Quality Alarm (SQA) System went online in 2021. When an alarm is triggered, City of Salem Dispatch is notified, the alarm is recorded in IPS, and Environmental Services is dispatched to investigate the cause of the alarm and to determine whether an illicit discharge is responsible. The alarm system has alerted environmental services to several acute illicit discharges, primarily turbidity plumes moving through the creeks. Some discharges have been successfully tracked to the source and preventative action was taken, while in other instances the source has remained elusive. **Stats:** No new monitoring stations were installed during FY 2021-22. No hotspot or problem areas were identified using the continuous instream monitoring stations this year. Any calls received from the public with concerns about water quality were given to Environmental Services to follow up on, and data was analyzed to see if any noticeable changes occurred. Several pollution concerns found during site visits and field observations were reported by Stormwater staff to Environmental Services staff, which were followed up upon.
MON 1-2: Continue the urban stream and Willamette River water quality sampling program, with emphasis on reviewing and evaluating sampling data to prioritize investigations and improvement/maintenance projects. This sampling augments the monitoring plan included in the City's 2008 NPDES MS4 Permit Renewal application.	Update database for collected data. Review collected data for purposes of trending and benchmarking by the end of the permit term. Follow-up on potential hotspots or problem areas as may be identified by the data review.	Document findings regarding trends.	**Ongoing**: Data is entered into an Excel database as soon as possible after laboratory results are received. Containing all data from 2001 thru present, the Excel database allows for fast data analysis, reporting, and formatting data for import into Aquarius. Data are verified at least twice, once before it is entered into the database, and again on a yearly basis when all data goes under a thorough review before being included in the annual report. The City will continue to update, and compute trends analyses as needed. Every year staff produce an Attachment of Monitoring Data that is included in the Annual Report submission. This summarizes the data for the year and documents any water quality exceedances. This provides a visual comparison of stream health from year to year, and helps staff target where issues may be occurring. **Of note**: Last year, CLA10, was identified as exceeding the E. coli single sample water quality criteria of >406 organisms per 100ml for 10 of the 12 sampling events during 2020-21. This year there were only five exceedances at CLA10, however citywide we did see 12 more total E. coli exceedances than last year, with most monitoring sites having a higher exceedance count. This could be partially due to a rainier spring creating more stormwater during sampling days, and coincidently sampling the Willamette River while the City was actively discharging a sanitary sewer overflow to the river.
MON 1-3: Continue to implement all components (MS4 outfall, instream, pesticide, and macro-invertebrate) of the City's "Surface Water and Stormwater Monitoring Plan."	Implement the City's Stormwater Monitoring Plan, including MS4 outfall, instream, pesticide, and macro-invertebrate monitoring components.	Provide summary statistics for sampling results from each wet-weather season. Track any modifications to the monitoring plan.	**Ongoing**: The City continues to collect data as part of the monitoring requirements listed in Table B-1 of the City's NPDES MS4 permit. Because the permit was administratively extended, the City will continue to implement its "Surface Water and Stormwater Monitoring Plan" and report all results as part of the Annual Report. No changes or modifications were made to that monitoring plan. Attachment 1 contains summary statistics for all sampling that was conducted during FY 2021-22. The City will be submitting a new monitoring plan by November 1, 2022, to ODEQ as required by the issuance of a new NPDES MS4 permit, effective October 1, 2021. New monitoring requirements under this permit include several additional monitoring parameters, including Total Mercury. Stormwater BMP monitoring will be replacing MS4 in pipe stormwater monitoring. All other monitoring types remain the same.

3 PROGRAM EXPENDITURES AND FUNDING SOURCES

Stormwater-related program costs in Salem were historically funded through wastewater rates comprised of a water consumption (flow) component and a fixed user charge. In December 2010, Salem City Council approved the adoption of a separate stormwater service charge or utility. Implementation of the stormwater utility was initiated on January 1, 2013 and completed over a period of four rate cycles.

The stormwater utility was developed to provide an equitable way of paying for Salem's stormwater programs by more accurately and fairly linking the stormwater impacts of the ratepayer's property to the rate paid by each ratepayer. The stormwater service charge is based on each property's impervious surface and an assessment of stormwater programmatic costs that are shared equally among all ratepayers. Additionally, properties that take steps to reduce their impervious surface areas, or that have onsite facilities that reduce stormwater impacts, have an opportunity to reduce their stormwater service charge. There currently is no mechanism for residential ratepayers to reduce their stormwater service charge.

Table 17 provides a summary of the total stormwater program budgeted per result area for the reporting year FY 2021-22 as well as the budgeted items for upcoming FY 2022-23.

Table 17. Stormwater Budgeting

Operational Task/Result Area	FY 22-23 Budgeted Items	FY 21-22 Budgeted Items
Chemical Handling and Disposal	119,280	105,770
Code Compliance - PW	137,440	128,900
Environmental Compliance for Outside Departments/Agencies	232,350	221,370
Environmental Monitoring	849,630	1,539,140
Floodplain Management and Regulatory Compliance	367,758	360,529
Flow Monitoring	253,986	249,204
Green Stormwater Infrastructure Maintenance and Natural Areas	1,051,900	587,010
Mapping and Data Management	363,268	309,534
Natural Areas Management	0*	406,740
Natural Resources Education and Outreach	651,710	575,050
Operational and Technology Transfers - Infrastructure	284,550	241,790
Public Works Dispatch	170,170	143,630
Storm Sewer Pipe Cleaning	616,620	585,200
Stormwater Construction	9,298,810	7,910,470
Stormwater Facility Inspections	227,000	254,940
Stormwater Open Channel System Maintenance	2,544,985	2,267,213
Stormwater Pipe Inspection	603,200	918,000
Stormwater Pipe Maintenance	1,234,730	1,277,030
Stormwater Quality Monitoring	195,800	188,340
Utility Billing and Customer Service	956,500	949,040
Stormwater Infrastructure Planning	1,209,059	1,058,758
Hazardous Materials/Emergency Management; Street Sweeping Services	1,257,830	1,244,050

Debt Service - Stormwater Utility	358,064	358,090
Total	**22,984,640**	**21,879,798**

* Natural Areas have been combined with Green Stormwater for FY 2022-23

4 ENFORCEMENT ACTIONS, INSPECTIONS, AND PUBLIC EDUCATION

Environmental Services staff responded to **411 water-quality-related incidences** during the reporting and reported **five** violations during this reporting period. Actions taken related to these violations are shown in the chart below.

Violations Report for July 1, 2021 – June 30, 2022					
Name	**Date**	**Violation**	**Action Taken**	**Discharge**	**SRC**
Private Residence	07/07/2021	Prohibited Discharge to the Storm Sewer	Warning	Oil	71.050
Popeye's Louisiana Kitchen	10/28/2021	Prohibited Discharge to the Storm Sewer	Citation	Grease and Other debris	71.050
Private Residence	11/16/2021	Erosion Control Violation	Warning	Soil Runoff	71.050
Walgreens Drug Store #11173	11/16/2021	Erosion Control Violation	Warning	Soil Runoff	71.050
Walgreens Drug Store #11173	01/18/2022	Erosion Control Violation	Citation	Soil Runoff	71.050

Erosion control and 1200-CA Permit requirements are an integral part of all City-issued construction plans and specifications. The City of Salem continues to coordinate efforts with Department of Environmental Quality (DEQ) staff regarding 1200-C permitted sites. **This reporting year, 5,797 erosion control-related inspections were conducted by Public Works Inspectors on 829 projects, with 1,107 enforcement actions.**

5 PLANNING, LAND USE CHANGES, AND DEVELOPMENT

The City of Salem Public Works Department Stormwater Management Design Standards (Design Standards) were revised in FY 2013-14 to reflect the post-construction requirements presented in the MS4 Permit. Before these updates were adopted via the City's relatively new administrative rule process, a new stand-alone stormwater chapter (SRC 71) was developed and approved. This new stormwater dedicated chapter was adopted by City Council in December 2013. SRC 71 and the updated Design Standards became effective on January 1, 2014. The Design Standards will continue to be revised as new information becomes available.

5.1 Planning

Salem has completed a multi-year project called *Our Salem,* which is updating Salem's Comprehensive Plan and amending the Comprehensive Plan Map, Zoning Map, and Salem Revised Code. The City Council approved the project in the summer of 2022. The updated comprehensive plan and associated work will guide development in the Salem area. The *Our Salem project was completed in* three phases. The first phase of the project focused on examining the existing conditions of the city and evaluated how Salem could grow under current policies. It resulted in a report card that evaluates whether we are heading in the right direction given current policies. It also resulted in a greenhouse gas (GHG) inventory. The second phase focused on community-wide visioning. It resulted in a vision for future growth and development in the Salem area. The vision, which included goals and maps, will laid the foundation for the final phase of the *Our Salem*

project, the update to the Salem Area Comprehensive Plan. More information can be found at https://www.cityofsalem.net/our-salem.

The City recently updated the Unified Development Code (UDC) to make minor housekeeping amendments, policy-related changes that respond to concerns from the community and implement changes in state law. For example, the UDC update implemented HB 2001 by allowing two-family, three-family, four-family, and cottage clusters in single-family areas. The update also increased Salem's tree preservation regulations.

5.2 Land Use Changes

Four annexations became effective from July 1, 2021, through June 30, 2022 for a total of 51.33 acres.

Location and Description	Number of Acres
38800 Mahrt Avenue SE	0.42 acres
4370 Fisher Road NE	0.96 acres
3821 Ibex Street NE	1.99 acres
7006 Sunnyside Road SE	47.96 acres
Total acres	**51.33 acres**

5.3 New Development

The City of Salem has continued to see a steady stream of new projects at all phases of development. During the FY 2020-21 reporting period, completed projects resulted in approximately 1,781,830 square feet. of commercial impervious area and 1,348,503 square feet of new impervious surface from the construction of new residences added for a total of almost 72 acres. The list below includes development projects and their status between for the reporting year.

	Address	**Description**	**Status**
Commercial/Industrial Development			
SPR-ADJ-DAP-DR22-01	650 2ND STREET NW	Site work including facade alterations, a new parking area, relocated driveway, reconfigured vehicle use areas, pedestrian connections, and new landscaping.	Building Permit Expired
SPR-ADJ22-14	1940 TURNER ROAD SE	A proposed building expansion and site improvements at existing Walmart.	Building Permit in Review
SPR22-08	3970 VILLAGE CENTER DRIVE SE	A proposed mixed-use building with one residential dwelling unit on the second floor above approximately 1,943 square feet of ground floor commercial.	Building Permit in Review
SPR-ADJ-DAP21-30	1275 STATE STREET	A proposal to alter an existing parking lot where existing paved surface is replaced with a new paved surface.	Building Permit in Review

	Address	Description	Status
SPR-ADJ-DAP22-05	4770 LOGISTICS STREET SE	Proposed development of a new 901,000 square foot dry goods and cold storage distribution building.	Building Permit in Review
	2112 LINWOOD STREET NW	Various improvements at Harritt Elementary School including replacement of two portable classrooms, a new concrete pad, resurfacing of an existing playground.	Building Permit in Review
SPR-ADJ-DAP22-25	4688 TRUAX DRIVE SE	Development of three new industrial buildings approximately 424,750 square feet in size, with associated parking, landscaping, and storage areas.	Building Permit in Review
	2713 19TH STREET SE	Development of a new 1,200 square foot accessory building associated with a fuel dealer use and 7,950 square feet of new paving.	Building Permit in Review
SPR-ADJ-DAP22-35	3815 CENTER STREET NE	Two new restaurant buildings within the Willamette Town Center with pedestrian access, parking lot modifications, and landscaping modifications.	Building Permit in Review
SPR-ADJ22-34	4635 SUNNYSIDE ROAD SE	Woodmansee Park improvements including grading, reconstruction of tennis courts, fencing, pathways, shelters, multi-use field, and stormwater improvements.	Building Permit in Review
SPR-ADJ21-23	685 MURLARK AVENUE NW	A proposal to construct a new building at the West Salem Machinery facility, with associated site improvements.	Building Permit Issued
SPR-ADJ21-28	4080 FAIRVIEW INDUSTRIAL DRIVE SE	Construction of an approximately 21,000 square foot warehouse and two retail buildings totaling 9,200 square feet	Building Permits Issued
SPR-ADJ-DAP22-07	3160 CENTER STREET NE	A proposal to construct a new building and site improvements at the existing Marion County Health and Human Services facility.	Building Permits Issued

	Address	Description	Status
SPR-ADJ22-12	3495 LIBERTY ROAD S	Replacement of a portable classroom and reconfiguration and expansion of bus lanes and off-street parking improvements for Salem Heights Elementary School.	Building Permits Issued
SPR-ADJ22-11	1155 CONNECTICUT STREET SE	Add four classrooms, expand a media and multi-purpose room, and relocate an existing off-street parking for Houck Middle School.	Building Permits Issued
	4373 MARKET STREET NE	Development of a new 5,000 square foot accessory building for sports equipment storage at Blanchet Catholic School.	Building Permits Issued
	5500 REED LANE SE	Various improvements at Pringle Elementary School, including building additions, covered play area, and reconfiguration of a parking lot.	Building Permits Issued
SPR-ADJ22-06	1751 AGUILAS COURT NE	Various improvements at Swegle Elementary School including a building addition, expanded parking area, covered play area, and new bike/pedestrian infrastructure.	Building Permits Issued
SPR-ADJ22-16	3509 COMMERCIAL STREET SE	Parking lot reconfiguration for ADA parking and pedestrian access.	Building Permits Issued
	3025 RYAN DRIVE SE	Building additions and reconfiguration of an existing parking lot for a new medical office.	Building Permits Issued
SPR-ADJ22-26	510 IDYLWOOD DRIVE SE	A 2,200-square foot building addition (lobby and offices) for Immanuel Lutheran Church.	Building Permits Issued
	4227 LONE OAK ROAD SE	Building additions for new classrooms, a relocated storage building, and expansion of an off-street parking area for Queen of Peace Catholic School.	Building Permits Issued
SPR-ADJ22-30	3165 LANSING AVENUE NE	Proposed addition of a modular classroom and reconfiguration of an existing vehicle use area.	Building Permits Issued

	Address	Description	Status
SPR-ADJ-DAP22-27	1705 COMMERCIAL STREET SE	Development of a new vehicle use area to accommodate a change of use to office use and an existing single-family dwelling.	Building Permits Issued
NA	3514 COMMERCIAL STREET SE	Site upgrades including landscaping, new parking lot layout, and pedestrian connections for an existing building.	Land Use Complete
NA	3421 25TH STREET SE	Conversion of one existing parking space to a new ADA parking space and the installation of a six-foot-wide paved walkway adjacent to an existing building.	Land Use Complete
SPR-ADJ-DR22-13	4000 DEERHAVEN DRIVE NE	Proposed renovations to Hallman Elementary school including development of a new vehicle use area.	Land Use Complete
	1560 22ND STREET SE	Paving over a 4,491 square foot existing gravel area for use as outdoor storage, with new landscape area for City Shops Complex	Land Use Complete
SPR-DAP22-19	0 36TH AVENUE SE	Development of nine flex buildings with a floor area of 189,066 square feet, and a self-storage use containing six buildings with a floor area approximately 58,000 square feet.	Land Use Complete
SPR22-20	1675 WALLACE ROAD NW	Family Life Church facility a new 8,440-square-foot building addition and site improvements, including a new off-street parking area and pedestrian pathways.	Land Use Complete
SUB22-04	3230 BOONE ROAD SE	An industrial phased subdivision to divide 79 acres into 12 lots ranging in size from 107,483 square feet to 499,672 square feet, in two phases.	Land Use Complete
SPR-ADJ22-32	4835 RIDGE DRIVE NE	To reconfigure and expand an existing off-street parking area at the Pfeifer Roofing facility.	Land Use Complete

	Address	Description	Status
	120 RAMSGATE SQUARE SE	Development of a new dog run and medical oxygen tanks enclosure for an existing veterinary clinic, with associated site improvements.	Land Use Complete
SPR-ADJ-TRV22-36	900 COURT STREET NE	Development of a Vietnam War Memorial. site improvements including walkways, memorial statues and viewing areas.	Land Use Complete
	4567 CAMPBELL DRIVE SE	Development of a new playground, reconstruction of existing sidewalk, picnic shelter, and access driveway with stormwater infrastructure improvements.	Land Use Complete
SPR-ADJ22-31	2980 RIVER ROAD N	A new fuel station with a 5,418-square-foot overhead canopy with 14 fueling positions, and associated site improvements.	Land Use Complete
	3997 CARSON DRIVE SE	Development of a gas station and retail building.	Land Use in Review
UGA-SPR-ADJ-DAP-TRV22-01	4400 BLOCK OF TURNER ROAD SE	Development of a new 193,758 square foot industrial building with associated site improvements.	Land Use in Review
	3501 PORTLAND ROAD NE	Proposed asphalt cap over exposed contaminated soils.	Land Use in Review
	3850 MAINLINE DRIVE NE	Development of two new shell buildings, approximately 7,200 square feet and 2,700 square feet in size.	Land Use in Review
	5775 COMMERCIAL STREET SE	Development of a mixed-use building containing 71 dwelling units and approximately 12,000 square feet of ground floor commercial space.	Land Use in Review
	3950 FAIRVIEW INDUSTRIAL DRIVE SE	A proposed building addition of approximately 1,700 square feet to the existing car museum.	Land Use in Review
	1815 22ND STREET SE	Proposed multi-building industrial park with proposed floor area approximately 84,000 square feet, for property of 11.27 acres in size.	Land Use in Review

	Address	Description	Status
	3130 22ND STREET SE	Proposed 11,260-square-foot building and new off-street parking area.	Land Use in Review
	2465 MADRONA AVENUE SE	A change of use from fruit processor to trailer service and storage, including new paving, parking, and landscaping.	Land Use in Review
	4660 RIDGE DRIVE NE	Parking and vehicle use area expansion, and new stormwater infrastructure.	Land Use in Review
SPR-ADJ22-38	2623 DOAKS FERRY ROAD NW	Proposed interior and exterior alterations to Brush College Elementary School, including a new modular building.	Land Use in Review
	1292 LANCASTER DRIVE NE	Demoliton of an existing building, and development of a new Panda Express restaurant with a drive-through use and associated site improvements.	Land Use in Review
	2839 LANCASTER DRIVE NE	New outpatient medical clinic approximately 6,000 square feet in size, and associated site improvements.	Land Use in Review
	1100 AIRPORT ROAD SE	New electrical service building approximately 700 square feet in size at the Salem Airport.	Land Use in Review
	2142 TURNER ROAD SE	Replacement, like for like, of an existing self-service storage building following fire damage and demolition.	Land Use in Review
SPR-ADJ22-37	681 REES HILL ROAD SE	Development of a water pump station associated with a new subdivision.	Land Use in Review
	1595 CAPITOL STREET NE	Development of an outpatient medical services and laboratories use for property approximately 0.45 acres in size.	Land Use in Review
DR-SPR-DAP18-04MOD1	1233 RIVER BEND ROAD NW	Development of a new plaza area to be used by Mobile Food Units and reduces the size of a previously approved retail building.	Land Use in Review
	2025 LIBERTY STREET NE	Conversion of single family dwelling to new hair salon with associated upgrades to parking and vehicle use area.	Project Complete

	Address	Description	Status
Multi-Family Development			
CU-SPR-ADJ-DAP-DR21-05	255 CORDON ROAD NE	Development of a new 26-building apartment complex with 291 dwelling units.	Appealed to LUBA
SPR-ADJ-DR21-31	3120 BROADWAY STREET NE	A proposal to construct a 60-unit permanent supportive apartment complex for the Salem Housing Authority.	Building Permit in Review
SPR21-35	3931 VILLAGE CENTER DRIVE SE	A proposed mixed-use building with 16 multiple family residential units and approximately 1,000 square feet of ground floor commercial lease space.	Building Permit in Review
SPR-DR22-29	2195 AUDUBON AVENUE SE	A proposed new six-unit multiple family apartment building.	Building Permit in Review
SPR-DAP-DR22-22	1055 SCHURMAN DRIVE S	Development of a new 42-unit apartment complex and associated site improvements.	Building Permit in Review
SPR-ADJ-DAP-DR22-24	5205 BATTLE CREEK ROAD SE	Development of a new 184-unit apartment complex and associated site improvements.	Building Permit in Review
SPR-ADJ-DAP-DR22-10	420 CENTER STREET NE	Development of a new five-story multi-family apartment building containing 157 dwelling units.	Building Permits Issued
	1735 COMMERCIAL STREET SE	Develop one new duplex for a property containing one existing duplex, for a total of four dwelling units.	Building Permits Issued
SPR-DR21-34	3910 VILLAGE CENTER DRIVE SE	Develop a new 9-unit multiple family residential building.	Building Permits Issued
SPR-ADJ-DR22-15	701 LOCKWOOD LANE S	Development of a new eight-unit apartment building within an existing apartment complex, for a total of 20 dwelling units.	Building Permits Issued
SPR-ADJ-DR21-36	226 SALEM HEIGHTS AVENUE SE	A proposal to demolish existing single-family home and develop 10 new apartment units (2 duplex and 2 triplex).	Land Use Complete
SPR-ADJ-DAP-DR22-17	0 KUEBLER BOULEVARD SE	Development of a new 200-unit apartment complex.	Land Use Complete

	Address	Description	Status
CU-SPR-ADJ-DAP-TRV-DR22-02	3230 BOONE ROAD SE	Phase 2 McKenzie Heights complex containing a total of 272 dwelling units, including 12 apartment buildings and 12 townhome buildings.	Land Use Complete
	1851 CORDON ROAD SE	Proposed development of a new 396-unit apartment complex for property with a combined size of approximately 23.3 acres.	Land Use in Review
	4345 SUNNYSIDE ROAD SE	New 24-unit multi-family housing development	Land Use in Review
	1341 WALLER STREET SE	New 24-unit multi-family housing development	Land Use in Review
UGA-PAR-SPR-ADJ-DR22-02	0 27TH AVENUE SE	Development of a 96-dwelling unit affordable housing development containing 11 buildings, clubhouse, and related site improvements.	Land Use in Review
	4375 RICKEY STREET SE	Development of a new 8-unit multi-family apartment complex.	Land Use in Review
Subdivisions			
FRPA-SUB-DAP21-03	3990 OLD STRONG ROAD SE	An application for a 29-lot residential subdivision of approximately 4.46 acres of the former Fairview Training Center site.	Land Use Complete
SUB-UGA-ADJ22-01	2527 ROBINS LANE SE	A phased subdivision to divide approximately 41.62 acres into 178 single family lots, in three phases of development.	Land Use Complete
SUB-UGA22-03	1374 CROWLEY AVENUE SE	A Tentative Subdivision Plan (Jackson Ridge) to divide approximately 14.5 acres, creating 46 lots.	Land Use Complete
SUB-UGA22-02	2490 MICHIGAN CITY LANE NW	A Tentative Subdivision Plan to divide approximately 9.15 acres, creating 47 lots.	Land Use Complete
SUB-UGA22-06	4345 27TH AVENUE SE	A tentative subdivision to divide approximately five acres into 29 lots and stormwater facility.	Land Use Complete
	365 EWALD AVENUE SE	Phased Planned Unit Development containing 130 residential dwelling units.	Land Use in Review

	Address	Description	Status
	0 MILDRED LANE SE	Proposed five-lot subdivision	Land Use in Review
	4120 KURTH STREET S	Proposed six-lot residential subdivision for property approximately 1.5 acres in size.	Land Use in Review
PUD22-01	255 CORDON ROAD NE	A Planned Unit Development Final Plan for Phase 2 of East Park Estates including 79 lots and an open space area.	Land Use in Review

ATTACHMENT 1. SUMMARY OF WATER QUALITY DATA

City of Salem
National Pollutant Discharge Elimination System (NPDES)
Municipal Separate Storm Sewer System (MS4)

Summary of Water Quality Data
For Reporting Year 2021/2022

Prepared by:
City Salem Public Works Department
Stormwater Services
Stormwater Monitoring Staff

November 1, 2022

Table of Contents

List of Figures

(All Figures follow text of this document)

List of Tables

(All Tables follow Figures of this document)

List of Attachments

1.0 Introduction

This document provides all monitoring data collected for the reporting year of July 1, 2021, to June 30, 2022 (RY 2021/2022), in accordance with the City of Salem's NPDES MS4 permit requirements listed in Schedule B(5)(f)&(g). A background narrative for each monitoring element for which data were collected and a brief summary of results for RY 2021/2022 is provided below, and all collected data are provided in the attached tables and figures.

2.0 Monitoring Elements

Specific details for each monitoring element can be found in the City's *Stormwater and Surface Water Monitoring Plan*. Progress toward meeting the monitoring requirements defined in Table B-1 of the City's MS4 Permit are summarized in Table 1. Monitoring site locations are described in Table 2 and denoted in Figure 1, and the parameters analyzed for each monitoring element are listed in Table 3.

2.1 Monthly Instream Monitoring

Sampling of designated urban streams for the Monthly Instream[1] monitoring element is conducted on a predetermined monthly schedule at 24 different locations. This monitoring element includes the collection of grab samples and field measurements on 11 of Salem's MS4 stormwater runoff receiving streams and the Willamette River. Ten of these streams are paired with upstream (at or near where the stream enters the City's jurisdiction) and downstream (at or near where the stream exits the City's jurisdiction or enters a receiving stream) site locations. The eleventh stream, the West Fork Little Pudding River, only has a downstream site location, because the West Fork Little Pudding River starts in the greater Salem area and runs dry during the summer months. The Willamette River has three sites located upstream, mid-way, and downstream of city limits.

The general locations of all sites are provided in Table 2 and Figure 1.

A general suite of water quality parameters are collected for each site, with additional water quality parameters analyzed for the sites within the Pringle Creek Watershed (PRI1, PRI5, CLA1, and CLA10), West Fork Little Pudding River (LPW1), and the Willamette River (WR1, WR5, and WR10).

Water quality parameters collected include:

- Temperature
- Turbidity
- Specific Conductivity
- pH
- Dissolved Oxygen (DO)
- Nitrate + Nitrite as Nitrogen (NO_3+NO_2-N)
- *Escherichia coli (E. coli)*
- Biochemical Oxygen Demand (BOD_{stream})

[1] Identified as "Urban Streams monitoring" in the City of Salem Stormwater Management Plan 2010.

- Zinc -total recoverable and dissolved (CLA1, CLA10, PRI1, PRI5 only)
- Copper -total recoverable and dissolved (CLA1, CLA10, PRI1, PRI5 only)
- Lead -total recoverable and dissolved (CLA1, CLA10, PRI1, PRI5 only)
- Hardness (CLA1, CLA10, PRI1, PRI5 only)
- Total Suspended Solids (TSS) (Before October 1, 2021: LPW1, WR1, WR5, WR10 only, after October 1, 2021: All sites)
- Alkalinity (WR1, WR5, WR10 only)
- Ammonia (WR1, WR5, WR10 only)
- Total Phosphorus (TP) (WR1, WR5, WR10 only)
- Total Solids (TS) (WR1, WR5, WR10 only)
- Total Dissolved Solids (TDS) (WR1, WR5, WR10 only)

Data for this monitoring element are provided in Tables 5 through 8, and Figures 2 and 3.

Some general observations from this reporting period compared to the last two reporting periods include:

- **E. coli** – there were 12 more exceedances this year compared to last year, continuing the trend of increasing exceedances over the past few years.
- **Dissolved Oxygen/Temperature** – After two consecutive hotter years, average DO median levels increased by.6 mg/L over last year and by .9 mg/L over 2019-20 and were the same as what was seen in 2018-19. Temperature followed a similar trend seeing an average median temp a little over 2-2.5 deg C lower than the past two years, very closely aligning to the data from 2018-19.
- **Copper** – there was one Total Cu exceedance this year, same as last year
- **Lead** – there were no Lead exceedances for the 2021/2022 reporting year, no change from the past three years
- **Zinc** – 2021/22 saw four Total Zinc exceedances, one more than last year, and two Dissolved Zinc exceedances, same as last year.
- **Nitrate & Nitrite** – Average Nitrate and Nitrite levels were higher this year than the last two years with an average median value of 1.2 mg/L. This is twice the amount seen in both 2018/2019 and 2019/2021 which saw average medians of 0.6 mg/L.
- **BOD** – no significant change from the past two reporting years was seen.
- **Specific Conductivity** – Average specific conductivity levels were very similar to what has been seen the past 3 years.
- **pH** – No significant change in average median values have been seen over the past four years.
- **Turbidity** – Average turbidity levels decreased slightly when compared to the last three years.
- **Rainfall** – 2021/2022 saw more precipitation than last year, with 5 out of 12 sampling days having measurable rainfall in the preceding 24 hours compared to 4 of 12 from last year. In some areas of town, December 2021 had roughly twice the amount of rainfall as December 2020. January and February 2022 were slightly drier than normal, however rainfall persisted in 2022 throughout the spring and into early summer for a much wetter spring than we've seen the past several years.

2.2 Continuous Instream Monitoring

The City maintains a network of Continuous Instream water quality monitoring stations and stream gauging stations on seven different urban streams within the city. There are currently ten water quality and stream gauging stations and four established stream gauge-only stations (SHE3, PRI4, WAL3, and LPW1) within city limits. Figure 1 identifies the location of each of the existing stations.

The monitoring stations for this monitoring element are positioned in an upstream/downstream configuration. The upstream stations are adjacent to where the stream enters the City and the downstream stations are either above the confluence with another stream or where the stream exits the City's jurisdictional boundary.

Continuous data collected includes:

- Turbidity
- Specific Conductivity
- Temperature
- pH
- DO
- Stage

All data are recorded in 15-minute intervals. All continuous statistical data summaries presented in the various tables and figures were computed using grade A and/or grade B data. **Qualifications for what constitutes grade A and grade B data are provided in Table 9, and monthly medians for collected data are summarized in Table 10. Plots of continuous data are provided in Figures 4 through 6.** There were no significant changes in data trends or exceedances from last year.

The Continuous Instream monitoring element incorporates an alarm system that supports the City's Illicit Discharge Detection and Elimination (IDDE) program. The alarm system is used to record, notify, and prompt investigation of water quality abnormalities that may be indicative of illicit discharges. It serves as an important tool to aid in the elimination of periodic illicit discharges, helps to prioritize dry weather outfall screening activities (see section 2.6), and serves as an outreach/education opportunity for residents.

2.3 Instream Storm Monitoring

Instream Storm refers to the monitoring of MS4 receiving streams during defined storm events. Sampling occurs at three sites in the Pringle Creek Watershed (continuous instream monitoring sites PRI12, PRI3, and CLK1). Data collected are used to increase understanding of receiving waters within the Pringle Creek Watershed and help guide Salem's stormwater management strategies in watersheds throughout the city. This monitoring element was initiated this permit cycle and is expected to continue beyond the current MS4 permit; ultimately providing a dataset for long-term trending and spatial analyses.

Sampling consists of flow weighted composite samples, grab samples, and field measurements. Parameters include:

- *E. coli*

- Dissolved Oxygen
- pH
- Temperature
- Specific Conductivity
- Copper (Total Recoverable and Dissolved)
- Zinc (Total Recoverable and Dissolved)
- Lead (Total Recoverable and Dissolved)
- Hardness
- Ammonia Nitrogen (NH_3)
- NO_3+NO_2-N
- Ortho Phosphorus
- Total Phosphorus (TP)
- BOD_{stream}
- TSS

No storm events were sampled for reporting year 2021/2022.

2.4 Stormwater Monitoring

The City has collected water quality samples from a number of sites throughout the piped MS4 system since 1995. Three monitoring sites are identified in the current monitoring plan, one each for residential, commercial, and industrial land use. The commercial and industrial sites are new sites for this permit cycle, but the residential site had been sampled previously during the last MS4 Permit and continued to be sampled through this permit cycle. Data from this monitoring element will be aggregated with previous data collected from similar land use types. The aggregated datasets will be used to characterize Salem's MS4 stormwater runoff pollutant concentrations by land use and compare them with the ACWA characterized land use concentrations.

No storm events were sampled for reporting year 2021/2022.

2.5 Pesticide Monitoring

No samples for the pesticide monitoring element were collected for RY 2021/2022.

2.6 Priority Dry Weather Outfall/Manhole Screening

The RY 2021-22 dry weather outfall screening effort recorded 84 outfall inspections (outfall structures or the first available upstream manhole), 68 of which had observable flow. Of these inspections, 35 are inspections associated with outfalls identified as priority outfalls in the City's Dry Weather Outfall and Illicit Discharge Screening Plan, and 49 are deemed secondary outfalls. Outfalls with chlorine detections are investigated further as resources allow.

Of the 84 total outfall inspections, 62 outfalls were tested for chlorine including 16 that had some amount of chlorine present and 15 that received additional analytical sampling for field and/or laboratory parameters.

Data for this monitoring element are provided as Attachment A at the end of this document.

3.0 Conclusion

The City continues to meet all monitoring requirements of its administratively extended MS4 Permit. Cumulatively, data collected throughout this MS4 Permit cycle will be used to meet monitoring objectives identified in the City's monitoring plan, while also supporting data analyses.

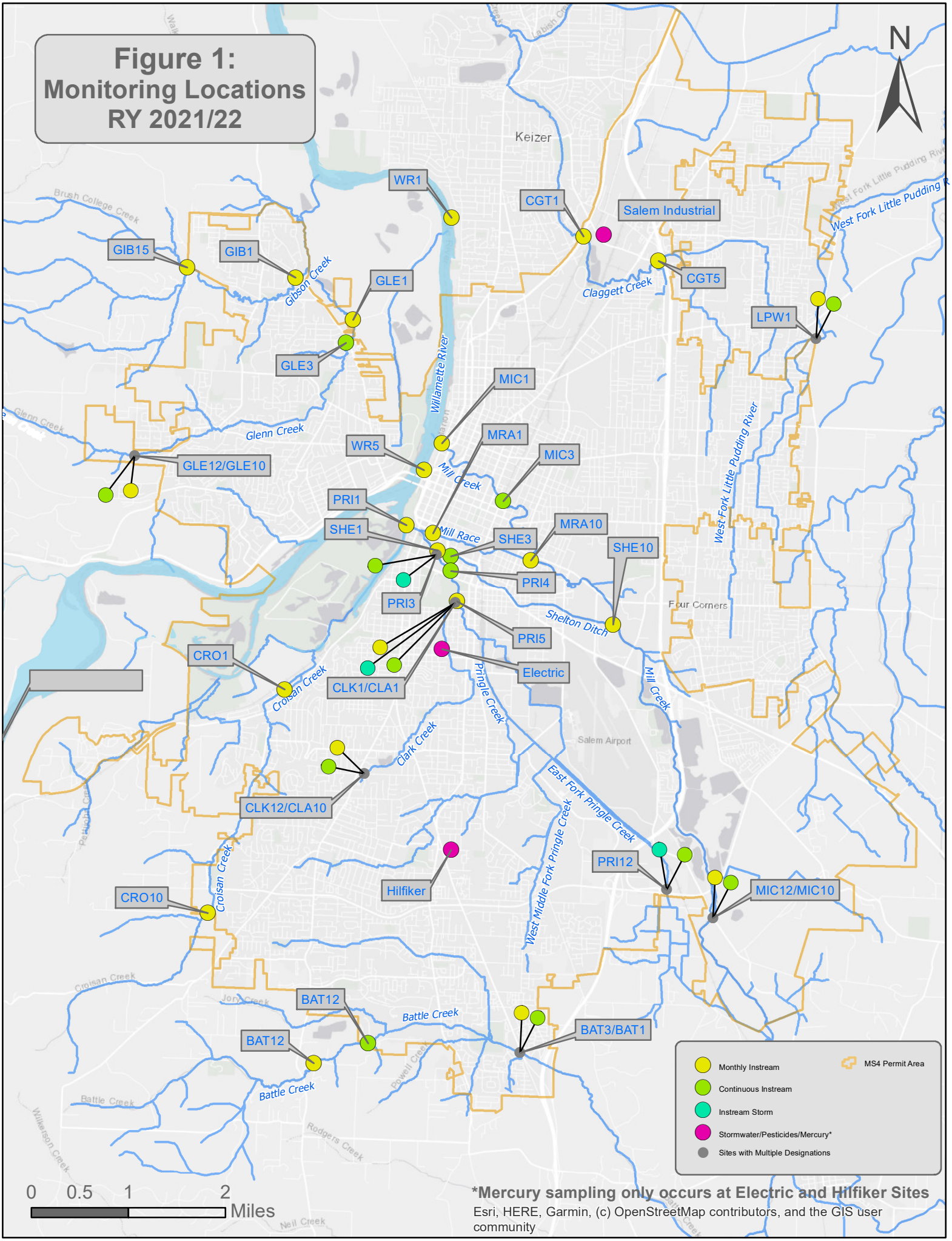
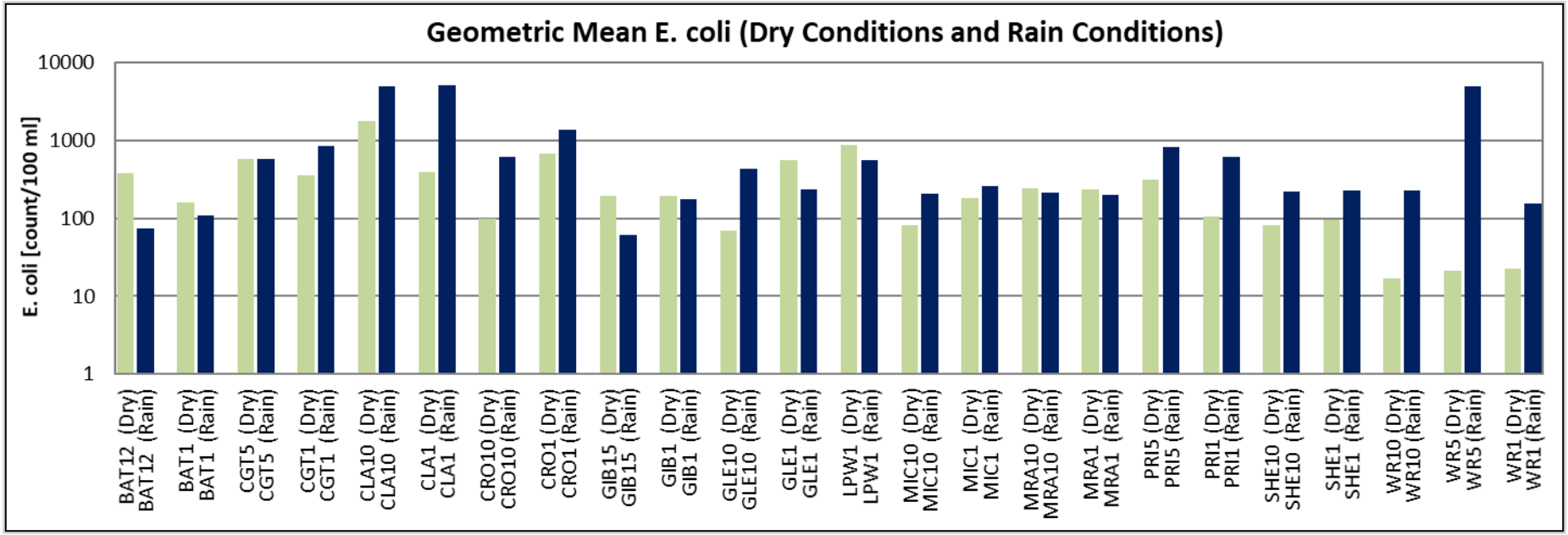
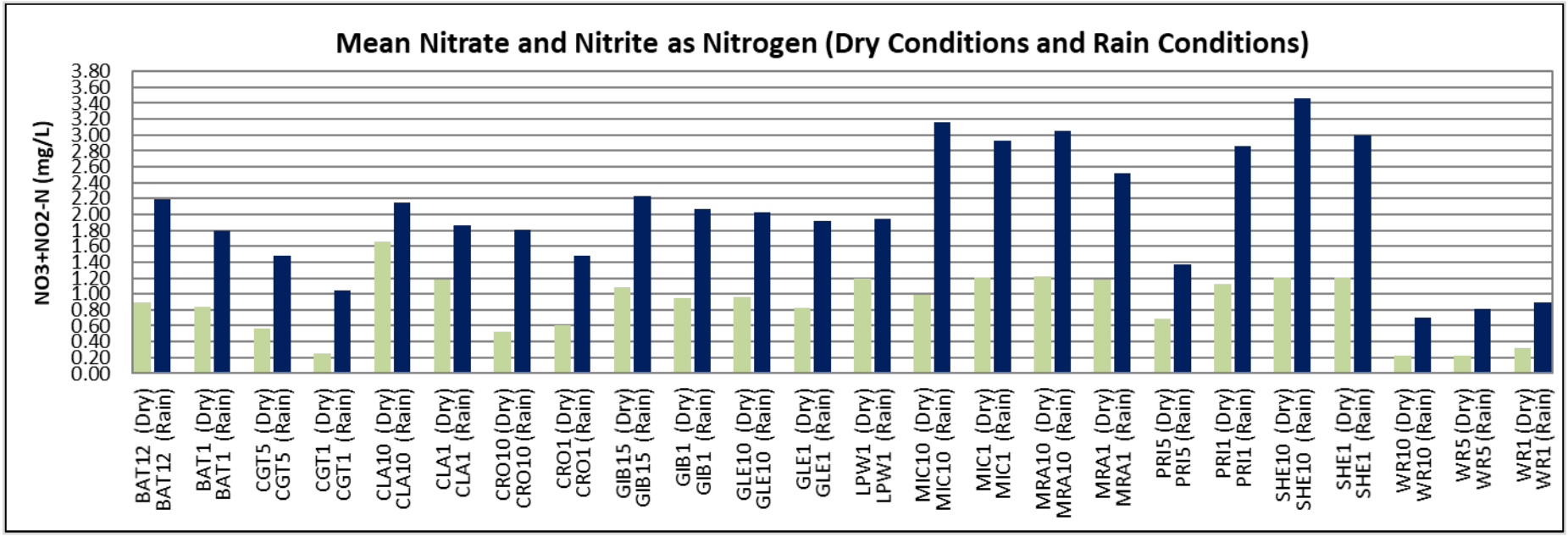


Figure 1:
Monitoring Locations
RY 2021/22
N
Keizer
WR1
CGT1
Salem Industrial
GIB15
GIB1
Gibson Creek
GLE1
Claggett Creek
CGT5
West Fork Little Pudding R
LPW1
GLE3
Willamette River
MIC1
Glenn Creek
MRA1
WR5
MIC3
Mill Creek
GLE12/GLE10
PRI1
SHE1
Mill Race
SHE3
MRA10
SHE10
West Fork Little Pudding River
PRI4
PRI3
Four Corners
Shelton Ditch
PRI5
CRO1
Croisan Creek
Electric
CLK1/CLA1
Pringle Creek
Mill Creek
Salem Airport
Clark Creek
East Fork Pringle Creek
CLK12/CLA10
West Middle Fork Pringle Creek
PRI12
Hilfiker
MIC12/MIC10
CRO10
Croisan Creek
BAT12
Battle Creek
BAT3/BAT1
BAT12
Battle Creek
Monthly Instream
Continuous Instream
Instream Storm
Stormwater/Pesticides/Mercury*
Sites with Multiple Designations
MS4 Permit Area
0 0.5 1 2
Miles
*Mercury sampling only occurs at Electric and Hilfiker Sites
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Figure 2

Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2021/2022)





Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

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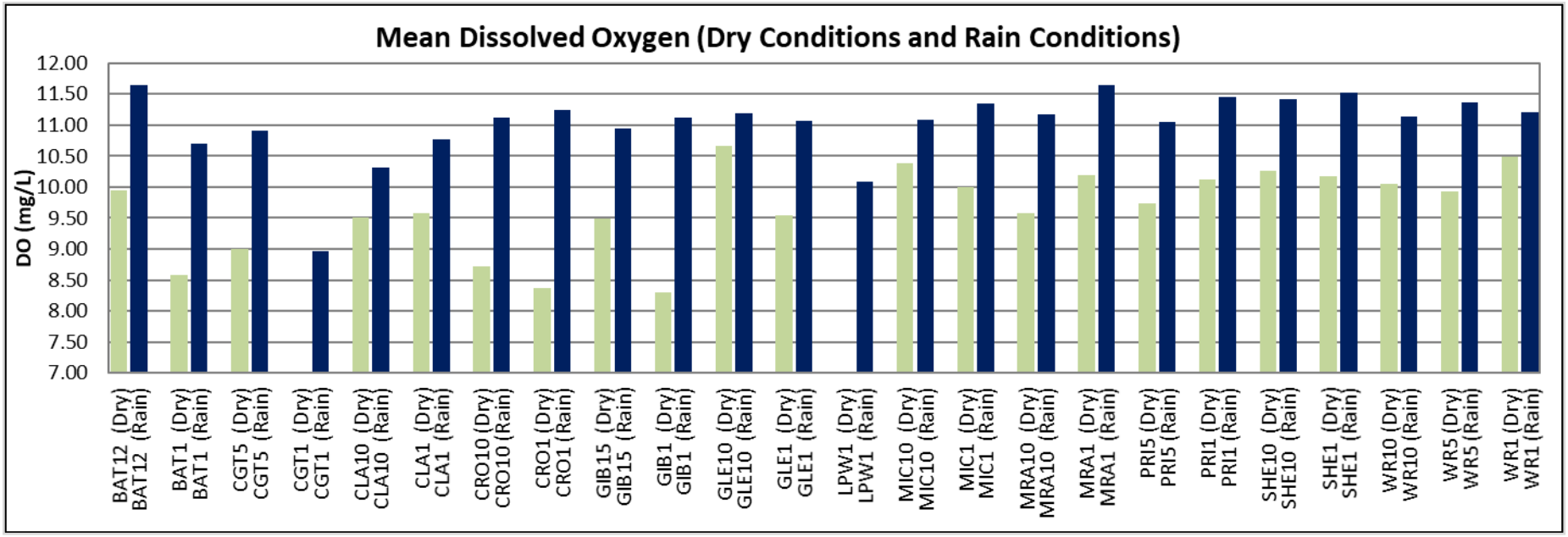

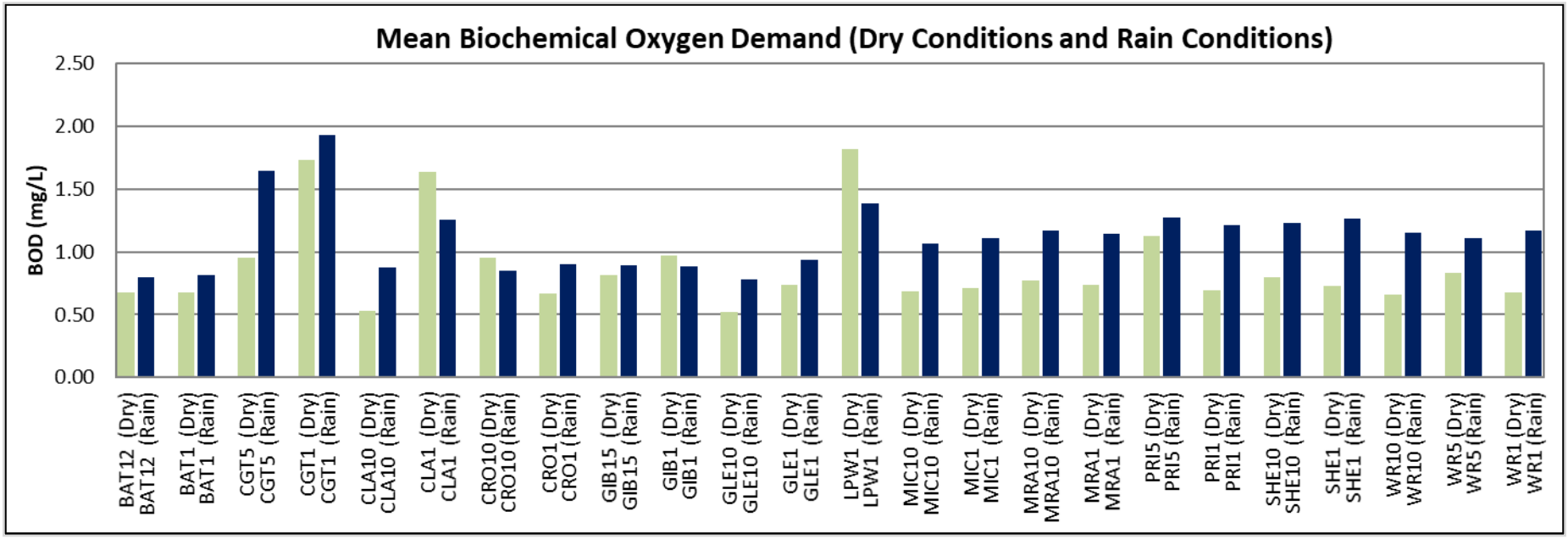

Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

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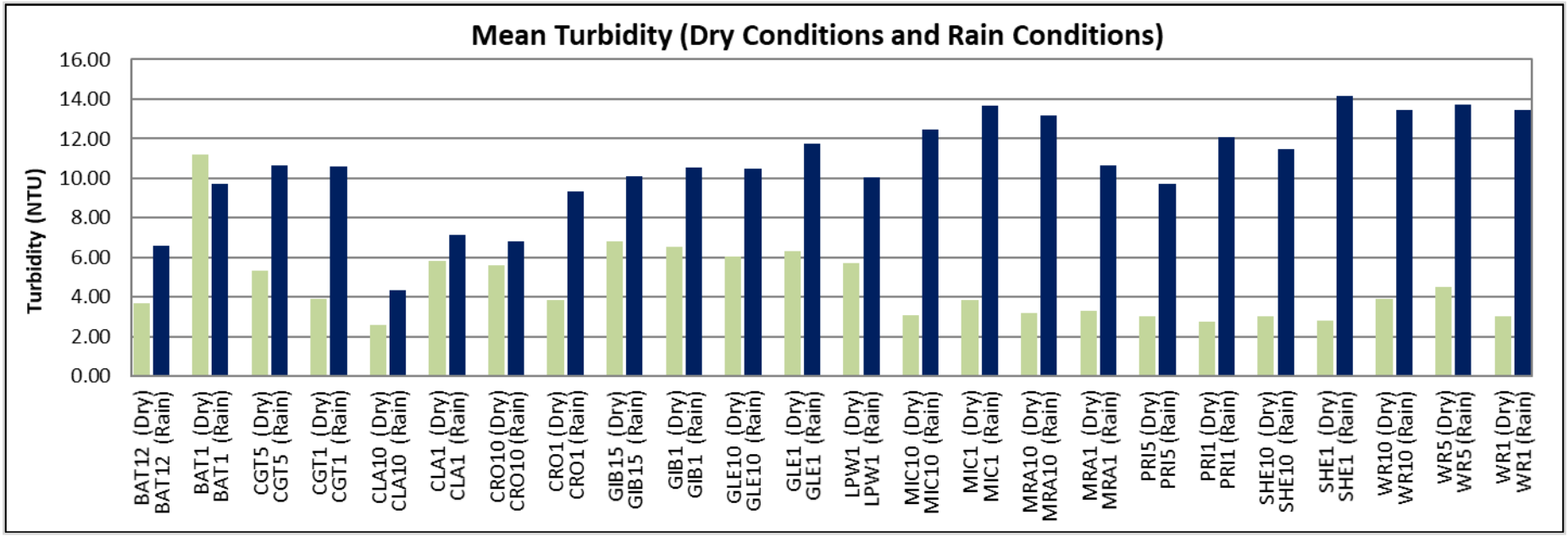

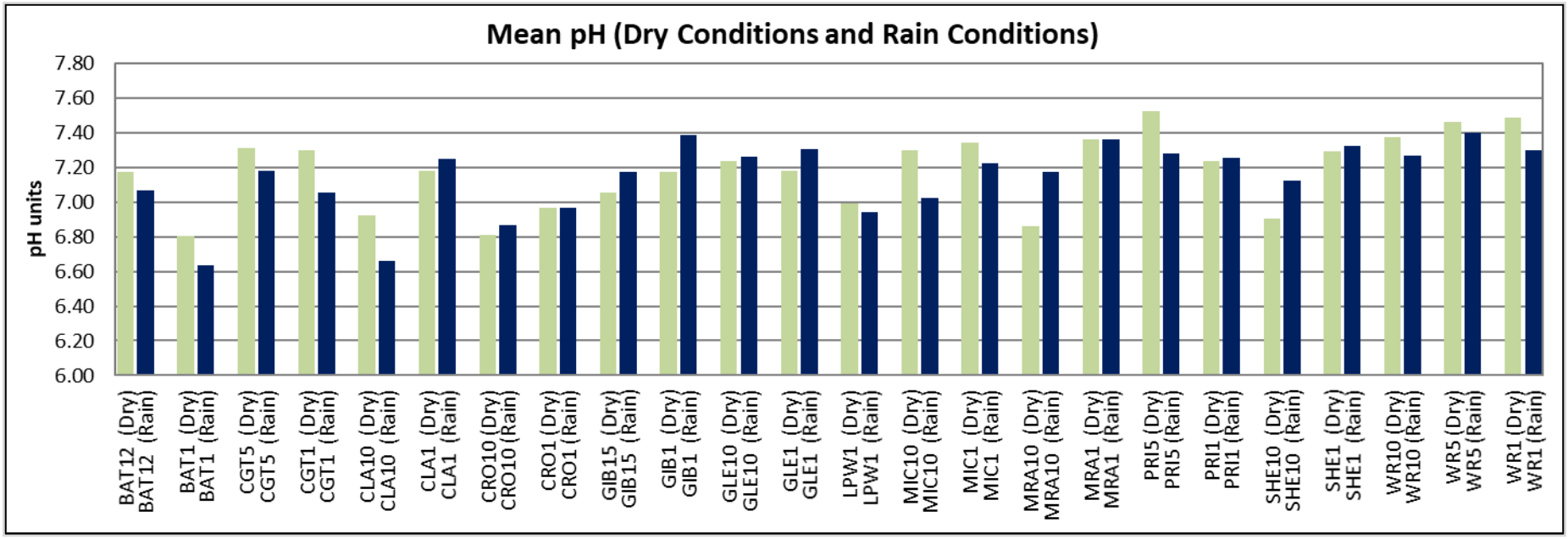

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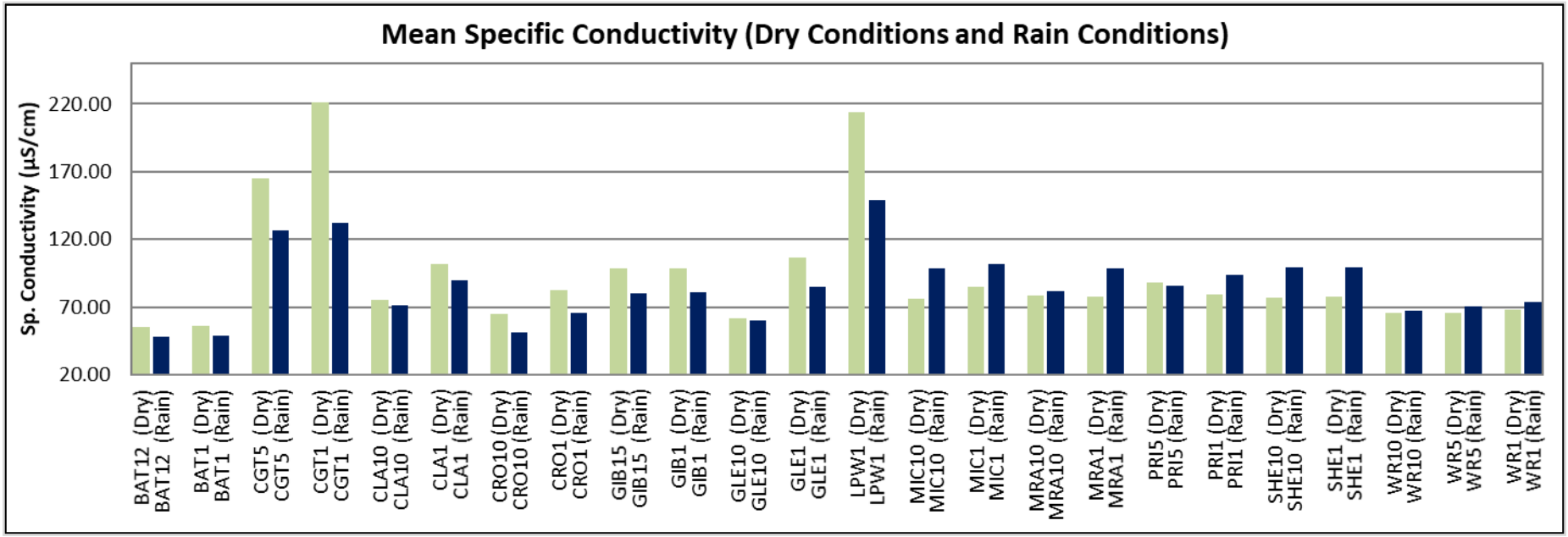
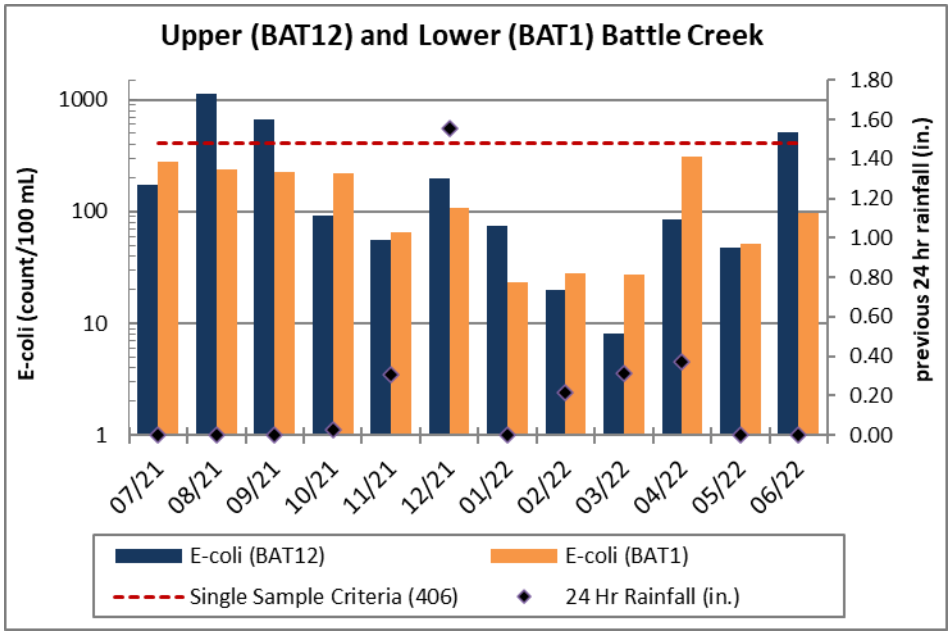
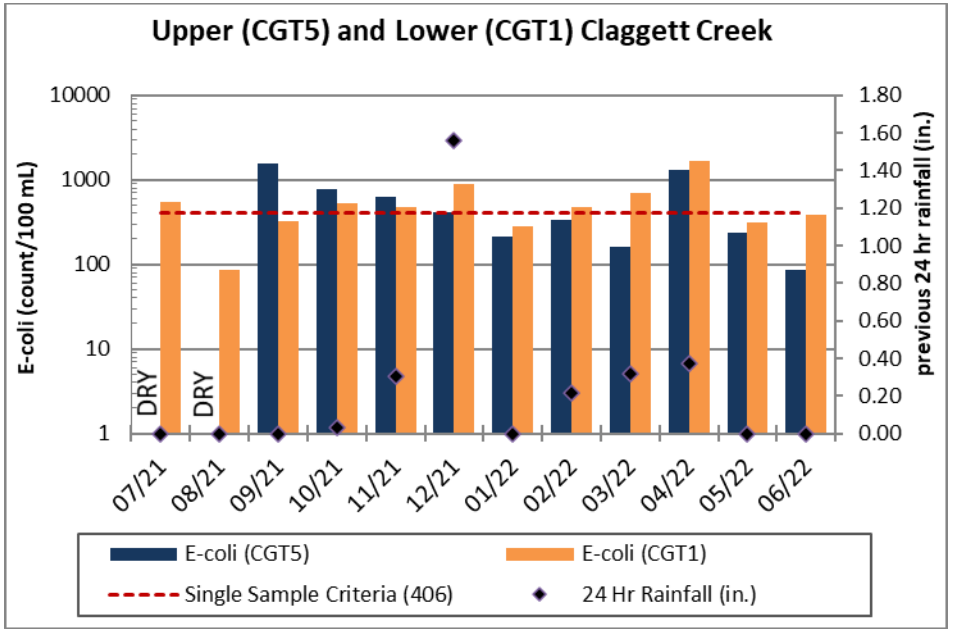


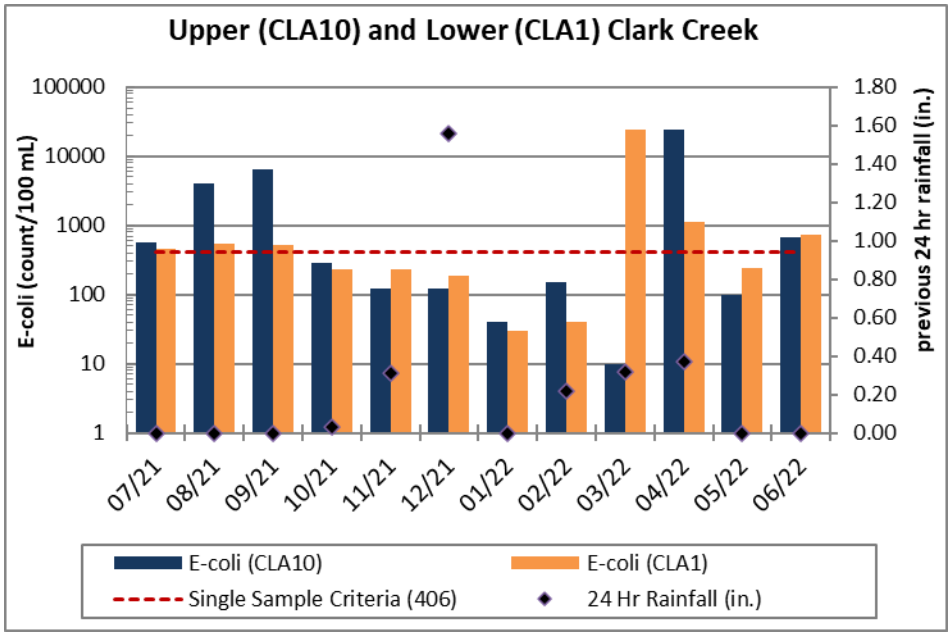
Dry conditions defined as less than 0.05 inches of rainfall in the 24 hours prior to sample collection; **rain** conditions defined as greater than or equal to 0.05 inches of rainfall in the 24 hours prior to sample collection.

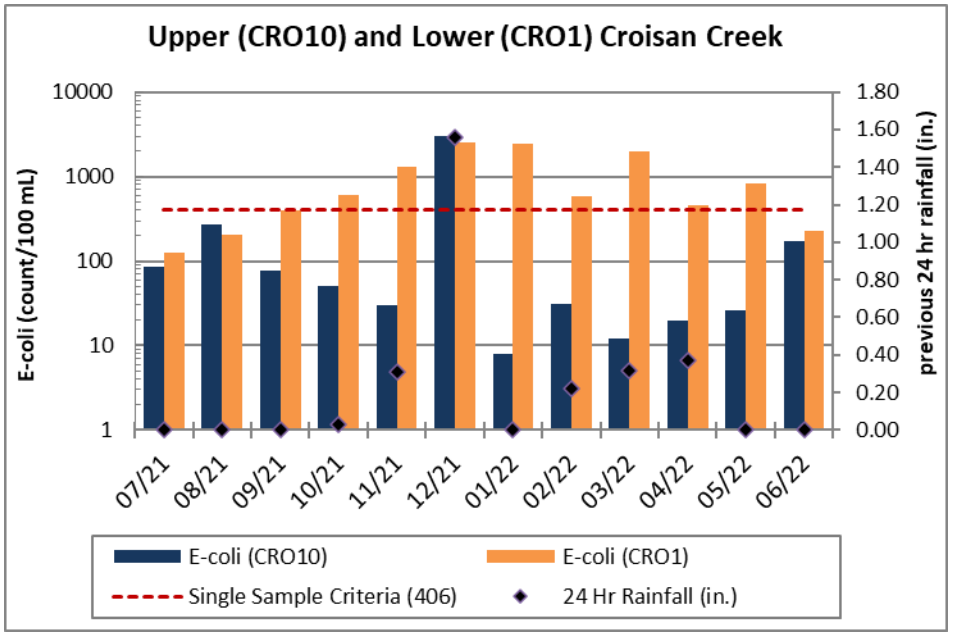
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison (Reporting Year 2021/2022)





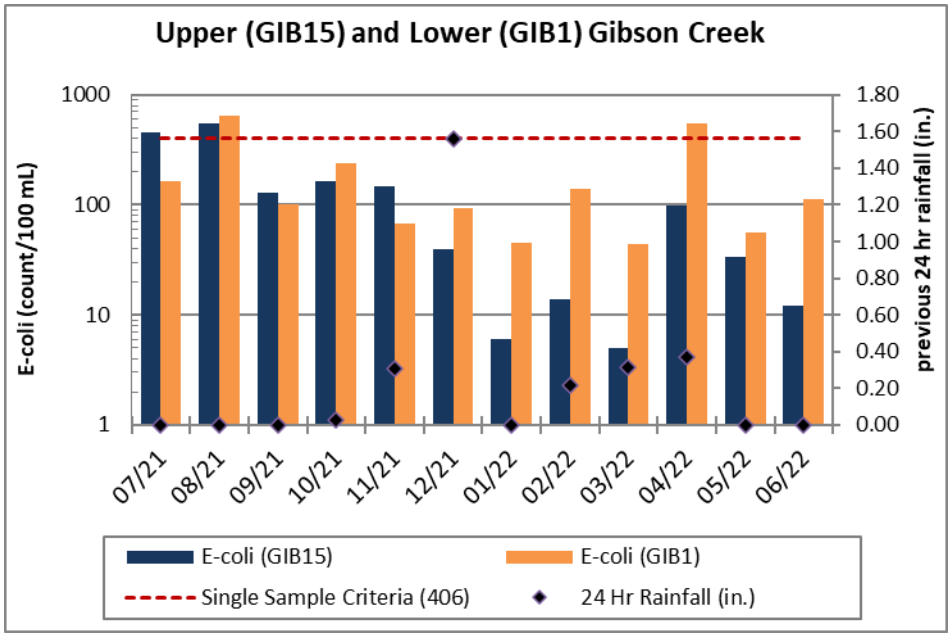


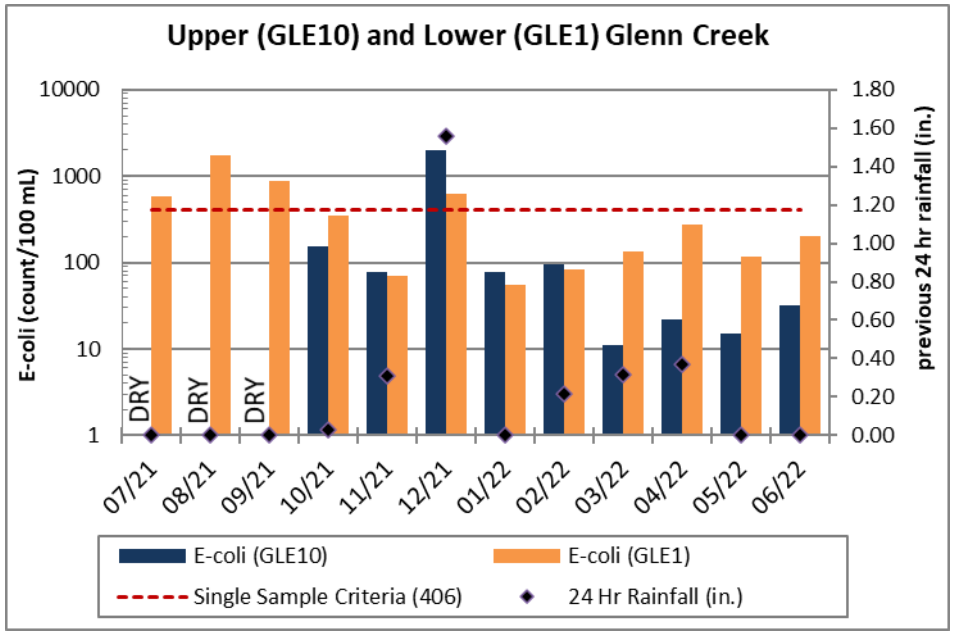


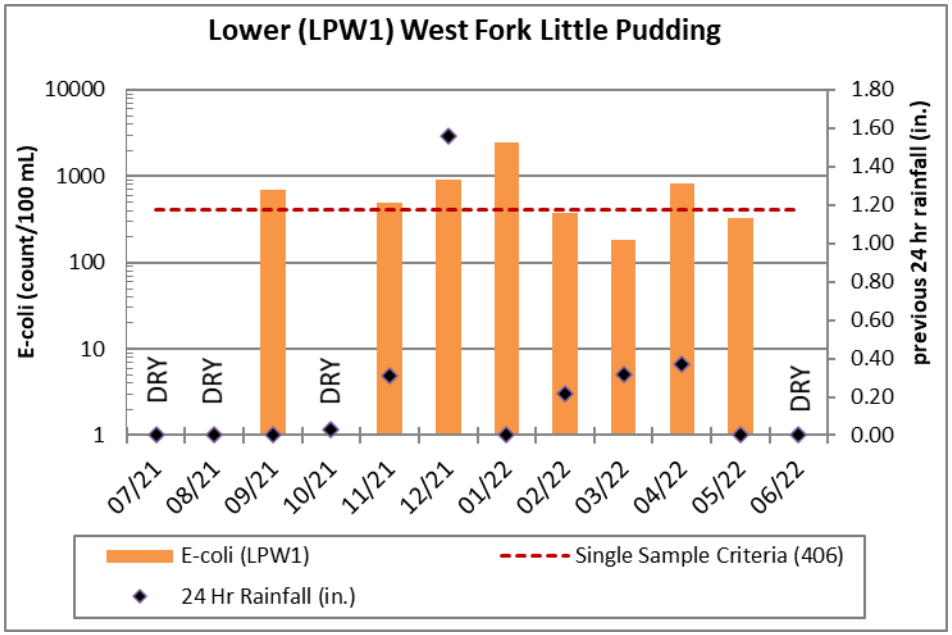
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall of the two sites was used.

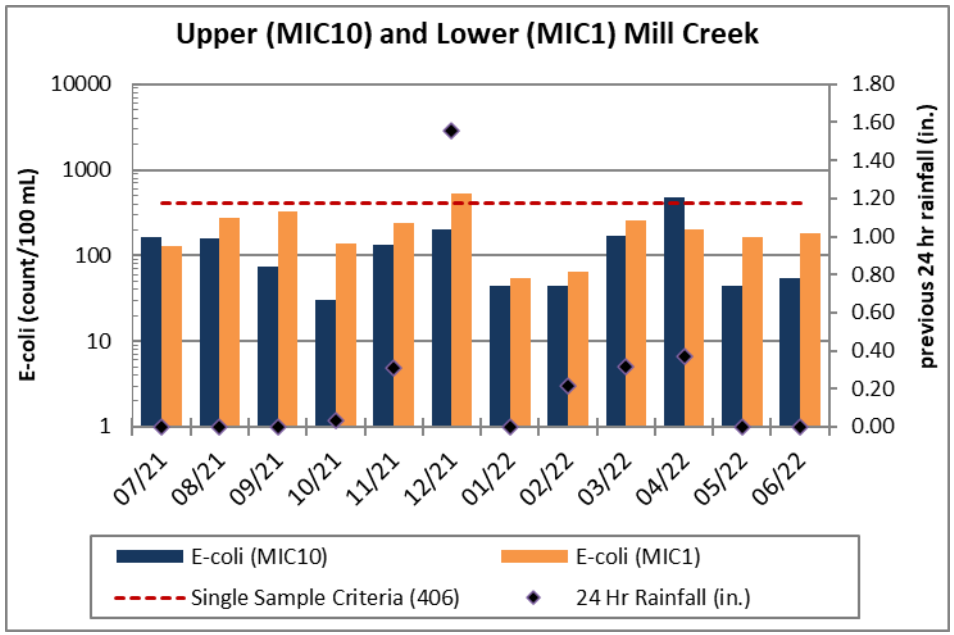
Figure 3

Monthly Instream E. Coli Upstream / Downstream Site Comparison (Reporting Year 2021/2022)









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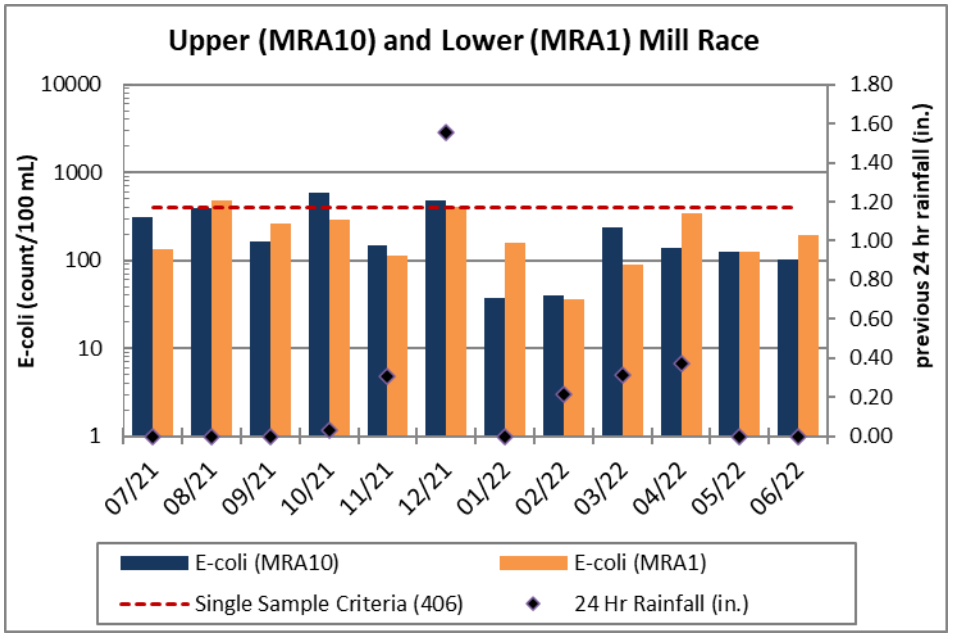
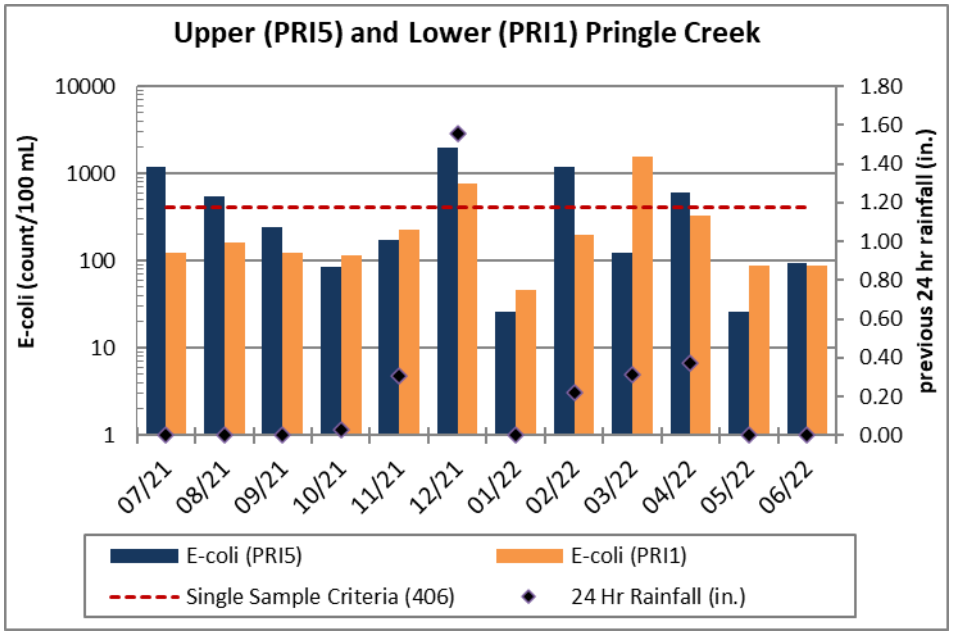
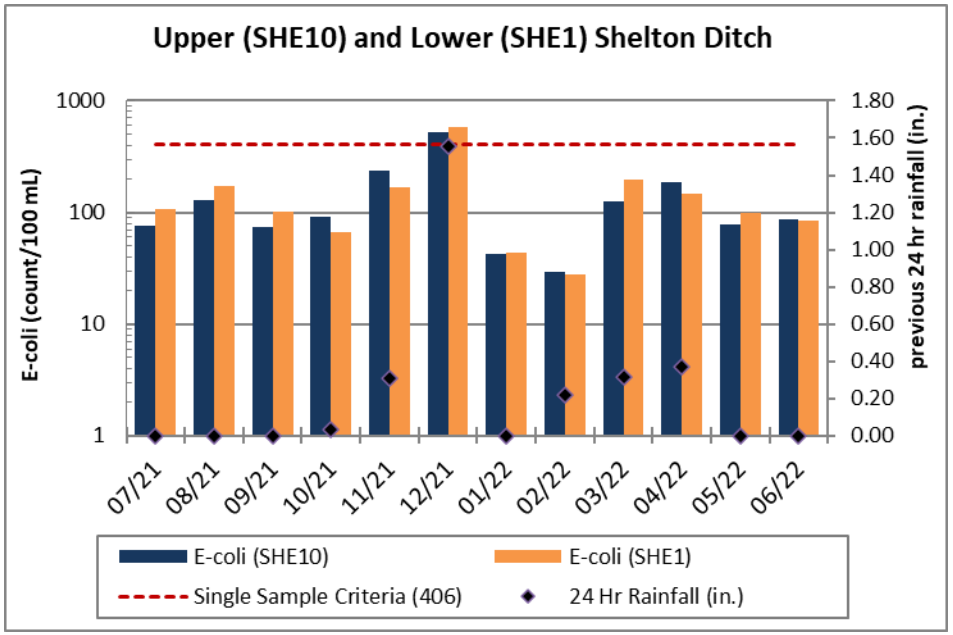
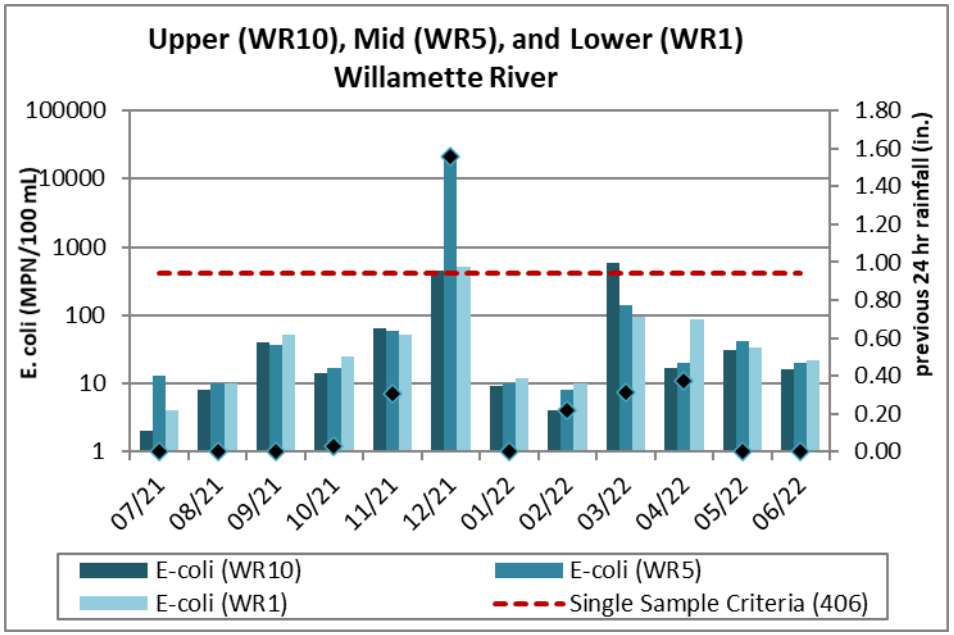




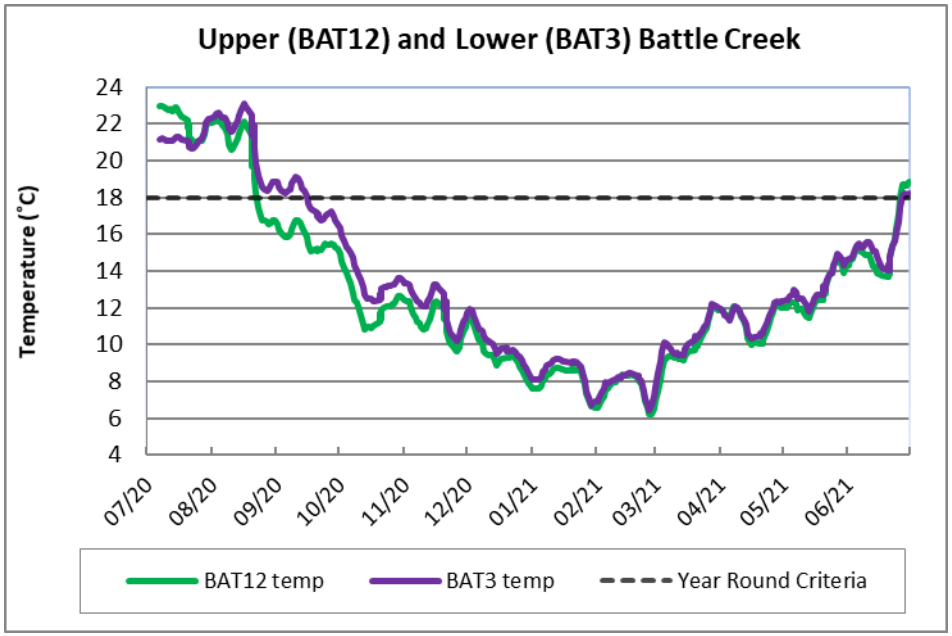


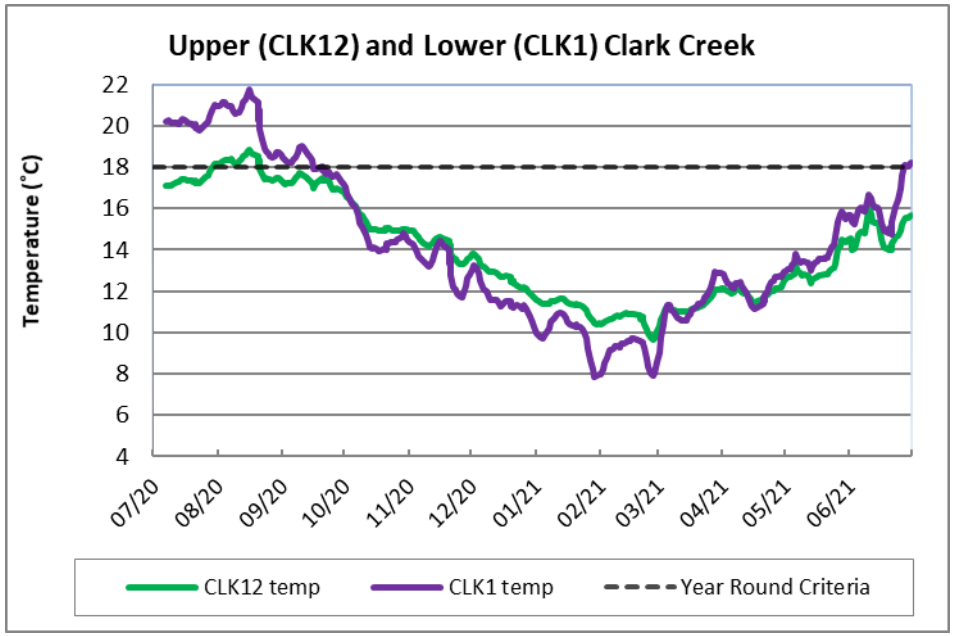


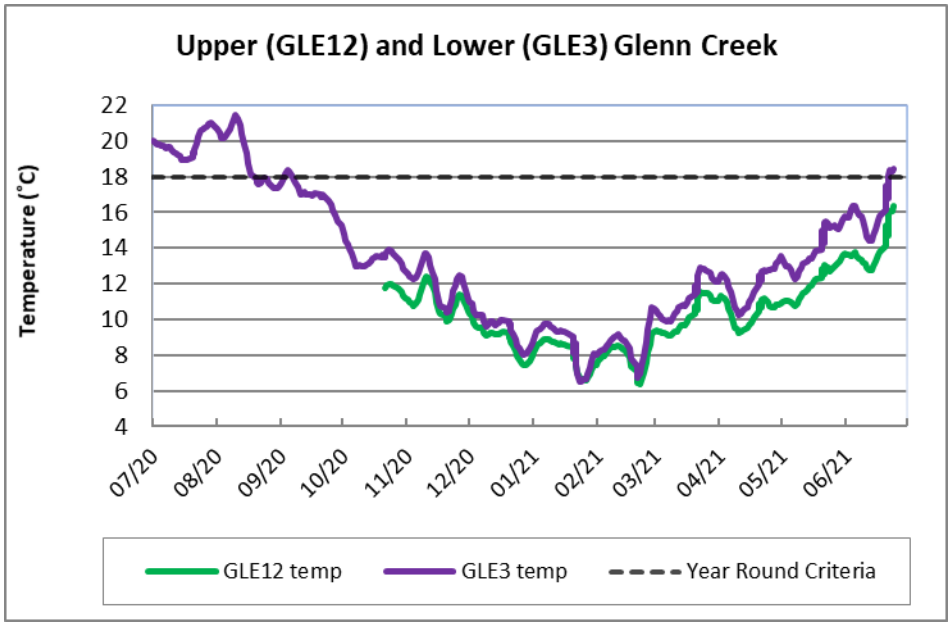
If 24 hour rainfall depth prior to sample collection differed between upstream and downstream sites, the average rainfall of the two sites was used.

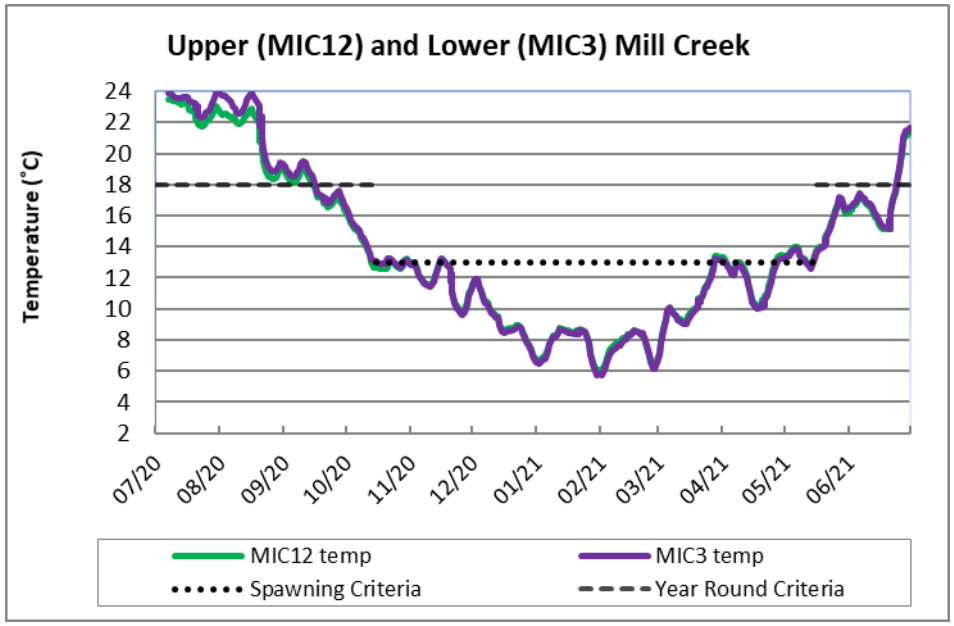
Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum (Reporting Year 2021/2022)







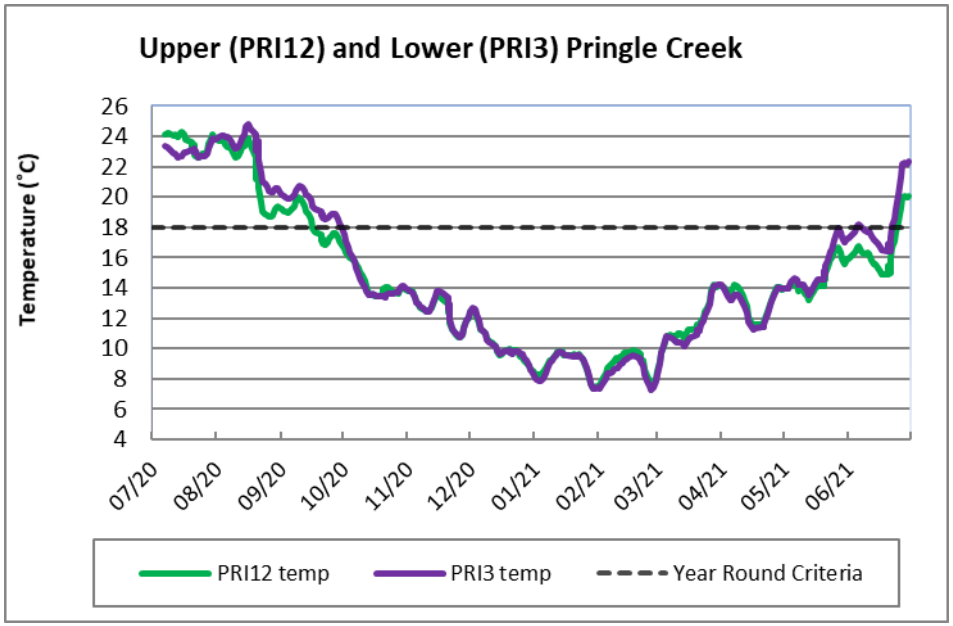


Presented temperature data consists of A grade data with greater than 80% of data points collected per day. Temperature criteria is defined in OAR 340--04100028 and OAR 340-0340, Tables 340A & B.

- Spawning Minimum Criteria for applicable streams may not exceed 7-day average maximum of 13 degrees C.
- Year Round Minimum Criteria may not exceed 7-day average maximum of 18 degrees C.

Figure 4

Continuous Instream Temperature 7-Day Moving Average Maximum (Reporting Year 2021/2022)

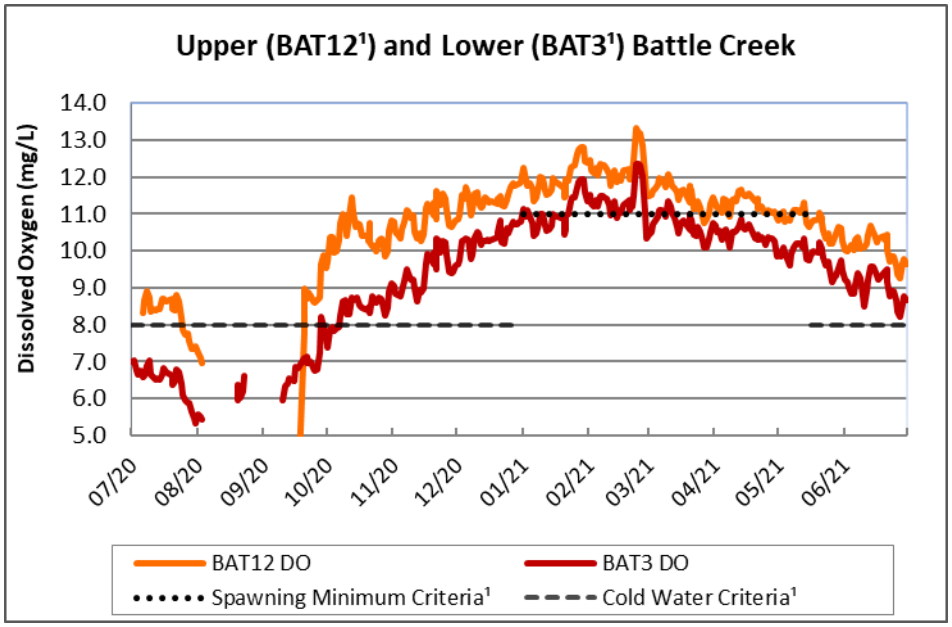


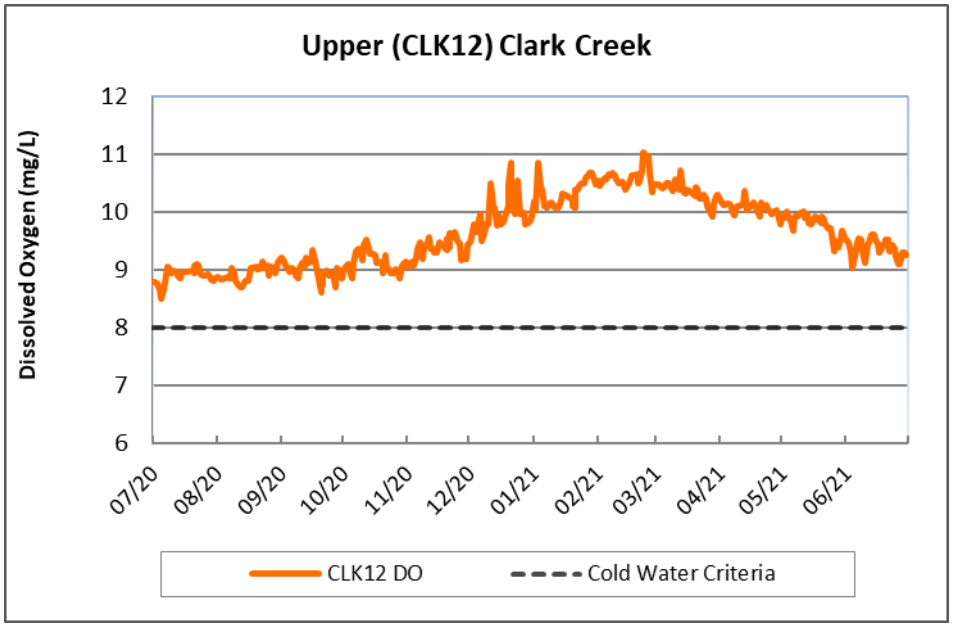
Presented temperature data consists of A grade data with greater than 80% of data points collected per day. Temperature criteria is defined in OAR 340--04100028 and OAR 340-0340, Tables 340A & B.

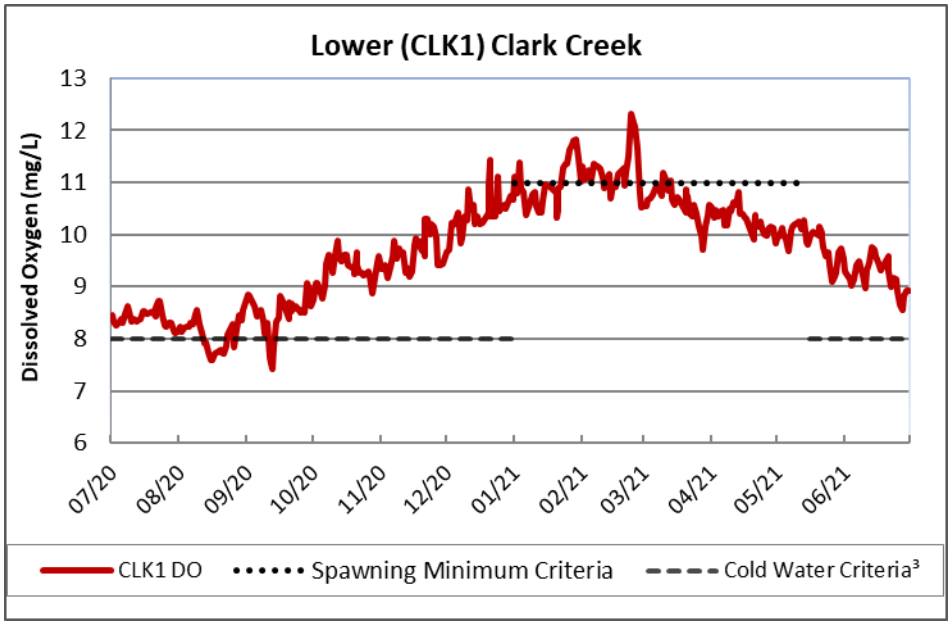
- Spawning Minimum Criteria for applicable streams may not exceed 7-day average maximum of 13 degrees C.
- Year Round Minimum Criteria may not exceed 7-day average maximum of 18 degrees C.

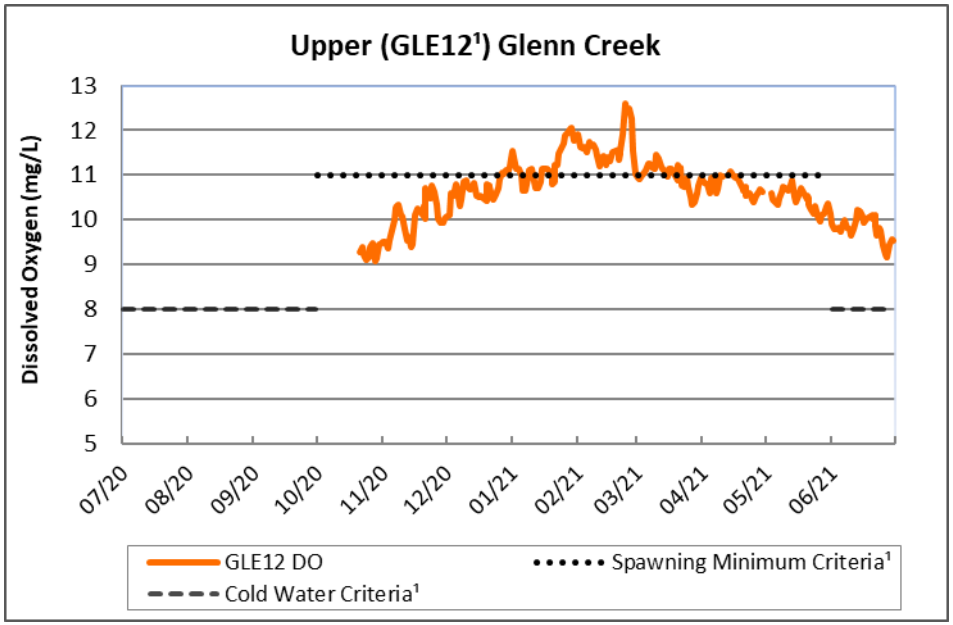
Figure 5

Continuous Instream Dissolved Oxygen Daily Mean (Reporting Year 2021/2022)









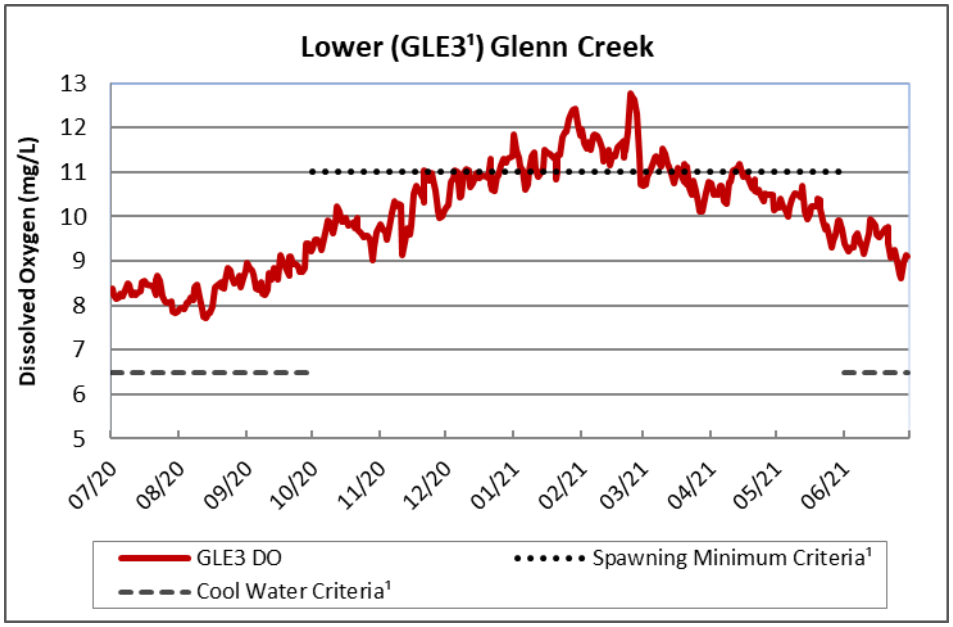
Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day. DO Criteria as defined in OAR 340-041-0016 and OAR 340-0340, Tables 340 A & B.

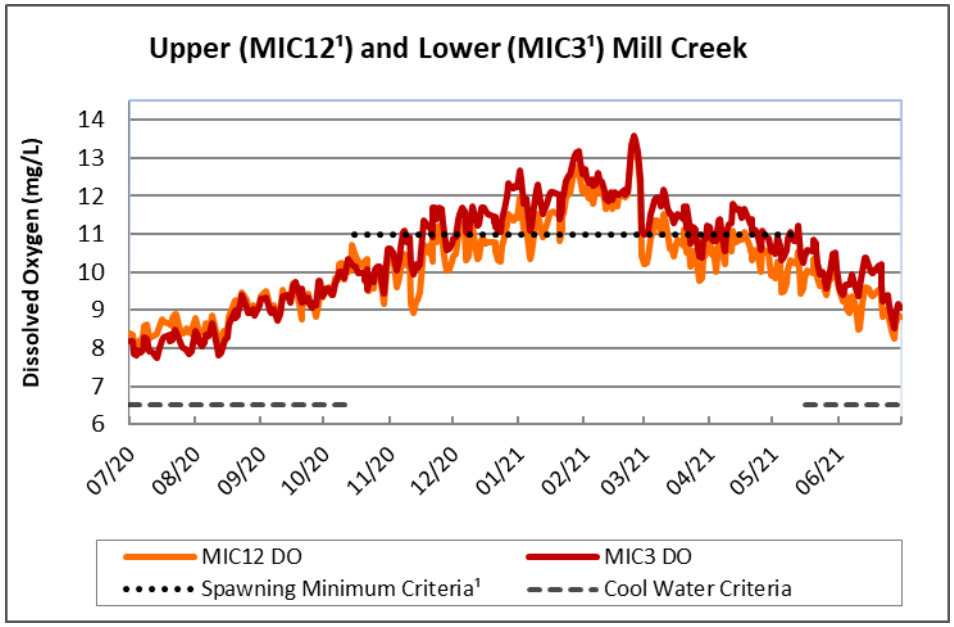
- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L.
- Oregon Cold Water Criteria for applicable streams may not be less than 8 mg/L.

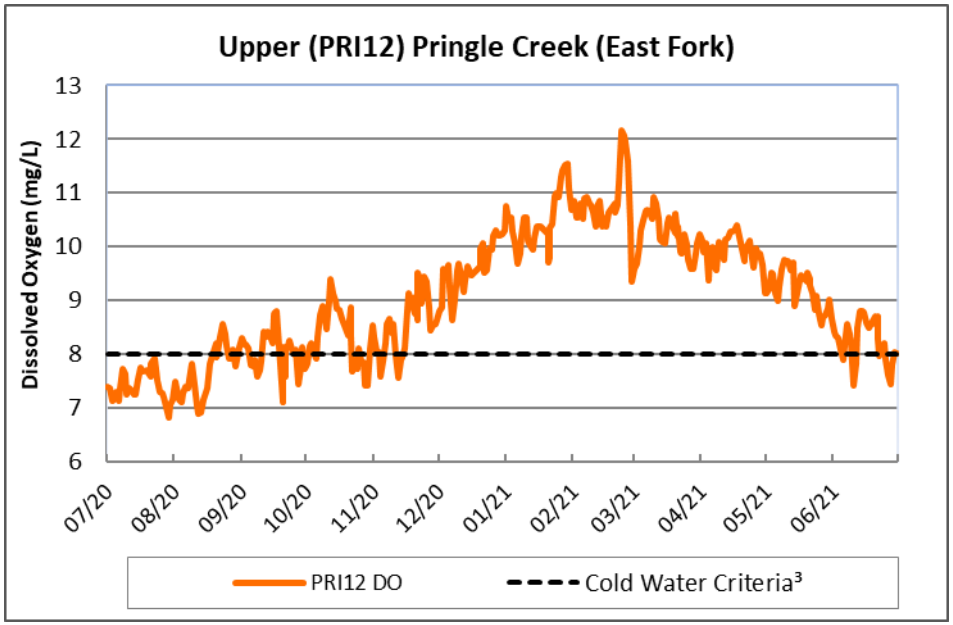
[1] Oregon's 2012 Integrated Report Section 303(d) listed.

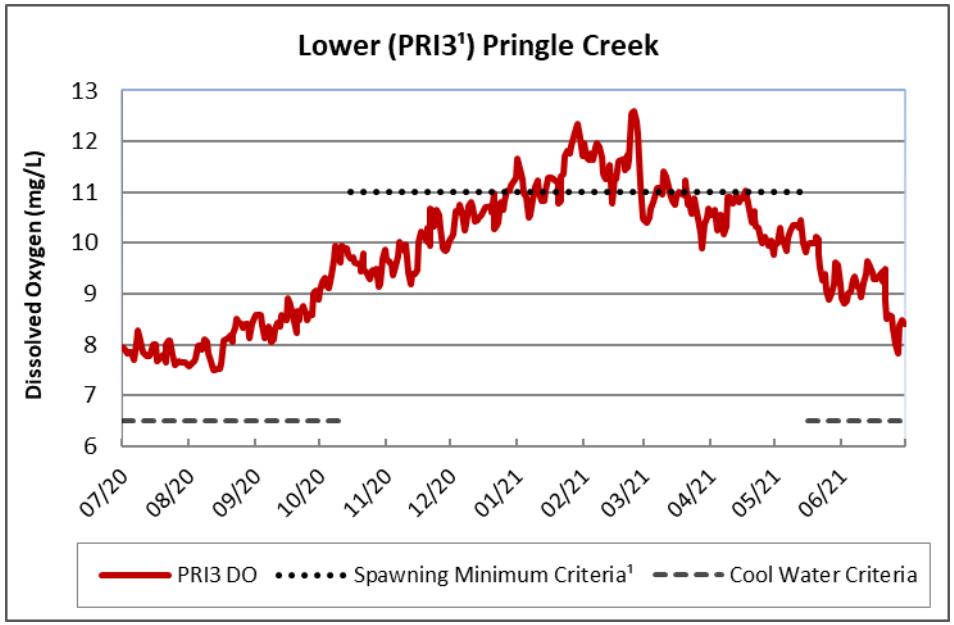
Figure 5

Continuous Instream Dissolved Oxygen Daily Mean (Reporting Year 2021/2022)









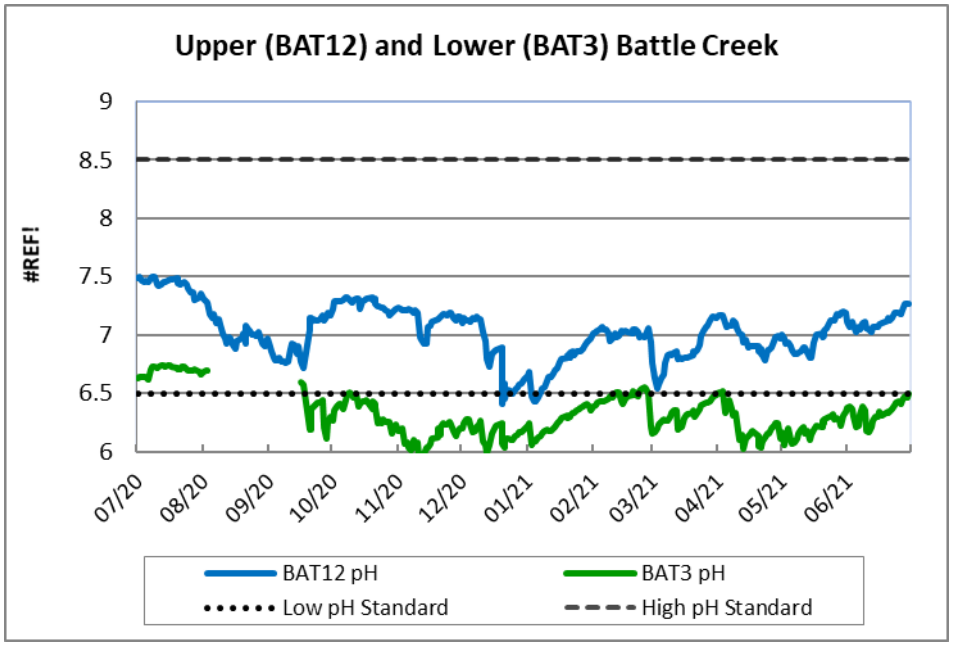
Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day. DO Criteria as defined in OAR 340-041-0016 and OAR 340-0340, Tables 340 A & B.

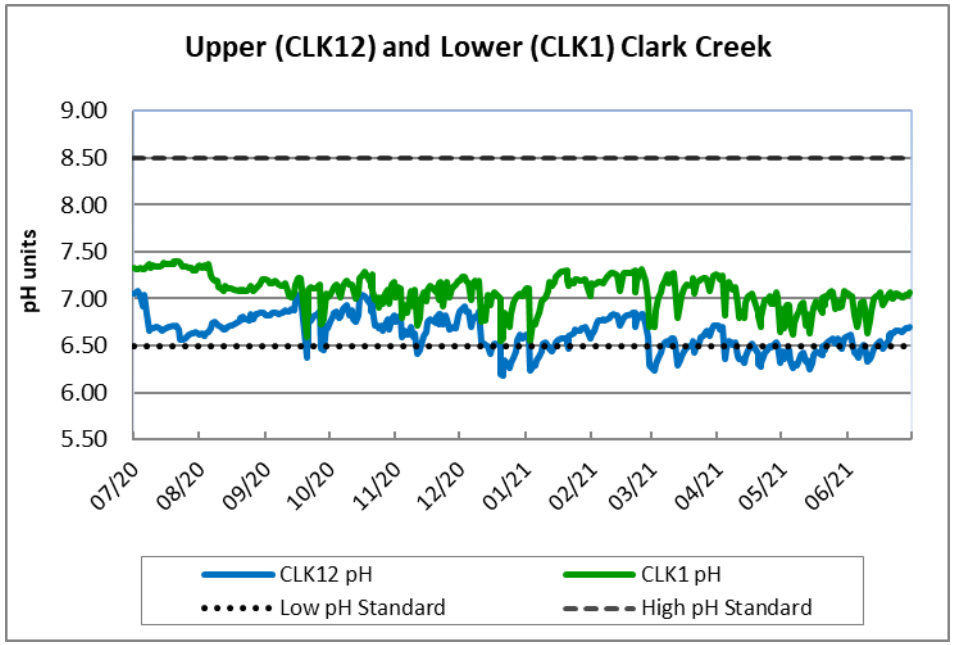
- Spawning Minimum Criteria for applicable streams may not be less than 11 mg/L.
- Oregon Cold Water Criteria for applicable streams may not be less than 8 mg/L.

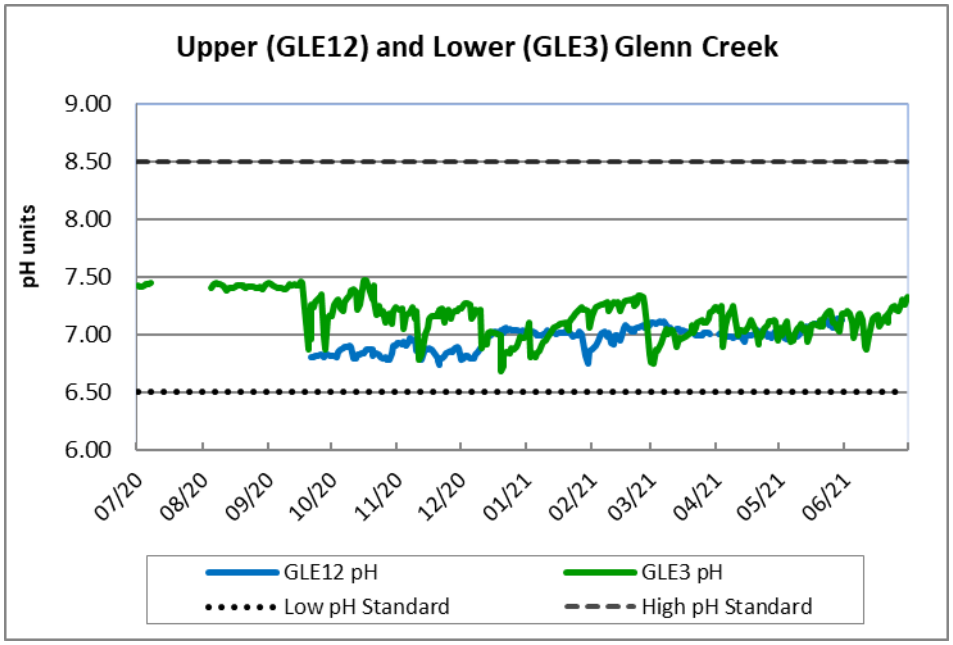
[1] Oregon's 2012 Integrated Report Section 303(d) listed.

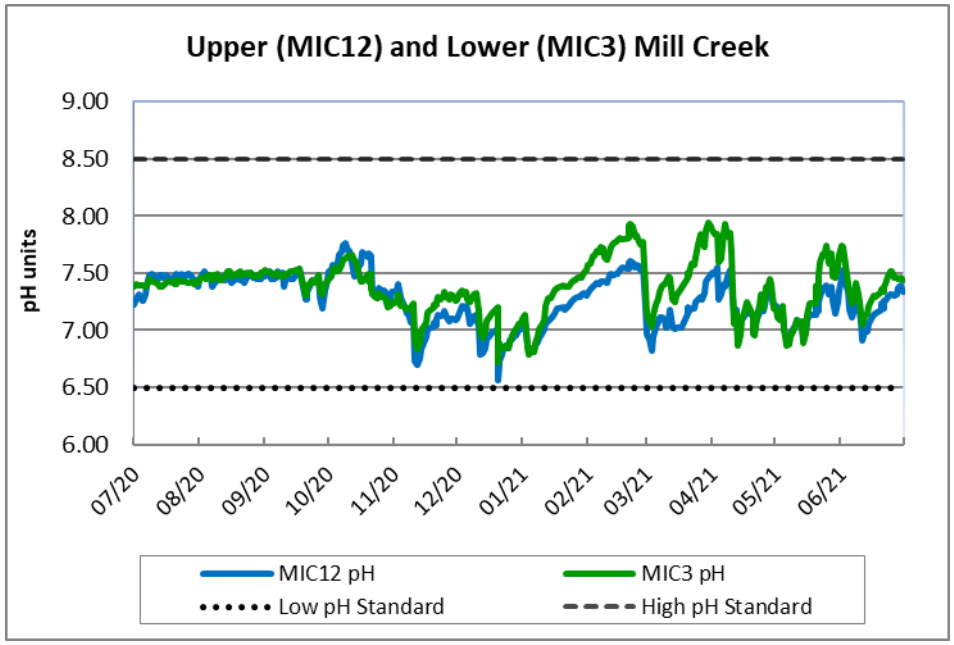
Figure 6

Continuous Instream pH Daily Mean (Reporting Year 2021/2022)



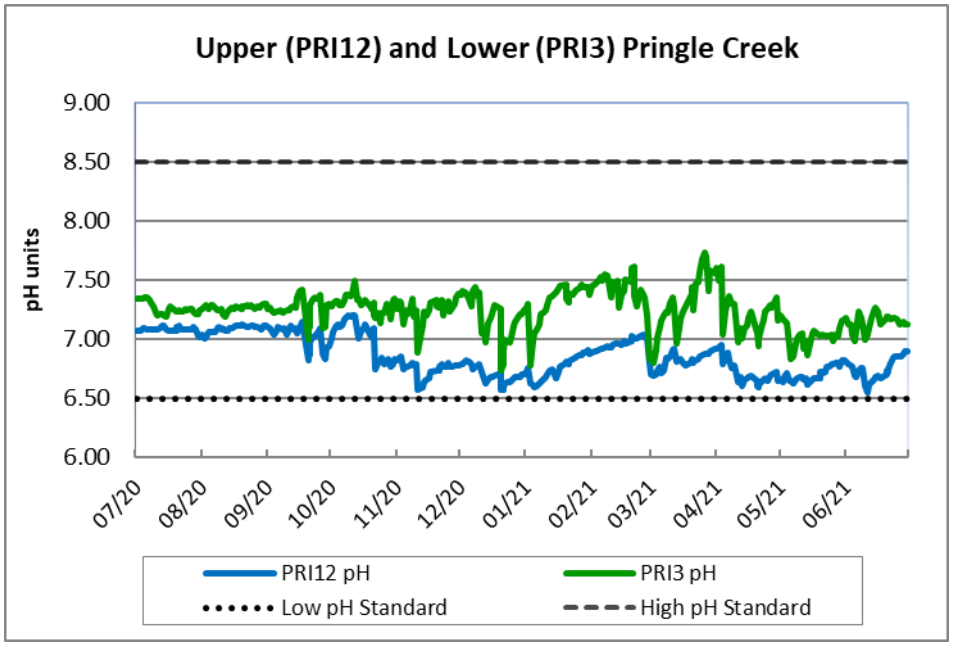






Presented pH data consist of A and B grade data with greater than or equal to 80% of data points collected per day.
As defined in OAR 341-041-0035 Water Quality Standards for the Willamette Basin, pH should not fall outside the ranges of 6.5 to 8.5 pH units.

Figure 6
Continuous Instream pH Daily Mean (Reporting Year 2021/2022)



Presented pH data consist of A and B grade data with greater than or equal to 80% of data points collected per day.
As defined in OAR 341-041-0035 Water Quality Standards for the Willamette Basin, pH should not fall outside the ranges of 6.5 to 8.5 pH units.

Figure 7
Total Rainfall by Month Across Salem (Reporting Year 2021/2022)

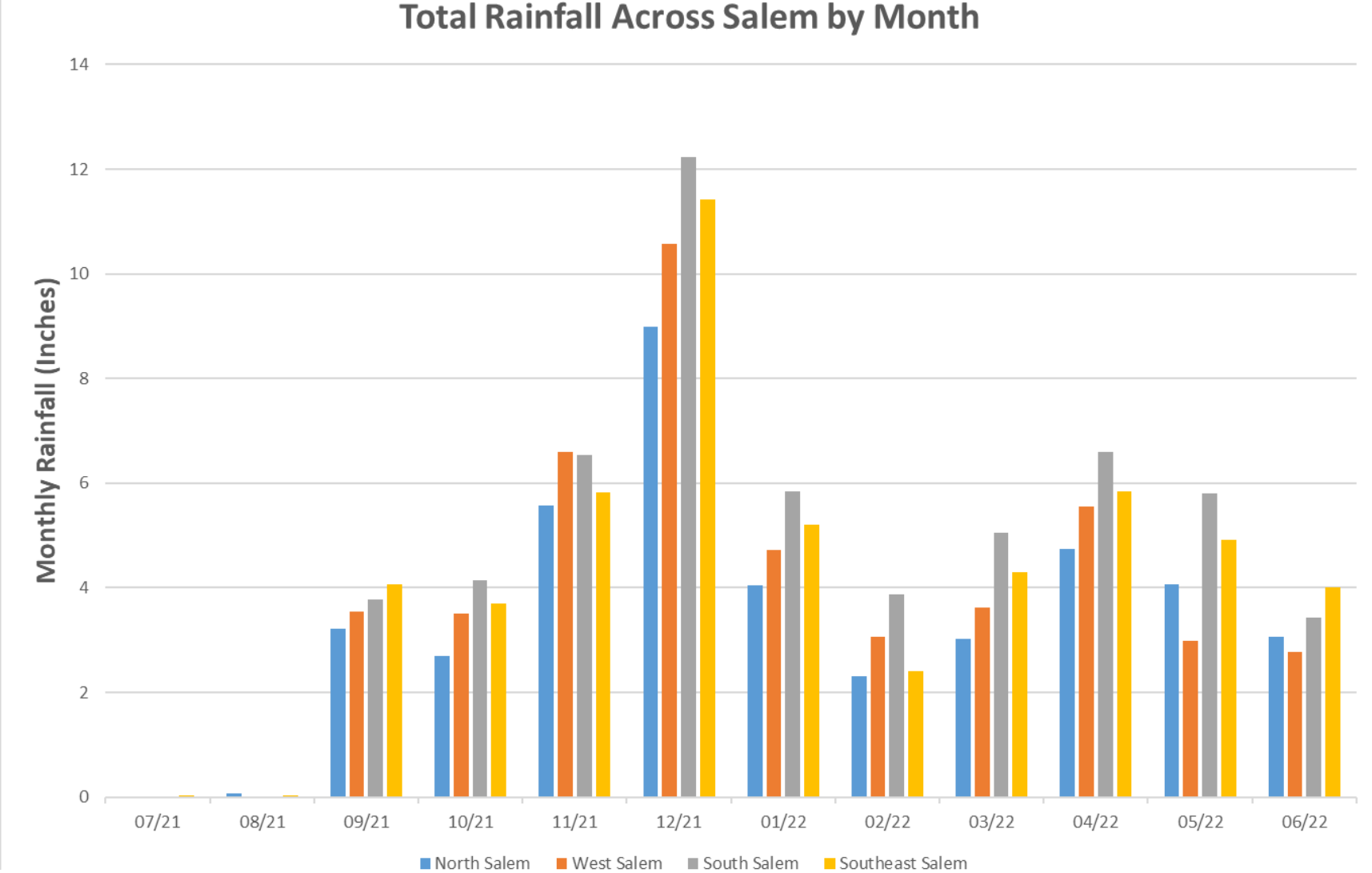


Table 1.
Completion of Table B-1 Environmental Monitoring Elements

Monitoring Type	# of sites	Total "Events" Needed	2011 / 2012	2012 / 2013	2013 / 2014	2014 / 2015	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	2021 / 2022
Monthly Instream	21	48 / site	12[1]	12[1]	12[1]	12[1]	12[1]	12[1]	12[1]	12[1]	10[3]	12[1]	12[1]
Continuous Instream	10	On going	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Instream Storm	3	25 / site	6	6	5	4	4	1	2	5	3	2	0
Stormwater (MS4)	3	15 / site	4	4	4	1	2	1	0	4	2	1	0
Pesticides	3	4 / site	1	2	0	1	0	0	1	0	0	0	0
Mercury	2	2 / site / year	2	1	1	COMPLETE[2]							
Macroinvertebrates	3	2 / site	1	1	0	0	0	0	1	0	0	0	0

[1] Due to no flow or access issues, several of the sites had less than 12 data collection events; however, all sites are on track to meet the minimum permit requirements.

[2] Following Table B-1 Special Condition #6 of the City's NPDES MS4 permit, the City requested and received approval from Department to eliminate the mercury and methyl mercury monitoring requirement after completing the required two years of monitoring.

[3] Due to staffing issues related to COVID19 and flood threat, only 10 data collection events occurred.

Table 2.
Site Locations for Each Monitoring Element

Monthly Instream	
Site ID	Site Location
BAT 1	Commercial St SE
BAT 12	Rees Hill Rd SE
CGT 1	Mainline Dr NE
CGT 5	Hawthorne St NE @ Hyacinth St NE
CLA 1	Bush Park
CLA 10	Ewald St SE
CRO 1	Courthouse Athletic Club
CRO 10	Ballantyne Rd S
GIB 1	Wallace Rd NW
GIB 15	Brush College Rd NW
GLE 1	River Bend Rd NW
GLE 10	Hidden Valley Dr NW
LPW 1	Cordon Rd NE
MIC 1	Front St Bridge
MIC 10	Turner Rd SE
MRA 1	High St SE
MRA 10	Mill Race Park
PRI 1	Riverfront Park
PRI 5	Bush Park
SHE 1	Church St SE
SHE 10	State Printing Office
WR1	Sunset Park (Keizer)
WR5	Union St. Railroad Bridge
WR10	Halls Ferry Road (Independence)

Continuous Instream	
Site ID	Site Location
BAT3	Commercial St SE
BAT12	Lone Oak Rd SE
CLK1[1]	Bush Park
CLK12	Ewald St SE
GLE3	Wallace Rd NW
GLE12	Hidden Valley Dr NW
LPW1[2]	Cordon Rd
MIC3	North Salem High School
MIC12	Turner Rd SE
PRI3[1]	Pringle Park
PRI4[2]	Salem Hospital Footbridge
PRI12[1]	Trelstad Ave SE
SHE3[2]	Winter St. Bridge
WAL3[2]	Wiltsey Rd SE

Stormwater / Pesticides / Mercury	
Site Id	Site Location
Electric[3]	Electric St. SE and Summer St. SE
Hilfiker[3]	Hilfiker Ln. SE and Commercial St. SE
Salem Industrial	Salem Industrial Dr. NE and Hyacinth St. NE

[1] Instream Storm sampling done at these sites. [2] Stage-only gauging station. [3] Mercury monitoring conducted at these sites.

BAT = Battle Creek, CGT = Claggett Creek, CLA / CLK = Clark Creek, CRO = Croisan Creek, GIB = Gibson Creek, GLE = Glenn Creek, MIC = Mill Creek, MRA = Mill Race, PRI = Pringle Creek, SHE = Shelton Ditch, LPW = West Fork Little Pudding River, WR = Willamette River

Table 3.
Parameters for Each Monitoring Element

Parameter	Units	Monitoring Element			
		Instream Storm	Stormwater	Monthly Instream	Continuous Instream
Alkalinity	mg/L			x[1]	
Biological Oxygen Demand (BOD_{stream})	mg/L	x		x	
Biological Oxygen Demand (BOD_{5day})	mg/L		x		
Specific Conductivity (Sp. Cond)	µS/cm	x	x	x	x
Copper (Total Recoverable and Dissolved)	mg/L	x	x	x[2]	
Dissolved Oxygen (DO)	mg/L	x	x	x	x
E. coli	MPN/100 mL	x	x	x	
Hardness	mg/L	x	x	x[2]	
Lead (Total Recoverable and Dissolved)	mg/L	x	x	x[2]	
Ammonia Nitrogen (NH_3-N)	mg/L	x	x	x[1]	
Nitrate and Nitrite (NO_3-NO_2)	mg/L	x	x	x	
pH	S.U.	x	x	x	x
Total Dissolved Solids (TDS)	mg/L			x[1]	
Temperature	˚C	x	x	x	x
Total Phosphorus (TP)	mg/L	x	x	x[1]	
Ortho Phosphorus	mg/L	x	x		
Total Solids (TS)	mg/L			x[1]	
Total Suspended Solids (TSS)	mg/L	x	x	x[1],[3]	
Turbidity	NTU			x	x
Zinc (Total Recoverable and Dissolved)	mg/L	x	x	x[2]	

[1] Willamette River sites only (WR1, WR5, and WR10).
[2] Pringle Creek Watershed sites only (PRI1, PRI5, CLA1, and CLA10).
[3] West Fork of Little Pudding River site only (LPW 1) prior to 10/2021, all other sites starting 10/2021.

Table 4.
Water Quality Criteria for Monitored Streams

Parameter	Season	Criteria	Applicable Waterbody
Dissolved Oxygen	January 1-May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Battle Creek*, Claggett Creek*, Clark Creek*[3], Croisan Creek*, Glenn Creek*, West Fork Little Pudding River*
	October 1- May 31	Spawning: Not less than 11.0 mg/L or 95% saturation	Gibson Creek*□
	October 15 - May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Mill Creek*, Pringle Creek*[1], Shelton Ditch*, Willamette River*[5]
	Year Around (Non-spawning)	Cold water: Not less than 8.0 mg/L or 90% saturation	Battle Creek*, Croisan Creek*, Clark Creek, Glenn Creek*[4], Pringle Creek[2]
		Cool water: Not less than 6.5 mg/L	Claggett Creek*, Glenn Creek*, Mill Creek, Pringle Creek[1], Shelton Ditch, West Fork Little Pudding River, Willamette River*[6]
pH	Year Around	Must be within the range of 6.5 to 8.5 pH units	All Monitoring Streams
Temperature	October 15 - May 15	Salmon and steelhead spawning: 13˚C 7-day average maximum	Mill Creek, Shelton Ditch
	October 1- May 31	Salmon and steelhead spawning: 13˚C 7-day average maximum	Gibson Creek□
	Year Around (Non-spawning)	Salmon and trout rearing and migration: 18˚C 7-day average maximum	All Monitoring Streams
E. coli	Fall-Winter-Spring	30 day log mean of 126 E. coli organisms per 100 ml (or) no single sample > 406 organisms per 100 ml	All Monitoring Streams
	Summer	30 day log mean of 126 E. coli organisms per 100 ml (or) no single sample > 406 organisms per 100 ml	All Monitoring Streams
Biological Criteria	Year Around	Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.	Claggett Creek*, Clark Creek*[3], Croisan Creek*, Glenn Creek*, Pringle Creek Trib*, Willamette River*
Copper	Year Around	Freshwater Acute and Chronic Criteria: 18 and 12 µg/L respectively with values calculated for a hardness of 100 mg/L	Pringle Creek*
Lead	Year Around	Freshwater Acute and Chronic Criteria: 82 and 3.2 µg/L respectively with values calculated for a hardness of 100 mg/L	Pringle Creek*, Willamette River*
Zinc	Year Around	Freshwater Acute and Chronic Criteria: 120 and 110 µg/L respectively with values calculated for a hardness of 100 mg/L	Pringle Creek*

Note: All waterbodies in this table are included under the Willamette Basin or Molalla-Pudding Subbasin TMDL for Temperature and E. coli.

* Oregon's 2012 Integrated Report Section 303(d) listed.

□ Gibson Creek is referred as Gibson Gulch in Oregon's 2012 Integrated Report.

[1] Applies to Pringle Creek from river mile 0 to 2.6.

[2] Applies to Pringle Creek from river mile 2.6 to 6.2.

[3] Applies to Clark Creek from river mile 0 to 1.9.

[4] Applies to Glenn Creek from river mile 4.1 to 7.

[5] Applies to Willamette River from river mile 54.8 to 186.5

[6] Applies to Willamette River from river mile 50.6 to 186.5

Table 5.
Median Values for Monthly Instream Sites (RY 2021/2022)

Site ID	Number of Samples	Temperature (C)	DO (mg/L)	Sp. Cond (µS/cm)	Turbidity (NTUs)	pH (S.U.)	E. Coli (MPN/100 mL)	NO_3-NO_2 (mg/L)	BOD_{stream} (mg/L)
BAT1	12	10.8	10.3	52.2	7.1	6.7	102.5	0.98	0.74
BAT12	12	9.2	11.2	50.4	4.2	7.2	87.5	1.40	0.78
CGT1	12	11.8	8.6	192.5	5.1	7.2	476.5	0.39	1.70
CGT5	10	10.5	10.2	141.1	7.3	7.2	372.0	0.72	1.08
CLA1	12	12.2	10.3	101.4	2.3	7.3	345.5	1.33	0.71
CLA10	12	12.9	9.9	75.6	3.0	6.9	220.0	1.80	0.60
CRO1	12	10.0	10.7	68.5	3.9	7.0	594.0	0.71	0.71
CRO10	12	10.5	10.7	53.0	5.1	6.8	40.5	0.92	0.85
GIB1	12	10.6	10.5	84.8	6.5	7.4	107.5	1.24	0.95
GIB15	12	10.1	10.4	82.4	7.1	7.2	69.5	1.44	0.88
GLE1	12	11.0	10.7	93.4	7.3	7.4	236.5	1.07	0.85
GLE10	9	9.1	11.2	57.8	5.8	7.3	77.0	1.36	0.67
LPW1	9	9.7	10.3	177.6	7.2	7.0	488.0	1.04	1.20
MIC1	12	11.0	10.8	94.6	4.1	7.3	189.0	1.99	0.83
MIC10	12	10.7	10.6	88.1	3.4	7.2	103.0	1.81	0.82
MRA1	12	10.9	11.2	91.7	3.4	7.4	176.0	1.89	0.82
MRA10	12	11.2	10.8	88.5	3.5	7.1	158.0	2.00	0.94
PRI1	12	10.9	10.9	86.2	3.1	7.2	142.5	1.76	0.78
PRI5	12	11.2	10.5	87.5	3.7	7.4	206.0	0.84	1.11
SHE1	12	10.8	11.0	91.4	3.1	7.3	105.0	2.01	0.92
SHE10	12	10.6	10.9	90.8	3.4	7.2	88.5	1.99	1.01
WR1	12	11.3	10.8	69.3	4.4	7.4	29.5	0.52	0.84
WR10	12	11.4	10.5	66.6	4.0	7.3	16.5	0.30	0.79
WR5	12	10.8	10.7	67.7	5.0	7.4	20.0	0.37	0.93

Table 6.

Number of Water Quality Criteria Exceedances for Monthly Instream Sites (RY 2021/2022)

Site ID	Number of Samples	Dissolved Oxygen	pH	E. Coli[5]			Copper[6]		Lead[6]		Zinc[6]	
				Total #	Dry[2]	Rain[3]	Total	Dissolved	Total	Dissolved	Total	Dissolved
BAT 1	12	5	1	0	0	0						
BAT 12	12	1	0	3	3	0						
CGT 1	12	9	0	7	2	5						
CGT 5[4]	10	2	0	5	2	3						
CLA 1	12	3	1	6	4	2	1	0	0	0	3	1
CLA 10	12	0	1	5	3	2	0	0	0	0	1	1
CRO 1	12	3	0	8	3	5						
CRO 10	12	3	0	1	0	1						
GIB 1	12	5	0	2	1	1						
GIB 15	12	4	0	2	2	0						
GLE 1	12	0	0	4	3	1						
GLE 10[4]	9	0	0	1	0	1						
LPW 1[4]	9	6	1	5	2	3						
MIC 1	12	1	0	1	0	1						
MIC 10	12	5	0	1	0	1						
MRA 1	12		0	2	1	1						
MRA 10	12		2	2	1	1						
PRI 1	12	1	0	2	0	2	0	0	0	0	0	0
PRI 5	12	4	0	5	2	3	0	0	0	0	0	0
SHE 1	12	1	0	1	0	1						
SHE 10	12	1	2	1	0	1						
WR1	12	1	0	1	0	1						
WR10	12	2	0	2	0	2						
WR5	12	2	0	1	0	1						

Note: Copper, lead, and zinc collected at Pringle Creek Watershed sites only (PRI1, PRI5, CLA1, and CLA10).

NA = Not available (No dissolved oxygen water quality criteria associated with this waterbody).

[1] No year-round dissolved oxygen water quality criteria associated with this waterbody

[2] Dry is < 0.05 inches of rainfall in previous 24 hours.

[3] Rain is ≥ 0.05 inches of rainfall in previous 24 hours.

[4] Unable to sample all 12 due to lack of flow/too high of flow.

[5] Single sample criterion of > 406 organisms per 100 mL used.

[6] Exceedances calculated based on hardness concentration for each event.

Table 7.
Monthly Instream Data - Battle Creek (RY 2021/2022)

Site Name:	BAT1									
Site Description:	Commercial St									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 11:10	18.1	6.44	62.1	15.6	6.85	276	0.361	0.79		0.00
08/17/2021 11:10	18.5	5.64	68.6	36.1	6.69	238	0.238	1.03		0.00
09/21/2021 10:45	14.97	7.72	62.6	6.5	6.62	225	0.645	0.8		0.00
10/19/2021 11:05	11.1	8.75	56.5	8.8	6.82	222	0.541	0.66	5.8	0.03
11/16/2021 10:30	10.4	10.01	54.6	5.7	6.57	66	2.039	0.81	3.6	0.31
12/21/2021 10:45	9.1	10.58	57.9	23.5	6.45	109	3.256	0.95	22.8	1.56
01/18/2022 10:35	8.2	11.08	49.8	2.9	6.77	23	2.118	0.68	3.4	0.00
02/15/2022 10:35	7.3	11.26	48.3	3.4	6.71	28	1.445	0.45	2.8	0.22
03/15/2022 10:07	9.4	10.68	48	8.4	6.65	27	1.465	0.54	4.8	0.32
04/19/2022 10:55	8.7	10.97	35.9	7.7	6.79	313	0.772	1.33	9	0.37
05/17/2022 11:05	11.3	10.64	45.5	3.9	6.83	52	1.178	0.47	5	0.00
06/21/2022 11:03	13.6	9.81	46.7	4.5	7.05	96	0.75	0.31	4.4	0.00
Median	**10.75**	**10.30**	**52.20**	**7.10**	**6.74**	**102.50**	**0.98**	**0.74**	**4.80**	

Site Name:	BAT12									
Site Description:	Rees Hill Rd.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 10:55	16.3	9.17	61.1	3.7	6.91	172	0.524	0.52		0.00
08/17/2021 10:50	16.8	6.16	76.2	2.7	6.92	1120	0.426	1.11		0.00
09/21/2021 10:30	12.28	10.04	64.7	4.71	7.15	659	0.299	0.71		0.00
10/19/2021 10:45	8.4	11.03	53.5	4.4	7.27	91	0.408	0.95	0.8	0.03
11/16/2021 10:15	9.6	11.42	51.9	4	7.1	55	2.486	0.84	3	0.31
12/21/2021 10:15	8.5	11.65	55.3	16.5	6.78	199	3.469	1.02	13.6	1.56
01/18/2022 10:20	7.9	11.86	48.9	1.9	7.38	75	2.396	0.73	3	0.00
02/15/2022 10:20	7	12.06	45.4	2.1	7.16	20	1.722	0.82	1.4	0.22
03/15/2022 09:52	8.8	11.56	45.2	4.9	7.38	8	1.829	0.5	1	0.32
04/19/2022 10:40	8.5	11.51	43	5.3	6.92	84	1.462	0.83	5.8	0.37
05/17/2022 10:50	11	11	42.3	4.8	7.16	47	1.344	0.49	7.2	0.00
06/21/2022 10:42	13.3	10.42	42.8	3.6	7.42	517	0.863	0.2	2.8	0.00
Median	**9.20**	**11.23**	**50.40**	**4.20**	**7.16**	**87.5**	**1.40**	**0.78**	**3.00**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Claggett Creek (RY 2021/2022)

Site Name:	CGT1									
Site Description:	Mainline Dr S									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 12:12	22.2	5.14	239.7	2.4	7.38	546	< 0.050	0.83		0.00
08/17/2021 12:15	20.5	4.14	264	2.4	7.53	86	< 0.050	1.8		0.00
09/21/2021 11:55	17.92	6.33	231.5	3.83	7.24	323	< 0.050	2.09		0.00
10/19/2021 12:15	12.4	5.4	180.9	3.9	7.16	537	0.053	1.59	13.6	0.03
11/16/2021 11:45	11.1	5.97	123.3	5.4	6.95	473	0.55	1.32	2.6	0.31
12/21/2021 12:10	8.5	9.54	156.5	13.2	7.12	882	3.132	1.2	6.4	1.56
01/18/2022 11:55	7.7	8.9	204.1	5.1	7.19	285	0.788	1.5	6	0.00
02/15/2022 12:05	8	9.61	178.1	7.1	7.11	480	0.51	2.54	8.6	0.22
03/15/2022 11:12	10.5	9.55	137.8	9.2	7.2	697	0.752	1.98	5.6	0.32
04/19/2022 12:02	9.3	10.15	67	18	6.9	1670	0.263	2.6	17.4	0.37
05/17/2022 12:22	15.5	8.33	214.9	5	7.25	309	0.572	2.93	6.4	0.00
06/21/2022 12:10	18.4	10.13	211	4.5	7.33	388	0.216	1.36	6.2	0.00
Median	**11.75**	**8.62**	**192.50**	**5.05**	**7.20**	**477**	**0.55**	**1.70**	**6.40**	

Site Name:	CGT5									
Site Description:	Hawthorne Ave									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 12:00										0.00
08/17/2021 12:00										0.00
09/21/2021 11:40	14.42	6.57	115.5	7.45	6.83	1565	0.05	1.48		0.00
10/19/2021 11:55	10.6	7.95	129.6	9.2	7.13	789	0.051	1.02	7.4	0.03
11/16/2021 11:30	10.7	9.8	135.7	7.1	7.11	638	1.294	1.24	6.8	0.31
12/21/2021 12:00	8.9	10.53	162.5	14.6	7.05	408	4.27	1.14	8.4	1.56
01/18/2022 11:45	8	11.58	210.7	4.7	7.64	216	1.505	0.85	5.6	0.00
02/15/2022 11:40	7.4	12.67	146.4	6.8	7.59	336	0.611	1.24	10.6	0.22
03/15/2022 10:59	10.4	10.99	128.6	10.8	7.27	161	0.957	0.95	6.2	0.32
04/19/2022 11:53	9.4	10.55	59	14	6.87	1296	0.249	3.64	15.8	0.37
05/17/2022 12:12	13.8	9.87	197.7	2.9	7.41	238	0.826	0.84	5	0.00
06/21/2022 12:00	17.3	9.05	173.6	2.4	7.55	85	0.392	0.59	5	0.00
Median	**10.50**	**10.20**	**141.05**	**7.28**	**7.20**	**668**	**0.72**	**1.08**	**6.80**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.

Monthly Instream Data - Clark Creek (RY 2021/2022)

Site Name:	CLA1									
Site Description:	Bush Park									
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 10:05	17.3	8.92	102.5	3.5	6.42	448	0.884	0.56		0.00
08/17/2021 09:55	17.8	7.82	109.1	27.7	6.8	546	0.72	7.9		0.00
09/21/2021 10:10	15.3	9.08	100.3	1.9	7.31	528	1.011	0.75		0.00
10/19/2021 09:45	12.4	9.93	95	2	7.66	228	0.974	0.56	2.2	0.03
11/16/2021 10:10	12.2	10.18	102.7	2	7.35	228	2.226	0.8	1.4	0.31
12/21/2021 09:40	11.1	10.57	108.8	8.7	7.07	187	3.235	1.23	7	1.56
01/18/2022 10:25	9.1	11.15	106.7	1.4	7.44	30	1.941	0.71	1.2	0.00
02/15/2022 10:10	8.4	11.28	97.2	1.7	7.51	41	1.518	0.7	1.8	0.22
03/15/2022 09:50	10.6	10.85	95.7	6.2	7.27	>24196	1.803	0.54	5.2	0.32
04/19/2022 10:10	9.2	10.99	44	17.1	7.03	1106	0.531	3.01	24.6	0.37
05/17/2022 10:25	12.2	10.4	99	2.6	7.2	243	1.56	0.67	3.4	0.00
06/21/2022 09:40	14.1	9.71	102.7	1.5	7.44	738	1.145	0.3	3	0.00
Median	**12.20**	**10.29**	**101.40**	**2.30**	**7.29**	**345.50**	**1.33**	**0.71**	**3.00**	

Site Name:	CLA1						
Site Description:	Bush Park						
Collection Date/Time	Total Cop-per (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/ L)	Dissolved Lead (mg/ L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
07/20/2021 10:05	0.00173	0.000956	0.00092	0.000144	0.0165	0.00734	32.6
08/17/2021 09:55	0.00569	0.00212	0.00401	0.000318	0.0555	0.0139	39.9
09/21/2021 10:10	0.00109	0.000921	0.000236	<0.000106	0.00954	0.00859	34.4
10/19/2021 09:45	0.000773	0.000661	0.000231	<0.000106	0.0204	0.0194	31.8
11/16/2021 10:10	0.000893	0.000604	0.000147	<0.000106	0.0133	0.0125	33.7
12/21/2021 09:40	0.00151	0.000851	0.00283	0.00859	0.0224	0.0198	34.9
01/18/2022 10:25	0.000523	0.000482	<0.000111	<0.000106	0.00963	0.00857	36.6
02/15/2022 10:10	0.000785	0.000592	0.000149	<0.000106	0.0453	0.0452	31.2
03/15/2022 09:50	0.00116	0.000665	0.000482	<0.000106	0.0197	0.0168	32.9
04/19/2022 10:10	0.00316	0.00162	0.00147	0.000134	0.0291	0.0204	16.2
05/17/2022 10:25	0.000867	0.000525	0.00134	0.000244	0.0137	0.0139	32.7
06/21/2022 09:40	0.00101	0.000669	0.000148	<0.000106	0.00887	0.0089	32.7
Median	**NA**	**NA**	**NA**	**NA**	**0.0181**	**0.0139**	**33**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

NA= Medians not calculated for copper and lead due to the large number of censored values.

Table 7.

Monthly Instream Data - Clark Creek (RY 2021/2022)

Site Name:	CLA10									
Site Description:	Ewald Ave									
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 09:40	16.3	9.08	71.2	3.2	6.93	556	1.545	0.6		0.00
08/17/2021 09:40	16.7	8.97	72.4	3.6	6.9	4106	1.246	0.6		0.00
09/21/2021 09:35	15.91	8.94	76.3	2.74	6.81	6488	1.316	0.6		0.00
10/19/2021 09:20	13.8	9.48	73.4	3.5	7.1	292	1.404	0.52	4.2	0.03
11/16/2021 09:15	13.5	9.68	78.2	1.9	6.77	122	2.35	0.6	2.6	0.31
12/21/2021 09:05	12.1	10.14	91.3	5.9	6.47	122	3.505	0.74	3.2	1.56
01/18/2022 09:25	10.6	10.45	80.5	2.1	6.92	41	2.473	0.51	2.2	0.00
02/15/2022 09:25	10.1	10.67	74.4	1.6	6.93	148	1.992	0.53	1	0.22
03/15/2022 08:58	10.9	10.42	75.9	5.1	6.62	<10	2.192	0.52	1.6	0.32
04/19/2022 09:43	9.4	10.66	38.1	7.3	6.51	24200	0.723	1.99	6.2	0.37
05/17/2022 10:00	12.3	10.08	76.3	2.5	6.74	98	2.03	0.67	3.4	0.00
06/21/2022 09:10	13.8	9.6	75.2	0.6	7.05	683	1.61	0.22	2	0.00
Median	**12.90**	**9.88**	**75.55**	**2.97**	**6.86**	**220**	**1.80**	**0.60**	**2.60**	

Site Name:	CLA10						
Site Description:	Ewald Ave						
Collection Date/Time	Total Copper (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
07/20/2021 09:40	0.000511	0.000228	0.000289	<0.000106	0.00757	0.00607	19.9
08/17/2021 09:40	0.000404	0.000291	0.00019	<0.000106	0.00656	0.00558	21
09/21/2021 09:35	0.000537	0.000386	0.000175	<0.000106	0.0113	0.0108	23.3
10/19/2021 09:20	0.000376	0.000369	0.00014	<0.000106	0.00739	0.00667	21.2
11/16/2021 09:15	0.000512	0.000244	<0.000111	<0.000106	0.0124	0.0119	22.6
12/21/2021 09:05	0.00104	0.000278	0.000317	<0.000106	0.0115	0.00974	28.1
01/18/2022 09:25	0.000277	<0.000211	<0.000111	<0.000106	0.0093	0.00858	24.7
02/15/2022 09:25	0.00262	0.000233	0.000123	<0.000106	0.0137	0.0138	21.1
03/15/2022 08:58	0.000728	0.000245	0.000168	<0.000106	0.01	0.00963	23.4
04/19/2022 09:43	0.00188	0.00127	0.000486	<0.000106	0.0287	0.0276	12.8
05/17/2022 10:00	0.000309	0.000273	0.000149	<0.000106	0.00752	0.0102	22.1
06/21/2022 09:10	0.000703	0.000282	0.000125	<0.000106	0.0152	0.0159	21.5
Median	**NA**	**NA**	**NA**	**NA**	**0.0107**	**0.0100**	**21.80**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

NA= Medians not calculated for copper and lead due to the large number of censored values.

Table 7.

Monthly Instream Data - Croisan Creek (RY 2021/2022)

Site Name:	CRO1									
Site Description:	River Rd S									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 10:00	17.3	5.53	99.8	3.8	6.69	125	0.363	0.56		0.00
08/17/2021 10:10	18.1	4.81	81.1	6	6.94	205	0.275	0.91		0.00
09/21/2021 09:55	13.16	6.75	106.5	2.94	6.8	397	0.433	1.03		0.00
10/19/2021 09:55	10.2	9.08	95.1	2.7	7.07	613	0.423	0.53	1	0.03
11/16/2021 09:30	9.8	10.58	76.9	3.6	6.91	1300	1.885	0.87	3	0.31
12/21/2021 09:20	8.7	11.31	65.1	22	6.94	2489	2.673	1.05	15.2	1.56
01/18/2022 09:45	7.7	11.59	64.5	3.9	7.17	>2420	1.568	0.72	5.2	0.00
02/15/2022 09:45	6.8	11.77	68.8	2.3	7.14	575	1.078	0.58	1.8	0.22
03/15/2022 09:15	9	11.25	62.9	9	6.99	1986	1.158	0.7	4.8	0.32
04/19/2022 10:03	8.5	11.34	53.8	9.7	6.85	457	0.623	1.31	9.2	0.37
05/17/2022 10:17	10.9	10.91	61.5	4.6	6.98	816	0.787	0.58	6	0.00
06/21/2022 09:50	12.9	9.95	68.2	2.9	7.1	231	0.429	0.36	3.6	0.00
Median	**10.00**	**10.75**	**68.50**	**3.85**	**6.96**	**594**	**0.71**	**0.71**	**4.80**	

Site Name:	CRO10									
Site Description:	Ballantyne Rd.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 10:25	17	7.31	81.11	8.8	6.65	84	0.241	0.63		0.00
08/17/2021 10:30	17.2	5.22	82.7	11.7	6.56	272	0.108	1.43		0.00
09/21/2021 10:10	14.08	6.64	77.7	4.37	6.58	76	0.099	1.28		0.00
10/19/2021 10:20	11.6	9.16	67.5	6.1	6.94	50	0.168	1.33	4	0.03
11/16/2021 09:45	10.3	10.41	58.9	3.4	6.74	30	2.395	1.02	2.8	0.31
12/21/2021 09:40	8.5	11.05	55.4	16.4	6.75	2987	2.961	0.93	7.8	1.56
01/18/2022 10:00	7.8	11.4	49.8	2.1	7.04	8	1.851	0.78	2.6	0.00
02/15/2022 10:00	6.9	11.65	50.6	2.5	6.93	31	1.313	0.79	1.6	0.22
03/15/2022 09:30	8.6	11.27	47.8	5.8	7.14	12	1.366	0.59	2.4	0.32
04/19/2022 10:18	8.5	11.19	46.1	6	6.77	20	0.975	0.91	3.8	0.37
05/17/2022 10:31	10.7	10.76	46.9	3.9	6.89	26	0.871	0.58	3.8	0.00
06/21/2022 10:22	13.9	10.59	48.3	2.1	7.02	172	0.336	0.65	3.8	0.00
Median	**10.50**	**10.68**	**53.00**	**5.09**	**6.83**	**41**	**0.92**	**0.85**	**3.80**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Gibson Creek (RY 2021/2022)

Site Name:	GIB1									
Site Description:	Wallace Rd.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 11:25	17.9	6.78	119.6	7.3	6.74	166	0.403	1.09		0.00
08/17/2021 10:55	18	4.46	119.6	6.9	6.6	649	0.303	1.36		0.00
09/21/2021 11:15	15.5	6.3	118.2	9.6	7.32	101	0.473	1.72		0.00
10/19/2021 10:30	10.7	9.1	87.4	4.8	7.41	238	0.562	0.91	3	0.03
11/16/2021 11:20	10.4	10.57	90	5.5	7.56	68	2.852	0.98	4.2	0.31
12/21/2021 10:25	8	11.1	76.7	22.8	7.16	93	2.888	1.01	19.2	1.56
01/18/2022 11:25	8.1	11.51	80.5	6.1	7.51	45	2.632	0.83	5	0.00
02/15/2022 11:40	7.6	11.67	84.4	4.6	7.63	140	1.713	0.72	3.6	0.22
03/15/2022 10:55	9.8	11.1	79.3	9.7	7.48	44	1.751	0.42	8	0.32
04/19/2022 11:25	8.7	11.12	75	10.1	7.11	548	1.142	1.28	12	0.37
05/17/2022 11:05	12.4	10.46	78.3	5.7	7.15	56	1.336	0.54	7.8	0.00
06/21/2022 10:30	15.1	9.48	85.2	5.4	7.5	114	0.9	0.32	6.4	0.00
Median	**10.55**	**10.52**	**84.80**	**6.50**	**7.37**	**107.5**	**1.24**	**0.95**	**6.40**	

Site Name:	GIB15									
Site Description:	Brush College Rd.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 11:35	17.5	8.5	110.5	7.2	6.73	461	0.223	0.77		0.00
08/17/2021 11:20	16.9	7.77	121.1	8.7	6.67	548	0.134	1.02		0.00
09/21/2021 11:30	14.4	8.81	113.2	7	7.26	130	0.466	0.91		0.00
10/19/2021 10:40	9.7	9.96	106	6	7.31	166	1.427	1.04	6.6	0.03
11/16/2021 11:30	10.5	10.28	88.3	5.4	7.36	147	3.048	1.18	17.2	0.31
12/21/2021 10:35	8.8	11.05	76.1	21.4	7	40	2.865	1.06	16	1.56
01/18/2022 11:35	8.5	11.2	81.5	4.6	7.21	6	2.711	0.79	7.8	0.00
02/15/2022 11:50	7.7	11.44	82.4	3.8	7.42	14	1.996	0.85	13.6	0.22
03/15/2022 11:00	9.5	10.94	76.5	9.9	7.16	5	1.792	0.33	5.6	0.32
04/19/2022 11:50	8.7	11.05	76	9.9	6.93	99	1.459	1.06	11	0.37
05/17/2022 11:20	11.7	10.45	76.7	10	6.9	34	1.409	0.62	14.6	0.00
06/21/2022 10:40	14.7	9.75	82.3	4.2	7.29	12	1.221	0.53	9.2	0.00
Median	**10.10**	**10.37**	**82.35**	**7.10**	**7.19**	**345**	**1.44**	**0.88**	**11.00**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Glenn Creek (RY 2021/2022)

Site Name:	GLE1									
Site Description:	River Bend Rd.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 10:55	17.4	8.04	129.2	8.6	6.55	579	0.416	0.67		0.00
08/17/2021 10:40	17.7	7.92	131.5	9.8	6.93	1733	0.35	0.88		0.00
09/21/2021 11:05	14.5	9.08	116.3	5.7	7.36	866	0.517	0.84		0.00
10/19/2021 10:15	11.3	9.91	102.9	6	7.43	345	0.535	0.87	17.8	0.03
11/16/2021 10:50	10.6	10.69	98.1	4.4	7.43	71	2.583	0.69	3.6	0.31
12/21/2021 10:20	9.2	10.76	88.3	25.7	7.01	613	3.303	1.21	18.2	1.56
01/18/2022 11:05	8	11.5	84.4	4.3	7.41	55	2.005	0.86	2.6	0.00
02/15/2022 11:25	8.4	11.59	90.8	9.2	7.59	83	1.283	0.86	11	0.22
03/15/2022 10:40	9.7	11.08	82.4	9.1	7.42	135	1.531	0.5	5.6	0.32
04/19/2022 11:15	8.8	11.21	66	10.3	7.09	272	0.893	1.42	11.4	0.37
05/17/2022 11:00	11.4	10.67	85.6	4.5	7.15	115	1.253	0.59	4.8	0.00
06/21/2022 10:20	14.1	9.64	96	5.3	7.42	201	0.712	0.44	6.6	0.00
Median	**10.95**	**10.68**	**93.40**	**7.30**	**7.39**	**237**	**1.07**	**0.85**	**6.60**	

Site Name:	GLE10									
Site Description:	Hidden Valley Dr.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 11:45										0
08/17/2021 11:30										0
09/21/2021 11:45										0
10/19/2021 11:00	10.6	10.39	69.1	3.4	7.45	156	0.245	0.71	0.6	0.03
11/16/2021 11:50	10.8	10.47	74	4.3	7.25	77	3.098	0.77	1.8	0.3075
12/21/2021 10:50	8.6	11.35	61.4	22.4	7.12	1986	3.157	1.1	9.8	1.5575
01/18/2022 11:55	8.1	11.41	56.1	5.8	7.29	77	1.913	0.63	3.8	0
02/15/2022 12:10	7.7	11.61	55.6	5	7.6	96	1.358	0.67	3	0.2175
03/15/2022 11:15	9.1	11.18	54	9.8	7.24	11	1.363	0.39	4	0.315
04/19/2022 12:00	8.4	11.31	57	11	7.09	22	1.153	0.99	7.6	0.3725
05/17/2022 11:40	10.8	10.79	57.8	9.3	6.94	15	1.078	0.5	7.8	0
06/21/2022 10:55	12.8	10.09	63.5	5.7	7.27	32	0.603	0.23	5.8	0
Median	**9.10**	**11.18**	**57.80**	**5.80**	**7.25**	**77.00**	**1.36**	**0.67**	**4.00**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.

Monthly Instream Data - West Fork Little Pudding River (RY 2021/2022)

Site Name:	LPW1									
Site Description:	Cordon Rd.									
Collection Date/ Time	**Temp (°C)**	**DO (mg/L)**	**Sp Cond (µS/ cm)**	**Turb (NTU)**	**pH (S.U.)**	**E-Coli (#/ 100 mL)**	**NO_3-NO_2 (mg/ L)**	**BOD (mg/ L)**	**TSS (mg/L)**	**Rainfall previous 24 hrs**
07/20/2021 11:45										0.00
08/17/2021 11:45										0.00
09/21/2021 11:25	15.27	1.28	140	4.03	6.46	689	< 0.050	4.43	8.2	0.00
10/19/2021 11:35										0.03
11/16/2021 11:15	9.7	8.6	115.7	6.5	6.84	488	1.037	1.47	5.2	0.31
12/21/2021 11:40	8.3	10.45	177.6	17.2	6.93	909	5.639	1.33	7.8	1.56
01/18/2022 11:30	7.9	10.55	247.9	7.2	7.22	2420	2.804	1.01	12.2	0.00
02/15/2022 11:15	7.4	10.76	195.7	6.4	7.16	378	0.794	1.2	7	0.22
03/15/2022 10:43	9.8	10.3	153.6	10.6	7.01	186	1.731	0.98	6	0.32
04/19/2022 11:35	9.2	10.31	104.1	9.4	6.77	833	0.516	1.97	11.4	0.37
05/17/2022 11:50	13.2	8.75	222.6	3.6	7.15	326	1.298	0.8	6	0.00
06/21/2022 11:45	17.5	6.18	244.5	8	7.13	108	0.642	1.02	9.4	0.00
Median	**9.70**	**10.30**	**177.60**	**7.20**	**7.01**	**488**	**1.17**	**1.20**	**7.8**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Mill Creek (RY 2021/2022)

Site Name:	MIC1									
Site Description:	Front St.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 09:00	19.8	8.94	61	4.1	7.31	127	0.164	0.71		0.00
08/17/2021 08:45	19.3	8.82	57.6	3.2	7.3	276	0.098	0.72		0.00
09/21/2021 08:40	14.89	9.65	61.8	2.54	7.21	326	0.33	0.49		0.00
10/19/2021 08:35	11.5	10.43	135.1	2	7.61	140	1.326	0.93	1.6	0.03
11/16/2021 08:40	10.5	11.09	117.9	9.1	7.28	236	4.96	0.85	8.4	0.31
12/21/2021 08:30	7.4	11.31	95.3	33.4	7.12	529	3.006	1.55	34.2	1.56
01/18/2022 08:50	7.4	11.99	101.4	8.9	7.35	54	3.149	0.81	4.2	0.00
02/15/2022 08:45	7.5	11.90	106.5	2.2	7.52	64	2.361	0.88	3.2	0.22
03/15/2022 08:20	9.4	11.2	101.9	17.2	7.02	261	2.326	0.92	15.4	0.32
04/19/2022 08:50	9.1	11.22	88.3	6.5	7.18	199	1.991	1.34	7.4	0.37
05/17/2022 09:03	12.6	10.42	93.9	4.1	7.23	166	1.992	0.73	6.2	0.00
06/21/2022 08:25	15.7	9.73	84.8	2.1	7.38	179	1.372	0.59	6	0.00
Median	**11.00**	**10.76**	**94.60**	**4.10**	**7.29**	**189**	**1.99**	**0.83**	**6.20**	

Site Name:	MIC10									
Site Description:	Turner Rd									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 11:30	18.5	9.82	54.3	3.4	7.33	162	0.158	0.78		0.00
08/17/2021 11:30	17.5	9.35	53.4	2.3	7.44	161	0.134	0.73		0.00
09/21/2021 11:05	14.64	9.98	53.7	2.35	7.2	73	0.322	0.45		0.00
10/19/2021 11:25	11.2	10.51	114.5	3.8	7.31	30	1.288	0.92	3	0.03
11/16/2021 10:55	10.2	10.59	118.9	8.8	6.91	133	4.967	0.94	5.6	0.31
12/21/2021 11:20	7.4	10.73	87.6	24.1	6.89	199	3.882	1.1	13.2	1.56
01/18/2022 10:55	7.3	11.53	94.3	3.1	7.26	44	1.591	0.82	3.4	0.00
02/15/2022 10:55	7	12.60	99.3	3	7.34	45	2.522	1.08	3.6	0.22
03/15/2022 10:25	9.1	10.6	99.2	15.4	7.1	172	2.41	0.81	9.2	0.32
04/19/2022 11:15	8.7	10.93	88.6	11.1	6.88	471	2.037	1.42	12.2	0.37
05/17/2022 11:25	12.3	11.16	86.2	3.4	7.23	44	2.082	0.61	6.2	0.00
06/21/2022 11:23	15.5	10.36	77.7	3.3	7.34	55	1.358	0.47	4.6	0.00
Median	**10.70**	**10.60**	**88.10**	**3.40**	**7.25**	**103**	**1.81**	**0.82**	**5.60**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Mill Race (RY 2021/2022)

Site Name:	MRA1									
Site Description:	High St.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 09:40	19.9	9.1	53.5	3.2	7.04	133	0.125	0.65		0.00
08/17/2021 09:25	19.2	9.1	52.6	2.7	7.21	488	0.077	0.77		0.00
09/21/2021 09:35	14.8	9.98	55.3	5.9	7.33	260	0.319	0.69		0.00
10/19/2021 09:20	11.3	10.32	117.4	1.9	7.61	291	1.307	0.94	2	0.03
11/16/2021 09:50	10.4	11.22	116.2	6.4	7.37	113	2.629	1.05	3.6	0.31
12/21/2021 09:20	7.3	11.96	94.7	29.7	7.19	411	3.058	1.57	26.2	1.56
01/18/2022 09:45	6.7	11.85	97.7	3.6	7.4	158	3.234	0.83	4.4	0.00
02/15/2022 09:45	7.4	12.16	100.1	3.1	7.61	36	2.362	0.93	3.6	0.22
03/15/2022 09:30	9	11.3	98.1	9	7.32	91	2.68	0.8	4.2	0.32
04/19/2022 09:40	8.9	11.61	86	5	7.32	345	1.889	1.35	5.6	0.37
05/17/2022 09:55	12.8	11.18	88.7	3.2	7.43	127	1.898	0.77	5.4	0.00
06/21/2022 09:10	15.8	9.85	82	2.7	7.51	194	1.304	0.51	3.8	0.00
Median	**10.85**	**11.20**	**91.70**	**3.40**	**7.35**	**176**	**1.89**	**0.82**	**4.20**	

Site Name:	MRA10									
Site Description:	19th St.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 09:10	19.7	8.05	53.3	3.1	6.03	308	0.12	0.62		0.00
08/17/2021 08:50	19.1	8.12	53.1	2.3	6.08	387	0.087	1.01		0.00
09/21/2021 09:05	14.6	9.11	55.2	2.6	7.14	166	0.333	0.86		0.00
10/19/2021 08:45	12	9.46	119.2	4.4	7.4	579	1.336	0.87	7.4	0.03
11/16/2021 09:10	10.3	10.83	117.1	8.5	7.19	150	4.896	1	6.2	0.31
12/21/2021 08:30	7.3	11.44	94.4	31.7	6.99	488	3.509	1.38	28.4	1.56
01/18/2022 09:10	7	11.98	97.7	3.3	7.26	37	3.208	0.7	3.8	0.00
02/15/2022 09:15	7.1	11.51	10.21	3.6	7.39	40	2.439	1.06	5	0.22
03/15/2022 09:05	9.1	11.04	100.5	15.9	7.17	236	2.433	1.08	14.6	0.32
04/19/2022 09:00	8.9	11.06	88	6.2	7.13	137	1.975	1.34	6	0.37
05/17/2022 09:15	12.3	10.73	89	3.4	7.09	124	2.016	0.73	5	0.00
06/21/2022 08:35	15.4	9.58	82.7	3	7.04	102	1.422	0.64	5.8	0.00
Median	**11.15**	**10.78**	**88.50**	**3.50**	**7.14**	**158**	**2.00**	**0.94**	**6.00**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Pringle Creek (RY 2021/2022)

Site Name:	PRI1									
Site Description:	Waterfront Park									
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 09:20	19.5	9.1	57.4	3	6.95	124	0.154	0.73		0.00
08/17/2021 09:10	19.2	8.95	56.2	2.4	6.98	161	0.1	0.74		0.00
09/21/2021 09:20	14.8	9.78	58.6	2.7	7.31	123	0.325	0.66		0.00
10/19/2021 09:00	11.3	10.42	113.1	2.1	7.59	115	1.174	0.81	2	0.03
11/16/2021 09:35	10.4	11.02	115.7	7.2	7.22	228	4.857	0.99	4.8	0.31
12/21/2021 08:50	7	11.66	71.7	26.8	7.12	770	3.211	1.54	32.4	1.56
01/18/2022 09:25	7.1	11.97	96.6	3.2	7.36	46	3.003	0.73	2.8	0.00
02/15/2022 09:30	7.3	12.21	101.6	2.9	7.55	201	2.319	0.92	2.4	0.22
03/15/2022 09:20	9.2	11.16	97.9	14.3	7.23	1553	2.243	0.98	11	0.32
04/19/2022 09:20	8.9	11.20	81	9.1	7.16	328	1.64	1.64	12	0.37
05/17/2022 09:30	12.3	10.69	88.6	3.2	7.13	88	1.88	0.67	4.8	0.00
06/21/2022 09:00	15.3	9.9	83.7	2.7	7.34	88	1.265	0.54	5.2	0.00
Median	**10.85**	**10.86**	**86.15**	**3.10**	**7.23**	**142.5**	**1.76**	**0.78**	**4.80**	

Site Name:	PRI1						
Site Description:	Waterfront Park						
Collection Date/Time	Total Cop-per (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/ L)	Dissolved Lead (mg/ L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
07/20/2021 09:20	0.000533	0.00117	<0.000111	<0.000106	0.00168	0.0013	20.6
08/17/2021 09:10	0.000648	0.000434	0.000131	<0.000106	0.00292	0.00132	21.3
09/21/2021 09:20	0.000719	0.00054	0.000196	<0.000106	0.00274	0.00119	22.5
10/19/2021 09:00	0.000632	0.000526	<0.000111	<0.000106	0.00269	0.00184	44
11/16/2021 09:35	0.00146	0.000909	0.000238	<0.000106	0.0041	0.00213	41.2
12/21/2021 08:50	0.00248	0.000927	0.00615	<0.000106	0.0298	0.00339	33.7
01/18/2022 09:25	0.000458	0.000396	<0.000111	<0.000106	0.00216	0.00145	36
02/15/2022 09:30	0.000552	0.000427	0.000117	<0.000106	0.00253	0.00204	36.7
03/15/2022 09:20	0.0018	0.000868	0.00076	<0.000106	0.00806	0.00336	36.1
04/19/2022 09:20	0.00154	0.000829	0.000437	<0.000106	0.00945	0.00772	30.2
05/17/2022 09:30	0.00056	0.000453	0.000118	<0.000106	0.00207	0.00344	32.6
06/21/2022 09:00	0.000556	0.000519	<0.000111	<0.000106	0.00145	0.0012	30.8
Median	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**33.15**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

NA= Medians not calculated for copper and lead due to the large number of censored values.

Table 7.
Monthly Instream Data - Pringle Creek (RY 2021/2022)

Site Name:	PRI5									
Site Description:	Bush Park									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 10:10	20.7	8.26	91.9	2.4	7.73	1203	0.217	1.58		0.00
08/17/2021 10:00	20.8	8.31	87.2	3.2	7.67	548	0.144	1.33		0.00
09/21/2021 10:15	16.3	8.99	82.7	2.4	7.36	240	0.361	1.33		0.00
10/19/2021 09:50	11	10.3	85	2.4	7.6	86	0.599	0.83	1.8	0.03
11/16/2021 10:15	11.4	10.32	98.8	4.2	7.4	172	1.593	0.93	3.2	0.31
12/21/2021 09:45	9.1	10.62	86.7	14.9	7.07	1986	2.292	1.22	12.6	1.56
01/18/2022 10:30	8	11.7	88.9	3.6	7.48	26	1.826	1	3	0.00
02/15/2022 10:20	7.5	12.25	91.8	4.3	7.58	1203	1.285	1.19	5	0.22
03/15/2022 09:55	9.5	11.12	84.7	12.5	7.28	122	1.073	0.93	13.6	0.32
04/19/2022 10:15	9.4	10.94	68	12.8	7.06	613	0.605	2.1	24.2	0.37
05/17/2022 10:30	13.2	11	87.7	3.5	7.34	26	0.94	1.02	4.6	0.00
06/21/2022 09:45	15.9	9.65	95.3	3.7	7.51	93	0.745	0.77	6	0.00
Median	**11.20**	**10.47**	**87.45**	**3.65**	**7.44**	**206**	**0.84**	**1.11**	**5.00**	

Site Name:	PRI5						
Site Description:	Bush Park						
Collection Date/ Time	Total Cop-per (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/ L)	Dissolved Lead (mg/ L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
07/20/2021 10:10	0.000827	0.000587	0.000172	<0.000106	0.00435	0.00217	32.7
08/17/2021 10:00	0.000917	0.000566	0.000298	<0.000106	0.00615	0.00283	32.5
09/21/2021 10:15	0.000976	0.000787	0.000203	<0.000106	0.00517	0.00287	31.4
10/19/2021 09:50	0.000674	0.000562	<0.000111	<0.000106	0.00428	0.00318	31.2
11/16/2021 10:15	0.00101	0.00071	0.000165	<0.000106	0.00769	0.00633	35.5
12/21/2021 09:45	0.00174	0.000828	0.000526	<0.000106	0.0131	0.00914	29.7
01/18/2022 10:30	0.000543	0.000436	0.000112	<0.000106	0.00596	0.00469	32.6
02/15/2022 10:20	0.00064	0.000543	0.000217	<0.000106	0.00664	0.00446	32.8
03/15/2022 09:55	0.00127	0.000691	0.000448	<0.000106	0.0137	0.0105	32.6
04/19/2022 10:15	0.00178	0.00101	0.00071	<0.000106	0.0209	0.0165	25.6
05/17/2022 10:30	0.000572	0.000458	0.000134	<0.000106	0.00511	0.00365	32
06/21/2022 09:45	0.001	0.000625	0.000169	<0.000106	0.00463	0.00433	34.3
Median	**NA**	**NA**	**NA**	**NA**	**0.0061**	**0.0044**	**32.55**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

NA= Medians not calculated for copper and lead due to the large number of censored values.

Table 7.
Monthly Instream Data - Shelton Ditch (RY 2021/2022)

Site Name:	SHE1									
Site Description:	Church St.									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 09:45	19.4	9.14	54.3	2.9	6.85	108	0.147	0.76		0.00
08/17/2021 09:35	18.7	9.22	54.4	2.9	7.03	172	0.102	0.92		0.00
09/21/2021 09:50	14.5	9.44	55	2.4	7.31	102	0.332	0.66		0.00
10/19/2021 09:30	11.3	10.64	114.4	2	7.65	66	1.314	0.91	3.8	0.03
11/16/2021 09:55	10.2	11.12	117.3	7.8	7.27	166	4.9	1.14	5.6	0.31
12/21/2021 09:30	7.1	11.59	94.6	36.7	7.21	579	3.288	1.47	34.2	1.56
01/18/2022 10:05	7	12.02	96.7	3.3	7.41	44	3.279	0.75	2.6	0.00
02/15/2022 09:55	7.2	12.25	100.8	2.8	7.64	28	2.336	1.06	2.8	0.22
03/15/2022 09:35	9.1	11.22	100.1	16.3	7.22	199	2.439	1.18	10.8	0.32
04/19/2022 09:55	8.8	11.42	86	7.1	7.27	147	2.041	1.48	7.6	0.37
05/17/2022 10:10	12.2	10.81	88.1	3.5	7.2	99	1.976	0.65	5	0.00
06/21/2022 09:25	15.3	10	81.9	2.6	7.58	84	1.289	0.48	5.4	0.00
Median	**10.75**	**10.97**	**91.35**	**3.10**	**7.27**	**105**	**2.01**	**0.92**	**5.40**	

Site Name:	SHE10									
Site Description:	Airport Road									
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/ cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/20/2021 08:50	19.3	9.16	54	3.5	6.25	76	0.167	0.67		0.00
08/17/2021 08:35	18.5	9.2	53.3	2.5	6	129	0.1	0.86		0.00
09/21/2021 08:50	14.3	10.02	53.9	2.7	7.08	73	0.351	0.52		0.00
10/19/2021 08:35	11.3	10.52	113.3	2.8	7.36	91	1.249	0.89	2.6	0.03
11/16/2021 08:40	9.9	11.21	116.3	7.3	7.14	236	4.754	1.12	7	0.31
12/21/2021 08:20	7.5	11.34	92.6	25.5	6.76	517	3.383	1.26	25.8	1.56
01/18/2022 08:50	7.1	12.25	95.8	3.5	7.22	43	3.202	1.01	3.4	0.00
02/15/2022 08:50	7.6	12.02	99.5	3.2	7.45	29	2.396	1.19	3.2	0.22
03/15/2022 08:50	9.4	11.21	99.9	14.9	7.08	127	4.766	1.14	12	0.32
04/19/2022 08:50	9.1	11.27	87	6.4	7.2	186	1.976	1.43	7	0.37
05/17/2022 09:00	12.8	10.68	89	3.3	7.21	77	2.008	0.82	5	0.00
06/21/2022 08:20	15.4	10	81.1	2.7	7.2	86	1.333		4.8	0.00
Median	**10.60**	**10.95**	**90.80**	**3.40**	**7.17**	**88.5**	**1.99**	**1.01**	**5.00**	

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Willamette River (RY 2021/2022)

Site Name:	WR1								
Site Description:	Sunset Park (Keizer)								
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
07/20/2021 12:40	22.4	10.5	73.1	1.1	7.65	4	0.165	0.74	0.00
08/17/2021 12:35	21.6	9.9	74.4	0.4	7.56	10	0.118	0.74	0.00
09/21/2021 12:15	16.82	9.71	68	2.22	7.35	51	0.204	0.43	0.00
10/19/2021 12:35	13.1	11.03	86	1	7.37	25	0.226	0.8	0.03
11/16/2021 12:05	11.1	10.33	65.8	10.8	7.23	52	0.952	0.96	0.31
12/21/2021 12:40	7.6	11.07	66.1	34	7.31	520	1.422	1.5	1.56
01/18/2022 12:15	6.8	11.67	60	6.2	7.38	12	0.511	0.73	0.00
02/15/2022 12:20	8	12.09	81.1	1.2	7.33	10	0.631	1.05	0.22
03/15/2022 11:40	9.4	11.28	84.6	15	7.47	96	0.94	1.09	0.32
04/19/2022 12:22	8.8	11.26	70.6	6.3	7.15	86	0.534	1.23	0.37
05/17/2022 12:43	11.5	10.5	56	7.9	7.45	34	0.747	0.88	0.00
06/21/2022 12:30	14.5	10.08	62.7	2.5	7.66	22	0.242	0.42	0.00
Median	**11.30**	**10.77**	**69.30**	**4.35**	**7.38**	**29.5**	**0.52**	**0.84**	

Site Name:	WR1				
Site Description:	Sunset Park (Keizer)				
Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
27	< 0.050	0.034	65	67	2.3
29	< 0.050	0.035	62	65	2.6
26	< 0.050	0.035	60	66	6.5
30	< 0.050	0.028	71	73	2.2
24	< 0.050	0.067	70	87	16.8
21	< 0.050	0.154	37	86	49.2
22	< 0.050	0.045	55	65	9.6
29	< 0.050	0.025	68	70	2.2
28	0.104	0.069	78	91	12.8
24	< 0.050	0.039	60	67	7.2
24	< 0.050	0.046	45	57	12.2
23	< 0.050	0.038	51	58	6.6
25	**NA**	**0.0385**	**61**	**67**	**6.9**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Willamette River (RY 2021/2022)

Site Name:	WR5								
Site Description:	Union Street Railroad Bridge								
Collection Date/Time	**Temp (°C)**	**DO (mg/L)**	**Sp Cond (µS/cm)**	**Turb (NTU)**	**pH (S.U.)**	**E-Coli (#/ 100 mL)**	**NO_3-NO_2 (mg/L)**	**BOD (mg/L)**	**Rainfall previous 24 hrs**
07/20/2021 09:15	20.9	8.52	70.3	2	7.45	13	0.186	0.71	0.00
08/17/2021 09:15	21	8.29	69.2	1.1	7.49	10	0.115	0.77	0.00
09/21/2021 09:00	15.42	9.49	66.2	3.71	7.3	37	0.196	1.3	0.00
10/19/2021 08:50	12.1	10.44	77.7	5.1	7.74	17	0.167	0.78	0.03
11/16/2021 08:55	10.2	10.81	63.4	12.3	7.42	59	0.868	0.98	0.31
12/21/2021 08:40	7.2	11.55	61.7	35.6	7.34	>24196	1.323	1.21	1.56
01/18/2022 09:05	6.7	12	57.6	7	7.4	10	0.462	0.74	0.00
02/15/2022 09:00	7	11.87	75.4	2.4	7.54	8	0.567	0.94	0.22
03/15/2022 08:37	8.6	11.29	81.5	13.4	7.26	140	0.777	1.14	0.32
04/19/2022 09:20	8.7	11.34	69.7	4.8	7.43	20	0.505	1.29	0.37
05/17/2022 09:20	11.4	10.59	56.7	9.4	7.38	41	0.28	0.92	0.00
06/21/2022 08:45	14	10.16	61.5	3.3	7.48	20	0.199	0.61	0.00
Median	**10.80**	**10.70**	**67.70**	**4.95**	**7.43**	**20**	**0.37**	**0.93**	

Site Name:	WR5				
Site Description:	Union Street Railroad Bridge				
Alkalinity (mg/L)	**Ammonia (mg/L)**	**TP (mg/L)**	**TDS (mg/L)**	**TS (mg/L)**	**TSS (mg/L)**
26	< 0.050	0.04	62	66	3.8
26	< 0.050	0.035	62	65	3
27	< 0.050	0.04	64	73	8.5
27	< 0.050	0.027	66	70	4
24	< 0.050	0.07	67	81	13.8
20	< 0.050	0.17	41	96	55
23	< 0.050	0.045	53	63	9.8
26	< 0.050	0.028	63	66	3.2
27	0.098	0.067	70	82	11.8
25	< 0.050	0.036	52	58	6.4
22	< 0.050	0.047	38	53	15
24	< 0.050	0.039	50	55	5.4
25.5	**NA**	**0.04**	**62**	**66**	**7.45**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 7.
Monthly Instream Data - Willamette River (RY 2021/2022)

Site Name	WR10								
Site Description:	Halls Ferry Road (Independence)								
Collection Date/Time	**Temp (°C)**	**DO (mg/L)**	**Sp Cond (µS/cm)**	**Turb (NTU)**	**pH (S.U.)**	**E-Coli (#/ 100 mL)**	**NO_3-NO_2 (mg/L)**	**BOD (mg/L)**	**Rainfall previous 24 hrs**
07/20/2021 12:15	21.5	8.97	70.4	1.2	7.7	2	0.197	0.77	0.00
08/17/2021 12:00	21	9.27	71.5	0.6	7.65	8	0.139	0.8	0.00
09/21/2021 12:20	16.2	9.59	67.1	2.5	7.48	40	0.213	0.65	0.00
10/19/2021 11:20	12.5	10.33	76	1.2	7.21	14	0.171	0.68	0.03
11/16/2021 12:10	10.8	10.44	59.8	11.8	7.34	65	0.644	0.92	0.31
12/21/2021 11:15	7.6	11.1	59.8	37	7.18	457	1.143	1.49	1.56
01/18/2022 12:25	6.6	11.71	57.8	7.6	7.33	9	0.497	0.69	0.00
02/15/2022 12:30	7.5	11.62	73.4	1.8	7.44	4	0.55	0.85	0.22
03/15/2022 11:40	8.6	11.19	79.3	12	7.22	579	0.746	1.18	0.32
04/19/2022 12:25	8.5	11.33	66	4.5	7.15	17	0.395	1.32	0.37
05/17/2022 12:10	11.9	10.5	55.4	10.5	7.07	31	0.207	0.7	0.00
06/21/2022 11:20	13.7	10.04	60.4	3.5	7.18	16	0.184	0.34	0.00
Median	**11.35**	**10.47**	**66.55**	**4.00**	**7.28**	**16.5**	**0.30**	**0.79**	

Site Name:	WR10				
Site Description:	Halls Ferry Road (Independence)				
Alkalinity (mg/L)	**Ammonia (mg/L)**	**TP (mg/L)**	**TDS (mg/L)**	**TS (mg/L)**	**TSS (mg/L)**
27	< 0.050	0.045	64	67	3.2
27	< 0.050	0.034	62	65	2.7
25	< 0.050	0.04	66	73	6.5
27	< 0.050	0.029	68	70	2.5
23	< 0.050	0.064	58	74	16
20	< 0.050	0.159	43	92	49.4
23	< 0.050	0.049	51	61	10.4
28	< 0.050	0.024	59	61	2.4
29	0.103	0.073	92	102	10.4
26	< 0.050	0.038	56	63	7
23	< 0.050	0.072	49	69	20.2
26	< 0.050	0.038	41	47	6.2
26	**NA**	**0.0425**	**58.5**	**68**	**6.75**

Note: Data in red exceed applicable water quality criteria (see Table 4). Single sample criterion (406 organisms/100 mL) used for E. Coli.

Table 8.
Monthly Instream Data - Duplicates (RY 2021/2022)

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	TSS	Total Copper (mg/L)	Dissolved Copper (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	Total Zinc (mg/L)	Dissolved Zinc (mg/L)	Hardness
PRI5	07/20/2021 10:15	20.7	8.24	91.9	2.4	7.74	1414	0.222	1.56		0.00073	0.000634	0.00015	<0.000106	0.00348	0.00189	32.7
GLE1	07/20/2021 11:00	17.2	8.03	129.4	8.4	6.5	687	0.407	0.69								
CGT1	07/20/2021 12:15	22.2	5.15	239.8	2.5	7.39	565	< 0.050	0.82								
MIC1	08/17/2021 08:50	19.3	8.84	57.6	2.9	7.32	201	0.104	0.75								
GIB1	08/17/2021 11:00	17.6	4.2	119.6	6.9	6.3	727	0.308	0.99								
GIB15	09/21/2021 11:35	14.6	8.74	113.6	6.1	7.27	142	0.462	0.85								
CLA10	10/19/2021 09:20	13.8	9.46	73.4	3.5	7.07	345	1.44	0.53	2.4	0.00056	0.000287	0.0003	<0.000106	0.0092	0.00665	21.5
CRO1	10/19/2021 09:58	10.2	8.96	95.3	2.7	7.12	613	0.437	0.58	1							
SHE10	11/16/2021 08:45	10	11.2	116.8	7.2	7.15	133	4.866	1.14	6.6							
MRA10	11/16/2021 09:15	10.3	10.84	117.1	8.29	7.19	114	4.633	0.92	6.2							
CRO10	11/16/2021 09:45	10.3	10.41	58.9	3.4	6.74	37	2.163	0.81	2.4							
PRI1	12/21/2021 08:55	6.9	11.67	94	29.7	7.14	365	3.169	1.56	31	0.00288	0.000984	0.00085	<0.000106	0.011	0.00396	33.8
BAT12	12/21/2021 10:18	8.5	11.64	55.4	16.9	6.71	332	3.732	1.21	13.6							
BAT3	12/21/2021 10:48	9.1	10.52	57.9	22.8	6.38	183	3.106	0.9	23							
MRA1	01/18/2022 09:50	6.7	11.85	97.8	3.4	7.39	206	3.125	0.82	3.8							
SHE1	01/18/2022 10:10	7	12.02	96.7	3.2	7.38	34	3.071	1.1	2.2							
MIC10	01/18/2022 10:58	7.3	11.51	94.3	3	7.24	48	3.163	0.75	3.6							
CLA1	02/15/2022 10:15	8.4	11.27	97.2	1.7	7.43	52	1.562	0.81	1.4	0.00061	0.000549	0.00011	<0.000106	0.0464	0.0459	31.6
LPW1	02/15/2022 11:18	7.4	10.77	195.4	6.2	7.16	727	0.912	1.45	6							
CGT5	02/15/2022 11:45	7.4	12.71	146.5	7.4	7.64	435	0.637	1.37	13.6							
PRI5	03/15/2022 10:00	9.5	11.1	84.7	12.8	7.24	121	1.091	0.62	14.8	0.00131	0.000653	0.00044	<0.000106	0.0135	0.00847	32.2
GLE1	03/15/2022 10:45	9.7	11.07	82.4	9	7.33	172	1.506	0.45	6.2							
CGT1	03/15/2022 11:13	10.4	9.53	137.9	9.1	7.19	512	0.788	1.95	6.4							
MIC1	04/19/2022 08:52	9.1	11.23	88.2	8.6	7.23	148	1.99		5.8							
GIB1	04/19/2022 11:30	8.7	11.13	75	9.5	7.09	365	1.148	1.36	12.6							
GLE10	05/17/2022 11:45	10.8	10.79	57.8	9.2	6.94	11	1.051	0.22	8.4							
CLA10	06/21/2022 09:13	13.8	9.59	75.2	0.7	6.97	602	1.646	0.21	3	0.00086	0.000297	0.00013	<0.000106	0.0152	0.0153	21.2
CRO1	06/21/2022 09:54	12.9	9.95	68.2	3	7.1	150	0.461	0.33	4							

Note: Duplicate field measurements and duplicate grab samples are taken at a minimum of 10 percent of the sites each month. These sites are selected prior to sampling.

Table 8.

Monthly Instream Data - Willamette River Duplicates (RY 2021/2022)

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (#/ 100 mL)	NO_3-NO_2 (mg/L)	BOD (mg/L)	Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
WR1	08/17/2021 12:40	21.60	9.85	74.00	0.50	7.56	5	0.118	0.75	29	< 0.050	0.034	63	65	1.8
WR5	09/21/2021 09:05	15.33	9.6	65	3.42	7.29	41	0.204	1.06	27	< 0.050	0.044	63	73	9.8
WR10	10/19/2021 11:25	12.50	10.33	76.20	1.20	7.22	15	0.169	0.72	27	< 0.050	0.028	64	66	2.2
WR1	04/19/2022 12:25	8.8	11.25	70.6	6.3	7.25	63	0.551	1.29	25	< 0.050	0.048	56	66	10.4
WR5	05/17/2022 09:30	11.40	10.59	56.70	9.40	7.38	40	0.295	0.72	23	< 0.050		55	63	7.7
WR10	06/21/2022 11:25	13.8	10.05	60.6	3.5	7.14	8	0.176	0.34	26	< 0.050	0.037	47	54	7

Note: Duplicate field measurements and duplicate grab samples are taken at a minimum of 10 percent of the sites each month. These sites are selected prior to sampling.

Table 9.
Continuous Instream Grade A and Grade B Data Qualifications

Grade Values	Temperature (˚C)	pH	Specific Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
A	± < 0.5	± ≤ 0.30	≤ 10%	± ≤ 3 or 5% (whichever is greater)	± ≤ 0.3
B	± 0.51 to 2.00	± > 0.3 to 0.50	> 10% to ≤ 15%	± ≤ 5 or 30% (whichever is greater)	± > 0.3 to ± ≤ 1.0

Note: As stated in the "Continuous Water Quality Monitoring Program Quality Assurance Project Plan", data grades are a result of the absolute difference (value or percent) of station instrument reading and audit instrument reading at the time of site audit.

Table 10.
Monthly Median Values for Continuous Instream Data (RY 2021/2022)

Monthly Medians for **Temperature** at Continuous Instream Sites												
	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022
Station Name	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Temperature (˚C)	Tempera-ture (˚C)
BAT3	19.38	19.28	16.37	12.74	11.40	9.10	8.02	7.24	9.37	9.88	11.70	14.31
BAT12	18.88	17.60	14.48	11.13	10.52	8.64	7.55	6.68	8.80	9.38	11.19	13.71
CLK1	18.47	18.61	16.88	13.84	12.63	10.44	9.35	8.58	10.69	11.02	12.83	14.98
CLK12	16.68	17.21	16.44	14.65	13.68	12.17	10.90	10.18	10.90	11.28	12.26	13.85
GLE3	18.30	18.14	16.16	13.00	11.59	9.12	8.06	7.59	9.89	10.32	12.44	14.92
GLE12	NA	NA	NA	NA	10.61	8.79	7.63	6.89	8.91	9.21	10.85	12.99
MIC3	21.78	19.86	16.77	12.51	10.89	8.33	7.17	7.21	9.59	11.06	13.26	16.41
MIC12	20.69	18.80	16.09	12.41	10.92	8.39	7.26	7.17	9.54	10.60	12.98	15.84
PRI3	21.13	20.67	17.94	13.26	11.84	9.25	8.29	7.79	10.39	11.18	13.64	16.64
PRI12	20.58	19.11	16.18	12.89	11.52	9.01	8.02	7.35	9.80	10.30	12.35	15.03

Monthly Medians for **pH** at Continuous Instream Sites												
	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022
Station Name	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)	pH (S.U)
BAT3	6.70	NA	NA	6.37	6.12	6.16	6.26	6.47	6.31	6.18	6.20	6.34
BAT12	7.44	7.00	6.93	7.27	7.17	6.83	6.76	7.02	6.84	6.97	6.97	7.12
CLK1	7.35	7.14	7.12	7.12	7.08	7.02	7.15	7.22	7.15	7.00	6.93	7.01
CLK12	6.69	6.74	6.84	6.83	6.70	6.55	6.56	6.79	6.52	6.46	6.44	6.57
GLE3	NA	7.41	7.39	7.27	7.18	6.99	7.06	7.27	7.02	7.08	7.09	7.18
GLE12	NA	NA	NA	NA	6.83	6.87	7.00	7.00	6.99	7.03	7.00	7.05
MIC3	7.40	7.47	7.44	7.46	7.22	7.07	7.33	7.65	7.39	7.24	7.10	7.26
MIC12	7.34	7.35	7.32	7.46	7.10	6.96	7.14	7.39	7.11	7.19	7.08	7.17
PRI3	7.26	7.26	7.27	7.30	7.27	7.20	7.34	7.33	7.21	7.18	7.03	7.15
PRI12	7.07	7.09	7.05	7.06	6.76	6.69	6.76	6.96	6.82	6.71	6.70	6.74

Presented median values consist of A and B grade data only. NA = 60% of the continuous record for a given month is not represented by A and B grade data.

Table 10.

Monthly Median Values for Continuous Instream Data (RY 2021/2022)

Monthly Medians for **Turbidity** at Continuous Instream Sites												
	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022
Station Name	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)	Turbidity (NTU)
BAT3	NA	NA	NA	7.97	6.50	8.54	5.01	4.24	5.84	5.55	5.89	5.30
BAT12	4.73	NA	NA	5.35	4.11	7.15	3.46	2.70	4.23	NA	NA	4.78
CLK1	3.06	2.80	3.37	2.43	2.57	4.60	2.07	1.62	3.34	2.64	2.72	2.34
CLK12	4.54	3.86	4.09	2.78	2.36	3.52	1.96	1.95	2.65	2.25	2.44	2.28
GLE3	8.16	7.70	7.17	5.74	4.83	NA	5.97	3.73	6.48	6.03	5.94	4.99
GLE12	NA	NA	NA	NA	2.76	NA	7.08	5.09	7.80	7.90	8.26	7.62
MIC3	3.51	3.51	4.06	3.48	5.62	8.10	4.67	3.52	5.44	4.61	4.31	3.36
MIC12	2.95	2.13	2.11	3.61	5.87	7.60	4.19	3.59	NA	NA	4.53	3.34
PRI3	2.13	2.61	3.37	3.57	4.21	NA	4.06	2.82	5.41	3.96	4.13	2.73
PRI12	2.27	1.74	1.99	2.42	3.49	5.56	3.61	3.11	5.02	4.74	4.21	4.23

Monthly Medians for **Specific Conductivity** at Continuous Instream Sites												
	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022
Station Name	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Specific Conductivity (µS/cm)
BAT3	63.60	67.20	65.01	57.12	50.76	49.57	48.88	47.27	46.64	45.86	44.65	46.62
BAT12	58.01	69.92	70.07	52.69	47.43	49.46	48.42	44.69	44.84	43.44	41.82	42.28
CLK1	104.92	103.54	101.57	96.97	99.72	101.96	103.97	100.75	100.33	100.08	98.72	102.13
CLK12	74.95	75.71	78.08	69.56	NA	NA	80.72	74.58	76.11	73.36	74.38	75.86
GLE3	119.12	129.68	NA	106.96	95.66	NA	84.56	90.26	84.26	86.09	87.02	97.65
GLE12	NA	NA	NA	NA	70.89	62.80	57.32	56.84	55.81	57.57	59.26	64.35
MIC3	NA	NA	NA	115.59	123.70	107.83	99.51	107.75	99.40	99.03	NA	NA
MIC12	55.33	51.75	52.10	112.98	117.97	103.11	92.60	101.31	90.82	90.32	83.76	77.89
PRI3	105.93	101.13	99.16	101.14	102.32	99.23	96.16	101.68	NA	96.48	98.82	106.00
PRI12	64.38	58.39	61.83	113.70	105.43	91.07	84.64	NA	87.15	87.41	NA	92.16

Presented median values consist of A and B grade data only. NA = 60% of the continuous record for a given month is not represented by A and B grade data.

Table 10.
Monthly Median Values for Continuous Instream Data (RY 2021/2022)

Monthly Medians for **Dissolved Oxygen** at Continuous Instream Sites												
	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022
Station Name	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (mg/L)
BAT3	6.46	6.34	6.58	8.47	9.37	10.38	10.94	11.31	10.70	10.40	9.86	9.09
BAT12	8.35	NA	NA	10.36	10.83	11.41	11.87	12.18	11.52	11.27	10.81	10.15
CLK1	8.40	8.11	8.55	9.35	9.59	10.36	10.89	11.15	10.64	10.27	9.91	9.28
CLK12	8.92	8.95	8.99	9.13	9.33	9.83	10.28	10.56	10.36	10.05	9.83	9.43
GLE3	8.29	8.30	8.81	9.68	10.21	10.91	11.39	11.61	10.89	10.66	10.12	9.39
GLE12	NA	NA	NA	9.29	10.01	10.70	11.16	11.56	11.00	10.74	10.46	9.84
MIC3	8.09	8.65	9.24	9.88	10.81	11.50	12.04	12.28	11.42	11.18	10.52	9.66
MIC12	8.35	8.74	9.06	9.79	10.25	10.84	11.49	11.96	10.71	10.48	9.81	9.08
PRI3	7.75	8.04	8.55	9.49	9.88	10.63	11.19	11.35	10.70	10.42	9.91	9.06
PRI12	7.36	7.73	8.04	8.31	8.48	9.59	10.41	10.75	10.19	9.85	9.18	8.25

Monthly Medians for **Stage** at Continuous Instream Sites												
	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022
Station Name	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)	Stage (ft)
BAT3	3.96	3.93	3.93	4.07	4.53	5.57	4.92	4.34	4.93	4.80	4.83	4.46
BAT12	4.20	4.13	4.12	4.27	4.55	4.90	4.76	4.47	4.75	4.69	4.68	4.51
CLK1	3.80	3.83	3.85	4.02	4.26	4.43	4.21	4.06	4.26	4.28	4.29	4.11
CLK12	3.94	3.90	3.89	3.93	4.00	4.12	3.99	3.87	3.97	3.99	3.99	3.90
GLE3	4.00	3.99	3.96	4.17	4.35	4.65	4.38	4.19	4.41	4.41	4.40	4.24
GLE12	NA	NA	NA	NA	1.00	1.29	1.13	0.96	1.16	1.12	1.13	0.98
LPW1	NA	NA	NA	NA	1.87	2.22	1.92	1.50	1.99	2.04	2.24	1.78
MIC3	5.14	5.20	5.26	4.89	6.07	6.79	6.23	5.37	6.22	6.08	6.16	5.83
MIC12	6.90	6.96	7.01	6.38	7.39	8.21	7.62	6.76	7.59	7.51	7.60	7.29
PRI3	4.21	4.21	4.22	4.24	4.52	4.91	4.59	4.40	4.60	4.59	4.55	4.30
PRI4	7.38	7.38	7.40	7.45	7.79	8.17	7.76	7.49	7.87	7.86	7.85	7.61
PRI12	4.31	4.34	4.41	4.05	4.74	5.01	4.43	4.22	4.52	4.52	4.54	4.44
SHE3	6.19	6.23	6.26	5.89	6.41	7.16	6.72	6.09	6.68	6.59	6.66	6.41
WAL3	3.63	3.61	3.70	3.83	4.03	4.34	4.01	3.81	4.07	4.06	4.06	3.90

Presented median values consist of A and B grade data only. NA = 60% of the continuous record for a given month is not represented by A and B grade data.

Attachment A. Dry Weather Outfall Screening Results (RY 2021/2022)

Dry Weather Outfall Screening Results RY 2021/2022

Basin	Asset ID	Date	Flow Estimate (gpm)	Flow Pattern	Physical Characteristics (odor, color, floatables, stains, pool quality, etc.)	Ch Test Strip?	Analytical Sampling	Free Cl Test Strip	Total Cl Test Strip	Cl Colorimeter	Temperature (°C)	Receiving Water Temperature (°C)	Specific Conductivity (µS/cm)	pH (S.U.)	Turbidity (NTU)	Fluoride	Detergents/Surfactants (mg/L)	Ammonia (mg/L)	Potassium (mg/L)	Sodium (mg/L)	E. coli (MPN/100mL)	Inspection Comments	Investigation Comments
Battle Creek	37502	7/7/2021	1-5 gpm	Steady		Yes	None			0													
Battle Creek	35917	7/12/2021	1-5 gpm	Steady		Yes	None	0	0														
Battle Creek	Private	7/19/2021	< 1 gpm	Steady		Yes	None	0	0														
Battle Creek	36579	7/20/2021	< 1 gpm	Steady		Yes	None	0	0														
Battle Creek	Private	8/24/2021	1-5 gpm	Steady		Yes	None	0	0														
Clark Creek	19952	8/11/2021	10-25 gpm	Steady		Yes	None	0	0-0.5														
Clark Creek	20166	8/11/2021	5-10 gpm	Steady		Yes	None	0	0														
Clark Creek	D39460252	9/3/2021	5-10 gpm	Steady		Yes	Lab and Field Sampling	0	0		17.7	17.7	73.9	7.5	1.4								**Ongoing Investigation: BacT Source Tracking**
Clark Creek	D42466417	9/3/2021	0 gpm	No Flow		No	None																**Ongoing Investigation: BacT Source Tracking**
Clark Creek	D42468244	9/3/2021	> 25 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.01	17.9	14.9	115.6	7.8	1.6	0.1							**Ongoing Investigation: BacT Source Tracking**
Clark Creek	D42468PVT	9/3/2021	< 1 gpm	Intermittent		Yes	Lab and Field Sampling	0	0	0	17.3	14.7	149.4	7.74	2.2	0.2							**Very slow trickle flowing from pipe.Ongoing Investigation: BacT Source Tracking**
Croisan Creek	89674	8/5/2021	< 1 gpm	Intermittent	**Color:** Orange **Poor Pool Quality:** Biofilm	Yes	None	0	0-0.5														
Gibson Creek	8593	7/16/2021	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	37871	7/20/2021	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	37932	7/20/2021	< 1 gpm	Steady		Yes	None	0	0														
Gibson Creek	38238	7/22/2021	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	114734	7/22/2021	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	37881	7/23/2021	< 1 gpm	Intermittent		Yes	None	0	0														
Gibson Creek	37881	7/23/2021	5-10 gpm	Steady		Yes	None	0	0														
Gibson Creek	8603	8/11/2021	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	8153	8/12/2021	< 1 gpm	Steady		Yes	None	0	0														
Gibson Creek	3410	8/16/2021	1-5 gpm	Steady		Yes	None	0	0														
Little Pudding River	37635	8/16/2021	< 1 gpm	Steady		Yes	None	0	0														
Lower Claggett Creek	D51488203	8/9/2021	0 gpm	No Flow		No	None																
Lower Claggett Creek	D51488236	8/9/2021	0 gpm	No Flow		No	None																
Lower Claggett Creek	D54494201	8/9/2021	0 gpm	No Flow		No	None																
Lower Claggett Creek	D54494201	8/9/2021	0 gpm	No Flow		No	None																
Mill Creek	18666	7/26/2021	1-5 gpm	Steady		Yes	None	0	0														
Mill Creek	12426	7/28/2021	< 1 gpm	Steady		Yes	None	0	0	0													
Mill Creek	87736	7/29/2021	1-5 gpm	Steady		Yes	None	0	0														
Mill Creek	D42478237	8/3/2021	0 gpm	No Flow		No	None																
Mill Creek	D54470205	8/3/2021	0 gpm	No Flow		No	None																
Mill Creek	D45476207	8/5/2021	5-10 gpm	Steady		Yes	Field Sampling	0	0	0	16.8	21.4	280	7.33	0.8							Conductivity is usually high. Source of water is wetland at State Penitentiary (yeah that's a long way from here). Pipeshed investigation not necessary	
Mill Creek	D45476217	8/5/2021	1-5 gpm	Steady		Yes	Field Sampling	0	0	0.02	22.9	21.8	273	7.83	0.8							Grabbed sample from main flow running out of pipe. Conductivity usually slightly elevated. Pipeshed has been characterized. No investigation needed.	
Mill Creek	D45476217	8/5/2021	< 1 gpm	Steady		Yes	Field Sampling	0	0	0.02	22.8	21.8	286.4	7.82	1.1							Grabbed sample from water running out from underneath pipe. Conductivity usually slightly elevated. Pipeshed has been characterized. No investigation needed.	
Mill Creek	D45468241	8/20/2021	10-25 gpm	Steady		Yes	None	0	0	0.03	19.7	17.9	123.8	7.64	4.2	0							
Mill Creek	37229	8/24/2021	< 1 gpm	Intermittent		Yes	None	0	0														
Mill Creek	D45474225	9/8/2021	> 25 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	15.4	18.3	286.1	7.34	0.1	0.2	0					Suspect water leak from 12th ST. High SpCond may be due to groundwater infiltration.	
Mill Creek	D51470205	9/8/2021	0 gpm	No Flow		No	None															Outfall in backwater. Opened next MH up from outfall and that was in backwater as well.	
Pringle Creek	38162	8/5/2021	< 1 gpm	Steady		Yes	None	0	0														
Pringle Creek	27312	8/9/2021	< 1 gpm	Steady		Yes	None	0	0-0.5														
Pringle Creek	28322	8/9/2021	10-25 gpm	Steady		Yes	None	0	0-0.5														
Pringle Creek	28517	8/9/2021	< 1 gpm	Steady		Yes	None	0	0														
Pringle Creek	28517	8/9/2021	1-5 gpm	Steady		Yes	None	0	0														
Pringle Creek	28774	8/9/2021	1-5 gpm	Steady		Yes	None	0	0														
Pringle Creek	D42468235	8/20/2021	0 gpm	No Flow		No	None																
Pringle Creek	D45464207	8/20/2021	1-5 gpm	Steady		Yes	None	0	0	0.07	19.4		96.1	7.79	2.1	0.1							
Pringle Creek	D45464207	8/20/2021	< 1 gpm	Steady		Yes	None	0	0	0.19	18.8		97.1	7.16	15.7	0.1							
Pringle Creek	D45466212	8/20/2021	< 1 gpm	N/A		No	None					22.3											
Pringle Creek	D48460229	8/20/2021	0 gpm	N/A		No	None																
Pringle Creek	17830	8/23/2021	5-10 gpm	Steady		Yes	None	0	0														

Dry Weather Outfall Screening Results RY 2021/2022

Basin	Asset ID	Date	Flow Estimate (gpm)	Flow Pattern	Physical Characteristics (odor, color, floatables, stains, pool quality, etc.)	Ch Test Strip?	Analytical Sampling	Free Cl Test Strip	Total Cl Test Strip	Cl Colorimeter	Temperature (C)	Receiving Water Temperature (C)	Specific Conductivity (µS/cm)	pH (S.U.)	Turbidity (NTU)	Fluoride	Detergents/Surfactants (mg/L)	Ammonia (mg/L)	Potassium (mg/L)	Sodium (mg/L)	E. coli (MPN/100mL)	Inspection Comments	Investigation Comments
Pringle Creek	18042	8/23/2021	< 1 gpm	Steady		Yes	None	0	0														
Pringle Creek	54456	8/23/2021	1-5 gpm	Steady		Yes	None	0	0														
Pringle Creek	D48464203	9/1/2021	< 1 gpm	Steady		Yes	None	0	0		18.5	17.4	249.1	6.95	1.3								
Pringle Creek	D48464249	9/1/2021	< 1 gpm	N/A		No	None					17.5											
Pringle Creek	D39456229	9/8/2021	10-25 gpm	Steady		Yes	Field Sampling	0	0	0.02	17.1		73.4	6.95	0.7	0.1							
Upper Claggett Creek	D51486201	8/9/2021	5-10 gpm	Steady		Yes	Field Sampling	0	0	0.06	18		78.8	6.63	5.3	0.6							Potential drinking water distribution system discharge/leak. Pipeshed investigation pending further investigation at 3415/3413 Duncan Av NE. Could hear water running into the catch basin (3479), but were unable to open the grate and/or sample due to a car being parked over it. Storm cleanout 3814 was dry, it appears that the leak is likely somewhere in between these two assets. Made contact with the resident at 3413 Duncan Ave, asking if she had noticed any higher usage on her water bill, as the water meter at the curb was continually running when checked during the investigation. The resident was not aware of any such usage/higher billing. Ongoing investigation.
Upper Claggett Creek	D51486216	8/9/2021	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.06	18.6	17.6	77.6	6.97	4.6	0.6	1-1.5	0.06					Potential irrigation and/or drinking water distribution system discharge/leak. Pipeshed investigation ended at manhole at the intersection of 25th St NE + Englewood Av NE. Chlorine strip results for water sample taken at the manhole were Free Cl: ~1.0 ppm and Total Cl: ~1.0 ppm.
Upper Claggett Creek	4824	8/10/2021	1-5 gpm	Steady		Yes	None	0	0														
Upper Claggett Creek	D51476217	8/10/2021	> 25 gpm	Steady		Yes	Field Sampling	1	1		18.4		62.9	6.23	3.1								
Upper Claggett Creek	D54482579	8/10/2021	1-5 gpm	Steady		Yes	Field Sampling	0	1		19.7		64.9	6.63	1.8								
Upper Claggett Creek	D54486217	8/10/2021	> 25 gpm	Steady		Yes	Field Sampling	0	0	0.06	19.5		184	7.34	2.8	0.5							Suspect irrigation and/or drinking water distribution discharge/leak from two potential sources. 1) Irrigation water discharge from leaking apartment building irrigation system that was currently undergoing repairs at the time of the outfall inspection and resulting pipeshed investigation. 2) Potential irrigation or drinking water discharge/leak on or in area adjacent to Willamette Towne Center. Willamette Towne Center discharge/leak. Ongoing investigation.
Upper Claggett Creek	80338	8/11/2021	1-5 gpm	Steady		Yes	Field Sampling	0-0.5	0	0.51			66.5	6.68	0.6	0.7							**Ongoing Investigation**
Upper Claggett Creek	D51484231	8/11/2021	10-25 gpm	Steady		No	None																
Upper Claggett Creek	4824	8/12/2021	< 1 gpm	Steady		Yes		0	0														
Upper Claggett Creek	D54474564	8/12/2021	1-5 gpm	Steady		Yes	None	0	0	0.03						0.5							**Ongoing Investigation**
Waln Creek	35072	7/8/2021	5-10 gpm	Steady		No	None																
Waln Creek	34648	7/16/2021	1-5 gpm	Steady		Yes	None	0	0	0													
Waln Creek	33798	8/2/2021	< 1 gpm	Steady		Yes	None	0	0														
Waln Creek	33306	8/4/2021	< 1 gpm	Intermittent		Yes	None	0	0														
Waln Creek	Private	8/4/2021	< 1 gpm	Intermittent		Yes	None	0	0	0													
Willamette Bank	D42480205	9/1/2021	0 gpm	No Flow		No	None																
Willamette Bank	D42480215	9/1/2021	0 gpm	Steady		No	None																
Willamette Bank	D42480223	9/1/2021	1-5 gpm	Steady		Yes	None	0	0		15.6	18.6	212.7	7.52	1.3								

Dry Weather Outfall Screening Results RY 2021/2022

Basin	Asset ID	Date	Flow Estimate (gpm)	Flow Pattern	Physical Characteristics (odor, color, floatables, stains, pool quality, etc.)	Ch Test Strip?	Analytical Sampling	Free Cl Test Strip	Total Cl Test Strip	Cl Colorimeter	Temperature (C)	Receiving Water Temperature (C)	Specific Conductivity (µS/cm)	pH (S.U.)	Turbidity (NTU)	Fluoride	Detergents/Surfactants (mg/L)	Ammonia (mg/L)	Potassium (mg/L)	Sodium (mg/L)	E. coli (MPN/100mL)	Inspection Comments	Investigation Comments
Willamette Bank	D42482212	9/1/2021	> 25 gpm	Steady		Yes	None	1.0-2.0	1.0-2.0	1.07	18.7	17.1	66.1	7.47	1.3	0.7	0						Traced partial source of potential illicit drinking water discharge occurring at business located at 1291 Madison St NE.Reported to and inspected by ES. Ongoing Investigation
Willamette Bank	D42482213	9/1/2021	0 gpm	No Flow		No	None																
Willamette Bank	D42482223	9/1/2021	5-10 gpm	Steady		Yes	None	0	0	0.03	18.7	17.2	149	7.8	3.7	0.6	0						**Ongoing Investigation**
Willamette Bank	D42482230	9/1/2021	0 gpm	No Flow		No	None																
Willamette Bank West	D39478271	8/19/2021	1-5 gpm	Steady		Yes	None	0	0	0.04	21.2		88.3	7.47	1.6	0.3							**Ongoing Investigation**
Willamette Bank West	D42476279	8/19/2021	0 gpm	No Flow		No	None																
Willamette Bank West	D30470203	9/8/2021	0 gpm	Steady		No	None																
Willamette Bank West	D36472203	9/8/2021	10-25 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.06	20.4		73	7.18	0.5	0.7	0						
Willamette River	D42482201	9/2/2021	> 25 gpm	Steady		No	None																
Willamette River	D48478202	9/2/2021	1-5 gpm	Steady	**Color:** Gray **Turbidity:** Cloudy	No	None																

ATTACHMENT 2: MERCURY MINIMIZATION ASSESSMENT

Mercury Minimization Assessment

A Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet applicable water quality standards. TMDLs assign wasteload allocations (WLAs) to point sources of pollutants, and load allocations (LAs) to nonpoint sources of pollutants. The Oregon Department of Environmental Quality (DEQ) has the regulatory authority to implement TMDL programs in Oregon with responsibility for: 1) requiring and reviewing TMDL Implementation Plans for nonpoint sources; and 2) incorporating TMDL related requirements for point sources in NPDES permits. Therefore, with respect to municipal stormwater discharges regulated under an NPDES MS4 permit, DEQ includes TMDL requirements directly within those permits.

As stated in DEQ's Permit Evaluation Report (PER) for the City of Salem NPDES MS4 Permit,

> "*DEQ has determined that implementation of the permit conditions, BMPs identified in the SWMP Document, and the adaptive management process will meet TMDL WLAs for municipal stormwater* (PER, pp 35)."

The City of Salem's NPDES MS4 permit identifies applicable TMDLs and associated WLAs. Schedule D, *Special Conditions* of the permit lists specific conditions for addressing those TMDLs. These permit conditions include requirements to conduct a TMDL pollutant load reduction evaluation in comparison to assigned WLAs for stormwater, and to develop pollutant load reduction benchmarks targeting achievement of WLAs for specified TMDL pollutants over time. DEQ included TMDL requirements in the 2005, 2010, and the recently issued 2021 NPDES MS4 permits for Phase I permittees.

The City has complied with permit requirements to conduct pollutant load reduction evaluations and establish TMDL pollutant load reduction benchmarks. However, WLAs were not established for mercury until 2021 and, therefore, mercury was neither required nor included in the City's prior TMDL analyses.[1]

The 2021 mercury TMDL includes a water quality management plan (WQMP) developed by DEQ, that outlines management strategies for both point and nonpoint sources of mercury. Specific management strategies for Phase I NPDES MS4 permittees are outlined in Section 13.3.2.2 of the revised TMDL (Appendix A) and were subsequently included in Schedule D.3.b of the City's NPDES MS4 permit. Per Schedule D.3.b, requirements specific for mercury are detailed below:

i. Develop and submit a mercury minimization assessment with the annual report due November 1, 2022, that documents the current actions, such as BMPs implemented, that reduce the amount of solids discharged into and from the permitted MS4 system (similar to the actions currently required in Schedule A). If the assessment indicates that mercury and

[1] Mercury was originally included in the 2006 Willamette River TMDL, but establishment of WLAs was deferred due to lack of data. On November 22, 2019, DEQ issued a revised Willamette River TMDL for mercury. The United States Environmental Protection Agency (EPA) disapproved DEQ's TMDL on December 30, 2019 and the final TMDL was issued on February 4, 2021.

sediment reducing BMPs are fully incorporated into the SWMP Document, a report documenting the results as such is sufficient.

ii. *Continued 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.*

iii. *An analysis of the effectiveness of the best management practices and any other actions taken and qualitative pollutant load reductions achieved in the MS4 Permit Renewal Application Package. Due to data limitations, mercury benchmarks are not applicable in the first permit cycle after the TMDL is finalized.*

iv. *Collection of paired total mercury and total suspended solids samples, as described in Schedule B.*

v. *Submittal of paired mercury and total suspended solids monitoring data in the appropriate DEQ data submission template. 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.*

The purpose of this Mercury Minimization Assessment, included with the City's 2022 MS4 Annual Compliance Report, is to address the requirement outlined in bullet *i.* above.

Sources: Chapter 4 of EPA's 2021 TMDL for Mercury in the Willamette Basin includes summary information regarding mercury sources. Atmospheric deposition of mercury from global sources is presented as the dominant source of mercury in the Willamette River Basin. Additional sources identified include:

- Nonpoint sources such as runoff from forestry and agricultural land management practices that can transport sediment and mercury to streams;
- Background/anthropogenic sources that include mercury in groundwater due to local geology, and naturally occurring sediment-bound mercury that is eroded and transported to streams; and
- Point sources such as municipal waste discharges, industrial discharges, suction dredge mining and stormwater.

Mercury loads in urban stormwater are believed to be predominantly associated with atmospheric deposition and active erosion or transport of sediment that is carried in runoff to downstream water bodies. As a result, stormwater best management practices (BMPs) implemented by the City are focused on reducing the discharge of sediment as the primary method to reduce discharges of mercury.

Current Actions: The prevention and reduction of sediment in runoff has been a focus of the City's stormwater management program since the first MS4 permit-required Stormwater Management Plan (SWMP) was developed in the early 1990's. The City uses an adaptive management approach to continually improve upon existing stormwater BMPs over time, as new knowledge is gained regarding the effectiveness and efficiency of these practices. The City has internally tracked results of its

adaptive management feedback every year and has used this information for the 2022 SWMP Document update. The City has also conducted a comprehensive adaptive management analyses as part of each NPDES MS4 permit renewal. The City's 2022 MS4 Annual Report, due to DEQ on November 1, 2022, provides the latest summary of BMP implementation between July 1, 2021, and June 30, 2022, according to the pre-existing 2010 SWMP (updated in 2011). A new SWMP that meets the conditions of the recently issued 2021 NPDES MS4 permit is also being submitted to DEQ for approval on November 1, 2022.

The City's BMPs, or Stormwater Program Management Control Measures as termed in the 2022 SWMP, include the following major categories of BMPs and activities that prevent sediment and mercury in stormwater discharges:

- Education and Outreach (SWMP Element No. 1)
- Public Involvement (SWMP Element No. 2)
- Illicit Discharge Detection and Elimination (SWMP Element No. 3)
- Erosion and Sediment Control (SWMP Element No. 4)
- Post Construction Stormwater Management (SWMP Element No. 5)
- Municipal Operations and Maintenance (SWMP Element No. 6)
- Industrial and Commercial Program (SWMP Element No. 7)
- Stormwater Program Implementation (SWMP Element No. 8)

The 2022 SWMP Document includes detailed descriptions of the BMPs, including associated measurable goals and tracking measures. As noted in the BMP tables, most BMPs support the prevention and reduction of mercury and sediment.

Assessment: Based on the City's long-term ongoing adaptive management process, a review of the existing 2011 SWMP, and a comprehensive MS4 program evaluation and update for the 2021 permit, we have determined that **effective sediment and mercury reducing BMPs are fully incorporated into the City's proposed 2022 SWMP Document**. BMP tables in the proposed SWMP provide a cross-reference of each strategy to potential TMDL pollutants addressed, including mercury (i.e., by way of addressing sediments). To meet the NPDES MS4 permit standard, the BMPs in the proposed 2022 SWMP have been developed as part of an overall program to reduce pollutants to the maximum extent practicable.

The City also submitted a TMDL Implementation Update letter on August 30, 2022, to DEQ's Salem branch and is submitting an updated TMDL Implementation Plan by November 1, 2022, that addresses requirements of the 2021 TMDL for Mercury in the Willamette Basin for nonpoint sources of mercury in Salem.

As a result of this Mercury Minimization Assessment, the City finds that sediment and mercury reducing BMPs are fully incorporated into the SWMP Document.

ATTACHMENT 3: WINTER MAINTENANCE INFORMATION

CITY OF Salem AT YOUR SERVICE	**Public Works Department** **PLAN**
Title:	Snow and Ice Control Plan
Document #:	26.1
Approved by:	Mark Becktel, Public Works Operations Manager
Effective date:	April 9, 2019
See also:	PRO 26.2, POL 26.3, PRO 26.4, SOG 26.5,

26.1 Snow and Ice Control Plan

A snow and ice control plan establishes policies, procedures, and training to meet specified levels of service and is routinely reviewed.

This plan provides the City of Salem's level of service goals for winter event response, including: response routes, required resources, roles and responsibilities, annual training requirements, and individual storm response needs.

1. Service Level Goal

It is the goal of the Public Works Department to provide pre-event, event, and post-event treatment to public roadways to assist traffic, transit, and first responder movements during winter events to the safest extent possible.

2. Prioritization of Snow and Ice Response Routes

Assigned snow and ice response routes will be prioritized by volume of traffic, grade of roadway, terrain, elevation, neighborhood inter-connecting traffic patterns, and locations of government and emergency facilities, with flexibility to adapt to heavy commute patterns, as defined in Public Works Plan 26.8 (Snow Route Assignment).

3. Resource Identification and Assignment

Resources necessary for responding to snow and ice events shall be identified and scheduled as follows:

a. Storm warning notification shall be per Public Works Procedure PRO 26.2 (Storm Warning Notification).

b. Personnel shall be identified and scheduled for 12-hour shift response

and assigned program responsibilities per Public Works Policy POL 26.3 (Personnel Scheduling) and mobilized for an event per Public Works Procedure PRO 26.4 (Mobilization).

c. Equipment shall be identified, prepared, and scheduled for winter response per Public Works Procedures PRO 26.6 (Equipment Inspection) and PRO 26.7 (Equipment Calibration).

d. Snow and ice mitigation materials shall be identified, acquired, stored, and loaded onto response vehicles per Public Works Procedure PRO 26.9 (Loading Procedures) and applied per Public Works Guidelines SOG 26.5 (Snow and Ice Materials) and SOG 26.10 (Spreading and Plowing Procedures*)*.

e. A snow storage area shall be defined and utilized as needed per Public Works Procedure PRO 26.11 (Snow Storage).

f. Damages to City or private property during response operations shall be reported and mitigated per Public Works Policy POL 26.12 (Snow Operation Damages).

g. Response to parked or abandoned vehicles on snow routes shall be per Public Works Policy POL 26.13 (Parking Limitations).

h. Annual training shall incorporate requirements stated in Public Works Guidelines SOG 26.5 (Snow and Ice Control Materials), Public Works Plan 26.6 (Equipment Inspection), Public Works Policy POL 26.9 (Loading Procedures), and Public Works Procedure POL 26.10 (Spreading and Plowing Procedures).

4. Inter-agency Cooperation and Assistance

An annual meeting will be hosted by the City of Salem for all adjoining transit, school transportation, municipal, county, federal, and state agencies, to compare and share new technologies, practices, materials, and methods, and to confirm shared and exchanged response routes along the periphery of each jurisdiction.

a. Shared and exchanged route segments will be confirmed.

b. Intergovernmental agreements will be verified as active and up to date.

c. Weather service vendors will be discussed.

d. Winter weather outlook will be discussed.

e. Topics of interest will be presented and discussed.

f. Meeting shall take place each year no later than November 20.

g. Interagency contact information shall be provided and verified.

5. Plan Review Requirements

This plan and associated elements shall be reviewed annually and updated as needed to reflect development and addition of new or altered roadways and high priority facilities.

6. Annual Training Requirements

All snow and ice response staff shall attend and participate in training to be held annually on or before the first week of November.

a. Training shall include:

1. Snow plow installation and operation.
2. Towed sander installation and operation.
3. Proper loading procedure for sanding rock.
4. Loading liquid deicer and application system operation.
5. Tire chain installation, removal, and repair.
6. Materials storage facility operation and maintenance.
7. Classroom study of snow and ice routes.
8. Classroom discussion of proper plowing, sanding, and deicing procedures.

CITY OF Salem AT YOUR SERVICE	**Public Works Department** **PLAN**
Title:	Equipment Inspection
Document #:	26.6
Approved by:	Mark Becktel, Public Works Operations Manager
Effective date:	April 22, 2019
See also:	Driver's Vehicle Inspection Report; Snow and Ice and Leaf Haul Equipment Preparation Email; Studded Tire List 2018;Teardown Email 2019; Fleet Teardown Completion Email 2019

Action By:	**Action:**
Supervisor	1. Updates snow and ice response vehicles and equipment list prior to October 15 of each year.
	2. Contacts Fleet Services to schedule equipment for snow and ice season preparation by October 15 each year. Prioritizes those vehicles involved in the Fall Leaf Haul program that begins November 1 each year. Also prioritizes the deicing tankers. Includes list of vehicles needing studded tires to be installed.
	3. Works with Fleet Service Coordinator to address any maintenance issues or needed repairs. Verifies calibration of deicing and sanding equipment per Public Works Department Procedure 26.7 (Equipment Calibration).
	4. Informs manager of equipment readiness and repair needs. The goal is to have majority of response vehicles and equipment ready by November 1, and all vehicles and equipment fully prepared by November 15.
Fleet Service Coordinator	5. Receives communication from Supervisor about upcoming snow and ice vehicle and equipment set up and maintenance needs. Schedules service staff to begin preparing, testing, and performing preventive maintenance on all snow and ice equipment for program beginning October 15.
	6. Keeps Supervisor apprised of progress and any issues needing resolution.
	7. Ensures all plow bumpers, frame mounted deicer tanks, towed sanders, snow plows, spray bars, switches, pumps, and slip-in deicer tanks are tested, calibrated, and installed as needed.

8. Updates Supervisor on completion of pre-season inspection and installs.

Snow and Ice Operator

9. Assists in installing plows, towed sanders, or spray bars as needed for response.

10. Conducts pre-trip inspections of all vehicles and related response equipment prior to beginning assigned routes.

11. Completes a post-trip inspection and reports any maintenance or repair concerns to Supervisor.

CITY OF Salem AT YOUR SERVICE	**Public Works Department** **PROCEDURE**
Title:	Equipment Calibration
Document #:	26.7
Approved by:	Mark Becktel, Public Works Operations Manager
Effective date:	April 25, 2019
See also:	

Action By:	**Action:**
Supervisor	1. Contacts Fleet Services Coordinator and sets schedule for pre-season calibration of deicer spray systems, towed sanders, and snow plow controls.
	2. Confirms availability and directs staff to assist in delivery of vehicles and equipment to Fleet Services.
	3. Confirms with the Street Maintenance Operations Manager that all equipment is calibrated and ready for use prior to start of snow and ice season (October 15).
Fleet Services Coordinator	4. Receives communication from Supervisor about equipment calibration checks during pre-season set up.
	5. Schedules equipment and shares schedule with Supervisor.
	6. Corrects as needed and confirms calibration of deicer spray systems. Confirms gate opening on towed sanders is calibrated per manufacturer's specifications and adjustment mechanism performs properly. Confirms snow plow controls are properly set and function per specifications.
	7. Notifies Supervisor when all equipment calibrations are completed.
Snow and Ice Responder	8. Operates equipment and adjusts as needed for spreading of snow and ice control materials.
	9. Checks application rate of materials throughout shift.

10. Notifies Supervisor of any calibration issues and follows instructions for turning in equipment to Fleet Services for re-calibration.

CITY OF Salem AT YOUR SERVICE	**Public Works Department** **GUIDELINES**
Title:	Snow and Ice Control Materials
Document #:	26.5
Approved by:	Mark Becktel, Public Works Operations Manager
Effective date:	April 17, 2019
See also:	Deicer Facility Instructions; Deicer Facility Operating Procedures; Sand Shed Flood Response Instructions; Sand Shed Spill Response Instructions

Purpose/Scope

Guidelines establish the identification, acquisition, application, and storage of appropriate materials to control snow and ice.

1. Identification and Acquisition of Snow and Ice Control Materials

Materials to be utilized for snow and ice control shall be identified through current industry standards and practices. Rigorous review of available materials will be conducted annually prior to snow and ice season to ensure industry standards and best practices are being followed. Materials currently utilized include: (1) a liquid deicer based on magnesium chloride solution and produced by a regional vendor; and (2) ¼"-10 graded sanding rock produced by a local sand and gravel vendor.

Acquisition of liquid deicer will be through a statewide purchasing contract held by the Oregon Department of Administrative Services or through direct contract with a vendor. Acquisition of sanding rock will be through a direct contract with a sand and gravel vendor.

2. Application of Snow and Ice Control Materials

Application of snow and ice control materials will be through properly maintained and calibrated application equipment mounted on or towed by City vehicles operated by trained and experienced operators:

A. Liquid Deicer:

1. Will be applied at the approved rate via spray bars mounted directly to vehicles or mounted to Epoke towed sanders. See Public Works Procedure PRO 26.7 (Equipment Calibration) and Public

Works Policy PRO 26.10 (Spreading and Plowing Procedures).

2. Will be applied pre-event, mid-event, and/or post-event as needed per forecast weather and current road conditions.
3. Can be utilized in conjunction with sanding rock.

B. Sanding Rock:

1. Will be applied at rate as established by traction needs of the motoring public and road surface conditions as determined by operator. See Public Works Procedure PRO 26.7 (Equipment Calibration) and Public Works Policy PRO 26.10 (Spreading and Plowing Procedures).
2. Can be applied in conjunction with liquid deicer as road surface conditions warrant.

3. Proper Storage of Snow and Ice Control Materials

Snow and Ice materials shall be stored in facilities approved by the Oregon Department of Environmental Quality (DEQ) and Federal Environmental Protection Agency (EPA) to prevent loss or migration of material into storm drain facilities or off-site deposition due to flooding.

A. Deicer Facility:

a. The storage facility shall consist of approved polyethylene storage tanks residing within a DEQ-approved secondary containment facility and marked with material identification and appropriate Hazardous Materials placards.

b. The storage facility shall provide a primary means of material circulation and the capability to load and unload deicer to and from application equipment.

c. The storage facility shall have a secured control cabinet to operate the system accessible only by authorized and trained operators or facility maintenance staff.

d. The storage facility shall be inspected annually prior to November 1st to ensure tanks, plumbing, pump, controls, and the containment facility are in good operating condition.

e. The Control Cabinet shall include a log book to record withdrawals and fills.

f. The Control Cabinet shall include comprehensive instructions in the proper operation of the facility stored within the control cabinet.

g. The secondary containment facility shall have a secured drainage system that allows discharge of clean rain water into the storm drain system. Discharge of contaminated rain water or concentrated liquid

deicer shall only be allowed into the sanitary system after notification of the City's sewage treatment plant and the Environmental Services Section.

h. Operators of the deicer facility shall coordinate with Environmental Services Section and have a technician available to inspect and monitor any release of contaminated rainwater or concentrated liquid deicer into the sanitary system at approved discharge rates.

i. The deicer facility shall have backup extraction systems available in case power to facility fails during an event.

j. Operation and maintenance responsibilities shall be assigned to a Project Leader with oversight assigned to a supervisor.

k. Monitoring of the deicer facility capacity and operation will be conducted through remote uplink to the City's Supervisory Control and Data Acquisition system (SCADA). This information will be available to supervisory and lead staff and will include alarm notifications should the pump fail or if the facility records a significant loss of stored material. Alarm notifications will include email alerts to City-issued phones carried by supervisors and lead staff, Public Works Dispatch, and Facilities Services staff.

B. Sanding Rock Storage Facility

a. The facility shall be constructed and maintained to FEMA floodplain requirements to prevent migration of sanding rock into storm drain system or off-site during flood events.

b. Flood migration barriers across opening of facility will be removed only for removing or adding sanding rock material. The barrier shall be replaced immediately upon completion of tasks per the Sand Shed Flood Control Instructions. The Sand Shed Flood Control Instructions shall be posted on the exterior of the facility immediately to the right of the opening.

c. Loading sanding rock material against walls of the facility will only be allowed as high as engineered specifications allow. This elevation will be marked to prevent overburdening walls.

d. A spill kit for spills of sanding rock and deicer shall be maintained in the facility just inside on the left side of the opening. The Spill Response Plan shall be posted on the exterior of the facility to the immediate left of the opening.

e. Any spillage of sanding rock outside facility shall be cleaned up as soon as possible.

f. Operation and maintenance of this facility will be assigned to a supervisor.

4, Proper Training on Operation and Use of Storage Facilities

Training shall be conducted annually for all staff in the safe and proper use of snow and ice mitigation materials and the safe and proper operation and maintenance of the storage facilities. Training will be documented and will occur each year no later than November 15.

CITY OF Salem AT YOUR SERVICE	**Public Works Department** **PROCEDURE**
Title:	Spreading and Plowing Procedures
Document #:	26.10
Approved by:	Mark Becktel, Public Works Operations Manager
Effective date:	May 1, 2019
See also:	

Action By:	**Action:**
O & M Supervisor	1. Oversees and conducts annual training of response staff in application of liquid deicer, sanding rock, and snow plowing techniques.
	2. As Snow and Ice Response Shift Supervisor, responsible for directing resources in route clearing/treatment of roadways. This includes assigning multiple plow and sander trucks to clear major multi-lane streets in tandem
	3. Ensures proper application of materials and snow plowing techniques are followed and reported by staff during event.
Snow and Ice Responder	4. Receives route assignment from supervisor/team lead.
	5. Conducts pre-event and event response treatment per the following guidelines:

Anti-icing/Deicing of Roadways

a. Liquid anti-icer application shall occur as conditions allow and must be through properly maintained and calibrated application equipment.
b. Pavement must be clear of flowing water/runoff.
c. Forecasts for rain are minimal prior to freezing temperatures occurring.
d. Anti-icer is best applied to dry pavement if possible to prevent bonding of snow and/or ice to road surface.
e. All horizontal and vertical curves, bridges, stop-controlled intersections, and areas of noted traction issues, shall be treated.

f. Spot spraying on level and straight segments of roads should be at 50 to 100 foot intervals and allows tracking by traffic to fill in the unsprayed areas.
g. Major and commercial driveways should be considered when treating travel lanes to assist traffic movements.
h. Only treat intersections in one direction by stopping application prior to crosswalk or stop bars on side streets. Do not apply both directions through the intersection as this can cause a buildup that actually may inhibit traction for the motoring public.
i. If forecasts call for moderate snow or ice accumulation, may treat entire street surface.
j. Deicing will follow same guidelines as anti-icing except where there is a need to clear the roadway. Standard application rate is 8 gallons per lane mile.
k. Heavy ice/snow pack may require heavier applications of deicer utilizing knife sniveys on application equipment, where installed, or by making multiple passes with fog sniveys to apply enough material to break up pack.
l. Deicer may be used in conjunction with sanding rock to coat and burn the rock into the snow/ice pack so it remains available for traction assistance as the pack breaks up.
m. Liquid anti-/deicer may be applied with on board spray systems on dedicated deicer tankers, inserted tanks with accessory spray bars, through spray bars on towed sanders, or through stand-alone spray bars attached to rear of dump trucks equipped with deicer saddle tanks and plumbing.
n. Do not apply liquid deicer in the Downtown Business Core per Snow and Ice Response Routes.

Sanding of Roadways

a. Sanding rock shall be applied through properly maintained and calibrated towed sanders.
b. Sanding rock shall be applied when accumulations of snow and/or ice interfere with traction for the motoring public.

c. Operator will adjust amount of sand applied through manipulation of towed sander gate opening depending on type and thickness of accumulated snow and/or ice.
d. Standard sanding rates are 1,600 pounds of sanding rock per lane mile (gate opening #1).
e. Sand shall be applied to all vertical and horizontal curbs, stop-controlled intersections, bridges, and where needed to provide traction to the motoring public and emergency services.
f. Sand may be applied in conjunction with sprayed liquid deicer to coat the sand particles helping them to burn into packed snow and/or ice to provide longer cycles of traction assistance before traffic pushes the sanding rock out of the wheel ruts. This is standard procedure when attempting to mitigate freezing rain/sleet accumulations on roadway surfaces.
g. Sanding rates shall be the same for all street classifications though increased application rates may be necessary on higher volume roads or other circumstances (i.e. high snowfall rates, etc.).
h. Dumping sanding rock into towed sanders should take place in an area free of overhead hazards. Operators should utilize street lights to assist with visibility during darkness.
i. Any spillage while filling towed sanders shall be addressed by the operator immediately before leaving site.
j. Operators can also spread sanding rock by hand to assist drivers who are unable to proceed without traction assistance.
k. Operator will report amount of material applied to supervisor at end of shift.

Plowing Streets

a. Snow plows should be operated by experienced operators who have received proper training and been assessed as competent.
b. All plowing shall be conducted to remove as much accumulation from the road surface as possible and stack it along the edge of pavement or the curbline.

c. At no time will snow be allowed to be sprayed onto or across sidewalks through plowing activities.
d. Plowing shall commence whenever more than ½ inch of accumulation on roadway surfaces has occurred.
e. When plowing multi-lane streets, if plowing your route alone:
    I. On two way multi-lane streets, plow the inside (left) lane to the right on the first pass and plow the outside (right) lane to the curbline on the second pass. Then return to clear turn pockets and access to major driveways for shopping centers, etc.
    II. On one way multi-lane streets, plow the left lane to the left curbline (edge of pavement) then plow the center lane to the right, then finish plowing the right lane to the right to the curbline (edge of pavement).
f. When plowing multi-lane streets with assistance:
    I. On a 5 lane street with a center turn median, first plow should plow from the centerline to the right where the second plow picks up their berm and existing snow/ice and also plows to the right. Third plow would then plow this accumulated snow/ice with existing accumulation to the curbline (edge of pavement).
    II. It is typical to conduct tandem plowing during late night or early morning hours when traffic volume is minimal.
g. When plowing a two way street with single lanes, follow your route pattern and plow each lane to the right curbline (edge of pavement).
h. When plowing narrow two way streets with parked vehicles or other obstacles restricting traffic to basically one way at a time, then one pass of plowing to the right shall be made.
i. When plowing through intersections, straighten the plow blade so as to carry the snow/ice to the far side of the intersection before angling blade again to shed material to the right.

j. Plowing Downtown Business Core:
   I. Plow snow to middle of street so as to not block parking access. Clear parking strips as well where possible.
   II. Snow from parking lanes can also be pushed and stacked to the end of the block for later removal.
   III. Clear intersections of all snow and stack at corners in the parking lane where possible.
   IV. Do not apply liquid deicer in downtown core, only sanding rock.
   V. Resources to remove plowed and stacked snow from business core will be assigned separately as needed.
   VI. Snow will be transported to an identified and prepared snow melt storage site.

Winter Weather Maintenance and Operations Procedures (for public roads)
Collection, Reuse, and Disposal of Materials

Material Collection

Collection of sanding material is scheduled to occur after a snow and ice event concludes. Collection of sanding material is dependent on where the City crews placed the materials on the established routes. Starting in 2021, the City tracks sanding locations with GPS and the street sweepers are scheduled to pick up the materials based on the location of where they were placed. This provides more accurate information and increased efficiencies for where the materials are placed and to be picked up.

Material Reuse or Disposal:

In approved locations, power brooms push the material onto the gravel shoulder where the materials become part of the shoulder.

Temporary satellite sanding site locations are set up for sanding materials to be received so the sweepers can get back on route. Crews then empty the temporary holding sites; the collected material is then hauled away to a location where it is used as fill. If the holding sites are on pavement, then the nearby catch basin(s) are protected with catch basin inserts and biobags to prevent entry of materials into the storm drain system.

If the sanding is too dirty to use as fill, the material is sent to the waste processing station where it gets combined with street sweeping debris.

ATTACHMENT 4: INDUSTRIAL AND COMMERCIAL FACILITIES STORMWATER PROGRAM

Industrial and Commercial Facilities Stormwater Program

Program Outline

1. Purpose: To reduce and control the discharge of pollutants from industrial and commercial facilities to the municipal separate storm sewer system. To fulfill NPDES MS4 Permit requirements of Section A.3.g.

2. Legal Authority: Environmental Services has historically requested stormwater source controls at facilities where stormwater pollutants are a concern. The City of Salem has adopted a new Stormwater Ordinance (SRC 71), Design Standards (administrative-rule-109-001_109-007-public-works-design-standards), and Stormwater Management Manual (administrative-rule-109-012-stormwater-source-controls), which require source control for known or potential sources of pollution and for certain activities.

3. New Facilities (A.3.g.i): Plans review/comment process—Environmental Services Staff will review new industrial and commercial development building permit applications submitted to the City to determine if any new facilities could be subject to an industrial stormwater NPDES (1200-Z) permit.

4. Existing Facilities (A.3.g.i): Environmental Services Staff will review data sources to determine if any existing facilities within the City could be subject to an industrial stormwater 1200-Z permit. The review will consist of the following steps:

    - Compare the SIC list provided in the 1200-Z permit to a list of industrial pretreatment-permitted businesses within the City;

    - Use existing data sources and staff knowledge of the community to identify businesses that appear to conduct operations covered by the SIC list, but may not currently have a 1200-Z permit; and

    - Perform site visits to identify sites potentially requiring a 1200-Z permit and/or having a discharge of concern.

5. Notification (A.3.g.i): If a new or existing facility is identified that is potentially subject to an industrial stormwater 1200-Z permit, Environmental Services Staff will notify the facility owner/operator and DEQ within 30 days. Environmental Services Staff will notify the facility owner or contact person by letter (see attached notification letter). Regional staff for the DEQ Western Region will be contacted by email and copied on the letter sent to the facility owner.

6. Significant Pollutant Sources (A.3.g.ii): The strategy to reduce significant pollutant sources in stormwater discharges from industrial and commercial facilities involves multiple City workgroups, with activities identified as follows:

- Stormwater Services Section: Implement annual dry weather outfall inspections to detect and eliminate illicit discharges, provide annual stream cleaning activities, and conduct water quality monitoring (in-stream and MS4).

- Environmental Services Section: Respond to citizen complaints, provide 24/7 spill response, perform general business inspections and plans review (including: grease trap requirements/inspections, trash area management plans, residential grease management plans, waste management plans, spill response plans, and stormwater design standards), require reports from industries permitted through the Industrial Pretreatment Program, perform industrial pretreatment inspections, receive information from City crews during routine maintenance work (including: TV inspection crews, sewer cleaning crews, and stormwater maintenance crews), provide monthly stream monitoring, and maintain existing Environmental Services database.

- Wastewater Pretreatment Section: Permitted Industrial users under the pretreatment program (40CFR403) are subject to annual or biannual inspections, depending upon permit type, which include a review of site activities, potential pollution sources, exiting source controls, and stormwater facilities (see attached inspection form). Examples of stormwater inspections include viewing outside storage areas, looking for evidence of staining or discoloring from past spills, and checking existing source controls and storm to sanitary diversion systems.

- Commercial Development Review: The plans review process will help screen new significant pollution sources by requiring pollution prevention plans be submitted. Plans may include information on grease trap requirements/inspections, trash area management, waste management, spill response, residential/apartment complex grease management, and stormwater design standards.

- Inspection and Enforcement: Facilities can also be inspected on a complaint derived basis. All facilities that are the subject of a complaint will be inspected in a timely manner. Inspections may be conducted during source tracking activities if storm event monitoring work or routine monitoring work shows excessive levels of one or more pollutants. The implementation of control measures for stormwater discharges from these facilities will be deemed necessary if the presence of excess levels of pollution in stormwater has been confirmed. Should the discharger's initial attempts to improve stormwater quality not produce the required improvement, City personnel will continue to provide guidance and technical assistance until the facility's stormwater quality improves. Enforcement actions are guided by Salem Revised Code (SRC) Chapter 71 – Stormwater.

ATTACHMENT 1
Industrial and Commercial Stormwater Permit Notification Letter

October 26, 2022

[Contact Name]
[Business Name]
[Business Address]
[City State Zip]

SUBJECT: **Industrial and Commercial Stormwater Permit Program Requirement Notification**

Dear [Contact Name]:

The City of Salem operates a Municipal Separate Storm Sewer System (MS4) under authority of a National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit issued by the Oregon Department of Environmental Quality (DEQ). The permit requires the City to maintain a program to monitor and control pollutant discharges to the local storm drain system from industrial and commercial facilities located within Salem. To meet this requirement, the City has developed an Industrial and Commercial Stormwater Program to notify potentially affected Salem-area businesses that they may be subject to an industrial stormwater NPDES permit.

Your facility has been identified as a business potentially subject to DEQ's industrial stormwater NPDES permit requirements. Please contact Mark Riedel-Bash, DEQ Western Region, at 503-686-7551 or riedel.mark@deq.state.or.us, for a permit application. Mark Riedel-Bash works in the Eugene DEQ office at 165 East 7th Avenue, Suite 100, Eugene, Oregon 97401.

If a permit is required for a facility site located within Salem, the facility must submit an industrial stormwater NPDES permit application to DEQ and obtain a permit. However, if no industrial activity occurs at the site that could be impacted by rainfall (i.e., outdoor production, materials storage, fleet activities, or other outdoor activities) and/or contribute pollutants to stormwater runoff, the facility may request an exemption from obtaining a permit by filing a No Exposure Certification with DEQ.

If you have questions regarding this letter, please contact City of Salem Environmental Services at 503-588-6063.

Sincerely,

[Author's Name Placeholder]
[Author's Title Placeholder]

[typist/proofreader initials]:\\allcity\Common\Template\PublicWorks\vAll_correspondence\letter_industrial commercial stormwater permit program notification.dotx
cc: Western Region Office, Oregon Department of Environmental Quality
Jim VanHouten, Environmental Services Supervisor
File: Chrono
File: Regulatory

ATTACHMENT 2

Industrial Pretreatment Facility Inspection Form

CITY OF SALEM

FULL FACILITY INSPECTION

Date:	[Inspection Date]	**Time:**	[Inspection Time]
Inspection Type:	[Inspection Type]	**Inspector:**	<Name>
Company Name:	[Company Name]	**User Code:**	[User Code]
Company Rep:	[Company Representatives]		
Address:	[Address]		
Mailing Address:	[Mailing Address]		

RECORDS

Permit:

ASPP:

Emergency Contacts: Name Day Phone Night Phone

Testing:

MSDS:

Plans:

DISPOSAL

Non-hazardous:

Hazardous:

Waste Invoices:

OTHER RECORDS

Employee Training:

OTHER PERMITS

Storm Water Permit:

Air Permit:

FACILITY INSPECTION

Processing:

Maintenance:

Storage:

Pretreatment:

CHEMICAL USE

Storage:

SPILLS/RELEASES

CHANGES

Made:

Planned:

EXTERIOR

Storm Drains:

Other:

MISCELLANEOUS

ATTACHMENT 5: 2022 PROPOSED SWMP DOCUMENT

City of Salem Stormwater Management Program

November 2022

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NPDES PHASE I
STORMWATER MANAGEMENT PROGRAM

Prepared for
City of Salem

NOVEMBER 1, 2022
BC Project No. 157669

Table of Contents

List of Figures

List of Tables

List of Abbreviations

ACWA	Oregon Association of Clean Water Agencies
BMP(s)	Best Management Practice(s)
CIP	Capital Improvement Program
City	City of Salem
CSI	Clean Streams Initiative
CWA	Clean Water Act
DEI	Diversity, Equity, and Inclusion
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
EPSC	Erosion Prevention and Sediment Control
ESC	Erosion and Sediment Control
GSI	Green Stormwater Infrastructure
IDDE	Illicit Discharge and Elimination
IGA(s)	Inter-governmental Agreements
LA(s)	Load Allocations
LID	Low Impact Development
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollution Discharge Elimination System
O&M	Operations and Maintenance
ODOT	Oregon Department of Transportation
OPPP	Operation Pollution Prevention Plan
Permit	NPDES MS4 (Stormwater) Phase I Discharge Permit
SDC	System Development Charge
SKAPAC	Salem/Keizer Area Planning Advisory Committee
SOPs	Standard Operating Procedures
SRC	Salem Revised Code
SWMP	Stormwater Management Program Document
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UST	Underground Storage Tank
WLA(s)	Waste Load Allocation(s)

Section 1 SWMP Overview

1.1 Introduction

Under the federal Clean Water Act (CWA) and Oregon Revised Statute 468B.050, Oregon Department of Environmental Quality (DEQ) has issued the City of Salem (City) a renewed National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase I Discharge Permit, effective October 1, 2021.

This Stormwater Management Program (SWMP) document describes activities implemented to comply with the City's NPDES MS4 Permit. The SWMP outlines best management practices (BMPs) that the City will conduct to protect water quality and prevent and reduce stormwater pollution to the maximum extent practicable (MEP).

The City is a Phase I permittee, which means that it has a population of over 100,000 residents. The City's first NPDES MS4 Permit was issued in 1997. Subsequent permits were issued in 2004 and 2010. The 2010 permit expired in 2015 and went into administrative extension until a renewed permit was issued September 15, 2021, with an effective date of October 1, 2021 (Permit #101513).

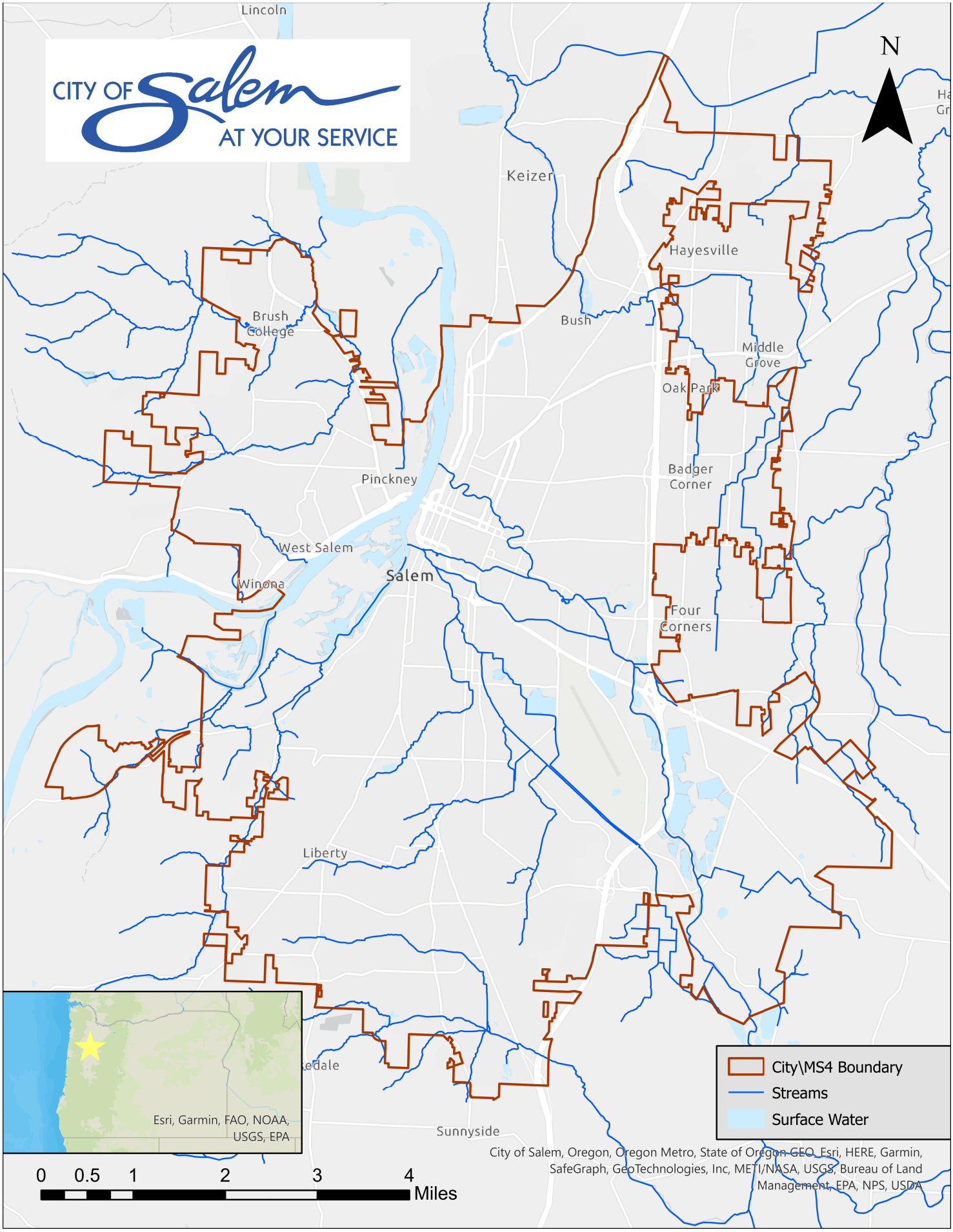
This 2022 version of the City's SWMP document was developed based on a review and evaluation of the City's stormwater program, including activities and accomplishments implemented during the previous permit term and during the administrative extension period. The City has used an adaptive management process to assess and modify BMPs to achieve reductions in stormwater pollutants to the MEP. This SWMP update was based on several key factors including an evaluation of available technologies and practices, a review of SWMP measurable goals and tracking measures, and an assessment of City resources available to implement programs.

The City's BMPs are evaluated annually during the preparation of the NPDES MS4 Annual Report. The Annual Report documents the status of implementing each BMP and identifies any proposed modifications or adaptations of the program.

1.2 Coverage Area

Salem is Oregon's capital city, encompassing approximately 47 square miles including significant areas of residential, commercial, industrial, and institutional land uses within the city, and 2,335 acres of park land. The Willamette River bisects the city between Marion County to the east and Polk County to the west. The 2020 census data estimates Salem's population at 177,723. Due to its location in the Middle Willamette River subbasin, runoff from Salem drains into several perennial streams that ultimately discharge into the Willamette River. These tributaries include Mill, Pringle, Glenn, and Claggett Creeks.

The map presented in Figure 1 illustrates the total area within the representative watersheds, as well as the surrounding jurisdictions. Additional maps related to the City's stormwater system and stormwater program are included on the City's SWMP website.


CITY OF Salem
AT YOUR SERVICE
N
Lincoln
Keizer
Hayesville
Brush College
Bush
Middle Grove
Oak Park
Pinckney
Badger Corner
West Salem
Winona
Salem
Four Corners
Liberty
Sunnyside
Esri, Garmin, FAO, NOAA, USGS, EPA
City\MS4 Boundary
Streams
Surface Water
0 0.5 1 2 3 4
Miles
City of Salem, Oregon, Oregon Metro, State of Oregon GEO, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

The City's NPDES MS4 permit area or "service area" is defined as the area included within Salem city limits for which the City has responsibility for implementing its SWMP. Though local water bodies and waterways are the backbone of the City's stormwater system, they historically, have been excluded from the NPDES MS4 permit. In addition, areas operated by another NPDES MS4 permitted entity are also historically excluded.

The Oregon Department of Transportation (ODOT) has its own NPDES MS4 permit covering right-of-way (ROW) associated with state highways and freeways, thus the City's NPDES MS4 service area excludes ODOT ROW.

1.3 Relationship to Total Maximum Daily Loads

In addition to the NPDES MS4 permit requirements, the City addresses Total Maximum Daily Loads (TMDL) regulations under the Clean Water Act. TMDLs serve as plans for restoring impaired or polluted waters. They identify the maximum amount of a specific pollutant that a body of water can receive while still meeting water quality standards. In Oregon, the Department of Environmental Quality (DEQ) identifies load allocations (LAs) for nonpoint sources of pollution and waste load allocations (WLAs) for point sources. Municipal stormwater discharges are regulated as point sources if they are covered by a NPDES MS4 permit.

The City is a designated management agency for municipal stormwater for the following TMDLs:

- Total suspended solids (TSS) as a surrogate for legacy pesticides that are no longer in use (Molalla-Pudding Subbasin TMDL, 2008)
- Bacteria (Willamette Basin TMDL, 2006 and Molalla-Pudding Subbasin TMDL, 2008)
- Mercury (Willamette Basin, Water Quality Management Plan issued by the Environmental Protection Agency [EPA] on December 30, 2019, and reissued with modification on February 4, 2021)

Point sources of pollutants and associated WLAs are regulated under the NPDES permitting program, while nonpoint sources are managed by TMDL Implementation Plans. The NPDES MS4 permit addresses the City's TMDL obligations for TSS, bacteria, and mercury under Schedule D.3, which states:

> *DEQ incorporated performance measures in Schedule A.3.c, d, e, and f to address water quality impairments and EPA-approved or issued TMDL allocations issued to date. Compliance with the permit's terms and conditions is presumed to be in compliance with TMDL Waste Load Allocations (WLAs) issued before the effective date of this permit…*
>
> *Salem Phase I NPDES MS4 Permit, Schedule D.3.a*

This SWMP presents the City's plan to control pollutant runoff to address TMDL WLAs for TSS, bacteria and mercury. Schedule D.3.b also requires the City to conduct and submit a mercury minimization assessment with the Annual Report due November 1, 2022. To address this requirement, the BMPs outlined in this SWMP include references to the targeted TMDL pollutants addressed with implementation of BMPs. In addition, Schedule D.3.c requires the City to conduct a TMDL pollutant load reduction evaluation and Schedule D.3.d requires the City to establish pollution load reduction benchmarks for relevant TMDL pollutants in conjunction with the NPDES MS4 Permit renewal application.

The SWMP covers point sources of pollutants and associated WLAs. The City must also conduct activities to address temperature and any other nonpoint sources of TMDL pollutants. The City's TMDL Implementation Plan addresses pollution reduction strategies for nonpoint sources of pollutants. The TMDL Implementation Plan acts as a complement to the SWMP.

1.4 Stormwater Program Implementation

Stormwater program activities are implemented by City staff in many groups and departments, but the Public Works Department Stormwater Quality Group is the primary group responsible for coordinating planning and tracking activities related to this SWMP.

The following groups and departments also participate in stormwater program operations or implement programs that reduce pollutant sources before they can enter stormwater runoff.

- Engineering
- Planning
- Development Services
- Street Maintenance/Sweeping
- Parks and Natural Resource Planning
- Facilities Maintenance
- Wastewater
- Water
- Fleet/vehicle
- Fire/Emergency Services
- GIS
- Communications/Outreach
- Stormwater Operations and Maintenance
- Code Compliance

1.5 SWMP Development

Since 1996, the City's SWMP has undergone three iterations to bring it into alignment with the reissuance of the NPDES MS4 permits and meet the respective permit renewal requirements. With each iteration, the City conducts an evaluation to identify areas where modifications to the SWMP are appropriate. Existing BMPs are reviewed by those responsible for implementing the BMP(s) to propose changes to the BMP(s) that enhance effectiveness. BMP revisions are reviewed internally to ensure that commitments and activities are accurate and achievable.

In 2022, the City conducted a detailed evaluation of the existing SWMP using a gap analysis strategy to compare the City's 2011 SWMP to the 2021 NPDES MS4 permit requirements. The evaluation also included a review of the City's Annual Reports and considered input from City staff responsible for implementing each BMP. Based on City experience, some BMPs were streamlined to reflect work previously completed and other BMPs were adjusted to better reflect the way the City operates. New BMPs were identified to increase program effectiveness and accommodate new NPDES MS4 permit requirements. Measurable goals and tracking measures were developed or adjusted as needed for each BMP.

1.6 SWMP Document Library

SWMP Document implementation involves numerous codes, ordinances, policies, procedures, guidance manuals, checklists, forms, mapping, and other related documents. Throughout this SWMP Document, the relevant documents are noted within each program category or BMP. The referenced documents have been compiled into a SWMP Document Library located on the City's website.

At the time of publication, the website address is https://www.cityofsalem.net/government/shaping-salem-s-future/reports-studies/stormwater-permits-and-annual-reports.

As described in the previous section, in accordance with the NPDES MS4 permit requirements, the City also prepares a report of stormwater program activities each year. The Annual Reports will also be posted on the City's website for public access.

Section 2 SWMP Control Measures

This section of the SWMP document outlines the best management practices (BMPs) developed by the City of Salem (City) to address the NPDES MS4 Permit requirements to reduce the discharge of pollutants to the Maximum Extent Practicable. The BMPs detailed below are organized using numbering and titles based on categories which correspond closely to the Schedule A.3 requirements of the NPDES MS4 permit:

- **EO: Education and Outreach.** Activities related to NPDES MS4 Permit Schedule A.3.a to provide stormwater education to the community
- **PI: Public Involvement and Participation.** Activities related to NPDES MS4 Permit Schedule A.3.b to involve the public in stormwater program priorities
- **IL: Illicit Discharge Detection and Elimination (IDDE).** Activities related to NPDES MS4 Permit Schedule A.3.c to prevent, detect, and eliminate spills and illicit discharges
- **EC: Construction Site Runoff Control (EC).** Activities related to NPDES MS4 Permit Schedule A.3.d to manage construction site runoff
- **PC: Post-Construction Stormwater Management.** Activities related to NPDES MS4 Permit Schedule A.3.e to manage site runoff from new development and redevelopment
- **OM: Municipal Operations and Maintenance.** Activities related to NPDES MS4 Permit Schedule A.3.f for pollution prevention and good housekeeping programs in municipal operations
- **IC: Industrial and Commercial Facilities.** Activities related to NPDES MS4 Permit Schedule A.3.g to reduce pollution potential from industrial and commercial businesses
- **SP: Stormwater Program Implementation.** Program implementation-related activities as included in Schedule A.3.h, Schedule B.1, Schedule B.4, and Schedule D, as well as activities related to overall stormwater program planning and organization

A comprehensive table listing the City's NPDES permit requirements and corresponding BMPs is included in the BMP reference matrix provided in Appendix A to this SWMP document.

The BMPs described in this SWMP are primarily those that address the explicit requirements of the SWMP as detailed in the City's 2021 NPDES MS4 Permit. Additional activities within the City's stormwater program that do not specifically align with permit requirements may not be included in this document.

The BMPs include measurable goals and tracking measures that will be used to report progress to DEQ annually. The reporting period covers July 1 through June 30 of each year, with Annual Reports on activities due to DEQ by November 1.

2.1 Education and Outreach (EO)

Public education is an integral component of a successful stormwater pollution prevention program. Increasing knowledge of local water quality issues is key to obtaining public support and ownership for stormwater programs.

The objectives of the City's EO Program are to:

- Increase community understanding about stormwater issues, pollution sources, and impactful choices they can make to help keep pollution out of the stormwater runoff and local streams
- Provide training to City staff regarding stormwater pollution prevention strategies
- Educate local officials about stormwater programs and outcomes

The City conducts a wide variety of public education and outreach programs to address stormwater issues that are significant in the community. EO activities are focused on education for residents and people who do business in and around Salem, as well as education and training for municipal staff.

The City's NPDES permit requirements for education and outreach are listed in the BMP reference matrix in Appendix A.

Table 2-1 provides a description, implementation schedule, measurable goals, annual tracking measures, and a list of TMDL pollutants addressed for each EO Program BMP. Measurable goals and tracking measures will be evaluated annually to assess the impact of the BMPs and to inform future education and outreach activities.

Table 2-1. Education and Outreach BMPs				
BMP Name	**BMP Description**	**Measurable Goals**	**Annual Tracking Measures**	**TMDL Pollutants Addressed**
EO-1. MS4 Staff Training (Previously RC 1-4, RC1-8, RC 4-3, RC 4-4)	**Responsible Party:** Public Works Department **Implementation Schedule:** Ongoing **BMP Description:** The stormwater permit is a city-wide permit. Staff who perform stormwater-related functions should have knowledge of their position and how their work relates to the permit. Management should have an understanding of the permit as well. City staff will meet to coordinate efforts relating to stormwater training. Topics of the coordination meetings may include outreach activities, program reviews and documentation of maintenance protocols, annual reporting, monitoring, sharing of data, adaptive management, review/update of documents and procedures, training needs, use of the asset management database, the involvement of inspection, maintenance, and operations staff in plan review and program development, checklists, and erosion control. The Operations and Maintenance (O&M) workgroup will conduct safety and tailgate meetings to review and improve the O&M practices and training needs with regards to safety and protection of water quality. Staff training is offered and required in a variety of stormwater related topics. The City's NPDES MS4 Training plan outlines appropriate staff, training frequency, and potential training resources for each training topic. **Reference Document**: NPDES MS4 Training Plan (Appendix B)	• Conduct annual training of staff involved in MS4-related positions, in accordance with the NPDES MS4 Training Plan. • Stormwater supervisors will meet quarterly to coordinate training and adaptively manage programs.	• Training dates and number of staff attending • Dates of stormwater supervisor meetings	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

Table 2-1. Education and Outreach BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
EO-2. Public Education and Outreach (Previously RC1-5, RC5-1, RC5-2, RC5-3, ILL3-3, ILL3-4)	**Responsible Party:** Public Works Department **Implementation Schedule:** Ongoing **BMP Description:** Nearly 90 miles of streams flow through Salem providing character, beauty, wildlife habitat, recreation, and more to the community. The streams are the backbone of the City's stormwater system, and it takes a full community effort to keep them healthy. The City developed the Clean Streams Initiative (CSI) that is the umbrella for stormwater outreach, education, and involvement. The City's Clean Streams, Clear Choices Initiative was developed to educate the community on impactful choices they can make to keep pollution out of stormwater runoff and local streams. The webpage can be found at www.CleanStreamsSalem.org. The CSI has both general and select-audience outreach and many elements of the program are referenced in the public education and outreach strategy matrix (Appendix C). The matrix also identifies goals, pollutants of concern, priority audiences, education, and activities (messaging methods), topics, the entity or individual responsible for implementation, potential strategies, evaluation metrics, and potential partners. The City a coordinates with other agencies, NGOs, private environmental groups, and watershed councils. Based on the campaign's selected audience, translate stormwater program materials (brochures, flyers, manuals, guidelines, and website) into culturally relevant messages. **Reference Document**: Public Outreach Program Matrix (Appendix C)	• Create an annual education and outreach plan showing Priority audience, topic, messaging method. • Meet with City's DEI coordinator annually, during development of outreach and education plan. • Implement identified public outreach activities and campaigns. • Support Marion County in providing alternatives for household hazardous waste disposal, including mercury-containing items.	• Confirm development of annual education and outreach plan • Date of meeting with DEI coordinator • Create an annual report that details the outreach activities and includes an evaluation of at least one outreach event or program for adaptive management • Types of publicity for Marion County household hazardous waste program	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

2.2 Public Involvement and Participation (PI)

The public provides valuable input and assistance to the City's stormwater pollution prevention program. The goal of the PI Program is to effectively involve a diverse cross-section of people who can participate in stormwater pollution prevention activities. The City conducts a variety of PI programs to provide opportunities for the public to participate in the water quality stewardship and natural resource protections.

The City's NPDES permit requirements for public involvement and participation are listed in the BMP reference matrix in Appendix A of this SWMP document.

Table 2-2 provides a description, implementation schedule, measurable goals, annual tracking measures, and a list of TMDL pollutants addressed for each PI Program BMP. Measurable goals and tracking measures will be evaluated annually to assess the impact of the BMPs and to inform future public involvement activities.

Table 2-2. Public Involvement and Participation BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
PI-1. Stormwater Program Website (New BMP)	**Responsible Parties:** Public Works Department (Stormwater Quality) **Implementation Schedule:** Annually **BMP Description:** Websites are a valuable tool for sharing an organization's information with the community. include required stormwater program information, updated SWMP, a SWMP Document Library, Annual Reports, and links to stormwater program ordinances and guidance documents. Highlight pollution prevention, spill reporting, illicit discharge complaint reporting, education and outreach messages, and stewardship opportunities. Add links to ordinances, policies and/or guidance documents related to construction, post-construction, and industrial/commercial programs, including education, training, licensing, and permitting.	• Update information on website in 2022 • At least annually review the webpages to check for accuracy, working links, staff changes, new documents, and policy updates	• Confirm website update in 2022 • Completion of annual website review checklist	
PI-2. Watershed Grants (Previously RC 8-1)	**Responsible Parties:** Public Works Department **Implementation Schedule:** Ongoing **BMP Description:** The City's watershed grants provide the community opportunity to be involved with enhancing local streams and watersheds. To be eligible, projects must be located inside the City's water/sewer customer service area. Exceptions may be made for projects that have a direct impact on the City's drinking water supply or water quality on streams flowing through Salem. The grant supports riparian restoration efforts, education, and/or stormwater-related improvements within the city, such as stormwater quantity reduction and/or stormwater quality/treatment.	• Fund $50,000 annually for the Watershed Protection and Preservation Grant for projects that enhance Salem's water resources • Promote the grant program.	• Annual inclusion of $50,000 in the budget • Number of approved Watershed Grants, their project category, and overall funds spent • Promotion mechanism and frequency	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature
PI-3 Adopt-a-Street Program (Previously ILL3-1)	**Responsible Parties:** Public Works Department (Signs and Sweeping) **Implementation Schedule:** Ongoing **BMP Description:** Continue to implement the Adopt-a-Street Program. The program is an effective way to get residents involved in keeping the community's streets and right-of-way clean, and consequently preventing trash and debris from entering the storm drainage system.	• Continue to implement the Adopt–a-Street Program.	• Miles of adoptable and adopted streets, number of participating groups/individuals, and pounds of litter collected	✓ Bacteria
PI-4 Adopt-a-Stream Program (Previously ILL3-3)	**Responsible Parties:** Public Works Department (Stormwater Quality) **Implementation Schedule:** Ongoing **BMP Description:** This program involves teachers and youth participating in stream stewardship opportunities with their classes through stream studies and restoration projects. This introduces young people to the importance of	• Continue to support the Adopt–a-Stream Program.	• Number of participating groups, and support provided	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

Table 2-2. Public Involvement and Participation BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
	water quality and encourages their involvement in further stewardship opportunities.			
PI-5 Storm Drain Marking Program	**Responsible Party:** Public Works Department (Stormwater Quality) **Implementation schedule:** June - September **BMP Description:** Provide storm drain marking program each summer. Volunteers work with City staff to mark storm drains. The messaging helps to spread the word that the trash and dirty water that enters a storm drain ends up in local streams where it creates water pollution and can harm wildlife.	• Provide marking to 100 storm drains per year.	• Number of drains marked	✓ TSS ✓ Bacteria ✓ Mercury
PI-6 Volunteer Green Infrastructure Cleaning Program	**Responsible Party:** Public Works Department (Stormwater Quality) **Implementation schedule:** 2024 **BMP Description:** As cities develop, Green Stormwater Infrastructure (GSI) facilities are constructed to help reduce the stormwater pollutant load that reaches local streams. These facilities require trash removal and landscape maintenance on a regular basis to function properly. With more stormwater facilities being built with GSI techniques, community members can help make a difference in their neighborhood by volunteering to assist in maintaining GSI facilities.	• Develop volunteer GSI cleaning program by June 30, 2024. • Implement program beginning July 1, 2024	• Progress towards program development of volunteer GSI cleaning program • Number of facilities cleaned by volunteers	✓ TSS ✓ Bacteria ✓ Mercury

2.3 Illicit Discharge Detection and Elimination (IL)

The goal of the IL Program is to detect and eliminate illegal discharges and illicit connections to the storm drain system. An illicit discharge is defined in EPA's stormwater regulations as any discharge to an MS4 that is not composed entirely of stormwater unless exempt by the permit. Stormwater is defined as the portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, channels, or pipes into a defined surface water channel or a constructed infiltration facility. Illegal discharges to the storm sewer from industrial facilities, commercial businesses, and residents can be a significant source of water pollution. Deteriorating piping in the sanitary sewer and storm drain systems may also be a source of pollution if sanitary sewage seeps into the stormwater system.

The IDDE program involves many City departments to protect water quality. Salem Fire (SFD) and Environmental Services (ES) provide immediate response to reports of spills, illicit discharges or any unusual substances noticed by the public or City crews. SFD has the lead role for emergency response, structural fires, and all major vehicular accidents. ES staff provides assistance when requested by the on-scene incident commander. For small discharges, ES may provide first response for containment and cleanup, as necessary. ES leads source investigation efforts to bill responsible parties for clean-up costs if identified.

Dry weather field screening and associated water quality monitoring results may alert the City to high levels of pollutants that might be related to upstream spills or illicit discharges. Any unusual findings are investigated and tracked to identify the cause. Conveyance system maintenance inspections may reveal cross connections or non-stormwater discharges flowing in the piped system. Construction site inspections evaluate material storage and waste management strategies and aim to correct problems before they can create a downstream pollutant discharge.

Through the pre-treatment program, ES staff also perform inspections of the City's permitted wastewater users to verify the proper handling and disposal of both wastewater and stormwater.

The City's NPDES permit requirements for IDDE are listed in the BMP reference matrix in Appendix A.

Table 2-3 provides a description, implementation schedule, measurable goals, annual tracking measures, and a list of TMDL pollutants addressed for each IL Program BMP. Measurable goals and tracking measures will be evaluated annually to assess the impact of the BMPs and to inform future IDDE priority areas and activities.

Table 2-3. Illicit Discharge Detection and Elimination BMPs				
BMP Name	**BMP Description**	**Measurable Goals**	**Annual Tracking Measures**	**TMDL Pollutants Addressed**
IL-1. Spill Prevention and Response (Previously ILL1-1, ILL1-2, ILL1-3)	**Responsible Parties**: Salem Fire Department and Public Works Department **Implementation Schedule**: Ongoing **BMP Description**: Spill prevention and response are the first lines of pollution prevention to guard stream health. Continue to implement the existing spill prevention and emergency response program to coordinate timely responses to, and clean-up of emergency response sites and structural fires. Coordinate activities among other relevant agencies and ODOT when appropriate. Update the City's Spill Response Plan, based on Salem Fire's Standard Operation Guideline (SOG) for spill response, containment, and protection of the MS4 during fire-fighting training activities and general maintenance and cleaning activities at the fire stations. **Reference Document**: Spill Response Plan	• Update the City's Spill Response Plan. Post it in the SWMP Document Library. • Continue to implement the spill prevention and emergency response program. • Conduct daily equipment inspections.	• Status of update to the Spill Response Plan • Number and category of spill events and responses	✓ TSS ✓ Bacteria ✓ Mercury
IL-2. Illicit Discharge Detection and Elimination Program (Previously ILL2-1, ILL2-2, ILL2-3, ILL3-2)	**Responsible Parties**: Public Works Department (Environmental Services, Wastewater Collections) **Implementation Schedule**: Ongoing **BMP Description**: This program works to keep illicit discharges from occurring. The City operates a 24-hour dispatch center to receive and respond to calls regarding illegal dumping, unusual discharges, suspicious water quality conditions, and other environmental issues. Staff work to identify sources/causes of illicit discharges and implement corrective actions in accordance with the City's IDDE Enforcement Response Plan. Operations staff work with Wastewater collections staff to identify and remedy cross-connections between the sanitary sewer and the stormwater system. **Reference Document**: IDDE Enforcement Response Plan	• Review, update, and post the City's IDDE Enforcement Response Plan in the SWMP Document Library. • Continue to operate the 24-hour Public Works Dispatch Reporting Center. • Respond to reports of illicit discharges and suspicious water quality conditions within the timelines identified in the IDDE Enforcement Response Plan. • Review stormwater and ambient stream monitoring data to identify possible cross-connection discharges into the stormwater system. • Take corrective action on any identified system cross-connection problems.	• Status of update to IDDE Enforcement Response Plan • Number of illicit discharge concerns reported • Number of confirmed illicit discharge problems and enforcement action taken • Number of cross-connections identified. • Number of cross-connections remedied	✓ TSS ✓ Bacteria ✓ Mercury

Table 2-3. Illicit Discharge Detection and Elimination BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
IL-3. Stream Crew Program (Dry Weather Screening and IDDE) (Previously ILL2-4, RC4-7)	**Responsible Party:** Public Works Department (Stormwater Quality) **Implementation Schedule**: Ongoing with updates to priorities in 2023 **BMP Description**: Dry weather screening is a field test method for inspecting storm water drainage areas to help locate and identify harmful and illegal discharges and improper connections to a municipal storm water system. The Summer Stream Crew walks and inspects stream segments. Using summer interns, inspect the riparian areas and streams, pick up litter and garbage, inspect for illicit discharges, address potential conveyance concerns, and evaluate areas for stream restoration. In 2023, update the Dry Weather Outfall and Illicit Discharge Screening Plan to identify new priority outfalls and stream segments. Include pollutant parameter action levels for field screening and SOPs for collecting water quality samples and conducting laboratory analyses in the event of an ongoing discharge. Implement updated Dry Weather Outfall and Illicit Discharge Screening Plan, with annual priorities for field inspections. Develop GIS geodatabase for storage and display of outfalls with observed dry weather discharges. Over time, this geodatabase will represent areas of chronic illicit discharges. **Reference Document**: Dry Weather Outfall and Illicit Discharge Screening Plan	• Conduct dry weather inspections for a minimum of 35 outfalls annually. • Develop GIS geodatabase for storage and display of observed dry weather flows and add observed dry weather flows to GIS geodatabase annually. • Update Dry Weather Outfall and Illicit Discharge Screening Plan in 2023 with updated priority areas, pollutant parameter actions levels, and water quality sampling SOPs. • Walk 50% of waterways within Salem each year for stream clean up and enhancement.	• Number of outfall inspections conducted and results of inspections including follow-up activities. • Number of outfalls with observed dry weather flows added to GIS geodatabase • Status of updating the Dry Weather Outfall and Illicit Discharge Screening Plan • Waterway miles walked and the amount of garbage/litter removed	✓ TSS ✓ Bacteria ✓ Mercury

2.4 Construction Site Runoff Control (EC)

Construction projects often involve the removal of vegetation and excavation of soils. When vegetation is removed, the velocity of stormwater runoff increases, and disturbed soils can be carried offsite to storm inlets or receiving waters. Soil particles can transport nutrients, mercury, and other metals to waterways, contribute to increases in stream temperature, reduce channel capacity, and have negative impacts to aquatic habitat. Construction sites include other potential pollutant causing activities including materials storage, fueling, and vehicle and equipment use. A robust and enforceable construction site runoff control program is a key aspect in reducing pollution in stormwater runoff.

The goal of the EC Program is to prevent sediment from leaving construction sites through the implementation of properly selected and installed BMPs. Requirements are outlined in the City's Erosion Prevention and Sediment Control Technical Guidance Handbook. Education is provided for both municipal staff and members of the design/engineering/construction community. Salem Revised Code (SRC) Chapter 75 provides the City with the legal authority to enforce erosion prevention and sediment control on construction sites. Construction site runoff controls are enforced through regulatory requirements, plan review and permitting, construction site inspections, enforcement procedures, and tracking mechanisms.

The City's NPDES permit requirements for construction site runoff control are listed in the BMP reference matrix in Appendix A.

Table 2-4 provides a description, implementation schedule, measurable goals, annual tracking measures, and a list of TMDL pollutants addressed for each EC Program BMP. Additional information on the EC Program is provided in the City's Erosion and Sediment Control (ESC) Manual. Measurable goals and tracking measures will be evaluated annually to assess the impact of the BMPs and to inform future construction site runoff control BMPs.

Table 2-4. Construction Site Runoff Control BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
EC-1. Erosion Control Requirements (Previously CON1-1, RC9-1, RC9-2, and RC9-3)	**Responsible Party:** Public Works Department (Engineering) **Implementation Schedule:** November 1, 2023 **BMP Description:** Erosion Prevention and Sediment Control requirements are outlined in SRC Chapter 75. The requirements include the submission of erosion prevention and sediment control plans with structural and nonstructural BMPs. Review the existing ordinance/code and design guidelines. Update the thresholds for erosion control requirements for consistency with the NPDES MS4 Permit (i.e., remove the exemption for projects under 25 cubic yards of disturbance). Review and update (if needed) structural and non-structural erosion control BMP requirements for consistency with industry standards, accepted practices, and new technologies. **Reference Documents:** ACWA Construction Site Stormwater Guide	• Update SRC Chapter 75 to update the threshold for erosion control requirements for consistency with NPDES MS4 permit by November 1, 2023.	• Status on updating SRC Chapter 75	✓ TSS ✓ Mercury
EC-2. ESC Plan Review (Previously CON1-3, CON1-5)	**Responsible Party:** Public Works Department (Engineering) **Implementation Schedule:** Ongoing **BMP Description:** Continue to require ESC Plans for developments that meet or exceed the threshold indicated in SRC Chapter 75. Conduct ESC Plan reviews and issue construction permits that require projects to have a site-specific ESC Plan that is maintained on site, reviewed, updated when needed, and made available to the City or DEQ upon request. Continue to coordinate with the City's 1200-CA Permit for City construction projects subject to its requirements. Compile resources and educational materials to support engineers and contractors in developing ESC plans. Post information and materials on a public-facing website that will serve as a resource for construction applicants. **Reference Documents:** The City's ESC Plan Review Procedures are included in the SWMP Document Library.	• Post the City's ESC Plan Review Procedures in the SWMP Document Library. • Perform ESC Plan reviews and issue construction permits. • Ensure requirements for 1200-CA compliance are incorporated into City construction plans, specifications, and contract documents. • Develop ESC Plan educational resource webpage.	• Number of erosion control plans reviewed, and permits issued • Status of renewal of the City's 1200-CA permit • Status of developing educational resource webpage	

Table 2-4. Construction Site Runoff Control BMPs				
BMP Name	**BMP Description**	**Measurable Goals**	**Annual Tracking Measures**	**TMDL Pollutants Addressed**
EC-3. Erosion Control Inspections (Previously CON1-3)	**Responsible Party:** Public Works Department (Engineering) **Implementation Schedule:** Ongoing **BMP Description:** Review and update construction site inspection procedures to incorporate requirements of Schedule A.3.d.iv. Set inspection frequencies based on project type to focus City inspections on sites with higher potential for erosion or sediment concerns. Continue to inspect construction sites in accordance with the City's Construction Site Inspection procedures. Site inspections include onsite meetings during pre-construction to highlight the importance of erosion prevention and proper BMP selection, installation, maintenance, and modification. Inspections during construction include evaluating onsite BMPs, checking onsite documentation and documenting potential erosion prevention or sediment/pollution control concerns. When concerns are noted, the City will follow escalating enforcement procedures. Enforcement begins with education and voluntary compliance and then follows the steps outlined in the City's Erosion Control Enforcement procedures. **Reference Documents:** Construction Site Inspection procedures and Erosion Control Enforcement procedures	• Maintain inventory of permitted construction sites with contact information, project size, date of approved plan, inspections, and complaints. • Make erosion prevention and sediment control key agenda items at all preconstruction conferences. • Include inspection of all site erosion prevention and sediment control measures as part of City projects. • Conduct construction site inspections in accordance with the City's documented Construction Site Inspection procedures. • Conduct enforcement in accordance with the City's documented Erosion Control Enforcement procedures. • Ensure the escalating enforcement procedure meets new permit requirements by Nov. 1, 2023.	• Number of preconstruction conferences that discuss erosion prevention and sediment control • Number of erosion control inspections performed • Number of enforcement actions and the outcome of the actions • Track number of 1200-CA inspections • Escalating enforcement procedures are documented and submitted by Nov 1, 2023, if needed.	✓ TSS ✓ Mercury
EC-4. Training for Construction Site Operators (Previously CON 1-2)	**Responsible Parties:** Public Works Department (Engineering, Stormwater Quality) **Implementation Schedule:** Ongoing **BMP Description:** The City's Public Works Department leads efforts to train private contractors about stormwater pollution at construction sites, with an emphasis on prevention and control BMPs. Notices are provided to construction site operators concerning where education and training to meet ESC requirements can be obtained.	• Provide annual erosion control training for private contractors.	• Number of training programs conducted, and number of contractors trained	✓ TSS ✓ Mercury

2.5 Post-Construction Stormwater Management (PC)

Stormwater runoff from new development and redevelopment of urban areas impacts the quality and quantity of stormwater discharges. Stormwater that flows through developed areas has the potential to carry pollutants such as sediment, nutrients, metals, hydrocarbons, and litter to water bodies degrading the water quality. Degraded water quality negatively impacts aquatic habitats and threatens human uses. Increases in impervious area associated with development decreases the amount of stormwater that can percolate into the ground which increases the flow rate and quantity of stormwater discharged to receiving waters. An increase to the quantity and flow rate of stormwater discharge can cause streambank scouring, channel incising, and downstream flooding, which could lead to a loss of aquatic habitats and damage to property.

The NPDES MS4 Permit requires that the City develop a site performance standard based on a numeric stormwater retention requirement (NSRR). The site performance standards should target natural surface or predevelopment hydrologic function and encourage a retention first approach to stormwater control designs. If onsite retention is not feasible for a given site, the City may establish alternative site performance standards that will result in treatment of a design storm representing at least 80 percent of average annual runoff. The permit requires the City to continue to prioritize Low Impact Development (LID) and GSI to reduce pollution by retaining and treating stormwater near where it falls. The City's codes and standards will be evaluated and updated as needed during the permit term to align with required performance standards.

Information on the City's current approach to managing stormwater from new and redevelopment is provided in the City's Stormwater Management Design Standards and SRC, Chapter 71. The standards require use of LID practices to the MEP for new and redevelopment activities that meet defined project thresholds. The standards require the use of infiltration where feasible and emphasize the use of GSI on small projects. Additional details about the City's LID/GSI strategy will be documented by November 1, 2023.

The City's NPDES permit requirements for the PC Program are primarily listed in Table 2-5. The NPDES MS4 Permit requires a robust program for long-term operations and maintenance (O&M) of stormwater management facilities and similar requirements are outlined in two sections of the NPDES MS4 Permit (Schedule A.3.e.vi and Schedule A.3.f.i). In this SWMP, the details of the stormwater management facility maintenance BMPs to address both Schedule A.3.e.vi and A.3.f.i are outlined in Section 2.6 (Municipal Operations and Maintenance [OM]) and Table 2-6.

The City's NPDES permit requirements for post-construction stormwater management are listed in the BMP reference matrix in Appendix A.

Table 2-5 provides a description, implementation schedule, measurable goals, annual tracking measures, and a list of TMDL pollutants addressed for each PC BMP. Measurable goals and tracking measures will be evaluated annually to assess the impact of the PC Program BMPs and to inform future new development and redevelopment management activities.

Table 2-5. Post-Construction Stormwater Management BMPs				
BMP Name	**BMP Description**	**Measurable Goals**	**Annual Tracking Measures**	**TMDL Pollutants Addressed**
PC-1. Post Construction Design Standards (Previously RC 3-1, RC 3-2, RC 9-2)	**Responsible Parties**: Public Works Department **Implementation Schedule**: Begin in 2023 for completion by Nov. 1, 2024. **BMP Description:** Review, update, and adopt revisions to SRC 71 and the Stormwater Management Design Standards to address NPDES MS4 Permit requirements. The revisions should adjust the large project threshold from 10,000 - 5,000 SF of impervious surface and identify the City's infiltration requirement as a Numeric Stormwater Retention Requirement. Review alternative stormwater mitigation options and consider incorporating a water quality benefit offset program in the updated standards for sites that cannot meet the NSRR or equivalent water quality standards. Review and update stormwater facility maintenance criteria, maintenance standards, easement and access requirements for private facilities, and submittal information for each type of stormwater management facility. The update should also incorporate the SRC requirements for peak flow matching for four storm events and improve clarity around infiltration testing requirements and determining infiltration feasibility. **Reference Documents:** Stormwater Management Design Standards	• Update SRC Chapter 71 by November 1, 2024. • Review and update the Stormwater Management Design Standards by November 1, 2024.	• Status on updating SRC Chapter 71 • Updates to the Stormwater Management Design Standards	✓ TSS ✓ Bacteria ✓ Mercury
PC-2. LID/GSI Strategy (New BMP)	**Responsible Parties:** Public Works Department (Development Services, Engineering) **Implementation Schedule:** November 1, 2023 **BMP Description:** Conduct an evaluation of the City's current Stormwater Management Design Standards to document the City's existing strategy to prioritize LID strategies in new development and redevelopment and GSI approaches to stormwater management. Identify recommended modifications to the SRC or Stormwater Design Management Standards to improve the City's strategy. Prepare a documentation memorandum to include in the 2023 Annual Report and post the documentation in the SWMP Documents Library. **Reference Documents:** LID/GSI Prioritization Strategy Document	• Prepare LID/GSI Prioritization Strategy document, submit with November 2023 Annual Report, and post to the SWMP Document Library.	• Status on developing LID/GSI Prioritization Strategy document	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

Table 2-5. Post-Construction Stormwater Management BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
PC-3. Development Review for Stormwater (Previously RC 3-3, RC 3-4)	**Responsible Parties:** Public Works Department (Engineering, Development Services) **Implementation Schedule:** Ongoing **BMP Description:** The City continues to review all residential, commercial, and industrial plans submitted for compliance with the City's Stormwater Management Design Standards. Public Works staff conducts inspections of completed stormwater facilities prior to the City's acceptance of those projects and project closeout to ensure work was done in accordance with approved plans. Staff continues to maintain a database of plans reviewed and final inspections conducted. Following updates to the post construction design standards (PC-1), review and update (if necessary) the stormwater submittal requirements checklist for land use and design submittals, outlining what content and supporting calculations are required at each level of submittal. The checklist guides applicants in providing the correct information, so that the City can evaluate the technical feasibility and site constraints related to onsite management of stormwater runoff. Following updates to the post construction design standards (PC-1), review and update (if necessary) the internal SOP for stormwater plan review that guides the review and approval of structural stormwater control plans. **Reference Documents:** Stormwater submittal requirements checklist and Internal Stormwater Plan Review SOP	• Review and update (if necessary) the stormwater submittal requirements checklist following updates to the post-construction design standards. • Review and update (if necessary) the internal stormwater plan review SOP following updates to the post-construction design standards. • Review all residential, commercial, and industrial plans submitted for City-issued permits for compliance with the Stormwater Management Design Standards and associated SRC provisions. • Review all Willamette Greenway Permits for compliance with the Stormwater Management Design Standards and associated SRC provisions. • Conduct inspections once construction is completed to ensure work was done in accordance with approved plans.	• Status of stormwater submittal requirements checklist • Status of internal stormwater plan review SOP • Number of plans reviewed and permits issued for compliance with the Public Works Design Standards • Number of plans reviewed for projects requiring Willamette Greenway Permits • Number of final inspections	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

2.6 Municipal Operations and Maintenance (OM)

The goal of the pollution prevention program is to reduce discharge of pollutants to receiving waters associated with municipal operations. The OM Program includes a wide variety of activities conducted to maintain City-owned properties and facilities such as parks, public streets, and the public storm drain system. These activities can lead to pollutants reaching the MS4 system and receiving waters such as sediments, chemicals from pesticide applications, nutrients from fertilizers, and litter. The City implements a variety of pollution prevention and good housekeeping BMPs to protect water quality during municipal operations.

The municipal operations program includes asset management to track stormwater infrastructure, stormwater management facility implementation and good housekeeping during operations and maintenance. During this permit term, the City will continue to develop written pollution prevention strategies and document the procedures that are already in place for many municipal operations. Data collected during operations and maintenance activities are used for annual reporting, evaluation, and modification of each activity.

The City also maintains separate NPDES discharge permits for several municipal facilities. These permits outline the specific actions and requirements to protect water quality at those facilities. At the time of this SWMP development, the City has discharge permits for the following municipal facilities:

- Wastewater Treatment Plant (NPDES Wastewater Discharge Permit)
- Salem Municipal Airport (NPDES 1200-Z Industrial Stormwater Discharge Permit)

The City's NPDES permit requirements for municipal operations maintenance are listed in the BMP reference matrix in Appendix A.

Table 2-6 provides a description, implementation schedule, measurable goals, annual tracking measures, and a list of TMDL pollutants addressed for each BMP for pollution prevention in municipal operations. Measurable goals and tracking measures will be evaluated annually to assess the impact of OM Program BMPs and to inform future BMPs for pollution prevention in municipal operations.

Table 2-6. Municipal Operations and Maintenance BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
OM-1. Asset Management and Systemwide Mapping (Previously RC1-3, RC 7-1, RC 7-2)	**Responsible Parties:** IT Department (GIS Section), Technical Services **Implementation Schedule:** Ongoing **BMP Description:** Continue to update the Geographic Information System (GIS) database(s) so that the City's MS4 system maps, including open channels and piped systems are accurate, up to date, and can be relied upon for stormwater planning, preliminary project design, and program management. The GIS database contains information on the stormwater conveyance system, including piped systems, ditches, structural controls (public and private), and capital improvement projects. Continue to update GIS database with completed capital improvement projects, the addition of new stormwater facilities, and the refinement of data for the existing system. Continue to update the official "waterways" geodatabase for use by all City staff in applying various regulations and standards. This includes updates to the delineation of wetlands, perennial streams, waterways, and floodplain/floodway designations. Incorporate field verified information that warrants the revision of the designated waterways.	• Continue to perform routine maintenance and updates to the GIS database(s) annually. This includes the addition of new public and private BMP installations and drainage areas. • Continue to review and refine the database of maps and waterways.	• Record maintenance/updates made to the GIS database(s) • Track completion of additional ground-truthing activities and waterways map updates	
OM-2. Public Stormwater Facility Inspection and Maintenance (Previously RC 4-8, RC 4-9)	**Responsible Party:** Public Works Department (Stormwater Quality, Stormwater O&M) **Implementation Schedule:** Ongoing **BMP Description:** Continue to inventory all public stormwater facilities when constructed and map them in accordance with BMP OM-1. If possible, link as-builts and O&M plans to the stormwater management facility inventory. Develop a stormwater management facility inspection schedule with annual priorities and conduct identified inspections of public stormwater management facilities (water quality, detention, and green infrastructure facilities), with the goal of inspecting 100% of public stormwater management facilities within the permit cycle. Identify maintenance needs and issue maintenance work orders for public facilities. Continue to perform routine maintenance for public stormwater management facilities to maintain performance standards. Perform actions to address issues identified during facility inspections.	• Develop a stormwater management facility inspection schedule in 2023. • Add all newly constructed stormwater management facilities to the digital inventory when they come into public ownership and maintenance responsibility. • Inspect 100% of public stormwater management facilities within the permit cycle. • Generate work orders based on inspections and track progress toward completing work orders.	• Status of stormwater management facility inspection schedule • Number of public stormwater management facilities in the digital inventory • Percent of stormwater management facility inspections per year • Number of generated and completed maintenance work orders for public facilities	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

Table 2-6. Municipal Operations and Maintenance BMPs				
BMP Name	**BMP Description**	**Measurable Goals**	**Annual Tracking Measures**	**TMDL Pollutants Addressed**
OM-3. Private Stormwater Facility Inspection and Maintenance Program (Previously RC4-12)	**Responsible Party:** Public Works Department (Stormwater Quality) **Implementation Schedule:** Ongoing **BMP Description:** Continue to inventory all privately owned stormwater facilities when constructed and map them in accordance with BMP OM-1. Include location, facility type, ownership, contact/mailing information, and maintenance responsibility in inventory. If possible, link as-builts and O&M plans to the stormwater management facility inventory. Continue to require maintenance agreements for newly constructed private stormwater management facilities. Update maintenance education handout that outlines ownership and maintenance responsibilities for owners of private stormwater control facilities. Mail maintenance reminder letters with education handout to private facility owners with request to confirm maintenance inspections and actions (voluntary compliance). Continue to conduct inspections of private stormwater management facilities with the goal of inspecting 100% of private stormwater management facilities per permit term. Identify maintenance needs and send follow-up letters to private owners to document needed maintenance actions.	• Add all newly constructed private stormwater management facilities to the digital inventory with links to maintenance agreements. • Update maintenance education handout for private owners. • Mail annual maintenance reminders to inventoried private facility owners. • Inspect 100% of inventoried private stormwater management facilities during the permit term.	• Number of private stormwater management facilities in the digital inventory. • Status of maintenance education handout. • Number of maintenance reminder letters sent. • Percent of private facility inspections conducted per year and in relation to total.	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

Table 2-6. Municipal Operations and Maintenance BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
OM-4. Conveyance System Inspection and Cleaning (Previously RC 4-6, RC 4-10, RC 4-11)	**Responsible Parties:** Public Works Department **Implementation Schedule:** Ongoing **BMP Description:** Maintenance activities associated with the stormwater conveyance system and components include regular TV inspection, cleaning of storm drains and catch basins, and ditch maintenance. Inspections are focused on areas with historical problems and high potential for debris. Maintenance is performed to collect and remove sediment and pollutants before they can travel downstream. Stormwater staff conduct routine cleaning and TV inspection of the public storm conveyance system on a schedule developed during the previous permit term. Based on data collected during the previous permit term, the City plans to inspect 50% of catch basins per year, in a rotating schedule, based on geography. Catch basins will be cleaned to remove sediment and debris when inspections identity a 30% sediment accumulation level. Ditch maintenance is performed by Stormwater Services to assure adequate conveyance, and includes three primary activities: 1. Roadside Ditch Cleaning: consists of removal of sediment in the bottom of roadside ditches only as needed for proper conveyance, with limited vegetation disturbance and the use of straw wattles to reduce sedimentation and erosion within the ditch. 2. Roadside Ditch Mowing: maintains vegetation for improved conveyance. 3. Drainage Ditch Mowing: typically conducted by Adults in Custody (AIC) crews using handheld equipment. Vegetation cutting facilitates conveyance and reduces the risk of potential fires in summer months.	• Inspect 120,000 LF of stormwater conveyance pipe annually to identify maintenance and repair needs. • Clean a minimum of 300,000 LF of stormwater conveyance pipe annually. • Inspect 50% of catch basins annually. • Clean any catch basin that meets a 30 percent sediment accumulation threshold during the inspection. • Regularly inspect and maintain 100% of City ditches using appropriate water quality BMPs.	• Length of conveyance system inspected. • Length of conveyance system cleaned. • Number of catch basins inspected • Number of catch basins cleaned and amount of sediment removed. • Length of ditch maintenance performed (cleaning and mowing) and sediment removed.	✓ TSS ✓ Bacteria ✓ Mercury

Table 2-6. Municipal Operations and Maintenance BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
OM-5. Street Sweeping and Debris Control (Previously RC4-1, ILL3-5)	**Responsible Parties:** Public Works Department (Signs and Sweeping, Streets Maintenance) **Implementation Schedule:** Ongoing **BMP Description:** Conduct sweeping in conjunction with the existing street sweeping schedule (see measurable goals). Maintain a daily log of routes swept and an annual record of the amount of material collected. The information that is collected assists staff in making recommendations for modified methods, schedules, and for annual reporting and overall program evaluation. Review and update the protocols for the City's stormwater waste processing facility (decant facility) to include expanded pollution prevention and good housekeeping strategies. Incorporate the updated protocols in the Operations Pollution Plan (OM-8). Continue to support the annual Fall Leaf Haul. City event agreements have litter control requirements and a clause to allow City to perform clean-up with cost reimbursement from the event operator. **Reference Documents:** The stormwater waste processing material disposal protocols will be included in the Operations Pollution Prevention Plan [OPPP] (OM-8)	• Review street sweeping program annually for effectiveness and any necessary revisions to sweeping schedules. • Continue sweeping City streets on a four-zone schedule, sweeping the heaviest zone 13 times per year and the lightest zone 6 times per year. • Continue sweeping City-owned parking lots as needed. • Update waste processing facility disposal protocols and include in OPPP. • Continue to support the Fall Leaf Haul effort.	• Provide information on changes • Number of curb-miles of streets swept • Status of the update to waste disposal protocols • Fall Leaf Haul dates and collection amounts	✓ TSS ✓ Bacteria ✓ Mercury
OM-6. Winter Road Maintenance (Previously RC4-2)	**Responsible Parties:** Public Works Department (Signs and Sweeping, Streets Maintenance) **Implementation Schedule:** Ongoing **BMP Description:** Both sanding and de-icing chemicals are used to treat roadways for ice and snow. Continue to perform deicing operations in a way that minimizes stormwater pollution. Conduct annual inspections and training to ensure proper operation of the deicing chemical storage facility. Use the covered and contained storage area for sanding rock material storage. Sweep and dispose of sand material as soon as possible following the return to safe driving conditions. When possible, collect and reuse sand for landfill "daily cover" or other appropriate uses. Use GIS-based tracking of winter road maintenance actions. Develop a SOP for the City's Winter Road Maintenance Strategy to document material selection, storage, proper application (timing and rates), collection and reuse opportunities. **Reference Documents:** Winter Road Maintenance Strategy	• Continue current deicing operations to prevent stormwater pollution. • Continue to research potential cost-effective reuse opportunities for deicing sand materials.	• Dates of annual inspections and training related to deicing • Deicing quantities applied annually including number of events and general locations	✓ TSS ✓ Mercury

Table 2-6. Municipal Operations and Maintenance BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
OM-7. Integrated Pest Management Procedures (Previously RC 4-5)	**Responsible Parties:** Public Works Department (Integrated Pest Management Committee) **Implementation Schedule:** Ongoing **BMP Description:** The City will continue to implement a program for careful monitoring and management of pesticides, herbicides, and fertilizers. This includes practices for proper handling and storage of chemicals. Over the permit term, staff will review and refine the City's Integrated Pest Management (IPM) Plan and create a Policy and associated Operational Plan.	• Create and adopt citywide IPM Policy by June 2023. • Once IPM Policy is adopted, update and implement the Operational Plan by December 2025. • Conduct routine inspections of storage facilities for proper storage of materials and chemicals.	• Progress on adoption of policy • Progress on updating and implementing the Operational Plan • Number of inspections of chemical storage facilities	
OM-8. Pollution Prevention for Operations (Previously ILL1-4)	**Responsible Parties:** Public Works Department (Stormwater Quality, Operations) **Implementation Schedule:** Ongoing **BMP Description:** The City's OPPP provides strategies to reduce the impact of stormwater runoff from the City's municipal properties that store and manage vehicles, materials, and waste. The plan needs to be expanded to include additional properties to incorporate SOPs for stormwater pollution prevention during municipal field operations. Expand the OPPP to include: • Updated list of facilities (properties) and activities where the pollution prevention strategies apply. • Guidelines for pesticide, herbicide, and fertilizers (in conjunction with OM-7). • Strategies for campsite clean-up, including trash disposal and stormwater pollution prevention during pressure washing • Pollution prevention strategies during bridge cleaning and maintenance activities. • Expanded pollution prevention and good housekeeping strategies that incorporate new technologies and industry best practices. In conjunction with EO-1, provide training to municipal staff on the updated OPPP. Consider extending the pollution prevention training opportunity to staff from franchise utilities and other agencies that perform field work in the City. **Reference Documents:** Operations Pollution Prevention Plan	• Expand and update the OPPP. • Provide at least one training per year for municipal staff on the updated OPPP.	• Updates/revisions to the OPPP • Number of trainings provided and number of attendees	✓ TSS ✓ Bacteria ✓ Mercury

2.7 Industrial and Commercial Facilities (IC)

Environmental Services (ES) manages the Wastewater Industrial Pretreatment Program, under SRC Chapter 74, that involves permitting of industries to meet local discharge limits set by the EPA, DEQ, and the City. The wastewater pretreatment program provides the framework for the industrial and commercial facility stormwater pollution prevention program.

ES works with DEQ to coordinate the permitting and compliance processes for industrial users in the Salem area, including DEQ-issued 1200-Z permitted sources, underground storage tank (UST) removal, and site remediation permits issued by DEQ for sources/sites within the City. Coordination efforts include receiving information on proposed 1200-Z permits, commenting on proposed permits, and meeting periodically with DEQ on coordination efforts.

In addition, surveys are sent to applicable business classes (restaurants, metal finishers/platers, radiator shops, dry cleaners, printing shops, photo processors, etc.) as part of the industrial pretreatment program for wastewater. Customers are surveyed regarding major onsite activities to identify potential locations for public education, future sampling, and tracking down illicit discharges.

ES continues to communicate with the City's industrial users through a variety of materials and means. This activity is principally associated with the City's wastewater Pretreatment Program but is used as a vehicle to address stormwater-related issues as well.

The City's NPDES permit requirements for the IC Program are listed in the BMP reference matrix in Appendix A.

The following table provides a description, implementation schedule, measurable goals, annual tracking measures, and TMDL pollutants addressed for each IC Program BMP. Measurable goals and tracking measures will be evaluated annually to assess the impact of the BMPs and to inform future BMPs for the industrial and commercial facilities program.

Table 2-7. Industrial and Commercial Facilities BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
IC-1. Industrial and Commercial Strategy (Previously IND1-1, IND1-2, IND1-3, IND1-4)	**Responsible Party:** Public Works Department (Environmental Services) **Implementation Schedule:** 2023 **BMP Description:** The Industrial/Commercial Facilities strategy has been updated as part of this SWMP update. The strategy includes a revised process to review new and existing businesses to identify those with increased stormwater pollution potential. The strategy includes procedures for site inspections, documentation, site operator education, and follow-up processes. Conduct reviews to identify facilities that could be subject to the 1200-Z industrial stormwater general permit and other facilities that have the potential to contribute a significant pollutant load to the MS4. Notify facility owners and DEQ of 1200-Z permit potential. Maintain a database of industrial and commercial facilities with the potential for increased stormwater pollution based on the activities at the specific facility. **Reference Documents:** Industrial/Commercial Facilities Strategy	• Update Industrial/Commercial Facilities strategy with revised facility screening strategy, inspection processes, and documentation procedures by November 1, 2023. • Develop database of industrial and commercial facilities with the potential for increased stormwater pollution.	• Status of updated Industrial/Commercial Facilities Strategy. • Number of facilities referred for 1200-Z permits.	✓ TSS ✓ Mercury
IC-2. Industrial and Commercial Site Inspections (Previously IND1-1, IND1-2)	**Responsible Party:** Public Works Department (Environmental Services) **Implementation Schedule:** Ongoing **BMP Description:** Conduct inspections of high priority businesses identified through the industrial/commercial facility screening program. During site inspections, review onsite stormwater systems, pollution prevention measures, material transport and storage, and waste disposal. Document facility inspections using the procedures in the Industrial/Commercial Facilities Strategy. Meet with site operators to discuss findings from the inspections, provide site operator education, require corrective actions (if needed) and schedule follow-up inspections (if needed) to review corrections. **Reference Documents:** Industrial/Commercial Facilities Strategy	• Inspect stormwater systems during inspections of City-permitted wastewater users. • Document facility inspections, site operator meetings, and corrective actions.	• Number of industrial/commercial stormwater inspections. • Number of corrective actions identified through industrial and commercial site inspections.	✓ TSS ✓ Mercury

2.8 Stormwater Program Implementation (SP)

Stormwater Program Implementation Program (SP Program) activities are those that impact the City's overall stormwater program planning, organization and compliance with the NPDES MS4 permit. The City has numerous personnel that work on programs and activities related to stormwater. The SP Program includes BMPs for staff training and intergovernmental coordination. Coordination currently occurs informally across departments, divisions, and sections as needed to share information and resources.

Stormwater program implementation also includes the activities conducted to assess the City's progress in pollution prevention and water quality treatment. This includes BMPs for long term planning of stormwater capital projects, assessment of retrofit and hydromodification plans, and stormwater monitoring.

SP Program funding is currently received through a stormwater utility, revenue bonds, grants, and a Stormwater System Development Charge (SDC). The City reviews the SDC methodology and utility funding in conjunction with stormwater master planning efforts. In addition, the City continues to identify and pursue external grant opportunities for program development and stormwater capitol projects, including potential retrofit and LID project opportunities.

The BMPs for SP program implementation relate to a wide range of NPDES permit requirements, as shown in the BMP reference matrix in Appendix A to this SWMP document.

The City's planning-related BMPs are outlined in Table 2-8. This table includes a description, implementation schedule, measurable goals, annual tracking measures, and a list of TMDL pollutants addressed for each SP Program BMP. Measurable goals and tracking measures will be evaluated annually to assess the impact of the BMPs and to inform future training and planning activities.

Table 2-8. Stormwater Program Implementation BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
SP-1. Intergovernmental Coordination (Previously RC1-6, RC1-8)	**Responsible Party:** Public Works Department **Implementation Schedule:** Ongoing **BMP Description:** Work with Marion and Polk Counties and the City of Keizer (Salem/Keizer Area Planning Advisory Committee or SKAPAC) to coordinate stormwater management programs and activities within the greater Salem-Keizer urban growth boundary. Continue to be an active member of the Oregon Association of Clean Water Agencies (ACWA) and share materials with other members to assist with stormwater program implementation.	• Continue participation with SKAPAC based on current group coordination level. • Attend ACWA committee meetings and workshops as scheduled.	• Report on updates to SKAPAC Agreement and other inter governmental agreements (IGAs) • Document participation in ACWA committee meetings	
SP-2. Retrofit Progress Report (New BMP)	**Responsible Party:** Public Works Department (Stormwater Quality, Engineering) **Implementation Schedule:** 2023 **BMP Description:** Document projects from the City's 2014 Stormwater Retrofit Plan that have been completed since the report publication. Document additional structural stormwater projects that have incorporated elements to retrofit the stormwater system for increased water quality treatment. Calculate total drainage area with increased water quality treatment from retrofit projects. Identify new goals, tools, priorities, or potential projects. Prepare a written assessment of the City's retrofit progress and outcomes and submit to DEQ.	• Complete Retrofit Progress Report by November 1, 2023.	• Status of completing Retrofit Progress Report	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature
SP-3. Hydromodification Progress Report (New BMP)	**Responsible Party:** Public Works Department (Stormwater Quality, Engineering, Development Services) **Implementation Schedule:** 2023 **BMP Description:** Develop a Hydromodification Progress Report to document projects and actions from the City's Hydromodification Assessment Report that have been started or completed since the report publication. Identify new goals, tools, priorities, or potential projects to address hydromodification. Prepare a written assessment of the City's hydromodification progress and outcomes and submit to DEQ.	• Complete Hydromodification Progress Report by November 1, 2023.	• Status of completing Hydromodification Progress Report	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

Table 2-8. Stormwater Program Implementation BMPs

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed
SP-4. Permit Renewal Package (New BMP)	**Responsible Party:** Public Works Department (Stormwater Quality) **Implementation Schedule:** Due by March 30, 2025 **BMP Description:** NPDES MS4 permits extend over a 5-year period, unless the permit is administratively extended by DEQ. Each permit builds off the work accomplished in the previous permit cycle as well as providing specific items to address. Prior to the permit expiration, the City develops a permit renewal application. The application includes each of the elements listed in permit Schedule B.4, including: • 303(d) evaluation • TMDL Pollutant Load Reduction Evaluation • Proposed TMDL Benchmarks • Proposed changes to the monitoring program • Documentation of service area expansions in 2025 • A fiscal evaluation in 2025 • Updated MS4 maps in 2025	• Develop and submit permit renewal application to DEQ by March 30, 2025 (or alternate date determined by DEQ)	• Status of completing permit renewal application	✓
SP-5. Implement Stormwater CIP (Previously RC 1-7, RC 2-1, RC 2-2, RC 2-3)	**Responsible Parties:** Public Works Department (Engineering) **Implementation Schedule:** Ongoing **BMP Description: The Capital Improvement Plan (CIP) is a five-year forecast that identifies major (capital) projects requiring the use of public funds over and above routine annual operating expenses. A CIP creates, improves, replaces, repairs or permanently adds to City assets including utility improvements.** Basin Plans identify integrated water quality capital improvement projects including on-site facilities, stream restoration projects, and other specific smaller scale improvements. In addition, the 2014 Retrofit Plan identified water quality projects in conjunction with scheduled capital improvement projects in the current Capital Improvement Program (CIP). The City will continue to implement stormwater projects (including stormwater conveyance, quantity, quality, and stream/habitat improvements) based on priorities established under the current CIP, the Retrofit Plan, and Basin Plans consistent with available funding. During implementation, the City will continue to acquire resource permitting and physical access/easements for public and private stormwater facilities.	• Review, prioritize, and budget for identified capital improvement projects annually. • Implement capital improvement projects based on prioritization and available funding.	• Confirm stormwater capital projects included in annual CIP budget • Number and description of completed capital improvement projects related to stormwater and water quality	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature

Appendix A: BMP Reference Table

Cross-reference of NPDES MS4 Permit Requirements and City of Salem activities

BMP Cross Reference Table

NPDES MS4 Permit Requirements (Schedule A.3)	City's Applicable BMPs																															
	EO-1. MS4 Staff Training	EO-1. Public Education and Outreach	PI-1. Stormwater Program Website	PI-2. Watershed Grants	PI-3. Adopt-a-Street Program	PI-4. Adopt-a-Stream Program	PI-5. Storm Drain Marking Program	PI-6. Volunteer Green Infrastructure Cleaning Program	IL-1. Spill Prevention and Response	IL-2. Illicit Discharge Detection and Elimination Program	IL-3. Stream Crew Program (Dry Weather Screening and IDDE)	EC-1. Erosion Control Requirements	EC-2. ESC Plan Review	EC-3. Erosion Control Inspections	EC-4. Training for Construction Site Operators	PC-1. Post Construction Design Standards	PC-2. LID/GSI Strategy	PC-3. Development Review for Stormwater	OM-1. Asset Management and System-Wide Mapping	OM-2. Public Stormwater Facility Inspection and Maintenance Program	OM-3. Private Stormwater Facility Inspection and Maintenance Program	OM-4. Conveyance System Inspection and Cleaning	OM-5. Street Sweeping and Debris Control	OM-6. Winter Road Maintenance	OM-7. Integrated Pest Management Procedures	OM-8. Pollution Prevention for Operations	IC-1. Industrial and Commercial Strategy	IC-2. Industrial and Commercial Site Inspections	SP-1. Intergovernmental Coordination	SP-2. Retrofit Progress Report	SP-3. Hydromodification Progress Report	SP-4. Permit Renewal Package	SP-5. Implement Stormwater CIP
A.3.a.i Education and Outreach Program	X	X																														
A.3.a.ii Stormwater Education Activities		X													X																	
A.3.a.iii Priority Audiences and Topics		X													X																	
A.3.a.iv Tracking and Assessment	X	X																														
A.3.b.i Publicly Accessible Website			X																													
A.3.b.ii Stewardship Opportunity				X	X	X	X	X																								
A.3.b.iii Tracking and Assessment				X	X	X	X	X																								
A.3.c.i MS4 Map										X	X								X	X	X	X										
A.3.c.ii Ordinance and/or Other Regulatory Mechanisms	***The City has code in place to meet the permit requirements. Therefore, a BMP is not needed to address this requirement.***																															
A.3.c.iii Enforcement Procedures										X																						
A.3.c.iv Program to Detect and Eliminate Illicit Discharges							X		X	X	X																					
A.3.c.v Dry Weather Screening Program											X																					
A.3.c.vi Illicit Discharge Detection and Elimination Training and Education	X																															
A.3.c.vii Tracking and Assessment	X								X	X	X								X													
A.3.d.i Ordinance and/or Other Regulatory Mechanism												X																				
A.3.d.ii Erosion and Sediment Control Plans												X	X																			
A.3.d.iii Erosion and Sediment Control Plan Review													X																			
A.3.d.iv Construction Site Inspections														X																		
A.3.d.v Enforcement Procedures												X		X																		
A.3.d.vi Construction Runoff Control Training and Education	X														X																	
A.3.d.vii Tracking and Assessment	X												X	X	X																	
A.3.e.i Ordinance and/or Other Regulatory Mechanism																X																
A.3.e.ii Prioritization of Low Impact Development and Green Infrastructure																	X															
A.3.e.iii Post Construction Stormwater Management Requirements																X		X														
A.3.e.iv Water Quality Benefit Offset Program																X		X														
A.3.e.v Post-Construction Site Runoff Plan Review																		X														
A.3.e.vi Long Term Operation and Maintenance								X											X	X	X											
A.3.e.vii Training and Education	X																															
A.3.e.viii Tracking and Assessment	X															X	X	X	X	X	X											

BMP Cross Reference Table

NPDES MS4 Permit Requirements (Schedule A.3)	City's Applicable BMPs																															
	EO-1. MS4 Staff Training	EO-1. Public Education and Outreach	PI-1. Stormwater Program Website	PI-2. Watershed Grants	PI-3. Adopt-a-Street Program	PI-4. Adopt-a-Stream Program	PI-5. Storm Drain Marking Program	PI-6. Volunteer Green Infrastructure Cleaning Program	IL-1. Spill Prevention and Response	IL-2. Illicit Discharge Detection and Elimination Program	IL-3. Stream Crew Program (Dry Weather Screening and IDDE)	EC-1. Erosion Control Requirements	EC-2. ESC Plan Review	EC-3. Erosion Control Inspections	EC-4. Training for Construction Site Operators	PC-1. Post Construction Design Standards	PC-2. LID/GSI Strategy	PC-3. Development Review for Stormwater	OM-1. Asset Management and System-Wide Mapping	OM-2. Public Stormwater Facility Inspection and Maintenance Program	OM-3. Private Stormwater Facility Inspection and Maintenance Program	OM-4. Conveyance System Inspection and Cleaning	OM-5. Street Sweeping and Debris Control	OM-6. Winter Road Maintenance	OM-7. Integrated Pest Management Procedures	OM-8. Pollution Prevention for Operations	IC-1. Industrial and Commercial Strategy	IC-2. Industrial and Commercial Site Inspections	SP-1. Intergovernmental Coordination	SP-2. Retrofit Progress Report	SP-3. Hydromodification Progress Report	SP-4. Permit Renewal Package	SP-5. Implement Stormwater CIP
A.3.f.i Operation and Maintenance for Existing Controls								X											X	X	X											
A.3.f.ii Inspection, Cleaning, and Maintenance of the MS4																			X			X										
A.3.f.iii Pollution Prevention in Facilities and Operations																							X	X	X	X						
A.3.f.iv Co-permittee owned NPDES Industrial Stormwater Permit Facilities	***The City maintains NPDES 1200-Z Permits for the Wastewater Treatment Plant and Salem Municpial Airport.***																															
A.3.f.v Winter Operations and Maintenance Program																								X								
A.3.f.vi Requirements for Pesticide and Fertilizer Application																									X							
A.3.f.vii Litter Control					X	X					X												X									
A.3.f.viii Materials Disposal																							X									
A.3.f.ix Flood Control, Transportation, and Other Infrastructure																																X
A.3.f.x Operations and Maintenance Staff Training	X																									X						
A.3.f.xi Tracking and Assessment	X																		X	X	X	X	X	X	X	X						
A.3.g.i Screening for Industrial Stormwater Permitting																											X					
A.3.g.ii Strategy to Reduce Pollutants from Industrial and Commercial Facilities																											X	X				
A.3.g.iii Commercial and Industrial Facility Inspection Staff Training	X																															
A.3.g.iv Tracking and Assessment	X																										X	X				
A.3.h Infrastructure Retrofit and Hydromodification Assessment Update																														X	X		X

Appendix B: MS4 Staff Training Plan

Municipal Staff MS4 Training Strategy

Prepared: July 2022

Last Update: September 2022

Overview

This document presents the City of Salem's multi-year and multi-topic training strategy to address storm-water education for municipal staff. The City's 2021 NPDES MS4 Permit requires training for municipal staff in several stormwater-related areas. In general, new staff will be trained in the duties of their position upon hire. Existing staff will be trained in the duties of their position on an annual basis. All staff will be trained on updated or changed procedures throughout the permit term, as those changes or updates occur.

This strategy covers training in the following categories:

- Illicit discharge detection and elimination
- Erosion and sediment control for construction sites
- Post construction stormwater management
- Operations and maintenance of stormwater management facilities
- Stormwater pollution prevention for municipal facilities and operations
- Industrial and commercial facilities

The following table outlines the City's strategy for conducting the required stormwater training for municipal staff. This strategy is specific to NPDES MS4 Permit requirements. City staff participate in trainings for topics and programs beyond those listed in this strategy, including field safety training and equipment training.

Table 1. Municipal Staff Training Strategy						
Category	**NPDES MS4 Permit Reference**	**Stormwater Training Topic**	**Target Groups**	**Frequency**	**Potential Resources**	**Notes**
Illicit Discharge Detection and Elimination	A.3.c.vi	Identifying and reporting illicit discharges (including procedures for enforcement and follow-up actions)	Municipal field staff Staff that respond to illicit discharges (Environmental Services) Code enforcement	Annually	Online training Internal training based on City's IDDE response SOP	
		Dry weather screening procedures, documentation, reporting, and follow-up actions	Stormwater Quality staff that conduct dry weather screenings	Annually	Internal training based on City's Dry weather screening SOP	Provide training each spring or summer, prior to commencing the dry weather screening program
Erosion and Sediment Control	A.3.d.vi	Best practices and new technologies for erosion prevention and sediment control	Engineering staff ESC site inspectors	At minimum, once in permit term	Online training Vendor provided training	
		Construction site ESC inspection processes and documentation procedures (including violations enforcement processes)	ESC site inspectors	At minimum, once in permit term	Internal training based on City's ESC process SOP or inspection checklist	
Post Construction Stormwater Management	A.3.e.vii	Proposed or adopted changes to stormwater design standards and stormwater related land use policies.	Engineering staff Development Services Staff involved with plan review and approval Planning/Community Development staff involved with land use reviews and approvals Site inspectors Field operations staff responsible for maintaining stormwater management facilities	Once in permit term	Internal training	Training should be conducted during development (or following adoption) of new or updated stormwater design standards or stormwater related land use policies

Table 1. Municipal Staff Training Strategy						
Category	**NPDES MS4 Permit Reference**	**Stormwater Training Topic**	**Target Groups**	**Frequency**	**Potential Resources**	**Notes**
		City site inspection processes and documentation procedures (including violations enforcement processes)	Site inspectors	At minimum, once in permit term	Internal training based on City's site inspection SOP or inspection checklist	
Operations and Maintenance of Stormwater Management Facilities	A.3.e.vii A.3.f.x	Operation and maintenance best practices for stormwater management facilities	Field operations staff responsible for maintaining stormwater management facilities Private facility inspectors Public facility inspectors Site Inspectors Engineering staff Development Services Staff involved with plan review and approval	Annually for field operations staff and private/public facility inspectors, at minimum once in permit term for all others	Online training Joint agency workshop or professional group presentation Vendor training	Training is required under two different permit elements.
Stormwater Pollution Prevention for Municipal Facilities and Operations	A.3.f.x	Inspection, cleaning, and documentation/tracking procedures for MS4 related structures (catch basins, storm drains inlets, pipes)	Field operations staff	Annually	Internal training based on City's SOP and schedule for MS4 maintenance	Training should be conducted after development of the revised CB inspection and cleaning schedule.
		Stormwater pollution prevention and good housekeeping practices for field operations	Field operations staff Facility inspectors Parks landscaping staff Facility landscaping staff Site inspectors ESC site inspectors Engineering staff Development services staff	Annually	Internal training based on City's municipal pollution prevention plan or SOPs	Conduct in 2024, after update to municipal pollution prevention plan Opportunity to offer training for staff from franchise utilities or other groups that conduct field operations in the City.

Table 1. Municipal Staff Training Strategy						
Category	NPDES MS4 Permit Reference	Stormwater Training Topic	Target Groups	Frequency	Potential Resources	Notes
		Construction Waste Processing Facility special waste management plan and best practices	Field operations staff that utilize Construction Waste Processing and Transfer Facility	Once in permit term	Internal training based on the City's Special Waste Management Plan	
		Integrated pest management and proper application of pesticides and fertilizers	Parks staff Facilities landscaping staff Field operations staff	At minimum, once in permit term	Online training External training	
Industrial and Commercial Facilities		Industrial/Commercial facility inspection procedures (including	Environmental Services staff	Once in permit term	Internal training based on the City's Industrial and Commercial Facilities Strategy	Training should be conducted after the City reviews and updates the Industrial and Commercial Facilities Strategy

Appendix C: Public Education and Outreach Strategy

Public Outreach, Education, and Involvement Program Strategy

Applicable Permit requirements: A.3. a. i -A3.b.ii

The following This matrix identifies Pollutants of Concern, Priority Audiences, Education/Outreach Activities, Responsible Party and Pollution Reduction, and Topics as defined in the NPDES MS4 Permit in Schedule A.3. a. ii - iv, and Stewardship Opportunities as defined in Schedule A.3.b.ii. The matrix includes current programs and possible future programs that may be developed during the 5-year permit cycle. Each outreach category also includes the City's Program Elements to which outreach is related and general Tracking Measures and Potential Outreach Partners. This matrix serves as the foundation for developing and implementing more specific annual goals and tracking measures for the City's stormwater public outreach, involvement, and education. The City will also produce an outreach summary for each annual report to document the activities completed each year.

Topic Areas:

1. Impacts of illicit discharges on receiving waters and how to report them (IDDE ES Staff)
2. Appropriate practices or techniques to avoid adverse water quality impacts due to impervious surfaces
3. BMPs for proper use, application, storage, and disposal of pesticides, herbicides, fertilizers, and other household chemicals
4. BMPs to avoid or reduce discharge of litter and trash to the MS4 or surface litter
5. BMPs for recycling programs
6. BMPs to avoid discharges from power washing, carpet cleaning, and auto repair and maintenance
7. Low-impact development and green infrastructure approaches
8. Watershed awareness education, including how storm drains lead to local creeks and rivers, and potential impacts to fish and other wildlife
9. Operation & Maintenance practices for privately owned stormwater quality management facilities
10. Construction site control measures and BMPs, including information on where in-depth training on erosion prevention and sediment control can be obtained

Priority Audiences:

A. General public (e.g., renters, homeowners, homeowner associations, youth, and other groups):
B. Local elected officials, land use planners, engineers, developers, and/or employees of the permittee responsible for implementing the SWMP, as appropriate: (Also see attachment A for internal employee training):
C. Construction site operators (See Schedule A.3.iii.B.10 below):
D. Businesses (including industrial and commercial facilities):
E. Any other groups/entities as appropriate:

Public Outreach, Education, and Involvement Program Matrix

Pollutants of Concern	Priority Audiences	Program Element	Education/Outreach Activities (Messaging Methods)	Responsible Party	General Tracking Measures	Potential Outreach Partners
E. coli *Source: pet waste* *Topics Addressed: 2,4* *Priority Audience: A*	• Dog/pet owners • Park staff and patrons • Streamside pet owners • Youth	• Capital Canine Club • Pick up after pet park signs • WE Pledge	• Print materials (flyers, WE pledge, Clean Streams activity book) • Electronic materials (e' newsletters, website, social media) • Mass Media (radio) • In-person outreach (events)	Clean Streams Marketing and Outreach Analyst Park Ranger	• # of new Capital Canine Club pledges per year • # of promotions of programs per year and reach, if applicable	City of Salem Parks and volunteers Oregon Humane Society, Salem Campus Marion Co. Dog Control Mid-Willamette Outreach Group Vets Pet Retailers

Pollutants of Concern	Priority Audiences	Program Element	Education/Outreach Activities (Messaging Methods)	Responsible Party	General Tracking Measures	Potential Outreach Partners
Turbidity *Source: erosion of soils* *Topics Addressed: 1, 10* *Priority Audience: A, B, C* ***Stewardship Opportunity: Riparian Restoration***	• Creekside homeowners • City EPSC permittees • Contractors • Engineers • Inspectors • City managers & field staff	• Landscape for Clean Streams • WE Pledge • Streamside site visits • Erosion Control and Stormwater Management Summit • Stream Crew Restoration*	• Print material (brochure, WE pledge, flyer) • Electronic materials (website, social media, Summit registration) • Mass Media (radio) • In- person: Streamside site visits • Training: Erosion Control and Stormwater Management Summit	Clean Streams Marketing and Outreach Analyst Urban Streamside Program Coordinator	• # of promotions of programs per year and reach, if applicable • # erosion calls and follow up visits • # of Summit attendees	Development Services Mid-Willamette Outreach Group Marion and Polk SWCDs Oregon DEQ Watershed Councils
Household Waste *Source: residential neighborhoods* *Topics Addressed: 2,3,4,5,7* *Priority Audience: A, D* ***Stewardship Opportunity: Fall Leaf Haul***	• General Public • Apartment managers/owners • Box retailers, garden centers, pool supply stores, other places that sell “harsher” chemicals. • Landscape companies • Youth	• Waste Reduction • WE Pledge • Marion County Recycling Support • Fall Leaf Haul	• Print material (brochures, WE pledge, activity book, flyer) • Electronic (website, social media, e’ newsletter) • Mass media (radio) • Event (Fall Leaf Haul)	Clean Streams Marketing and Outreach Analyst Signs and Sweeping Project Leader	• # of promotions of programs per year and reach, if applicable • Amount of debris collected at Leaf Haul event	Clean Rivers Coalition Marion County Environmental Services OSU Extension--Marion & Polk County Master Gardeners Local Garbage Haulers
Illicit Discharges *Source: industry, business, and general public* *Topics Addressed: 1,4,8* *Priority Audience: A, D* ***Stewardship Opportunity: Storm Drain Marking***	• General public • Streamside businesses/residents • Restaurants • Carpet cleaners** • Painters** • Mobile pet groomers** • RV dumping**	• Storm Drain Marking “Drains to Stream” • WE Pledge	• Print material (Annual streamside mailer, WE pledge, flyer) • Electronic (website, social media, e’ newsletter) • Mass media (radio) • Site visits • In-person outreach (events)	Environmental Services Clean Streams Marketing and Outreach Analyst	• # of drains marked per year • # of promotions of programs per year and reach, if applicable	Stream Crew Environmental Services Businesses community/organizations
Garbage *Source: residential neighborhoods* *Topics Addressed 2,3,4* *Priority Audience: A, D* ***Stewardship Opportunity: Adopt-A-Street River Cleanups***	• General public • Apartment managers (trash area management plans instead of roof over garbage) • Schools	• Adopt-A-Street • Watershed Enhancement (WE) Pledge • Willamette River and Streamside Cleanups	• Print material (WE pledge) • Electronic (website, e’ newsletter, social media) • Mass media (radio) • In-person events (school presentations, Stream Symposium, River Cleanups)	Signs and Sweeping Supervisor Clean Streams Marketing and Outreach Analyst Urban Streamside Program Coordinator	• # of promotions of programs per year and reach, if applicable • # of clean up events and volunteer # • Symposium audience reach	Mid-Willamette Outreach Group Willamette Riverkeeper Local Garbage Haulers Solve Watershed councils Salem Community Action Team
Industrial Stormwater *Source: industry and business* *Topics Addressed: 1,2,9* *Priority Audience: D*	• Permit holders • Non-permitted industries (paint stores, cannabis growers) **	• Plan Review Process	• Site visits • Plan Reviews Accidental Spill Prevention Plan • Waste Management Plan	Environmental Services	• Number of plans reviewed/approved • Number of ASPPs received • WMPs received	

Pollutants of Concern	Priority Audiences	Program Element	Education/Outreach Activities (Messaging Methods)	Responsible Party	General Tracking Measures	Potential Outreach Partners
Dissolved Oxygen *Source: organic material, temperature, and turbidity* *Topics Addressed: 2,7,8* *Priority Audience: A, B, D*	• Streamside property owners • Landscapers • On-street carwashes	• Free Tree and Shrub for streamside properties • Landscape for Clean Streams • Stream-Friendly Car Care	• Print materials (postcard, flyer, brochure) • Electronic materials (website, e-newsletter, social media)	Clean Streams Marketing and Outreach Analyst Urban Streamside Program Coordinator	• # of promotions of programs per year and reach, if applicable	Nurseries Commercial Carwash Companies Parks Staff Marion & Polk Soil and Water Conservation Districts
Toxins: Copper / Lead / Zinc / Chromium *Source: street runoff, rooftops, gutters, electronics waste* *Topics/Activities Addressed: 2,3,5,7,9* *Priority Audience: A, B* ***Stewardship Opportunity: Volunteer Car Wash***	• Property owners • City staff	• Rain Garden info Native Plant info • Green Infrastructure Community Maintenance • Clean Streams Mechanic	• Print materials (rack card, flyer, activity book, brochure) • Electronic materials (website, e-newsletter, social media)	Clean Streams Marketing and Outreach Analyst GSI Program Coordinator	• # of promotions of programs per year and reach, if applicable	Commercial Carwash Companies Neighborhood Associations
Pesticides *Source: past use of insecticides and current agricultural practices, residential neighborhoods* *Topics Addressed: 1,2,3,9* *Priority Audience: A, B, D* ***Stewardship Opportunity: Green Infrastructure Volunteers (proposed for 2024)*******	• General public • City staff • Landscapers	• Mayor's Monarch Pledge • City IPM Plan • WE Pledge • Grow Healthy Lawns • Follow the Water, What's Your Lawn Style	• Print materials (rack card) • Electronic materials (website, e-newsletter, social media) • In-person outreach (events)	Clean Streams Marketing and Outreach Analyst IPM Coordinator Natural Resources Specialist	• # of promotions of programs per year and reach, if applicable • Number of pollinator gardens planted in parks	Clean Rivers Coalition Nurseries Parks Staff Natural Resources Staff Marion & Polk Soil and Water Conservation Districts
Mercury *Source: soil erosion, improper disposal of Hg products, coal-burning energy sources* *Topics Addressed: 2, 3, 4* *Priority Audience: A, C*	• Streamside property owners • Drivers • Auto repair • General public -mercury-containing items • Contractors and developers	• Free Tree and Shrub for streamside properties • Landscape for Clean Streams • Stream-Friendly Car Care • Erosion Control and Stormwater Management Summit • Marion County Disposal Support • Climate Action Plan#	• Print materials (postcard, brochure, flyer) • Electronic materials (website, e-newsletter, social media)	Clean Streams Marketing and Outreach Analyst Urban Streamside Program Coordinator CAP Coordinator	• # of promotions of programs per year and reach, if applicable	Marion County Marion & Polk Soil and Water Conservation Districts Watershed Councils

Pollutants of Concern	Priority Audiences	Program Element	Education/Outreach Activities (Messaging Methods)	Responsible Party	General Tracking Measures	Potential Outreach Partners
Nutrients *Source: agriculture, residential neighborhoods* *Topics Addressed: 2,3,9* *Priority Audience: A, D*	• Property Owners • Landscapers	• Landscape for Clean Streams	• Print materials (flyer) • Electronic materials (website, e-newsletter, social media) • Mass media (radio)	Clean Streams Marketing and Outreach Analyst	• # of promotions of programs per year and reach, if applicable	Marion & Polk Soil and Water Conservation Districts Watershed Councils
Temperature *TMDL: Not a Stormwater Pollutant*	• Streamside Residents	• Free Tree and Shrub Program • Watershed Grant Program • Riparian Restoration • Streambank Stabilization • Backyard Buffer Program	• Print materials (Annual mailer, letters, brochure, postcard) • Electronic materials (website, e' newsletter, online meetings) • Mass media (radio) • In-person (planting events, site visits)	Urban Streamside Program Coordinator Clean Streams Marketing and Outreach Analyst	• # of promotions of programs per year and reach, if applicable • # free trees provided • # watershed grants applied for and approved. • Completion of streambank project • Development of buffer program	Friends of Trees Marion & Polk Soil and Water Conservation Districts

** When feasible, interested neighbors can assist with the stream crew restoration project.*
*** Potential for new campaign during permit cycle.*
 # The Climate Action Plan has many energy-reduction strategies identified that when employed will help reduce mercury emissions.

ATTACHMENT 6: SURFACE WATER AND STORWMATER MONITORING PLAN

City of Salem

National Pollutant Discharge Elimination System (NPDES)

Municipal Separate Storm Sewer System (MS4)

Surface Water and Stormwater Monitoring Plan

Prepared by: City Salem Public Works

Stormwater Services

September 19, 2022

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Introduction and Purpose

As a condition of its Oregon Department of Environmental Quality (DEQ) issued National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit, issued September 15, 2021, the City of Salem developed this "Surface Water and Stormwater Monitoring Plan", which implements the monitoring elements identified in Schedule B of the permit.

Data collected through the implementation of this monitoring plan will undergo review and analysis before becoming integral components of both the Annual Reporting and Permit Renewal process. Statistical summaries of monitoring data will assist the City in an ongoing assessment of the effectiveness of the Best Management Practices (BMPs) that have been identified in the City's Stormwater Management Program (SWMP) Document. The City will ultimately utilize the collected data to evaluate and adaptively manage its Stormwater Management Program, thereby limiting pollutants entering receiving streams from the MS4 to the Maximum Extent Practicable (MEP). The long-term goal of this monitoring plan is to maintain permit compliance while providing high quality data to assist in decision-making and the adaptive management process.

1.2 Monitoring Plan Requirements

The requirements of this monitoring plan are detailed in Schedule B of the City's NPDES MS4 permit, including the requirement to incorporate the specific monitoring objectives found in Schedule B.1.a. These monitoring objectives include:

i. Evaluate the source(s) of and means for reducing the pollutants of concern applicable to the permittee's permit area, including 2018/2020 303(d) listed pollutants, as applicable;
ii. Evaluate the effectiveness of Best Management Practices (BMPs) in order to help determine BMP implementation priorities;
iii. Characterize stormwater based on land use type, seasonality, geography or other catchment characteristics;
iv. Evaluate status and long-term trends in receiving waters associated with MS4 stormwater discharges;
v. Assess the chemical, biological, and physical effects of MS4 stormwater discharges on receiving waters; and,
vi. Assess progress towards reducing TMDL pollutant loads.

This monitoring plan describes six different environmental monitoring elements the City will utilize (along with programmatic monitoring elements identified in the City's Stormwater Management Plan, historical monitoring data, stormwater modeling, national stormwater monitoring data, and/or literature reviews) to address the above objectives. The environmental monitoring elements described in this plan have been divided into either storm event dependent or non-storm event dependent. Environmental monitoring elements include:

Storm Event Dependent Monitoring Elements

1. Instream Storm monitoring (section 2.1)
2. Stormwater and Structural BMP monitoring (section 2.2)

3. Stormwater Pesticide Monitoring (section 2.3)

Non-Storm Event Dependent Monitoring Elements

4. Continuous Instream monitoring (section 3.1)
5. Monthly Instream monitoring (section 3.2)
6. Macroinvertebrate monitoring (section 3.3)

The City will implement these monitoring elements during the newly issued NPDES MS4 permit term, which expires September 30, 2026.

Additionally, the permit requires that the following information is provided for the above monitoring elements:

- Project/task organization
- Monitoring objectives, including monitoring question and background
- Documentation and record-keeping procedures;
- Monitoring process/study design, including monitoring location, description of sampling event or storm selection criteria, monitoring frequency and duration, and responsible sampling coordinator;
- Sample collection methods and handling/custody procedures;
- Analytical methods for each water quality parameter to be analyzed;
- Quality control procedures, including quality assurance, the testing, inspection, maintenance, calibration of instrumentation and equipment;
- Data management, review, validation, and verification; and,
- Data analysis methodology and quality criteria, and assumptions and rationale.

1.2.1 Adaptive Management

To maintain permit compliance an adaptive management process needs to be implemented annually and at the time of permit renewal. This process is used to assess and modify the City's SWMP Document, prioritize structural BMP retrofit projects including treatment strategies, and identify potential changes to construction design standards in ways that help remove stormwater pollutants to the maximum extent practicable. The City will utilize programmatic data to aid in the analyses of the data collected through this plan. Examples of programmatic data that may be used for analyses of the environmental data include, but are not limited to: structural BMP inspections and maintenance activities, outreach strategies, street sweeping schedule, catch basin cleaning, etc. The implementation of this monitoring plan and performing routine analyses of the data collected will directly aid the City in the adaptive management process.

If at any point the city needs to modify this monitoring plan for adaptive management purposes or other unforeseen conditions, changes to the monitoring plan along with notification to the DEQ will be done in accordance with NPDES MS4 permit Schedule B.1.c.vi.

Annual Reporting

To help facilitate using the data collected through this monitoring plan for adaptive management purposes the data needs to be analyzed on an annual basis. Analysis completed annually will include, at a minimum, a review of all data collected looking for outliers, identifying receiving waterbody water quality exceedances, and identification of improving or deteriorating trends on a small temporal scale that could indicate the presence of discharges that could potentially require follow-up through the City's Illicit Discharge Detection and Elimination

Program. Information on any exceedances or changing trends discovered during the review and analysis of data will be included with the Annual Report.

Permit Renewal

During the permit renewal application process, the City will evaluate the overall effectiveness of its Stormwater Management Program. The data collected through the implementation of this monitoring plan and the analyses performed will contribute to this assessment; thus supporting the adaptive management process.

1.2.2 Environmental Monitoring and Long-term Monitoring Program Strategy

There is a direct relationship between the environmental monitoring implemented through this monitoring plan and the long-term monitoring program strategy. The City was issued its first NPDES MS4 permit in 1997. One of the first monitoring objectives was to characterize stormwater discharges. To do this the City worked with other Phase 1 communities in Oregon and developed a range of event mean concentrations of stormwater pollutants based on land use types. These data have since been revised and are currently used as baseline data, i.e. representing stormwater discharge quality prior to implementation of the City's first SWMP. Since that time, the City's SWMP BMPs and environmental monitoring activities/elements have continued to evolve. This evolution has resulted in numerous changes to construction design standards, programmatic pollution control activities, changes in asset inspections, maintenance activities, outreach strategies, etc.

More specific information regarding the relationship between the current permit's monitoring approach and long-term monitoring strategy has been provided in each of the monitoring elements below.

2 Storm Event Based Monitoring Elements

Storm Criteria

The City of Salem has three monitoring elements: Instream Storm, Stormwater and Structural BMP, and Stormwater Pesticide Monitoring which require sample collection during storm events that meet specific storm criteria. These criteria include the following: a predicted rainfall depth of over 0.1", minimum antecedent dry period (defined by the permit as being the dry time before precipitation events that include less than 0.1 inches of precipitation) of 12 hours, lacking an intra-event dry period that exceeds 6 hours, and each sampling event for a specific monitoring element must be at least 72 hours apart.

Weather Forecasting Service

The City of Salem utilizes quantitative precipitation forecasts (QPF) from the National Weather Service and a private meteorological service. These QPFs are monitored throughout the year and are used to select storm events to sample, determine the flow interval quantities (FIQ) that are used for flow-paced storm sampling for Instream Storm sampling, and to create a schedule for grab and field measurement sample collection.

Storm Sampling Response Team

One of the City's two Stormwater Monitoring Analysts will act as the Responsible Sampling Coordinator (RSC) for each storm sampling event. This person will be responsible for coordinating with the laboratory, organizing the sampling teams, being the contact person for the private meteorological service, and ensuring that all sampling equipment is ready before the start of the storm event.

Once the decision has been made to sample a storm, the RSC will coordinate with Salem's Willow Lake Laboratory and Portland Water Pollution Control Laboratory (WPCL) to ensure there are not any personnel or material shortages that may compromise hold times or other analytical method requirements. Before the start of the storm event, the Storm Sampling Response Team will program and deploy portable samplers, prepare field instrumentation, inspect bottleware, field filtering equipment, gloves, etc., and print off field data collection and chain of custody forms. The City's private meteorological service will call the RSC to provide notification before the start of the storm event (typically one hour prior to the predicted start of the rainfall). This process is in place to ensure that the collection of grab samples and field measurements will start during the first few hours of the storm event. As the event progresses, the meteorological service will continue to provide updated QPFs to the RSC so that they can time all follow-up grab sampling for Stormwater and Structural BMP sampling times accordingly.

The City has four staff members available to collect samples during a storm event, all of whom are trained in the following:

- Calibration of field instruments and programming of automated samplers.
- Ensuring all field data sheets and chain of custody forms are filled out properly and completely.
- Ensuring that all grab and composite samples are collected, stored, and delivered to the laboratory in accordance with this monitoring plan and the applicable analytical methods.
- Ensuring that all appropriate traffic control measures and necessary personal protective equipment are used.
- Collection of Total Hg samples in adherence to EPA Method 1669 using clean hands/dirty hands handling procedures.

2.1 Instream Storm

2.1.1 Project / Task Organization

Instream Storm refers to the sampling of small MS4 receiving streams during storm events that are selected based on the criteria defined in section 2.0 above. The City's Stormwater Monitoring Analyst will serve as the RSC and Quality Assurance Officer for this monitoring element. The City's Stormwater Quality workgroup will calibrate field instruments, program mechanical samplers, perform sampling and collect field measurement data. The City's Willow Lake Laboratory and Portland's WPCL will perform all analytical laboratory analyses. Ongoing analyses of the data for abnormally large pollutant concentrations, annual reporting, and permit renewal will be completed by the Stormwater Monitoring Analyst(s).

2.1.2 Monitoring Objectives

There are over 90 miles of small streams that are identified as MS4 receiving waterbodies of Salem's MS4 discharges. This monitoring element was developed with the understanding that the data collected would represent stormwater-related impacts, not only for the streams specifically monitored, but for all other small streams that receive MS4 discharges in Salem.

Instream Storm monitoring will contribute to permit monitoring objectives i, ii, iv, v, and vi, as identified in Section 1.2 above.

2.1.2.1 Background

The Instream Storm monitoring element was implemented at the start of the last permit cycle (December 29, 2010). All monitoring sites associated with this monitoring element are within the Pringle Creek Watershed and are located at permanent continuous flow and water quality monitoring locations. This watershed was chosen because it is almost entirely within Salem's city limits, therefore limiting stressors and pollutant sources that are outside of the City's control and jurisdiction. Furthermore, the monitoring sites associated with this monitoring element represent similar land use and geography that is typical for numerous other small stream (1st through 3rd order) MS4 discharge receiving waterbodies within Salem.

Change Made for this Permit Term

One of the three monitoring sites for this monitoring element has changed for this permit cycle. The PRI12 site is located at the city boundary and represents the only portion of the Pringle Creek Watershed that is outside of Salem's city limits and City jurisdiction. This site was monitored from 2011 through 2021 and the water quality data collected during storm events for this site have been well characterized. However, future staff will want to consider recommencing instream storm monitoring at this site during future permit terms as more development and as annexation of the catchment area occurs.

For this permit term, the PRI12 site will be replaced by the CLK12 site. This change resulted from analyses of the data from the existing Instream Storm site on Clark Creek, CLK1. This analysis showed significantly higher concentrations of pollutants during storm events than at the Instream Storm sites on Pringle Creek. This resulted in the reallocation of resources towards additional monitoring of upper Clark Creek (CLK12 is upstream of CLK1) to help inform the City on the sources of pollutants and means to limit them within stormwater discharges. The CLK12 site, like all other sites sampled through this monitoring element, is located at a permanent continuous flow and water quality monitoring location.

2.1.3 Study Design / Sampling Process

2.1.3.1 Study Design

All sampling sites for this monitoring element are on small streams (i.e., all receiving streams in Salem except for the Willamette River, Mill Creek and Shelton Ditch). Monitoring these small streams during storm events was developed with the assumption that these data would represent water quality stressors related to the MS4 system for the streams monitored, and for other small stream receiving waterbodies in Salem.

The study design is a spatial layout of the three different sites that are to be monitored during storm events only. The name of each site, the receiving stream, and the location are included in Table 1 and are identified in Figure 1. Relevant characteristics for each site are as follows:

- **CLK12-** This site on Clark Creek is located approximately 175 feet from where the stream first daylights and upstream of the two sites listed below. The catchment area is entirely inside the city limits, is mostly built-out, and has limited stormwater structural BMP controls. The catchment is the smallest of the three sites at approximately 280 acres and is dominated by residential and land use.

- **CLK1-** This site on Clark Creek is located just above the confluence with Pringle Creek and represents an older portion of town. The majority of the catchment is built-out, is entirely inside the city limits, and has limited stormwater structural BMP controls. The catchment is approximately 1550 acres and is characterized predominately as residential land use with approximately 10% commercial land use.

- **PRI3-** This site on the main fork of Pringle Creek is located just before the confluence of Shelton Ditch with Pringle Creek and downstream of both sites listed above. This site represents a portion of the city with a larger percentage of catchment being treated by stormwater structural BMP controls. The catchment is approximately 8300 acres with over 90% of the total catchment being inside city limits. The breakdown of acres of residential, commercial, and industrial land use for the catchment area within the city is 3300, 350, and 1050 acres, respectively.

Table 1: Instream Storm Monitoring Sites

Site ID	Creek Name	Site Location	Aquarius Database Name
PRI3	Pringle Creek	Pringle Park	Instream3-PRI3
CLK12	Clark Creek	Ewald Ave SE	Instream4-CLK12
CLK1	Clark Creek	Bush Park	Instream3-CLK1

2.1.3.2 Frequency and Duration / Storm Selection Criteria

Instream Storm monitoring will be conducted during fifteen storm events at each of the three sites throughout the permit term. Each storm event will be chosen based on the following criteria:

- Storm event must be greater than 0.1 inch of rainfall;
- A minimum of 50% of the water quality sample events must be collected during the wet season (September 1 to April 30); and,
- Each unique sample event must occur at a minimum of 72 hours apart.

Although it is anticipated that fifteen samples from each of the three sites will be collected over the five-year permit term, unanticipated circumstances including, but not limited to, weather, personnel illness and turnover, vehicular malfunction, equipment malfunction, and various safety issues could prevent the collection of some of the samples. If such a situation arises, Oregon DEQ will be informed following notification procedures listed in the MS4 permit.

2.1.3.3 Sample Collection Method

Sample collection methods are parameter specific (see Table 2) and include grab samples, composited grab samples, in-situ field measurements, and flow-weighted compositesi. Samples will be collected directly from the stream where the water is well mixed and representative of the ambient conditions of the site's wetted perimeter.

Portable mechanical sampling units will be programmed to collect a flow-weighted composite sample. The flow-weighted composite sample will be comprised of 24 sample collection events over the runoff duration produced by the sampled storm. A spreadsheet model that utilizes the predicted precipitation depth for the storm event has been developed for each site. These models are used to determine the flow interval quantity (FIQ) that will be used to trigger the sampler to collect a sample. The result is a sample that is representative of an event mean concentration (EMC) for each parameter sampled with this collection method. The portable

sampling units will remain in the field until the program is completed or 24 hours from the start of the runoff event, whichever comes first.

Note, If stream gauging equipment fails and it is infeasible to repair equipment before a targeted storm event starts, a time-composite sample will be collected in lieu of a flow-paced sample.

Total Mercury samples will be collected in adherence to EPA Method 1669 sampling protocol and will be conducted by collecting grab samples with a target of three, throughout the storm duration, and then composited into a single representative sample.

A grab sample for E.Coli and all field parameters will be collected on the rising limb of the storm hydrograph.

The collection method for each Instream Storm parameter can be found in Table 2 below.

Table 2: Instream Storm Parameter List and Collection Method

Instream Storm Parameters	Collection Method
TSS	Portable Mechanical Sampler
BOD ('stream')	Portable Mechanical Sampler
Total Phosphorus	Portable Mechanical Sampler
Ortho-Phosphorus	Portable Mechanical Sampler
Nitrate+Nitrite as Nitrogen	Portable Mechanical Sampler
Total Kjeldahl Nitrogen	Portable Mechanical Sampler
Ammonia Nitrogen	Portable Mechanical Sampler
Copper (Total Recoverable & Dissolved)	Portable Mechanical Sampler
Lead (Total Recoverable & Dissolved)	Portable Mechanical Sampler
Zinc (Total Recoverable & Dissolved)	Portable Mechanical Sampler
Hardness	Portable Mechanical Sampler
Specific Conductivity	In-Situ and Portable Mechanical Sampler
Dissolved Oxygen	In-Situ (rising limb)
Temperature	In-Situ (rising limb)
pH	In-Situ (rising limb) and Portable Mechanical Sampler
Turbidity	In-Situ (rising limb) and Portable Mechanical Sampler
E. coli	Grab (rising limb)
Total Mercury	Grab (total of 3 grabs that are composited)
Total Alkalinity	Portable Mechanical Sampler
Dissolved Organic Carbon	Portable Mechanical Sampler

Note: BOD ('stream') analytical method is not identified in 40 CFR 136; however, this method has been identified as an acceptable method under schedule B.1.d.iii in the City's NPDES MS4 permit issued in 2010. Additionally, this parameter is not a current permit listed parameter; however, the City will continue to monitor this parameter to ensure the uninterrupted longevity of the data set.

2.1.4 Long-term Strategy

This monitoring element supports the long-term monitoring program strategy by providing environmental data that will contribute to understanding the relationship between the water quality of small receiving streams during MS4 discharge events and current nonstructural programmatic SWMP activities, as well as post-construction structural stormwater controls. The sites selected for sampling have catchments with differing amounts of impervious acres treated

by structural stormwater controls. Furthermore, the CLK12 site is small enough that potential changes to various nonstructural programmatic SWMP activities can be piloted in hopes that the data collected can be used as a guide for future SWMP revisions. Evaluating data by these catchment characteristics and/or programmatic efforts is intended to provide the City a basis to assess the aggregate effectiveness of structural and nonstructural stormwater controls. Which will, in turn, help the City prioritize available funds for retrofitting projects and programmatic efforts.

This monitoring element was first implemented during the last permit term, starting in June 2011 (when the City's monitoring plan was approved by DEQ), and it is expected that this element will continue beyond this permit term and provide a long-term dataset for time and spatial trends analyses as well as other types of analyses.

2.2 Stormwater and Structural BMP

2.2.1 Project / Task Organization

Stormwater and structural BMP monitoring refers to the monitoring of MS4 stormwater runoff at the inlets and outlets of selected structural stormwater BMPs during defined storm criteria, as defined in section 2.0 above. The City's Stormwater Monitoring Analyst(s) will serve as the RSC and Quality Assurance Officer for this monitoring element. The City's Stormwater Quality workgroup will calibrate field instruments, program mechanical samplers, perform sampling and collect field measurement data. The City's Willow Lake Laboratory and Portland's WPCL will perform all analytical laboratory analyses. Ongoing analyses of the data for abnormally large pollutant concentrations, annual reporting, and permit renewal will be completed by the Stormwater Monitoring Analyst(s).

2.2.2 Monitoring Objectives

This monitoring element was developed with the understanding that samples collected at the inlets of structural BMPs will add to the continued refinement of the land use characterization of stormwater pollutant concentrations. The samples collected at the outlets would be used to calculate removal efficiencies and add to the characterization of structural BMP effluent pollutant concentrations for various structural BMP types, a critical piece of data used in the TMDL pollutant load reduction permit requirement.

Stormwater and Structural BMP monitoring will contribute, at least in part, to monitoring objectives i, ii, iii, iv, v, and vi, as identified in Schedule B.1.a of the City of Salem's NPDES MS4 Permit.

2.2.3 Background

The City of Salem began collecting stormwater samples from four land use-based monitoring sites (Redleaf, Edgewater, Cottage, and Commercial) in January 1995. The City's first NPDES MS4 permit was subsequently issued in 1997. Annual stormwater sampling continued at these four sites through the winter of 2005. In 2006, the City discontinued these sites and began sampling four new stormwater sites. These new sites were selected to represent stormwater discharges to 303(d) listed streams and were identified by the associated stream name (Clark Storm, Mill Storm, Pringle Storm, and Glenn Storm).

During the last NPDES MS4 permit term (December 2010 - December 2015) the City resumed land use-based stormwater monitoring with three sites, Electric, Hilfiker, and Salem Industrial,

which represented residential, commercial, and industrial land use in Salem, respectively. The commercial and industrial sites were new locations, while the residential site was the Clark Storm location from the previous permit.

For the current permit term, the City will continue with land use-based monitoring with a total of six structural BMP monitoring inlet sites selected, 2 for each major land use (residential, commercial, and industrial). Furthermore, this monitoring element will be paired with samples being collected at the structural BMP outlet sites. See figure 1 for the various sites the City has identified for this monitoring element.

2.2.4 Study Design / Sampling Process

2.2.4.1 Study Design

The study design for this monitoring element includes two separate sets of samples being collected at each structural BMP. The first set comprises stormwater structural BMP inlet samples, without any preceding structural stormwater controls. These data will be used for the characterization of MS4 stormwater runoff on commercial, industrial, and residential land uses. A total of six sites (two for each land use type) have been identified for stormwater BMP inlet monitoring. During each sampling event, three of the six sites, representing residential, industrial, and commercial land use will be sampled, and each land use type will be sampled a total of 15 times during the permit term.

The second component of the study design for this monitoring element is the monitoring at structural BMP outlet sites, which represent effluent concentrations of the BMP. These data will be used for the characterization of structural BMP effluent pollutant concentrations per structural BMP type and the paired data from inlet and outlet sites will be used to calculate removal efficiencies. Just as described for the stormwater structural BMP inlet sites, a total of six sites (two for each land use type) have been identified for structural BMP outlet monitoring. During each sampling event, three of the six, representing a residential, industrial, and commercial land use site will be sampled, and each land use type will be sampled a total of 15 times during the permit term.

Of note, Schedule B, Table 2 of the permit labels monitoring locations for the Stormwater and Structural BMP monitoring type as three sites, at inlet and outlet, and monitoring frequency as 15 total storm events/permit term per land use type. The City is interpreting "site" as a "land use" based structural BMP inlet site as well as a structural BMP outlet site. Additional monitoring sites for this monitoring element have been written into this monitoring plan because the City recognizes that there may be times that certain structural BMPs are undergoing maintenance activities, thus limiting the ability to perform sampling. Given that one of the objectives of this monitoring element is to characterize structural BMP effluent pollutant concentrations, it was concluded that having only 3 sites could jeopardize the City meeting this objective and would likely increase uncertainty in the data.

All six of the stormwater influent and structural BMP effluent locations are new locations and will be sampled for the first time this permit term.

Table 3: Stormwater Structural BMP-Inlet Monitoring Sites

Dominant Land Use	Residential	Residential	Industrial	Industrial	Commercial	Commercial
Site Identifier (database name)	Ptarmigan-In	Landau-In	22nd-In	Henningsen-In	Market-In	Edgewater-In
Asset # identifier	180210	34692	23969	29071	113667	16082/16208
BMP Facility #	19413	608	1301	8536	34773	223/298
BMP Type	Water Quality Swale	Infiltration Basin	Water Quality Planter	Water Quality Swale	Water Quality Swale	Raingarden
Number of Events	15 total events		15 total events		15 total events	
Watershed	Glenn	Pringle	Pringle	Mill	Claggett	Willamette
Receiving Stream	Glenn	West Middle Fork Pringle	East Fork Pringle	Mill Creek	Claggett	Willamette

Table 4: Stormwater Structural BMP-Outlet Monitoring Sites

Dominant Land Use	Residential	Residential	Industrial	Industrial	Commercial	Commercial
Site Identifier (database name)	Ptarmigan-Out	Landau-Out	22nd-Out	Henningsen-Out	Market-Out	Edgewater-Out
Asset # identifier	8309	34562	23979	(8536 exit to 16214)	113666	16121/16240
BMP Facility #	19413	608	1301	8536	34773	223/298
BMP Type	Water Quality Swale	Infiltration Basin	Water Quality Planter	Water Quality Swale	Water Quality Swale	Raingarden
Number of Events	15 total events		15 total events		15 total events	
Watershed	Glenn	Pringle	Pringle	Mill	Claggett	Willamette
Receiving Stream	Glenn	West Middle Fork Pringle	East Fork Pringle	Mill Creek	Claggett	Willamette

2.2.4.2 Frequency and Duration / Storm Selection Criteria

Stormwater structural BMP inlet and outlet monitoring will be conducted during fifteen storm events at each of the three land use site types (residential, commercial, and industrial) throughout the permit term. Storms of varying intensity and duration will be targeted. Each storm event will be chosen based on the following criteria:

- Storm event must produce more than 0.1 inch of rainfall.

- When possible, samples must be collected after an antecedent dry period of a minimum of 12 hours and less than 0.1" in the previous 24-hour period.
- Precautions will be taken to avoid the collection of samples lacking stormwater runoff, e.g. an intra-event dry period of a storm that exceeds 6 hours.

Although it is anticipated that fifteen samples from each of the three sites will be collected over the five-year permit term, unanticipated circumstances including, but not limited to, weather, personnel illness and turnover, vehicular malfunction, equipment malfunction, and various safety issues could prevent the collection of all the samples. If such a situation exists, Oregon DEQ will be informed following notification procedures outlined in the MS4 permit.

2.2.4.3 Sample Collection Method

Sample collection methods will include a target of three time-based grab samples, and three time-based field measurements collected at six sites. Three of the sites will be at structural BMP inlets and three will be at the accompanied structural BMP outlets representing residential, commercial, and industrial land use types. The first of the grab samples and field measurements for inlet samples will be taken during the first three hours of the sampled storm event. If at the time of the first inlet samples being collected there is adequate flow to sample the outlet, the first outlet samples will be collected at that time. Sampling times from that point on will be based on the forecasted rain event, with the focus being to collect the following two inlet grab samples during times with expected increased flow rates (based on QPF data) into the BMP structure. If a forecast is calling for an extended storm event the inlet samples will be collected at a frequency of no more than one sample per hour. The structural BMP outlet grab samples and field measurements will be based on the expected hydraulic detention time for the specific BMP being sampled, noting that there may be a significant lag between the cessation of the inlet and outlet sampling. As time progresses, it is expected that staff will be able more accurately predict when adequate flow for outlet sampling will be occurring.

Once all stormwater inlet and outlet grab samples have been collected, the three samples for each site/land use type will be composited for laboratory analyses. Table 5 below details the parameters that will be analyzed for both the structural BMP inlet and outlet sites.

The one exception to the above paragraph is for E. coli samples. Due to the short hold time, a total of one E.coli grab sample will be collected for each structural BMP inlet and outlet site on the rising limb of the hydrograph. This strategy for E. coli sample collection matches how Salem has historically collected E. coli samples during storm events.

Rainfall Monitoring

The City of Salem has a rainfall monitoring system that is comprised of six rain gauges within Salem's jurisdictional limits that report in near real-time. These data are then uploaded to a city-managed website, hww.onerain.com . A dashboard for viewing these data and creating automated alerts has been developed to aid staff in the timing for the collection samples associated with this monitoring element.

Table 5: Structural BMP Inlet and Outlet Parameter List

Instream Storm Parameters	Collection Method
TSS	Grab (total of 3 time based then composited)
BOD ('stream')	Grab (total of 3 time based then composited)
Total Phosphorus	Grab (total of 3 time based then composited)
Ortho-Phosphorus	Grab (total of 3 time based then composited)
Nitrate+Nitrite as Nitrogen	Grab (total of 3 time based then composited)
Total Kjeldahl Nitrogen	Grab (total of 3 time based then composited)
Ammonia Nitrogen	Grab (total of 3 time based then composited)
Copper (Total Recoverable & Dissolved)	Grab (total of 3 time based then composited)
Lead (Total Recoverable & Dissolved)	Grab (total of 3 time based then composited)
Zinc (Total Recoverable & Dissolved)	Grab (total of 3 time based then composited)
Hardness	Grab (total of 3 time based then composited)
Specific Conductivity	In-Situ field measurement (total of 3 time based)
Dissolved Oxygen	In-Situ field measurement (total of 3 time based)
Temperature	In-Situ field measurement (total of 3 time based)
pH	In-Situ field measurement (total of 3 time based)
Turbidity	In-Situ field measurement (total of 3 time based)
E. coli	Grab (1 on rising limb only)
Total Mercury	Grab (total of 3 time based then composited)
Total Alkalinity	Grab (total of 3 time based then composited)
Dissolved Organic Carbon	Grab (total of 3 time based then composited)

2.2.5 Long-term Strategy

This monitoring element contributes to the long-term monitoring program strategy by providing data that characterizes the quality of MS4 discharges, both prior to and post-structural BMP controls, and supports long-term evaluation of the effectiveness of the City's SWMP. Datasets can be utilized for comparison between ACWA concentration values used for estimating total annual pollutant loads and TMDL benchmark analysis completed as part of the 2008 and 2015 permit renewal packages and future TMDL benchmark development. Thus, providing a gauge of the effectiveness of both structural and non-structural stormwater controls. Additionally, seasonal and geographic characterization will also be evaluated to help identify future stormwater control facility implementation priorities.

2.3 Pesticides

2.3.1 Project / Task Organization

Pesticide monitoring refers to the monitoring of MS4 stormwater runoff during defined storm criteria, as defined in section 2.0 above with a focus on fall and spring storm events. The City's Stormwater Monitoring Analyst(s) will serve as the RSC and Quality Assurance Officer for this monitoring element. The City's Stormwater Quality workgroup will perform sampling and Pacific Agricultural Laboratory will perform the analysis.

2.3.2 Monitoring Objectives

This monitoring element was developed with the understanding that data will help fill a data gap related to the characterization of stormwater pesticide pollutant concentrations, and aid in assessing the chemical and biological effects of MS4 discharges on receiving waterbodies.

Pesticide monitoring will contribute, at least in part, to monitoring objectives iii and v, as identified in Schedule B.1.a of the City of Salem's NPDES MS4 Permit.

2.3.3 Background

The City incorporated pesticide monitoring as a new stormwater monitoring element in its last permit cycle. A total of 188 different types of pesticides were analyzed at three different land use-based sites (residential, commercial, and industrial) during each sampling event. A total of six different storm events were sampled for pesticides between 2012 and 2018. Of these events, three were collected in the fall, and three were collected in the spring. Combining all events, a total of 13 individual pesticide types were identified. Independent of pesticide type and sampling event, a total of 47 pesticides were detected. Of the detected pesticides, 20 were present in spring samples and 27 were present in fall samples. The land use type breakdown of pesticides present in both spring and fall samples for residential, commercial, and industrial land uses were 13 (27.7%), 11 (23.4%), and 23 (48.9%), respectively.

2.3.4 Study Design / Sampling Process

2.3.4.1 Study Design

The study design for this monitoring element will be similar to the last permit term, with the most significant change being different pesticide types will be screened/analyzed for. The permit states the requirement of a total of 3 sites to be monitored during 4 total storm events/site. The three sites to be monitored will be the same three that were monitored last permit term, representing residential, commercial, and industrial land use types. See figure 1 for the location of each. There will be 2 sampling events taking place in the spring and two sampling events in the fall.

Pesticides to be Monitored

Schedule B. Table 2, Special Condition #5 specifies that the City must consider monitoring for a list of specified pesticides as well as any pesticides that are in use by the City within the MS4 jurisdictional area. Legacy pesticide monitoring (DDT, Dieldrin) must also be conducted for streams where an established TMDL requires it. The City has considered each of the permit specified pesticides and will monitor for them all, with the exception of 2,6-dichlorobenzamide (dichlobenil degradate). Multiple laboratories explained that analysis for this compound has little to no recovery in water, and that the LOQ will be high and of minimal usefulness. For a complete list of pesticides that will be analyzed for see Table 6, below.

Table 6: Pesticide Analysis

Pesticide	Method	Reporting Limit (ug/L)	Pesticide Selection Rationale
Bifenthrin	EPA 8321B Modified	0.06	Permit Specified
Chlorpyrifos	EPA 8321B Modified	0.06	Permit Specified
Imidacloprid	EPA 8321B Modified	0.06	Permit Specified
Fipronil	EPA 8321B Modified	0.06	Permit Specified
Atrazine	EPA 8321B Modified	0.06	Permit Specified
Simazine	EPA 8321B Modified	0.06	Permit Specified
Sulfometuron Methyl	DuPont	0.008	Permit Specified
Diuron	EPA 8321B Modified	0.06	Permit Specified
2,4-D	EPA 8151A Modified	0.08	Permit Specified
Glyphosate & degradate (AMPA)	EPA 547 Modified	10	Permit Specified
DDT	EPA 8321B Modified	0.06	Permit Specified
Dieldren	EPA 8321B Modified	0.06	Permit Specified
Triclopyr	EPA 8151A Modified	0.08	City of Salem
Dithiopyr	EPA 8321B Modified	0.06	City of Salem
Dichlobenil	EPA 8321B Modified	0.06	City of Salem
Picloram	EPA 8151A Modified	0.08	City of Salem
Aminopyralid	EPA 8321B Modified	0.2	City of Salem
Chlorsulfuron	DuPont	0.008	City of Salem
Isoxaben	EPA 8321B Modified	0.06	City of Salem

2.3.4.2 Frequency and Duration / Storm Selection Criteria

For pesticide monitoring two storm events will be sampled in the spring and two storm events will be sampled in the fall for a total of 4 storm events per site for the permit term. Beyond the spring and fall criteria, each sampled storm event will be chosen based on the following criteria:

- Storm event must produce more than 0.1 inch of rainfall.
- When possible, samples must be collected after an antecedent dry period of a minimum of 12 hours and less than 0.1" in previous 24-hour period.
- Precautions for stormwater influent will be taken to avoid the collection of samples lacking stormwater runoff, e.g. an intra-event dry period of a storm that exceeds 6 hours.

2.3.4.3 Sample Collection Method

Sample collection methods will include grab samples after at least 0.1 inches of rainfall at the nearest rain gauge has been recorded, but no more than 6 hours after the start of the storm, i.e. the time since the first recorded rainfall occurred.

Rainfall Monitoring

The City of Salem has a rainfall monitoring system that is comprised of six rain gauges within Salem's jurisdictional limits that report in near real-time. These data are then uploaded to a city-managed website, hww.onerain.com . A dashboard for viewing these data and creating automated alerts has been developed to aid staff in the timing for the collection samples associated with this monitoring element.

2.3.5 Long Term Strategy

This monitoring element was first implemented during the last permit term, starting in June 2011 (when the City's monitoring plan was approved by DEQ), and it is expected that this element will continue beyond this permit term; ultimately providing a long-term dataset for time and spatial trends analyses.

This monitoring element supports the long-term monitoring program strategy by providing environmental data that will contribute to understanding pesticide discharges to receiving waterbodies from the MS4 system. Gaining this knowledge helps brings to light the necessity of always exploring new and innovative efforts toward controlling pesticides from entering the MS4 system to the maximum extent practicable.

3 Non-Storm Event Dependent Monitoring Elements

The City has three monitoring elements that do not require sample collection during storm events, and are intended to provide the City with the means to assess overall stream health and long-term trends. These include Continuous Instream, Monthly Instream, and Macroinvertebrate monitoring.

3.1 Continuous Instream

3.1.1 Project / Task Organization

Continuous Instream monitoring refers to the continuous monitoring of MS4 receiving streams at fixed sites (monitoring stations). The City's Stormwater Monitoring Analyst(s) will serve as the Responsible Sampling Coordinator. The City's Stormwater Quality monitoring workgroup will perform all operation/maintenance and quality assurance/quality control procedures.

3.1.2 Monitoring Objectives

Continuous Instream monitoring will contribute, at least in part, to monitoring objectives i, ii, iii, iv, v, and vi, as identified in Schedule B.1.a of the City of Salem's NPDES MS4 Permit.

3.1.3 Background

Continuous Instream monitoring began in 2006 with a total of six stations, including two on Mill Creek, two on Pringle Creek, and two on Clark Creek. In 2007, three more stations were added, two on Glenn Creek, and one on Mill Creek. In 2008, two stations were added on Battle Creek. Due to concerns with data quality and maintenance, the furthest downstream station on Mill Creek, just before the creek flows into the Willamette River, was removed in 2012 and a new station was put in on Shelton Ditch. Also in 2012, two stage-only monitoring stations were added, one on Pringle Creek and one on the West Fork Little Pudding River. In 2014, the Shelton Ditch station was converted to record stage only during the replacement of the Winter St. bridge. 2018 saw the addition of another stage-only monitoring station on Waln Creek, and in 2019 another stage-only station was installed on Clark Creek.

3.1.4 Study Design / Sampling Process

3.1.4.1 Study Design

A total of fifteen continuous monitoring stations are installed on Battle Creek, Clark Creek, Glenn Creek, Mill Creek, Pringle Creek, Shelton Ditch, Waln Creek, and West Fork Little Pudding River. Stations are positioned in an upstream/downstream configuration. The exceptions to this

are Shelton Ditch, West Fork Little Pudding, and Waln Creek, which each have only one station. Additionally, Clark Creek and Pringle Creek each have a third station located between the upstream/downstream sites. The upstream sites are adjacent to where the stream enters the City, and the downstream sites are either above the confluence with another stream or where the stream exits the City's jurisdictional boundary. The positioning of these sites is identified in Figure 1 and described in Table 7. Schedule B, Table 2 of the permit requires a total of ten continuous monitoring stations that collect field parameters (labeled as water quality in the table below) including dissolved oxygen, pH, temperature, and specific conductivity, as well as stage/flow. Turbidity, while not a direct permit requirement, has and will continue to be monitored at the continuous water quality stations.

Table 7: Continuous Instream Monitoring Sites

Site ID & Database ID	Stream Location	Creek Name	Station Monitoring Type	Site Location
BAT3	Downstream	Battle Creek	Water Quality and Stage/Flow	Commercial St SE
BAT12	Upstream	Battle Creek	Water Quality and Stage/Flow	Lone Oak Rd SE
CLK1	Downstream	Clark Creek	Water Quality and Stage/Flow	Bush Park
CLK3	Middle	Clark Creek	Stage Only	Hoyt St SE
CLK12	Upstream	Clark Creek	Water Quality and Stage/Flow	Ewald St SE
GLE3	Downstream	Glenn Creek	Water Quality and Stage/Flow	Wallace Rd NW
GLE12	Upstream	Glenn Creek	Water Quality and Stage/Flow	Hidden Valley Dr NW
MIC3	Downstream	Mill Creek	Water Quality and Stage/Flow	North Salem High School
MIC12	Upstream	Mill Creek	Water Quality and Stage/Flow	Turner Rd SE
PRI3	Downstream	Pringle Creek	Water Quality and Stage/Flow	Pringle Park
PRI4	Middle	Pringle Creek	Stage Only	Salem Hospital
PRI12	Upstream	Pringle Creek	Water Quality and Stage/Flow	Trelstad Ave SE
SHE3	Downstream	Shelton Ditch	Stage/Flow	Winter St Bridge
LPW1	Downstream (at city limit)	West Fork Little Pudding River	Stage/Flow	Cordon Rd
WAL3	Middle	Waln Creek	Stage/Flow	Wiltsey Rd SE

All monitoring equipment was installed so that it collects a representative dataset within each stream that describes the ambient conditions during both storm and non-storm conditions. This study design allows for long-term, time-based, and spatial trends analyses.

Additionally, the continuous monitoring stations aid in the Illicit Discharge Detection and Elimination (IDDE) program by utilizing near real-time monitoring capabilities to detect parameter readings that fall outside of the normal range and therefore may be the result of an illicit discharge and the system then sends an alarm to response staff to investigate.

3.1.4.2 Frequency and Duration

The City's network of fifteen continuous monitoring stations runs 24 hours a day, 365 days a year, and collects and logs data every 15 minutes. Infrequent disruptions to data collection can result from station maintenance, power outages, or equipment failures, creating 'gaps' in the continuous data time series record.

3.1.4.3 Collection Method

Data are collected in situ using automated datasondes for the following water quality parameters: temperature, pH, dissolved oxygen, specific conductivity, and turbidity. Stage readings are also measured in situ using automated equipment. Data are sent from the field to a base station via radio or cell modem telemetry and stored in a database on the City's IT servers. Provisional flow measurements are also computed in real-time. Finalized flow measurements are computed by the Stormwater Monitoring Analyst(s) using proprietary rating curve software (Aquarius). Table 8 details each of the parameters and the sample collection method.

Table 8: Continuous Instream Parameter List and Collection Method

Continuous Instream Parameters	Collection Method
Temperature	In-situ with YSI datasonde
pH	In-situ with YSI datasonde
Dissolved Oxygen	In-situ with YSI datasonde
Specific Conductivity	In-situ with YSI datasonde
Turbidity	In-situ with YSI datasonde
Stage	In-situ with Campbell Scientific pressure transducer or YSI bubbler with Integrated Pressure Sensor

3.1.5 Long-Term Strategy

All monitoring sites for this element are at fixed locations that are either on City-owned property or located within City easements. This ensures that sites will continue to be operated and maintained for stream discharge and water quality monitoring into the future.

This monitoring element provides data that will support multiple long-term monitoring program strategies. Examples of the intended use of the data include: aiding and showing progress in the IDDE program (by use of station alarms); studying the impacts of hydromodification and strategies to address hydromodification (stream flow/stage data); continued evaluation of receiving stream status and 303(d) listings (water quality data); examining the cumulative effects (chemical, physical, and biological) of the City's MS4 stormwater runoff on receiving streams; and assessing progress towards meeting TMDL load reduction benchmarks.

3.2 Monthly Instream

3.2.1 Project / Task Organization

Monthly Instream refers to the monitoring of MS4-receiving streams, where sampling is to occur once a month on a schedule that is determined at the beginning of each calendar year. The City's Stormwater Monitoring Analyst(s) will serve as the Responsible Sampling Coordinator. The City's Stormwater Quality monitoring workgroup will collect all field measurements and grab samples. The City's Willow Lake Laboratory and Portland's Water Pollution Control Lab (WPCL) will perform all analytical laboratory analyses.

3.2.2 Monitoring Objectives

Monthly Instream monitoring will contribute, at least in part, to monitoring objectives i, ii, iii, iv, v, and vi, as identified in Schedule B.1.a of the City of Salem's NPDES MS4 Permit.

3.2.3 Background

Monthly Instream monitoring began in 2001 with 21 sampling sites on local streams and all but one has remained at the same location. The exception is the upstream Battle Creek site which was moved in 2003 due to lack of access, and again in 2020 to correspond with the upstream Battle Creek continuous monitoring station location. Additionally, in July of 2013, the City added three sampling sites on the Willamette River, bringing the total number of sites to 24. The sampling sites are identified in Figure 1 and locations are described in Table 9 below.

3.2.4 Study Design / Sampling Process

3.2.4.1 Study Design

The study design for this monitoring element is a paired design, where samples are collected monthly at upstream and downstream sites on Battle Creek, Claggett Creek, Clark Creek, Croisan Creek, Gibson Creek, Glenn Creek, Mill Creek, Mill Race, Pringle Creek, and Shelton Ditch, as well as the Willamette River (there is a third, mid-way sampling point on the Willamette). The eleventh MS4 receiving stream, West Fork Little Pudding River, has only one monitoring site because it begins as a trickle outside of Salem city limits, and tends to run dry during the summer months, so an upstream site was not selected. Dates for sampling are determined at the beginning of each calendar year and are therefore independent of weather conditions.

Due to the number of sites needing to be collected in one day, a narrowed set of parameters were chosen for this monitoring element. When initiated in 2001, this monitoring element was intended to produce a dataset that could provide an index of stream quality, as well as data for spatial and trend analyses. During the last permit cycle, 303(d) and TMDL listed parameters were added to the study design. As a requirement of the current permit, total suspended solids (TSS) will also be monitored at all site locations. Refer to Table 10 for a list of parameters for all sites.

Table 9: Monthly Instream Monitoring Sites

Site ID	Creek Name	Site Location
BAT1	Battle Creek	Commercial St SE
BAT12	Battle Creek	Lone Oak Rd SE
CGT1	Claggett Creek	Mainline Dr NE
CGT5	Claggett Creek	Hawthorne St NE @ Hyacinth St NE
CLA1	Clark Creek	Bush Park
CLA10	Clark Creek	Ewald St SE
CRO1	Croisan Creek	Courthouse Athletic Club
CRO10	Croisan Creek	Ballantyne Rd S
GIB1	Gibson Creek	Wallace Rd NW
GIB15	Gibson Creek	Brush College Rd NW
GLE1	Glenn Creek	River Bend Rd NW
GLE10	Glenn Creek	Hidden Valley Dr NW
MIC1	Mill Creek	Front St Bridge
MIC10	Mill Creek	Turner Rd SE
MRA1	Mill Race	High St SE
MRA10	Mill Race	Mill Race Park
PRI1	Pringle Creek	Riverfront Park
PRI5	Pringle Creek	Bush Park
SHE1	Shelton Ditch	Church St SE
SHE10	Shelton Ditch	State Printing Office
LPW1	West Fork Little Pudding River	Cordon Rd NE
WR1	Willamette River	Sunset Park (Keizer)-River Mile 81
WR5	Willamette River	Railroad Bridge-River Mile 83
WR10	Willamette River	Halls Ferry-River Mile 91

3.2.4.2 Frequency and Duration

The sampling frequency will be once a month at all 24 sites as long as there is flow. Three of the sites (LPW1, CGT5, GLE10) typically run dry during the summer months, often resulting in fewer samples collected at these sites each year. Per Table B-2 in the City's NPDES MS4 permit, a minimum of 48 sample events, from each of the 24 sites, will be collected. However, Table B-2 Special Condition #8 states that the minimum number of sample events may be reduced to 30 if insufficient flow does not allow for sample collection.

In addition, personnel illness and turnover, vehicular malfunction, equipment malfunction, and various safety issues, including flooding and/or high flows and debris could prevent the collection of some of the samples. If such a situation exists, Oregon DEQ will be informed following notification procedures listed in the MS4 permit.

3.2.4.3 Sample Collection Method

Sample collection will include grab samples and field measurements. For the 21 monitoring sites on streams (not including Willamette River sites), grab samples and field measurements will be collected directly from the stream where the water is well mixed and representative of the ambient conditions. For the three Willamette River monitoring sites, samples will be collected from within fifty feet of the bank of the Willamette River (west bank for upstream site,

east bank for the midway and downstream sites). The sample collection method for each parameter can be found in Table 10, below.

Table 10: Monthly Instream Parameter List and Collection Method

Monthly Instream Parameters	Collection Method	Site
BOD ('stream')	Grab Sample	All 24 sites
Nitrate-Nitrite (NO3-NO2)		
E. coli		
TSS		
Dissolved Oxygen	In-Situ	All 24 Sites
Temperature		
Specific Conductivity		
pH		
Turbidity		
Copper (Total & Dissolved)	Grab Sample	Pringle Creek and Clark Creek sites
Lead (Total & Dissolved)		
Zinc (Total & Dissolved)		
Hardness		
TDS	Grab Sample	Willamette Sites
TS		
Total Phosphorus		
Ammonia		
Alkalinity		

Note: BOD ('stream') analytical method is not identified in 40 CFR 136; however, this method has been identified as an acceptable method under schedule B.1.d.iii in the City's NPDES MS4 permit issued in 2010. Additionally, this parameter is not a current permit listed parameter; however, the City will continue to monitor this parameter to ensure the uninterrupted longevity of the data set.

3.2.5 Long-term Strategy

By providing the oldest continuous dataset of instream water quality data, the Monthly Instream monitoring element is essential to the long-term monitoring program strategy. Data collected through this monitoring element have been used (and will continue to be used) for long-term trending, spatial analysis, and seasonal differences.

3.3 Macroinvertebrate

3.3.1 Project / Task Organization

Macroinvertebrate monitoring will consist of the collection of benthic macroinvertebrates and physical habitat data on Clark Creek (in Gilmore Field), West Fork Pringle Creek (immediately downstream of Madrona Ave.), and mainstream Pringle Creek (upstream of the confluence of Shelton Ditch). All sampling site reaches are within the Pringle Creek Watershed. The City's Stormwater Monitoring Analyst will serve as the Responsible Sampling Coordinator. The City's Stormwater Quality monitoring workgroup will be responsible for the completion of this monitoring element.

3.3.2 Monitoring Objectives

Macroinvertebrate monitoring will contribute, at least in part, to monitoring objectives iv and v as identified in Schedule B.1.a of the City of Salem's NPDES MS4 Permit.

3.3.3 Background

Macroinvertebrate monitoring was a new monitoring element prescribed in the City's last permit (2010-2015), and it was designed to help the City assess the biological effects of MS4 discharges on receiving waters. The City had collected macroinvertebrate and physical habitat data within the Pringle Creek Watershed as part of a non-permit-related project in 2000 and 2001. With that data collection effort, the City followed a transect sampling approach for collecting benthic macroinvertebrate samples and the methodologies found in the Environmental Protection Agency's Environmental Monitoring and Assessment Program Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams (EMAPSW) for collecting physical habitat data. For the 2010-2015 permit term, the same methodologies were followed at three site reaches within the Pringle Creek watershed. The site reaches included Coats Lateral (also known as East Fork Pringle Creek) downstream of Trelstad Avenue, Clark Creek at Gilmore Field, and mainstem Pringle Creek immediately upstream of the confluence of Shelton Ditch. This was done so that the City could compare the data from the 2000-2001 macroinvertebrate and physical habitat study.

In addition to sampling the three sites within the Pringle Creek Watershed as part of the prescribed monitoring requirements of the last permit, the City also chose to perform sampling, following the same methodologies, at four additional sites on Waln and Battle Creeks within the old Battle Creek golf course. This sampling was conducted in the fall of 2011, before a large mitigation project that realigned the creek, added woody debris, replanted riparian areas within the reach, and added detention. The sampling effort assessed the type of habitat that existed prior to the construction of the mitigation project. In 2017 these sites were resampled with results very similar to the 2011 study, with total Benthic Index of Biological Integrity (BIBI) scores in the mid 20's, indicating low biological integrity overall. Since that time, beaver activity and the encroachment of reed canary grass in Waln Creek have altered channel conditions to the point where macroinvertebrate sampling would not be practical at this time. Rehabilitation efforts are currently in process and the City intends to complete follow-up sampling at these sites in the future.

3.3.4 Study Design / Sampling Process

3.3.4.1 Study Design

The study design for this monitoring element is a transect sampling approach, where macroinvertebrates and physical habitat data will be collected at two of the three site reaches in the Pringle watershed that have been sampled repeatedly since the year 2000. The third site reach is a new site on the Middle Fork Pringle Creek that is currently listed on the 303d list as Category 5 for Biocriteria. This study design intends to continue the collection of data on benthic macroinvertebrate communities and physical habitat characteristics at the two existing site reaches on lower Pringle and Clark Creeks and begin collection on the impaired Middle Fork Pringle site reach. The data collected at the existing sites can be compared to historical data to look for trends in improving or decreasing biological integrity, while data collected at Middle Fork Pringle will begin building a dataset to establish baseline biological integrity levels within the stream reach.

3.3.4.2 Frequency and Duration

Macroinvertebrate sample collection will be completed twice during the permit term for a total of two samples per site. Sampling collection will occur during the in-water work period.

3.3.4.3 Sample Collection Method

The City will follow Oregon Department of Environmental Quality's Water Monitoring and Assessment Mode of Operations Manual (MOMs) (June 2010) transect sampling approach for collecting benthic macroinvertebrate samples and the methodologies found in the Environmental Protection Agency's Environmental Monitoring and Assessment Program - Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams (EMAP-SW) for collecting physical habitat data. Both protocols require the collection of data at evenly spaced transects within the sampling reach. Since the Clark Creek and mainstem Pringle Creek sites were sampled during the previous permit term, permanent transects for sampling have been established. Permanent transects will also be established for the Middle Fork Pringle Creek site reach.

Oregon DEQ MOMs and EMAP-SW protocols specify that the length of the sampling reach is forty times the average wetted width of the channel or a minimum of 150 meters long when the average wetted width is less than four meters. Two of the sites, Middle Fork Pringle Creek and Clark Creek, have an average wetted width of fewer than four meters, therefore will have reach lengths of 150 meters. Whereas the average wetted width of the mainstem Pringle Creek site reach is approximately 7.31 meters, thus the total site reach length is 292.5 meters.

3.3.5 Quality Criteria

3.3.5.1 Comparability

Targeted sampling at the same time of year at permanently established transects while using the same previously used methodologies will reduce the potential for spatial and temporal sample variation while increasing the comparability of data in the long term.

3.3.6 Quality Assurance / Quality Control / Record Keeping

3.3.6.1 Duplicate Samples

Field and laboratory duplicates will be collected for 10% of all samples.

3.3.6.2 Handling / Custody Procedures

All samples will be preserved in the field using a 70-95% ethanol concentration and labeled with sample collection information. This information will also be documented in pencil on waterproof paper and placed inside the preserved sample jar. If the sample is not immediately sent off to the lab for identification, the preservative will be replaced with fresh solution within one week of sample collection. Chain of custody forms will be completed for each sampling event.

3.3.6.3 Documentation and Records

Field sheets documenting the site, date, and sampling personnel will be completed for each macroinvertebrate sampling event. This information will be combined with a set of additional field sheets designed to document the associated physical habitat data. It is the responsibility of the Responsible Sampling Coordinator to ensure that these documents are correctly completed for each sampling event.

3.3.6.4 Data Management

All field documents and data received from the laboratory will be kept as paper and electronic copies.

3.3.6.5 Data Validation and Verification

Macroinvertebrate samples will be preserved in the field, with sorting and identification conducted by a qualified taxonomist (past efforts used Aquatic Biology Associates and effort will be made to continue using this company). Identification of organisms will be performed following the Oregon DEQ Benthic Macroinvertebrate Protocol for Wadeable Rivers and Streams.

3.3.7 Long-term Strategy

The macroinvertebrate monitoring completed during this permit term will provide a measure of the biological conditions at targeted sites within the Pringle Creek Watershed. These data can be compared with past data collected from the Pringle and Clark creek sites, while the collection of data at the Middle Fork Pringle site will establish baseline biological integrity scores for that site reach. These data will inform the City's adaptive management practices and future data collected at these sites will provide a long-term assessment of changes in macroinvertebrate communities and help to evaluate the overall effectiveness of the City's SWMP. Performing macroinvertebrate monitoring at the same sites during subsequent permit cycles, if feasible, will continue to be a key element of the long-term monitoring program strategy.

4 Data Quality and Documentation for Water Quality Monitoring Elements

As described in the introduction, the intent of this monitoring plan is that all environmental data collected will be used to support adaptive management of the stormwater monitoring program, as well as demonstrate the effectiveness of structural and non-structural BMPs in reducing the discharge of pollutants to MS4 receiving streams. This section documents the analytical methods, quality control procedures, data management, and documentation and record-keeping procedures for both field and laboratory data for all water quality monitoring elements found under this plan (Instream Storm, Stormwater and Structural BMP, Pesticides, Continuous Instream, and Monthly Instream).

All relevant data quality objectives for macroinvertebrate sampling are found under that specific section, 3.3.

General data quality objectives are that the data are representative of known precision and accuracy, will withstand scientific scrutiny, and are generated using approved sampling techniques, handling procedures, standardized calibration and maintenance of field equipment and instrumentation.

4.1 Data Quality Objectives

4.1.1 Field Measurement Data Quality Objectives

The minimum data quality objectives and analytical methods for field measurements for Instream Storm, Stormwater and Structural BMP, and Monthly Instream along with Continuous Instream monitoring elements are detailed in Table 11 below.

Table 11: Field Measurement Data Quality Objectives

Field Parameters	Accuracy	Precision	Analytical Methods
Temperature	± 0.5 °C	± 0.5 °C	NIST Traceable/Standard Method 2550
pH	± 0.2 SU	± 0.3 SU	Standard Method 4500 H+
Specific Conductivity	± 7% of standard value	± 10% of standard value	Standard Method 2510A
Dissolved Oxygen	± 0.2 mg/L	± 0.3 mg/L	ASTM Method D888-09 (C)
Turbidity	± 5%	± 5%	ATSM Method D7315-07a

4.1.1.1 Instrument Calibration / Inspection / Maintenance

Instruments will be inspected and calibrated prior to each sampling event. Instrument calibration, inspection, and maintenance procedures are all documented in the City's "Stormwater and Instream (Storm Only) Monitoring Standard Operating Procedures" (2022).

4.1.2 Duplicate and Blank Samples

Duplicates will be taken for a minimum of ten percent of the total number of grab samples and field measurements. Blank samples will be run at a minimum rate of ten percent of the total number of grab samples analyzed for total recoverable mercury. Portable mechanical samplers will also have blank samples performed at a rate of ten percent of all samples collected.

4.1.3 Sample Handling and Chain of Custody Procedures for Grab and Composite Samples

Grab samples will be collected using a sterilized beaker, transferred to appropriate bottles, and transported to Willow Lake Laboratory to be processed within their hold times. As soon as the portable mechanical samplers have completed their programs, the flow-weighted composite samples will be taken to Willow Lake Laboratory or put on ice and shipped to Portland's WPCL Laboratory. All grab and composite samples will have a chain of custody form associated with them.

4.1.4 Analytical Procedures – Laboratory

All grab and composite samples for the Instream Storm, Stormwater and Structural BMP and Monthly Instream programs will utilize the same handling requirements and laboratory procedures. Analytical methods for composite and grab samples analyzed at Willow Lake Laboratory and Portland WPCL are identified in 40 CFR 136 or otherwise identified in Schedule B.1.d.iii of the NPDES MS4 permit. Table 12 below shows the analytical method for each parameter, hold time, collection container, and reporting limit (Limit of Quantification).

Table 12: Laboratory Analytical Information for Water Quality Samples

Parameter	Analytical Method	Hold Time	Collection Container	Reporting Limit	Lab
E. coli	SM9223B	6 hours	Plastic sterile specimen cup	1 (MPN/100mL)	Willow Lake
Total Alkalinity	SM2320B	14 days	Plastic	5 (mg/l)	Willow Lake
Total Suspended Solids (TSS)	SM2540D	7 days	Plastic	0.2 (mg/l)	Willow Lake
Total Kjeldahl Nitrogen (TKN)	SM4500N-B	48 hours	Plastic	1 (mg/l)	Willow Lake
Nitrate-Nitrite (NO3-NO2)	SM4500NO3-F	48 hours (28 days if acidified)	Plastic	0.05 (mg/l)	Willow Lake
Ammonia Nitrogen (NH3-N)	SM4500NH3-D	7 days	Plastic	0.05 (mg/l)	Willow Lake
Total Phosphorus (TP)	SM4500PO4-BE	28 days	Plastic	0.01 (mg/l)	Willow Lake
Ortho-Phosphorus (O-PO4)	SM4500PO4-E	48 hours	Plastic	0.01 (mg/l)	Willow Lake
BOD ('stream' and 5 day)	SM5210B	24 hours	Plastic	2 (mg/l)	Willow Lake
Hardness	SM2340B	6 months	Plastic (acid rinsed)	0.253 (mg/l)	WPCL
Dissolved Organic Carbon (DOC)	5310B	7 days	Plastic (acid rinsed)	1 (mg/l)	WPCL
Total Copper	EPA 200.8	6 months	Plastic (acid rinsed)	0.000222 (mg/l)	WPCL
Dissolved Copper	EPA 200.8	6 months	Plastic (acid rinsed)	0.000212 (mg/l)	WPCL
Total Lead	EPA 200.8	6 months	Plastic (acid rinsed)	0.000111 (mg/l)	WPCL
Dissolved Lead	EPA 200.8	6 months	Plastic (acid rinsed)	0.000106 (mg/l)	WPCL
Total Zinc	EPA 200.8	6 months	Plastic (acid rinsed)	0.000556 (mg/l)	WPCL
Dissolved Zinc	EPA 200.8	6 months	Plastic (acid rinsed)	0.00053 (mg/l)	WPCL
Total Mercury	US EPA 1631E	90 days	Plastic	0.5 (ng/L)	ALS

4.1.5 Comparability

Field measurements, grab samples, and composite samples will utilize the same handling requirements and laboratory procedures for all water quality sampling monitoring elements.

All field measurements will utilize the same YSI sensors, following the same quality assurance and quality control protocols. Additionally, the recording of all field measurements are done in-situ, or when necessary, by immersing the sensors within a represented sample immediately after sample collection. This uniformity increases the validity of the data for analyses and comparison with other data collected within the scope of this plan.

Rainfall Monitoring

The City of Salem has a rainfall monitoring system that is comprised of six rain gauges within Salem's jurisdictional limits that report in near real-time. These data are then uploaded to a city-managed website, hww.onerain.com. A dashboard for viewing these data and creating automated alerts has been developed to aid staff in the timing for the collection samples associated with Instream Storm, Stormwater and Structural BMP, and Pesticide monitoring elements. Rainfall data is also imported into the City's Aquarius database where it can easily be analyzed for antecedent conditions and rainfall intensities, thus supporting mining of water quality data to help answer more specific questions.

4.2 Record Keeping and Data Management

4.2.1 Documentation and Records

A field data sheet will be completed for each monitoring element and each monitoring event. Information to be recorded on these field data sheets includes project name, sampler's name, date and time of sample collection, site ID, field measurement results for temperature, pH, dissolved oxygen, turbidity, and specific conductivity, and check boxes to verify all necessary grab samples were collected and record the time of sample collection.

4.2.2 Data Management

The sampling team is responsible for the completion of the field data sheet. Willow Lake Laboratory and Portland WPCL will provide laboratory results, which will be stored in their respective LIMS databases, as well as duplicated in the City of Salem's Aquarius Database. Field measurement data will also be entered into the Aquarius database.

4.2.3 Data Validation and Verification

The Responsible Sampling Coordinator will complete a review of all information on field data sheets. Once the data have been entered into the database, the Responsible Sampling Coordinator or other monitoring staff will compare the data in the database to the field sheets, and then have a second person do the same. Errors in data entry will be corrected at that time. Outliers and inconsistencies will be flagged for further review. It is the responsibility of the Responsible Sampling Coordinator to investigate further and determine the validity of the data. Data quality issues will be addressed as they occur and will be identified in any dataset that is distributed to City staff and the public.

4.2.4 Pollutant Parameter Action Levels

The City has developed pollutant parameter action levels to evaluate water quality data collected in accordance with this plan. With the exception of E. coli, Total Mercury, and pH action levels represent the average of 95th and 99th percentile of all "wet weather" instream and stormwater data. "Wet weather" instream data is defined as data collection occurring within 24 hours of a storm event. Total Mercury action level represents the 95th percentile of data. E coli action level represents the 99th percentile.

The Quality Assurance Officer will be responsible for reviewing the data and identifying any parameters that exceeded the pollutant parameter action levels identified in Table 13 below. When an action level is exceeded, staff will begin investigating potential sources within 48 hours of becoming aware of the exceedance. Investigations may include reconnaissance of the catchment area for possible sources of the pollutant and/or the collection of additional samples of the piped conveyance system and of the receiving waterbody.

Furthermore, if it is determined that the source is coming from the City's MS4 system and is contributing to the exceedance of a water quality standard as established in OAR 340-041, the City will implement the corrective actions identified in Schedule A.1.b of the permit.

Table 13: Pollutant Parameter Action Levels

Parameter	Action Levels	Measurement Unit
E. coli	8000	MPN/100 mL
Ammonia Nitrogen (NH3-N)	0.31	mg/L
Total Phosphorus (TP)	0.91	mg/L
Dissolved Copper	0.013	mg/L
Dissolved Lead	0.0014	mg/L
Dissolved Zinc	0.36	mg/L
Total Mercury	35	ng/L
pH	5.5-8.5	pH units

5 Data Analysis

5.1 Questions

To address the permit monitoring objectives found under Schedule B.1.a. in the permit (or section 1.2 in this Plan), the City has developed a number of questions to answer with the data that are collected through this monitoring plan. Table 14 below provides these questions and the monitoring elements that will be used to answer the questions.

Table 14: Questions to be Answered with the Data

Question to Answer with the Data	Monitoring Element(s) Used to Answer the Question
What are the typical pollutant concentrations found in receiving water bodies during storm events?	Instream Storm, Monthly Instream
What are the typical pollutant concentrations found in receiving water bodies during non-storm events?	Monthly Instream, Continuous Instream
Are instream pollutant concentrations changing over time during storm events?	Instream Storm, Monthly Instream, Continuous Instream
Are instream pollutant concentrations changing over time during non-storm events?	Monthly instream, Continuous Instream
What are the typical pollutant concentrations of stormwater MS4 discharges based on land use, and how do those compare against past OR ACWA studies?	Stormwater and Structural BMP, Pesticide
What are the typical structural BMP effluent pollutant concentrations and how do these data compare with other studies?	Stormwater and Structural BMP
Can non-structural BMPs be implemented in a manner that shows a statistically significant difference in pollutant parameter concentrations during storm events?	Instream Storm, Stormwater and Structural BMP
Are stormwater MS4 discharges affecting biological communities?	Macroinvertebrate, Continuous Instream

5.2 Methodology and Rationale

Annual Report

Once data have been processed and validated, they will be categorized to account for variables such as rainfall, stream levels, and seasonality. Once this is done, basic summary statistics both in tabular and graphical form will be provided for each type of monitoring data. A narrative explaining the findings will accompany all graphical descriptions and tables. If additional analysis is completed within the reporting year, a report of the methodology and results of the analysis will be produced. This information will be included in an annual report that will be submitted by November 1st of each year.

The rationale for producing the tabular, graphical, and associated narrative for all data collected within the report is that it allows for an easy visual comparison of the data from year to year. For example, if a significant change was to occur from one year to the next that led to a noticeable increase in a pollutant, the source/cause of the increase can be investigated prior to the next wet weather (sampling) season.

Permit Renewal

Prior to the submittal of the permit renewal application, the data collected from implementing this monitoring plan will be used for statistical hypothesis testing.

For the water quality data collected via the monitoring elements explained within this plan, the statistical hypothesis testing analyses preformed will look for temporal trends and spatial observations. Temporal trends analysis will test if the water quality parameters change with time. The Seasonal Kendal test will be used for the temporal trends analysis. The rational for using the Season Kendal test is that these data tend to exhibit strong seasonal patterns, and this non-parametric test is able to account for this variability in the data. The spatial observations analysis will be used to better understand the influence of City discharges on receiving stream water quality. For spatial trends the City will use the Mann-Whitney rank sum test. The rational for using this non-parametric test is that the city has paired most of its monitoring in an upstream/downstream configuration. Furthermore, this test does not require assumptions or knowledge about the underlying probability distributions of the data.

Additional analyses looking at BMP effluent concentrations and removal efficiencies, impacts of programmatic (non-structural BMPs), B-IBI scoring comparisons, and habitat changes within macroinvertebrate sampling reaches will also be analyzed and document prior to the permit renewal application.

It is the goal that by answering the questions in Table 14 and fulfilling all the data collection and analyses outlined in this plan, the City can utilize these data to make informed decisions on future changes to the City's Stormwater Management Program Document.

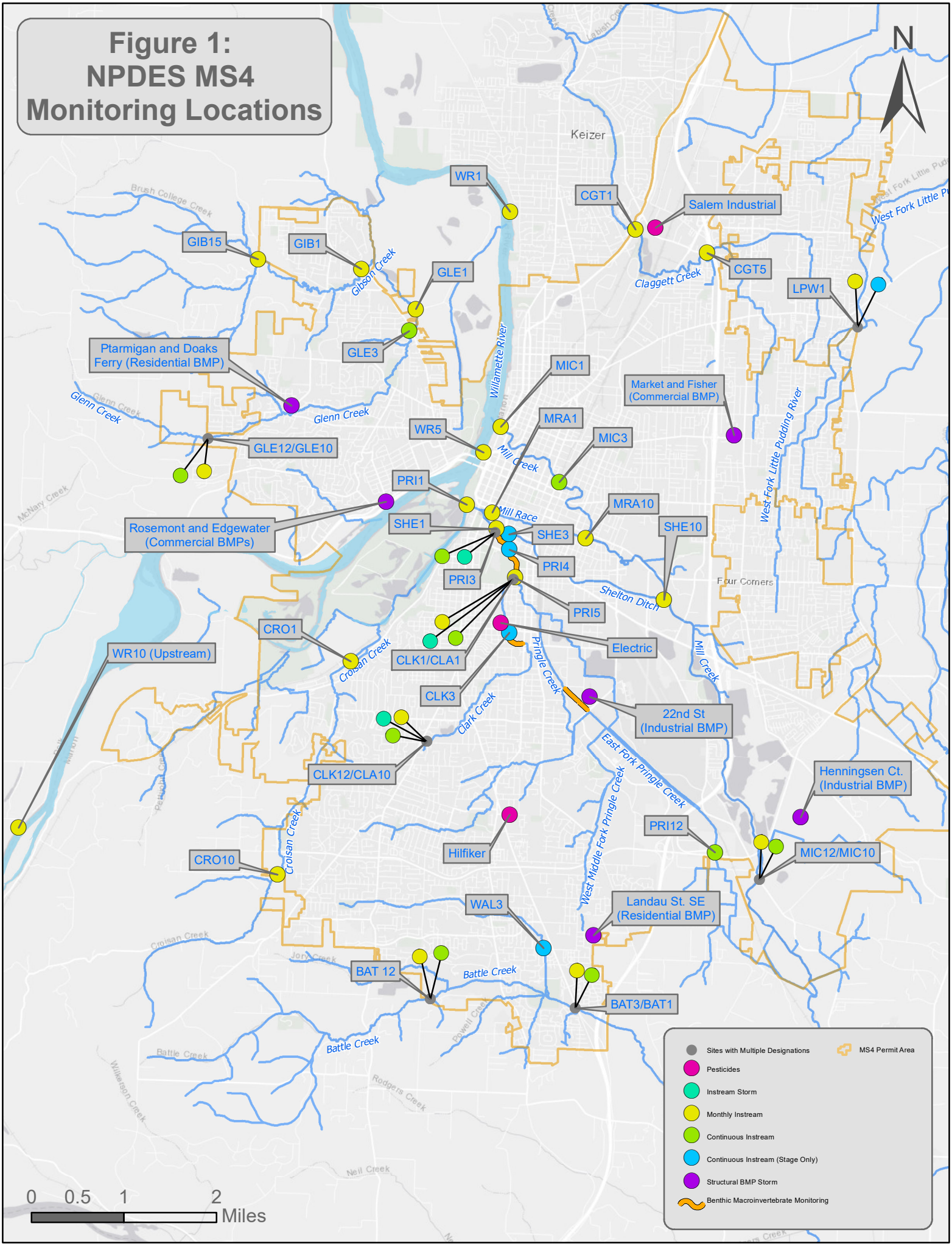


Figure 1:
NPDES MS4
Monitoring Locations
N
Keizer
WR1
CGT1
Salem Industrial
GIB15
GIB1
Gibson Creek
GLE1
Claggett Creek
CGT5
LPW1
West Fork Little Pudding River
Ptarmigan and Doaks
Ferry (Residential BMP)
GLE3
Willamette River
MIC1
Market and Fisher
(Commercial BMP)
Glenn Creek
MRA1
WR5
MIC3
GLE12/GLE10
Mill Creek
PRI1
MRA10
Mill Race
SHE1
SHE3
SHE10
Rosemont and Edgewater
(Commercial BMPs)
PRI4
PRI3
Four Corners
Shelton Ditch
PRI5
CRO1
Croisan Creek
Electric
WR10 (Upstream)
CLK1/CLA1
Pringle Creek
Mill Creek
CLK3
Clark Creek
22nd St
(Industrial BMP)
East Fork Pringle Creek
CLK12/CLA10
Henningsen Ct.
(Industrial BMP)
PRI12
Hilfiker
CRO10
West Middle Fork Pringle Creek
MIC12/MIC10
WAL3
Landau St. SE
(Residential BMP)
BAT 12
Battle Creek
BAT3/BAT1
Sites with Multiple Designations
Pesticides
Instream Storm
Monthly Instream
Continuous Instream
Continuous Instream (Stage Only)
Structural BMP Storm
Benthic Macroinvertebrate Monitoring
MS4 Permit Area
0 0.5 1 2
Miles