

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 2022-23

October 27, 2023

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.

  
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Mark Bechtel, AICP, Operations Division Manager

10/27/2023

Date

Prepared by  
City of Salem Public Works Department



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## 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 until a new permit was issued.

DEQ issued the City its fourth MS4 permit on September 15, 2021, and it went into effect on October 1, 2021. The City submitted its updated SWMP Document with the FY 2021-22 annual report. The FY 2021-22 annual report package included the elements necessary to meet requirements of the third and fourth permits, including an updated 2022 Stormwater Management Program Document that was open to public comment for 30 days, a mercury minimization assessment, and Winter Maintenance Activities (Winter Weather Snow and Ice Plan).

Salem's most recent SWMP Document was approved by DEQ in January 2023. As a result, the City worked under two SWMP documents for FY 2022-23 and the actions are reported on accordingly. In addition to the annual report, the permit deliverables with a due date of November 1, 2023, are also included: LID/GI Strategy and program description, the Infrastructure Retrofit and Hydromodification Assessment Update, update of the prioritization criteria for dry weather screening locations, and a review of construction escalating enforcement procedures. An updated Industrial/Commercial Strategy is also due by November 1, 2023; however, the City updated and provided a 30-day public comment period on it last fiscal year and submitted it to DEQ along with the 2021-22 annual report.

The current MS4 permit issued to the City of Salem covers the Willamette River Basin with the Middle Willamette River and Molalla-Pudding Subbasins that include the following waterbodies:

Willamette River, Little Pudding River, Claggett Creek, Battle Creek, Clark Creek, Croisan Creek, Gibson Gulch (Creek) Glenn Creek, Laurel Creek, Mill Creek, Pettijohn Creek, Shelton Ditch, and the Willamette Slough.

In addition to addressing pollutants in stormwater through the NPDES MS4 permit and its associated SWMP Document, the City's efforts also address wasteload allocations of the following:

- 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 2022 DEQ-approved SWMP Document that were completed during the period of July 1, 2022, through June 30, 2023. The information presented in this report is based on the requirements listed in Schedule B.5 of the 2010 MS4 Permit (see Table 1).

<b>Table 1. Annual Reporting Requirements for the MS4 Permit</b>		
<b>2021 Permit Section</b>	<b>Reporting Requirement</b>	<b>Location in Annual Report</b>
B(3)(a)	The status of implementing the stormwater management program and each control measure program element in Schedule A.3, including progress in meeting measurable goals and program tracking and assessment metrics identified in the SWMP Document as well as additional annual reporting requirements identified in each section, or, prior to SWMP Document approval by DEQ, measurable goals and tracking metrics approved under the previous permit's approved Stormwater Management Plan(s).	Section 2
B(3)(b)	A summary of the adaptive management implementation and any changes or updates to programs made during the reporting year, including rationales for any proposed changes to the stormwater management program (e.g., new BMPs), and review of related new and historical monitoring data. This summary should also include discussion of the implications of, or any findings related to recent years' adaptive management and/or changes made to the SWMP Document, based on data from tracking measures, measurable goals, and any monitoring related to the change.	Section 1.3
B(3)(c)	Any proposed changes to SWMP program elements that are designed to reduce TMDL pollutants.	Section 1.3
B(3)(d)	A summary of education & outreach and public involvement activities, progress toward or achievement of measurable goals, and any relevant assessment of those activities. This should include planned adaptive management or other program enhancements to occur in the following year.	Section 2 and associated attachments
B(3)(e)	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 4
B(3)(f)	A list of entities referred to DEQ for possible 1200-Z NPDES general permit coverage based on permittee screening activities, a list of categories of facilities inspected, and an overview of the results of inspections of commercial and industrial facilities.	Section 2, IC-1



<b>Table 1. Annual Reporting Requirements for the MS4 Permit</b>		
<b>2021 Permit Section</b>	<b>Reporting Requirement</b>	<b>Location in Annual Report</b>
B(3)(g)	A summary of total stormwater program expenditures and funding sources over the reportingfiscal year, and those anticipated in the next fiscal year.	Section 3
B(3)(h)	A summary of monitoring program results, including monitoring data that are accumulated throughout the reporting year submitted in the DEQ-approved Data Submission Template, and any assessments or evaluations of that data completed by the permittee or an authorized third party.	Section 5
B(3)(i)	Any proposed modifications to the monitoring plan that are necessary to ensure that adequate data and information are collected to conduct stormwater program assessments.	Section 5
B(3)(j)	An overview, as related to MS4 discharges, of concept planning, land use changes and new development activities (including the number of new post-construction permits issued) that occurred within the Urban Growth Boundary (UGB) expansion areas during the reporting year, and those forecast for the following year, where such data is available.	Section 6
B(3)k	The details of all corrective actions implemented associated with Schedule A.1.b.iii during the rreporting year.	Section 5
B(3)l	Additional Annual Report requirements found in these sections of the permit shall also becomplied with: <ul style="list-style-type: none"> <li>● Schedule A.3.c.vii – IDDE</li> <li>● Schedule A.3.d.vii. – Construction</li> <li>● Schedule A.3.e – Post-Construction Site Runoff Program</li> <li>● Schedule A.3.f.v.C – Winter Maintenance information</li> <li>● Schedule A.3.h.i – Hydromodification Assessment and Stormwater Retrofit StrategyUpdates</li> <li>● Schedule D.3.b – Mercury Minimization Assessment</li> </ul>	Section 7

### 1.3 Adaptive Management

The stormwater management program that is described in the City's 2022 SWMP Document is the result of adaptively managing (e.g., implementing, evaluating, and adjusting) the program since first being issued an MS4 permit in 1997. The City provided a history of the adaptive management approach in Section 2 of the City's "National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permit Renewal (September 2, 2008)," and also submitted and "Adaptive Management Approach" to DEQ on October 24, 2011, as required by the 2010 MS4 permit. For the 2021 MS4 permit, no strategy is required to be submitted; however, per Schedule A.2.d the City must provide metrics in each annual report that can be used for adaptive management purposes to help determine whether programmatic improvements are needed. Schedule A.2.f also states the City must continue to follow the adaptive management approach developed under the previous permit in order to "assess and modify, as necessary, any or all existing SWMP components and adopt new or revised SWMP components to achieve reductions in stormwater pollutants to the MEP." By adaptively managing its stormwater management program, the City continues to reduce the discharge of pollutants from its stormwater system.

In preparation of the Stormwater Management Program (SWMP) Document update that was due to DEQ November 1, 2022, information provided in previous years' adaptive management process was reviewed and used to update the new SWMP Document. During FY 2022-23, the City of Salem was operating under the former SWMP for approximately six months and the current approved SWMP Document for six months.

The City of Salem recognizes adaptations needed for some of the reported items, some of which are due to improving the data collection and some seek to provide the most appropriate and meaningful metric for reporting. BMP IL-1 Spill Prevention and Response under the Illicit Discharge Detection and Elimination BMP has the following tracking measure: *Number and category of spill events and responses (including an estimate of the amount of spilled materials collected and any associated enforcement actions)*. The City can provide the tracking measures for the number and categories of spills and responses; however, estimating the total amount of spilled materials is difficult to determine especially when the focus of the response is on cleaning the materials to prevent them from entering the storm drains. Additionally, estimating the quantity of materials spilled does not provide information that can be used to improve the spill response program. Consequently, we request to remove the portion of the tracking measure that asks for the City to report on estimated spilled materials collected.

The City of Salem will be adapting the catch basin cleaning program elements related to tasks under OM-4 to ensure proper data collection of catch basins inspected and cleaned annually. The measurable goals associated with these tasks are to "inspect 50% of catch basins annually" and to "clean any catch basin that meets a 30% sediment accumulation threshold during the inspection." In previous fiscal years, the City determined the dimensions of each catch basin (the sump's length, width, and depth below the catch basin outlet pipe invert). Using an app created with the catch basin dimensions, the volume of debris removed can be calculated when staff enters information that shows the height of the debris compared to the outlet pipe invert once it is cleaned. To ensure that staff provide accurate information into the app, staff will receive training on how to perform measurements and the app will require digital photographs to be submitted during the inspection and after debris removal. Additionally, a dashboard noting the progress will be available to supervisors and managers so that they can monitor and course correct throughout the year.

The final adaptation to the program this year is related to the tracking measure under OM-5 Street Sweeping and Debris Control: *Number of curb-miles of streets swept, (add amount of debris removed and leaves collected)*. You will note in Section 2 of the report that information on the amount of leaves collected was provided and that the City will be looking into the best way to track the street debris and will seek to implement this process during fiscal year 2023-24, if feasible. Staff from Stormwater Quality,

Signs and Sweeping, and Pumps and Controls will meet to determine whether a mechanism to collect meaningful data for managing the program can be determined.

Figure 1. Permit Area Map

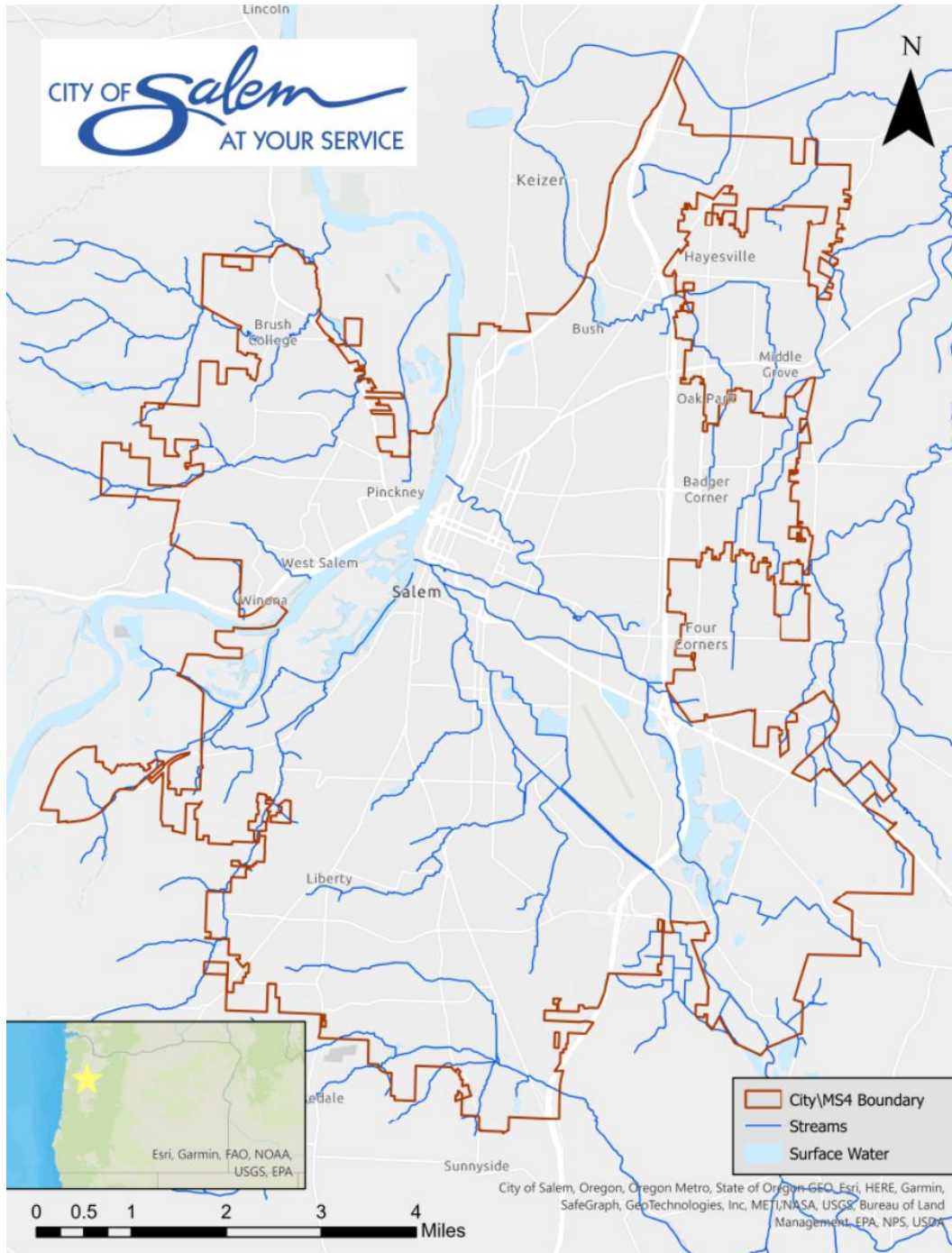
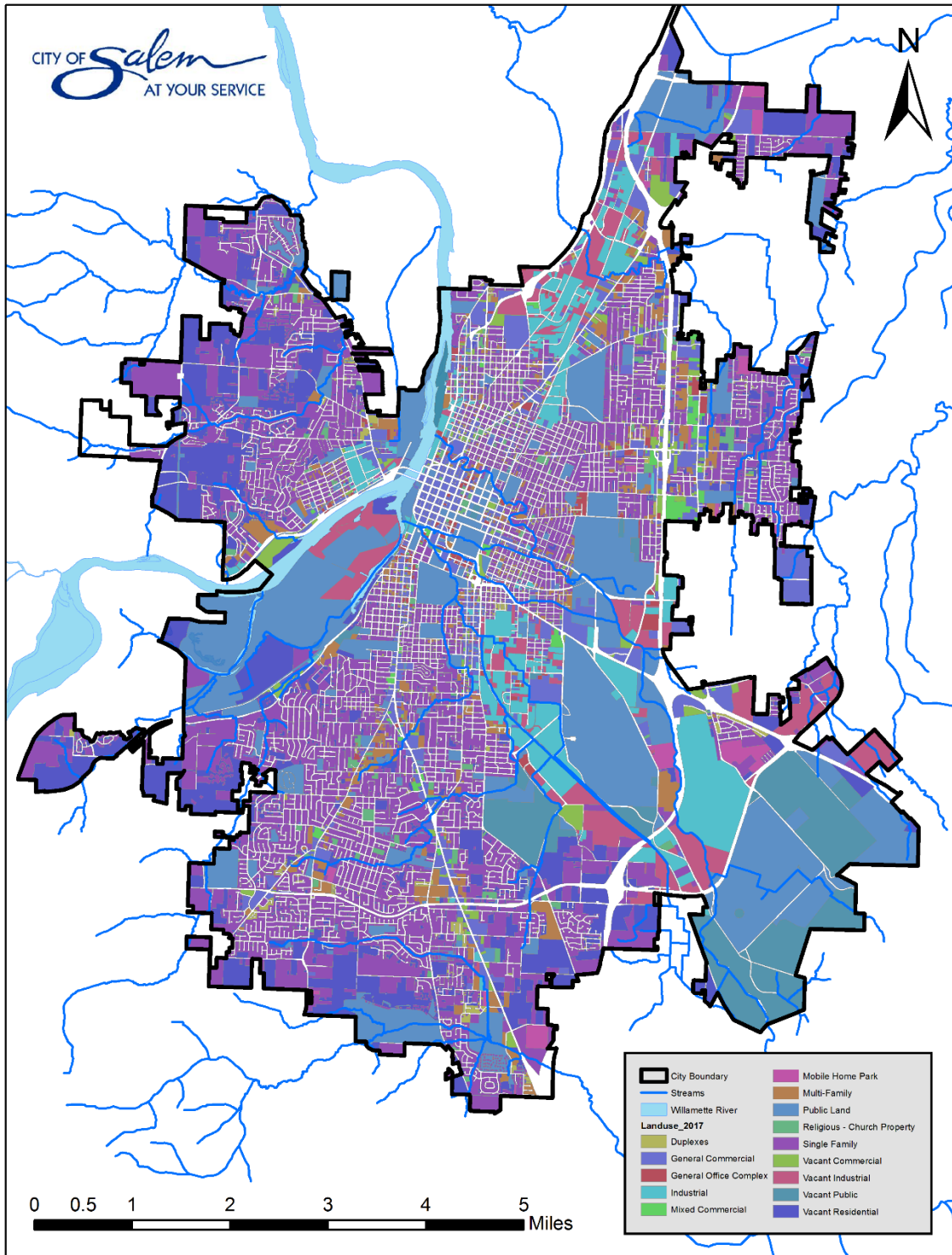


Figure 2. Land Use



## 2 STATUS OF THE STORMWATER MANAGEMENT PROGRAM DOCUMENT

The primary objective of the SWMP Document 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 2022 SWMP Document is discussed in this section of the Annual Report. BMPs within the SWMP Document have been categorized into the following control measures:

- Education and Outreach (EO)
- Public Involvement and Participation (PI)
- Illicit Discharge Detection and Elimination (IL)
- Construction Site Runoff Control (EC)
- Post-Construction Stormwater Management (PC)
- Municipal Operations and Maintenance (OM)
- Industrial and Commercial Facilities (IC)
- Stormwater Program Implementation (SP)

Each BMP identified in the 2022 SWMP Document is discussed in this report with the following information:

- A table describing BMPs, associated measurable goals, and tracking measures as stated in the 2022 SWMP Document.
- Notation of which TMDL pollutant the BMPs address along with a summary of activities completed during FY 2022-2023 (July 1, 2022, through June 30, 2023) that demonstrates progress toward meeting the measurable goals and tracking measures.

**Table 2: Education and Outreach BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<p><b>EO-1. MS4 Staff Training</b> (Previously RC 1-4, RC1-8, RC 4-3, RC 4-4)</p>	<p>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 understand 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.</p> <p>The Operations and Maintenance (O&amp;M) workgroup will conduct safety and tailgate meetings to review and improve the O&amp;M practices and training needs with regards to safety and protection of water quality.</p> <p>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.</p>	<p>Conduct annual training of staff involved in MS4-related positions, in accordance with the NPDES MS4 Training Plan.</p> <p>Stormwater supervisors will meet quarterly to coordinate training and adaptively manage programs.</p>	<p>Training dates and number of staff attending</p> <p>Dates of stormwater supervisor meetings</p>	<p>✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature</p>	<p><b>Conducted:</b> Twenty Environmental Services Staff, Stormwater Services Staff, Field Supervisors, and Public Works and Community Development Enforcement Staff completed the online training provided by Nathan Hardebeck from CWT Training Academy. An additional 8 stormwater services staff viewed the training video. Enrollment date: June 20, 2023. Training dates range: June 20, 2023 – June 29, 2023. Total staff trained: 28</p> <p><b>Coordinated:</b> Stormwater supervisors and related staff met 17 times during the year to discuss program and project management and coordination, and to discuss asset management changes.</p> <ul style="list-style-type: none"> <li>• May 16: Detention Basin &amp; Water Quality Facility Meeting (Legal Prep)</li> <li>• June 16: Discuss Private Detention Basins Inspection, Maintenance and Legal Authority</li> <li>• June 20: Stream Crew Prep meeting</li> <li>• May 30: Fire Prevention Vegetation Control at Claggett Creek Natural Area</li> <li>• May 4: Shared Asset Discussion - Stormwater Quality and Operations and Maintenance</li> <li>• April 25: Stream Crew Prep Meeting</li> <li>• April 12: Detention basin inspections</li> <li>• March 15: Proposed revisions to Flow Control MH drawings</li> <li>• March 1: SW CB Survey - Process Mapping</li> <li>• October 19: Resident issue follow up meeting</li> <li>• September 7: Procedures for camp clean ups related to stormwater</li> <li>• September 1: MS4 and APWA for annual reporting</li> <li>• August 19: SWMP BMP overview</li> <li>• August 10: Work Order &amp; GIS Clarifications</li> <li>• August 9: CityWorks Creek Discussion</li> <li>• July 7: Clark Creek between Rural and Howard Street Clean Up</li> <li>• July 1: Catch Basin Cleaning Reporting and Dashboard</li> </ul>

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<b>EO-2. Public Education and Outreach</b> (Previously RC1-5, RC5-1, RC5-2, RC5-3, ILL3-3, ILL3-4)	<p>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 <a href="http://www.CleanStreamsSalem.org">www.CleanStreamsSalem.org</a>. 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.</p> <p>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 coordinate with other agencies, NGOs, private environmental groups, and watershed councils.</p> <p>Based on the campaign's selected audience, translate stormwater program materials (brochures, flyers, manuals, guidelines, and website) into culturally relevant messages.</p>	<p>Create an annual education and outreach plan showing Priority audience, topic, messaging method (Formerly RC 5-1 and RC 1-5)</p>	<p>Confirm development of annual education and outreach plan</p>	<ul style="list-style-type: none"> <li>✓ TSS</li> <li>✓ Bacteria</li> <li>✓ Mercury</li> <li>✓ Temperature</li> </ul>	<p><b>Created:</b> An annual outreach plan was created for FY 22/23. See attachment 1: Clean Streams Outreach Plan and Report. In addition to the local Clean Streams Initiative, the City also works with the regional stormwater education group (Mid-Willamette Valley Group) and the statewide Clean Rivers Coalition to provide additional means for outreach to the Salem community.</p>
		<p>Meet with City's DEI coordinator annually, during development of outreach and education plan. (New item)</p>	<p>Date of meeting with DEI coordinator</p>		<p><b>Amended:</b> The focus of our inclusiveness in outreach materials training is provided through conferences and trainings. Staff attended two conferences this year: 1. Pacific NW Social Marketing Association SPARKS Conference Presentation: Centering Equity in Communications, A Community-Centered Approach to Creating Campaigns with the Black/African Community; Ethics, Equity, Efficiency Training; 2. Social Marketing Association of North America Webinar: Harnessing Equity-Centered Narrative Change for Effective Social Marketing</p> <p>Unfortunately, due to budgetary constraints the DEI position will not be filled in FY 2023-24. We will continue to learn about DEI in outreach through various vendors.</p>
		<p>Implement identified public outreach activities and campaigns. (Formerly RC 5-1 and RC 1-5)</p>	<p>Create an annual report that details the outreach activities and includes an evaluation of at least one outreach event or program for adaptive management.</p>		<p><b>Implemented:</b> The annual plan for FY 22/23 was implemented See attachment 1: Clean Streams Outreach Plan and Report to view the plan and the goals reached during implementation of the plan. A fuller description of outreach completed can be found in attachment 2: Clean Streams Outreach Report FY 2022-23.</p>
		<p>Support Marion County in providing alternatives for household hazardous waste disposal, including mercury containing items. (Formerly ILL 3-4)</p>	<p>Types of publicity for Marion County household hazardous waste program</p>		<p><b>Advertised:</b> Information about Marion County household hazardous waste was provided in the Clean Streams e-newsletter Stream Currents in the October and November 2022 Issues; on a Facebook Post October 25, 2022; and one week of radio ads on local stations KMUZ and KBZY during October 17 – 21 for CFL disposal and one week from December 5 – 9 on e' cycling.</p>

**Table 3: Public Involvement and Participation BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<b>PI-1. Stormwater Program Website</b> (New BMP)	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	Confirm website update in 2022.		<b>Created and reviewed:</b> A new webpage was created to house all information for the annual report and all associated documents, links, and policy updates. In addition, several documents on the website were updated and a link was corrected during the reporting year.
		At least annually review the webpages to check for accuracy, working links, staff changes, new documents, and policy updates.	Completion of annual website review checklist.		
<b>PI-2. Watershed Grants</b> (Previously RC 8-1)	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.	Annual inclusion of \$50,000 in the budget  Number of approved Watershed Grants, their project category, and overall funds spent.	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature	<b>Funded:</b> \$50,000 was included in the FY 2022-23 budget.  <b>Approved:</b> One grant was approved (stormwater retrofit of a water quality facility). The project is in progress and funds are available for reimbursement in FY 2023-24.
		Promote the grant program.	Promotion mechanism and frequency		<b>Promoted:</b> Staff engaged with 29 landowners. Zero applications were submitted thus far; however, lots of interest was generated and good potential projects were identified. It was also promoted on the radio during the following weeks: January 30 – February 3 and February 27 - March 3.
<b>PI-3 Adopt-a-Street Program</b> (Previously ILL3-1)	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	<b>Ongoing:</b> The Adopt a Street Program is up and running at normal capacity. No big changes from last year, however, the miles of adopted streets have dropped slightly, the number of volunteers is up by about 100, and the amount of garbage is down by about 500 lbs.  <b>Stats:</b> Miles of adoptable streets: 112.55 Miles of streets adopted (including pending): 93.61 Number of groups: 93 (this number includes some individuals) Number of volunteers: 1,523 Pounds of garbage collected: 16,434 New applications: The online application continues to bring in many applications. This year 6 groups dropped off, but 28 new applications were received. However, many of those applications did not translate into adopted streets this year. At the moment 15 streets are up for adoption, which is up five from last year, but some of these are in the process of adoption.



<b>PI-4 Adopt-a Stream Program</b> (Previously ILL3-3)	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 water quality and encourages their involvement in further stewardship opportunities.	Continue to support the Adopt-a-Stream Program.	Number of participating groups, and support provided.	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature	<b>Supported:</b> Staff provided 10 water-related presentations to local schools.
<b>PI-5 Storm Drain Marking Program</b> (New BMP)	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	<b>Marked:</b> Nineteen volunteers marked 323 storm drains.
<b>PI-6 Volunteer Green Infrastructure Cleaning Program</b> (New BMP)	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.	Progress towards program development of volunteer GSI cleaning program	✓ TSS ✓ Bacteria ✓ Mercury	<b>In development:</b> Staff worked to create the volunteer program. The program structure has been developed as well as a webpage. A review of the program is needed before launch in FY 2023-24.
		Develop volunteer GSI cleaning program by June 30, 2024.	Number of facilities cleaned by volunteers		<b>Scheduled:</b> This volunteer opportunity is scheduled for implementation by June 30, 2024.

**Table 4: Illicit Discharge Detection and Elimination BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity	
<b>IL-1. Spill Prevention and Response</b> (Previously ILL1-1, ILL1-2, ILL1-3)	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.	Update the City's Spill Response Plan (include a review schedule with a checklist for the Plan). Post it in the SWMP Document Library. (Formerly ILL 1-2)	Status of update to the Spill Response Plan (include Document refinements to cleanup procedures for vehicular accidents and structural fires).	✓ TSS ✓ Bacteria ✓ Mercury	<b>Updated:</b> The response plan for response to hazardous materials minor spills was updated on June 1, 2023. The Spill Response Plan has not yet been updated. The current iteration is posted on the City's website.	
		Continue to implement the spill prevention and emergency response program. (Formerly ILL 1-1)	Number and category of spill events and responses (including an estimate of the amount of spilled materials collected and any associated enforcement actions).		<b>Responded:</b> Staff responded to the following: 30 chemical leaks 140 fuel/oil spills 786 motor vehicle accidents	
		Conduct daily equipment inspections. (Formerly ILL 1-3)	Report revisions to the daily inspection program		<b>Revisions:</b> Using electronic Driver Vehicle Inspection Report (DVIR) forms for most vehicles. Paper inspection forms are used for all else.	
<b>IL-2. Illicit Discharge Detection and Elimination Program</b> (Previously ILL2-1, ILL2-2, ILL2-3, ILL3-2)	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.	Review, update, and post the City's IDDE Enforcement Response Plan in the SWMP Document Library.	Status of update to IDDE Enforcement Response Plan	✓ TSS ✓ Bacteria ✓ Mercury	<b>Status:</b> The Enforcement Response Plan is current, and no update was conducted this fiscal year.	
		Continue to operate the 24-hour Public Works Dispatch Reporting Center. (Formerly ILL 3-2)	Number of illicit discharge concerns reported		Track media outreach when a discharge warrants.	<b>Ongoing:</b> 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 371 incidents during this reporting period.
			Respond to reports of illicit discharges and suspicious water quality conditions within the timelines identified in the IDDE Enforcement Response Plan (Formerly ILL 2-1)			

		Maintain database to document unusual/suspicious discharges, sources found, and corrective actions taken.			database. A summary of enforcement actions and inspections is provided in Section 4 of this report.  <b>Stats:</b> There were six (6) violations during this reporting period.
		Review stormwater and ambient stream monitoring data to identify possible cross-connection discharges into the stormwater system. (Formerly ILL 2-3a)	Number of cross connections identified		<b>Ongoing:</b> Wastewater Collections also provide smoke and dye inspection of lines to identify cross connections. Two (2) cross-connections were identified during the reporting year.
		Take corrective action on any identified system cross connection problems. (Formerly ILL 2-3b)	Number of cross connections remedied		<b>Corrected:</b> All cross-connections (two) have been corrected.
<b>IL-3. Stream Crew Program (Dry Weather Screening and IDDE)</b> (Previously ILL2-4, RC4-7)	<p>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.</p> <p>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.</p> <p>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.</p> <p>Implement updated Dry Weather Outfall and Illicit Discharge Screening Plan, with annual priorities for field inspections.</p> <p>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.</p>	Conduct dry weather inspections for a minimum of 35 outfalls annually.	Number of outfall inspections conducted and results of inspections including follow-up activities.		<p><b>Ongoing:</b> The FY 2022-23 dry weather outfall screening effort recorded 130 outfall inspections (outfall structures or the first available upstream manhole), 109 of which had observable flow. Of these inspections, 50 are inspections associated with 38 outfalls identified as priority outfalls in the City's 2012 Dry Weather Outfall and Illicit Discharge Screening Plan and 80 inspections were associated with secondary outfalls. Outfalls with chlorine and/or <i>E.coli</i> detections were investigated further as resources allowed.</p> <p><b>Stats:</b> Of the 130 total outfall inspections, 92 outfalls were tested for chlorine, 4 of which were revisited for follow up chlorine testing. A total of 26 outfalls had some amount of chlorine present, 3 of which were revisited for follow up chlorine sampling. 30 outfalls received additional analytical sampling for field and/or laboratory parameters. 26 outfalls were tested for <i>E. coli</i>, 5 of which were revisited for follow up sampling. Results for all sites can be found in Attachment 3: Summary of Water Quality Data.</p>
		Develop GIS geodatabase for storage and display of observed dry weather flows and add observed dry weather flows to GIS geodatabase annually.	Number of outfalls with observed dry weather flows added to GIS geodatabase.		<b>Observed:</b> 100 outfalls with observed dry weather flows were added to the GIS geodatabase.
		Update Dry Weather Outfall and Illicit Discharge Screening Plan in 2023 with updated priority areas, pollutant parameter actions levels, and water quality sampling SOPs.	Status of updating the Dry Weather Outfall and Illicit Discharge Screening Plan	<ul style="list-style-type: none"> <li>✓ TSS</li> <li>✓ Bacteria</li> <li>✓ Mercury</li> </ul>	<b>Updating:</b> The Dry Weather Outfall and Illicit Discharge Screening Plan is currently undergoing internal review and update for the submission to DEQ by November 1, 2023. See attachment 4.

		Walk 50% of waterways within Salem each year for stream clean up and enhancement. (Formerly RC4-7)	Waterway miles walked and the amount of garbage/litter removed.		<b>Walked and cleaned:</b> The 2022 Stream Crew walked 68.3 miles (75.89% of the total estimated 90 miles of stream) and they removed 20,040 lbs. of trash.

**Table 5: Construction Site Runoff Control BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<b>EC-1. Erosion Control Requirements</b> (Previously CON1-1, RC9-1, RC9-2, and RC9-3)	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	Update SRC Chapter 75 to update the threshold for erosion control requirements for consistency with NPDES MS4 permit by November 1, 2024.	Status on updating SRC Chapter 75	✓ TSS ✓ Mercury	<b>Planned:</b> The SRC Chapter 75 update is planned to occur in FY 2023-24 to submit to DEQ by the November 1, 2024, due date.
		Review and update (if needed) the Erosion Prevention and Sediment Control Technical Guidance Handbook.	Status on updates to the Erosion Prevention and Sediment Control Technical Guidance Handbook.		<b>None:</b> No updates were documented.
<b>EC-2. ESC Plan Review</b> (Previously CON1-3, CON1-5)	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.  Develop educational materials that guide small construction site managers in developing a simplified ESC Plan. Develop an educational "do/do not" fact sheet that is focused on erosion control techniques for single family construction sites. Provide educational materials to construction applicants.	Post the City's ESC Plan Review Procedures in the SWMP Document Library. (Con 1-3)			<b>Completed:</b> Document was posted to the stormwater report webpage in October 2022.
		Perform ESC Plan reviews and issue construction permits. (Con 1-1)	Number of erosion control plans reviewed, and permits issued		<b>Reviewed and issued:</b> 423
		Ensure requirements for 1200-CA compliance are incorporated into City construction plans, specifications, and contract documents. (Con 1-5)	Status of renewal of the City's 1200-CA permit		<b>Issued:</b> The 1200-CA general permit was issued August 11, 2022, and became effective September 15, 2022. The permit is set to expire on September 14, 2027.
		Develop ESC Plan educational resource webpage.	Status of developing educational materials for small site managers		<b>Reviewed:</b> Staff suggested adding information to the Erosion Control and Stormwater Management Summit page including links to standard erosion control details.
<b>EC-3. Erosion Control Inspections</b> (Previously CON1-3)	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.	Maintain inventory of permitted construction sites with contact information, project size, date of approved plan, inspections, and complaints	Number of preconstruction conferences that discuss erosion prevention and sediment control	✓ TSS ✓ Mercury	<b>Number of preconstruction conferences:</b> All 423 permitted construction sites have a preconstruction meeting including erosion control, as well as some other small projects that were not tracked.
		Make erosion prevention and sediment control key agenda items at all preconstruction conferences.	Number of erosion control inspections performed		<b>Number of inspections:</b> 4,238
		Include inspection of all site erosion prevention and sediment control measures as part of City projects.	Number of enforcement actions and the outcome of the actions		<b>Number of inspections and actions:</b> 27 notice of non-compliance, onsite correction, and stop work orders.

		Conduct construction site inspections in accordance with the City's documented Construction Site Inspection procedures.	Track number of 1200- CA inspections		<b>Number of 1200-CA inspections: 239</b>																		
		Conduct enforcement in accordance with the City's documented Erosion Control Enforcement procedures.			<b>Ongoing:</b> This current fiscal year's enforcement resulted in 27 notices of non-compliance, onsite correction, and stop work orders.																		
		Ensure the escalating enforcement procedure meets new permit requirements by Nov. 1, 2023.	Escalating enforcement procedures are documented and submitted by Nov 1, 2023, if needed.		<b>In progress:</b> The City has been working with a consultant to review and update the enforcement procedures, if needed, that will be submitted to DEQ for the November 1, 2023, due date. See attachment 5.																		
		Maintain inventory of permitted construction sites with contact information, project size, date of approved plan, inspections, and complaints			<b>Tracked:</b> All permitted site information is tracked with Amanda, with partial information on 1200C site inspections being collected in Survey123.																		
<b>EC-4. Training for Construction Site Operators</b> (Previously CON 1-2)	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	<b>Training conducted:</b> The Erosion Control and Stormwater Management Summit hosted 179 attendees on January 24, 2023. Of the 136 attendees that took the post-event survey, none identified as contractors. The attendee information follows: <table border="0"> <tr> <td>Construction Inspector</td> <td>16%</td> <td>26</td> </tr> <tr> <td>Engineer</td> <td>38%</td> <td>61</td> </tr> <tr> <td>Municipal Operations Staff</td> <td>17%</td> <td>28</td> </tr> <tr> <td>Regulatory Staff</td> <td>12%</td> <td>19</td> </tr> <tr> <td>Landscape Professional</td> <td>3%</td> <td>5</td> </tr> <tr> <td>Other</td> <td>14%</td> <td>22</td> </tr> </table>	Construction Inspector	16%	26	Engineer	38%	61	Municipal Operations Staff	17%	28	Regulatory Staff	12%	19	Landscape Professional	3%	5	Other	14%	22
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**Table 6: Post-Construction Stormwater Management BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<b>PC-1. Post Construction Design Standards</b> (Previously RC 3-1, RC 3-2, RC 9-2)	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.	Update SRC Chapter 71 by November 1, 2024.	Status on updating SRC Chapter 71	✓ TSS ✓ Bacteria ✓ Mercury	<b>In preparation:</b> The City has been working with a consultant to prepare the update to SRC Chapter 71 that will be submitted to DEQ for the November 1, 2024, deadline.
		Review and update the Stormwater Management Design Standards by November 1, 2024.	Updates to the Stormwater Management Design Standards		<b>In preparation:</b> The City has been working with a consultant to review and update the Stormwater Management Design Standards that will be submitted to DEQ for the November 1, 2024, deadline.
<b>PC-2. LID/GSI Strategy (New BMP)</b>	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.	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	<b>In preparation:</b> The City has been working with a consultant to prepare the strategy that will be submitted to DEQ for the November 1, 2023, deadline.
<b>PC-3. Development Review for Stormwater</b> (Previously RC 3-3, RC 3-4)	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.  Update 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 will help guide 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.	Update the stormwater submittal requirements checklist.	Status of stormwater submittal requirements checklist	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature	<b>In progress:</b> A stormwater submittal requirements checklist has been drafted by the City's stormwater consultant, OTAK, and discussed with staff. Final edits will be made after the stormwater standards and code sections have been drafted.
		Update the internal stormwater plan review SOP	Status of internal stormwater plan review SOP		<b>Planned:</b> The internal stormwater plan review SOP will be updated after the stormwater standards and code sections have been updated.
		Review all residential, commercial, and industrial plans submitted for City issued permits for compliance with the Stormwater Management Design Standards and associated SRC provisions.	Number of plans reviewed and permits issued for compliance with the Public Works Design Standards		<b>Plans reviewed and permits issued: 452</b>

	Update the internal SOP to outline standardized procedures for the review and approval of structural stormwater control plans.				
		Review all Willamette Greenway Permits for compliance with the Stormwater Management Design Standards and associated SRC provisions.	Number of plans reviewed for projects requiring Willamette Greenway Permits.		<b>Number: 4</b> 1887 Water Street 1112 Edgewater Street 1105 Front Street 102 Pine Street
		Conduct inspections once construction is completed to ensure work was done in accordance with approved plans.	Number of final inspections		<b>Number of final inspections: 448</b>



**Table 7: Municipal Operations and Maintenance BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<b>OM-1. Asset Management and Systemwide Mapping</b> (Previously RC1-3, RC 7-1, RC 7-2)	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 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.	Record maintenance/updates made to the GIS database(s)		<b>Updated:</b> Added new public and privately owned and maintained features and made any necessary changes to the data. For any edits or new features created, the person and date/time of the edit were recorded. Staff updated (added or edited) a total of 177 water quality facilities and an additional 6 natural areas.  <b>Updated:</b> Updates were made to the creeks based on aerial imagery and plans that the City receives. Twenty- five edits were made to the stream or creek layer, two to the ephemeral stream or creek layer. In addition, 32 edits were made to the ditch layer and 14 to network flow (overland flow).  <b>Ongoing:</b> The City has been working on a migration to CityWorks to manage their assets. Staff have held multiple stakeholder meetings, small group meetings, and supervisor meetings to gather input, feedback, and information prior to updating the system, which is slated to for a Fall 2023 launch.
	Continue to track O&M activities in the Hansen IMS database. The database should reflect completion of any capital improvement projects, the addition of new stormwater facilities, and the refinement of data for the existing system.	Continue to review and refine the database of maps and waterways.	Track completion of additional ground truthing activities and waterways map updates		
	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.	Complete and implement an action plan for how the GIS and IMS system will be integrated and updated.	Track completion of action plan items and implementation status of the GIS and Hansen IMS database integration.		
	Continue work to integrate Hansen IMS data into the GIS system, so that the Hansen IMS database can be visualized using the GIS system.				
<b>OM-2. Public Stormwater Facility Inspection and Maintenance</b> (Previously RC 4-8, RC 4-9)	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 in 2023.	Status of stormwater management facility inspection schedule	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature	<b>Developed:</b> An inspection schedule was developed and will be implemented in the fiscal year 2023 -2024.  <b>Digital facility inventory number:</b> 1,869  <b>Facilities inspected:</b> 782 of 1,801 public stormwater facilities, or 43 percent.  <b>Work orders generated and completed:</b> 888 work orders were generated and completed for maintenance on public stormwater facilities. 469 were general field, 24 were for planting, 6 were for pruning, 35 for vegetation management, 159 for weeding, 126 for inlet cleaning, and 69 for sediment removal.
	Develop a stormwater management facility inspection schedule 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.	Add all newly constructed stormwater management facilities to the digital inventory when they come into public ownership and maintenance responsibility.	Number of public stormwater management facilities in the digital inventory		
	Identify maintenance needs and issue maintenance work orders for public facilities.	Inspect 100% of public stormwater management facilities within the permit cycle	Percent of stormwater management facility inspections per year		
	Complete identified maintenance actions for public stormwater management facilities to maintain performance standards.	Generate work orders based on inspections and track progress toward completing work orders.	Number of generated and completed maintenance work orders for public facilities		
<b>RC 4-9</b>	<b>RC 4-9 is carried over from the 2010 SWMP due to FY 2022-23 being a hybrid year where the City operated under two SWMPs, each for</b>	Document and implement a long-term maintenance strategy for public and private stormwater	Track progress toward developing a facility long-term maintenance strategy.		<b>In development:</b> multiple meetings have taken place to discuss issues, options, and strategies.



	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.				<b>Roadside Ditch Cleaning:</b> Of the length mowed, 79,047 linear feet of ditch needed cleaning. <b>Drainage Ditch Mowing:</b> 100% of the drainage ditches was mowed.
BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<b>OM-5. Street Sweeping and Debris Control</b> (Previously RC4-1, ILL3-5)	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 Prevention Plan (OPPP) (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.	Review street sweeping program annually for effectiveness and any necessary revisions to sweeping schedules. (Formerly RC 4-1)	Provide information on changes	✓ TSS ✓ Bacteria ✓ Mercury	<b>Updates:</b> Staff set a goal to increase the sweeping frequencies of major bicycle routes going through Salem. This task was accomplished by hiring a 3rd night sweeper thus allowing the arterial road bicycle lanes to be swept more often. Areas with frequent reports of construction debris were targeted. The City now gets little to no calls into dispatch regarding heavy debris in bike lanes. Staff also meet every 4 months to discuss any deficiencies in sweeping and additional roads or neighborhoods that need to be incorporated into the routes.
		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. (Formerly RC 4-1)	Number of curb-miles of streets swept, (add amount of debris removed and leaves collected)		<b>Sweeping totals:</b> Swept 19,568 curb miles. This is a slight increase from FY 21-22. Part of the reason is that a 3rd night sweeper operator was hired in May 2023. The City is scheduled to hire a 3rd daytime operator in October 2023. This should result in a significant increase in sweeping miles. Sweeping resulted in approximately 4655 cubic yards of leaves removed. The City will be looking into the best way to track the street debris and will seek to implement this process during fiscal year 2023-24, if feasible.
		Continue sweeping City owned parking lots as needed. (Formerly RC 4-1)			<b>Continued:</b> The City has continued to sweep City-owned parking lots as needed or requested. This includes the shops complex swept on a monthly basis (12x year) and Willow Lake Treatment Plant complex 6 times a year.
		Update waste processing facility disposal protocols and include in OPPP.	Status of the update to waste disposal protocols		<b>To be scheduled:</b> At this time, the waste processing facility disposal protocols have not been updated. They will be reviewed when the City looks at updating the OPPP, which is planned for FY 2023-24.
		Continue to support the Fall Leaf Haul effort. (Formerly ILL 3-5)	Fall Leaf Haul dates and collection amounts.		<b>Continued:</b> The City held two Fall Leaf Haul events: November 19 and December 10, 2022. Roughly 205 cubic yards of leaves were collected. The City has discontinued having this as a volunteer event and it is staffed by City personnel.

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
OM-6. Winter Road Maintenance (Previously RC4-2)	<p>Both sanding and de-icing chemicals are used to treat roadways for ice and snow. Continue to perform de-icing operations in a way that minimizes stormwater pollution.</p> <p>Conduct annual inspections and training to ensure proper operation of the deicing chemical storage facility. Utilize the expanded covered storage area for deicing material storage.</p> <p>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.</p> <p>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.</p>	Continue current de-icing operations to prevent stormwater pollution.	Dates of annual inspections and training related to deicing	<ul style="list-style-type: none"> <li>✓ TSS</li> <li>✓ Mercury</li> </ul>	<p><b>Date of training and inspections:</b> 11/4/2022 - annual training for snow and ice operators, covered equipment set up and usage, material storage, spill response, and application rates. Epoke sanders, plows, tanks, and spraybars were gone through by Fleet during the first week of November to prepare for the snow/ice season.</p> <p><b>Applied materials:</b> For the 13 unique events (2 multi-day events), approximately 25,600 gallons of Freezgard Zero liquid deicer (Magnesium Chloride solution) were applied, and 1,300 yards of sanding rock. The map of routes that shows bridge treatment for ice, primary snow routes, secondary snow routes, and pretreatment deicer routes is located at <a href="https://salem.maps.arcgis.com/apps/insant/interactivelegend/index.html?appid=37ca1060b106460f9cb4afed1a67a85b">https://salem.maps.arcgis.com/apps/insant/interactivelegend/index.html?appid=37ca1060b106460f9cb4afed1a67a85b</a></p>
		Continue to research potential cost-effective reuse opportunities for deicing sand materials.	Deicing quantities applied annually including number of events and general locations		
BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
OM-7. Integrated Pest Management Procedures (Previously RC 4-5)	<p>The City will continue to implement a program for careful monitoring and management of pesticides, herbicides, and fertilizers.</p> <p>Over the permit term, staff will review and refine the City’s Integrated Pest Management (IPM) Plan, ensuring proper handling and storage of pesticides, herbicides, and fertilizers.</p>	Create and adopt citywide IPM Policy by June 2023.	Progress on adoption of policy	<ul style="list-style-type: none"> <li>✓ Bacteria</li> </ul>	<p><b>In progress:</b> IPM Policy has been approved by the City’s legal counsel and leadership team and is in the process of being formally adopted. While slightly delayed, we expect that the IPM Policy will be formally adopted early within the next fiscal year.</p> <p><b>Progress:</b> Not yet started.</p>
		Once IPM Policy is adopted, update and implement the Operational Plan by December 2025.	Progress on updating and implementing the Operational Plan		
BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
OM-8. Pollution Prevention for Operations (Previously ILL1-4)	<p>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.</p> <p>Expand the OPPP to include:</p> <ul style="list-style-type: none"> <li>• Updated list of facilities (properties) and activities where the pollution prevention strategies apply.</li> <li>• Guidelines for pesticide, herbicide, and fertilizers (in conjunction with OM-7).</li> <li>• Strategies for campsite clean-up, including trash disposal and stormwater pollution prevention during pressure washing</li> <li>• Pollution prevention strategies during bridge cleaning and maintenance activities.</li> </ul>	Expand and update the Operations Pollution Prevention Plan (OPPP)	Updates/revisions to the OPPP	<ul style="list-style-type: none"> <li>✓ TSS</li> <li>✓ Bacteria</li> <li>✓ Mercury</li> </ul>	<p><b>In progress:</b> Staff have been identified and are in the review phase of the update where they are identifying items for update including review of monthly facility inspections and biweekly recycling center inspections to determine key elements that should be added to the OPPP. Work on the plan update is scheduled to begin in November 2023.</p> <p><b>To be scheduled:</b> Once the plan is updated, trainings will be scheduled.</p>
		Provide at least one training per year for municipal staff on the updated OPPP.	Number of trainings provided and number of attendees.		

	<ul style="list-style-type: none"> <li>Expanded pollution prevention and good housekeeping strategies that incorporate new technologies and industry best practices.</li> </ul> <p>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.</p>				
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**Table 8: Industrial and Commercial Facilities BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
IC-1 Industrial and Commercial Strategy (Previously IND1-1, IND1-2, IND1-3, IND1-4)	<p>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.</p> <p>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.</p> <p>Notify facility owners and DEQ of 1200-Z permit potential.</p> <p>Maintain a database of industrial and commercial facilities with the potential for increased stormwater pollution based on the activities at the specific facility.</p>	Update Industrial/Commercial Facilities strategy with revised facility screening strategy, inspection processes, and documentation procedures by November 1, 2023.	Status of updated Industrial/Commercial Facilities Strategy		<p><b>Completed and submitted:</b> The City of Salem's Industrial and Commercial Facilities Stormwater Program document went out for a 30-day public comment period in 2022 prior to submitting the document along with the FY 2021-22 annual report to DEQ by November 1, 2022.</p>
		Develop database of industrial and commercial facilities with the potential for increased stormwater pollution.	Number of facilities referred for 1200-Z permits.		
INDI 1-1	<p>All INDI items 1-1 through 1-4 are carried over from the 2010 SWMP due to FY 2022-23 being a hybrid year where the City operated under two SWMPs, each for about six months. The items noted with an INDI prefix will not be carried into the FY 2023-24 reporting period.</p>	Develop process to coordinate with DEQ on industrial permits within the City.	Include stormwater observations as appropriate on inspection reports and follow-up actions.	<p>✓ TSS ✓ Mercury</p>	<p><b>Ongoing:</b> 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. Environmental Services staff notified the facility owner or contact person by letter. Regional staff for the DEQ Western Region were contacted by email with a scanned copy of the letter that was sent to the facility. Refer to ILL2 Task 2 for a total of facility inspections, and IND1 Task 2 for a total of facility plans reviewed.</p>
INDI 1-2		<p>Review industrial plans as necessary for additional stormwater treatment.</p> <p>Conduct inspections once construction is completed to ensure work was done in accordance with approved plans.</p>	Maintain database of plans reviewed and final inspections conducted.		<p><b>Ongoing:</b> Environmental Services staff reviewed and inspected 46 industrial and commercial plans.</p>
INDI 1-3		Send surveys to new customers as accounts are opened.	Track number of surveys sent out.		<p><b>Ongoing:</b> Environmental Services provides identified target businesses registration access to the City of Salem's online portal, where survey completion is prompted. Inspectors follow up with businesses that do not have a completed survey on record. Number of grease surveys requested: 140 Number of grease surveys completed: 21</p>
		Enter survey results into database – on-going as surveys are returned.	Track number of surveys returned and entered into database.		

					Number of dental surveys sent: 1 Number of dental surveys returned: 1
			Track targeted public education activities for specific industries.		<b>Outreach Opportunity:</b> Environmental Services staff attended the annual Salem Service Day (formerly Public Works Day) in June 2023.
<b>INDI 1-4</b>		Produce two technical bulletins for industrial users each year.	Track published technical materials prepared for industrial users each year.		<b>Continued:</b> Targeted and individualized (email and/or direct phone call) communication with permitted industrial users continued during FY 2022-23 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.
<b>IC-2. Industrial and Commercial Site Inspections (Previously IND1-1, IND1-2)</b>	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.	Inspect stormwater systems during inspections of City permitted wastewater users. (Formerly INDI 1-1)	Number of industrial/commercial stormwater inspections.		<b>Ongoing:</b> 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. Environmental Services notified the facility owner or contact person by letter. Regional staff for the DEQ Western Region were contacted by email with a scanned copy of the letter that was sent to the facility. Refer to ILL2 Task 2 for a total of facility inspections, and IND1 Task 2 for a total of facility plans reviewed. <b>Number of SW inspections conducted: 53</b>
		Document facility inspections, site operator meetings, and corrective actions.	Number of corrective actions identified through industrial and commercial site inspections.		<b>Number of corrective actions:</b> One corrective action resulted from Industrial/Commercial inspections.

**Table 9: Stormwater Program Implementation BMPs**

BMP Name	BMP Description	Measurable Goals	Annual Tracking Measures	TMDL Pollutants Addressed	FY 2022-23 Activity
<b>SP-1. Intergovernmental Coordination</b> (Previously RC1-6, RC1-8)	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.	Report on updates to SKAPAC Agreement and other intergovernmental agreements (IGAs)		<b>Update:</b> No new agreements were processed during FY 2022-23.
		Attend ACWA committee meetings and workshops as scheduled. (Formerly RC 1-8)	Document participation in ACWA committee meetings	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature	<b>Participated:</b> The Stormwater Quality Supervisor is the co-chair of the ACWA stormwater committee. She attends all committee meetings as well as ACWA Board meetings and conferences. Other City staff attend ACWA stormwater meetings based on relevance of topics presented.
<b>SP-2. Retrofit Progress Report</b> (New BMP)	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 Report	✓ TSS ✓ Bacteria ✓ Mercury ✓ Temperature	<b>In progress:</b> Work is being conducted to submit the Retrofit Progress Report to DEQ for the November 1, 2023, due date.
<b>SP-3. Hydromodification Progress Report</b> (New BMP)	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	<b>In progress:</b> Work is being conducted to submit the Hydromodification Progress Report to DEQ for the November 1, 2023, due date.
<b>SP-4. Permit Renewal Package</b> (New BMP)	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: <ul style="list-style-type: none"> <li>• 303(d) evaluation</li> <li>• TMDL Pollutant Load Reduction Evaluation</li> <li>• Proposed TMDL Benchmarks</li> <li>• Proposed changes to the monitoring program</li> <li>• Documentation of service area expansions in 2025</li> <li>• A fiscal evaluation in 2025</li> <li>• Updated MS4 maps in 2025</li> </ul>	Develop and submit permit renewal application to DEQ by March 30, 2025 (or alternate date determined by DEQ).	Status of completing permit renewal application.		<b>Scheduled:</b> No current work has been conducted for the March 30, 2026, permit renewal.



<p><b>SP-5. Implement Stormwater CIP</b> (Previously RC 1-7, RC 2-1, RC 2-2, RC 2-3)</p>	<p>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.</p> <p>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).</p> <p>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.</p>	Review, prioritize, and budget for identified capital improvement projects annually.	Confirm stormwater capital projects included in annual CIP budget	<ul style="list-style-type: none"> <li>✓ TSS</li> <li>✓ Bacteria</li> <li>✓ Mercury</li> <li>✓ Temperature</li> </ul>	<p><b>Confirmed:</b> The following stormwater-related projects are in the CIP process and budget:</p> <ol style="list-style-type: none"> <li>1. Shelton Ditch Sediment Removal, \$1,282,800</li> <li>2. Mill Race Deck Replacement, \$470,000</li> <li>3. Goldcrest Brook Stormwater Improvements, \$580,000</li> <li>4. Replace Railroad and McGilchrist St Culverts, \$2,500,000</li> <li>5. Mountain View Dr Stormwater Improvements, \$650,000</li> <li>6. McGilchrist St SE Corridor Stormwater Improvements, \$700,000</li> </ol>
		Review, prioritize, and budget for identified capital improvement projects annually.	Number and description of completed capital improvement projects related to stormwater and water quality		<p><b>Completed stormwater-related CIP projects:</b> Three stormwater-related projects were completed:</p> <ol style="list-style-type: none"> <li><b>1. Sunridge Dr Stormwater Improvements</b> - Installation of approximately 520 linear feet of 10-inch stormwater main to address flooding of private property (3301 Sunridge Dr S).</li> <li><b>2. Lucille Ave Stormwater Improvements</b> - Installation of approximately 600 linear feet of 10-inch stormwater main to address flooding of private property (4073 Lucille Ave SE).</li> <li><b>3. Elderberry Dr Stormwater Improvements</b> - Replacement of three sections of the existing 18-inch concrete stormwater pipeline for the installation of a CIPP liner and a spot repair at cleanout 25341 on Hillwood Court due an older 12-inch by 18-inch rectangular cleanout.</li> </ol>

### 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, commercial, or industrial 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 10 provides a summary of the total stormwater program budgeted per result area for the reporting year FY 2022-23 as well as the budgeted items for upcoming FY 2023-24.

<b>Table 10. Stormwater Budgeting</b>		
<b>Operational Task/Result Area</b>	<b>FY 23-24 Budgeted Items</b>	<b>FY 22-23 Budgeted Items</b>
Chemical Handling and Disposal	123,600	119,280
Code Compliance - PW	140,930	137,440
Environmental Compliance for Outside Departments/Agencies	272,910	232,350
Environmental Monitoring*	91,970	82,850
Floodplain Management and Regulatory Compliance	363,899	367,758
Flow Monitoring	262,230	253,986
Green Stormwater Infrastructure Maintenance & Natural Areas#	0	0
Mapping and Data Management	392,406	363,268
Natural Areas Management^	0	0
Natural Resources Education and Outreach#	0	0
Operational and Technology Transfers - Infrastructure	295,850	284,550
Public Works Dispatch	172,470	170,170
Storm Sewer Pipe Cleaning	608,270	651,260
Stormwater Construction	13,220,780	9,298,810
Stormwater Facility Inspections#	0	0
Stormwater Open Channel System Maintenance	2,850,527	2,611,915
Stormwater Pipe Inspection	962,660	637,820
Stormwater Pipe Maintenance	1,150,540	1,269,360
Stormwater Quality Monitoring	3,955,990	3,737,560
Utility Billing and Customer Service	205,700	195,800
Stormwater Infrastructure Planning	866,070	940,640
Hazardous Materials/Emergency Management; Street Sweeping Services	971,155	1,257,830

Debt Service - Stormwater Utility	284,457	358,064
<b>Total</b>	<b>28,654,194</b>	<b>24,179,770</b>

Due to the new budgeting system the City is using, the line items with zeros on which we have previously reported have been merged with other programs.

# Green Stormwater Infrastructure Maintenance & Natural Areas is now rolled up into Stormwater Quality.

^ Natural Areas was combined with Green Stormwater in FY 2022-23

# Natural Resources Education and Outreach was rolled up into Stormwater Quality

# Stormwater Facility Inspections was rolled into Stormwater Quality

\* Stormwater Quality portion of Environmental Monitoring is now rolled up into Stormwater Quality.

## 4 ENFORCEMENT ACTIONS, INSPECTIONS, AND PUBLIC EDUCATION

Environmental Services staff responded to 346 water-quality-related incidences (IL-2) during the reporting period and reported six violations during this time. Actions taken related to these violations are shown in the chart below.

Name	Date	Violation	Action Taken	Discharge	SRC
Apartment Residence	07-01-2022	Prohibited Discharge To The Storm Sewer	Warning	Sediment runoff	71.050
Residence	11-11-2022	Prohibited Discharge To The Storm Sewer	Warning	Food truck washwater	71.050
Pro Cure Inc	12-21-2022	Prohibited Discharge To The Storm Sewer	Notice of Violation	Commercial washwater	71.050
Transpacific Processing Inc	02-10-2023	Prohibited Discharge To The Storm Sewer	Citation	Leaking process waste	71.050
Proline Plumbing	04-14-2023	Prohibited Discharge To The Storm Sewer	Citation	Water line boring runoff	71.050
Residence	05-01-2023	Prohibited Discharge To The Storm Sewer	Warning	Concrete 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, Public Works Inspectors conducted 4,237 erosion control-related inspections on 735 project sites and had 27 enforcement actions.

Environmental Services staff conduct inspections of industrial/commercial properties throughout the year. An overview of the results of 56 inspections of commercial and industrial facilities included one citation to Transpacific Processing Inc. for process waste leaking into the storm system. A Notice of Violation was also sent to Pro Cure Inc. for discharging commercial wash water to the storm system and was based on a citizen complaint. See Table 11.

The permit requests a list of entities referred to DEQ for possible 1200-Z NPDES general permit coverage based on

permittee screening activities, a list of categories of facilities inspected, and an overview of the results of inspections of commercial and industrial facilities. See table 12.

One industry was referred to DEQ for possible 1200-Z NPDES general permit coverage based on permittee screening activities this past fiscal year: Transpacific Processing Inc.

ID No	Name	Permit Type	Permit No	Effective	NAICS
9176	Baxters North America EAST	Wastewater	WD9176	5/2/2022	311111
4726	Baxters North America WEST	Wastewater	WD4726	1/1/2023	311991
557	Capitol Recycling and Disposal Inc - A Republic Services Company	Wastewater	WD557	1/1/2022	562111
5976	Ennis-Flint	Wastewater	WD5976	6/6/2022	325510
3469	ISA Corporation	Wastewater	WD3469	1/1/2022	339113
4758	Kerr by Ingredion	Wastewater	WD4758	1/1/2022	311930
9123	LRI Landfill	Wastewater	WD9123	1/1/2023	562212
9072	Oregon Fruit Products LLC	Wastewater	WD9072	1/29/2021	311421
337	Oregon State Penitentiary	Wastewater	WD337	1/1/2022	922140
9028	Pacific Coast Producers	Wastewater	WD9028	1/1/2022	311421
5649	Packaging Corporation of America	Wastewater	WD5649	1/29/2021	322211
381	RainSweet West Plant	Wastewater	WD381	1/1/2023	311411
7082	Recology Organics - Aumsville	Wastewater	WD7082	1/29/2021	325314
9310	Recology Organics-North Plains	Wastewater	WD9310	1/14/2022	325314
6593	REsys Inc	Wastewater	WD6593	1/1/2023	333914
7635	Riverbend Landfill	Wastewater	WD7635	1/1/2023	562212
2421	SAIF Corporation	Wastewater	WD2421	5/1/2021	524113
2258	Salem Health Patient Care Building A	Wastewater	WD2258	1/29/2021	622110
5498	Salem Health Regional Laboratory	Wastewater	WD5498	1/1/2023	621511
379	Scenic Fruit Company - Salem Facility	Wastewater	WD379	10/1/2022	311411
4057	Shinsegae Foods INC.	Wastewater	WD4057	1/1/2023	311991
3104	Snyder's-Lance, Inc.	Wastewater	WD3104	1/27/2023	311919
9354	Transpacific Processing Inc	Wastewater	WD9354	9/14/2022	311411
7577	Valley Landfills, Inc. - a Republic Services Company	Wastewater	WD7577	1/1/2023	562212
386	Ventura Foods LLC	Wastewater	WD386	1/1/2022	311225
1731	Yamasa Corporation	Wastewater	WD1731	1/1/2022	311941
8854	Yaquina Bay Fruit Processors LLC	Wastewater	WD8854	1/29/2021	311421
522	Capital Chrome & Precision Grinding Inc	ZDCM	ZD522	1/29/2021	332813
5251	Garmin AT Inc	ZDCM	ZD5251	1/1/2022	334511
<b>Total Permits</b>					<b>29</b>

## 5 Monitoring

The City has submitted all monitoring data that has been collected throughout reporting year 2022-2023 electronically through the DEQ-approved Data Submission Template. Additionally, Attachment 3 includes a full summary and analysis of all monitoring data collected during fiscal year 2022-23 for Schedule B of the permit. In the 2010 SWMP, the monitoring program was included as a BMP (MON1-3); however, these monitoring BMPs were removed from the 2022 SWMP Document. The City continues to provide all the same information as it did previously; it is just consolidated into one location in this document (Attachment 3).

A revised Surface Water and Stormwater Monitoring Plan was submitted to DEQ with the last annual report in October 2022, and was approved on January 4, 2023. The most significant changes to the monitoring plan were to the storm event-based monitoring elements, and due to the timing of approval of the monitoring plan, no storm events were sampled for fiscal year 2022-23. Because of this, the City has no proposed modifications to the monitoring plan at this time, but that may change after storm event samples are collected.

In the City's monitoring plan, section 4.2.4 addresses the pollutant parameter action levels that were developed to address Schedule A.1.b of the permit for complying with water quality standards established in OAR 340-041. The City's two Quality Assurance Officers reviewed all data as they were received for any exceedances of the pollutant parameter action levels, and no exceedances occurring during fiscal year 2022-23; therefore, there are no corrective actions to report. Any potential illicit discharges that were detected through monitoring data or from calls to the City's 24-hour Dispatch Center were handled by Environmental Services staff as part of the IDDE program and are reported in that section of the annual report.

## 6 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 are currently being revised to reflect new requirements of the 2021 MS4 permit and will be submitted to DEQ with the next annual report by November 1, 2024.

### 6.1 Planning

Salem updated its Comprehensive Plan in the summer of 2022. It was the result of a multi-year project called Our Salem that involved broad community engagement. The updated Comprehensive Plan provides goals and policies that will guide how Salem grows and develops in the future. As part of the Our Salem project, the City also updated its Comprehensive Plan Map, zoning map, and zoning code. They all now align to advance the vision for future growth established in the updated Comprehensive Plan. More information can be found at <https://www.cityofsalem.net/our-salem>.

The City is now starting a multi-year project called Salem in Motion that will update the Salem Transportation System Plan (TSP). The project will address a variety of existing and emerging challenges and priorities, including reducing greenhouse gas emissions from transportation and addressing equity in transportation investments and impacts. Salem in Motion will build on the goals and policies adopted through the Our Salem project and the transportation actions included in the Climate Action Plan. It will also address new State requirements for transportation and land use planning that resulted from the Climate-Friendly and Equitable Communities (CFEC) rulemaking project. More information can be found at <https://www.cityofsalem.net/salem-in-motion>.

## 6.2 Land Use Changes

Petitioners initiated annexations for three properties between July 1, 2022, and June 30, 2023, for a total of approximately 5.94 acres.

Table 13: Land Use Changes Location and Description	Number of Acres
4800 Block of Macleay Road SE	4.21
572 HILE LANE NE	0.78
4815 AUBURN ROAD NE	0.95
<b>Total acres</b>	<b>5.94</b>

## 6.3 New Development Activities

The City of Salem has continued to see a steady stream of new projects at all phases of development. Below is a list of projects and their status for Commercial/Industrial development (44), Multi-family/Mixed-use development (21), and subdivisions (12).

Table 14: Commercial/Industrial Development		
Location	Description	Status
900 COURT STREET NE	Proposed development of a Vietnam War Memorial.	Project Complete
1100 AIRPORT RD SE	Construction of a new stand-alone electrical room and the modification of two existing parking areas.	Building Permits Issued
2142 TURNER RD SE	Reconstruction of a building containing storage units after a fire.	Building Permits Issued
681 REES HILL ROAD SE	A proposal to construct a pump station on property known as Rees Hill Park, which is south of Affinity Heights Subdivision.	Building Permits Issued
1595 CAPITOL ST NE	An application for development of a rehab clinic with various site improvements.	Land Use Complete
102 HRUBETZ RD SE	Modification of a previously approved decision to alter the off-street parking area and add a secondary driveway access to Pembroke Street SE.	Building Permits Issued
827 LANCASTER DR NE	An application for proposed site improvements adjacent to the former Sears building within the Willamette Town Center.	Building Permits Issued
2410 FAIRGROUNDS RD NE	Phased development of a motor vehicle sales use and motor vehicle services use, with vehicle display and vehicle storage areas.	Building Permit in Review
1075 8TH ST NW	An application for development of a new vehicle use area for the existing Walker Middle School.	Building Permits Issued

3997 CARSON DR SE	Development of gas station and retail building with associated modifications on two properties.	Building Permit in Review
835 COMMERCIAL ST SE	Proposed new 31,814 square-foot, three-story, medical/office building with associated site improvements and off-street parking.	Land Use in Review
3630 STATE ST	Development of a new quad addition to Roberts High School.	Building Permits Issued
2410 TURNER RD SE	A Managed Temporary Village for 40 individuals for Church At The Park	Building Permits Issued
3365 MARIETTA STREET SE	Development of a new 3 story building for childcare and offices.	Building Permits Issued
4500 MILL CREEK DR SE	Proposed development of a new gasoline service station, convenience store approximately 3,955 square feet in size, and car wash.	Building Permit in Review
1815 22ND ST SE	Proposed development of a new multi-tenant industrial park containing six buildings with a total floor area of approximately 84,000 square feet.	Building Permits Issued
3840-3950 MAINLINE DR NE	Proposed development of two new shell buildings.	Building Permit in Review
900 COURT ST NE	Oregon State Capitol Accessibility, Maintenance, and Safety (CAMS III) renovation project, including ADA accessibility, maintenance, and safety improvements.	Building Permit in Review
4660 RIDGE DR NE	Parking area expansion for the existing building, associated with warehousing and distribution use.	Land Use Complete
4870 TURNER RD SE	Site improvements for a food cart development, including indoor and outdoor seating, parking, and landscaping.	Land Use in Review
4710 MILL CREEK DRIVE SE	Proposed development of a new 479,000 square foot warehousing and distribution building.	Building Permit in Review
1921 TURNER ROAD SE	Addition on a canopy over an existing fueling station and minor associated improvements at the McNary Army Aviation facility.	Building Permits Issued
2135 COMMERCIAL ST NE	Development of a new off-street parking area for an existing development site.	Building Permit in Review
2475 25TH ST SE	An application for change of use to eating and drinking use and associated site improvements.	Building Permits Issued
3985 LINDBURG RD SE	Proposed new 9,000 square-foot, two-story, office building with	Building Permits Issued

	associated off-street parking and site improvements.	
3575 DEL WEBB AVE NE	Development of a new 10,640 square foot vocational trade school facility with associated site improvements.	Building Permit in Review
3501 PORTLAND ROAD NE	Paving of a new off-street parking area over an existing vacant portion of the CTEC property.	Building Permits Issued
155 COTTAGE STREET NE	Renovations at the Oregon State Executive Building including widening the access to an existing loading and solid waste service area.	Building Permits Issued
2190 25TH STREET SE	Development of two new industrial flex buildings approximately 45,864 and 50,704 square feet in size.	Land Use in Review
4900 BLOCK OF INDIAN SCHOOL ROAD NE	Development of a new gravel storage yard for a heavy vehicle and trailer service and storage use.	Land Use Complete
2373 KUEBLER ROAD S	Development of new paved pedestrian paths and accessory buildings at Sprague High School.	Building Permits Issued
315 LANCASTER DRIVE SE	Expansion of an existing AutoZone.	Building Permit in Review
2908 MARKET STREET NE	Redevelopment of a motor vehicle sales use, including removal of existing building, construction of a new 25,256 square-foot sales building, and new off-street parking and vehicle sales/display areas.	Land Use Complete
1920-1940 HYACINTH STREET NE	A consolidated application for development of a heavy vehicle and trailer storage lot.	Building Permit in Review
2195 HYACINTH STREET NE	Development of a new mixed-use building.	Land Use in Review
4900 Block of 27th Avenue SE	Development of a new mixed-use building site with retail, multifamily, office, and eating and drinking uses.	Land Use in Review
3225 STATE STREET	Development of a new off-street parking area to serve the Oregon Military Department's Anderson Readiness Center.	Land Use in Review
3405 DEER PARK DRIVE SE	A building addition at the Oregon State Correctional Institution.	Land Use Complete
1410 20TH STREET SE	Demolition of Building 2 at the City of Salem Shops Complex, development of a new vehicle storage area and pedestrian access.	Land Use Complete
2200 MINTO ISLAND ROAD S	The project involves improvements to the existing Parking Lots #2 and #3 within Minto-Brown Island Park.	Land Use in Review



9999 CULVER DRIVE SE	Proposed building and storage area for concrete construction contracting use.	Land Use in Review
4725 TURNER RD SE	Proposed warehousing and distribution use for Blue Box Storage and associated site improvements.	Land Use in Review
1720 13TH STREET SE	New outpatient medical services building and associated site improvements.	Land Use in Review
1205 20TH STREET SE	Expansion of the vehicle storage lot serving the Withnell Hyundai site.	Land Use in Review

<b>Table 15: Multi-Family/Mixed-Use Development</b>		
<b>Location</b>	<b>Description</b>	<b>Status</b>
5205 BATTLE CREEK RD SE	Proposed development of a 129-unit multiple family residential use with associated off-street parking, common open space, and site improvements.	Building Permits Issued
5775 COMMERCIAL STREET SE	Proposed development of a mixed-use building containing 71-dwelling units and 11,998 square feet of retail commercial floor area.	Building Permit in Review
1140 HOWARD ST SE	Proposed development of a five-unit multi-family building.	Building Permit in Review
1230 HIGHLAND AVENUE NE	Proposed development of a 12-unit multiple family residential use.	Building Permit in Review
1074 37TH AV NE	Proposed development of a 24-unit multiple family residential use	Land Use Complete
3480 BLOSSOM DR NE	Proposed development of a 90-unit multiple family residential use.	Building Permits Issued
1525 JONMART AV SE	Proposed development of an eight-unit multiple family residential use.	Building Permit in Review
1341 WALLER ST SE	Proposed development of a 24-unit multiple family residential use.	Appealed
1035 COMMERCIAL STREET SE	Mixed-use building containing 45 residential units, including four work/live units, with dedicated office, storage, trash enclosure, and off-street parking area.	Land Use Complete
1851 CORDON ROAD SE	Proposed development of a 396-unit multiple family apartment complex - Hawks Ridge Phase 3	Land Use Complete
1900 BLOCK OF LINWOOD STREET NW	Proposed development of a new 67-unit multi-family residential use.	Building Permit in Review
3997 CARSON DRIVE SE	New mixed-use building containing a drive-through oil-change facility and three residential units.	Building Permit in Review
4125 MARKET STREET NE	Proposed development of a new two-story multi-family apartment	Building Permits Issued

	building containing ten dwelling units.	
4195 AUMSVILLE HIGHWAY SE	Proposed development of a 279-unit multiple family residential apartment complex.	Land Use in Review
5534 SKYLINE ROAD S	Proposed development of a 16-unit multiple family residential use.	Land Use Complete
5080 MACLEAY ROAD SE	Proposed development of a 75-unit multiple family residential use.	Land Use Complete
102 PINE STREET NE	18-unit multifamily building within the Willamette Greenway (Pine Street West).	Land Use in Review
0 FRONT STREET NE	18-unit multifamily building with off-street parking improvements (Pine Street East).	Land Use in Review
2710 BROADWAY STREET NE	Proposed mixed-use building with ground floor retail space and 14 dwelling units in the upper floors.	Land Use in Review
2916 ORCHARD HEIGHTS ROAD NW	Proposed development of a 186-unit multiple family residential use.	Land Use in Review
255 CORDON RD NE	East Park Apartments phase 2, including an additional four buildings containing 42 dwelling units.	Land Use Complete

**Table 16: Subdivisions**

Location	Description	Status
4120 KURTH ST S	A six-lot residential subdivision of approximately 1.52 acres, with associated site improvements.	Land Use Complete
1440 BOONE RD SE	A tentative phased subdivision plan to divide approximately 0.75 acre into nine lots ranging in size from 2,000 square feet to 11,300 square feet.	Land Use Complete
380 FARM CREDIT DR SE	An industrial subdivision to divide approximately 10 acres into a total of 5 lots ranging in size from approximately 1.3 acres to approximately 2.5 acres in size.	Project Complete
6600 Block Lone Oak Road SE	A tentative phased subdivision plan to divide approximately ten acres into 40 lots ranging in size from 6,800 square feet to 12,248 square feet.	Land Use Complete
2100 BLOCK OF DOAKS FERRY RD NW	A six-lot subdivision for Titan Hill Estates in conjunction with a proposed multi-family development of 436 units for Titan Hill Apartments.	Appealed
1355 MILDRED LN SE	A residential subdivision for Toney Estates to divide 5.19 acres into 23	Land Use Complete

	lots ranging in size from approximately 4,785 square feet to 13,457 square feet.	
5045 MACLEAY RD SE	A residential subdivision to divide approximately 4.1 acres into a total of 24 lots ranging in size from 1,500 square feet to 6,696 square feet in size.	Land Use Complete
900 Block of Creekside Drive SE	A residential subdivision to divide the approximately 4.9-acres into four lots ranging in size from approximately 9,000 square feet to 185,769 square feet in size.	Final Plat in Review
4350 HEARTH ST NE	A phased residential subdivision plan to divide approximately 3.1 acres into 15 residential lots ranging in size from 4,072 square feet to 9,326 square feet.	Land Use Complete
5465 TURNER ROAD SE	A subdivision to divide approximately 390 acres of public zoned land into five lots ranging in size from approximately 15 acres to 246 acres.	Land Use Complete
6600 BLOCK OF DEVON AVENUE SE	A residential subdivision to divide approximately 6.60 acres into 48 lots ranging in size from 4,000 square feet to 4,900 square feet.	Land Use Complete
1800 PARK AVENUE NE	A residential subdivision to divide approximately 0.82 acres into six lots ranging in size from 4,006 square feet to 6,761 square feet.	Land Use in Review

## 7. Additional Annual Report Requirements

In addition to the annual report that details activities conducted as outlined in the SWMP Document, the permit indicates additional deliverables and their due dates that shall be complied with. The following table shows those requirements, their status, and where the information is located.

Section of Permit	Program Requirement	Status	Location
Schedule A.3.c.vii	IDDE- Tracking and Assessment	Ongoing	Provided with each annual report in IL as well as Section 4.
Schedule A.3.d.vii	Construction- Tracking and Assessment	Ongoing	Provided with each annual report in EC as well as tracked in Survey123 and Amanda databases
Schedule A.3.e	Post-Construction Site Runoff Program	Ongoing	Provided with each annual report in PC, additionally the

			LID/GI strategy is provided as Attachment 6.
Schedule A.3.f.v.C	Winter Maintenance Information- Tracking and Reporting	Ongoing	Provided with each annual report in OM-5 and OM-6, the Winter Maintenance Strategy was submitted with the fiscal year 2022-23 report and can be found on the City's website
Schedule A.3.h.i	Hydromodification Assessment and Stormwater Retrofit Strategy Updates	Completed	Submitted with the fiscal year 2022-23 annual report as Attachment 7.
Schedule D.3.b	Mercury Minimization Assessment	Completed	Submitted with the fiscal year 2021-22 annual report.

Attachments:

Attachment 1: Clean Streams Outreach Plan and Report

Attachment 2: Clean Streams Outreach Report FY 2022-23

Attachment 3: Summary of Water Quality Data

Attachment 4: Dry Weather Outfall and IDDE Screening

Attachment 5: Erosion Control Escalating Enforcement Procedures Memo

Attachment 6: LID/GI Strategy

Attachment 7: Hydromodification Assessment and Retrofit Strategy

# Attachment 1: Clean Streams Outreach Plan and Report

# Outreach & Public Involvement Plan and Report

Fiscal Year 2022/2023

**Goal: Attend at least 15 outreach events per year with varying key audiences.**

**Measures: Number of events attended, Audience reach**

**Outcome:** 24 events, 14,366 Total Attendance

Audience: General Public

Pollutant: All

Outreach Mechanisms: In-person Events (appendix with all events attached), radio

**Goal: Provide at least 15 water-related presentations per year.**

**Measures: Number of presentations, Audience reach**

**Outcome:** June 2023 – 21 events attended, 1,108 Total Attendance

Audience: Youth, Businesses

Pollutant: All

Outreach Mechanisms: In-person Events (appendix with all presentations attached)

**Goal: Increase the subscription rate of the Stream Currents e-newsletter by 10 % per year.**

**Measure: Number of newsletters, Number of subscribers**

**Outcome:** Increase of 103 July 22 – June 23 to 368 subscribers, equaling 34 percent increase

Audience: General Public

Pollutant: All

Outreach Mechanisms: Print: Sign Up Sheets, Electronic: e-Newsletters, In-person Events: City's Civic Center 50<sup>th</sup> Anniversary 8/18/22, Community Salmon Watch Day 9/11/22, Walk n' Wag 9/24/22, Saltwater Sportsmen's Show 2/25/23 & 2/26/23, Summer Block Party 6/26/23

**Goal: Review applicable webpages annually to ensure they meet permit criteria.**

**Measure: Report detailing any webpage updates needed**

**Outcome:** Review list provided for updates.

Audience: General Public

Pollutant: All

Outreach Mechanisms: Webpages

**Goal: Increase the number of Capital Canine Club pledges by at least 30 per year.**

**Measure: Number of new pledges per year**

**Behavior: Pick up after your pet.**

Outcome: 69 New Pledges

Audience: Pet owners

Pollutant: E. coli

Outreach Mechanisms: Print (Capital Canine Club flyer, WE Pledge), Electronic (Facebook Post – 8/3/22 & April 2023, e-Newsletter – August 2022, April 2023), Radio, In-person Events (Community Salmon Watch Day 9/11/22, Walk n' Wag 9/24/22)

Giveaway: Pet Waste Bags

**Goal: Offer Erosion Control & Stormwater Management Summit annually with an audience of at least 100 people.**

**Measure: Number of attendees at event**

**Behavior: Practice erosion control methods.**

**Outcome:** Event held on January 24, 2023, with an 179 participants

Audience: Creekside Homeowners, Contractors, Inspectors, Engineers

Pollutant: Turbidity

Outreach Mechanisms: Print (Tips for Erosion Prevention for Homeowners Brochure), Electronic: (Facebook Post – 1/10/23, e-Newsletter – January 2023), Radio, In-person Event (Erosion Control & Stormwater Management Summit, 1/24/23)

**Goal: Increase the number of WE Pledges taken by at least 25 per year.**

**Measure: Number of new pledges per year**

Outcome: 40 New WE Pledges

Audience: General Public

Pollutant: Household Hazardous Waste, Pesticides, E. coli, Garbage, Illicit Discharges

Outreach Mechanisms: Print: (WE Pledge, WE Pledge Flyer), Electronic (Facebook Posts – 9/22/22, 1/17/23, June 2023; e-Newsletter – September 2022, January 2023, June 2023), Radio, In-person Events (Englewood Forest Festival 8/13/22, Community Salmon Watch Day 9/11/22, Yard & Garden Show 3/24-26/23, World Water Day Great Raindrop Scavenger Hunt 3/20/23 – 4/3/23, Salem Service Day 6/15/23)

**Goal: Increase the number of storm drains marked in Salem by at least 100 drains per year.**

**Measure: Number of storm drains marked per year – FY 22/23 = 323**

**Behavior: Place storm drain markers.**

Outcome: 323 by 19 volunteers

Audience: General Public, Streamside Residents & Businesses, Restaurants, Carpet Cleaners, Painters, Mobile Pet Groomers, RV Owners

Pollutant: Illicit Discharge

Outreach Mechanisms: Print (Storm Drain Marking Flyer, WE Pledge), Radio, Electronic (Facebook Posts – 8/18/22, e-Newsletter – August)

Giveaways: Report Stormwater Pollution Pens, Dump No Waste Pencils

**Goal: Coordinate, in partnership with Willamette Riverkeeper, at least one volunteer waterway cleanup event per year.**

**Measure: Number of cleanup events per year**

**Behavior: Clean up trash.**

Outcome: 3 Events, Dates: 7/12/22, 10/25/22, 6/14/23 with 26 volunteers

Audience: General Public

Pollutant: Garbage

Outreach Mechanisms: Electronic (Facebook Posts – 7/1/22, May & June 2023, e-Newsletter – July 2022, May 2023), In-Person Events: 7/12/22, 10/25/22, 6/14/23

**Goal: Provide a Free Tree & Shrub Program to all streamside homeowners, giving plants out to at least 100 residents.**

**Measure: Number of free trees and shrubs given out, Number of streamside residents participating in program**

**Behavior: Plant native plants within 25 ft. of stream on property.**

Outcome: 153 residents ordered 602 plants

Audience: Streamside Homeowners

Pollutant: Temperature, Dissolved Oxygen, Mercury

Outreach Mechanisms: Print (Free Tree Program Postcard), Electronic (Emails to Streamside Homeowners)

Giveaway: Native Plants

### **Adaptive Management for FY 23/24**

Marketing and outreach for the Clean Streams Initiative ranges from broad audiences, such as the City's general Facebook page, to specialized audiences, such as outreach that occurs at pet-related events to promote picking up after your pets. During FY 2022-23, all metrics were met or exceeded. Metrics are based on numbers that can reasonably be accomplished under current normal circumstances.



One outreach mechanism that will be explored in fiscal year 2023-24 is paid promotional Facebook posts to help reach audiences searching for content related to pollution prevention topics that we address thus providing a greater impact. Another outreach mechanism that will be explored is the synergy that we can create promoting clean streams through our Youth Environmental Education Program (YEEP). In collaboration with the new YEEP Instructor, promotion of campaigns will be expanded into local K-5 schools.



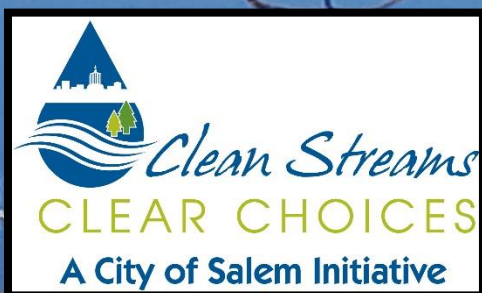


Attachment 2: Clean Streams Outreach Report  
FY 2022-23

# ANNUAL REPORT

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Clean Streams Initiative Outreach Report  
Fiscal Year 2022 - 2023



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# Clean Streams Initiative Outreach Annual Report

Fiscal Year July 2022 – June 2023

## Overview

The City of Salem operates under the Municipal Separate Storm Sewer System (MS4) Permit under the National Pollutant Discharge Elimination System (NPDES) program of the Clean Water Act. As a part of this permit, the City is required to provide outreach and education to specific community audiences on pollutants of concern to local water ways and how to reduce pollution contribution to water ways. To fulfill this requirement, the City of Salem developed the *Clean Streams, Clear Choices* Initiative that encompasses campaigns seeking to educate and inform Salem residents on actions they can take to help keep pollution out of stormwater and local streams. The Clean Streams Initiative states: *Our everyday behaviors affect streams. Our choices can make a difference.*

## Outreach Events

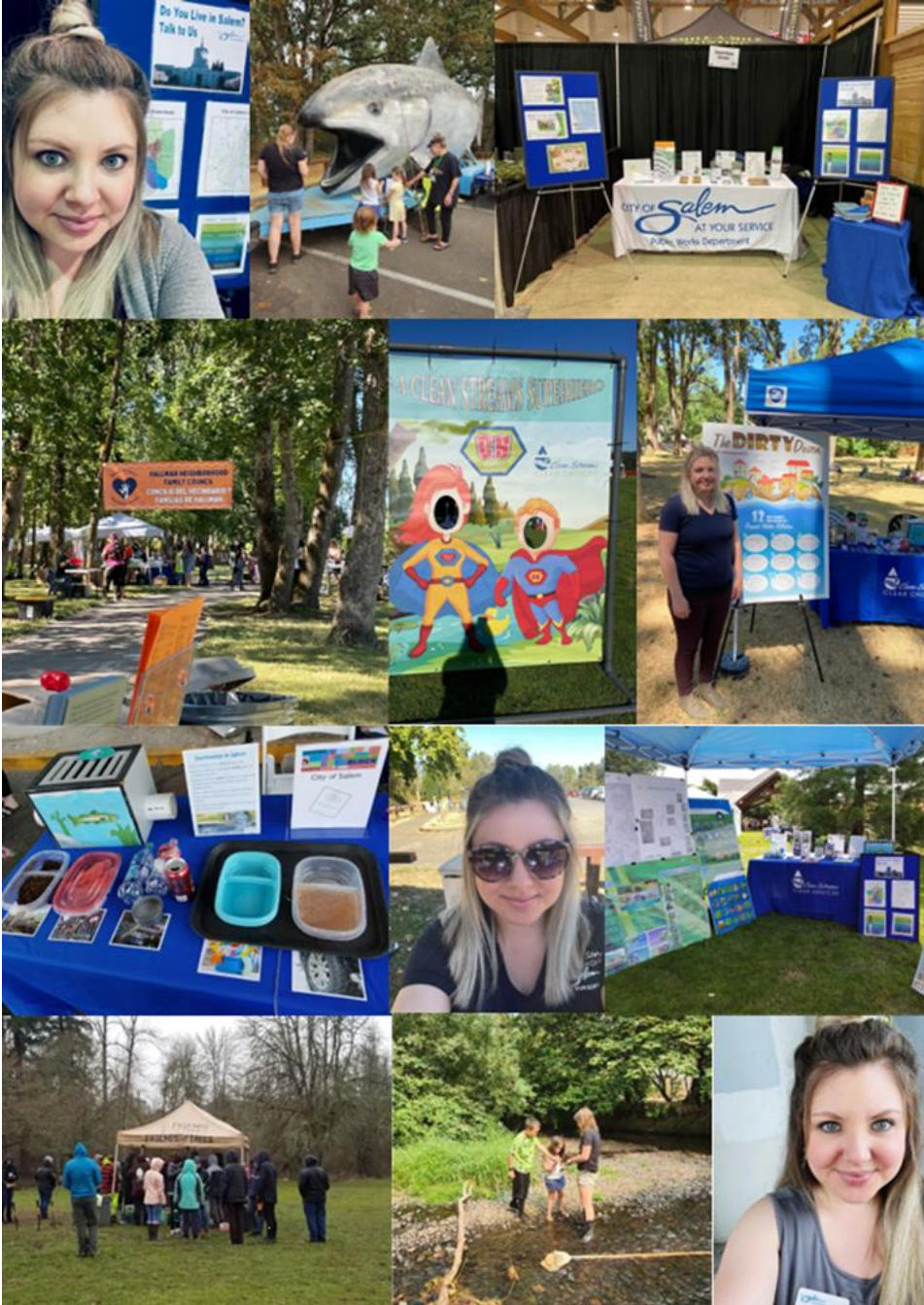
The following lists outreach events from July 2022 through June 2023. The total number of outreach events attended was **24**, with a total attendance number of **14,366** attendees.

The following is a brief breakdown of outreach events, including date, event, and notable outcome or attendance total. For complete information on outreach events see Appendix 1, pg. 14.

<i>Date</i>	<i>Event</i>	<i>Notable Outcome/Attendance</i>
7/12/2022	Willamette Riverkeeper Cleanup	
7/12/2022	Conservation with Community	26 Native Wildflower Seed Packets Handed Out
7/15/2022	Fun Fridays	
8/6/2022	Family Building Blocks Family Fest	Attendance = 3,378
8/13/2022	Englewood Forest Festival	Attendance = 2,500
8/18/2022	City of Salem 50 <sup>th</sup> Anniversary	13 people signed up for newsletter
9/11/2022	Community Salmon Watch Day	5 CCC Pledges, 9 WE Pledges, 7 Signed up for newsletter
9/24/2022	Walk n' Wag	28 CCC Pledges, 13 Signed up for newsletter
9/28/2022	Neighborhood Association Presentation	
10/25/2022	Willamette Riverkeeper Cleanup	
1/24/2023	Erosion Control Summit	
2/25 &26/2023	Saltwater Sportsmen's Show	Attendance = 1,836, 16 Signed up for newsletter
5/3/2023	Marion SWCD First Friday	
5/4/2023	Friends of Trees Planting	47 Volunteers
5/24-26/2023	HBA Yard, Garden, & Home Show	230 Milkweed & Wildflower Seed Packets Handed Out, 11 WE Pledges
4/1/2023	Urban Streams Symposium	
4/20/2023	Rain Garden Tour	
4/22/2023	Marion Co. Earth Day	



5/31/2023	Marion SWCD Oak Tour	
6/7/2023	Trinity Covenant Church Presentation	
6/14/2023	Willamette Riverkeeper Cleanup	
6/15/2023	Salem Service Day	14 WE Pledges
6/26/2023	Summer Block Party	



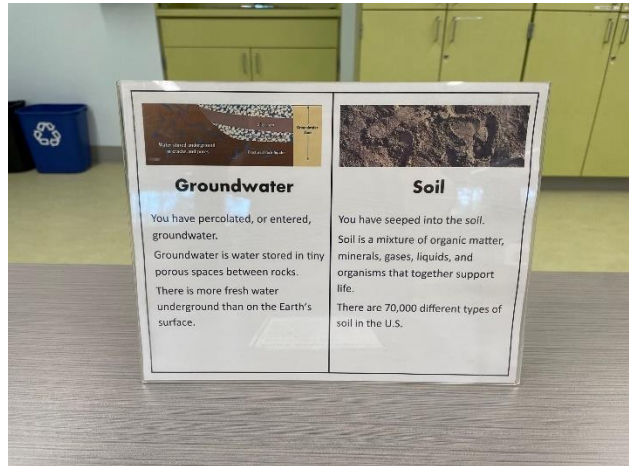
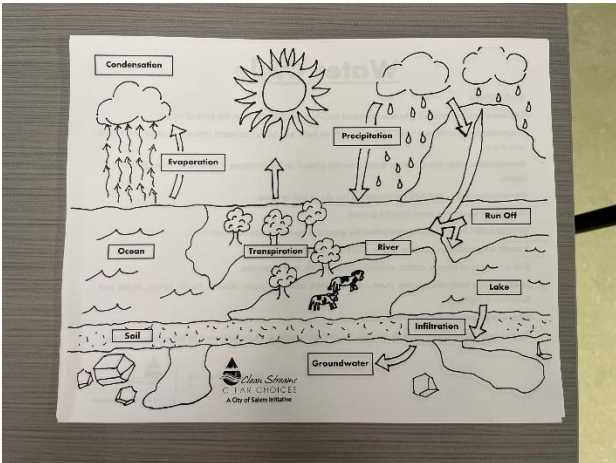
Pictures from Outreach Events

## Educational Events

Participation in educational events in coordination with the YEEP program were still on pause as the YEEP position is vacant. The total number of educational events attended was **21**, with **1,108** total attendees.

The following is a breakdown of educational events including date, location or event, and participating school or business. For complete information on educational events see Appendix 2, pg. 16.

<i>Date</i>	<i>Location/Event</i>	<i>School</i>
9/23, 29 &30/2022	Salmon Watch	Turner Elementary, Pre-College High School
10/4/2022	Drop in the Bucket	Heritage School
2/8/2023	Clean Streams Presentation	Chemeketa Community College
2/8/2023	Green Jobs Career Connect	Western Oregon University
2/14/2023	Clean Streams Presentation	Willamette University
2/15/2023	Career Fair	George Fox University
3/9/2023	Flood Warning & Clean Streams Presentation	Willamette University
3/16/2023	Clean Streams Presentation	Willamette University
4/6/2023	Water Cycle Wristband Activity	Salem Public Library
4/10/2023	Career Day	Auburn Elementary
4/17/2023	Macros & Water Quality	Sumpter Elementary
4/21/2023	Critters in the Creek	Weddle Elementary
4/27/2023	Take Your Child to Work Day	City of Salem Shops
5/2/2023	Water Presentations	Yoshikai Elementary
5/9/2023	Water Presentations	Marion Co. Juvenile Dept.
5/12/2023	Critters in the Creek	Marion Co. Juvenile Dept.
5/15, 16, 18, 19/2023	Outdoor School	Richmond, Clear Lake, Scott Elementary
5/23/2023	Water Festival	Yoshikai Elementary
5/26/2023	Clean Streams Presentation	South Salem High School
6/6/2023	Critters in the Creek	Marion Co. Juvenile Dept.
6/7/2023	Water Presentation	Trinity Covenant Church



Pictures from Water Cycle Activity

## Marketing

Marketing for the Clean Streams campaigns included community outreach events, social media marketing on Facebook, the Clean Streams e-newsletter, and the City of Salem e-newsletter. For a full Facebook and Clean Streams e-newsletter campaign promotion calendar see Appendix 3, pg. 18.

### Clean Streams e-Newsletter

The Clean Streams e-newsletter, *Stream Currents*, is a monthly newsletter sent via email with water-related news and topics, upcoming Clean Streams events, spotlights on Clean Streams campaigns, and other campaigns to market and highlight. The list currently has **368** active subscribers. There were **103** new subscribers for this fiscal year, a **34** percent increase from the previous year. The newsletter goes out on the first day of each month.

### City of Salem e-Newsletter

The City of Salem e-newsletter, *Salem Connection*, periodically promotes Clean Streams Initiative campaigns. During this fiscal year the City's e-newsletter promoted Clean Streams campaigns in **34** newsletters. A full list of campaigns promoted can be found in Appendix 4, pg. 19.

### Facebook Campaigns & Posts

The Clean Streams Facebook posts are all posted on the City of Salem's general Facebook account. The posts are identified by a Clean Streams frame for the picture accompanying the post. For fiscal year 22/23, there were **70** Facebook posts which resulted in **947** reactions, **506** shares, and **235** comments. The following is a breakdown of metrics for each month. For full details see Appendix 5, pg. 21.

<i>Month</i>	<i>Reactions</i>	<i>Shares</i>	<i>Comments</i>
<i>July 2022</i>	76	18	14
<i>August 2022</i>	85	30	7
<i>September 2022</i>	22	40	0

October 2022	89	48	13
November 2022	109	30	49
December 2022	24	90	2
January 2023	80	61	13
February 2023	44	10	6
March 2023	97	25	6
April 2023	109	30	34
May 2023	140	69	76
June 2023	72	55	15
<b>TOTALS</b>	<b>947</b>	<b>506</b>	<b>235</b>

## Advertising

Advertising for this fiscal year included a magazine ad in MOM Magazine and a digital billboard run for 4 weeks.

### Magazine Ad

An ad was run in the 2022 August/September issue of MOM Magazine. MOM Magazine produces **10,000** print copies for each issue and serves a reach of **400,400** in Salem.



Ad in MOM Magazine August/September 2022 Issue

## Digital Billboard Advertising

An advertising campaign was run on four rotating digital billboards for four weeks throughout Salem in April 2023. The ad design featured the Oregon ducks and beavers messaging and design. The following breaks down the digital billboard dates, locations, impressions, and resulting Clean Streams website metrics.

<i>Location</i>	<i>Dates</i>	<i>Impressions</i>	<i>Website Users</i>	<i>Website Page Views</i>
<i>Lancaster &amp; Market</i>	April 3 – 9	65,367	18	35
<i>Mission &amp; 17<sup>th</sup></i>	April 10 – 16	37,019	21	39
<i>N. River Rd.</i>	April 17 – 23	35,777	29	43
<i>Commercial &amp; Kuebler</i>	April 24 - 30	83,788	28	40
<b>TOTALS</b>		<b>221,951</b>	<b>96</b>	<b>157</b>



Final Ad Design for Billboard

## Design Materials

- **Bareroot Planting Tips Flyer:** a flyer was created for the Free Tree Program with information on how to plant bareroot plants, as those are the plants that were offered through the program this year. Flyer included information on planting, maintenance, and the new Urban Streamside Program Coordinator.
- **Urban Streams Symposium Flyer:** a flyer was created for the Urban Streams Symposium event which included information on the 2022 Stream Crew

accomplishments, streamside homeowner resources, and other local resources and partners.

## Proposals

The following outlines the social marketing and outreach proposals that are currently being developed.

### Toxins Social Marketing Proposal

The social marketing proposal targeting toxins copper and zinc is in progress. Edits are being made to draft three. Once edits are finished it will be sent to be finalized. Once final approval is given, the campaign materials can be created to move towards implementing the pilot program.

### Business Outreach Proposal

The new NPDES MS4 Permit includes an audience-based outreach component rather than pollutant based. To meet this requirement a Business Outreach Plan is being created. This plan includes different business types, which will each require their own outreach materials as messaging will need to be tailored to each type of business. The types of businesses identified include contractors, car wash providers, landscapers, industrial, vehicle fleet, and food processing. Draft one of the proposal is almost complete.

## Clean Streams Campaigns

### Capital Canine Club

The Capital Canine Club asks residents to pledge to pick up after their dog every time they go outside, as pet waste adds *E.coli* bacteria to local streams. As an incentive for taking the pledge, residents receive a mutt mitt dispenser with bags. The Capital Canine Club was promoted through social media, the e-newsletter, and at outreach events. During this fiscal year **69** new pledges were acquired.

## Water Enhancement (WE) Pledge

The Water Enhancement (WE) Pledge has 10 pledge actions that residents can pledge to take at home to conserve water and reduce pollution in waterways. The WE Pledge was promoted through social media, the e-newsletter, schools, and outreach events. This fiscal year **40** WE Pledges were taken.

## Environmentally Friendly Car Wash Fundraisers

The Clean Streams Initiative promotes tips on keeping pollution from vehicles out of stormwater and provides information for fundraising groups on how to host an environmentally friendly car wash. An email with the Car Wash brochure attached was sent to **15** contacts at **10** schools.

## Storm Drain Marking

The storm drain marking and awareness program *Dump No Waste, Drains to Creek* involves volunteers placing storm drain markers near storm drains to alert the community that anything that goes down this drain flows straight to local streams. The program runs July through mid-September. During this time **323** storm drains were marked. There was a total of **19** volunteers that participated in the program.

## Mayor's Monarch Pledge

The Clean Streams Initiative partners with City of Salem Parks to promote the Mayor's Monarch Pledge, which involves promoting what steps the City of Salem is taking to increase the Monarch butterfly populations and providing education to residents on what they can do to help at their residence. The reduction of pesticide use is one action residents can take to help. The Mayor's Monarch Pledge was promoted at applicable outreach events, through the City of Salem Facebook page, and through the Clean Streams newsletter and City of Salem newsletter. New for this year was the creation of native milkweed seed packets to be given out to the community. Milkweed seed packets and native wildflower packets were given out at the Yard, Garden, & Home Show; **230** packets were given out. A promotion was run on the City



of Salem’s Facebook page to celebrate National Pollinator Week, June 19 – 25, offering a free native milkweed seed packet for Salem residents; **80** residents requested milkweed seed packets.

## Free Tree Program

The Free Tree Program is an annual program offering native, streamside plants for streamside homeowners to plant along the section of the stream running through their property to help reduce stream temperatures and reduce streamside erosion. The program was offered February –March 2023. Four plant species were offered, and residents could choose up to four plants; **153** residents picked up **602** native plants.

## Our River, Regional Campaign

The Clean Streams Initiative participates in the Mid-Willamette Outreach Group, which is a collaborative group consisting of partners from Marion County, City of Keizer, and Marion Soil & Water Conservation District. This group focuses on stormwater outreach. A new campaign, Our River, is in development through this group. This campaign aims to connect residents in the Mid-Willamette Valley to the Willamette River through stewardship, free to low-cost activities, and events. Events in the Our River campaign include learning to fish, kayaking, and the Community Salmon Watch Day. The City of Salem events include the Waterway Wednesday series in partnership with Willamette Riverkeeper. These Wednesday events include on-the-water volunteer trash cleanups on the Willamette River starting at Wallace Marine Park. Three river cleanups occurred this fiscal year with a total of **26** volunteers.

## Clean Rivers Coalition Statewide Lawn Care Pilot Program

The City of Salem is a steering committee member of this group and is working in collaboration with this statewide group on a pesticide reduction lawn care pilot program looking at creating a social marketing campaign to influence behavior change in regards to the use of weed and feed products on lawns. Currently the program is in the pilot audience research phase conducting intercept surveys. Additionally, the lawn care videos created in the previous fiscal year were marketed during FY 2022-23.

# Appendix 1

## Outreach Events Matrix

Date	Event	Description	Campaign Promoted	Attendance	Measureable Outcome
12-Jul	Willamette Riverkeeper Cleanup	Trash cleanup in the Willamette Slough in partnership with Willamette Riverkeeper	General Clean Streams	15	
12-Jul	Conservation with Community	Riparian & Mayor's Monarch Pledge talk at Orchard Heights Park	Riparian planting, Mayor's Monarch Pledge	27	26 native seed packets were given out
15-Jul	Fun Fridays	Event at Northgate Park	General Clean Streams	300	
6-Aug	FBB Family Fest	Event by Family Building Blocks	General Clean Streams, Activity Book - Eng. & Span., Photo Station	3,378	
13-Aug	Englewood Forest Festival	Event at Englewood Park	General Clean Streams, storm drain & pollution display, WE Pledge board	2,500	
18-Aug	City's 50th Anniversary	City's Anniversary resource fair	General Clean Streams, storm drain model	75	13 people signed up for newsletter
11-Sep	Community Salmon Watch Day	Event through MWOG at Bush Park	General Clean Streams, CCC, WE Pledge	50	5 people took CCC pledge, 7 signed up for newsletter, 9 took WE Pledge
24-Sep	Walk n' Wag	Event through Willamette Valley Hospice at Minto Brown Park	CCC	300	28 people took the CCC pledge, 13 signed up for newsletter
28-Sep	Neighborhood Association Presentation	Virtual presentation to 5 land use chairs with neighborhood associations on SWMP update and comment period	SWMP & Permit	5	They provided good feedback and will be sharing with neighborhood chairs. 1. Interested in a list of outreach materials that we can share. Provide to Irma to share with them. 2. Interested in the development of the backyard buffer program. 3. Report stream pollution and dumping should be added to the list on where you can report things. *Presentation by Deborah Topp
25-Oct	Willamette Riverkeeper Cleanup	Volunteer trash pick up at Wallace Marine Park & under Peter Courtney Bridge	General Clean Streams, Mayor's Monarch Pledge	6	
24-Jan	Erosion Control Summit	Erosion Control Summit through MWOG	Erosion & BMP's	179	
Feb 25 & 26	Saltwater Sportsmen's Show	Expo at Oregon State Fair & Expo Center geared toward watercraft users	CDCD Invasives	1836	16 signed up for newsletter
3-Mar	Marion SWCD First Friday Presentation	Presentation on rain gardens and bioswales	Green Stormwater Infrastructure, Rain Gardens	19	*Presentation by Jesse Dillow
4-Mar	Friends of Trees Planting	Volunteer tree planting at Orchard Heights Park	General Clean Streams	47	
Mar. 20 - Apr. 3	The Great Raindrop Scavenger Hunt	Great Raindrop Scavenger Hunt organized through MWOG for World Water Day, Salem location Riverfront Park	Clean Streams, WE Pledge, CCC, FOG	19	

Mar. 24-26	Yard, Garden, & Home Show	HBA Yard, Garden, Home Show	General Clean Streams, Naturescaping, Mayor's Monarch Pledge, Native Plants flyer, WE Pledge	4500	11 WE Pledges taken; all seed packets handed out - 230 total; 1 person signed up for lawn pilot program info
1-Apr	Urban Streams Symposium	Table set up at event at Loucks Auditorium for the Clean Streams Initiative	General Clean Streams	25	
20-Apr	Rain Garden Tour	Tour of rain gardens for Marion SWCD staff	Green Stormwater Infrastructure, Rain Gardens	2	*Tour by Jesse Dillow
22-Apr	Earth Day	Earth Day event at Spongs Landing through Marion County - storm drain and pollution activity	General Clean Streams	380	*Heather Dimke attended
31-May	Marion SWCD Oak Tour	Presentation on oak wetlands and woodlands habitat	Clean Streams, Wetlands	25	*Presentation by Luke Westphal
7-Jun	Trinity Covenant Church Presentation	Presentation on Clean Streams Initiative and how to get involved	General Clean Streams	17	*Presentation by Luke Westphal
14-Jun	Willamette Riverkeeper Cleanup	Willamette Riverkeeper Cleanup at Wallace Marine Park - Parks attended	General Clean Streams	11	
15-Jun	Salem Service Day	Booth at Salem Service Day at Riverfront Park	General Clean Streams, Superhero Activity Book & Photo Station, WE Pledge	500	14 people took WE Pledge
26-Jun	Summer Block Party	Event at Gilbert House with storm drain & pollution display	General Clean Streams	150	
			<b>TOTAL ATTENDANCE OF EVENTS</b>	<b>14,366</b>	

## Appendix 2

### Education Events Matrix

Date	Event	Details	Location	Attendance
9/23, 29, 30/22	Salmon Watch	Salmon Watch volunteer days through Marion SWCD for Turner Elementary, Pre-College High School	Pack Saddle Park	130
4-Oct	Drop in the Bucket	Presentation on water quantity and quality and fish habitat	Heritage School	40
8-Feb	Presentation at Chemeketa Community College	Topic: Stream Crew Internships, Clean Streams Initiative Programs, & Water Quality; Presentation by Luke	Chemeketa Community College	7
8-Feb	Green Jobs Career Connect	Outreach booth at Western Oregon University Topic: Stream Crew Internships, Clean Streams Initiative Programs, & Water Quality; Attended by Luke	Western Oregon University	16
14-Feb	Presentation at Willamette University	Topic: Stream Crew Internships, Clean Streams Initiative Programs, & Water Quality; Presentation by Luke	Willamette University	9
15-Feb	Annual Career Fair	Topic: Stream Crew Internships, Clean Streams Initiative Programs, & Water Quality; Attended by Luke	George Fox University	23
9-Mar	Presentations at Willamette University	Presentation by Justin Boyington on flood warning system followed by presentation by Luke Westphal on stream crew	Willamette University	11
16-Mar	Presentation at Willamette University	Presentation on stream crew by Luke Westphal	Willamette University	19
6-Apr	Water Cycle Wristband Activity	Water Cycle Wristband activity for youth	Salem Public Library	11
10-Apr	Career Day	Career day presentations and outreach booth on Clean Streams Initiative and Stream Crew	Auburn Elementary	300
17-Apr	Macros & Water Quality	Adopt-a-Stream presentation on macros and water quality	Sumpter Elementary	30
21-Apr	Critters in the Creek YEEP Presentation	Presentation by Luke on aquatic insects, stream water quality, and Clean Streams.	Weddle Elementary	50
27-Apr	Take Your Child to Work Day	Inflatable orca and macro activity promoting Clean Streams Initiative for youth	City of Salem Public Works Ops Building	74
2-May	Water Presentations	Water presentations on macros, water quality, and Clean Streams Initiative for students K-3	Yoshikai Elementary School	52
9-May	Water Presentations	Water presentations on macros, water quality, and Clean Streams Initiative	Marion Co. Juvenile Dept.	11

7	12-May	Critters in the Creek YEEP Presentation	One presentation for ages 12-18	Marion Co. Juvenile Dept.	10
8	May 15, 16, 18, & 19	Outdoor School	Outdoor School presentations for 4 schools on macros and water quality	Schools: Richmond Elementary, Clear Lake Elementary, Scott Elementary	194
9	23-May	Water Festival	Water Festival event coordinated through MWOG, Yoshikai Elementary	Keizer Civic Center	66
0	26-May	School Presentation	Presentation by Luke on native plants and stormwater planters.	South Salem High School	15
1	6-Jun	Critters in the Creek YEEP Presentation	One presentation for ages 12-18	Marion Co. Juvenile Dept.	10
2	7-Jun	Water Presentations	Water presentations on macros, water quality, and Clean Streams Initiative for youth and adults	Trinity Covenant Church	30
3					
4					
5	*YEEP and Adopt-a-Streams were limited, due to COVID & staffing				
6					
7				<b>TOTAL ATTENDANCE</b>	<b>1108</b>
8					

# Appendix 3

## Facebook & e-Newsletter Campaign Promotion Calendar

Campaign	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Capital Canine Club		FB, N								FB, N		
Car Wash Fundraising/Tips												FB, N
Dump No Waste	FB, N	FB, N										FB, N
Fall Leaf Haul					FB, N	FB, N						
Friends of Trees Plantings				FB, N	FB, N		FB, N	FB, N	FB, N	FB, N	FB, N	
FOG						FB, N						
Landscaping		FB, N						FB, N	FB, N			
Mayor's Monarch Pledge				FB, N					FB, N			
Plastics	FB, N					FB, N						FB, N
CDCD - Invasives	FB, N											FB, N
Watershed Grant	FB, N										FB, N	
W.E. Pledge			FB, N				FB, N					FB, N

# Appendix 4

## e-Newsletter Topics Tracking

Month	Clean Streams Newsletter	City Newsletter
July	CDCD, Plastics	Watershed Grant
August	GSI, CCC, Pesticide Alts, Native Plants, Drain Marking	Capital Canine Club
16-Aug		Naturescaping & Native Plants
19-Aug		Storm Drain Marking
26-Aug		Clean Streams Activity Book
September	Water conservation, WE Pledge	Community Salmon Watch Day
18-Sep		National Cleanup Day
23-Sep		Permit public comment, WE Pledge
October	Recycling, Mayor's Monarch Pledge, FOT	
8-Oct		FOT Crew Leader Training, Follow the Water
22-Oct		Willamette River Cleanup
29-Oct		Fall Leaf Haul, Recycling & Marion Co. Guide, Mayor's Monarch Pledge
November	Fall Leaf Haul, Marion Co. Recycling, Planting Natives, Drinking Water, FOT	Fall Leaf Haul
8-Nov		Fall Leaf Haul, Clean Streams e-newsletter
December	Plastics, FOG, Waste Reduction, Fall Leaf Haul	EC Summit
10-Dec		Fall Leaf Haul, Reduce Holiday Waste, FOT
16-Dec		FOG, FOT
24-Dec		FOT
30-Dec		FOT
January	Clean Streams, EC Summit, WE Pledge, Emergency Preparedness, FOT	Emergency Preparedness, FOT
14-Jan		FOT, EC Summit, Marion SWCD Native Plant Sale
20-Jan		WE Pledge
February	Native Plants, CS Website, Eco-Friendly Deicer, Emergency Preparedness, FOT	

	4-Feb		FOT, Native Planting
	11-Feb		Love the Willamette/Clean Streams, FOT
March		Landscaping, Native Plants, FOT, WE Pledge	FOT
	11-Mar		Native planting
	18-Mar		Native planting, YGHS
	25-Mar		Great Raindrop Hunt, Urban Streams Symposium
April		Arbor Month, Arbor Events in Parks, City Tree Programs, CCC, Pesticide Alternatives, FOT	Mayor's Monarch Pledge, Arbor Event
	7-Apr		Arbor Month Event
	28-Apr		CCC, FOT
May		Recycling, Water Conservation, CO2 Reduction, FOT, River Cleanup	Our River
	19-May		Our River: Learn to Fish Event
June		World Ocean Day, Pollinator Week, Mayor's Monarch Pledge, Wetlands, Car Wash, Invasives/CDCD	Benefits of Trees
	23-Jun		Mayor's Monarch Pledge & Milkweed Seeds



## Appendix 5

### Facebook Campaigns & Posts

Date	Post & Campaign	Description	Outcome	Reactions	Shares	Comments			
1-Jul	Willamette Riverkeeper Cleanup	Post about trash cleanup on July 12 in the Willamette Slough		22	7	2			
8-Jul	Follow the Water	Post promoting CRC's Follow the Water campaign		4	1				
11-Jul	What's Your Lawn Style	General post promoting What's Your Lawn Style campaign		13	2				
13-Jul	Plastic Free July	Post about Plastic Free July and reducing plastic use		26	5	3			
16-Jul	What's Your Lawn Style	Low maintenance lawn post		6	1	8			
19-Jul	Check, Drain, Clean, Dry	Post about not carrying invasive species to other waterbodies via watercraft.		4	2	1			
27-Jul	Watershed Grant	Post about applying for the Watershed Grant		1					
3-Aug	Capital Canine Club	Post about CCC and picking up pet waste	23 new pledges	35	8				
9-Aug	Naturescaping	Post about naturescaping with native plants		34	13	6			
18-Aug	Storm Drain Marking	Post about storm drain marking		1	1				
27-Aug	Activity Book	Post promoting CS Activity Book for National Just Because Day		4	1	1			
27-Aug	Community Salmon Watch Day	Promoting MWOG event		11	7				
4-Sep	National Wildlife Day	Looking at salmon for National Wildlife Day & promoting Clean Streams		7	10				
8-Sep	Community Salmon Watch Day	Promoting MWOG event		6	10				
14-Sep	National Cleanup Day	Picking up trash to keep it out of storm drains and local streams for Natl. Cleanup Day on Sept. 17		3	15				
21-Sep	Stormwater Master Plan	Comment period open for Stormwater Master Plan		1	2				
22-Sep	WE Pledge	Promoting WE Pledge		5	3				
4-Oct	Follow the Water	Post about the Follow the Water campaign		3	2				
5-Oct	Friends of Trees	Post about FOT crew leader training in October		6	1				

12-Oct	Willamette Riverkeeper Cleanup	Post promoting cleanup on Oct. 25 in partnership with Willamette Riverkeeper	6	3				
16-Oct	Public Comment	Public comment open for stormwater permit	3					
19-Oct	Willamette Riverkeeper Cleanup	Post about river cleanup on Oct. 25	12	19	4			
25-Oct	Marion Co. Recycling	Post about how to recycle uncommon items via Marion Co.'s recycle guide	7	6				
26-Oct	Claggett Creek WS Council	Post promoting a trash cleanup at Wallace House Park in Keizer	4	2				
29-Oct	Mayor's Monarch Pledge	Pormoting pledge and planting milkweed for monarch butterflies	27	7	7			
31-Oct	Thank You Volunteers	Post thanking storm drain marking volunteers	21	8	2			
2-Nov	Fall Leaf Haul	Promoting clearing storm drain grates of leaves and Fall Leaf Haul	87	26	49			
4-Nov	FOT	Promoting Friends of Trees planting on Nov. 5	5	1				
6-Nov	Fall Leaf Haul	Promoting the Fall Leaf Haul	14	3				
15-Nov	Newsletter	Post promoting the Clean Streams newsletter	3					
1-Dec	EC Summit	Post promoting early bird registration for EC Summit	3	25				
6-Dec	Reduce Waste	Post talking about waste reducing during the holidays.	7	4				
13-Dec	Water Conservation	Water conservation during the holidays	5	57	1			
13-Dec	FOG	FOG during holidays and what not to dump and flush	9	4	1			

5-Jan	FOT	Post promoting January Friends of Trees planting.	15	3			
9-Jan	Marion SWCD Native Plant Sale	Post promoting Marion SWCD's online native plant sale	56	52	11		
10-Jan	EC Summit	Post promoting last week of registration for EC Summit	2	5			
17-Jan	WE Pledge	Post promoting taking the WE Pledge	7	1	2		
1-Feb	Native Plants	Post promoting Polk SWCD's native plant sale	18	3			
3-Feb	FOT	Post promoting FOT planting	2	2			
9-Feb	Love the Willamette	Post for Valentine's Day and loving the Willamette River, promoting Clean Streams website	21	3	6		
23-Feb	Saltwater Sportsmen's Show	Promotion of the Clean Streams booth at the expo and CDCD	3	2			
1-Mar	FOT	Post promotong both March plantings	20	3	1		
9-Mar	Native Plants	Post promoting planting natives for spring	24	3	1		
14-Mar	Pesticide & Fertilizer Alternative	Post promoting alternatives to chemical pesticides & fertilizers	3				
16-Mar	Yard & Garden Show	Post promoting Clean Streams booth at the Yard & Garden Show	16	1			
20-Mar	Great Raindrop Scavenger Hunt	Post promoting the MWOG Great Raindrop Scavenger Hunt for spring break and World Water Day	22	12	4		
21-Mar	Urban Streams Symposium	Post promoting the stream symposium event on April 1	4	2			
22-Mar	World Water Day	Post promoting World Water Day and Great Raindrop Scavenger Hunt thru MWOG	2				
28-Mar	Monarch Pledge/Native Planting	Promoting native plants and Mayor's Monarch Pledge	6	4			
2-Apr	Arbor Month Events	Post promoting Arbor Month events in Parks	16	7	1		

3-Apr	FOT	Post promoting FOT planting on April 8		5				
6-Apr	Urban Streams Symposium	Post promoting the airing of the Symposium on CC Media and YouTube		26	7	21		
12-Apr	Tree City USA	Post promoting the City as a Tree City USA & tree resources for Arbor Month		10	3			
17-Apr	Earth Day	Post promoting Earth Day and Clean Streams website		14	5	4		
27-Apr	Capital Canine Club	Post promoting picking up pet waste and CCC	3 new pledges	11	3	5		
28-Apr	FOT	Last volunteer planting event		27	5	3		
1-May	FOT	Last volunteer planting event		10	1	1		
5-May	Our River	Intro post for Our River campaign		8	3	14		
7-May	Drinking Water Week	Post promoting DWW and conserving water		9	5	3		
8-May	Our River	Learn to Fish event on 5/20		24	35	5		
9-May	World Ocean Day	Promoting World Ocean Day and WE Pledge		0	0	0		
10-May	Car Wash	Promoting safe ways to wash car		57	22	38		
15-May	Bike to School & Work	Promoting biking to reduce carbon emissions		8	1	12		
16-May	Waterway Wednesdays	Promoting Willamette Riverkeeper cleanup		24	2	3		
1-Jun	Our River	Free Fishing Weekend		20	28	10		
3-Jun	CDCD	Post about aquatic invasives and check, drain, clean, dry		1	2			
6-Jun	Our River	Promoting Our River campaign		3	1			
19-Jun	National Pollinator Week	Post about National Pollinator Week promoting Mayor's Monarch Pledge and giving away milkweed seed packets		32	22	5		
24-Jun	Upcycle Post	Promoting Upcycling Day to reduce waste		16	2			

# The Clean Rivers Coalition

Annual Report

2022–2023 *(July 1 – June 30)*

Prepared by



**PARACHUTE STRATEGIES**

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November 1, 2023

## About The Clean Rivers Coalition

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The Clean Rivers Coalition (CRC) formed in 2016 to build a bridge between clean water and healthy communities through education and engagement. With over 60 partners—local municipalities, watershed councils, state and federal agencies, soil and water conservation districts, and water-related nonprofits—we aim to develop a connection between people and their local waterways. Our vision is that diverse communities in Oregon and Southwest Washington will actively engage in creating and enjoying clean water.

From 2016 to 2022, CRC laid the groundwork for two campaigns: Follow the Water, a public outreach campaign, and What's Your Lawn Style, a pesticide-reduction project. With funds from the EPA, the Meyer Memorial Trust, and municipal funds from 22 local governments, we were able to conduct research and produce a video series for each of these projects. For more details on our funding and budget, see page 14.

In this fiscal year, we rolled out two campaigns, Follow the Water and What's Your Lawn Style.

### Steering Committee

- Lara Christensen, *Oak Lodge Water Services*
- Kathy Eva, *City of Eugene*
- Erinne Goodell, *Lower Columbia Estuary Partnership*
- Keri Handaly, *City of Gresham*
- Roy Iwai, *Multnomah County – Steering Committee Chair*
- Eric Lambert, *Clark County*
- Katie Meckes, *East Multnomah Soil & Water Conservation District*
- Brooke Mossefin, *City of Springfield*
- Deborah Topp, *City of Salem*
- Kaileigh Westermann, *City of Keizer*
- Nate Woodard, *Washington Department of Ecology*



## Follow the Water

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CRC launched Follow the Water to connect people to their rivers, connect people's behavior to the rivers, and promote actions that protect water. The campaign aims to build a culture of appreciation and knowledge of local water resources. Follow the Water is built on the idea that people who connect with their local waterways are more likely to take action to protect them.

Our video project explores this idea of connection in three parts: connection, disconnection, and reconnection. The series features water scientists, local creatives, and Indigenous water experts. The videos were created in partnership with members of the Columbia River Inter-Tribal Fish Commission and filmmakers at MetroEast Community Media, and production cost \$25,000.

Follow the Water also created social media channels to build community around water and began posting several times a week, as well as promoting the video series and our content. We launched a website that features stories, blog posts, and seasonal resources.

### Annual Youtube Results



#### **Chapter 1: Connection**

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Total Views: **440**  
Watch Time: **11.7 hrs**



#### **Chapter 2: Disconnection**

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Total Views: **541**  
Watch Time: **20.2 hrs**



#### **Chapter 3: Reconnection**

---

Total Views: **338**  
Watch Time: **19.7 hrs**

## Social Media Results

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**1M**

Social Media Impressions

**44K**

Twitter Impressions

**591**

Facebook Followers

**17K**

Social Media Engagement

**1.2K**

Instagram Followers

**509K**

Social Media Reach

**1.9K**

Social Media Followers

**73**

Twitter Followers

**436%**

Follower growth across all platforms



## Follow the Water Social Media

Follow the Water features water content on Facebook, Instagram, Twitter, and Youtube. CRC worked closely with our partners to define Follow the Water's voice, values, and audience. We created social media channels that reflect our vision, with posts that provide simple everyday actions to protect water, demonstrate a commitment to diversity, and highlight river stewards, places to access water, and creatures that depend on river health. A sample of some of our most popular posts is below.

### Top Performing Organic Posts



**#1: Did you know that the Columbia South Shore Well..**

Platform: **Instagram**  
Reach: **703**  
Engagements: **139**



**#2: Did you know that lamprey is a first food....**

Platform: **Instagram**  
Reach: **630**  
Engagements: **172**



**#3: Many families celebrate the season by bringing a...**

Platform: **Instagram**  
Reach: **585**  
Engagements: **175**



**#4: Are you considering getting rid of your lawn...**

Platform: **Instagram**  
Reach: **527**  
Engagements: **41**

## Follow the Water Advertising

On Follow the Water's social media platforms, we advertised posts to reach a broader audience. We promoted the Follow the Water film series as a whole and each video. We also used a small budget (typically less than \$50 per post) to promote our most successful social media posts in terms of reach and engagement. We were able to receive 1.5 million impressions through our advertising efforts.

CRC also experimented with advertising What's Your Lawn Style on social media but found that advertising elsewhere was more successful. See the What's Your Lawn Style section for more information.

### Annual Results

Impressions: **1.5M**

Reach: **500K**

Engagements: **23K**

Total Spent: **\$9.3K**

### Top Performing Paid Posts



*We've heard from a thousand folks around...*

Platform: **Facebook**

Impressions: **88K**

Reach: **46K**

Engagement: **3,850**

Cost: **\$500**



*Follow the Water is about our relationship with...*

Platform: **Facebook**

Impressions: **14K**

Reach: **8,617**

Engagement: **762**

Cost: **\$105**



*The pond's funkier creature is the rough...*

Platform: **Instagram**

Impressions: **680**

Reach: **6,550**

Engagement: **448**

Cost: **\$50**



*It's quite rare to go smelt dipping...*

Platform: **Instagram**

Impressions: **445**

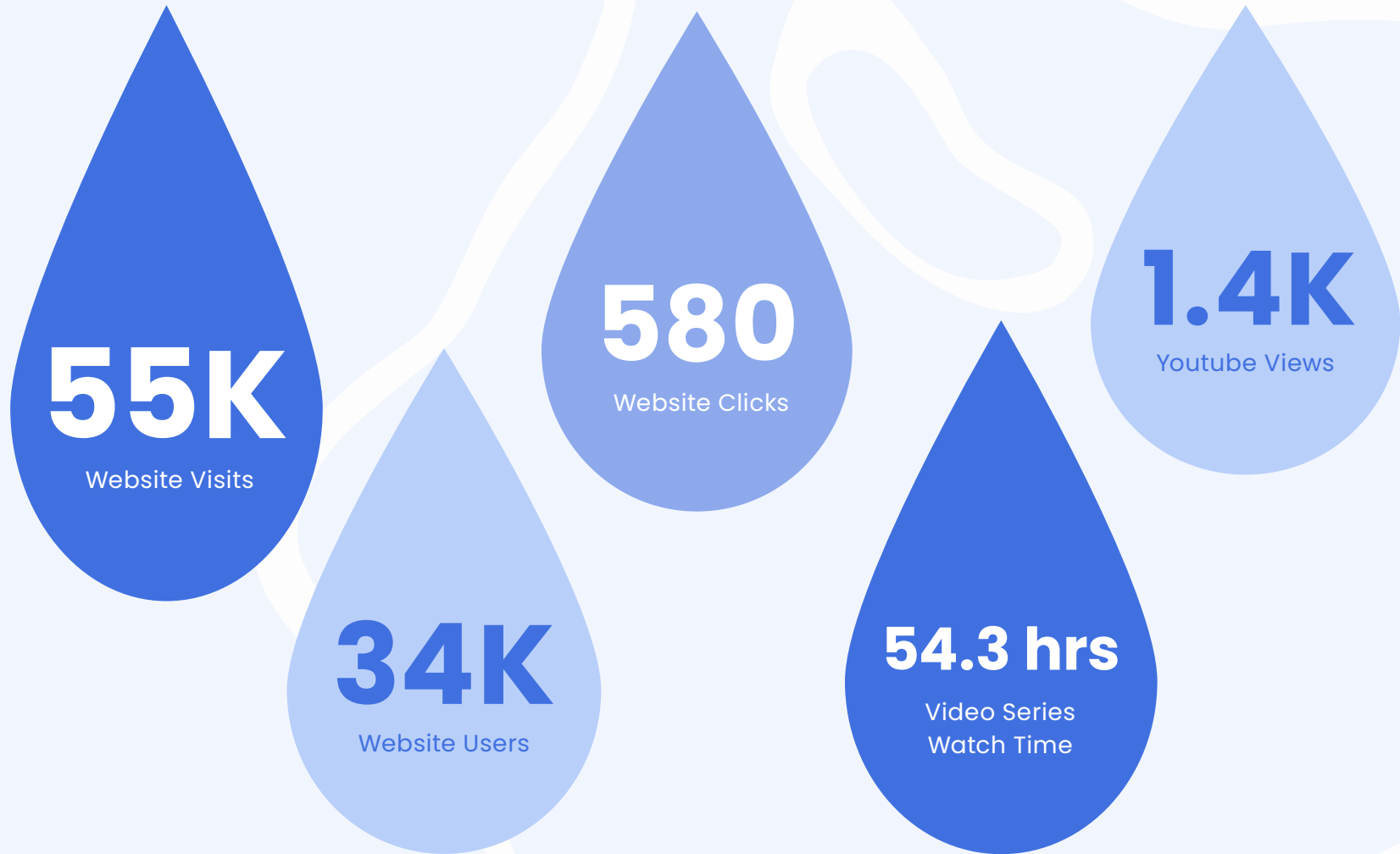
Reach: **6,130**

Engagement: **180**

Cost: **\$49.95**

## Follow the Water Website and Video Series Results

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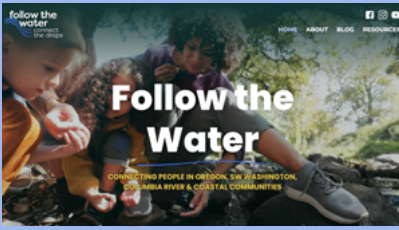


## Follow the Water Website

CRC created a website to engage people on water issues in our region. It showcases our video series, a timely resources page covering topics from recreation to water health, and writing from across the community for our clean-water blog. Creating the resources page was a joint effort on behalf of all of our partners to find the best tools, information, and guides to share on our key topic areas: the outdoors, plant and wildlife, water science and water health. The website also adds to our digital footprint, giving us credibility and acting as a centralized place to find out about the coalition and our projects.

What's Your Lawn Style ran two digital advertising campaigns that led some audiences to the Follow the Water website, which was a large share of the site's traffic. More information about this project are on the following pages.

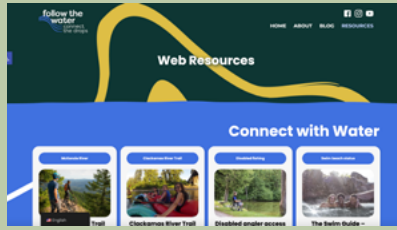
### Most Viewed Pages and Blog Posts



The screenshot shows the homepage of the 'Follow the Water' website. It features a large image of people outdoors near water, with the text 'Follow the Water' and 'CONNECTING PEOPLE IN OREGON, SW WASHINGTON, THE UMBIA RIVER & COASTAL COMMUNITIES'. Navigation links for HOME, ABOUT, BLOG, and RESOURCES are visible at the top.

**Follow the Water Campaign Homepage**

Total Views: **3,649**



The screenshot shows the 'Web Resources' page of the website. It has a green header with 'Web Resources' and a blue section titled 'Connect with Water' containing four resource cards: 'Recreation', 'Habitat and Trail', 'Biodiversity', and 'Water Quality'. Each card has a small image and a title.

**Follow the Water Resources Page**

Total Views: **617**



The screenshot shows a close-up of two fish in a clear container, likely a photarium, with a ruler visible below them for scale.

**"Good Things Come From Small Places" Blog Post**

Total Views: **123**



The screenshot shows a group of diverse people smiling and posing for a photo outdoors near water.

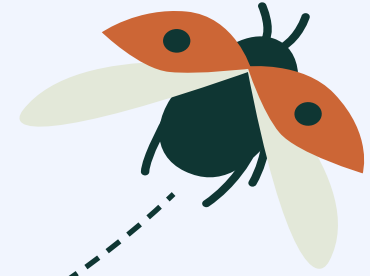
**"An Invitation for People of Color" Blog Post**

Total Views: **80**

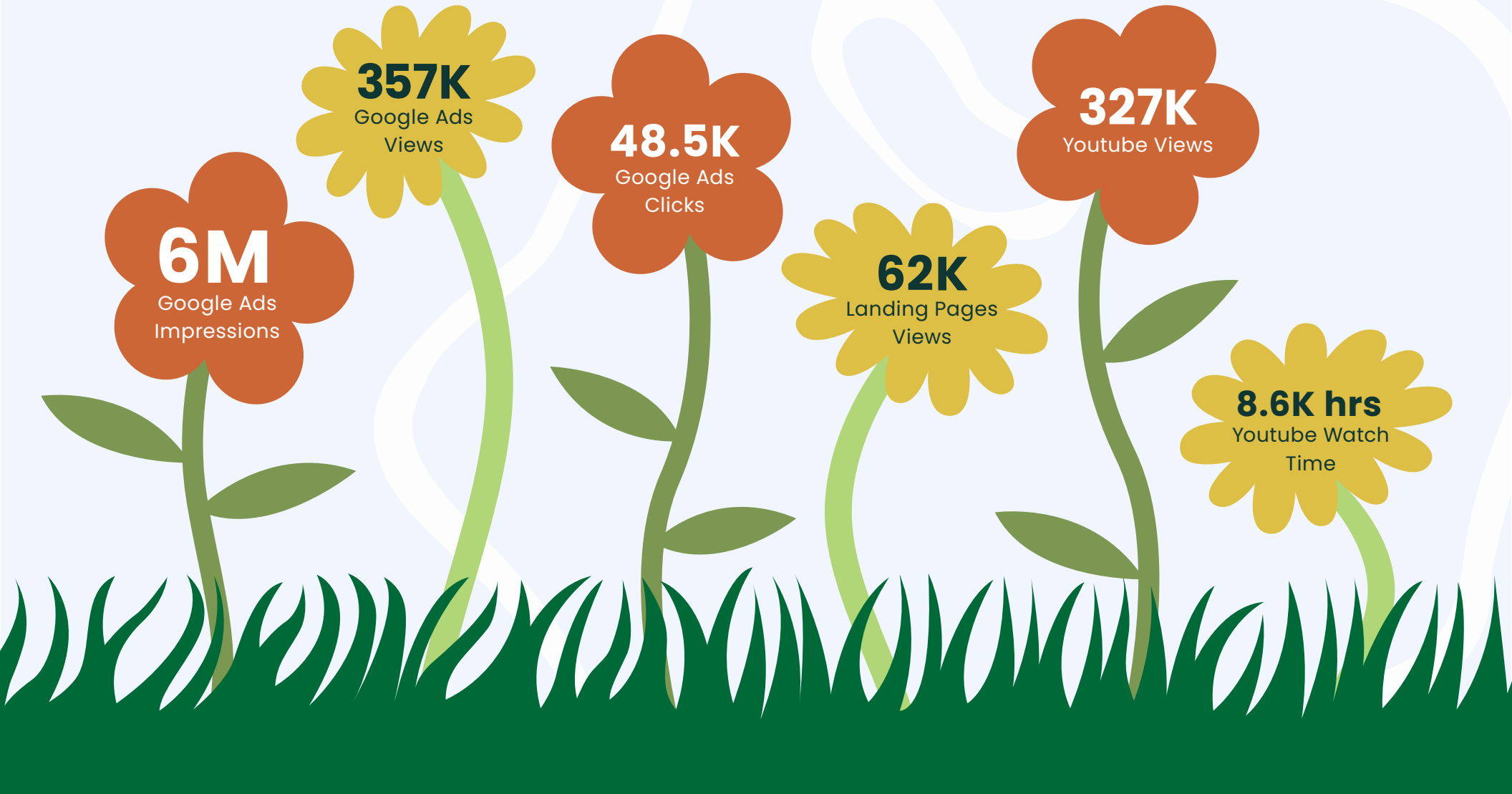
## What's Your Lawn Style

What's Your Lawn Style shares water-safe lawn care information with homeowners in Oregon and Southwest Washington through fun and informative videos in English and in Spanish. With trusted experts at the OSU Extension Master Gardener program, we created regimens for different styles of lawn.

We produced a series of instructional videos in the previous fiscal year with MetoEast Media on a budget of \$25,000. The campaign was launched in June 2022 on [WhatsYourLawnStyle.org](https://WhatsYourLawnStyle.org). We promoted the series with short commercials through digital advertising.



## What's Your Lawn Style Results



## What's Your Lawn Style YouTube

The What's Your Lawn Style campaign consists of three instructional videos to meet homeowners where they are in terms of effort. The videos are available to watch on Youtube, and the series is available to watch on OSU Extension Master Gardener's website to inspire trust. Our goal was to receive 14,000 views from audiences most likely to have a lawn and use pesticides.

When the campaign launched, we quickly achieved our goal in terms of views. Most people were drawn to the low maintenance video, however, and we wanted to reach lawn enthusiasts as well. We introduced an alternative high-maintenance video with the same content, but under an alternate title, "Lawn Goals: How to Get Green Grass." The video gained traction in the first month with 46,000 views. We also wanted to reach environmentally minded homeowners, so we added a page on Follow the Water's website and framed the series as water-friendly tips.

### Youtube Annual Views




**Low Maintenance**

Total Views: **51K**  
Watch Time: **1,575 hrs**



**Medium Maintenance**

Views: **1,220**  
Watch Time: **50 hrs**



**High Maintenance**

Views: **1,365**  
Watch Time: **49 hrs**



**Lawn Goals**

Views: **105K**  
Watch Time: **5,158 hrs**

## What's Your Lawn Style Advertising

CRC promoted What's Your Lawn Style in two key lawn care seasons, late summer and early spring. Through four short video commercials (shown below), we directed the majority people to our videos on the OSU Extension Master Gardener website. For a more environmentally engaged audience, we directed people to a page on Follow the Water's website. On both pages, audiences can find the three how-to videos, along with tips and resources for lawn care.

The campaign was incredibly successful, and as we noted on the previous page, we quickly reached our goal of 14,000 views. We then pursued other goals, such as reaching lawn enthusiasts. We reframed the high maintenance video by using a different title "Lawn Goals: How to Get Green Grass" with minimal changes to the content and garnered 46,000 views in less than four weeks.

### Annual Results

Google Ads Impressions: **6M**  
Google Ads Views: **357K**  
Google Ads Clicks: **48.5K**  
Average Cost-per-Click: **\$0.48**  
Cost per Conversion: **\$0.29**  
Total Spent: **\$23,363**

### Top-Performing Commercials



#### Grab the Baby! Tips for a Safe Lawn (0:53)

Impressions: **550K**  
Views: **119K**  
Clicks: **11K**



#### Less Yard Work, More Time on the River (0:20)

Impressions: **308K**  
Views: **49K**  
Clicks: **3K**



#### Manscaping - It's All Natural (0:20)

Impressions: **173K**  
Views: **17K**  
Clicks: **315**



#### What's on Your Lawn? (0:37)

Impressions: **59K**  
Views: **7K**  
Clicks: **886**



## Clean Rivers Coalition Public Relations

CRC promoted Follow the Water and What's Your Lawn Style at several events and broadcasts throughout the region, taking our message directly into our communities. Social media and digital advertising are great for reaching new audiences, but we wanted to engage with people face to face. We believe that in-person engagement is valuable to demonstrate commitment and foster meaningful connections within the community. By participating in events and presenting our ideas, we hope to bring the campaigns to life through hope, curiosity, and inspiration.

### ***Selected Presentations and Media Appearances***

- KOIN 6 AM Extra | July 2022 | What's Your Lawn Style Feature
- OCEAN Connect+ Conference | September 2022 | Presentation on Follow the Water
- Clean Rivers Coalition Annual Forum | January 2023 | Presentation on Follow the Water
- Portland State University Water Resource Management Class | January 2023 | Collaboration with Follow the Water
- Beyond Your Front Door Podcast | February 2023 | Follow the Water and What's Your Lawn Style Feature
- Portland EcoFilm Festival | April 2023 | Follow the Water Film Series
- Watershed Alliance Film Screening | June 2023 | Presentation on Follow the Water



## The Clean Rivers Coalition Budget

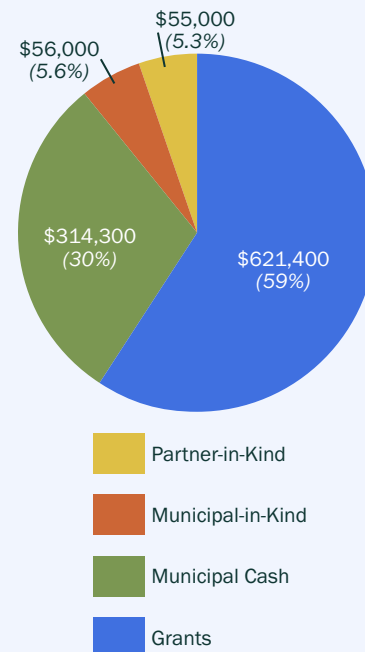
To support our vision and projects, CRC has been awarded over \$1 million since 2017. We garnered \$314,300 from local municipalities interested in funding our coalition's work. We were awarded \$100,000 in grant money from Meyer Memorial Trust's Willamette River Initiative. We also received Environmental Protection Agency grant funds that were partially matched by local municipalities and nonprofit organizations.

You can find a chart and graph of our funding sources below, along with a budget breakdown of funds used to promote Follow The Water and What's Your Lawn Style in this fiscal year.

### Total Funding 2017–2023

Contributor	Funding Supplied
Municipal Cash Contributions	\$314,300
Meyer Memorial Trust Grant	\$100,000
EPA Grant I	\$174,000
Municipal-in-Kind Match to EPA Grant I	\$12,500
EPA Grant II	\$347,400
Municipal-in-Kind Match to EPA Grant II	\$43,500
Partner-in-Kind Match to EPA Grant II	\$55,000
<b>Total Budget</b>	<b>\$1,046,700</b>

### Funding Sources 2017–2023



### Annual Spending FY 2022–2023

Budget Item	Amount Spent
Content Management	\$46,708.01
Planning and Evaluation	\$32,745.10
Digital Advertising	\$23,011.51
Content Development	\$15,486.85
Ad Production and Management	\$15,460.79
TV and Theater Advertising	\$15,250.00
Website	\$13,051.15
Social Media Advertising	\$10,557.99
Lawn Campaign Outreach	\$7,072.63
Software and Infrastructure	\$2,546.00
Public Relations	\$364.70
<b>Total</b>	<b>\$181,616.51</b>

## Future Plans for the Clean Rivers Coalition

CRC has several projects on the horizon, in addition to continuing both of our campaigns. The following projects are already underway.

### **Community-Based Social Marketing**

We are collaborating with a community-based social marketing (CBSM) firm to implement the behavior change aspect of our lawn campaign, creating a pilot program that will begin in 2024. The pilot will be tested in Salem, Eugene, and Clackamas County, and digital ads will use the video series and a survey to learn more about residential lawn care habits, especially among weed-and-feed users. We have plans to adapt the video series based on our research, and an evaluation report will share results and how it can be rolled out across Oregon and SW Washington.

### **Latinx/e/a/o Landscaper Project**

CRC partnered with Northwest Center for Alternatives to Pesticides and Metro to create a lawn care video series for Spanish-speaking landscapers that highlights best practices for worker, customer, and water safety. Corresponding workshops will be offered in Multnomah and Clackamas Counties. An evaluation report will describe what we learned and how this can be replicated across Oregon and SW Washington.

### **Eco-Lawn Video Series**

We are in the process of planning an extension of the lawn campaign for a more environmentally engaged audience called "Beyond the Lawn." The video series would be for households who are contemplating eco-lawns, gardens, meadow-scaping, and other lawn alternatives.

### **Follow the Water Website**

The Follow the Water website is also growing. We hope that with expanded content and engaging resources, we can encourage more people to visit again and again.



## Thank You to Our Stakeholders!

- Benton County
- Benton Soil and Water Conservation District
- City of Albany\*
- City of Bend
- City of Camas\*
- City of Corvallis
- City of Creswell
- City of Eugene\*
- City of Gladstone\*
- City of Gresham\*
- City of Keizer\*
- City of Lake Oswego\*
- City of Milwaukie\*
- City of Oregon City\*
- City of Portland\*
- City of Salem\*
- City of Silverton
- City of Springfield\*
- City of Tigard\*
- City of Troutdale\*
- City of West Linn\*
- City of Wilsonville\*

- City of Wood Village
- Clackamas County Water Environment Services\*
- Clackamas River Basin Council
- Clark County\*
- Clean Water Services\*
- Coast Fork Willamette Watershed Council
- Columbia Slough Watershed Council
- Corvallis Sustainability Coalition
- East Multnomah Soil & Water Conservation District
- Eugene Water & Electric Board
- Hood River Watershed Group
- Johnson Creek Watershed Council
- Luckiamute Watershed Council
- Marion County

- Marion Soil & Water Conservation District
- Mary's River Watershed Council
- McKenzie Watershed Council
- Meyer Memorial Trust
- Willamette River Initiative
- Multnomah County\*
- North Santiam Watershed Council
- NW Center for Alternatives to Pesticides
- Oak Lodge Water Services\*
- Oregon Department of Agriculture
- Oregon Department of Environmental Quality
- Oregon Department of Fish & Wildlife
- Oregon Department of Parks & Recreation
- Oregon Environmental Council
- Oregon State University

- Polk County Community Development
- Port of Portland
- Rogue Valley Council of Governments
- Rogue Valley Sewer Services\*
- Sandy River Watershed Council
- SOLVE
- South Santiam Watershed Council
- Tualatin Riverkeepers
- Tualatin Soil & Water Conservation District
- US Environmental Protection Agency
- US Geological Survey
- Wasco County Soil & Water Conservation District
- Watershed Alliance of SW Washington
- Willamette Partnership
- Willamette Riverkeeper

\* Contributed funding

## Glossary

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### **Impressions**

How often an ad or post is shown. An impression is counted each time one is shown.

### **Reach**

The number of people who have seen an ad or post. Since one person can be shown a post multiple times, impressions are a larger number than reach.

### **Engagement**

Engagement includes all actions that people take, including reacting to, commenting, sharing, viewing a photo or video (for at least 3 seconds), or clicking on a link.

### **Views**

When a viewer initiates intentional play of a video. For instance, short commercials (six seconds) are unskippable, so they often receive zero views because the user didn't initiate play.

### **Organic**

Unpaid efforts such as social media posts that aren't advertised.

### **Google Ads**

Google Ads is Google's online advertising program. We used a combination of Search, Display, Video, and Performance Max campaigns.

### **Average Cost-Per-Click**

The average amount charged for a click on an ad. Average cost-per-click (avg. CPC) is calculated by dividing the total cost of clicks by the total number of clicks.

### **Cost per Conversion**

The average amount charged for a conversion. Conversions are pre-defined actions, such as clicking and scrolling on the webpage, that we have identified as valuable to our campaign.

## Attachment 3: Summary of Water Quality Data

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

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**Summary of Water Quality Data  
For Reporting Year 2022/2023**

**Prepared by:  
City Salem Public Works Department  
Stormwater Quality  
Stormwater Monitoring Staff**

**November 1, 2023**

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Attachment A. Dry Weather Outfall Screening Results (RY 2022/2023)

## 1.0 Introduction

This document provides all monitoring data collected for the reporting year of July 1, 2022, to June 30, 2023 (RY 2022/2023), in accordance with the City of Salem’s NPDES MS4 permit requirements listed in Schedule B(3)(h). A background narrative for each monitoring element for which data were collected and a brief summary of results for RY 2022/2023 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*, which was updated and submitted to the DEQ November 1, 2022 per the permit requirements, and approved for use in January 2023. Progress toward meeting the monitoring requirements defined in Table 2 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 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) 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<sub>3</sub>+NO<sub>2</sub>-N)
- *Escherichia coli* (*E. coli*)
- Biochemical Oxygen Demand (BOD<sub>stream</sub>)
- Total Suspended Solids (TSS)

- Zinc -total recoverable and dissolved (CLA1, CLA10, PRI1, PRI5)
- Copper -total recoverable and dissolved (CLA1, CLA10, PRI1, PRI5)
- Lead -total recoverable and dissolved (CLA1, CLA10, PRI1, PRI5)
- Hardness (CLA1, CLA10, PRI1, PRI5)
- Alkalinity (WR1, WR5, WR10)
- Ammonia (WR1, WR5, WR10)
- Total Phosphorus (TP) (WR1, WR5, WR10)
- Total Solids (TS) (WR1, WR5, WR10)
- Total Dissolved Solids (TDS) (WR1, WR5, WR10)

**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 several reporting periods include:

- **E. coli** – there were 44 exceedances of the single sample criterion for E. coli (406 MPN/100mL) this year, down 35% compared to last year, and down 22% from the year prior.
- **Dissolved Oxygen/Temperature** – Average DO median levels were similar to last year, only 0.1 mg/L lower, but still higher than 2019-2021. Temperature was an average of 0.1 C lower than last year, continuing the cooler trend of average median temps 2-2.5 deg C lower than 2019-2021, very closely aligning to the data from 2018-19.
- **Copper** – there were no total or dissolved copper exceedances this year.
- **Lead** – there were no total or dissolved lead exceedances this year.
- **Zinc** – there were no total or dissolved zinc exceedances this year.
- **Nitrate & Nitrite** – Average Nitrate and Nitrite levels were the same this year as last year, with an average median value of 1.2 mg/L. This is twice the amount seen in both 2018/2019 and 2019/2020 which saw average medians of 0.6 mg/L.
- **BOD** – no significant change from the past two reporting years was seen, with an average median value of 0.9 mg/L.
- **Specific Conductivity** – Average specific conductivity levels were very similar to what has been seen the past three years.
- **pH** – No significant change in average median values have been seen over the past four years.
- **Turbidity** – Average turbidity levels decreased slightly by over 1 NTU, and were the lowest levels seen in the past five years.
- **Rainfall** – 2022/2023 saw less precipitation than last year on sampling days, with 3 out of 12 sampling days having measurable rainfall in the preceding 24 hours compared to 5 of 12 from last year. Citywide, an average of approximately 13 inches less rainfall was measured for the entire year compared to last year. Significant precipitation began one month later in the fall and ended two months earlier in the spring when compared to 2021-2022.

## **2.2 Continuous Instream Monitoring**

The City maintains a network of Continuous Instream water quality monitoring and/or stream gauging stations on eight different urban streams within the city. There are currently ten water quality and stream gauging stations on five of those streams and four established stream gauge-

only stations (SHE3, PRI4, WAL3, and LPW1) on three additional streams within city limits. Figure 1 identifies the location of each of the existing stations.

The water quality 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 at water quality stations includes:

- Turbidity
- Specific Conductivity
- Temperature
- pH
- Dissolved Oxygen (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.**

#### **Continuous Data Observations:**

**Temperature:** After slightly warmer summer and early fall temperatures in 2022, continuous temperature 7 day moving avg maximum values showed colder temperatures earlier in the winter when compared to last year. These temperature values reached similar low temperature levels compared to last year, but generally stayed colder longer. By late spring/early summer, temperature values looked similar to last year at the same time.

**Dissolved Oxygen:** Dissolved Oxygen (DO) generally follows an inverse trend to water temperature data, with colder temperatures leading to higher DO values. Because of this, DO levels were generally higher throughout the winter and for longer periods of time than last year. Values in the summer also appear to be on average slightly higher than the 2021-22.

**pH:** pH data were similar to the 2021-22 monitoring year.

**Turbidity:** Average monthly median Turbidity values were very similar to the 2021-22 monitoring year, with the most notable exception being 36% lower average turbidity in the month of December. This is likely related to December 2022 receiving roughly half the rainfall that December 2021 received.

**Specific Conductivity:** Average monthly Specific Conductivity values were largely unchanged from 2021-22, except for October. October 2022 had an average of 16% lower specific conductivity when compared to October 2021. Much of these higher Specific Conductivity levels in October 2021 were seen in Mill Creek and East Fork Pringle Creek.

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 at the continuous water quality monitoring stations 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 PRI3, CLK1 and CLK12). 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 in 2010 (one of the site locations changed in the updated monitoring plan) and is expected to continue beyond the current MS4 permit term; 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:

- 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

**No storm events were sampled for this monitoring element for reporting year 2022/2023.**

## **2.4 Stormwater and Structural BMP Monitoring**

The City of Salem began collecting stormwater samples from land use-based monitoring sites in 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. During the last NPDES MS4 permit term (12/2010 – 12/2015) the City resumed land use-based stormwater monitoring with three sites which represented residential, commercial, and industrial land use in Salem.

For the current permit term, the City will continue with land use-based monitoring of selected structural Best Management Practice (BMP) sites. Two sites have been chosen for each major land use (residential, commercial, and industrial), and during each sampling event one site for each land use type will be chosen, for a total of three sites. Samples will be taken from the inlet, prior to any treatment, and at the outlet, after treatment has occurred.

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

- 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)

**No storm events were sampled for this monitoring element for reporting year 2022/2023.**

## **2.5 Pesticide Monitoring**

No samples for the pesticide monitoring element were collected for reporting year 2022/2023.

## **2.6 Priority Dry Weather Outfall/Manhole Screening**

The 2022-23 dry weather outfall screening effort recorded 130 outfall inspections (outfall structures or the first available upstream manhole), 109 of which had observable flow. Of these inspections, 50 are inspections associated with 38 outfalls identified as priority outfalls in the City's 2012 Dry Weather Outfall and Illicit Discharge Screening Plan and 80 inspections were associated with secondary outfalls. Outfalls with chlorine and/or E.coli detections were investigated further as resources allowed.

Of the 130 total outfall inspections, 92 outfalls were tested for chlorine, 26 of which had some amount of chlorine present. Three were revisited for follow up chlorine sampling. 30 outfalls received additional analytical sampling for other field and/or laboratory parameters. E.coli was tested at 26 outfalls, five of which were revisited for follow up sampling.

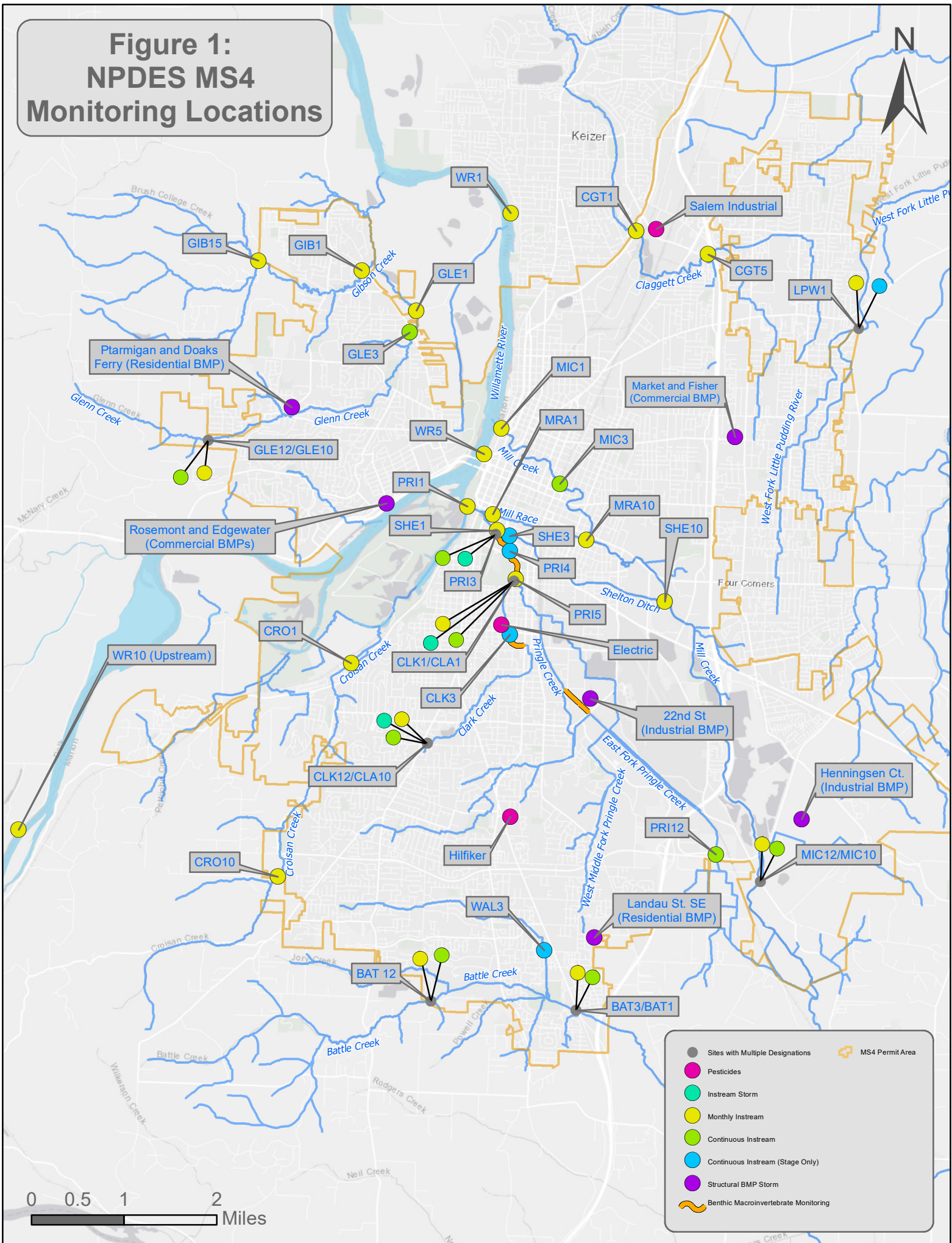
The Dry Weather Outfall and Illicit Discharge Screening Plan is currently undergoing internal review and updating and will be in effect for reporting year 2023/24.

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

## **3.0 Conclusion**

The City is making progress towards meeting all monitoring requirements of the 2021-2026 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:  
NPDES MS4  
Monitoring Locations**



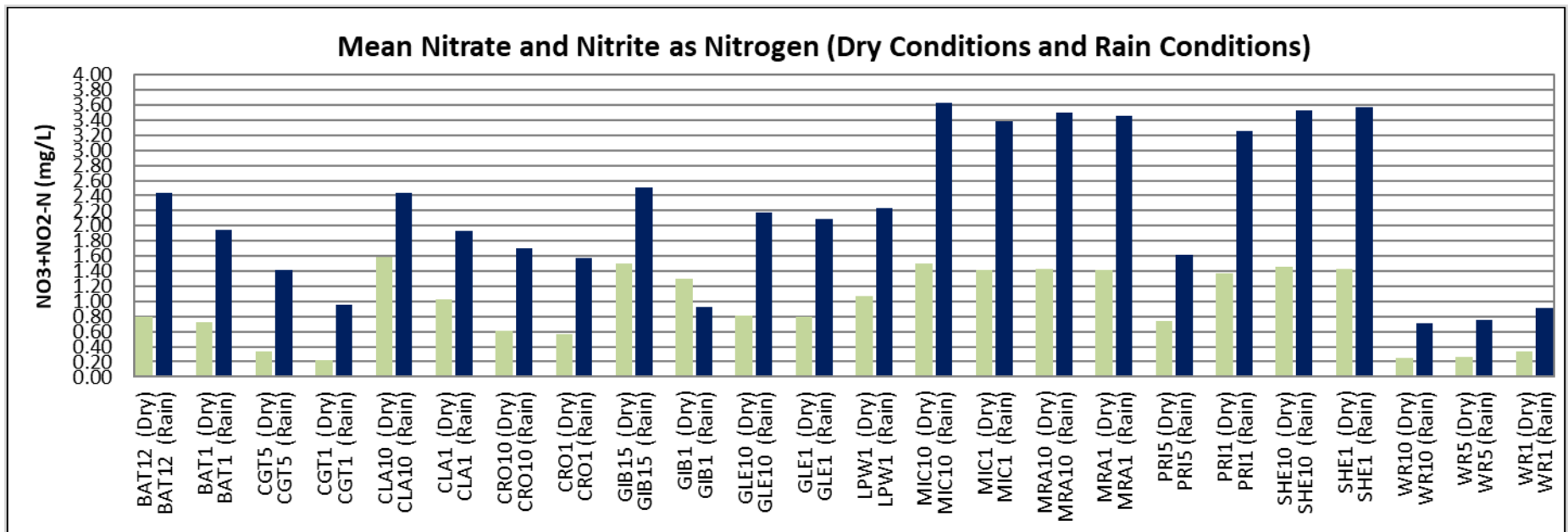
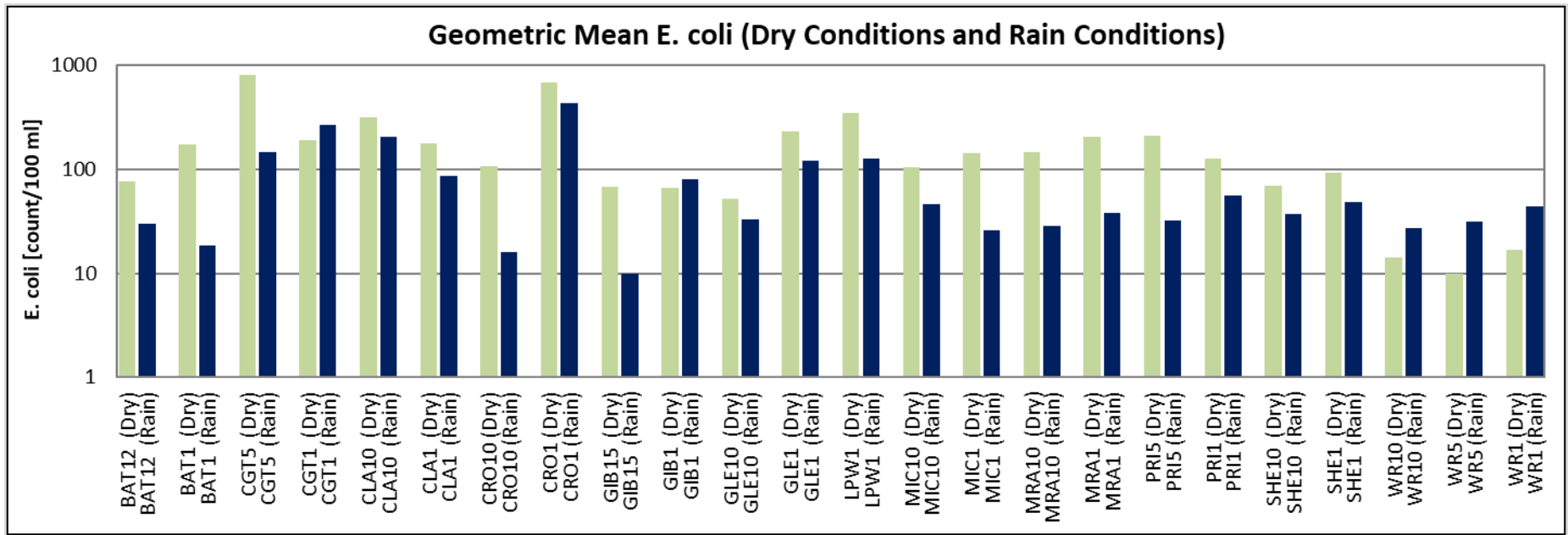
0 0.5 1 2 Miles

- Sites with Multiple Designations
- Pesticides
- Instream Storm
- Monthly Instream
- Continuous Instream
- Continuous Instream (Stage Only)
- Structural BMP Storm
- Benthic Macroinvertebrate Monitoring
- MS4 Permit Area



Figure 2

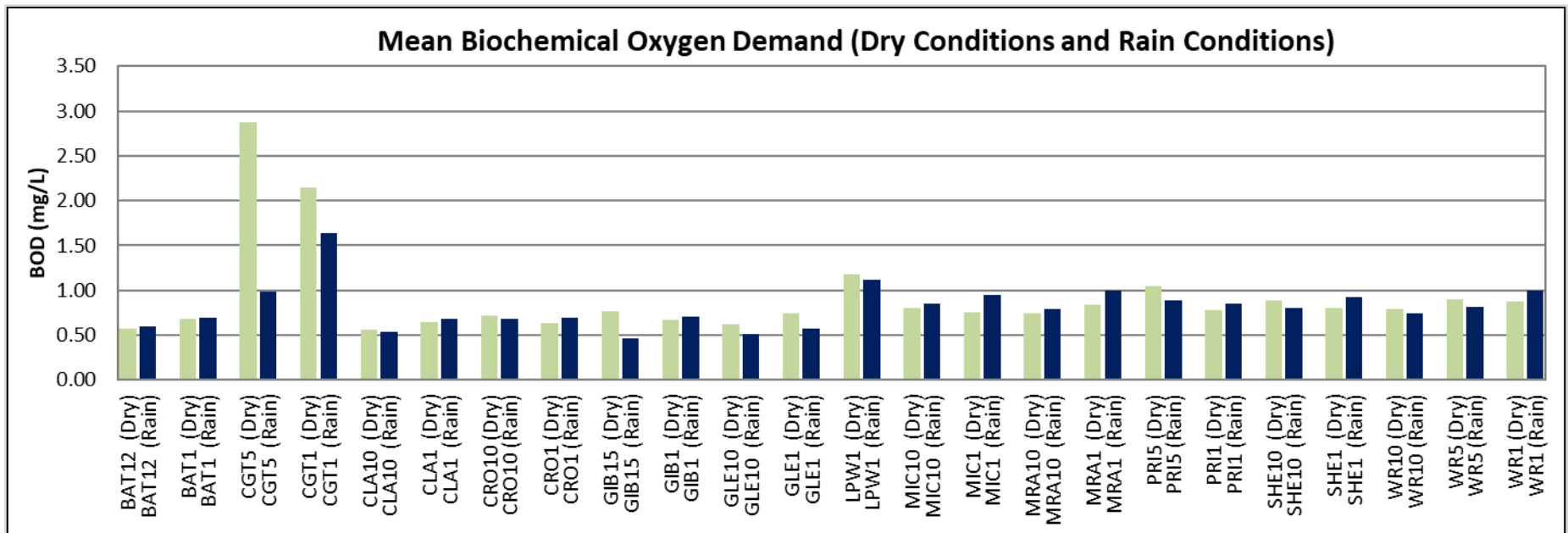
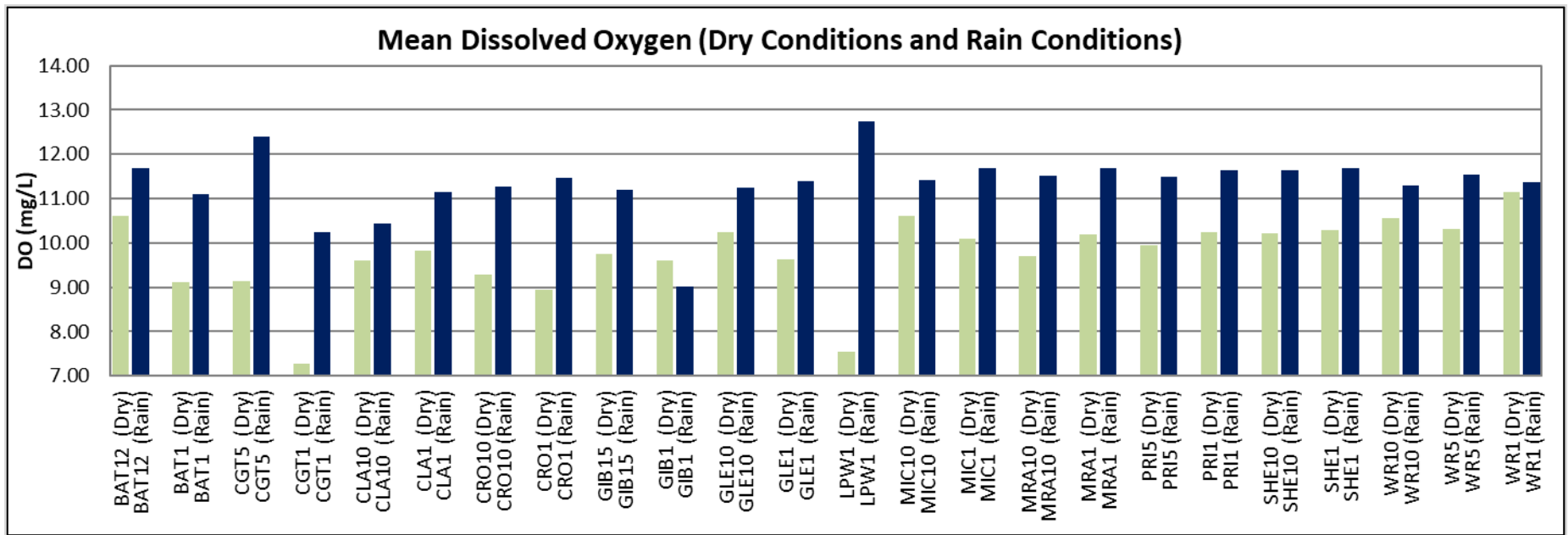
Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2022/2023)



**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 2

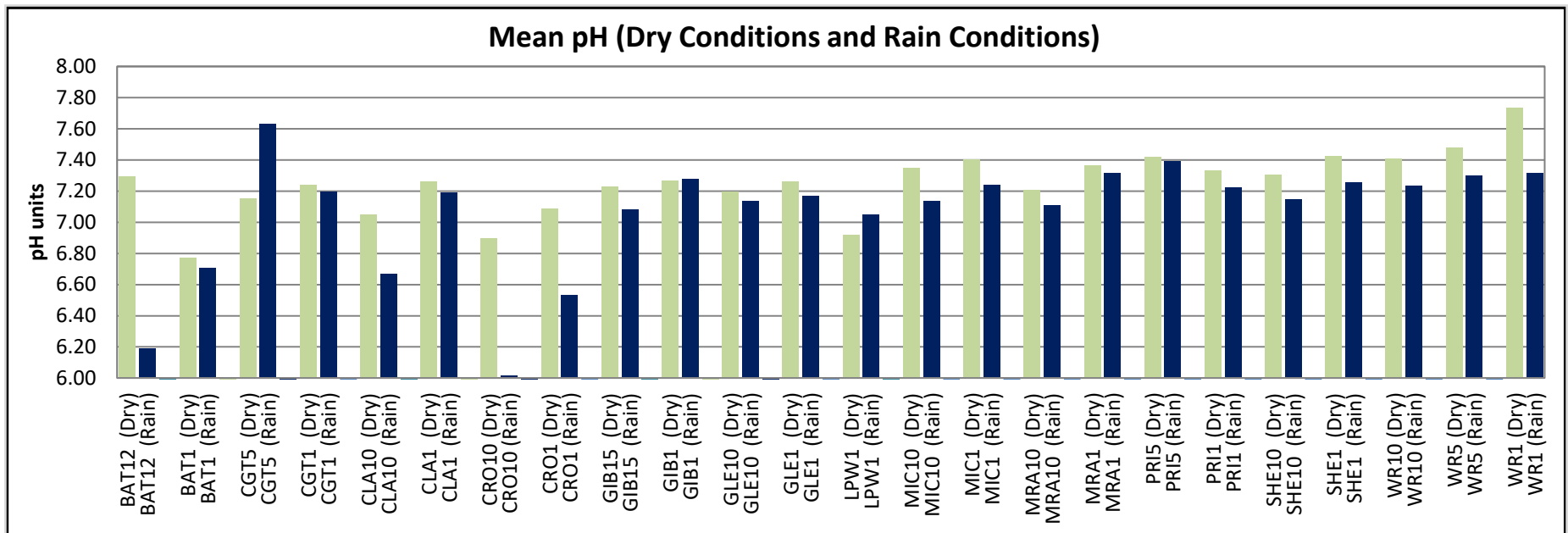
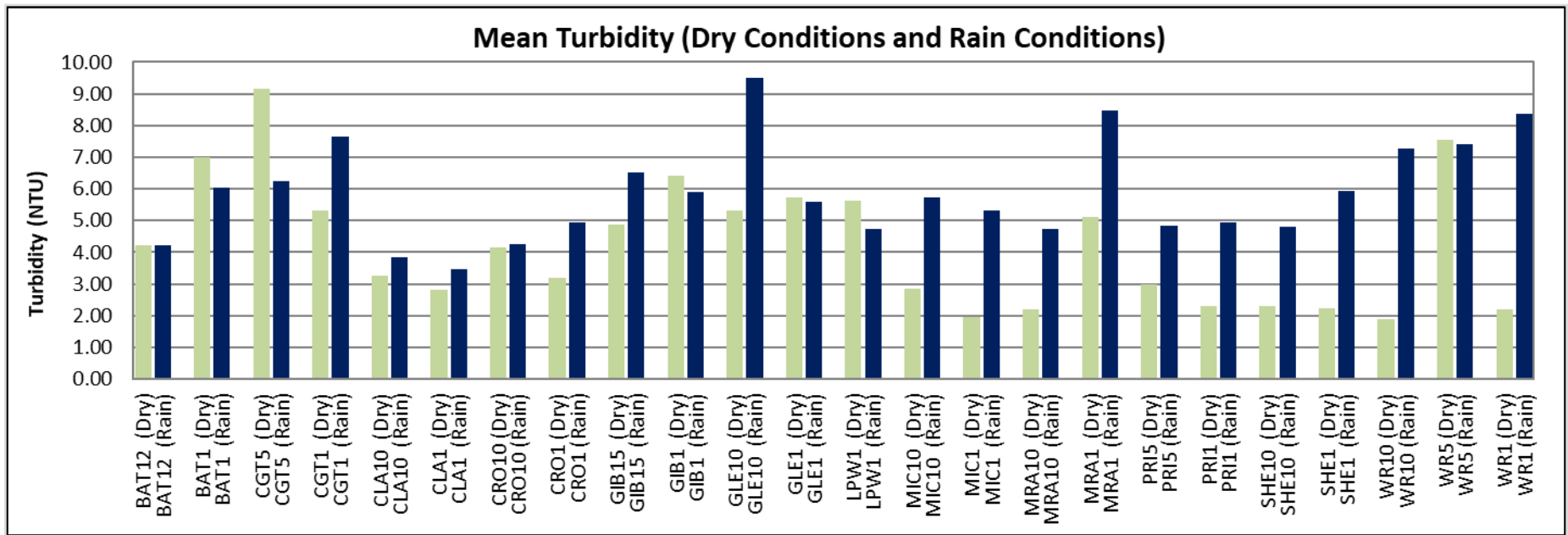
Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2022/2023)



**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 2

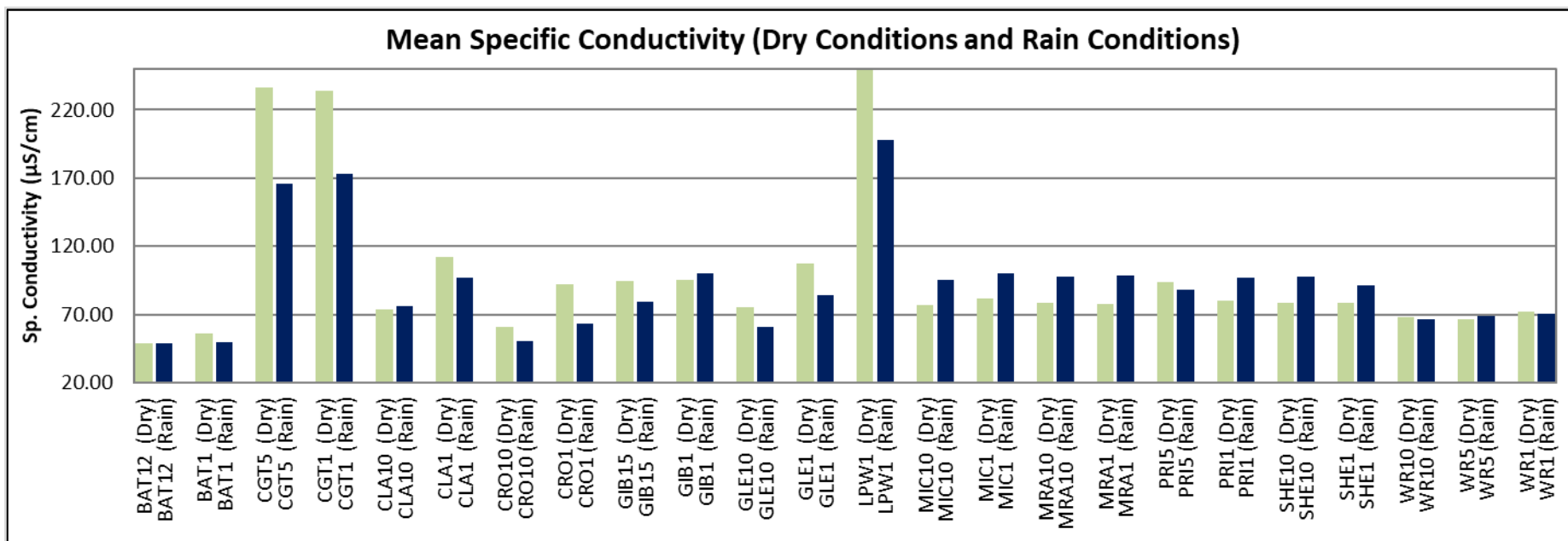
Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2022/2023)



**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 2

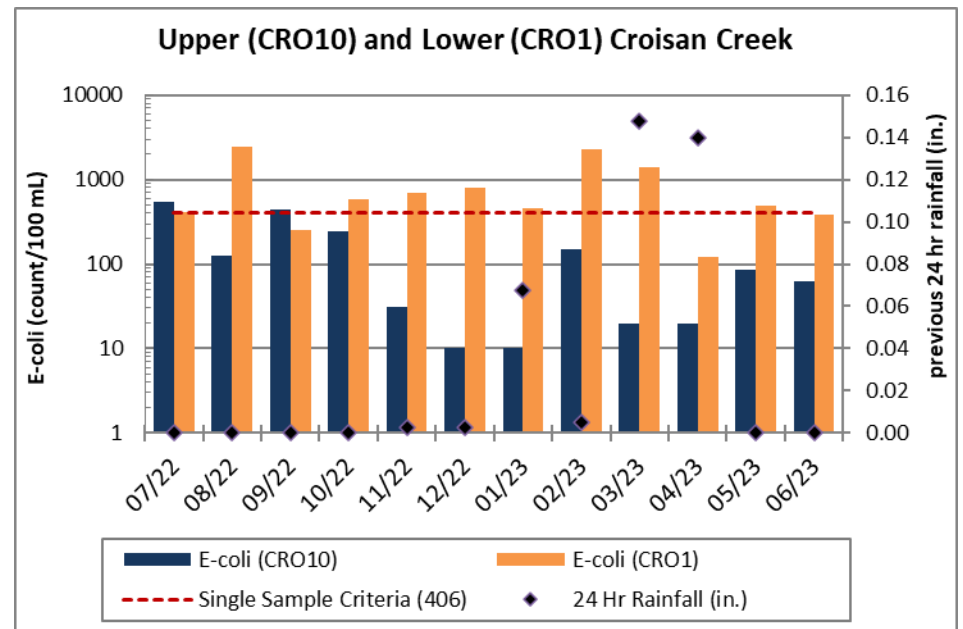
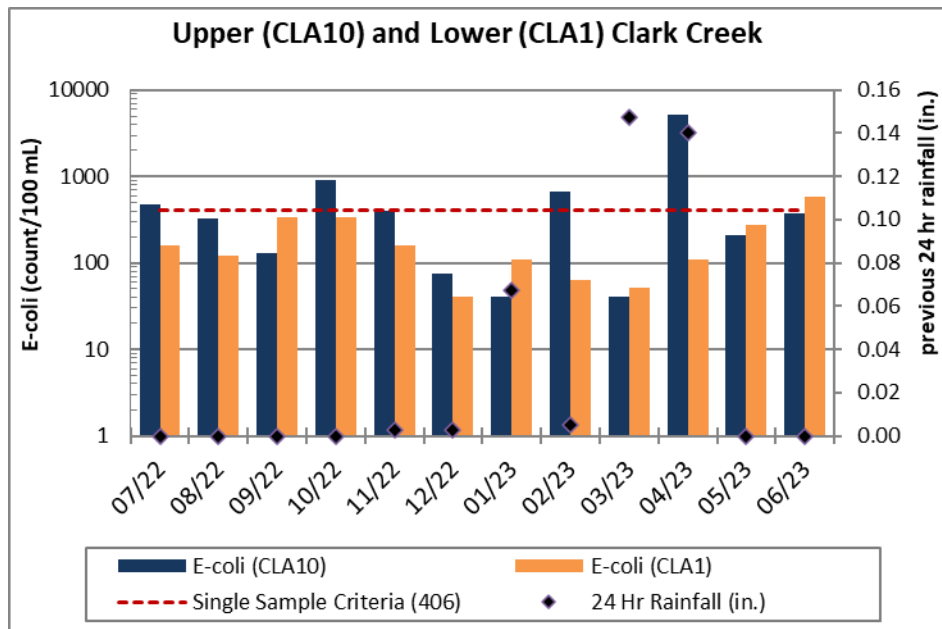
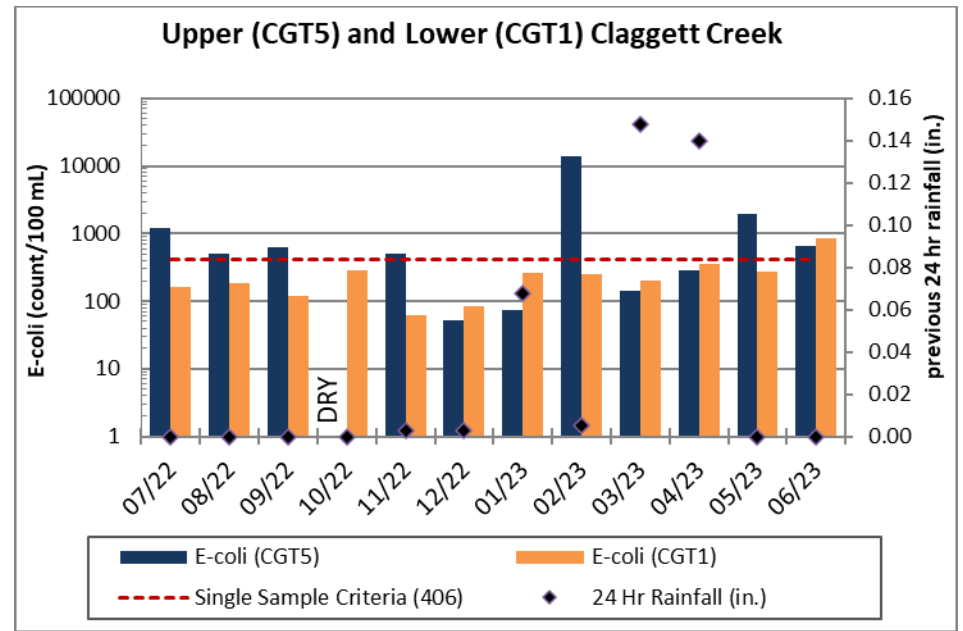
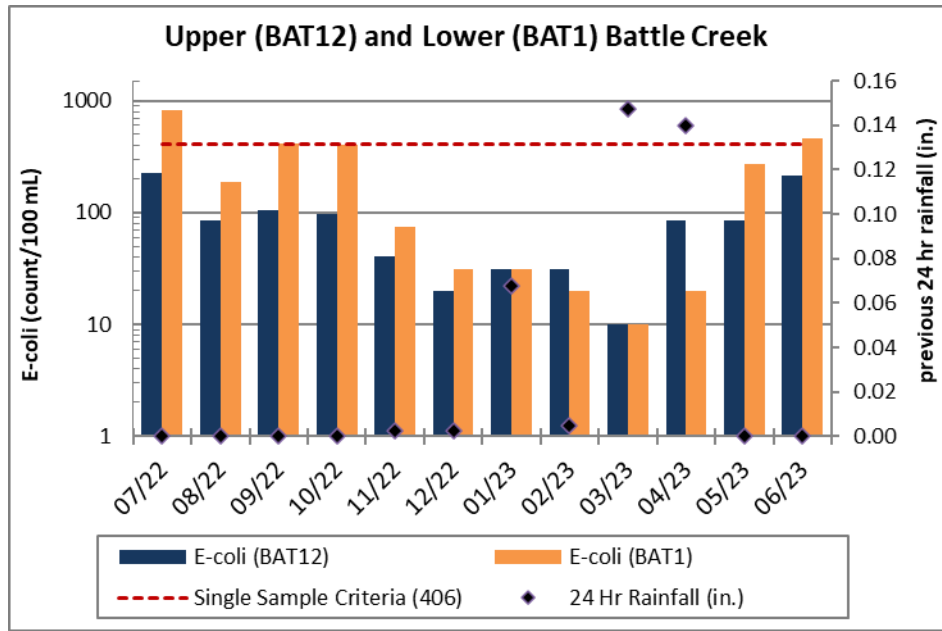
Monthly Instream Mean Value Comparison for Dry and Rain Conditions (Reporting Year 2022/2023)



**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

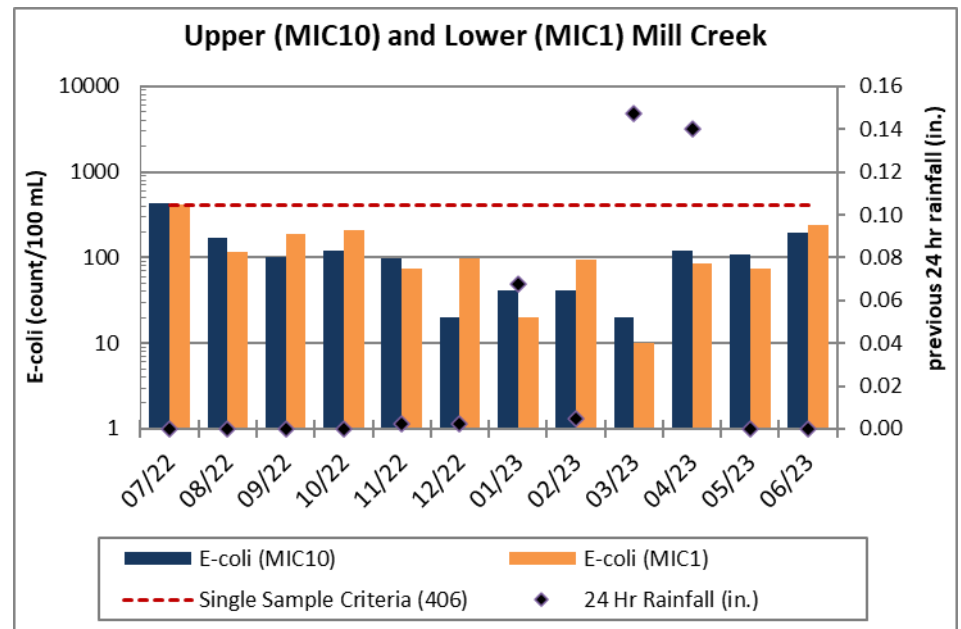
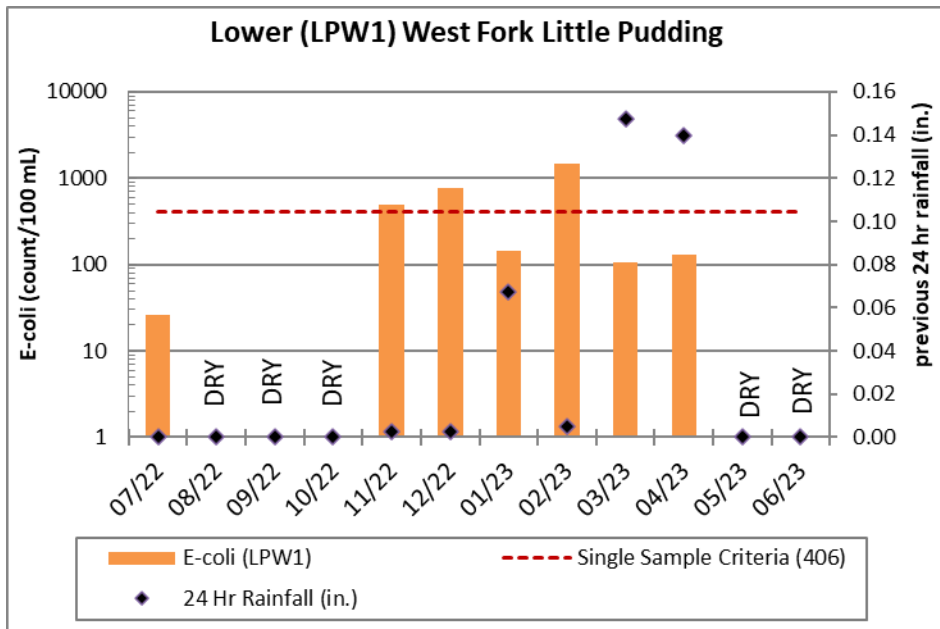
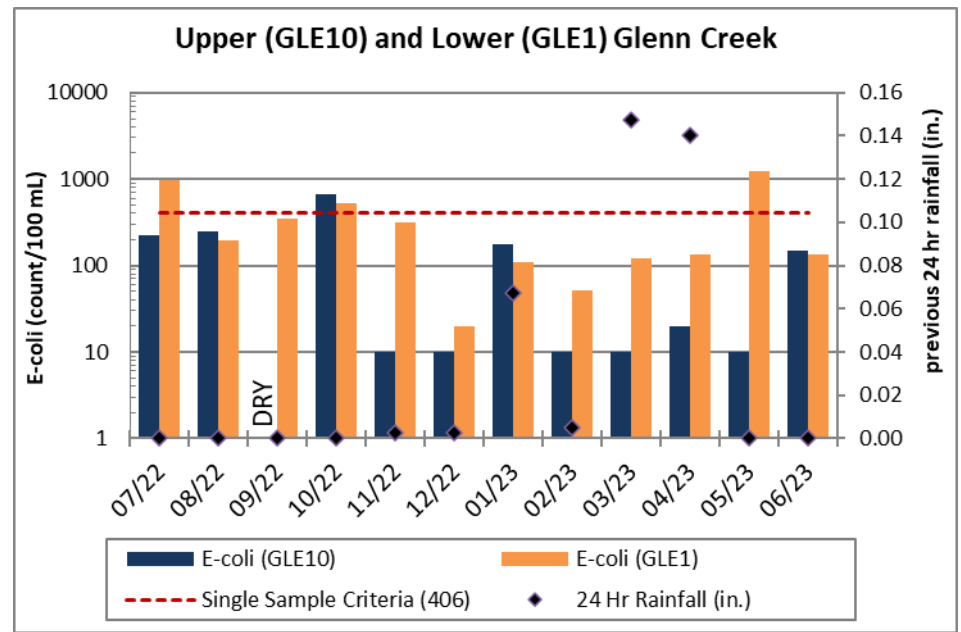
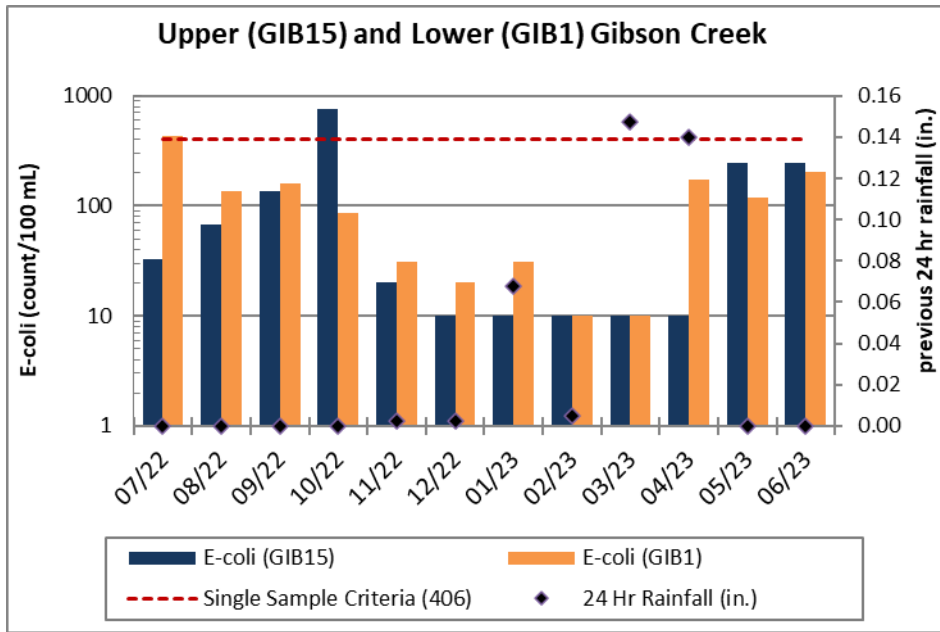
Monthly Instream E. Coli Upstream / Downstream Site Comparison (Reporting Year 2022/2023)



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

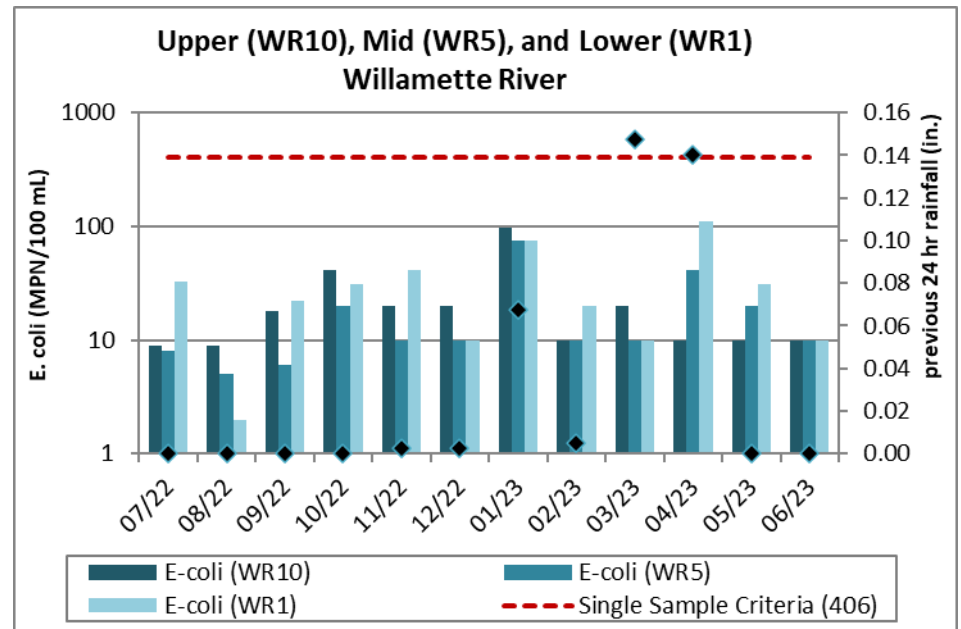
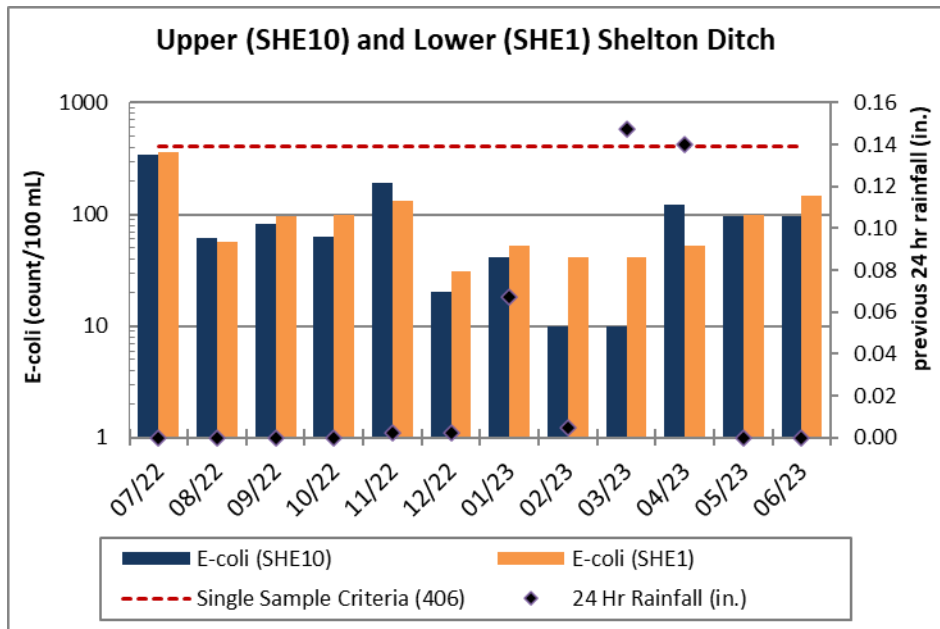
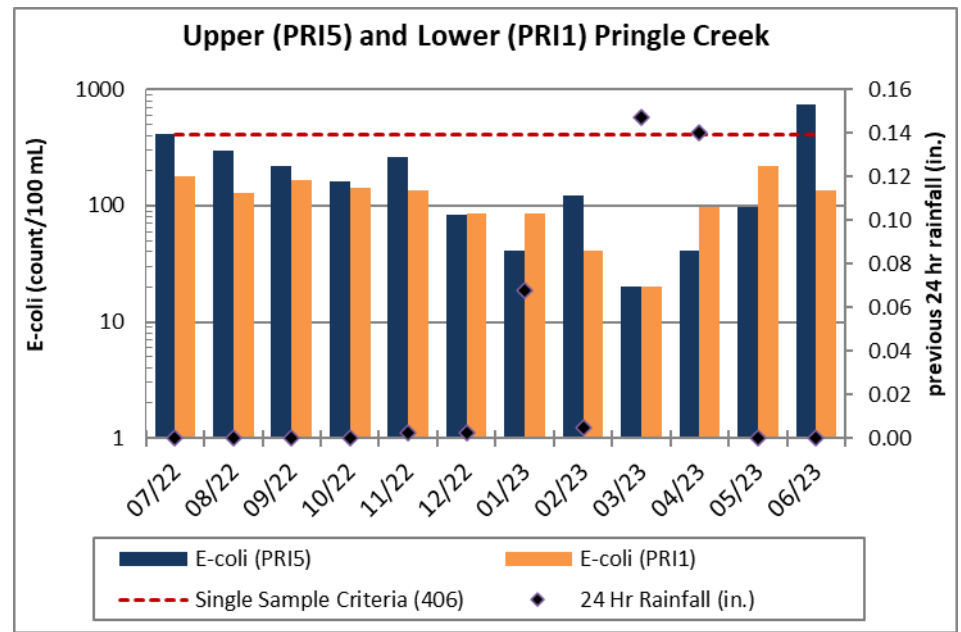
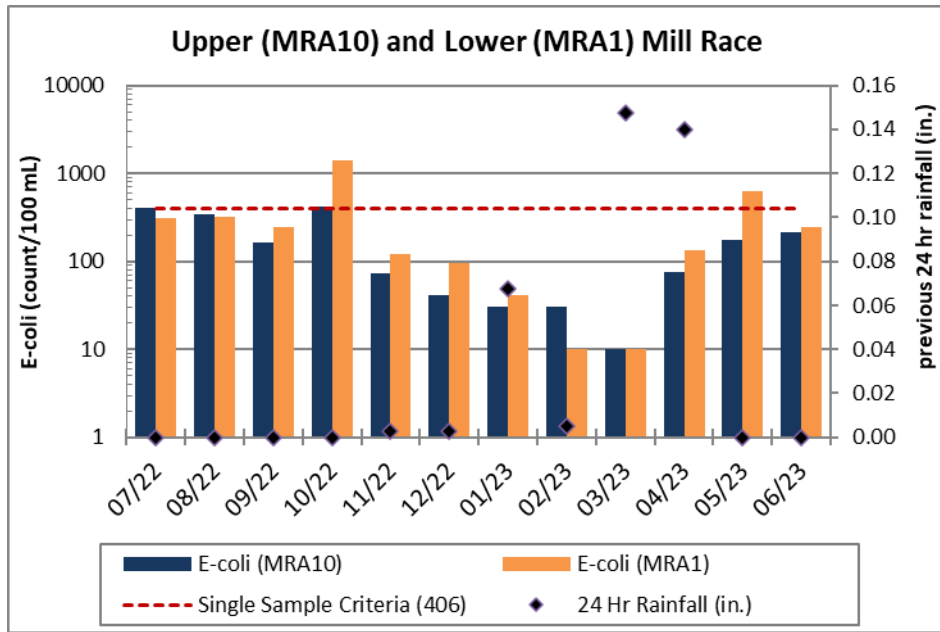
Monthly Instream E. Coli Upstream / Downstream Site Comparison (Reporting Year 2022/2023)



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

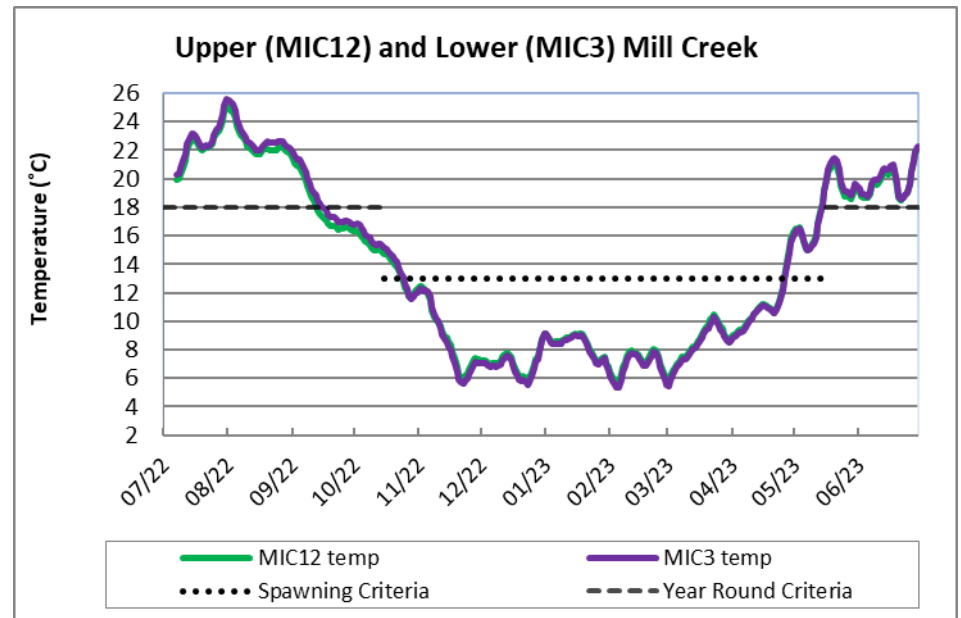
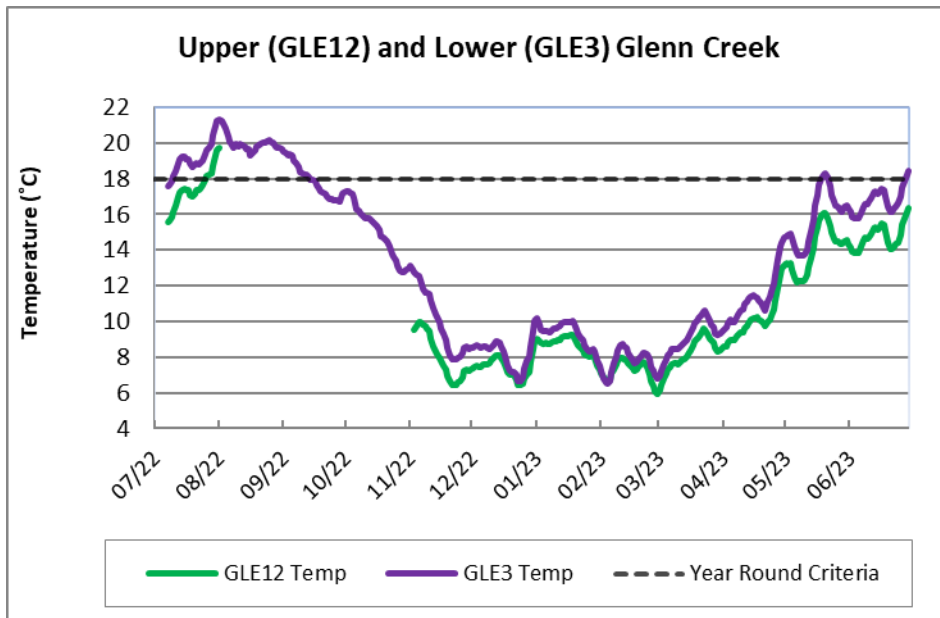
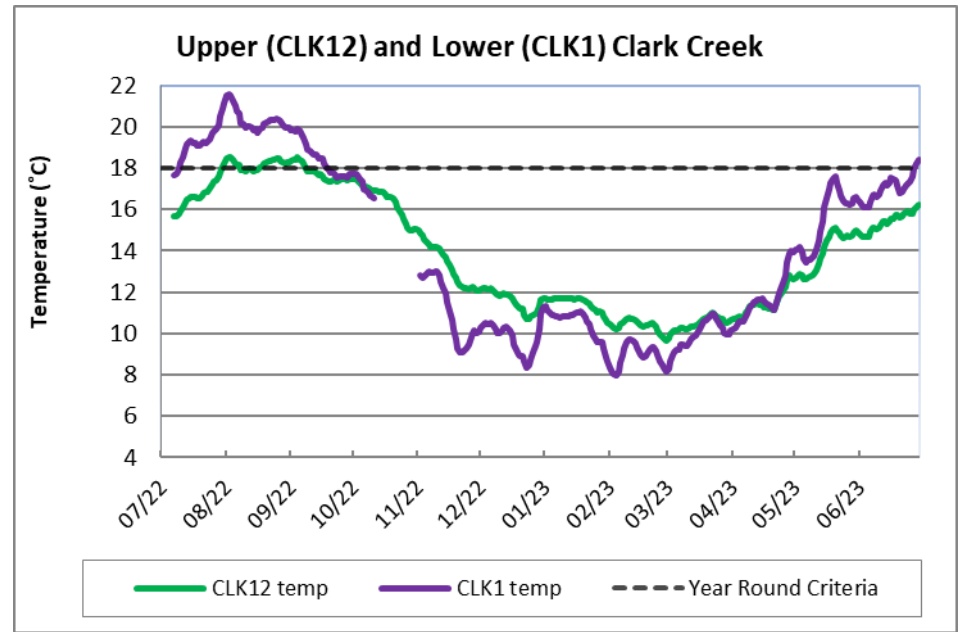
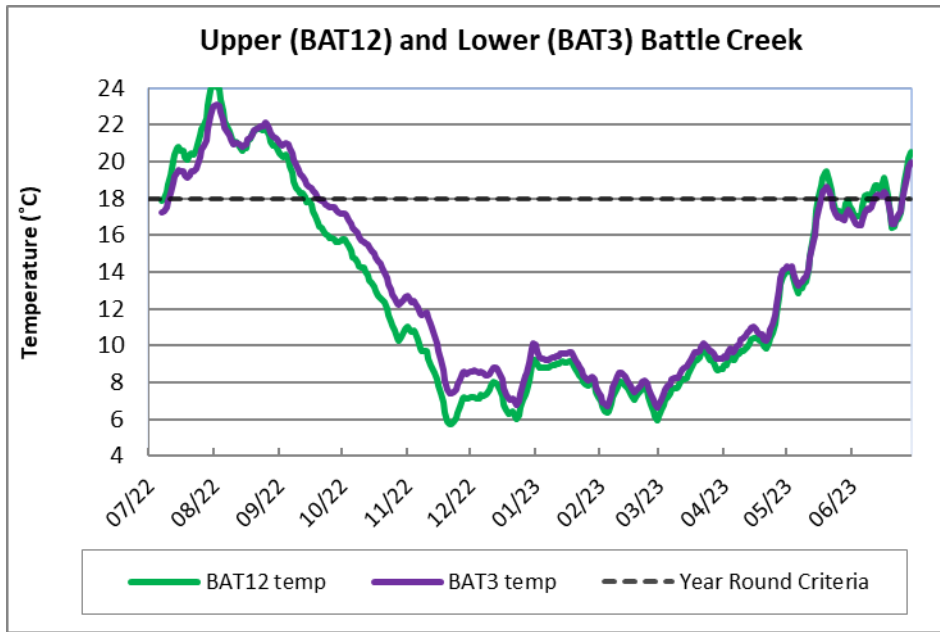
Monthly Instream E. Coli Upstream / Downstream Site Comparison (Reporting Year 2022/2023)



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 2022/2023)



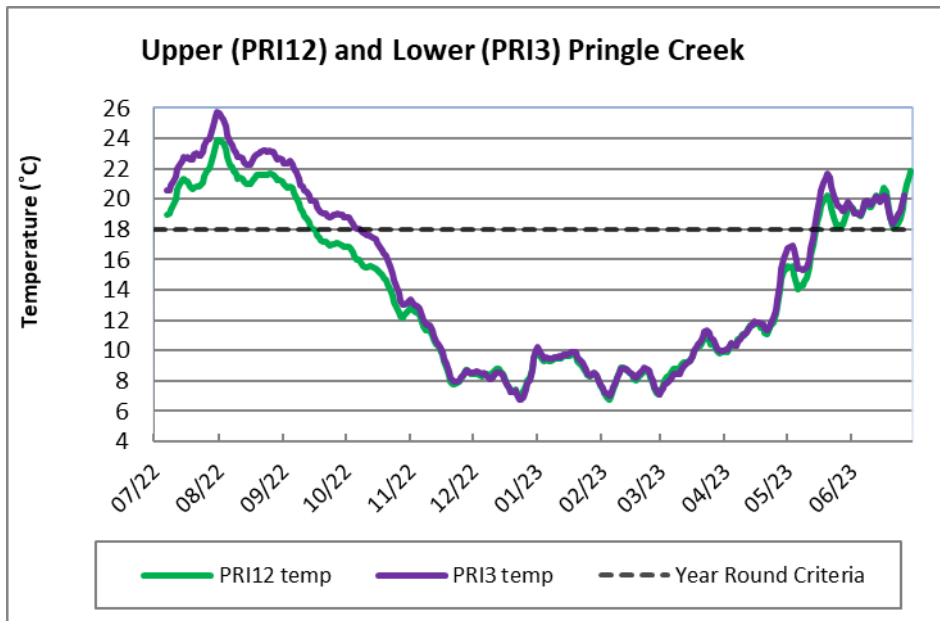
Presented temperature data consists of A grade data with greater than 80% of data points collected per day. Temperature criteria is defined in OAR 340--04100028 and OAR 340-0340, Tables 340A & B.

- 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

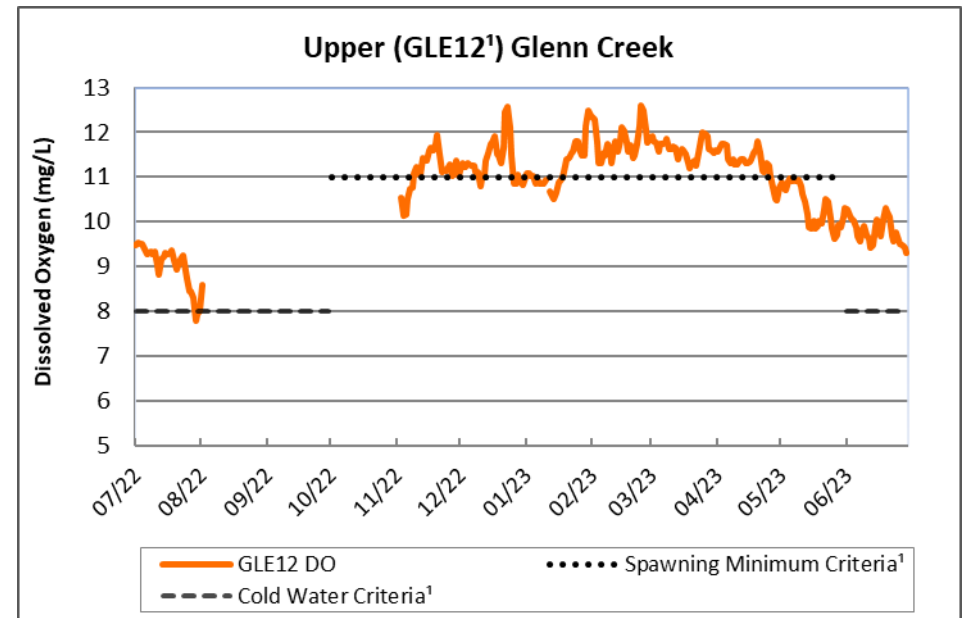
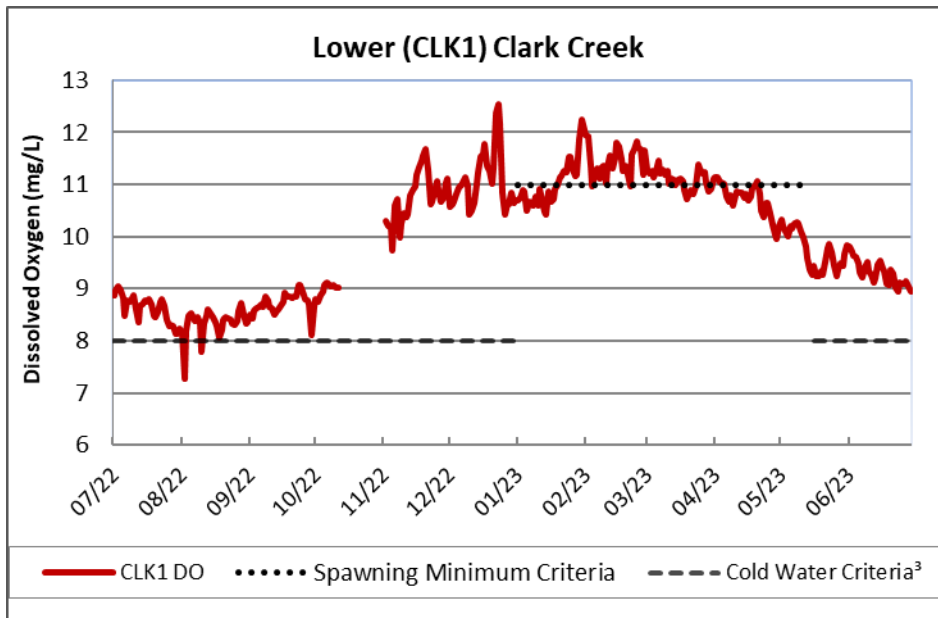
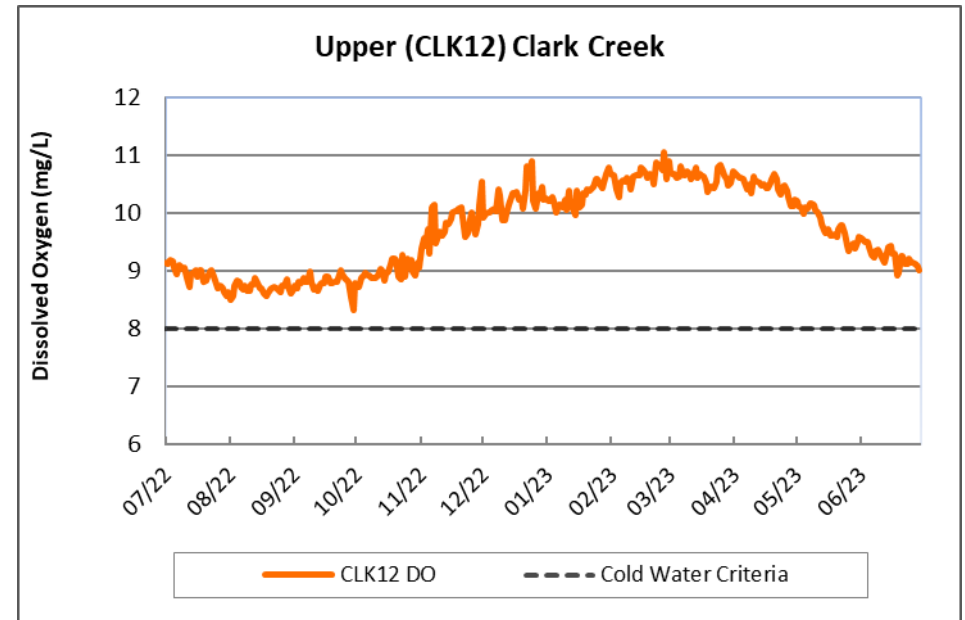
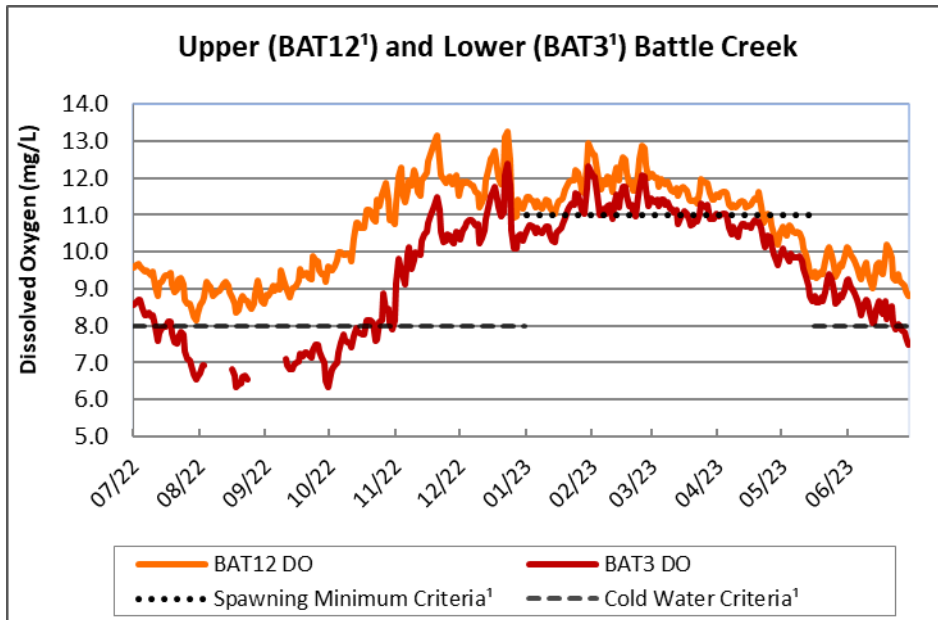
Continuous Instream Temperature 7-Day Moving Average Maximum (Reporting Year 2022/2023)



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 2022/2023)

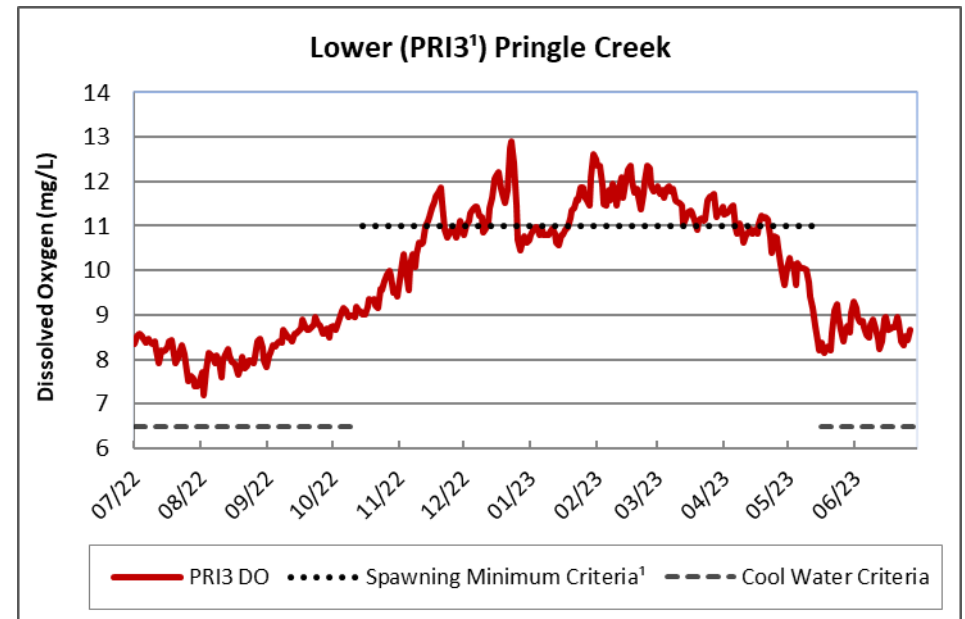
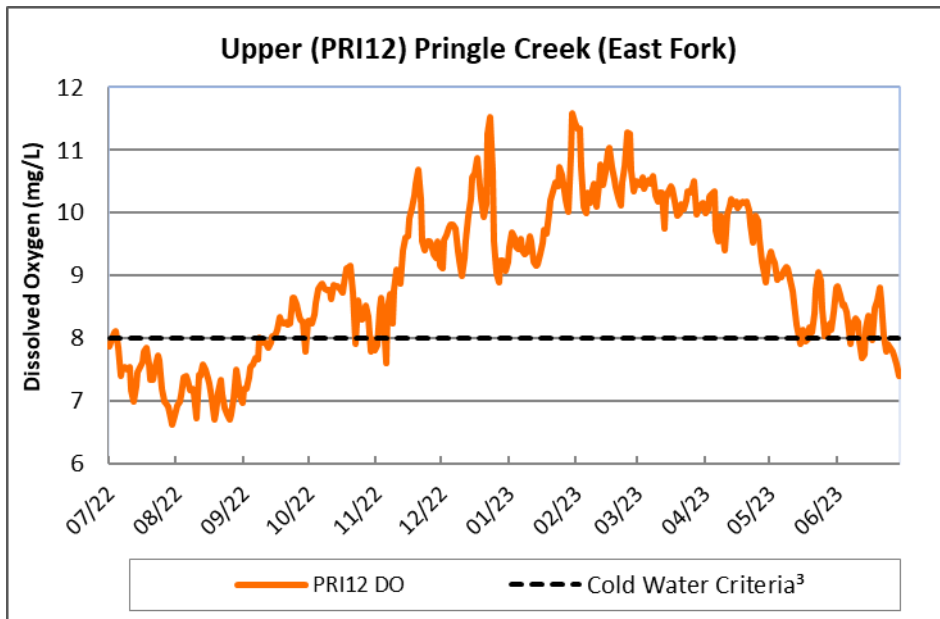
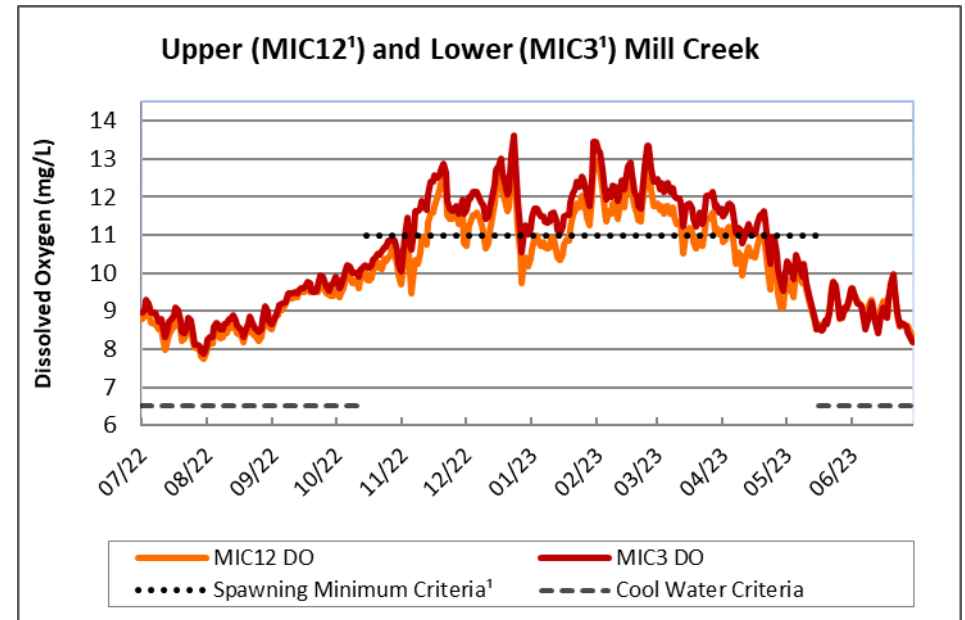
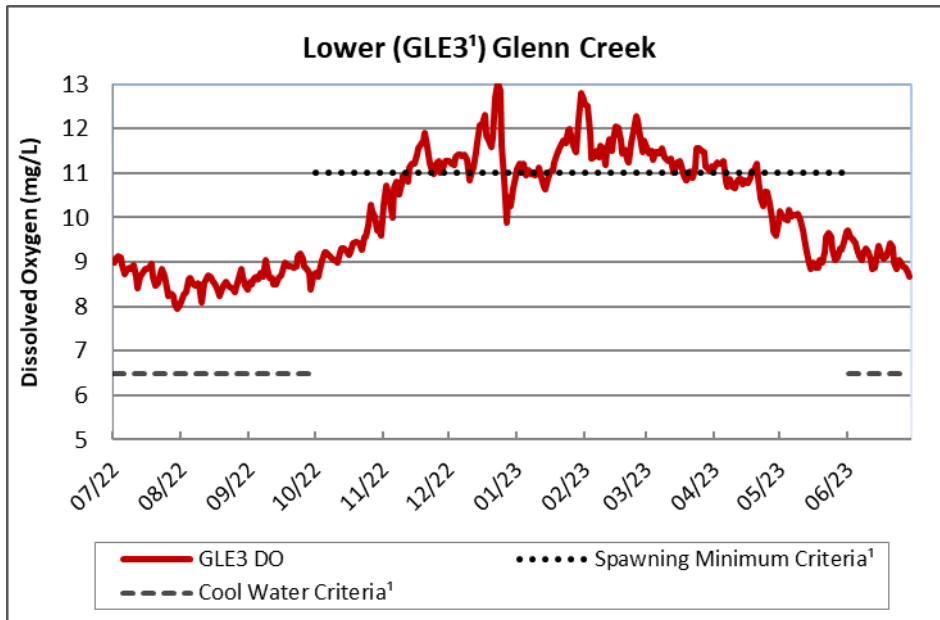


Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day. DO Criteria as defined in OAR 340-041-0016 and OAR 340-0340, Tables 340 A & B.

- 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.

<sup>1</sup> Oregon's 2012 Integrated Report Section 303(d) listed.

Figure 5  
 Continuous Instream Dissolved Oxygen Daily Mean (Reporting Year 2022/2023)

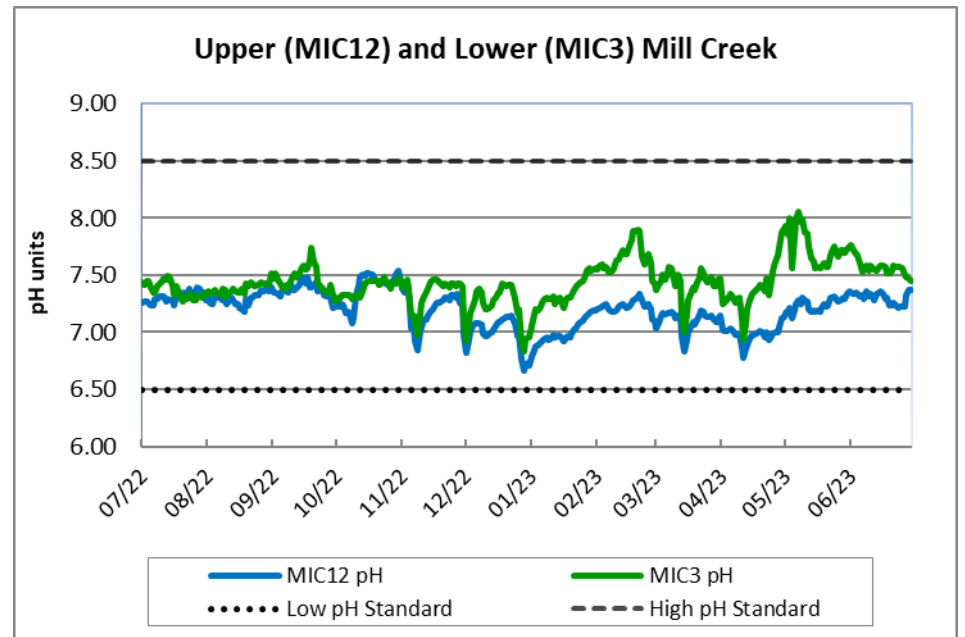
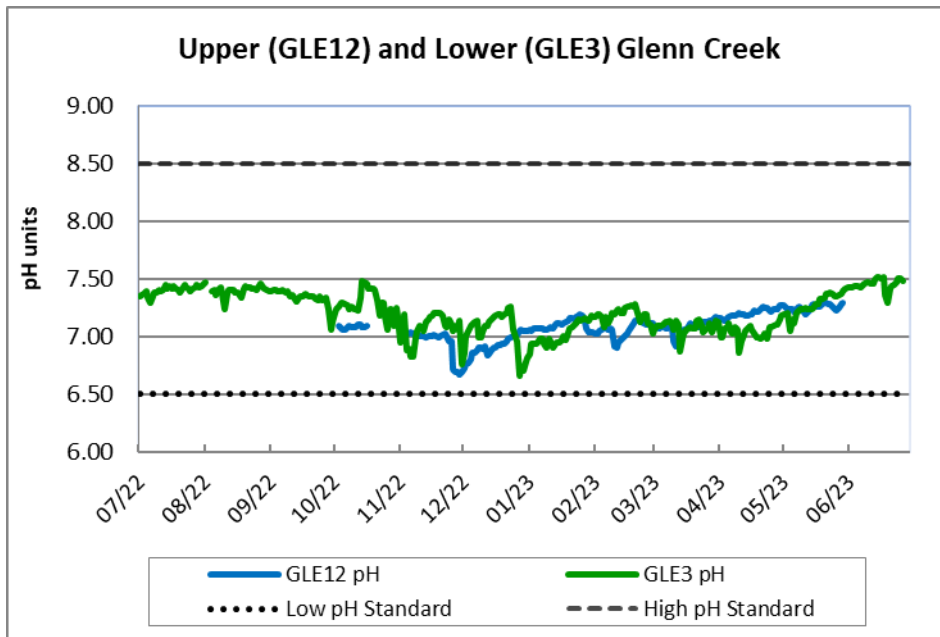
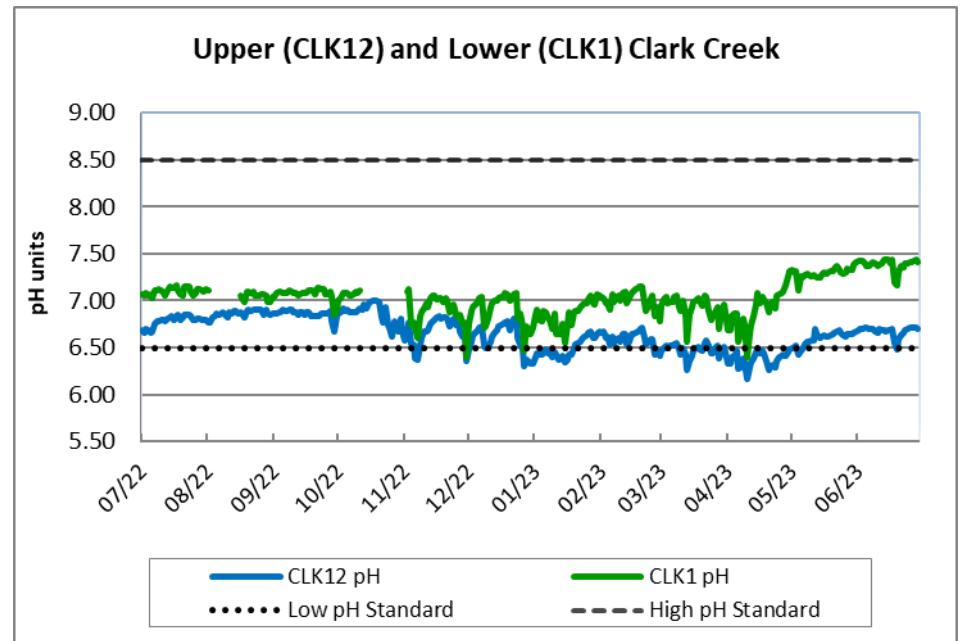
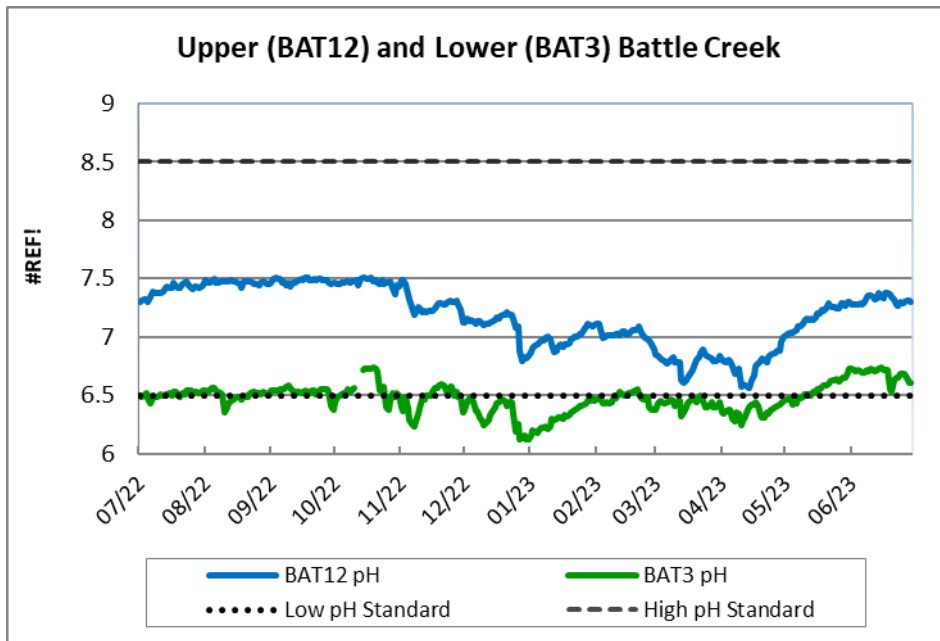


Presented DO data consists of A and B grade data with greater than or equal to 80% of data points collected per day. DO Criteria as defined in OAR 340-041-0016 and OAR 340-0340, Tables 340 A & B.

- 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.

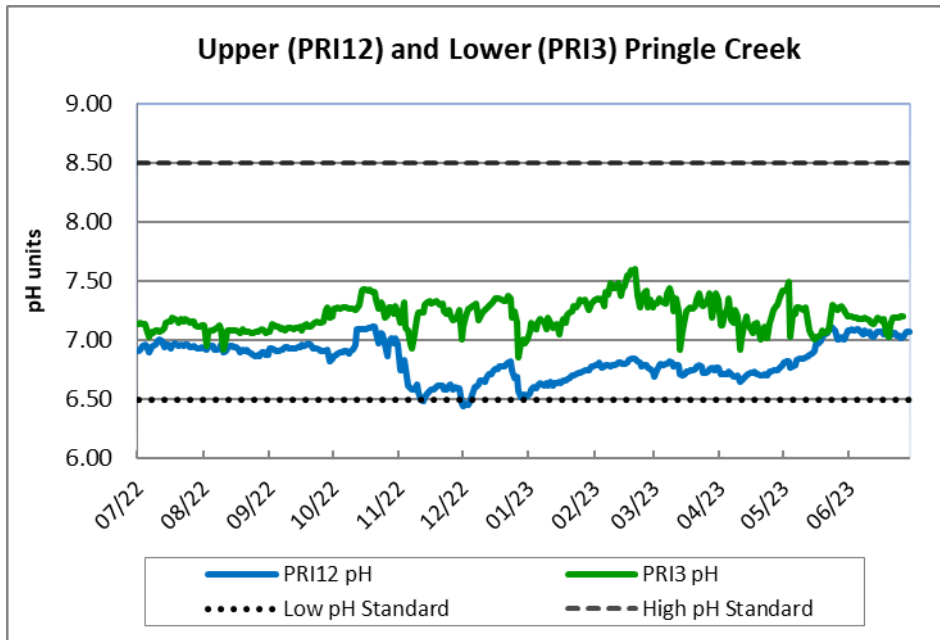
Figure 6  
 Continuous Instream pH Daily Mean (Reporting Year 2022/2023)



Presented pH data consist of A and B grade data with greater than or equal to 80% of data points collected per day.

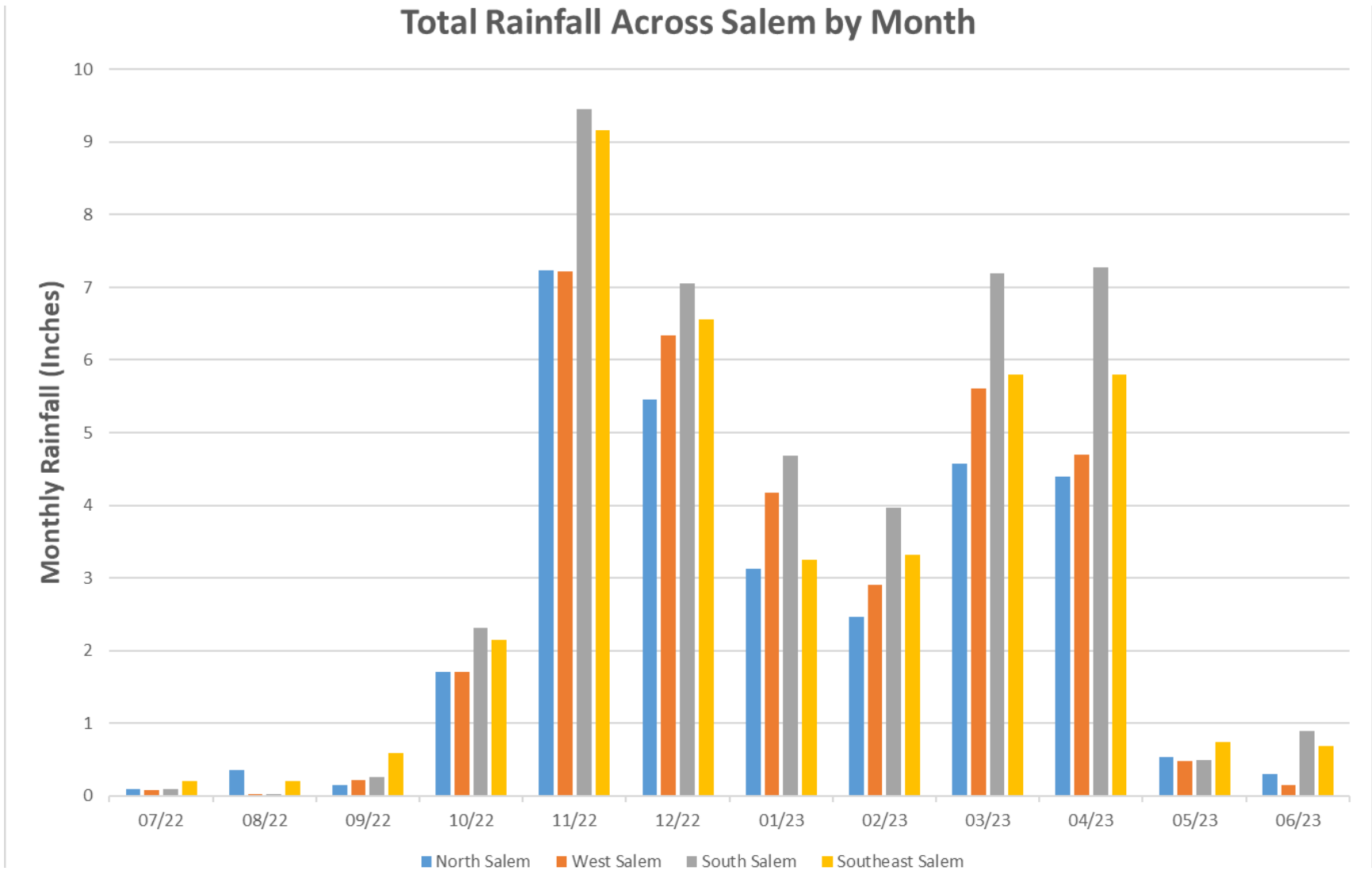
As defined in OAR 341-041-0035 Water Quality Standards for the Willamette Basin, pH should not fall outside the ranges of 6.5 to 8.5 pH units.

Figure 6  
Continuous Instream pH Daily Mean (Reporting Year 2022/2023)



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 2022/2023)



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

<b>Monitoring Type</b>	<b># of sites</b>	<b>Total "Events" Needed</b>	<b>2021 / 2022</b>	<b>2022 / 2023</b>
Monthly Instream	24	48 / site	12 <sup>1</sup>	12 <sup>1</sup>
Continuous Instream	10	On going	NA	NA
Instream Storm	3	15 / site	0	0
Stormwater & Structural BMP	3	15 / site	0	0
Pesticides	3	4 / site	0	0
Macroinvertebrates	3	2 / site	0	0

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> 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		Continuous Instream		Stormwater & Structural BMP		
Site ID	Site Location	Site ID	Site Location	Site Id	Site Location	Land Use Type
BAT 1	Commercial St SE	BAT3	Commercial St SE	Ptarmigan (In/Out)	Ptarmigan Ct NW & Kitsap St NW	Residential
BAT 12	Rees Hill Rd SE	BAT12	Lone Oak Rd SE	Bailey Jean (In/Out)	Baily Jean Ct SE	Residential
CGT 1	Mainline Dr NE	CLK1 <sup>1</sup>	Bush Park	22nd (In/Out)	22nd St SE & Madrona Ave SE	Industrial
CGT 5	Hawthorne St NE @ Hyacinth St NE	CLK12 <sup>1</sup>	Ewald St SE	Henningsen (In/Out)	Henningsen Ct SE	Industrial
CLA 1	Bush Park	GLE3	Wallace Rd NW	Market (In/Out)	Market St SE & Fisher Rd NE	Commercial
CLA 10	Ewald St SE	GLE12	Hidden Valley Dr NW	Edgewater (In/Out)	Edgewater St NW & Rosemont Ave NW	Commercial
CRO 1	Courthouse Athletic Club	LPW1 <sup>2</sup>	Cordon Rd			
CRO 10	Ballantyne Rd S	MIC3	North Salem High School			
GIB 1	Wallace Rd NW	MIC12	Turner Rd SE			
GIB 15	Brush College Rd NW	PRI3 <sup>1</sup>	Pringle Park			
GLE 1	River Bend Rd NW	PRI4 <sup>2</sup>	Salem Hospital Footbridge			
GLE 10	Hidden Valley Dr NW	PRI12	Trelstad Ave SE			
LPW 1	Cordon Rd NE	SHE3 <sup>2</sup>	Winter St. Bridge			
MIC 1	Front St Bridge	WAL3 <sup>2</sup>	Wiltsey Rd SE			
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)					

<sup>1</sup> Instream Storm sampling done at these sites. <sup>2</sup> Stage-only gauging station.

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 & Structural BMP	Monthly Instream	Continuous Instream
Alkalinity	mg/L	<b>x</b>	<b>x</b>	<b>x<sup>1</sup></b>	
Biological Oxygen Demand (BOD <sub>stream</sub> )	mg/L	<b>x</b>		<b>x</b>	
Biological Oxygen Demand (BOD <sub>5day</sub> )	mg/L		<b>x</b>		
Specific Conductivity (Sp. Cond)	µS/cm	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Copper (Total Recoverable and Dissolved)	mg/L	<b>x</b>	<b>x</b>	<b>x<sup>2</sup></b>	
Dissolved Oxygen (DO)	mg/L	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
E. coli	MPN/100 mL	<b>x</b>	<b>x</b>	<b>x</b>	
Hardness	mg/L	<b>x</b>	<b>x</b>	<b>x<sup>2</sup></b>	
Lead (Total Recoverable and Dissolved)	mg/L	<b>x</b>	<b>x</b>	<b>x<sup>2</sup></b>	
Ammonia Nitrogen (NH <sub>3</sub> -N)	mg/L	<b>x</b>	<b>x</b>	<b>x<sup>1</sup></b>	
Nitrate and Nitrite (NO <sub>3</sub> .NO <sub>2</sub> )	mg/L	<b>x</b>	<b>x</b>	<b>x</b>	
pH	S.U.	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Total Dissolved Solids (TDS)	mg/L			<b>x<sup>1</sup></b>	
Temperature	°C	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Total Phosphorus (TP)	mg/L	<b>x</b>	<b>x</b>	<b>x<sup>1</sup></b>	
Ortho Phosphorus	mg/L	<b>x</b>	<b>x</b>		
Total Solids (TS)	mg/L			<b>x<sup>1</sup></b>	
Total Suspended Solids (TSS)	mg/L	<b>x</b>	<b>x</b>	<b>x</b>	
Turbidity	NTU	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Zinc (Total Recoverable and Dissolved)	mg/L	<b>x</b>	<b>x</b>	<b>x<sup>2</sup></b>	
Total Mercury	ug/L	<b>x</b>	<b>x</b>		
Dissolved Organic Carbon (DOC)	mg/L	<b>x</b>	<b>x</b>		
Total Kjeldahl Nitrogen (TKN)	mg/L	<b>x</b>	<b>x</b>		

<sup>1</sup> Willamette River sites only (WR1, WR5, and WR10).

<sup>2</sup> Pringle Creek Watershed sites only (PRI1, PRI5, CLA1, and CLA10).

**Table 4.**  
**Water Quality Criteria for Monitored Streams**

Parameter	Season	Criteria	Applicable Waterbody
<b>Dissolved Oxygen</b>	January 1-May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Battle Creek*, Claggett Creek*, Clark Creek <sup>3</sup> , 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* <sup>d</sup>
	October 15 - May 15	Spawning: Not less than 11.0 mg/L or 95% saturation	Mill Creek*, Pringle Creek* <sup>1</sup> , Shelton Ditch, Willamette River <sup>5</sup>
	Year Around (Non-spawning)	Cold water: Not less than 8.0 mg/L or 90% saturation	Battle Creek*, Croisan Creek*, Clark Creek*, Glenn Creek* <sup>4</sup> , Pringle Creek* <sup>2</sup>
Cool water: Not less than 6.5 mg/L		Claggett Creek*, Glenn Creek*, Mill Creek, Pringle Creek* <sup>1</sup> , Shelton Ditch, West Fork Little Pudding River, Willamette River <sup>6</sup>	
<b>pH</b>	Year Around	Must be within the range of 6.5 to 8.5 pH units	All Monitoring Streams
<b>Temperature</b>	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 <sup>d</sup>
	Year Around (Non-spawning)	Salmon and trout rearing and migration: 18°C 7-day average maximum	All Monitoring Streams
<b>E. coli</b>	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
<b>Biological Criteria</b>	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* <sup>3</sup> , Croisan Creek, Glenn Creek*, Pringle Creek Trib*, Willamette River*
<b>Copper</b>	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
<b>Lead</b>	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
<b>Zinc</b>	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 2022 Integrated Report Section 303(d) listed.

<sup>1</sup> Applies to Pringle Creek from river mile 0 to 2.6.

<sup>3</sup> Applies to Clark Creek from river mile 0 to 1.9.

<sup>5</sup> Applies to Willamette River from river mile 54.8 to 186.5

<sup>d</sup> Gibson Creek is referred as Gibson Gulch in Oregon's 2022 Integrated Report.

<sup>2</sup> Applies to Pringle Creek from river mile 2.6 to 6.2.

<sup>4</sup> Applies to Glenn Creek from river mile 4.1 to 7.

<sup>6</sup> Applies to Willamette River from river mile 50.6 to 186.5

Table 5.  
Median Values for Monthly Instream Sites (RY 2022/2023)

Site ID	Number of Samples	Temperature (C)	DO (mg/L)	Sp. Cond ( $\mu$ S/cm)	Turbidity (NTUs)	pH (S.U.)	E. Coli (MPN/100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD <sub>stream</sub> (mg/L)	TSS
BAT1	12	10.7	10.2	52.2	6.3	6.9	130.5	1.01	0.73	4.90
BAT12	12	9.1	11.3	47.3	3.7	7.3	85.5	1.08	0.56	2.30
CGT1	12	13.3	8.4	227.1	5.5	7.3	224.5	0.28	1.85	7.05
CGT5	11	10.2	10.7	184.5	6.6	7.2	504.0	0.57	1.41	7.80
CLA1	12	12.1	10.3	101.6	2.6	7.3	141.0	1.22	0.66	2.30
CLA10	12	12.9	9.9	73.7	2.6	7.0	351.0	1.69	0.61	2.55
CRO1	12	10.6	10.4	77.0	3.1	7.1	535.5	0.78	0.69	2.70
CRO10	12	10.5	10.5	54.1	4.1	6.8	74.0	0.90	0.65	2.90
GIB1	12	10.3	10.0	92.8	6.0	7.3	102.5	1.40	0.76	5.15
GIB15	12	10.0	10.3	88.6	5.5	7.2	26.5	1.85	0.71	8.20
GLE1	12	10.8	10.2	102.3	5.5	7.3	164.5	1.02	0.81	4.70
GLE10	11	8.8	11.1	66.9	6.5	7.2	20.0	1.14	0.63	6.20
LPW1	7	8.4	10.6	217.0	5.2	7.0	145.0	1.56	1.12	5.00
MIC1	12	10.7	10.9	83.9	2.4	7.3	97.0	1.91	0.86	3.80
MIC10	12	10.5	11.0	79.3	3.6	7.4	104.5	1.98	0.75	4.10
MRA1	12	10.5	10.8	81.0	3.3	7.4	187.5	1.82	0.91	3.80
MRA10	12	10.5	10.4	81.3	2.5	7.3	118.5	1.88	0.86	4.00
PRI1	12	10.6	10.9	81.6	2.5	7.4	131.5	1.80	0.83	4.60
PRI5	12	11.3	10.4	91.5	3.3	7.4	141.0	1.06	1.07	3.90
SHE1	12	10.4	11.0	73.3	2.7	7.4	76.5	1.84	0.96	3.40
SHE10	12	10.6	11.0	80.7	2.5	7.3	73.0	1.91	0.88	3.90
WR1	12	12.3	11.3	71.6	2.6	7.5	26.5	0.41	1.01	5.40
WR10	12	11.2	11.2	67.6	2.2	7.4	14.0	0.29	0.79	5.60
WR5	12	11.0	10.7	67.7	4.1	7.4	10.0	0.34	0.87	5.00

Table 6.  
Number of Water Quality Criteria Exceedances for Monthly Instream Sites (RY 2022/2023)

Site ID	Number of Samples	Dissolved Oxygen	pH	E. Coli <sup>5</sup>			Copper <sup>6</sup>		Lead <sup>6</sup>		Zinc <sup>6</sup>	
				Total #	Dry <sup>2</sup>	Rain <sup>3</sup>	Total	Dissolved	Total	Dissolved	Total	Dissolved
BAT 1	12	4	0	3	3	0						
BAT 12	12	0	0	0	0	0						
CGT 1	12	8	0	1	1	0						
CGT 5 <sup>4</sup>	11	3	1	7	7	0						
CLA 1	12	1	0	1	1	0	0	0	0	0	0	0
CLA 10	12	0	1	4	3	1	0	0	0	0	0	0
CRO 1	12	4	0	9	7	2						
CRO 10	12	2	0	2	2	0						
GIB 1	12	5	0	1	1	0						
GIB 15	12	1	0	1	1	0						
GLE 1	12	0	1	3	3	0						
GLE 10 <sup>4</sup>	11	0	0	1	1	0						
LPW 1 <sup>4</sup>	7	2	1	3	3	0						
MIC 1	12	1	0	1	1	0						
MIC 10	12	1	0	1	1	0						
MRA 1 <sup>1</sup>	12	NA	0	2	2	0						
MRA 10 <sup>1</sup>	12	NA	0	2	2	0						
PRI 1	12	1	0	0	0	0	0	0	0	0	0	0
PRI 5	12	2	0	2	2	0	0	0	0	0	0	0
SHE 1	12	1	0	0	0	0						
SHE 10	12	1	0	0	0	0						
WR1	12	1	1	0	0	0						
WR10	12	1	0	0	0	0						
WR5	12	1	0	0	0	0						

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).

<sup>1</sup> No year-round dissolved oxygen water quality criteria associated with this waterbody

<sup>3</sup> Rain is  $\geq 0.05$  inches of rainfall in previous 24 hours.

<sup>5</sup> Single sample criterion of  $> 406$  organisms per 100 mL used.

<sup>2</sup> Dry is  $< 0.05$  inches of rainfall in previous 24 hours.

<sup>4</sup> Unable to sample all 12 due to lack of flow/too high of flow.

<sup>6</sup> Exceedances calculated based on hardness concentration for each event.

Table 7.  
Monthly Instream Data - Battle Creek (RY 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:55	19.1	8.03	52	7.9	7.12	816	0.425	0.06	3.6	0.00
08/16/2022 10:35	18	7	62.3	7.4	6.92	186	0.26	0.39	4.8	0.00
09/20/2022 10:37	15.5	7.41	62.9	7.7	6.8	411	0.35	1.02	7.7	0.00
10/18/2022 10:35	12.3	8.55	69.3	9.2	6.93	404	0.278	0.93	6.4	0.00
11/15/2022 10:10	8.2	10.61	54.7	3.4	6.89	75	0.989	0.83	2.2	0.00
12/20/2022 10:25	7.4	11.06	49.3	2.9	7.35	31	1.104	0.94	3	0.00
01/17/2023 10:40	9	10.76	52.1	5.5	7.04	31	1.964	0.31	5	0.07
02/21/2023 10:57	7.5	11.19	52.2	4.4	6.6	20	1.31	0.54	4.6	0.01
03/21/2023 10:57	7.5	11.3	49.7	6.1	6.57	<10	2.146	0.66	5.4	0.15
04/18/2023 10:53	8.3	11.26	47.1	6.51	6.5	20	1.721	1.12	6.6	0.14
05/16/2023 10:50	14.9	9.71	48.8	5.2	5.5	272	1.039	0.59	2.7	0.00
06/13/2023 10:35	17.1	8.51	53.5	15	6.83	457	0.783	0.79	20	0.00
<b>Median</b>	<b>10.65</b>	<b>10.16</b>	<b>52.15</b>	<b>6.31</b>	<b>6.86</b>	<b>130.50</b>	<b>1.01</b>	<b>0.73</b>	<b>4.90</b>	

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:40	18.3	9.19	45.5	6.4	7.65	225	0.389	0.08	1.8	0.00
08/16/2022 10:06	16.3	9.46	54.1	2.8	7.38	86	0.341	0.38	2.2	0.00
09/20/2022 10:19	12.9	9.79	56.4	5.2	7.07	105	0.329	0.74	1.2	0.00
10/18/2022 10:20	9.8	10.92	54.9	5.1	7.36	97	0.208	0.85	2.4	0.00
11/15/2022 09:55	5.8	12.42	47	3.5	7.22	41	0.977	0.97	5.2	0.00
12/20/2022 10:05	6.8	12.11	45.6	3.6	7.58	20	1.328	0.42	0.6	0.00
01/17/2023 10:24	8.4	11.62	50.7	3	7.29	31	2.492	0.27	3.8	0.07
02/21/2023 10:43	7.1	11.95	47.4	2.9	6.67	31	1.642	0.81	4.4	0.01
03/21/2023 10:29	7.1	11.77	48.7	2.7	6.97	<10	2.601	0.51	2.2	0.15
04/18/2023 10:37	7.9	11.64	47.1	4.3	6.97	86	2.21	1.01	3.8	0.14
05/16/2023 10:35	14.6	10.02	45.4	3.7	7.29	85	1.184	0.61	2.7	0.00
06/13/2023 10:20	16.1	9.65	46.8	4.7	7.44	213	0.776	0.26	2.2	0.00
<b>Median</b>	<b>9.10</b>	<b>11.27</b>	<b>47.25</b>	<b>3.65</b>	<b>7.29</b>	<b>85.5</b>	<b>1.08</b>	<b>0.56</b>	<b>2.30</b>	

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs	
07/12/2022 12:08	24.2	8.97	239.1	2.9	7.36	160	0.068	0.65	3.2	0.00	
08/16/2022 12:05	23.2	6.27	260.5	2.2	7.25	187	0.089	1.59	5.4	0.00	
09/20/2022 12:03	19	4.9	266.3	3.4	7.29	121	< 0.050	3.17	11	0.00	
10/18/2022 11:35	16	5.84	252.4	5.8	7.16	288	< 0.050	3.05	7.6	0.00	
11/15/2022 11:10	7.8	5.18	184.6	4.9	7.04	63	0.331	1.78	4.8	0.00	
12/20/2022 11:30	6.5	8.35	202.3	5.8	7.38	86	0.542	1.76	6.4	0.00	
01/17/2023 11:50	8.5	9.26	157.9	9.5	7.04	265	1.197	1.38	11.8	0.07	
02/21/2023 12:19	8	10.83	217.6	10.65	7.07	246	0.463	3.32	14.4	0.01	
03/21/2023 12:22	8.8	10.58	184.6	5.1	7.25	203	0.795	2.01	6	0.15	
04/18/2023 12:49	10.6	10.86	176.5	8.3	7.3	359	0.871	1.51	8.8	0.14	
05/16/2023 12:20	20.3	6.68	243.3	7.8	7.22	275	0.228	1.91	6.5	0.00	
06/13/2023 11:45	20.9	8.36	236.6	4.4	7.37	860	0.223	2.09	8.8	0.00	
<b>Median</b>	<b>13.30</b>	<b>8.36</b>	<b>227.10</b>	<b>5.45</b>	<b>7.25</b>	<b>224.50</b>	<b>0.28</b>	<b>1.85</b>	<b>7.05</b>		

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs	
07/12/2022 11:55	21.4	8.71	216.6	7.67	5.6	1223	0.119	0.95	12.2	0.00	
08/16/2022 11:50	18.4	5.49	174.8	5.5	7.19	504	0.096	1.96	8.8	0.00	
09/20/2022 11:50	16.3	6.07	166.7	11.9	7.24	637	<0.050	1.6	17.4	0.00	
10/18/2022 11:20										0.00	
11/15/2022 11:00	6	11.31	147.2	10.2	7.16	496	0.622	1.41	7.4	0.00	
12/20/2022 11:15	6.3	11.5	231.8	6.6	7.38	52	0.648	0.78	5.2	0.00	
01/17/2023 11:39	8.8	10.66	155.1	7.4	7.05	74	1.844	0.41	8	0.07	
02/21/2023 12:07	8.4	12.65	567	21.1	7.15	14140	0.567	>10.61	30.2	0.01	
03/21/2023 12:11	9	12.65	184.5	6.6	7.83	145	1.328	0.82	7.8	0.15	
04/18/2023 12:36	10.2	13.86	158.3	4.7	8.01	288	1.068	1.72	4.6	0.14	
05/16/2023 12:00	17.4	10.03	198	3.6	7.93	1956	0.264	1.03	4.3	0.00	
06/13/2023 11:25	17.5	7.41	190.4	6.6	7.56	663	0.286	4.61	7.8	0.00	
<b>Median</b>	<b>10.20</b>	<b>10.66</b>	<b>184.50</b>	<b>6.60</b>	<b>7.24</b>	<b>504.00</b>	<b>0.57</b>	<b>1.41</b>	<b>7.80</b>		

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:10	17.4	8.44	105.5	2.3	7.25	160	0.927	0.1	1.8	0.00
08/16/2022 09:20	17.6	8.55	105	2.8	7.25	122	0.757	0.33	2.6	0.00
09/20/2022 09:55	15.8	9.19	100.2	6.1	7.36	341	0.729	0.97	7.2	0.00
10/18/2022 09:10	13.6	9.82	101	3.3	7.29	336	0.585	0.8	3.6	0.00
11/15/2022 09:35	9.4	11.13	102.5	1.4	7.33	160	1.292	0.65	2	0.00
12/20/2022 09:20	8.6	11.25	102.7	1.2	7.14	41	1.382	1.03	1.4	0.00
01/17/2023 09:40	10.6	10.73	101	3.04	6.96	109	2.271	0.17	2.8	0.07
02/21/2023 10:00	8.67	11.07	190.5	2.04	6.96	63	1.222	0.98	2	0.01
03/21/2023 10:10	8.9	11.45	100.5	2.4	7.37	52	1.963	0.66	1.8	0.15
04/18/2023 10:20	9.2	11.27	89.5	5	7.24	110	1.571	1.2	7	0.14
05/16/2023 10:20	14.3	9.63	102.1	2.2	7.34	279	1.223	0.56	1.3	0.00
06/13/2023 09:40	15.8	9.34	98.9	4.1	7.41	591	1.064	0.4	4	0.00
<b>Median</b>	<b>12.10</b>	<b>10.28</b>	<b>101.55</b>	<b>2.60</b>	<b>7.27</b>	<b>141.00</b>	<b>1.22</b>	<b>0.66</b>	<b>2.30</b>	

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
07/12/2022 10:10	0.00094	0.000681	0.000271	<0.000106	0.00754	0.0052	34.9
08/16/2022 09:20	0.00104	0.000878	0.000346	0.000144	0.00541	0.00445	34.5
09/20/2022 09:55	0.00121	0.000751	0.00211	0.000638	0.0074	0.00408	32.1
10/18/2022 09:10	0.000906	0.000624	0.000502	0.000163	0.00499	0.00379	32
11/15/2022 09:35	0.000592	0.000546	0.000148	<0.000106	0.00769	0.00731	33.4
12/20/2022 09:20	0.000904	0.000438	0.000156	<0.000106	0.00823	0.00794	32.1
01/17/2023 09:40	0.000722	0.000569	0.000199	<0.000106	0.0126	0.0144	31.7
02/21/2023 10:00	0.00146	0.000985	<0.0002000	<0.000106	0.0564	0.055	55.2
03/21/2023 10:10	0.000717	0.000459	0.000169	<0.000106	0.0128	0.0125	31.8
04/18/2023 10:20	0.00125	0.000881	0.000404	<0.000106	0.0223	0.0183	29.9
05/16/2023 10:20	0.000638	0.000567	0.000157	<0.000106	0.0075	0.00708	31.7
06/13/2023 09:40	0.000828	0.000615	0.000357	<0.000106	0.00683	0.00494	31.7
<b>Median</b>	<b>0.00</b>	<b>0.00</b>	<b>0.0002355</b>	<b>0.000106</b>	<b>0.00762</b>	<b>0.00720</b>	<b>32.05</b>

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 09:33	16.1	8.9	74	2.4	7.12	473	1.467	0.16	3.4	0.00
08/16/2022 08:55	16.8	8.87	73.6	2	7.19	323	1.403	0.4	1.8	0.00
09/20/2022 09:18	16.3	9.04	71.9	3.7	7.17	130	1.257	0.67	4.2	0.00
10/18/2022 09:20	14.6	9.44	70.6	8.4	7.4	906	1.185	0.6	5.2	0.00
11/15/2022 09:05	12.3	9.98	76.5	3.4	7.03	399	1.706	0.63	2.6	0.00
12/20/2022 09:10	10.8	10.31	73.7	1.3	7.29	75	1.673	0.97	1	0.00
01/17/2023 09:20	11.5	10.2	79.6	1.7	6.93	41	2.614	0.19	1.2	0.07
02/21/2023 09:18	9.8	10.64	74.1	2.9	6.83	677	1.674	0.61	2.2	0.01
03/21/2023 09:31	10.1	10.52	76.8	2.4	6.64	41	2.591	0.41	2.2	0.15
04/18/2023 09:42	10	10.62	73.1	7.4	6.43	5172	2.087	0.99	6.2	0.14
05/16/2023 09:45	13.5	9.79	73.6	2.3	6.72	211	1.996	0.67	2.5	0.00
06/13/2023 09:25	14.8	9.41	73.6	2.8	6.68	379	1.974	0.35	4.2	0.00
<b>Median</b>	<b>12.90</b>	<b>9.89</b>	<b>73.65</b>	<b>2.60</b>	<b>6.98</b>	<b>351.00</b>	<b>1.69</b>	<b>0.61</b>	<b>2.55</b>	

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
07/12/2022 09:33	0.000365	0.00024	0.000127	<0.000106	0.00712	0.00621	21.6
08/16/2022 08:55	0.000403	0.000327	0.000151	<0.000106	0.00483	0.00467	21.1
09/20/2022 09:18	0.00169	0.000398	0.00154	<0.000106	0.0162	0.00451	20.5
10/18/2022 09:20	0.000431	0.000217	0.000263	<0.000106	0.00514	0.00375	19.5
11/15/2022 09:05	0.000468	0.000242	0.000128	<0.000106	0.0218	0.0201	21.7
12/20/2022 09:10	0.00031	0.000213	0.000143	<0.000106	0.00803	0.00695	20.5
01/17/2023 09:20	0.00027	0.000227	<0.000111	<0.000106	0.00778	0.00752	22.9
02/21/2023 09:18	0.000627	0.000239	<0.0002000	<0.000106	0.00954	0.00811	21.9
03/21/2023 09:31	0.000479	0.000275	0.000155	<0.000106	0.00688	0.00653	22.1
04/18/2023 09:42	0.0013	0.000721	0.000403	<0.000106	0.0152	0.0119	22.3
05/16/2023 09:45	0.000377	0.000211	0.000135	<0.000106	0.00693	0.00291	20.9
06/13/2023 09:25	0.000363	0.000246	0.000156	<0.000106	0.00517	0.00456	21.6
<b>Median</b>	<b>0.00</b>	<b>0.00</b>	<b>0.000153</b>	<b>0.000106</b>	<b>0.00745</b>	<b>0.00637</b>	<b>21.60</b>

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 09:45	17.3	7.83	84	2.5	7.24	411	0.357	0.05	2.6	0.00
08/16/2022 09:25	17.1	6.41	99.4	2.9	6.96	2420	0.301	0.54	3	0.00
09/20/2022 09:40	15	5.81	99.2	4	7.01	250	0.191	0.78	3.4	0.00
10/18/2022 09:40	12.5	7.78	168	7	7.15	583	0.242	0.88	21.6	0.00
11/15/2022 09:20	6	11.5	78.7	1.9	7.02	697	0.78	0.95	1	0.00
12/20/2022 09:30	6.5	11.37	75.2	1.6	7.44	789	0.931	0.53	1.6	0.00
01/17/2023 09:48	8.6	11.23	66.4	4.3	7.18	455	1.705	0.21	4	0.07
02/21/2023 09:38	6.9	11.68	68.5	2.7	6.71	2247	0.975	0.86	1.8	0.01
03/21/2023 09:51	7.1	11.7	63.1	3.6	7.02	1420	1.663	70	2.8	0.15
04/18/2023 10:00	8.1	11.50	60.9	5.4	6.93	121	1.341	1.16	6.2	0.14
05/16/2023 10:00	14	9.66	72.8	3.3	7.11	488	0.778	0.59	2.5	0.00
06/13/2023 09:45	15.5	8.51	81.9	2.9	7.12	383	0.53	0.52	2.2	0.00
<b>Median</b>	<b>10.55</b>	<b>10.45</b>	<b>76.95</b>	<b>3.10</b>	<b>7.07</b>	<b>535.50</b>	<b>0.78</b>	<b>0.69</b>	<b>2.70</b>	

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:06	16.2	8.73	55.2	3.8	6.91	548	0.351	0.08	3.4	0.00
08/16/2022 09:45	17.7	6.89	67.3	4.9	6.77	127	0.149	0.63	3.2	0.00
09/20/2022 10:00	15.8	6.32	78.4	5	6.68	435	0.069	1.1	9.6	0.00
10/18/2022 09:55	12.9	8.29	78.2	6.1	6.96	246	0.102	1.5	12.8	0.00
11/15/2022 09:35	7.3	10.99	57.2	2.5	6.96	31	0.782	0.69	2.6	0.00
12/20/2022 09:50	6.5	11.45	51.9	2.8	7.45	<10	0.827	0.56	1	0.00
01/17/2023 10:04	8.4	11.12	52.9	3.1	7.16	<10	1.876	0.25	3	0.07
02/21/2023 10:07	6.7	11.55	50.9	2.1	6.71	148	1.169	0.89	1.6	0.01
03/21/2023 10:08	7.3	11.35	50	2.9	6.78	20	1.646	0.66	1.8	0.15
04/18/2023 10:17	8.2	11.33	48.7	4.1	6.79	20	1.602	1.12	4	0.14
05/16/2023 10:15	12.6	9.96	52.4	4.3	6.85	86	1.016	0.58	2.7	0.00
06/13/2023 10:00	14	9.32	56.2	5.8	6.78	62	0.975	0.43	2.8	0.00
<b>Median</b>	<b>10.50</b>	<b>10.48</b>	<b>54.05</b>	<b>4.05</b>	<b>6.82</b>	<b>74.00</b>	<b>0.90</b>	<b>0.65</b>	<b>2.90</b>	

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 2022/2023)

Site Name: GIB1										
Site Description: Wallace Rd.										
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:50	20.4	7.59	97.6	5.8	7.42	435	0.552	-0.03	5	0.00
08/16/2022 10:10	17.9	6.85	111	6.1	7.22	137	0.321	0.3	4.2	0.00
09/20/2022 10:45	15.3	7	115.8	5.6	7.26	161	0.312	0.97	4.2	0.00
10/18/2022 10:05	11.9	7.75	110.9	10	7.16	85	0.309	1.04	10	0.00
11/15/2022 10:35	6.6	11.28	109	4.6	7.2	31	1.558	1.09	2.6	0.00
12/20/2022 10:20	6.4	11.63	87.3	4.1	7.21	20	1.381	0.83	1.8	0.00
01/17/2023 10:20	8.5	11.16	80.9	6.94	6.61	31	2.614	0.25	9	0.07
02/21/2023 10:40	7.23	11.59	86.9	6.14	7.38	10	1.605	0.8	5.4	0.01
03/21/2023 10:55	7.7	11.46	80.4	8.3	7.8	10	2.462	0.58	7	0.15
04/18/2023 11:05	8.6	11.47	79.2	8.8	7.3	171	2.153	0.81	11	0.14
05/16/2023 11:00	17.1	8.86	88	5.7	7.3	120	1.416	0.71	5.3	0.00
06/13/2023 10:30	16.9	8.53	97.7	5	7.34	201	0.926	0.69	3.2	0.00
<b>Median</b>	<b>10.25</b>	<b>10.01</b>	<b>92.80</b>	<b>5.95</b>	<b>7.28</b>	<b>102.50</b>	<b>1.40</b>	<b>0.76</b>	<b>5.15</b>	

Site Name: GIB15										
Site Description: Brush College Rd.										
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 11:00	19.9	8.25	90.3	5.1	7.38	33	1.144	0	10	0.00
08/16/2022 10:20	17.9	8.59	99.4	3.1	7.38	67	0.771	0.57	14	0.00
09/20/2022 10:55	14.7	9.14	107.8	5.6	7.36	135	0.903	1.05	51.6	0.00
10/18/2022 10:15	11	9.65	109.8	3.8	7.23	749	1.187	1.12	18.4	0.00
11/15/2022 10:45	5.8	11.6	101.4	4.4	7.1	20	1.98	1.2	12.6	0.00
12/20/2022 10:40	6.5	11.27	82	4.2	6.84	10	1.759	1.02	1.8	0.00
01/17/2023 10:30	8.9	11.01	80.3	6.31	6.83	<10	2.507	0.05	6.6	0.07
02/21/2023 10:50	7.39	11.39	82.9	6.51	7.1	10	1.941	0.84	5	0.01
03/21/2023 11:05	8.1	11.32	79.4	5.6	7.23	<10	2.65	0.6	5	0.15
04/18/2023 11:15	8.9	11.29	78.1	7.6	7.18	10	2.352	0.74	8.2	0.14
05/16/2023 11:15	16.9	9.18	86.9	5.4	7.28	246	2.082	0.68	8.2	0.00
06/13/2023 10:35	17.7	8.78	90.7	5.6	7.39	243	1.692	0.46	6.6	0.00
<b>Median</b>	<b>9.95</b>	<b>10.33</b>	<b>88.60</b>	<b>5.50</b>	<b>7.23</b>	<b>26.50</b>	<b>1.85</b>	<b>0.71</b>	<b>8.20</b>	

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 2022/2023)

Site Name: GLE1										
Site Description: River Bend Rd.										
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:40	17.9	8.22	112.9	7	7.47	980	0.462	0.13	18.2	0.00
08/16/2022 10:00	17.1	8.29	120.6	8.1	7.35	194	0.382	0.41	6	0.00
09/20/2022 10:35	15.7	8.85	116.7	8.8	7.54	345	0.51	0.98	8	0.00
10/18/2022 09:55	12.6	9.02	112.4	8.4	7.26	530	0.441	0.89	6.8	0.00
11/15/2022 10:15	8.1	11.23	103.4	3	7.35	318	1.211	1.02	2.2	0.00
12/20/2022 10:05	7.1	11.35	93.9	2.3	7.24	20	1.36	0.84	2	0.00
01/17/2023 10:15	8.9	11.09	87.6	6.52	7.03	110	2.3	0.28	4	0.07
02/21/2023 10:30	7.79	11.46	94.3	3.62	7.3	52	1.31	0.94	2.4	0.01
03/21/2023 10:45	7.5	11.56	85.4	5.5	7.2	121	2.203	0.56	4.6	0.15
04/18/2023 10:55	8.3	11.54	80.8	4.8	7.28	135	1.768	0.86	4	0.14
05/16/2023 10:55	16.7	9.24	101.1	4.8	7.44	1223	0.82	0.72	5	0.00
06/13/2023 10:20	17.1	8.98	108.5	5.5	6.4	135	0.656	0.77	4.8	0.00
<b>Median</b>	<b>10.75</b>	<b>10.17</b>	<b>102.25</b>	<b>5.50</b>	<b>7.29</b>	<b>164.50</b>	<b>1.02</b>	<b>0.81</b>	<b>4.70</b>	

Site Name: GLE10										
Site Description: Hidden Valley Dr.										
Collection Date/ Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 11:15	16.5	8.95	66.9	4.7	7.21	225	0.335	0.08	3.4	0.00
08/16/2022 10:35	16.5	8.85	88.8	5.3	7.34	248	0.168	0.63	3.8	0.00
09/20/2022 11:10										0.00
10/18/2022 10:30	11.4	10.08	103.1	4.9	7.25	677	0.114	0.78	11.6	0.00
11/15/2022 11:05	6.8	11.7	80.7	2	7.09	10	1.139	1.01	1.4	0.00
12/20/2022 11:00	7.1	11.53	67.7	2.5	6.82	<10	1.555	0.82	1.6	0.00
01/17/2023 10:55	8.8	11.06	63.4	7.41	6.9	173	2.287	0.39	6	0.07
02/21/2023 11:10	7.03	11.63	64.9	9.33	7.11	10	1.37	0.68	6.8	0.01
03/21/2023 11:20	7.8	11.35	60.9	9.9	7.21	<10	2.313	0.42	6.6	0.15
04/18/2023 11:30	8.8	11.35	59.4	11.2	7.29	20	1.91	0.74	8.4	0.14
05/16/2023 11:25	15.2	9.76	63	7.3	7.34	10	1.076	0.57	6.2	0.00
06/13/2023 11:00	15.4	9.45	67.8	6.5	7.38	148	0.679	0.38	7.2	0.00
<b>Median</b>	<b>8.80</b>	<b>11.06</b>	<b>66.90</b>	<b>6.50</b>	<b>7.21</b>	<b>20.00</b>	<b>1.14</b>	<b>0.63</b>	<b>6.20</b>	

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 11:40	18.9	1.74	364.3	6.4	7	26	0.154	1.12	11.2	0.00
08/16/2022 11:30										0.00
09/20/2022 11:30										0.00
10/18/2022 11:10										0.00
11/15/2022 10:45	5.3	7.75	160.6	6.5	6.97	496	0.9	1.02	3.6	0.00
12/20/2022 11:00	6.4	9.01	230.7	2.3	7.07	771	1.643	1.21	2.4	0.00
01/17/2023 11:23	8.5	10.61	185.2	5.2	6.42	145	2.98	0.56	6.6	0.07
02/21/2023 11:44	8.1	11.64	240.4	7.3	6.63	1467	1.555	1.37	8	0.01
03/21/2023 11:52	8.4	13.51	217	5.1	7.36	107	2.425	1.01	5	0.15
04/18/2023 12:21	9	14.13	192.1	3.9	7.36	132	1.293	1.78	4	0.14
05/16/2023 11:40										0.00
06/13/2023 11:05										0.00
<b>Median</b>	<b>8.40</b>	<b>10.61</b>	<b>217.00</b>	<b>5.20</b>	<b>7.00</b>	<b>145.00</b>	<b>1.56</b>	<b>1.12</b>	<b>5.00</b>	

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 2022/2023)

Site Name: MIC1		Site Description: Front St.									
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs	
07/12/2022 08:55	21.5	8.4	72	2.5	7.28	411	0.443	0.24	4.4	0.00	
08/16/2022 08:10	20	8.75	57.8	1.2	7.53	118	0.121	0.67	3.8	0.00	
09/20/2022 08:30	15.5	9.68	57.5	0.9	7.29	190	0.106	0.95	4	0.00	
10/18/2022 08:40	13.1	10.31	59.8	1.4	7.9	206	0.109	0.78	2.8	0.00	
11/15/2022 08:26	6.4	12.15	130.2	1.9	7.14	75	4.132	1.13	2.2	0.00	
12/20/2022 08:15	6.5	11.99	112.6	2.1	7.81	98	3.552	0.57	2.4	0.00	
01/17/2023 08:36	8.2	11.56	108.1	6.8	7.11	20	3.848	0.37	6	0.07	
02/21/2023 08:42	8.1	11.73	111.4	2.4	6.78	96	2.829	0.95	2.8	0.01	
03/21/2023 08:45	7.6	11.81	97.8	3.4	7.32	10	3.399	0.96	3.8	0.15	
04/18/2023 09:00	8.2	11.69	94.4	5.8	7.29	86	2.922	1.51	5	0.14	
05/16/2023 09:00	18.7	8.98	73.3	2.8	7.35	75	0.993	0.93	2.8	0.00	
06/13/2023 08:45	19.6	8.86	62.1	2.4	7.53	241	0.507	0.59	5.2	0.00	
<b>Median</b>	<b>10.65</b>	<b>10.94</b>	<b>83.85</b>	<b>2.40</b>	<b>7.31</b>	<b>97.00</b>	<b>1.91</b>	<b>0.86</b>	<b>3.80</b>		

Site Name: MIC10		Site Description: Turner Rd									
Collection Date/Time	Temp (°C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTU)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs	
07/12/2022 11:18	21.3	9.16	68.7	1.7	7.61	435	0.498	0.25	2.4	0.00	
08/16/2022 11:10	19	9.52	54.7	1.4	7.49	172	0.112	0.74	6.6	0.00	
09/20/2022 11:00	14.5	10.85	54	1.4	7.56	101	0.12	1.15	3.2	0.00	
10/18/2022 10:55	12.7	10.71	55.2	3.5	7.49	120	0.113	0.7	4	0.00	
11/15/2022 10:30	6.5	11.98	124	3.7	7.06	98	4.287	1.14	1.8	0.00	
12/20/2022 10:45	6.6	11.88	106.9	2.3	7.3	20	3.747	0.73	2.8	0.00	
01/17/2023 11:05	8.2	11.08	103.3	6	7.08	41	4.103	0.37	4.4	0.07	
02/21/2023 11:24	7.8	11.99	101	3.1	6.53	41	2.955	1.02	4.2	0.01	
03/21/2023 11:30	7.4	11.71	92.3	4.9	7.2	20	3.654	0.8	3.6	0.15	
04/18/2023 11:47	8.1	11.48	89.9	6.3	7.12	122	3.119	1.4	4.8	0.14	
05/16/2023 11:20	17.4	9.84	66.8	4.8	7.44	108	1.011	0.76	5.2	0.00	
06/13/2023 10:55	19.1	9.6	61.2	3.7	7.66	197	0.612	0.7	5.2	0.00	
<b>Median</b>	<b>10.45</b>	<b>10.97</b>	<b>79.30</b>	<b>3.60</b>	<b>7.37</b>	<b>104.50</b>	<b>1.98</b>	<b>0.75</b>	<b>4.10</b>		

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs	
07/12/2022 09:50	21.7	8.51	69.1	3.4	7.51	308	0.41	0.2	3.6	0.00	
08/16/2022 09:00	19.8	8.88	54.3	8	7.37	326	0.105	0.63	18.2	0.00	
09/20/2022 09:20	15.3	9.84	55.1	1.5	7.49	248	0.093	0.91	4.2	0.00	
10/18/2022 08:50	13	10.48	54.3	4.5	7.37	1414	0.095	0.74	10.8	0.00	
11/15/2022 09:11	6.1	12.44	126.7	2.2	7.31	120	4.294	1.07	1.4	0.00	
12/20/2022 09:00	5.5	11.8	110.1	2.1	7.1	97	3.704	0.96	2.8	0.00	
01/17/2023 09:20	7.6	11.16	109	6.03	6.93	41	3.854	0.53	4	0.07	
02/21/2023 09:20	7.46	11.61	104.7	1.38	7.11	10	2.785	0.91	1.2	0.01	
03/21/2023 09:45	7.5	12.09	95.1	3.1	7.57	10	3.528	0.92	2.8	0.15	
04/18/2023 09:55	8	11.80	92.2	16.3	7.45	132	2.981	1.53	32.4	0.14	
05/16/2023 09:35	18.7	9.11	69.8	20	7.44	631	0.847	1.42	37.8	0.00	
06/13/2023 09:20	19.5	9.08	58.4	3	7.56	243	0.444	0.72	1.6	0.00	
<b>Median</b>	<b>10.50</b>	<b>10.82</b>	<b>81.00</b>	<b>3.25</b>	<b>7.41</b>	<b>187.50</b>	<b>1.82</b>	<b>0.91</b>	<b>3.80</b>		

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs	
07/12/2022 09:10	21.4	8.15	69.2	2.6	7.1	411	0.422	0.31	4.2	0.00	
08/16/2022 08:20	19.7	7.96	54.3	2.2	7.31	345	0.104	0.47	5.4	0.00	
09/20/2022 08:50	15.2	9.56	56.4	1.5	7.23	162	0.118	0.98	4	0.00	
10/18/2022 08:25	12.9	9.75	54.1	1.3	7.4	420	0.083	0.55	3.6	0.00	
11/15/2022 08:40	6.1	11.94	126.7	2.3	7.02	74	4.283	0.88	2.4	0.00	
12/20/2022 08:25	6.2	11.76	109.9	2	7.16	41	3.681	0.84	1.6	0.00	
01/17/2023 08:50	8	11.41	106.5	5.61	6.67	31	3.986	0.32	5.2	0.07	
02/21/2023 08:50	7.98	11.09	106.1	2.11	6.91	31	2.895	0.87	2.4	0.01	
03/21/2023 09:05	7.3	11.59	95.6	3.8	7.36	10	3.443	0.73	4	0.15	
04/18/2023 09:15	7.9	11.54	92.5	4.8	7.29	75	3.074	1.32	7	0.14	
05/16/2023 09:10	18.5	8.68	70	3.2	7.39	173	0.866	0.93	4	0.00	
06/13/2023 08:50	19.7	8.36	58.6	2.7	7.35	211	0.446	0.87	3.2	0.00	
<b>Median</b>	<b>10.45</b>	<b>10.42</b>	<b>81.25</b>	<b>2.45</b>	<b>7.26</b>	<b>118.50</b>	<b>1.88</b>	<b>0.86</b>	<b>4.00</b>		

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 2022/2023)

Site Name: PR1		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 <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 09:35	21.6	8.85	71.9	1.8	7.45	179	0.382	0.29	3.2	0.00
08/16/2022 08:30	19.7	8.83	57.5	3	7.25	129	0.108	0.54	5.8	0.00
09/20/2022 09:05	15.2	9.78	59.7	1.2	7.39	166	0.135	1.03	4.6	0.00
10/18/2022 08:40	12.9	10.35	56.3	1.6	7.39	144	0.099	0.62	5.6	0.00
11/15/2022 08:55	6.3	12.22	124.3	2.3	7.19	134	4.009	0.96	2	0.00
12/20/2022 08:45	6.3	12.13	109.5	2.1	7.13	86	3.592	0.74	2	0.00
01/17/2023 09:05	8.3	11.42	104.2	5.85	6.81	86	3.777	0.38	5.4	0.07
02/21/2023 09:05	7.73	11.77	105.5	2.21	7.07	41	2.723	0.98	2.4	0.01
03/21/2023 09:30	7.4	11.72	96	4	7.43	20	3.213	0.86	4.6	0.15
04/18/2023 09:25	8.1	11.75	91.2	5	7.42	98	2.774	1.3	6.2	0.14
05/16/2023 09:20	18.3	9.13	71.7	4	7.51	218	0.872	1	4	0.00
06/13/2023 09:05	19.3	9.01	62.7	2.6	7.58	134	0.469	0.8	4.6	0.00
<b>Median</b>	<b>10.60</b>	<b>10.89</b>	<b>81.55</b>	<b>2.45</b>	<b>7.39</b>	<b>131.50</b>	<b>1.80</b>	<b>0.83</b>	<b>4.60</b>	

Site Name: PR1		Site Description: Waterfront Park					
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
07/12/2022 09:35	0.000561	0.000468	<0.000111	<0.000106	0.00122	0.000732	27
08/16/2022 08:30	0.000493	0.000459	0.00012	<0.000106	0.00122	0.000673	21.3
09/20/2022 09:05	0.000953	0.000633	0.000128	<0.000106	0.00711	0.00338	21.5
10/18/2022 08:40	0.000366	0.00026	<0.000111	<0.000106	0.000842	0.000886	20.5
11/15/2022 08:55	0.000685	0.000532	<0.000111	<0.000106	0.00157	0.0013	43.6
12/20/2022 08:45	0.00198	0.000392	<0.000111	<0.000106	0.0122	0.00198	38.7
01/17/2023 09:05	0.000734	0.000555	0.000123	<0.000106	0.00499	0.00308	34.9
02/21/2023 09:05	0.00212	0.000663	<0.0002000	<0.000106	0.0156	0.00545	38.2
03/21/2023 09:30	0.000739	0.000424	0.000117	<0.000106	0.00245	0.00193	32.6
04/18/2023 09:25	0.000738	0.000536	0.000246	<0.000106	0.00396	0.00268	34.5
05/16/2023 09:20	0.000537	0.000443	<0.0002000	<0.000106	0.0018	0.00101	24.9
06/13/2023 09:05	0.00113	0.000782	0.000512	<0.000106	0.00434	0.00259	23
<b>Median</b>	<b>0.00</b>	<b>0.00</b>	<b>0.0001215</b>	<b>0.000106</b>	<b>0.00321</b>	<b>0.00196</b>	<b>29.80</b>

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:15	20.7	8.42	92.3	3.2	7.27	411	0.515	0.14	2.6	0.00
08/16/2022 09:25	20.2	8.18	89.3	3.3	7.43	299	0.258	0.98	4.8	0.00
09/20/2022 10:00	16.8	8.96	89.5	2.9	7.4	219	0.281	1.37	4.6	0.00
10/18/2022 09:20	13.5	9.73	87.5	2	7.38	161	0.21	1.19	2	0.00
11/15/2022 09:40	7.8	11.48	97.9	3.2	7.27	262	1.167	1.15	2.6	0.00
12/20/2022 09:25	6.6	11.81	96.9	2.8	7.28	84	1.322	1.19	2.2	0.00
01/17/2023 09:45	9.1	10.97	91.4	5.22	7.03	41	1.677	0.48	5	0.07
02/21/2023 10:05	7.52	12.20	107.4	4.31	7.57	121	1.044	1.58	3.8	0.01
03/21/2023 10:15	8.2	11.75	91.5	4.2	7.6	20	1.692	0.97	4	0.15
04/18/2023 10:25	8.9	11.77	81.6	5.1	7.55	41	1.461	1.2	5.8	0.14
05/16/2023 10:25	17.5	9.58	93.5	1.9	7.65	98	1.08	0.88	1.3	0.00
06/13/2023 09:50	18.7	9.07	88.8	3.4	7.53	733	0.742	0.94	4.6	0.00
<b>Median</b>	<b>11.30</b>	<b>10.35</b>	<b>91.45</b>	<b>3.25</b>	<b>7.42</b>	<b>141.00</b>	<b>1.06</b>	<b>1.07</b>	<b>3.90</b>	

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
07/12/2022 10:15	0.000719	0.00052	0.000215	<0.000106	0.00459	0.00207	32.8
08/16/2022 09:25	0.000678	0.00058	0.000168	<0.000106	0.00324	0.00178	32.4
09/20/2022 10:00	0.000617	0.000515	0.000193	<0.000106	0.00317	0.00204	31.8
10/18/2022 09:20	0.000503	0.000508	0.000118	<0.000106	0.00286	0.00174	31
11/15/2022 09:40	0.00079	0.000892	0.00602	<0.000106	0.000152	0.00515	34.6
12/20/2022 09:25	0.000562	0.000383	<0.000111	<0.000106	0.00481	0.00353	33.7
01/17/2023 09:45	0.000834	0.000578	0.000187	<0.000106	0.0101	0.0104	31
02/21/2023 10:05	0.00121	0.000754	<0.0002000	<0.000106	0.0154	0.0115	35.1
03/21/2023 10:15	0.000745	0.00047	0.000152	<0.000106	0.00729	0.00652	31
04/18/2023 10:25	0.00355	0.000678	0.00019	<0.000106	0.0137	0.0102	29.6
05/16/2023 10:25	0.000526	0.000462	<0.0002000	<0.000106	0.00385	0.00545	31
06/13/2023 09:50	0.000745	0.00058	0.000165	<0.000106	0.00447	0.00278	31.4
<b>Median</b>	<b>0.00073</b>	<b>0.00055</b>	<b>0.0001885</b>	<b>0.000106</b>	<b>0.00453</b>	<b>0.00434</b>	<b>31.60</b>

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 10:25	22.2	8.76	73.7	2	7.8	365	0.414	0.21	3	0.00
08/16/2022 09:10	19.6	8.86	55.3	1.7	7.34	57	0.116	0.49	3	0.00
09/20/2022 09:30	15.1	9.96	57.2	1.3	7.51	96	0.131	1.02	4.2	0.00
10/18/2022 08:55	12.6	10.47	54.5	1.4	7.51	98	0.097	0.89	3.2	0.00
11/15/2022 09:20	6.2	12.37	126.1	2.9	7.31	134	4.146	1.03	3	0.00
12/20/2022 09:10	6.2	12.2	109.5	2.4	7.09	31	3.79	0.95	2.4	0.00
01/17/2023 09:30	8.2	11.51	105.7	6.02	6.9	52	4.164	0.42	4.6	0.07
02/21/2023 09:30	7.71	11.86	104.7	2.02	7.15	41	2.817	1	1.8	0.01
03/21/2023 09:50	7.2	11.83	94.9	4	7.45	41	3.581	1	3.8	0.15
04/18/2023 10:05	8	11.76	72.8	7.8	7.41	52	2.965	1.34	6.4	0.14
05/16/2023 10:00	18.1	9.24	70	3.2	7.52	98	0.865	0.97	3.7	0.00
06/13/2023 09:30	19.4	9	59.8	3	7.57	146	0.491	0.65	3.6	0.00
<b>Median</b>	<b>10.40</b>	<b>10.99</b>	<b>73.25</b>	<b>2.65</b>	<b>7.43</b>	<b>76.50</b>	<b>1.84</b>	<b>0.96</b>	<b>3.40</b>	

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 <sub>3</sub> -NO <sub>2</sub> (mg/ L)	BOD (mg/ L)	TSS (mg/L)	Rainfall previous 24 hrs
07/12/2022 08:50	21.6	8.65	68.7	2	7.25	345	0.445	0.28	3.4	0.00
08/16/2022 08:05	19.2	8.96	54.6	2.2	7.32	61	0.155	0.68	5.2	0.00
09/20/2022 08:40	15	9.88	56.7	1.5	7.17	83	0.135	1.21	4.4	0.00
10/18/2022 08:15	12.9	10.4	54.7	1.6	7.66	63	0.102	0.6	3.2	0.00
11/15/2022 08:25	6.7	12.21	126	2.7	6.97	189	4.405	1.29	2.4	0.00
12/20/2022 08:15	7.2	11.93	110.7	2.1	7.33	20	3.597	0.9	2.6	0.00
01/17/2023 08:38	8.3	11.57	105.2	5.54	6.84	41	3.992	0.35	6.6	0.07
02/21/2023 08:35	8.03	11.80	109.4	2.15	7	10	2.902	1.11	3	0.01
03/21/2023 08:45	7.3	11.52	95.2	4.3	7.36	10	3.535	0.71	3.6	0.15
04/18/2023 08:55	7.8	11.81	91.9	4.6	7.23	122	3.041	1.33	5.6	0.14
05/16/2023 08:55	18.1	9.28	69.4	3.7	7.46	97	0.921	1.04	7	0.00
06/13/2023 08:35	19.6	8.95	60.2	2.8	7.57	97	0.491	0.85	4.2	0.00
<b>Median</b>	<b>10.60</b>	<b>10.96</b>	<b>80.65</b>	<b>2.45</b>	<b>7.29</b>	<b>73.00</b>	<b>1.91</b>	<b>0.88</b>	<b>3.90</b>	

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
07/12/2022 12:35	21.6	10.94	77	0.5	7.74	33	0.188	0.41	0.00
08/16/2022 12:35	22	9.89	73.2	0.6	7.65	2	0.338	0.8	0.00
09/20/2022 12:25	16.7	10.51	68	0.4	7.99	22	0.096	1.02	0.00
10/18/2022 12:10	15.7	10.65	70.7	2.8	7.8	31	0.084	1.18	0.00
11/15/2022 11:30	8.1	11.51	71.4	5	7.44	41	0.485	1.24	0.00
12/20/2022 11:50	5.9	12.15	86.2	2.3	7.47	10	0.849	0.77	0.00
01/17/2023 12:10	7.5	11.3	71.8	12.7	7.29	75	0.964	0.72	0.07
02/21/2023 12:40	7.8	12.41	85.9	4.6	7.3	20	0.617	1.05	0.01
03/21/2023 12:40	8.4	11.57	71.9	4.3	7.39	10	0.971	1.03	0.15
04/18/2023 13:10	8.8	11.24	69.1	8.1	7.27	109	0.782	1.23	0.14
05/16/2023 12:40	16.4	10.21	53.1	1.9	7.53	31	0.23	1	0.00
06/13/2023 12:17	19.2	12.02	67	1.7	8.67	10	0.149	0.38	0.00
<b>Median</b>	<b>12.25</b>	<b>11.27</b>	<b>71.60</b>	<b>2.55</b>	<b>7.50</b>	<b>26.50</b>	<b>0.41</b>	<b>1.01</b>	

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)
29	< 0.050	0.023	61	62	1.4
29	< 0.050	0.028	72	74	1.8
26	< 0.050	0.026	50	52	2
26	< 0.050	0.042	53	64	10.6
26	< 0.050	0.047	51	68	16.8
26	0.052	0.035	58	66	7.8
23	< 0.050	0.068	17	30	13.2
28	< 0.050	0.026	43	46	3.2
24	< 0.050	0.043	52	58	6
24	< 0.050	0.044	16	24	7.6
20	< 0.050	0.027	42	47	4.8
28	< 0.050	0.026	44	47	2.6
<b>26</b>	<b>0.05</b>	<b>0.0315</b>	<b>50.5</b>	<b>55</b>	<b>5.4</b>

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
07/12/2022 09:13	20.4	8.82	72.9	1.1	7.47	8	0.178	0.13	0.00
08/16/2022 08:30	20.1	8.77	48.4	5.6	7.49	5	0.137	0.77	0.00
09/20/2022 08:55	15	9.81	67.7	1.9	7.42	6	0.082	1.19	0.00
10/18/2022 08:55	13.9	9.95	63.9	3	7.71	20	0.069	0.82	0.00
11/15/2022 08:45	7.5	11.63	67.6	5.2	7.44	10	0.462	1.01	0.00
12/20/2022 08:40	5.7	12.42	80.1	3.4	7.92	<10	0.611	0.87	0.00
01/17/2023 08:58	7.2	11.73	70.4	11.9	7.23	74	0.842	0.48	0.07
02/21/2023 08:58	7.1	11.98	80.2	2.8	6.94	<10	0.502	1.1	0.01
03/21/2023 09:08	7.8	11.57	70.8	5.5	7.42	10	0.786	0.72	0.15
04/18/2023 09:20	8	11.35	66.1	4.8	7.25	41	0.611	1.26	0.14
05/16/2023 09:20	15.9	9.83	52.9	43.2	7.29	20	0.214	1.32	0.00
06/13/2023 09:05	18.4	9.66	64.5	1.6	7.63	<10	0.132	0.87	0.00
<b>Median</b>	<b>10.95</b>	<b>10.65</b>	<b>67.65</b>	<b>4.10</b>	<b>7.43</b>	<b>10</b>	<b>0.34</b>	<b>0.87</b>	

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)
27	< 0.050	0.024	64	66	2.5
27	< 0.050	0.028	73	76	2.6
25	< 0.050	0.061	54	60	5.6
24	< 0.050	0.03	50	53	3.4
26	< 0.050	0.042	44	50	6.2
24	< 0.050	0.035	57	59	2.2
23	< 0.050	0.071	46	61	14.8
28	< 0.050	0.026	47	51	4.4
24	< 0.050	0.046	61	68	6.8
24	< 0.050	0.041	2	12	10.4
20	< 0.050	0.035	30	38	8.2
26	< 0.050	0.022	48	52	3.6
<b>24.5</b>	<b>0.05</b>	<b>0.035</b>	<b>49</b>	<b>56</b>	<b>5</b>

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 2022/2023)

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 <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	Rainfall previous 24 hrs
07/12/2022 11:40	20.8	NA	73.4	1.2	7.54	9	0.233	0.13	0.00
08/16/2022 11:00	20.6	9.12	70.4	0.6	7.34	9	0.157	0.53	0.00
09/20/2022 11:25	16	9.89	68.2	0.8	7.53	18	0.099	1.13	0.00
10/18/2022 10:50	14.1	10.18	64.1	1.7	7.36	41	0.088	0.67	0.00
11/15/2022 11:25	8.1	11.4	66.5	5	7.24	20	0.35	0.93	0.00
12/20/2022 11:25	5.5	12.15	76.9	2.5	6.94	20	0.509	1.05	0.00
01/17/2023 11:20	7.4	11.29	67.7	11.65	6.98	97	0.807	0.56	0.07
02/21/2023 11:30	7.49	11.66	80.1	2.11	7.18	<10	0.459	1.21	0.01
03/21/2023 11:50	7.8	11.36	67.4	4.9	7.42	20	0.715	0.88	0.15
04/18/2023 11:55	8.3	11.24	65.3	5.3	7.3	10	0.617	0.79	0.14
05/16/2023 11:50	15.3	10.02	51.5	2.3	7.46	10	0.212	0.78	0.00
06/13/2023 11:20	18.7	10.09	65.6	0.9	8.09	<10	0.171	0.71	0.00
<b>Median</b>	<b>11.20</b>	<b>11.24</b>	<b>67.55</b>	<b>2.21</b>	<b>7.35</b>	<b>14</b>	<b>0.29</b>	<b>0.79</b>	

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)
28	< 0.050	0.033	58	61	2.8
28	< 0.050	0.027	66	69	2.6
25	< 0.050	0.03	55	61	5.6
25	< 0.050	0.029	51	57	5.6
26	< 0.050	0.047	46	51	5.2
26	< 0.050	0.033	57	63	5.6
22	< 0.050	0.069	53	67	14.4
28	< 0.050	0.024	59	61	1.6
24	< 0.050	0.045	51	58	7.4
24	< 0.050	0.042	19	26	7.2
20	< 0.050	0.026	31	37	5.6
25	< 0.050	0.021	44	48	4
<b>25</b>	<b>0.05</b>	<b>0.0315</b>	<b>52</b>	<b>59.5</b>	<b>5.6</b>

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 2022/2023)**

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (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
SHE10	07/12/2022 09:00	22	8.64	68.7	1.9	7.26	326	0.421	0.17	2.8							
MRA10	07/12/2022 09:15	21.4	8.15	69.2	2.5	7.09	365	0.41	0.12	4							
CRO10	07/12/2022 10:09	16.3	8.72	55.4	3.8	6.89	921	0.349	0	3							
PRI1	08/16/2022 08:35	19.7	8.84	57.5	3	7.21	161	0.115	0.67	4.8	0.00048	0.000392	0.00011	<0.000106	0.00164	0.000841	21.6
BAT12	08/16/2022 10:06	16.3	9.46	54.1	2.8	7.38	107	0.365	0.58	1							
BAT1	08/16/2022 10:35	18.6	7	62.3	7.4	6.92	308	0.274	0.49	5.8							
MRA1	09/20/2022 09:25	15.3	9.86	55.2	3.1	7.48	365	< 0.050	0.86	2.8							
SHE1	09/20/2022 09:35	15	9.99	57.3	1.6	7.49	99	0.112	1.01	3.6							
MIC10	09/20/2022 11:03	14.5	10.85	54.1	1.4	7.57	77	0.111	1.1	5.4							
CLA1	10/18/2022 09:15	13.6	9.83	101	3.3	7.3	529	0.641	0.6	3.6	0.00083	0.000646	0.00051	0.000168	0.00497	0.00366	32.8
CGT1	10/18/2022 11:40	16.2	5.69	256.3	5.9	7.22	228	< 0.050	3.04	7.6							
PRI5	11/15/2022 09:45	7.8	11.42	97.9	3.2	7.27	135	1.212	1.01	1.8	0.00105	0.000625	0.00016	<0.000106	0.00576	0.00463	34.6
GLE1	11/15/2022 10:20	8.2	11.18	103.5	2.9	7.32	246	1.152	0.91	2.8							
MIC1	12/20/2022 08:20	6.4	12.06	112.6	2	7.71	41	3.603	0.84	2.6							
GIB1	12/20/2022 10:25	6.3	11.65	87	5.2	7.09	20	1.412	1.56	2.2							
CLA10	01/17/2023 09:22	11.5	10.18	79.7	1.8	6.87	20	2.634	0.53	0.8	0.00033	<0.000212	<0.000111	<0.000106	0.00762	0.00737	22.6
GIB15	01/17/2023 10:35	8.9	11	80.3	6.21	6.83	<10	2.472	0.29	5.8							
GLE10	01/17/2023 11:00	8.8	11.05	63.4	7.72	6.86	161	2.291	0.27	6.2							
CRO1	02/21/2023 09:42						1607	1.042	0.68	1.4							
CRO10	02/21/2023 10:11						292	1.15	0.83	1.6							
SHE10	03/21/2023 08:50	7.3	11.7	94.8	4	7.36	<10	3.516	0.78	4.4							
MRA10	03/21/2023 09:10	7.3	11.55	95.6	3.8	7.36	10	3.321	0.78	3.4							
BAT12	03/21/2023 10:30	7.1	11.81	48.7	2.8	6.94	<10	2.51	0.82	1.6							
PRI1	04/18/2023 09:30	8.1	11.71	91.3	5	7.44	110	2.808	1.3	6.8	0.001	0.000499	0.00025	<0.000106	0.00393	0.00265	34.2
BAT1	04/18/2023 10:55	8.3	11.29	47.1	6.4	6.5	41	1.732	1.05	6.6							
MIC10	04/18/2023 11:48	8.1	11.56	89.9	6.3	7.18	146	3.155	1.27	5.8							
MRA1	05/16/2023 09:40	18.7	9.12	69.8	15.8	7.44	480	1.044	1.44	33							
SHE1	05/16/2023 10:05	18.2	9.23	70	3.1	7.53	98	1.056	1	4							
CGT5	05/16/2023 12:01	17.4	10.06	198	3.8	7.92	2613	0.26	1.23	4.2							
CLA1	06/13/2023 09:45	15.8	9.32	98.6	4.1	7.39	457	1.019	0.4	4.2	0.00087	0.000644	0.00037	<0.000106	0.00656	0.00487	31.6
CGT1	06/13/2023 11:46	20.9	8.35	236.7	4.5	7.36	521	0.2	2.33	9.6							

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 2022/2023)

Site ID	Collection Date/Time	Temp (C)	DO (mg/L)	Sp Cond (µS/cm)	Turb (NTUs)	pH (S.U.)	E-Coli (#/ 100 mL)	NO <sub>3</sub> -NO <sub>2</sub> (mg/L)	BOD (mg/L)	Alkalinity (mg/L)	Ammonia (mg/L)	TP (mg/L)	TDS (mg/L)	TS (mg/L)	TSS (mg/L)
WR1	11/15/2022 11:35	8.10	11.49	71.20	4.90	7.36	31	0.472	0.94	26	< 0.050	0.05	55	62	7.2
WR5	12/20/2022 08:45	5.5	12.43	78.5	3.2	7.74	10	0.588	0.99	25	< 0.050	0.035	52	58	5.8
WR10	02/21/2023 11:35	7.51	11.67	80.10	2.09	7.21	<10	0.459	1.21	28	< 0.050	0.024	59	61	1.6
WR1	06/13/2023 12:18	19.2	12.08	66.7	1.7	8.68	31	0.143	0.43	28	< 0.050	0.022	38	41	2.6

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

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)
<b>A</b>	$\pm < 0.5$	$\pm \leq 0.30$	$\leq 10\%$	$\pm \leq 3$ or 5% (whichever is greater)	$\pm \leq 0.3$
<b>B</b>	$\pm 0.51$ to 2.00	$\pm > 0.3$ to 0.50	$> 10\%$ to $\leq 15\%$	$\pm \leq 5$ or 30% (whichever is greater)	$\pm > 0.3$ to $\pm \leq 1.0$

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 2022/2023)**

Monthly Medians for Temperature at Continuous Instream Sites												
	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023
Station Name	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)	Temperature (°C)
BAT3	18.01	19.23	16.89	13.45	8.51	8.05	8.55	6.94	7.95	9.68	14.66	16.49
BAT12	17.67	18.40	15.38	11.62	6.96	7.07	8.12	6.33	7.39	9.14	14.02	15.52
CLK1	17.60	18.78	17.33	NA	9.84	9.56	10.01	8.48	9.31	10.80	14.29	15.69
CLK12	15.80	17.26	16.93	15.61	12.22	11.37	11.19	9.93	10.13	10.83	13.14	14.64
GLE3	17.62	18.51	16.72	13.90	8.51	8.00	8.64	7.19	8.19	10.17	14.54	15.65
GLE12	15.74	NA	NA	NA	7.07	7.30	8.21	6.40	7.39	9.14	12.62	13.60
MIC3	20.97	21.21	16.93	13.75	7.06	6.76	7.76	6.39	7.65	10.11	17.11	18.90
MIC12	20.47	20.57	16.30	13.30	7.29	6.89	7.83	6.44	7.64	10.00	16.55	18.38
PRI3	20.71	21.11	18.53	15.34	8.60	7.84	8.78	7.31	8.48	10.62	16.63	18.02
PRI12	19.19	19.68	16.52	13.38	8.51	7.98	8.57	7.01	8.14	10.16	15.10	17.20

Monthly Medians for pH at Continuous Instream Sites												
	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023
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	6.51	6.50	6.53	6.55	6.49	6.36	6.32	6.48	6.43	6.36	6.55	6.67
BAT12	7.40	7.46	7.48	7.47	7.27	7.13	6.97	7.02	6.80	6.78	7.19	7.32
CLK1	7.10	NA	7.07	NA	6.94	6.96	6.88	7.04	6.97	6.92	7.31	7.40
CLK12	6.80	6.87	6.87	6.89	6.73	6.63	6.47	6.61	6.49	6.38	6.62	6.69
GLE3	7.42	7.41	7.35	7.27	7.10	7.09	7.01	7.20	7.09	7.06	7.28	7.47
GLE12	7.09	NA	NA	NA	NA	7.00	6.92	7.09	7.06	7.09	7.21	7.26
MIC3	7.31	7.34	7.40	7.40	7.38	7.25	7.31	7.52	7.35	7.30	7.60	7.51
MIC12	7.21	7.18	7.18	7.37	7.24	7.03	6.97	7.20	7.09	6.96	7.18	7.22
PRI3	7.13	7.06	7.12	7.30	7.24	7.28	7.20	7.35	7.25	7.13	7.16	7.18
PRI12	6.93	6.90	6.91	7.00	6.60	6.66	6.65	6.79	6.76	6.71	6.94	7.05

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 2022/2023)**

Monthly Medians for <b>Turbidity</b> at Continuous Instream Sites												
	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023
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	7.01	7.66	7.24	8.87	5.68	4.68	5.19	4.47	6.31	6.34	4.05	5.14
BAT12	4.94	3.96	3.32	4.06	3.58	NA	3.61	3.47	5.35	5.03	5.36	6.11
CLK1	2.48	2.65	2.72	5.35	NA	3.01	3.51	3.16	4.13	3.93	2.92	3.85
CLK12	2.60	3.03	3.57	4.55	2.35	2.26	2.23	2.24	2.97	2.61	2.43	2.80
GLE3	6.60	6.94	6.41	6.25	3.29	4.04	6.94	4.26	6.64	6.99	4.73	5.72
GLE12	4.07	NA	NA	NA	2.69	4.73	9.52	8.52	NA	NA	7.67	6.59
MIC3	2.59	1.98	1.82	1.89	3.30	4.59	5.37	3.52	6.53	6.76	2.70	2.83
MIC12	2.34	1.64	1.51	2.15	4.34	4.65	5.22	3.94	6.63	6.41	3.93	4.02
PRI3	1.87	2.26	2.54	2.56	3.86	NA	NA	NA	NA	5.62	2.08	NA
PRI12	3.83	3.04	3.72	3.53	4.61	4.76	5.28	4.28	5.81	6.05	4.03	3.68

Monthly Medians for <b>Specific Conductivity</b> at Continuous Instream Sites												
	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023
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	52.91	61.83	62.46	64.99	53.29	50.68	50.75	49.58	49.90	48.61	48.68	53.12
BAT12	45.89	53.58	55.45	55.55	47.19	46.77	50.49	48.08	49.00	47.75	45.60	47.46
CLK1	105.19	104.56	101.09	99.28	101.24	101.51	101.33	98.74	101.03	100.19	101.83	100.58
CLK12	74.85	73.71	75.77	77.06	75.55	77.31	76.11	74.51	75.51	74.96	77.96	77.48
GLE3	113.83	121.87	117.14	111.48	99.58	95.62	86.25	90.18	86.33	84.87	99.37	108.69
GLE12	68.59	NA	NA	NA	NA	72.39	63.51	62.21	62.28	60.70	62.09	67.28
MIC3	NA	62.83	56.15	60.03	125.37	113.33	108.61	108.87	100.59	98.48	78.12	NA
MIC12	58.89	55.11	51.85	53.82	123.92	107.83	101.71	102.97	95.47	92.15	65.60	55.56
PRI3	105.38	102.71	100.86	98.82	102.88	104.48	100.64	103.56	98.29	95.31	102.42	101.64
PRI12	78.92	73.72	71.98	73.04	105.47	97.76	96.72	99.48	94.71	92.02	99.20	81.59

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 2022/2023)**

Monthly Medians for Dissolved Oxygen at Continuous Instream Sites												
	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023
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	7.84	6.69	7.04	NA	10.32	10.78	10.76	11.37	11.13	10.60	9.37	8.30
BAT12	9.20	8.78	9.21	10.64	11.96	11.82	11.47	12.09	11.72	11.26	9.94	9.50
CLK1	8.65	8.38	8.73	9.51	10.81	10.92	10.87	11.41	11.11	10.77	9.72	9.29
CLK12	8.95	8.72	8.81	9.01	9.79	10.19	10.26	10.62	10.62	10.49	9.78	9.26
GLE3	8.70	8.47	8.75	9.32	11.05	11.38	11.21	11.63	11.29	10.80	9.50	9.13
GLE12	9.16	NA	NA	NA	11.13	11.28	11.04	11.74	11.65	11.37	10.31	9.78
MIC3	8.61	8.59	9.50	10.25	11.74	12.00	11.65	12.38	11.81	11.15	9.35	8.89
MIC12	8.31	8.25	9.09	9.89	11.24	11.36	10.98	11.92	11.21	10.45	9.28	8.96
PRI3	8.12	7.90	8.50	9.24	10.80	11.29	11.02	11.80	11.39	10.88	9.06	8.79
PRI12	7.44	7.14	8.06	8.63	9.34	9.71	9.73	10.55	10.23	9.78	8.61	8.13

Monthly Medians for Stage at Continuous Instream Sites												
	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023
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	4.09	3.96	3.94	3.96	4.36	4.60	5.05	4.48	5.02	5.19	4.29	4.08
BAT12	4.31	4.21	4.18	4.20	4.41	4.57	4.81	4.53	4.79	4.82	4.42	4.28
CLK1	3.76	3.75	3.73	3.74	4.09	4.18	4.33	4.14	4.27	4.35	4.00	3.93
CLK12	3.85	3.84	3.83	3.82	3.95	4.03	4.13	4.00	4.10	4.16	3.89	3.90
GLE3	4.08	4.03	4.00	4.01	4.20	4.33	4.56	4.27	4.48	4.52	4.16	4.08
GLE12	0.88	0.75	0.67	0.78	0.91	1.07	1.31	1.09	1.21	1.26	0.98	0.88
LPW1	0.00	0.00	0.00	0.00	1.61	1.76	2.07	1.76	2.13	2.30	0.00	0.00
MIC3	5.63	5.53	5.61	5.38	5.36	5.98	6.30	5.56	6.28	6.61	5.47	5.42
MIC12	6.97	6.81	6.87	6.79	6.85	7.49	7.76	7.10	7.72	7.96	6.99	6.82
PRI3	4.14	4.09	4.15	4.20	4.44	4.54	4.38	4.41	4.62	4.70	4.24	4.20
PRI4	7.43	7.37	7.36	7.38	7.65	7.80	8.00	7.64	7.92	8.03	7.46	7.38
PRI12	4.35	4.28	4.27	4.23	4.22	4.41	4.56	4.31	4.58	4.69	4.32	4.31
SHE3	6.02	6.02	6.09	6.15	6.19	6.60	6.80	6.32	6.72	6.85	6.19	6.03
WAL3	3.72	3.67	3.67	3.68	3.90	4.00	4.20	3.93	4.18	4.28	3.79	3.71

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 2022/2023

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	36112	7/22/2022	1-5 gpm	Steady		Yes	None	0	0													Pipe broken, flowing from broken section	
Battle Creek	D39446206	7/21/2022	< 1 gpm	Steady		Yes	None	0	0														
Battle Creek	D42446231	7/22/2022	< 1 gpm	Steady		Yes	None	0	0														
Battle Creek	D42446232	7/22/2022	< 1 gpm	Steady		Yes	None	0	0														
Battle Creek	Private	7/21/2022	< 1 gpm	Steady	Turbidity: Cloudy	Yes	None	0	0														
Battle Creek	Private	7/21/2022	0 gpm	No Flow		No	None																
Battle Creek	Private	7/21/2022	0 gpm	No Flow		No	None																
Battle Creek	Private	7/21/2022	1-5 gpm	Steady		Yes	None	0	0														
Clark Creek	D39460252	7/29/2022	10-25 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	18	17.6	66.3	7.18	0.9	0.2					598		Priority Outfall
Clark Creek	D42466417	7/29/2022	1-5 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.06	20.1	19.7	132.8	7.22	4.9	0.2					670		Priority Outfall
Clark Creek	D42468244	7/29/2022	> 25 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.44	19.9	19.3	99.3	7.68	23.2	0					20		Priority Outfall
Clark Creek	D42468PVT	7/29/2022	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.00	18.8	19.4	165.6	7.84	0.9	0.2					97	Very low flow. Set up sample collection drip catch using black plastic garbage bags.	Priority Outfall
Clark Creek	D45464268	7/25/2022	< 1 gpm	Steady		Yes	None	0	0														
Croisan Creek	37335	8/8/2022	1-5 gpm	Steady		Yes	None	0	0														
Croisan Creek	D33460214	8/8/2022	5-10 gpm	Steady		Yes	None	0	0														
Croisan Creek	D33460215	8/8/2022	5-10 gpm	Steady		Yes	None	0	0														
Croisan Creek	D33462214	8/8/2022	1-5 gpm	Steady		Yes	None	0.5	2													1.5 foot diameter outfall under a road, madrona ave south and croisan creek rd south. Hidden behind lots of dead blackberries.	
Croisan Creek	Private	8/8/2022	1-5 gpm	Steady		Yes	None	0	0														
Croisan Creek	Private	8/8/2022	< 1 gpm	Steady		Yes	None	0	0														
East Bank Willamette	D42480214	8/19/2022	< 1 gpm	Steady		No	Lab Sampling														448	Grabbed BacT sample out of MH D42480214 to determine whether there was a difference in MPNs between the upstream MH and the end of the pipe (outfall to river).	Follow Up BacT Sample. Priority Outfall.
East Bank Willamette	D42480214	8/30/2022	< 1 gpm	Steady		No	Lab Sampling														160	Grabbed BacT sample out of MH D42480214 to determine whether there was a difference in MPNs between the upstream MH and the end of the pipe (outfall to river).	Follow Up BacT Sample. Priority Outfall.
East Bank Willamette	D42480215	8/5/2022	1-5 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	16.8	20.3	179.2	8.07	1	0.6			1.1	10.1	15530	Grabbed BacT and K&Na samples.	Initial BacT Sample. Priority Outfall.
East Bank Willamette	D42480215	8/19/2022	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	18.6	21.2	116.2	7.77	1.2	0.6					3076	Grabbed BacT and K&Na samples.	Follow Up BacT Sample. Priority Outfall.
East Bank Willamette	D42480215	8/30/2022	< 1 gpm	Steady		Yes	Lab Sampling	0	0		18.2	19.5	89.2	7.96	2.4						281	Follow up bacteria sample grab.	Follow Up BacT Sample. Priority Outfall.
East Bank Willamette	D42480223	8/5/2022	5-10 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	15.8	15.5	236	7.5	2	0.3			2.2	9.961	216		Priority Outfall
East Bank Willamette	D42482212	8/5/2022	> 25 gpm	Steady		Yes	Lab and Field Sampling	1.0-2.0	0.5-1.0	0.95	19	19.8	64.6	7.79	0.5	0.6			0.6	7.182	10	<10 MPN	Priority Outfall
East Bank Willamette	D42482213	8/5/2022	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.02	16.3	19.8	68	7.74	2.4	0.6			0.9	10.9	10	<10 MPN	Priority Outfall
East Bank Willamette	D42482230	8/5/2022	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.04	15.2	19.8	137.5	7.41	4.5	0.8			2.1	7.601	1106		Initial BacT Sample. Priority Outfall.
East Bank Willamette	D42482230	8/22/2022	10-25 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.05	18.1		79.9	7.11	3.7	0.5					19860	Grabbed BacT sample	Follow Up BacT Sample. Priority Outfall.
East Bank Willamette	D42482230	8/30/2022	< 1 gpm	Steady		Yes	Lab Sampling	0	0		17.8		98.7	7.48	5.5						1956	Grabbed follow up bacteria sample.	Follow Up BacT Sample. Priority Outfall.
East Bank Willamette	D48482567	8/22/2022	10-25 gpm	Steady		Yes	Lab and Field Sampling	2	2	1.14	20.6		64	7.5	2.6	0.6					10	<10 MPN. Grabbed BacT from CB D48482567. Talked to Real Tech Auto Repair store manager about possible water leak at this address. Opened water meter and noticed it was actively spinning. High probability of drinking water leak at this business location.	This appears to be the source of flow occurring at priority outfall D42482230. Performed pipeshed investigation beginning at D42482230 that lead to this CB.
Gibson Creek	D27478203	7/19/2022	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	D30478206	7/19/2022	0 gpm	No Flow		No	None																
Gibson Creek	D30478207	7/19/2022	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	D30478216	7/19/2022	0 gpm	No Flow		No	None																
Gibson Creek	D30478233	7/19/2022	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	D30478246	7/19/2022	0 gpm	No Flow		No	None																
Gibson Creek	D30478247	7/19/2022	0 gpm	No Flow		No	None																
Gibson Creek	D30478289	7/19/2022	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	D30478293	7/19/2022	5-10 gpm	Steady		Yes	None	0	0														
Gibson Creek	D33478205	7/18/2022	0 gpm	No Flow		No	None																
Gibson Creek	D33478274	7/18/2022	< 1 gpm	Steady		No	None																Flowing outfall, but no Cl test strip used.
Gibson Creek	D33478283	7/18/2022	1-5 gpm	Steady		No	None																Flowing outfall, but no Cl test strip used.

Attachment A: Dry Weather Outfall Screening Results RY 2022/2023

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
Gibson Creek	D33486243	7/27/2022	1-5 gpm	Steady		Yes	None	0	0														
Gibson Creek	D36480221	7/15/2022	10-25 gpm	Steady		Yes	None	0	0	0													
Gibson Creek	D36480224	7/18/2022	1-5 gpm	Steady		Yes	None	0	0													Test strip expired in November. 1.5 ft diameter outfall.	
Gibson Creek	D36480252	7/18/2022	5-10 gpm	Steady		Yes	None	0	0													2.5 in diameter pipe	
Gibson Creek	Private	7/15/2022	0 gpm	No Flow		No	None															Cracked outlet	
Gibson Creek	Private	7/15/2022	0 gpm	Transitory		Yes	None	0	0													Drip	
Gibson Creek	Private	7/15/2022	0 gpm	No Flow		No	None															Water in it but not flowing	
Gibson Creek	Private	7/18/2022	1-5 gpm	Steady		No	None															Flowing outfall, but no Cl test strip used.	
Gibson Creek	Private	7/18/2022	1-5 gpm	Steady		No	None															Flowing outfall, but no Cl test strip used.	
Gibson Creek	Private	7/19/2022	< 1 gpm	Steady		Yes	None	0	0													Flowing outfall, but no Cl test strip used.	
Gibson Creek	Private	7/19/2022	< 1 gpm	Steady		No	None															Flowing outfall, but no Cl test strip used.	
Gibson Creek	Private	7/19/2022	< 1 gpm	Intermittent		Yes	None	0	0														
Gibson Creek	Private	7/19/2022	< 1 gpm	Intermittent		Yes	None	0	0														
Gibson Creek	Private	7/19/2022	< 1 gpm	Steady		Yes	None	0	0														
Gibson Creek	Private	7/19/2022	< 1 gpm	Steady		No	None															Flowing outfall, but no Cl test strip used.	
Little Pudding River	D60474208	9/6/2022	< 1 gpm	Steady		Yes	None	0	0.5-1.0														
Little Pudding River	Private	9/7/2022	< 1 gpm	Steady		Yes	None	0.5-1.0	0.5-1.0														
Little Pudding River	Private	9/7/2022	< 1 gpm	Steady		Yes	None	0-0.5	0.5													40 or 50 feet away from an outfall that also tested positive for chlorine	
Lower Claggett Creek	D51488203	8/17/2022	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.11	16.8	22.6	123	7.44	1.7	0.7	0.25-0.50	0.01			10	<10 MPN. Grabbed BaCT and K&Na samples	Priority Outfall
Lower Claggett Creek	D51488236	8/17/2022	0 gpm	No Flow		No	None																Priority Outfall
Lower Claggett Creek	D54494201	8/9/2022	0 gpm	No Flow		No	None															Outfall not in backwater. However no discernible flow. Checked upstream MHs for flow and both were dry.	Priority Outfall
Mill Creek	D42476203	7/18/2022	0 gpm	No Flow		No	None																Priority Outfall
Mill Creek	D42478237	7/18/2022	0 gpm	No Flow		No	None																Priority Outfall
Mill Creek	D45468241	8/19/2022	> 25 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.02	19.8	19.9	154.5	7.78	0.6	0.2					10	Grabbed BaCT and K&Na samples.	Priority Outfall
Mill Creek	D45474207	8/19/2022	< 1 gpm	Steady		Yes	None	0	0														
Mill Creek	D45474225	7/18/2022	> 25 gpm	Intermittent		Yes	Field Sampling	0	0	0	15.7	19.1	283.3	7.49	0.7	0.3						Flow intermittent from 25+ gpm down to less than 5gpm.	Priority Outfall
Mill Creek	D45476207	7/18/2022	10-25 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	15.9	18.4	289.4	7.8	0.5	0.2	0-0.25	0.02	2.79	11.1	71		Priority Outfall
Mill Creek	D45476217	7/18/2022	5-10 gpm	Steady		Yes	Field Sampling	0	0-0.5	0.04	19	18.6	234.9	8	2.5	0.4	0	0					Priority Outfall
Mill Creek	D45476217	8/19/2022	5-10 gpm	Steady		Yes	None	0	0														Priority Outfall
Mill Creek	D48468246	8/30/2022	5-10 gpm	Steady		Yes	None	2	2													Chlorine found	
Mill Creek	D51470205	7/19/2022	> 25 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.11	17.5		309.6	7.43	6.5	0.2	0-0.25	0	2.68	11.4	1	<1 MPN. Detergents was very light blue. So result fell somewhere between 0 - 0.25 closer to 0 than 0.25. Grabbed bact and K & Na sample. Sampled MH D51468201.	Priority Outfall
Mill Creek	D54470205	7/19/2022	0 gpm	No Flow		No	None															Outfall in backwater due to beaver dam. Performed upstream investigation of stormwater system and determined no discharge to outfall was occurring.	Priority Outfall
Mill Creek	Private	8/19/2022	< 1 gpm	Steady		Yes	None	0	0														
Mill Creek	Private	8/19/2022	10-25 gpm	Steady		Yes	None	0	0														
Mill Creek	Private	8/19/2022	< 1 gpm	Transitory	Color: Milky and bubbles Floatables: Suds	Yes	None	0	0													Flowed milky bubbled water for a few seconds then stopped	
Mill Creek	Private	8/22/2022	1-5 gpm	Steady		Yes	None	0	1													The test strip pad for total chlorine fell off, bc outfall was high up and force of water falling removed the strip. That was our last strip with us at moment.	
Mill Creek	Private	8/26/2022	1-5 gpm	Steady		Yes	None	0	0														
Pringle Creek	38336	8/3/2022	1-5 gpm	Steady		Yes	None	0	0													Two large outfalls only one has flow pretty strong	
Pringle Creek	88727	7/28/2022	< 1 gpm	Steady		Yes	None	0	0														
Pringle Creek	194290	8/4/2022	1-5 gpm	Steady		Yes	None	0	0														
Pringle Creek	D39456229	7/29/2022	10-25 gpm	Steady		Yes	Field Sampling	0	0-0.5	0.06	18.1	18	68.8	6.51	0.8							Flow likely due to combination of ground and trace drinking water.	Priority Outfall
Pringle Creek	D42456204	8/2/2022	1-5 gpm	Steady		Yes	None	0	0														

Attachment A: Dry Weather Outfall Screening Results RY 2022/2023

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	D42456216	8/19/2022	1-5 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.03	16.7	17.1	61.4	7.32	0.7	0.3					10	Grabbed BacT and K&Na samples. Reactivating Idylwood sample location that had previously been designated as being no longer sampled	Priority Outfall	
Pringle Creek	D42458217	8/1/2022	10-25 gpm	Steady		Yes	None	0	0															
Pringle Creek	D42458219	8/1/2022	1-5 gpm	Steady		Yes	None	0	0															
Pringle Creek	D42468235	8/4/2022	0 gpm	No Flow		No	None																Priority Outfall	
Pringle Creek	D42472210	7/22/2022	1-5 gpm	Steady		Yes	None	0	0															
Pringle Creek	D45454258	8/4/2022	5-10 gpm	Steady		Yes	None	0	0															
Pringle Creek	D45458210	8/1/2022	5-10 gpm	Steady		Yes	None	0	0															
Pringle Creek	D45458211	8/1/2022	< 1 gpm	Steady		Yes	None	0	0															
Pringle Creek	D45458233	8/1/2022	5-10 gpm	Steady		Yes	None	0	0														Next to culvert.	
Pringle Creek	D45464207	7/20/2022	5-10 gpm	Steady		Yes	Field Sampling	0	0-0.5	0.04	20.4		121.1	7.97	0.7	0.2	0	0					Priority Outfall	
Pringle Creek	D45466212	8/4/2022	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.2	20.3	26.1	158.5	7.18	17.6		0-0.25	0.03	1	6.323	10	Outfall in backwater. Walked to next upstream MH D45466217 and it was barely flowing. Collected field and lab samples. Fluoride sample below detection limit which may indicate the presence of an interfering substance.	Priority Outfall	
Pringle Creek	D48458201	8/4/2022	5-10 gpm	Steady	Odor: Sulfide	Yes	None	0	0															
Pringle Creek	D48460518	8/4/2022	5-10 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	19		279.1	7.27	1.2	0.2	0	0.03	3.6	9.681	30	Priority Outfall D48460229 in backwater. Walked upstream until no longer in backwater. No obvious discharge appeared to be occurring. However, noticed flow from flow through DB. Collected samples, BacT and K & Na sample from CB unit description D48460518.	Priority Outfall	
Pringle Creek	D48464203	8/4/2022	0 gpm	No Flow		No	None																Outfall in backwater. Walked upstream and opened manholes. No apparent discharge to outfall was occurring.	Priority Outfall
Pringle Creek	D48464249	7/20/2022	0 gpm	N/A		No	None																Outfall in backwater. Walked upstream storm main and opened MHs until no longer in backwater. Storm MH D45464227 was first US MH not in backwater, it was dry. No apparent US discharge to outfall.	Priority Outfall
Pringle Creek	Private	7/29/2022	1-5 gpm	Steady		Yes	None	0	0															
Pringle Creek	Private	7/29/2022	1-5 gpm	Steady		Yes	None	0	0															
Pringle Creek	Private	8/1/2022	1-5 gpm	Steady		Yes	None	0	0															
Pringle Creek	Private	8/2/2022	1-5 gpm	Steady		Yes	None	0	0															
Pringle Creek	Private	8/2/2022	1-5 gpm	Steady		Yes	None	0	0															
Upper Claggett Creek	D51486201	8/30/2022	5-10 gpm	Steady		No	Lab Sampling				19.3	19.3	82	7.17	2.4						1782	Infall investigation for D51486203. Grabbed bact sample and recorded water quality parameters.	Follow Up BacT Sample. Priority Outfall.	
Upper Claggett Creek	D51486203	8/17/2022	5-10 gpm	Steady		Yes	Lab and Field Sampling	0	0	0	19.2	20.1	79.8	7.19	2.5	0.6					6131	Proxy for D51486201. Took samples at storm manhole D51486203, same MH as last year. This was traced this upstream to be, most likely, a drinking water leak.	Initial BacT Sample. Priority Outfall.	
Upper Claggett Creek	D51486216	8/17/2022	1-5 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.05	18	18.8	71.8	7.45	4.6	0.5	0-0.25				3654	Flowing slightly more than last year.	Initial BacT Sample. Priority Outfall.	
Upper Claggett Creek	D51486216	8/30/2022	1-5 gpm	Steady		No	Lab Sampling				18.5	18.4	71.9	7.66	2.6						1670	Grabbed follow up bacteria sample	Follow Up BacT Sample. Priority Outfall.	
Upper Claggett Creek	D54486217	8/17/2022	5-10 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.09	18.6	18.8	77.6	7.44	3.2	0.8					1187		Initial BacT Sample. Priority Outfall.	
Upper Claggett Creek	D54486217	8/30/2022	10-25 gpm	Steady	Odor: Sewage	No	Lab Sampling				18.6	18.6	204	7.57	3.5						4352	Grabbed follow up bacteria sample	Follow Up BacT Sample. Priority Outfall.	
Upper Claggett Creek	D54486218	8/10/2022	< 1 gpm	Steady		Yes	None	0	0														Downstream of culvert. Lots of trash around.	
Upper Claggett Creek	State	8/10/2022	< 1 gpm	Steady		Yes	None																No test strip photo	
Waln Creek	D39450218	7/20/2022	1-5 gpm	Steady		Yes	None	0	0															
Waln Creek	D42450205	7/20/2022	< 1 gpm	Steady		Yes	None	0	0															
Waln Creek	D42450206	7/20/2022	< 1 gpm	Steady		Yes	None	0	0															
Waln Creek	D42450209	7/20/2022	< 1 gpm	Steady		Yes	None	0	0															
Waln Creek	D45448261	7/20/2022	< 1 gpm	Steady		Yes	None	0	0															
Waln Creek	Private	7/20/2022	< 1 gpm	Steady		Yes	None	0	0														6 inch diameter pipe with a low and steady flow	

Attachment A: Dry Weather Outfall Screening Results RY 2022/2023

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	137021	7/26/2022	< 1 gpm	Steady		No	None															Flowing outfall, but no Cl test strip used.		
Willamette Bank	D39478271	8/9/2022	5-10 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.06	19.2		93.2	7.31	7.7	0.2	0	0.04				30	Grabbed BacT and K & Na samples	Priority Outfall
Willamette Bank	D42480205	8/5/2022	0 gpm	No Flow		No	None																	Priority Outfall
Willamette Bank	D42482223	8/5/2022	> 25 gpm	Steady		Yes	Lab and Field Sampling	0	0-0.5	0.07	18.9	17.4	178.8	7.74	3.5	0.3			1.6	9.071		52	Grabbed BacT and K & Na samples.	Priority Outfall
Willamette Bank	Private	7/26/2022	1-5 gpm	Steady		Yes	None	0	0															
Willamette Bank	Private	7/26/2022	1-5 gpm	Steady		Yes	None	0	0															
Willamette Bank West	D30470203	8/4/2022	0 gpm	No Flow		No	None																In the future, stop at office and ask where is best place to park.	Priority Outfall
Willamette Bank West	D36472203	8/9/2022	< 1 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.13	19.9		127.4	7.33	11	0.3	0-0.25	0.23				41	Grabbed BacT and K&Na sample from Storm Catchbasin D36474531	Priority Outfall
Willamette Bank West	D42476279	8/5/2022	0 gpm	No Flow		No	None																	Priority Outfall
Willamette Slough East	D39470220	8/19/2022	10-25 gpm	Steady		Yes	Lab and Field Sampling	0	0	0.09	20.2	22.7	75.9	7.71	1.3	0.4						10	<10 MPN	Priority Outfall
Willamette Slough East	D39470220	8/22/2022	5-10 gpm	Steady		Yes	Field Sampling	1	1	0.59						0.6							Sampled for Cl and FI at MH Cleanout D39470236 as part of investigating a potential drinking water leak btwn Myers and Wilson on Commercial that may be contributing to flow at outfall D39470220.	Priority Outfall

## Attachment 4: Dry Weather Outfall and IDDE Screening

# **City of Salem's Dry Weather MS4 Field Screening Plan**

**National Pollutant Discharge Elimination System (NPDES) Municipal  
Separate Storm Sewer System (MS4)**

Prepared by PW Stormwater Quality  
October 2023



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## **1.0 Introduction**

This plan, which fulfills requirements identified in Schedule A.3.c.v of the City of Salem's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit, describes the Dry Weather MS4 Field Screening Program. This plan supports the City's Illicit Discharge Detection and Elimination (IDDE) Program. Activities discussed in this plan meet the current (Effective: October 1, 2021) NPDES MS4 permit requirements and will be implemented for the remainder of the current permit cycle.

## **2.0 Objective**

The objective of the Dry Weather MS4 Field Screening Program is to identify illicit discharges from a variety of potential sources. This is done through visual inspections and water chemistry screening of MS4 discharges. If an illicit discharge is identified, the work of tracking and eliminating the discharge is initiated.

## **3.0 Adaptive Management**

The City has been conducting dry weather MS4 screening as part of its IDDE Program since it received its first NPDES MS4 Permit in 1997. The data this program has produced has identified illicit discharges, drinking water leaks, and MS4 pipe catchments that convey groundwater to receiving streams throughout the year. These data have been imported into a geodatabase for historical record and spatial analysis purposes. Having the data in this format allows for quick and efficient responses when an illicit discharge is suspected, and helps staff adaptively manage the program on an ongoing basis.

### **3.1. Changes to this Plan During the Permit Term**

As this plan is implemented, it may be necessary to make modifications to improve the effectiveness of the program. Modifications may include but are not limited to: 1) the addition of priority outfall sites based on notifications of potential illicit discharges, variations in in-stream data, personnel safety, or other factors identified by City staff, 2) unusual weather conditions that inhibit dry weather (minimum 72-hour antecedent dry period) inspections, and 3) changes to pollutant parameter action levels. Significant modifications to this plan, made during the permit cycle, will be submitted to the DEQ as part of the annual reporting process.

## **4.0 Task Organization**

### **4.1. Stormwater Quality Monitoring Group**

Stormwater Quality monitoring staff are responsible for performing all dry weather screening at MS4 priority sites on an annual basis. This includes but is not limited to calibration of field instrumentation, visiting each MS4 priority site during the dry weather period, performing visual observations, collecting field measurements when flow is present, delivering samples to Willow Lake Laboratory for additional analysis, and updating the dry weather MS4 screening geodatabase. In addition, when an illicit discharge is found or suspected, the Stormwater Quality Monitoring Group notifies Environmental Services via Public Works Dispatch center, and often aids Environmental Services with tracking activities.

## **4.2. Annual Stream Crew Interns**

Stormwater Services employs a crew of seasonal interns to walk Salem's streams during the summer months. Primary duties include removing trash and debris for flow conveyance, documenting infrastructure damage, reporting illegal taking from waters of the state, and identifying and reporting illicit discharges. They are trained to stop at each outfall they come across and look for scaling and staining, floatable waste, recording various odors, etc. They also test the water of all flowing outfalls for the presence of chlorine using chlorine test strips. All data collected by the Stream Crew Interns is imported into the dry weather screening geodatabase. Whenever the crew suspects an illicit discharge, they notify Environmental Services via Public Works Dispatch center.

## **4.3. Environmental Services**

The City's Environmental Services workgroup leads the tracking, response, and enforcement actions associated with illicit discharges. Environmental Services staff respond to notifications from Stormwater Quality monitoring staff, annual Stream Crew Interns, all other internal staff, and residents reporting suspected illicit discharges. If the source of the suspected flow cannot be identified in the field, the Environmental Services workgroup will work with Public Works Operations supervisors to create work orders for storm line camera inspections, cleaning of the MS4 system, dye testing of the sanitary sewer system, collection of samples for laboratory analysis, and other source tracking activities.

The Environmental Services workgroup procedures for responding, reporting to OERS, notifying other authorities, and response/complaint tracking complies with the permit language found under Schedule A.3.c.iv of the current MS4 permit.

## **5.0 Information Sharing**

All information sharing of findings that come through the implementation of this plan are routed through the Public Works Dispatch Center. For example, if Stormwater Quality Monitoring staff find the presence of fluoride and no other indicators of pollutants exist (this scenario indicates water source may be treated drinking water), staff will notify the Public Works Dispatch Center and they will create a Service Request (SR) for the leak detection team. The standard practice of routing a SR through the Dispatch Center ensures that a record of activity is codified, and the appropriate response staff are issued the SR. The SR always includes the name and contact information of the caller that generated the SR, description of the issue, location, infrastructure asset number (if applicable), time/date of the call, and any other relevant information.

If it is determined that an illicit discharge has originated outside of the City's jurisdiction, that jurisdiction will be contacted as soon as possible, and all relevant data will be shared.

## **6.0 Priority MS4 Dry Weather Screening Sites**

Priority MS4 dry weather screening sites are sites that have been identified for annual visits during the dry weather season (July - September) and after an antecedent dry period of at least 72 hours. If flow is present at a priority site, all the parameters listed in Table 2 of this document will be collected at the site and the associated exceedance action levels will initiate additional efforts to determine the source of the water. All screening activities at priority MS4 dry weather

sites will be completed by the Stormwater Quality Monitoring Group. Table 1 lists all the identified priority MS4 dry weather screening sites that will be visited annually during the remainder of this permit cycle.

### **6.1. 2012 Prioritization Process**

In 2012, thirty-five MS4 locations were identified as priority sites and screened annually during the dry season during the last permit cycle. All screening activities followed the 2012 DEQ approved iteration of this plan. The prioritization process for selecting priority sites for the 2012 plan is detailed in the bulleted list below.

- **Drainage Area:** To ensure a large drainage area, storm lines discharging directly to a receiving stream of greater than or equal to 30 inches in diameter were identified, resulting in a total of 139 storm lines.
- **Land use type(s):** Greater than or equal to 30-inch diameter storm lines that drained a portion of industrial land use were given higher priority.
- **Accessibility:** Site location accessibility was reviewed from previous dry weather inspections. Areas where accessibility proved to be an issue were managed by identifying the first upstream manhole as the priority site.
- **Storm System Age:** Storm system age was determined using storm line as-builts and the relative age of buildings in the catchment area, with older storm lines being prioritized over more recent storm lines.
- **Sanitary Sewer Condition:** Storm sub-basin catchments with known sanitary sewer infiltration concerns were prioritized over catchments with relatively little infiltration concerns.
- **Historical Notifications of Suspected Illicit Discharges:** Discussion with Environmental Services Staff identified several outfalls based on historical complaints that were added to the prioritized outfall/manhole list regardless of any of the above considerations.

### **6.2. 2023 Prioritization Process**

#### **6.2.1. Data Review of 2012 Identified Priority Sites**

Staff performed a review of all screening data that was collected at 2012 priority sites. The date range for these data were from 2012 to 2023. This review helped to determine which sites should be omitted from future screening activities and which would remain. Staff analyzed the data for consistencies in flow, water chemistry, and visual observations. Of the 35 - 2012 priority sites, 12 of the sites showed inconsistencies in the data and will remain priority sites. The data for remainder of the sites were static, with several of them never having dry weather flows and others conveying ground water flows.

#### **6.2.2. Analysis of Stream Crew Data and Historical Complaints**

Staff reexamined historical complaints of suspected illicit discharges and data collected by the annual Stream Crew Interns. This analysis resulted in 5 additional sites being added as priority sites.

### 6.2.3. Analysis of MS4 Receiving Stream Water Quality Data

Staff analyzed receiving stream water quality data during the dry weather season (July-September) from the 10 continuous water quality monitoring station the City operates. The analysis looked for abnormalities in the data that may indicate the presence of illicit discharges throughout the drainage. The data showed that two of the sites, both located on Clark Creek, had a history of random abnormalities in the data. A follow up spatial analysis of the Clark Creek catchment found that there are 54 different locations where the MS4 system discharges to Clark Creek. Of the 54 locations, only 18 are outfalls that discharge to a non-piped portion of Clark Creek. Given the results of this analysis, it was decided that 18 of the larger MS4 discharge locations that enter a piped section of Clark Creek will be identified as priority MS4 dry weather screening sites. These sites, combined with the other 17 priority sites, comes to a total of 35 priority dry weather MS4 sites per year. This is the same number of priority sites that were visited annually during the last permit term.

Table 1: Priority Dry Weather Screening Sites

Historical Priority Dry Weather Screening Sites			
Unit ID:	Unit Description	Basin	Structure Type
16611	D36472203	West Bank	Outfall
26647	D39460252	Clark	Outfall
28788	D42456526	Pringle	Catchbasin
19952	D42468244	Clark	Outfall
7457	D42480215	East Bank	Outfall
5030	D42482212	East Bank	Outfall
6002	D42482223	East Bank	Outfall
5047	D42482230	East Bank	Outfall
12769	D45476217	Mill	Outfall
19081	D51468201	Mill	Manhole
2863	D51486203	Claggett	Manhole
2417	D54486217	Claggett	Outfall
New Priority Dry Weather Screening Sites			
27909	D48458201	Pringle	Outfall
73324	NA	Claggett	Manhole
24624	D33462214	Croisan	Outfall
26525	D39460209	Clark	Outfall
26463	D36460217	Clark	Manhole
New Priority Dry Weather Screening Sites that Discharge to Piped Sections of Clark Creek			
19362	D42468226	Clark	Manhole
19471	D42468560	Clark	Catchbasin
19722	D42468624	Clark	Manhole
19344	D42468204	Clark	Manhole
19521	D42468211	Clark	Manhole
19748	D42468539	Clark	Catchbasin
20472	D42466233	Clark	cleanout
20506	D42466218	Clark	cleanout
20641	D42466227	Clark	Manhole
20644	D42466263	Clark	cleanout
22327	D45464534	Clark	Catchbasin
22890	D42464208	Clark	Manhole
22893	D42464292	Clark	Manhole
24703	D39462212	Clark	Manhole (lines from N. & S.)
24760	D39462241	Clark	Manhole
24914	D39462226	Clark	Manhole
25237	D39460531	Clark	Catchbasin
25249	D39460225	Clark	Manhole

## **7.0 Dry Weather MS4 Site Field Screening**

Dry weather field screening of priority sites will occur after an antecedent dry period of at least 72 hours. The screening activities will be completed each calendar year during the dry season, more specifically July-September.

ArcGIS Online, a Survey123 outfall inspections form, ArcGIS Field Maps, and mobile devices (i.e., phones or tablets) are used to collect and record priority site inspection general observations and field screening measurements.

### **7.1. General Observations**

These observations are recorded whether flow is present or not present. The general observations that are recorded include:

- Color
- Odor
- Floatable (toilet paper, food waste, etc.)
- Oils / Sheens / Suds
- Deposits / Staining
- Overall receiving pool quality

If any of the first four bullets above are actively occurring during the visit, staff will immediately report the findings to the Public Works Dispatch Communications Center. The Dispatch Center will create a SR for the City's Environmental Services staff to respond and perform tracking activities.

If either of the last two bullets above are observed, there is the possibility that an intermittent illicit discharge exists at the site. In which case, a chalk dam will be placed in the pipe and revisited. If a pool of water exists upon return to the site, all field screening measurements listed below will be analyzed and treated accordingly.

### **7.2. Field Screening Measurements**

When flow is present at a priority dry weather MS4 screening site the following field screening measurements and/or analysis will be performed:

- Temperature
- pH
- Turbidity
- Specific Conductivity
- Total Chlorine
- Fluoride

If fluoride exceeds the action level of 0.3 mg/L then the following is performed in the field:

- Ammonia
- Detergents/Surfactants

Each of the above parameters have associated action levels that when exceeded require additional follow up activities. Table 2 below provides the action level and rationale.

If fluoride is above the 0.3 mg/L action level, field analysis for ammonia and detergents/surfactants will also be conducted.

If any exceedances of field screening pollutant parameter action levels are found and/or field observations indicate the potential of an illicit discharge, the Public Works Dispatch Communications Center will be contacted, and a SR will be created for the City’s Environmental Services staff to respond and perform tracking activities.

If fluoride is absent and there are no other indicators pointing to a potential illicit discharge, the site will be noted as conveying a natural water source. All sites noted as conveying a natural water source will continue to be screened in subsequent years.

Table 2: Field Screening Action Levels and Rationale

<b>Parameter</b>	<b>Reporting Limit</b>	<b>Action Level</b>	<b>Rationale for Action Level</b>
Flow	NA	Presence of flow	Presence of flow from unknown source may indicate illicit discharge. Source could be groundwater, leaking potable water, or illicit discharge.
Temperature	NA	> 20° C	Temperature above 20 degrees centigrade signifies wastewater or industrial process water.
pH	NA	<6.0, > 8.5	pH values falling outside the <6.0, > 8.5 range indicate something other than groundwater or potable water.
Turbidity	0.1 NTU	> 15 NTU	Turbidity values > 15 NTU indicate something other than a natural source.
Specific Conductivity	1 µS/cm	> 250 µS/cm	Historical dry weather outfall inspections data show a specific conductivity ranging 30-200 µS/cm. A Specific conductivity > 250 µS/cm indicates something other than a natural source thus necessitating the need for increased analysis and will prompt a catchment reconnaissance.
Chlorine	range 0.0 to 10 mg/L	> 0.5 mg/L	Presence of chlorine >0.5 mg/L indicates a significant presence of a city drinking water which could be wastewater. Additionally, chlorine serves as an indicator for discharges from pools or hot tubs.
Fluoride	0.3 mg/L	> 0.3 mg/L	Presence of fluoride >0.3 mg/L indicates a significant presence of city drinking water which could be sewage, or other type of wastewater.
Ammonia	0.05 mg/L	> 0.5 mg/L	Ammonia levels in city wastewater range 10-20 mg/L, closer to 20 mg/L during the dry season. An action level at 0.5 allows for detection even with significant dilution.
Detergents/ Surfactants	0.25 mg/L	0.25 mg/L	The City is limited on background data for detergents. However, tap water, groundwater, and irrigation is expected to be void of detergents. An action level of 0.25 will serve as an indicator of wastewater.



### 7.3. Laboratory Analysis

Laboratory analysis will be performed on water samples when field screening general observations and/or measurements indicate the potential of an illicit discharge, and the source was not identified.

Laboratory analysis action levels are used as additional confirmation of a suspected illicit discharge as well as to help identify the potential source, e.g., industrial/commercial wastewater sanitary cross connection, wash water, or a natural water source. Laboratory analysis will include testing for E. coli bacteria, sodium, and potassium.

Laboratory analysis parameter action levels are included in Table 3. Analytical results that exceed action levels will prompt a pipe-shed investigation and additional tracking methods. Additional analysis may be necessary when the source is difficult to find (e.g., metals, bacteria genetic markers, industry-specific pollutants).

Table 3: Laboratory Pollutant Parameter Action Levels

Parameter	Reporting Limit	Action Level	Hold Time	Rationale for Action Level
E. coli	1 MPN/100 ml	> 800 MPN/100 mls	6 hours	A value greater than 800 MPN/100 mls indicates a significant source of bacteria that is worth investigating.
Potassium	0.5 mg/L	> 5 mg/L	6 months	Stormwater and in-stream sampling data history show potassium levels ranging 0.5-2.5 mg/L. Wastewater and industrial levels range 5-150 mg/L. Action level at 5 mg/L allows for slight variance above normal but is low enough to detect a possible illicit discharge. (Potassium helps to determine potential industrial or commercial liquid wastes.)
Sodium	0.25 mg/L	> 15 mg/L	6 months	Stormwater and in-stream sampling data history show sodium levels ranging 1.5-4.0 mg/L. Wastewater and industrial levels range 20-6000 mg/L. Action level at 15 mg/L allows for slight variance above normal but is low enough to detect possible illicit discharge. ( <i>Sodium helps to further identify a potential industrial or commercial liquid waste discharge</i> )

### 8.0 Documentation and Reporting

The results of all priority MS4 dry weather screening activities are saved in a geodatabase. At the conclusion of each dry weather outfall inspection season, a report of findings will be produced. These findings will be summarized in the MS4 Annual Report, along with additional IDDE Program information and reporting.

**Attachment 5: Erosion Control Escalating Enforcement  
Procedures Memo**



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# Technical Memorandum

# FINAL

Prepared for: City of Salem

Project Title: City of Salem Code Review

Project No.: 180289

## Technical Memorandum

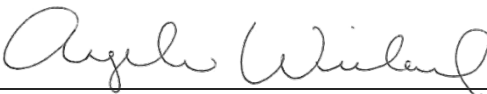
Subject: Gap Analysis and Performance Standard Analysis Results for  
Design Standards Review (Phases 002 and 003)

Date: September 12, 2023

To: Heather Dimke, Management Analyst

From: Angela Wieland, P.E., Project Manager and  
Jessica Christofferson, Sr. Water Resources Engineer

Copy to: Robert Chandler, Ph.D, P.E., City of Salem, Asst. Public Works Director

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### Limitations:

*This document was prepared solely for City of Salem in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Salem and Brown and Caldwell dated April 11, 2023. This document is governed by the specific scope of work authorized by City of Salem; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Albany and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.*

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## List of Abbreviations

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ACWA	Association of Clean Water Agencies
BC	Brown and Caldwell
BMP	Best Management Practices
Chapter	Ch.
City	City of Salem
Construction	Permit Schedule A.3.d Construction Site Runoff Control
DEQ	Oregon Department of Environmental Quality
Design Standards Administrative Rules	Design Standards
EPSC	Erosion Prevention and Sediment Control
ESCP	Erosion and Sediment Control Plans
Div.	Division
ESCP	Erosion Prevention and Sediment Control Plan
FC	Flow Control
GI	Green Infrastructure
GSI	Green Stormwater Infrastructure
in/hr	inches/hour
LID	Low Impact Development
MCM	Minimum Control Measures
MEF	Maximum Extent Feasible
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NSRR	Numeric Stormwater Retention Requirement
O&M	Operation and Maintenance
NPDES MS4 Permit	NPDES MS4 Phase I General Permit
Post-construction	Permit Schedule A.3.e Post Construction Site Runoff for New Development and Redevelopment
RG	Raingarden
ROW	Right-of-Way
SF	square feet
SFD	Single-Family Development
SFR	Single-Family Residential
SOPs	Standard Operating Procedures
SRC	Salem Revised Code
SWMP	Stormwater Management Plan Program
Tc	Time of Concentration
TM	Technical Memorandum
TSS	Total Suspended Solids
WQ	Water Quality



## Executive Summary

This Technical Memorandum (TM) summarizes the work completed under Task 2 (Regulatory Review and Gap Analysis) and Task 3 (Performance Standards for Stormwater Facilities), to support future updates to the City of Salem's (City's) Salem Revised Code (SRC) and the Administrative Rules-Design Standards (dated January 2014, referred to as Design Standards hereafter).

The City was issued their National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase I Permit (NPDES MS4 Permit) on October 1, 2021. The City is required to update construction and post-construction-related code and standards, if necessary, for compliance with the NPDES MS4 Permit by November 1, 2024.

In addition, the City is required to document their strategy for using Low Impact Development (LID) and Green Infrastructure (GI) to minimize effective impervious area and reduce the volume and pollutant discharge of stormwater from new and redevelopment projects by November 1, 2023.

Efforts completed and documented as part of this TM include the results of the gap analysis comparing the SRC and Design Standards against the City's NPDES MS4 Permit requirements for *Construction Site Runoff Control* (construction) outlined in Schedule A.3.d and for *Post-Construction Site Runoff for New Development and Redevelopment* (post-construction) outlined in NPDES MS4 Permit Schedule A.3.e.

**Section 1** provides a short introduction and background on the Salem Stormwater Standards Update project.

**Section 2** provides an overview of the City's Design Standards, SRC and SOPs that were reviewed to inform the gap analysis, and the resulting recommendations and conclusions in this TM.

**Section 3** includes a summary of the relevant NPDES MS4 Permit requirements, including discussion of post-construction performance standards in additional detail, and a summary of a regional comparison to the performance standards. Review of the SRC and Design Standards indicate that, while Salem currently emphasizes low impact development approaches and green infrastructure, updates to the City's existing standards will be required to meet selected portions of the NPDES MS4 Permit requirements.

**Section 4** summarizes results of the construction and post-construction gap analysis including general recommendations for updates to the City's SRC and Design Standards, and other related considerations.

**Section 5** details conclusions and recommendations, including those related to establishing an NSRR, and establishing technical infeasibility criteria related to infiltration. In addition, other conclusions and recommendations on reorganization, thresholds, and definitions are provided. Recommendations and conclusions are summarized below:

- Establish a Numeric Stormwater Retention Requirement (NSRR). As written, it appears the City does implement an NSRR, although it is not explicit in the Design Standards (i.e., upfront under Section 4.1- Introduction or Section 4.2- General Design) or directly implemented for development applications submitted for approval. It is recommended that the City refine their Design Standards to more explicitly reflect an NSRR that is associated with a goal to retain and/or infiltrate the such as the water quality design storm using Green Stormwater Infrastructure (GSI) to the Maximum Extent Feasible (MEF).
- Establish updated Technical Infeasibility Criteria related to the use of infiltration.
- Update project threshold requirements to adhere to the new NPDES MS4 Permit requirement for large project thresholds.
- Refine the organization of the Design Standards, *Div. 400, Section 4.2 General Design Requirements* to support improved interpretation and implementation of standards.

- Refine definitions to ensure consistency between the NPDES MS4 Permit, SRC, and Design Standards. BC conducted an initial review and prepared a definitions summary that compared definitions in Salem’s Phase I Permit, SRC 70.005, 75.0202, 82.005 and Design Standards *Ch. 109-001*.
- Review Appendix 4E to confirm whether infiltration-based limitations may be specified instead of relying on the more discretionary approach for achieving MEF (Appendix 4E, Section 4E.7).

**Section 6** summarizes potential policy questions by technical topics to be discussed at the upcoming project workshops. The technical topics include thresholds, NSRR Site Performance and Treatment Standards, technical infeasibility criteria, practical/financial infeasibility criteria, stormwater facility design, operations and maintenance, and definitions.





## Section 1: Introduction and Background

This TM provides background information to inform the decisions and processes for updating the SRC and Design Standards by November 1, 2024.

Brown and Caldwell (BC) conducted a detailed review (gap analysis) of the City’s current stormwater-related construction and post-construction code, standards, and standard operating procedures (SOPs) with respect to the NPDES MS4 Permit requirements, identifying gaps and recommendations for updates.

Compliance with the post-construction NPDES MS4 Permit *Schedule A.3.e.iii* requirements necessitate identification of a preferred “performance standard” specific to the retention and treatment of stormwater runoff. Compliance with the construction NPDES MS4 Permit *Schedule A.3.d* necessitates minimal updates to the City’s current construction related code, standards, and SOPs.

BC met with City staff and outside development review (consultant) staff to understand current challenges and feedback from the development community with regards to implementation of the City’s standards, with the desire that any updates to code and standards will improve or address those challenges.

Based on the selected approach to address gaps and the “performance standard,” recommendations for future internal policy discussions and supporting technical evaluations are identified. These policy and technical topics will inform decision making needs and future stakeholder outreach and will also be discussed during internal project workshops. The overall approach to addressing gaps and updating standards also informs the larger LID/GI Strategy documentation (due November 1, 2023).

This TM is organized as follows:

- **Section 2** provides an overview of the City’s Design Standards, SRC, and SOPs.
- **Section 3** includes a summary of the relevant NPDES MS4 Permit requirements, including discussion of post-construction performance standards in additional detail and a summary of a regional comparison to the performance standards approach.
- **Section 4** summarizes results of the construction and post-construction gap analysis including general recommendations for updates to the City’s SRC and Design Standards.
- **Section 5** details conclusions and recommendations, including on establishing an NSRR, establishing technical infeasibility criteria related to infiltration. In addition, other conclusions and recommendations on reorganization, thresholds, and definitions.
- **Section 6** summarizes potential policy needs and discussion topics for the upcoming project workshops.

## Section 2: Summary of City's Existing Standards

The City's post-construction stormwater design requirements are primarily detailed in their Design Standards, *Ch. 109, Div. 400* and codified in SRC *Ch. 71*. The City's construction-related requirements are primarily detailed in SRC *Ch. 75* and Design Standards, *Ch. 109, Div. 700*. SRC *Ch. 75* provides the City with the legal authority to enforce erosion prevention and sediment control on construction sites.

The Design Standards and SRC were adopted by City Council in November 2013 (documents dated January 2014) following a significant public outreach process and public hearing during which the local homebuilder's association recommended approval. More recent updates (2020) to SRC *Ch. 70 (70.005–Definitions)*, SRC *Ch. 71 (71.090–Requirements for Large Projects; 71.095–Flow Control Facilities)*, and SRC *601.070* were made under Ordinance 8-20. Comparable updates to the Design Standards to adhere to the 2020 SRC update have not been made yet.

The City's construction and post-construction programs are robust and include enforceable requirements (as detailed in the SRC and Design Standards), as well as procedural elements implemented through SOPs, internal checklists, and other guidance documentation. Relevant excerpts of the City's existing standards are detailed below, more specific to the codified requirements and update needs to the SRC and Design Standards, as opposed to programmatic and implementation-related needs.

### 2.1.1 Construction Requirements

In addition to the SRC and Design Standards, the City has several construction-related SOPs, checklists, and guidance and training documentation that help implement provisions of their program including:

- *City's Erosion Prevention and Sediment Control Technical Guidance Handbook*
- *City's Erosion Prevention and Sediment Control (EPSC) Plans for Small Development (2014)*
- *ACWA Construction Site Stormwater Guide: Illustrated BMPs (2013)*
- *Erosion Sediment Control Site Plan Review (Minimum Requirements for all Development Projects, except Single-Family/Duplex) (2013)*
- Provisions of the City's Project Management Manual (2013), specifically
  - *9.12 Erosion Control Plan Review Standard of Practice*
  - *10.13 Erosion Control Inspection Procedure Standard of Practice*
  - *10.14 Erosion Control Enforcement Standard of Practice*

The City requires erosion control permits for projects that are 1,000 square feet (SF) of ground disturbance but includes exemptions (listed in SRC *75.050*) for home gardening and projects with less than 25 cubic yards of impact. City erosion control permits are not currently required for sites that also require a 1200-CA permit. The Design Standards govern all construction and other land disturbing activities within the City of Salem in accordance with the administrative authority granted in the SRC. The Design Standards, with demonstrative authority granted by the SRC, applies to both publicly and privately owned lands and projects within the right-of-way.

The City requires an Erosion and Sediment Control Plan (ESCP) to be prepared that contains methods and interim facilities to be constructed, used, operated, and maintained during ground disturbing activities to prevent and to control erosion. The City's ESCP Checklist may be used during ESCP development to ensure compliance with the City's SRC and Design Standards.

The City requires erosion prevention and sediment control measures to be inspected and approved prior to the start of any ground disturbing activities including preliminary grading work. The City may require inspections during construction at other times, as deemed necessary or specific in the erosion control permit. The City's *10.13 Erosion Control SOP* details out the construction inspection requirements.



## 2.1.2 Post-Construction Requirements for Infiltration, Water Quality and Flow Control

The City's Design Standards (2013) were developed specific to the previous (2011) NPDES MS4 Permit conditions, which required:

- 1) *the incorporation of site-specific management practices to target natural surface or predevelopment hydrologic functions as much as practicable;*
- 2) *reduce site specific post-development stormwater runoff volume, duration, and rates of discharges to the MS4;*
- 3) *prioritize and include implementation of LID, GI or equivalent approaches; and*
- 4) *capture and treat 80% of the average annual runoff volume, based on documented local or regional rainfall frequencies and intensity.*

### 2.1.2.1 Post-Construction Thresholds

Div. 400, Section 4.2(a) of the Design Standards requires an initial identification of project type, impervious area threshold, and point of discharge to inform the requirements for facility selection and design. Unique from other NPDES MS4 Phase I permitted communities in Oregon, Salem's Design Standards contain two impervious area thresholds triggering post-construction stormwater treatment and flow control requirements based on three project-specific development types— Single-Family Residential (SFR), Small Project (non-SFR) and Large Project:

- **SFD (total impervious surface is 1,300 to 10,000 SF).** Shall be designed and constructed with GSI to the MEF except where flow control facilities and treatment facilities have already been constructed per SRC Ch. 71 to serve the lot or parcel.
- **Small Project, Non-SFR (less than 10,000 SF of new or replaced impervious surface).** SRC does not require non-SFR projects consisting of less than 10,000 SF of new or replaced impervious surface to provide stormwater flow control or general stormwater treatment.
- **Large Projects (new or replaced impervious surface greater than 10,000 SF).** Large projects are required to provide both flow control and treatment facilities using GSI to the MEF and conforming to the City's Design Standards. This includes all projects with 10,000 SF or more of ground disturbing activities. To fully meet the requirements for large projects, both treatment and flow control facilities must meet the standards for GSI to the MEF.

Establishment of the thresholds was based on a City-conducted analysis of development applications (both SFR and other development) and determination of an impervious area threshold that would result in management of 90 percent of the cumulative impervious area to be added or replaced during the 2013 Design Standards update.

There are additional requirements that apply to all projects, regardless of size such as those related to source control, discharge to wetlands, preserving trees, and providing landscaping. Projects that are adjacent to an existing open channel waterway or within the 100-year floodplain of any waterway must meet the requirements of SRC Ch. 140 (now SRC Ch. 601).

### 2.1.2.2 Post-Construction Requirements for Infiltration, Water Quality and Flow Control

The prioritization of stormwater interception, infiltration, and evapotranspiration is included in the upfront objectives of the Design Standards, and all projects triggering stormwater standards are required to implement GSI to the MEF. GSI is defined as *stormwater facilities that mimic natural surface hydrologic functions through infiltration or evapotranspiration, or that involve stormwater reuse* (SRC Ch. 71.005(7)). Thus, a GSI facility is a facility with retention functionality. Examples of GSI facilities as provided in Design Standards include permeable pavement, stormwater planters, raingardens, and vegetated filter strips.

Two facility sizing methodologies (simple and engineered) are defined in Design Standards *Div. 400, Ch. 4.2(n)*. Each methodology accounts for the sizing of water quality and flow control facilities and incorporates infiltration into the design. Facility-specific design criteria for GSI establish a minimum infiltration rate of 0.5 inches per hour (in/hr) as requiring infiltration facilities; less than 0.5 in/hr warrants design as a partial infiltration facility. A rainfall analysis using local rainfall data was conducted in 2010 and identified a water quality design storm reflective of 80 percent of the average annual runoff volume as 1.38 inches over a 24-hour period.

The current flow control standards are based on a peak flow matching standard and numeric criteria designed to satisfy the 2011 NPDES MS4 Permit's requirement to *"incorporate site-specific management practices to mimic natural surface or predevelopment hydrologic functions as much as practicable."* This is achieved by:

1. Establishing pre-development runoff conditions as reflective of a grassland and woods per established curve numbers in Design Standards *Div. 400, Appendix 4D, Table 4D-6 "City of Salem Predevelopment"*, and,
2. Requiring peak flow matching (pre-development to post-development) for half of the 2-, 10<sup>-1</sup>, 24-hour design storm event (SRC *Ch. 71.095(c)*).

Figure 2-1 summarizes the City's Design Standards by development category.

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<sup>1</sup> Flow control is also required for the 25- and 100-year, 24-hour storm events, but not required for water quality purposes.

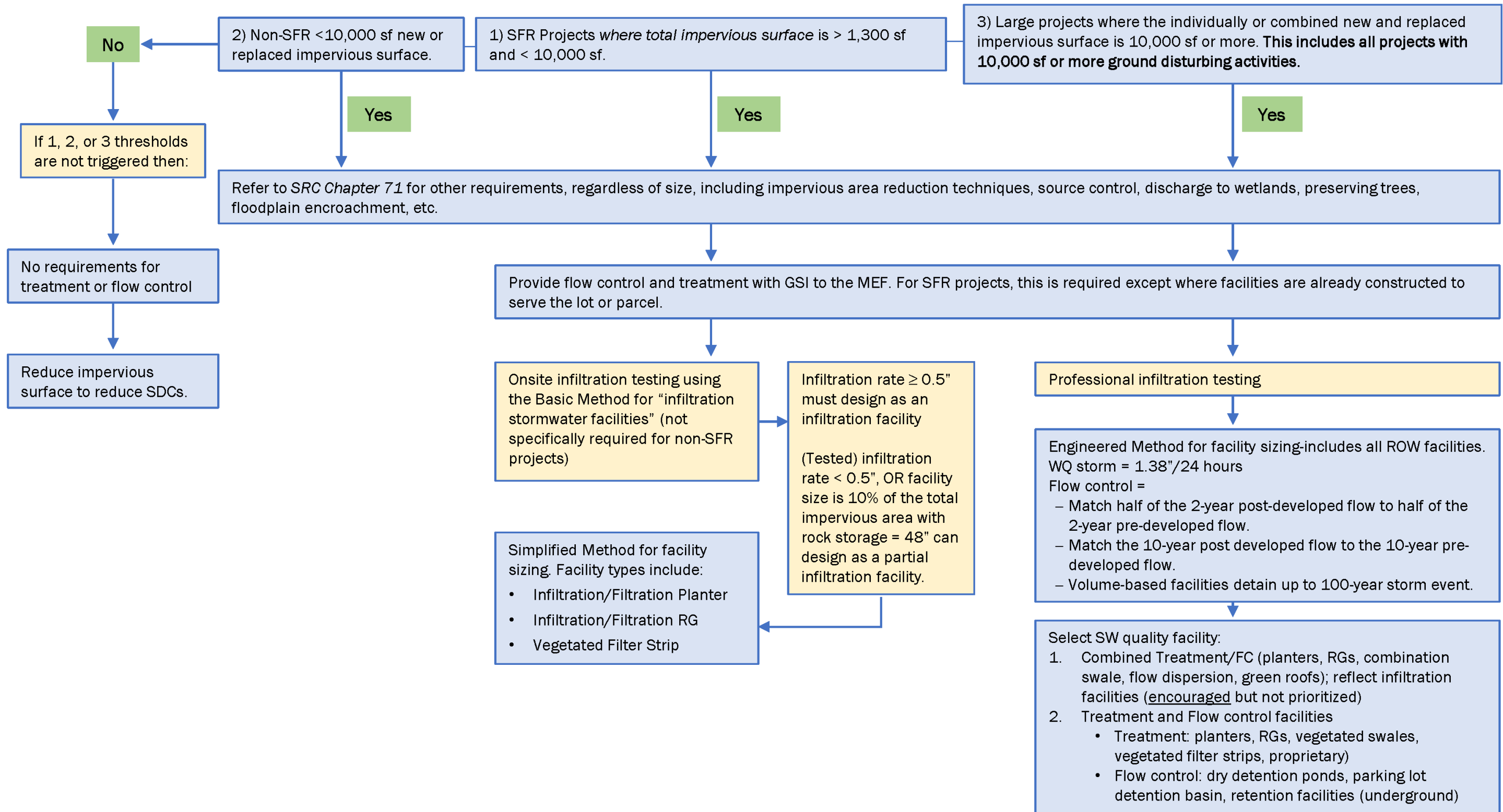


Figure 2-1. City Design Standards Overview

## 2.2 Implementation Challenges and Clarification Needs

Ongoing implementation of the standards have resulted in the identification of areas in the Design Standards that need clarification and technical updates.

BC met with the City and OTAK (*City's outside development review consultant*) in June 2023 to review current policy and technical challenges associated with implementation of Design Standards. Policy-related challenges and clarification needs to be addressed/resolved through the larger updates to the SRC and Design Standards are summarized below and distinguished based on whether the need has an associated NPDES MS4 Permit driver<sup>2</sup>. Other topics that are not NPDES MS4 Permit-related can be found in the separate transmittal spreadsheet sent to the City.

- Clarify wording associated with pavement maintenance exemption.
- Clarify that impervious area reduction techniques are intended to reduce impervious area subject to treatment and/or flow control in a facility and do not reduce the project's total impervious area to avoid triggering stormwater standards. Clarify whether pervious pavement is an allowable impervious area reduction technique.
- Specify requirements for estimating the seasonally high groundwater level, as it impacts infiltration feasibility.
- Provide recommendations or guidelines regarding the use of stormwater proprietary treatment systems and following manufacturer sizing requirements. The Permit requires documentation of model number, manufacturer identifiers and schedules for replacement for proprietary systems if used.
- Update the definition of "impervious area" to include gravel, as it impacts NPDES MS4 Permit threshold triggers.
- Require a factor of safety to be applied to measured infiltration rates for use in design calculations to account for potential clogging and lapses in maintenance that may occur.
- Clarify the definition of "ground disturbing activity" and add a definition for "large projects" to the SRC and Design Standards, as it impacts NPDES MS4 Permit threshold triggers.
- Specify when and on what type of projects infiltration testing is required to ensure consistency among development projects. The City and OTAK currently have a difficult time enforcing the required infiltration testing in conjunction with current land use approval processes (i.e., pre-application and selection of the anticipated stormwater management approach) and SRC and Design Standards Language<sup>3</sup>.
- Clarify the pre-development conditions' allowable flow rate and how it should be calculated based on the predeveloped Time of Concentration (Tc). Clarify acceptable shallow concentrated flow conditions for the pre-developed condition.
- Clarify how pervious areas factor into facility sizing. Identify what are pollution generating and non-pollution generation surfaces and provide definitions.
- Identify how and when a private facility becomes a public facility.
- Clarify the downstream submittal process. Define the point of discharge.

Additional, technical-related adjustments are currently being reviewed by City staff for confirmation of need.

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<sup>2</sup> OTAK's complete list was reviewed by BC and sent to the City in a separate transmittal in July 2023. Not all the challenges are clarifications needed for NPDES MS4 Permit compliance.

<sup>3</sup> The Design Standards have Infiltration Testing Requirements in Chapter 109, Division 004, Appendix C. The City's Development Services Operations Manager is currently exploring options to adjust the land use review process and associated submittal information at the pre-application stage.

## Section 3: NPDES MS4 Permit Requirements

Under the City's 2021 NPDES MS4 Permit, the City must develop and execute programs to minimize stormwater pollution under the following category of program control measures:

- Public Education and Outreach (Schedule A.3.a)
- Public Involvement and Participation (Schedule A.3.b)
- Illicit Discharge Detection and Elimination (Schedule A.3.c)
- Construction Site Runoff Control (Schedule A.3.d)
- Post-Construction Site Runoff Control (Schedule A.3.e)
- Pollution Prevention and Good Housekeeping for Municipal Operations (Schedule A.3.f)
- Industrial and Commercial Facilities (Schedule A.3.g)
- Infrastructure Retrofit and Hydromodification Assessment Update (Schedule A.3.h)

In 2022, the City completed updates to their Stormwater Management Plan Program Document (SWMP)<sup>4</sup> that reflects initial construction and post-construction-related modifications to the SRC and Design Standards, including clarification around peak flow matching standards (for flow control to address water quality) and implementation of when infiltration testing is required, including more discrete requirements related to infiltration feasibility.

Detailed explanation of the 2021 NPDES MS4 Permit requirements and associated City best management practices for addressing construction and post-construction requirements are outlined in the 2022 SWMP Sections 3.1 and 3.2.

### 3.1 Construction Overview

Construction requirements per the 2021 NPDES MS4 Permit include implementation of ordinances and other regulatory mechanisms specific to construction area thresholds and enforcement practices; submittal of Erosion Prevention and Sediment Control Plans (ESCP) and plan review activities; and implementation of construction inspections to ensure compliance.

Relevant excerpts from the City's NPDES MS4 Permit are detailed below, and critical elements are underlined. Critical elements are those specific to the content of this TM and identification of update needs to the SRC and Design Standards, as opposed to programmatic and implementation-related needs.

Schedule A.3.d.i of the NPDES MS4 Permit is related to ordinance and other regulatory mechanisms and states that the Permittee must:

*...require construction site operators to complete and implement an Erosion and Sediment Control Plan (ESCP) for construction project sites that results in a minimum land disturbance of 1,000 square feet:*

Schedule A.3.d.ii of the NPDES MS4 Permit states that the ESCP must:

*...maintain written specifications that address the proper installation and maintenance of erosion and sediment controls during all phases of construction activity occurring their cover area. The written specifications must include an ESCP template, worksheet, checklist, or similar document for*

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<sup>4</sup> The 2022 SWMP can be found on the City's Stormwater webpage: [637989335050870000 \(cityofsalem.net\)](https://www.cityofsalem.net/637989335050870000)

*construction site operators to document how erosion, sediment, and waste materials management controls for non-stormwater wastes will be implemented and maintained at the project site.*

Schedule A.3.d.iii of the NPDES MS4 Permit states that the Permittee must continue to implement procedures:

*...to review Erosion and Sediment Control Plans from construction projects that will result in land disturbance of equal to or greater than 1,000 square feet using a checklist or similar document to determine compliance...review procedures must include consideration of the construction activities' potential water quality impacts and remain in accordance with applicable state and local public notice requirements.*

Schedule A.3.d.iv of the NPDES MS4 Permit states that the Permittee must continue to perform inspections of construction sites to ensure:

*...the approved ESCP or other documented set of control is properly implemented.*

Schedule A.3.d.v of the NPDES MS4 Permit states that the Permittee must:

*...continue to implement and maintain written escalating enforcement and response procedures for all qualifying construction sites and summarize or reference in the SWMP Document. The procedure must address repeat violations through progressively stricter responses, as needed, to achieve compliance. The escalating enforcement and response procedure must describe how the permittee will use enforcement techniques to ensure compliance. The enforcement procedures must include timelines for compliance and when formulating response procedures and penalties should consider factors (or multipliers) such as the type and severity of pollutant discharge, and whether the discharge was intentional or accidental.*

Figure 3-1 presents a flow chart illustrating the 2021 NPDES MS4 Permit requirements for construction.



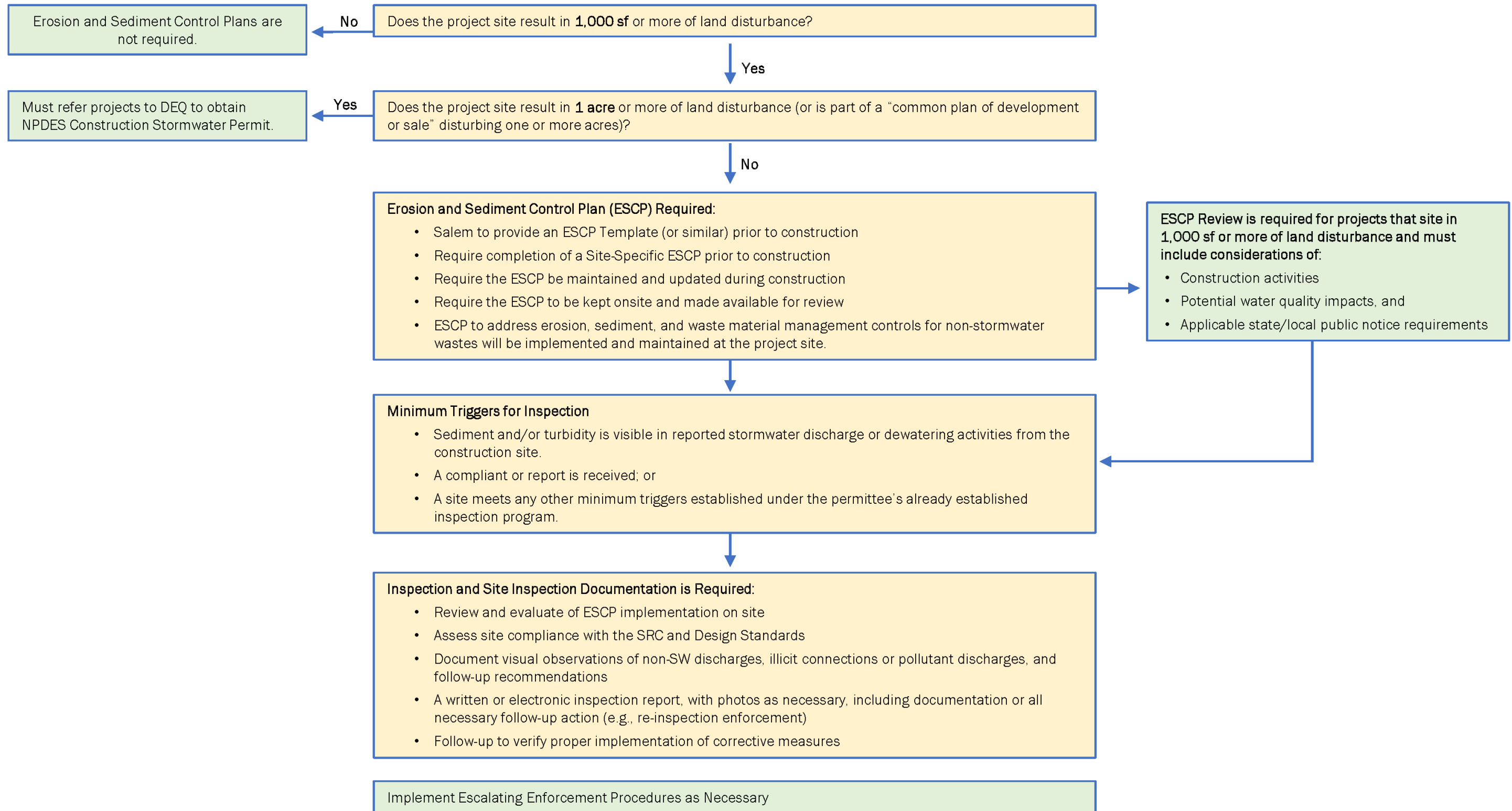


Figure 3-1. NPDES MS4 Permit Requirements for Construction

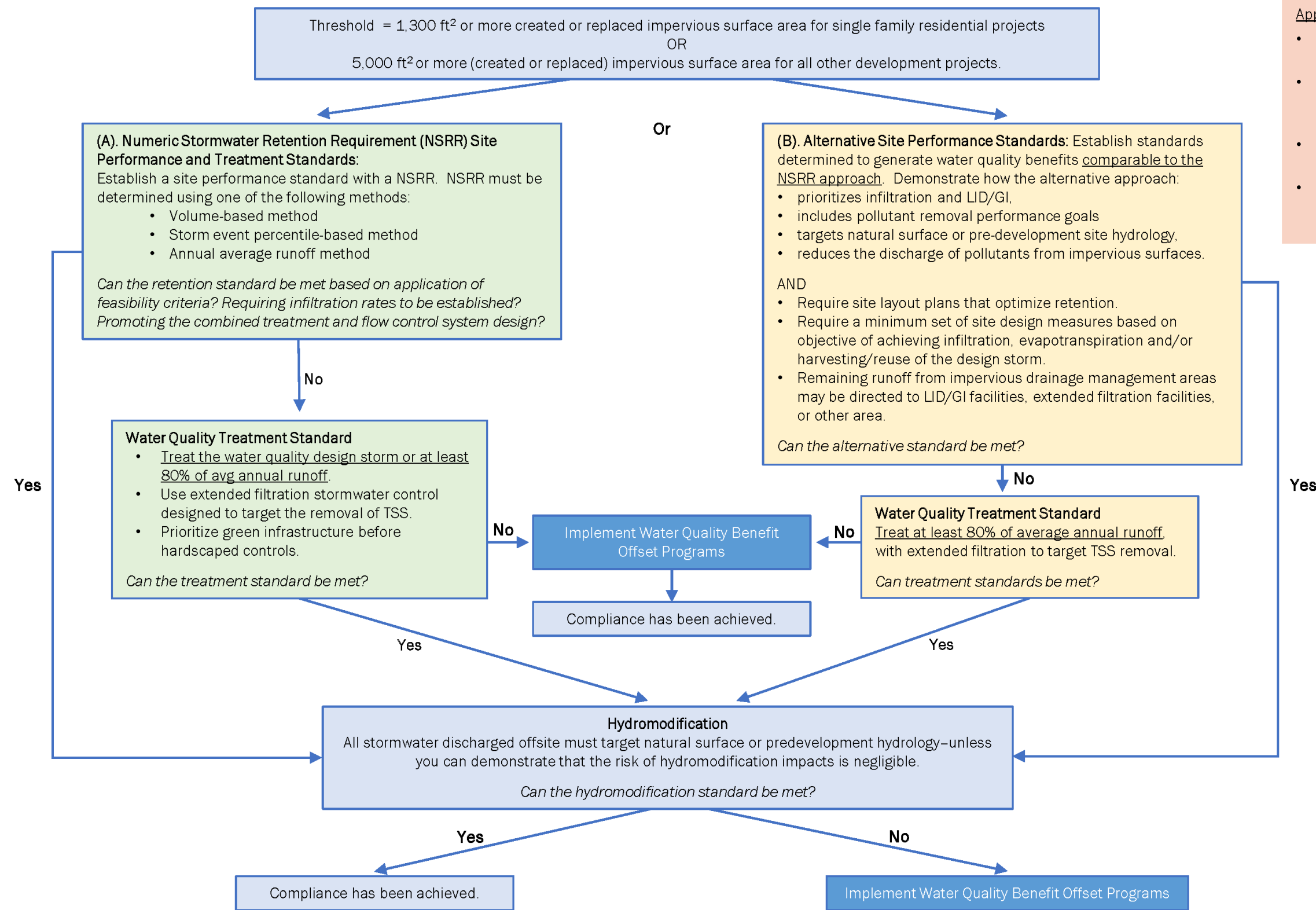
### 3.2 Post-Construction Overview

Post-construction requirements per the City’s 2021 NPDES MS4 Permit include requirements to implement an ordinance and/or other regulatory mechanism (i.e., the SRC and Design Standards); prioritize LID and GI; establish a site performance standard for retention and treatment; maintain requirements for a water quality benefit offset programs; conduct post-construction site runoff plan review, long-term operation and maintenance, training and education, and tracking and assessment.

Like the 2011 NPDES MS4 Permit, any stormwater discharged offsite from new/replaced impervious surface must target natural surface or redevelopment hydrology (in terms of rate, duration, and volume) to minimize the potential for hydromodification impacts. However, unique to the 2021 NPDES MS4 Permit, there is a specific requirement to use structural stormwater controls that retain stormwater onsite to minimize offsite discharge and those stormwater controls should infiltrate and facilitate evapotranspiration.

The most substantive changes reflected in the City’s 2021 NPDES MS4 Permit as compared to the 2011 NPDES MS4 Permit are: specific impervious thresholds (regulating when stormwater standards apply), additional definition related to the prioritization of LID and GI, and Post-Construction Stormwater Management Requirements specific to defined performance standards (including a numeric stormwater retention requirement or NSRR), and detention without infiltration and/or filtration is not allowed as a water quality treatment facility. These specific requirements and relevant excerpts of the City’s NPDES MS4 Permit are detailed below. Critical elements specific to the content of this TM and identification of update needs to enforceable regulatory elements (i.e., the SRC and Design Standards), as opposed to programmatic and implementation-related needs are underlined.

A flow chart illustrating the NPDES MS4 Permit requirements for post-construction is provided as Figure 3-2.



Applies to all projects:

- Require LID and GI design, planning, and engineering to the MEF.
- Prioritize onsite retention, infiltration, and evapotranspiration and the option of reuse where feasible.
- Require extended filtration where LID/GI is not feasible.
- Use of treatment trains should be encouraged where appropriate for treating stormwater runoff.

Figure 3-2. NPDES MS4 Permit Requirements for Post-Construction

### 3.2.1 Impervious Threshold

Schedule A.3.e.i of the NPDES MS4 Permit states that the Permittee must:

*...require the following for project sites discharging stormwater to the MS4 that create or replace 1,300 square feet or more of impervious surface area for single family residential projects or 5,000 square feet or more of impervious surface area for all other development projects:*

- A. *The use of structural stormwater controls at all qualifying sites.*
- B. *A site-specific stormwater management approach that targets natural surface or predevelopment hydrological function through the installation and long-term operation and maintenance of structural stormwater controls.*
- C. *Long-term operation and maintenance of stormwater control at project sites that are under the ownership of a private entity.*

This change affects the City's current definition of a Large Project and has the potential to affect the number of development applications submitted to the City for review in conjunction with their Design Standards. Because this upper range of the thresholds is also used to differentiate SFR projects in the City's Design Standards, it has the potential to impact the type of design method (use of the simplified method versus engineered) that can be employed by the development community.

### 3.2.2 Prioritization of LID and GI

Schedule A.3.e.ii of the NPDES MS4 Permit states that the Permittee must:

*...review and update, or develop and begin implementation of a strategy to require to the maximum extent feasible, the use of LID/GI design, planning, and engineering strategies intended to minimize effective impervious area or surfaces, and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects...the permittee must review ordinance and development code for opportunities to reduce the volume of discharge by design, engineering, and planning methods that prioritize onsite retention, infiltration, and evapotranspiration and the option of reuse where feasible in order to make LID/ GI the preferred and commonly used approach to site development...*

The City's current Design Standards incorporate GSI stormwater facilities that meet the 2021 NPDES MS4 Permit definition of LID/GI. However, LID-related site planning approaches also fit within this requirement, and this change may affect how the City requires their site assessment efforts (including where and when to conduct infiltration testing). The City will prepare an LID/GI Strategy document by November 1, 2023, and the findings will be reflected in the updates to the SRC and Design Standards.

### 3.2.3 Performance Standards

One of the biggest changes to the 2021 NPDES MS4 Permit is the requirement to establish a site performance standard based either on an NSRR or specific alternative site performance standards. Although defined as two separate performance standards, both approaches encourage a retention first approach to stormwater control design.

Schedule A.3.e.iii(A) of the NPDES MS4 Permit is related to the NSRR performance standard and states that the Permittee must:

*...the permittee must establish a site performance standard with a Numeric Stormwater Retention Requirement (NSRR) that retains stormwater onsite and minimizes the offsite discharge of pollutants in runoff by utilizing stormwater controls that infiltrate and facilitate evapotranspiration.*

*The NSRR volume must be determined using one of the following methods: 1) volume based method; 2) storm event percentile method; 3) average annual runoff based method.... The NSRR is met when the NSRR runoff volume from new and/or replaced impervious surface is managed by structural stormwater controls with sufficient capacity.... The first priority of this option is onsite retention but at sites where the NSRR cannot be met due to technical infeasibility or site constraints (including zoning or land use regulations) the permittee must require treatment of the runoff volume up to a specified water quality design storm.*

Schedule A.3.e.iii(B) of the NPDES MS4 Permit is related to the alternative compliance performance standard and states that the Permittee must:

*...the permittee may establish design requirements including site performance standards determined to generate water quality benefits comparable to the NSRR approach for new development and redevelopment.... Such local requirements and thresholds shall provide equal or similar protection of receiving waters and equal or similar levels of treatment as the NSRR approach.*

*The permittee must demonstrate how alternative compliance approaches prioritize infiltration and LID/ GI, include pollutant removal performance goals, target natural surface or pre-development site hydrology and reduce the discharge of pollutants from new and/or redevelopment..*

*The Permittee shall set requirements for site layout plans and a minimum site of specific onsite stormwater controls based on a GI approach of emphasizing infiltration, evapotranspiration and/or harvesting/ reuse of stormwater. Site design measures shall be used to reduce the amount of runoff, comparable to the NSRR, and to the extent technically feasible and not prohibited by other constraints...*

Both site performance standards essentially require establishment of a retention-based standard and promote the use of infiltration to manage a specified volume or storm event. However, the alternative performance standard requires the permittee to demonstrate their standards are comparable to having an NSRR.

As background, the alternative performance standard was a focus during negotiations of the current NPDES MS4 Permit. The language associated with the alternative performance standard was developed in consideration of those jurisdictions who, in accordance with requirements of the 2011 NPDES MS4 Permit, had established a peak flow and flow duration-based standard (and tool) to address hydromodification impacts. Instead of requiring a specific infiltration or retention volume/design storm, these jurisdictions require use of a separate tool based on continuous simulation to directly match post-development peak flows and the duration of those flows to pre-development (historic) conditions. By nature, this standard requires infiltration or retention-based stormwater facilities to achieve that goal, but a specific amount or reduction was not assumed given the variation in pre-development conditions by site.

Research into performance standards used by select Phase I and II communities were documented for comparative purposes. Some of the agencies reviewed are currently updating their standards to reflect the new performance standards requirements and so the currently pending approach is listed. Because there is

much correlation between the two performance standards, some jurisdictions could potentially be meeting either performance standard.

Table 3-1 provides an overview of the performance standard comparison. A detailed description of the comparison is included in Attachment A.

Table 3-1. Performance Standards for Stormwater Facilities Comparison of Other Local Jurisdictions Summary			
Jurisdiction	NPDES MS4 Permit and Post-Construction Standards Update Compliance Date	Performance Standard A: NSRR Standard (NSRR Design Storm)	Performance Standard B: Alternative Compliance Standard
City of Albany	Phase II General Permit February 28, 2024	Pending (WQ) <sup>5</sup>	Not Applicable (N/A)
City of Corvallis	Phase II General Permit February 28, 2024	Pending (WQ)	N/A
City of Eugene	Phase II Individual Permit December 1, 2024	Pending (To be determined)	N/A
City of Gresham	Phase I Gresham Group Permit November 1, 2024	Yes (WQ and 10-year)	N/A
Marion County	Phase II General Permit February 28, 2023	Yes (WQ)	N/A
City of Portland	Phase II Portland Group Permit November 1, 2024	Yes (TBD)	N/A
City of Oregon City	Phase I Clackamas County (CC) Group Permit December 1, 2024	Yes (10-year)	Yes (flow duration matching standard with BMP Sizing Tool)
City of Wilsonville	Phase I CC Group Permit December 1, 2024	Yes (10-year)	Yes (flow duration matching standard with BMP Sizing Tool)
Water Environment Services (WES)	Phase I CC Group Permit December 1, 2024	Yes (10-year)	Yes (flow duration matching standard)

### 3.2.4 Additional Requirements

Additional requirements related to site plan review and operations and maintenance are detailed below.

Schedule A.3.e.v of the NPDES MS4 Permit states that the Permittee must:

*...have documented, standardized procedures for the review and approval of structural stormwater control plans for new development and redevelopment projects, and procedures must be detailed or referenced in the SWMP Document.*

*...the Permittee must review and approve or disapprove plans for structural stormwater controls at new development and redevelopment sites that result from the creation or replacement of impervious area equal to or greater than 1,300 square feet for single family residential projects or 5,000 square feet for all other development projects; and site that use alternative compliance to meet the retention requirement...*

<sup>5</sup> WQ stands for the Water Quality Design Storm.

*...the Permittee must require and subsequently review and approve or disapprove the written technical justification to evaluate any technical infeasibility or site constraints which prevent the onsite management of the runoff amount stipulated in the NSRR or the site's ability to meet the alternative site performance standard.*

Schedule A.3.e.vi of the NPDES MS4 Permit states that the Permittee must:

*...continue to maintain an inventory and implement a strategy to ensure that all public and private stormwater controls that discharge to the MS4 are operated and maintained to the maximum extent practicable.*

The Permit requires site runoff plans are reviewed for technical feasibility and to identify if technical infeasibility is properly justified. The City has a robust plan review process that meets the NPDES MS4 Permit requirements. As the project thresholds are updated to meet Permit requirements, it may have an impact on the total number of required stormwater reviews.

The City's O&M requirements can be found in multiple places in the Design Standards. Maintenance protocols and documentation will be discussed during the project workshops.

## Section 4: NPDES MS4 Permit Gap Analysis

BC reviewed the City's SRC and Design Standards with respect to the construction and post-construction requirements from the 2021 NPDES MS4 Permit and documented results in a formal permit gap analysis. The following sections of the City's SRC and Design Standards were reviewed and documented:

- SRC Ch. 70 Utilities
- SRC Ch. 71 Stormwater
- SRC Ch. 75 Erosion Prevention and Sediment Control
- SRC Ch. 82 Clearing and Grading of Land
- Design Standards Ch. 109, Div. 004 Stormwater System
- Design Standards Ch. 109, Div. 007 Erosion and Sediment Control Plan
- Design Standards Ch. 109, Div. 011 Operations and Maintenance of Stormwater Facilities
- Design Standards Ch. 109, Div. 012 Stormwater Source Controls
- Design Standards Ch. 109, Div. 100 Public Works Enforcement of Public Works Regulations

In addition, the erosion control documents listed in Section 2.1.1 of the TM were reviewed and documented in the construction gap analysis. Results of the gap analysis for construction are detailed in Attachments B and C. Attachment C reflects a review of the specific construction site enforcement provisions. Results of the gap analysis for post-construction are detailed in Attachment D.

Gaps and recommendations are summarized below. This summary reflects direct reference to components of the City's Design Standards and permit requirements. Refer to Figures 2-1, 3-1, and 3-2 for a graphical summary of construction and post-construction requirements.

### 4.1 Construction

In general, the City's current SRC, Design Standards, and supporting documentation adheres to the requirements of the 2021 NPDES MS4 permit. There are a few items where the SRC or Design Standards could be updated to meet provisions of the permit more explicitly.

- **Gap:** The explicit threshold to trigger an applicant to document site-specific erosion and sediment controls for construction projects is not listed in Design Standards *Ch. 109, Div. 007, 7.1(d)*. Review/confirm the exemptions in the SRC 75.050 so all construction projects that result in land disturbance of equal to or greater than 1,000 SF document site specific erosion and sediment controls.  
**Recommendation:** Consider adding the 1,000 SF threshold to the Design Standards update so developers/other designers don't have to refer to the NPDES MS4 Permit to access threshold information. Consider updating the exemptions in SRC 75.050, if needed after a more detailed review.

In addition to the gaps and recommendations above, some further considerations were identified that can be addressed during the SRC and Design Standards Update. These considerations include:

- Consider updating the City's Plan Requirement Checklist to ensure consistency with the SRC/Design Standards and the Permit. Some considerations for updating the checklist include: 1) add a line to the checklist for the applicant to report the total ground disturbance area for the project; 2) add a note section at the end of the checklist to remind the developer that the ESPC Plan needs to always be kept onsite and written EPSC inspection logs need to be maintained onsite and available to City inspectors upon request.
- The 1200-CA permit cannot be obtained by a private entity, only authorized government entities. If the City holds a 1200-CA permit (or has obtained one), consider revising code language to remove the reference in SRC 75.050(d) that indicates applicants could obtain a 1200-CA permit.

The City's Construction Escalating Enforcement requirements were reviewed in detail (see Attachment C). Between the *10.14 Erosion Control Enforcement SOP, Administrative Rules Ch. 109, Div. 100-1 Enforcement of Public Works Regulations*, and SMC, *Section 75*, it appears that the City is following the Permit's escalating enforcement requirements.

## 4.2 Post-Construction

In general, the City's Design Standards and SRC will require select updates to adhere to requirements of the NPDES MS4 Permit. The large-project threshold will need to be adjusted (and associated implications of adjusting the impervious area threshold for large projects confirmed with City staff) and a performance standard will need to be established. There are a few items where the SRC or Design Standards could be updated to meet provisions of the NPDES MS4 Permit more explicitly as summarized below:

- **Gap:** The current 10,000 SF threshold for large projects/non-SFR projects to require flow control (for hydromodification) or treatment does not meet the 5,000 SF Permit requirement.
  - **Recommendation:** The Large Project threshold must be reduced to 5,000 SF or lower to meet the permit requirement.
  - **Recommendation:** The Design Standards reference to SFR development lists TOTAL impervious surface area as the threshold. This needs to be revised to be specific to new or replaced impervious surface in accordance with SRC Ch. 71.005.
  - **Recommendation:** Applicability of new and replaced impervious surface should be clarified in the Design Standards and a definition for both new impervious surface and replaced impervious surface should be added.
- **Gap:** Duplexes are not addressed under threshold descriptions.
  - **Recommendation:** Discuss duplexes in the threshold descriptions, as it seems from reading the SRC and Design Standards that duplexes have the same requirements as an SFR projects.



- **Gap:** The City does not explicitly identify their NSRR. The definition of GSI (infiltration facility) and requirement to use GSI to the MEF indicates infiltration (or retention) is prioritized. Design criteria associated with GSI facilities indicate sizing for infiltration of the water quality storm is required. Therefore, an NSRR appears to be established but the Design Standards do not document it as such.
  - **Recommendation:** As written, it appears the City does implement an NSRR, although it may not be explicit in the Design Standards or regulated with development applications submitted for approval. Establish a more explicit NSRR (design storm event is still to be determined but recommended to be the water quality storm) as further described in Section 5.1 of the TM.
  - **Recommendation:** Determine how the NSRR is used to inform GSI applications, and the process associated for applicants to meet GSI to the MEF.
  - **Recommendation:** Decide whether infiltration testing (or literature values) should be required to inform GSI applications and GSI facility sizing.
- **Gap:** Combined treatment and flow control facilities can be designed as infiltration or partial infiltration/filtration (treatment) systems, but it is unclear how GSI is prioritized if combined facilities are used. Infiltration must be prioritized first for the design of combined treatment and flow control facilities.
  - **Recommendation:** Clarify how combined treatment and flow control facilities utilizing GSI (infiltration-based facilities) are prioritized. Is infiltration testing always conducted for combined facilities?
- **Gap:** Appendix 4E appears to primarily only pertain to large projects; however, SFR projects are not covered in Appendix 4E.
  - **Recommendation:** Update Appendix 4E for clarity regarding SFR projects.
- **Gap:** Technical infeasibility criteria for infiltration are listed in Design Standards Section 4.3 and include slope stability concerns, sites with a high groundwater table, sites with contaminated soils and sites where physical limitations do not allow for a setback from a build foundation. The current standards are missing other considerations such as areas of shallow bedrock, areas with fill soils, erosion/landslide hazard areas, and proximity to drinking water wells.
  - **Recommendation:** Update Design Standards Section 4.3 to expand technical infeasibility criteria to include those readily identified during the site assessment and currently influence the use and application of GSI (see Section 5.2).
- **Gap:** The current standards do not specify pollutant removal performance goals as required by the permit beyond the volume-based requirement to treat 80 percent of the average annual runoff.
  - **Recommendation:** The City will need to document how their program meets overall pollutant removal performance goals of retention and treatment.
- **Gap:** It is not clear from the SRC or Design Standards that SFR projects must submit a stormwater submittal or not. The use of “may be used” does not specify that they must use either the Simplified or Engineered Method.
  - **Recommendation:** Update the language from “may be used” to something more definitive about the required use of the Simplified or Engineered Method for SFR projects.
- **Gap:** Tracking mechanisms for documenting enforcement actions and compliance was not identified.
  - **Recommendation:** Develop a tracking mechanism for documenting enforcement actions and compliance actions as required by the permit. This is a procedural activity.

## Section 5: Conclusions and Recommendations

Based on review of the City’s SRC and Design Standards, and findings outlined in the gap analysis, it appears that the City’s current construction and post-construction requirements meet the main intent of the 2021 NPDES MS4 Permit language, but specific construction and design standard language adjustments and revisions are needed for consistency and to improve interpretation.

### 5.1 Establish an NSRR

One of the primary areas of focus of this TM is whether the City’s post-construction design standards, as primarily documented in the City’s Design Standards, *Div. 004*, adhere to the NPDES MS4 Permit’s Post-Construction Stormwater Management Requirements and associated performance standards (Schedule A.3.e.iii.(A) and (B)). As written, it appears the City does implement an NSRR, although it is not clearly explicit in the Design Standards or regulated with development applications submitted for approval. The rationale for this understanding is as follows:

- The City’s definition of GSI and MEF reflects the prioritized use of stormwater retention in the selection of stormwater facilities for new and redevelopment projects.
  - GSI (by definition) includes stormwater facilities that mimic natural surface hydrologic functions through infiltration or evapotranspiration, or that involve stormwater reuse (SRC *Ch. 71.005(7)*). Thus, GSI is a stormwater facility that is intended to retain stormwater onsite. Examples of GSI facilities as provided in the Design Standards include permeable pavement, stormwater planters, raingardens, and vegetated filter strips.
  - MEF is the extent to which a requirement or standard must be complied with as constrained by the physical limitations of a site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts (SRC *Ch. 71.005(12)*). Thus, the definition of MEF provides the framework to regulate or control when GSI (or retention) is used onsite.
- SRC *Ch. 71.085* and *71.090*, and multiple sections of the Design Standards include how and when GSI is required to the MEF; GSI applications extend to all types of development regulated by the City’s Design Standards.
  - Except as provided in SRC *71.085(b)*, all SFR projects shall be designed and constructed with GSI to the MEF, except where flow control facilities and treatment facilities have already been constructed per SRC *71.080 (Requirements of Land Divisions)* to serve the lot or parcel.
  - For large projects, both treatment and flow control facilities must meet the standards for GSI/MEF. Although site constraints, limitations in engineering design, and financial costs should rarely completely restrict the use of GSI, the City recognizes some projects will be unable to exclusively provide GSI. Therefore, per Design Standards, *Div. 400, Appendix 4E—Implementing GSI to the MEF* establishes the criteria for meeting the requirements to meet MEF for GSI.
- Stormwater facility sizing requirements per the Design Standards (*Section 4.2(n) and 4.3(a)(2 and 3)*) reference use of a minimum infiltration rate of 0.5 inches per hour to support infiltration facility sizing (i.e., should be included as technical feasibility criteria supporting use of infiltration systems).
- Various sizing methodologies (Design Standards *Section 4.2(n)*, the *Simplified Approach for Stormwater Management*, and *4.3(a)(3)*) reference using identified GSI facilities to meet “treatment requirements.”

While the City’s standards address the intent of an NSRR, it is recommended that the City refine the Design Standards to more explicitly reflect an NSRR that is associated with a specific goal to retain and/or infiltrate a storm such as the water quality design storm using GSI to the MEF. GSI applications currently appear to be required for water quality; sizing for water quality (as opposed to sizing for flow control or flood control) would likely fit within the City’s current definition of MEF, based on physical and practical constraints of a site.



As the City's flow control standards to prevent flooding require facility design to the 100-year storm event, it is unlikely that use of GSI will negate the need to install these flow controls for a site.

## 5.2 Update Infeasibility Criteria related to the use of Infiltration

Per City staff, use of infiltration-based stormwater facilities is typically limited in the City, as site conditions generally do not allow for their widespread use. However, the NPDES MS4 Permit requires the prioritization of retention while also allowing for the establishment of technical infeasibility criteria for sites where the NSRR cannot be met. Clearly defining the characteristics and constraints related to the application of GSI (infiltration-based stormwater facilities) will be beneficial in maintaining the practicality of implementing the standards.

The City's definition of MEF considers physical/practical/financial limitations<sup>6</sup> related to compliance with a requirement or standard. These limitations related to the use of GSI are outlined in Design Standard's *Section 4.3.(a)(4)* and *Appendix 4E*, and they may be refined to expand on physical limitations of the site that preclude the use of GSI, specifically physical (technical) infeasibility criteria precluding the use of infiltration. These limitations for constructing infiltration facilities (that could be defined in the Design Standards) include physical limitations on the site such as:

- Steep slopes (e.g., over 15 percent)
- Soil type (especially mapped areas of Group D soils)
- High Groundwater/areas of perched groundwater
- Areas with underground contamination
- Proximity to structures or building foundations.
- Areas with fill soils
- Areas with shallow bedrock
- Proximity to drinking water wells.
- Erosion Hazard or Landslide Hazard Areas
- Professional Geotechnical evaluation recommendations.

Review of Appendix 4E to confirm whether infiltration-based limitations may be specified instead of the discretionary approach for achieving MEF (*Appendix 4E, Section 4E.7*).

Currently the City specifies that a Geotechnical Engineering or geologist report is required for sites with slope stability concerns or high groundwater, but other criteria are documented generally. There are measurable guidelines detailed in the Design Standards or SRC; however, they guidelines are scattered throughout the document, and it would be helpful to consolidate them in one place. If technical infeasibility criteria are more defined, and consolidated in one section, potentially there would be less discretionary determination of MEF and plan review activities may be more straightforward.

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<sup>6</sup> Limitations listed in Design Standards *Appendix 4E* includes surface slopes, mandatory setbacks, downspout configuration, minimum vertical or horizontal clearance, presence of sensitive areas, restricting pedestrian, bike or vehicle access, limitations due to Historical Preservation requirement (*SRC Chapter 230*).

### 5.3 Other Recommendations

In addition to establishing an explicitly defined NSRR performance standard and technical infeasibility criteria, the following are recommendations related to refining the City’s Design Standards and SRC.

- Update project thresholds requirements to adhere to NPDES MS4 Permit and large project thresholds.
  - Identify whether changing the upper SFR threshold to 5,000 SF (from 10,000 SF), to adhere to the new, large project threshold definition is also needed to support interpretation of standards. Per the NPDES MS4 Permit, the City could maintain the SRF threshold range as is (thereby not impacting the number of eligible SFR-related projects).
- Refine the organization of the Design Standards, *Div. 400, Section 4.2 General Design Requirements to Support Improved Interpretation and Implementation of Standards*. Potential revisions could include:
  - Moving the project and threshold requirements upfront into a dedicated section (not under 4.1© and 4.2(a)) for clarity.
  - Consolidate site assessment activities (4.2(c, d, e, and f) to meet NPDES MS4 Permit requirements related to LID and “site planning.” Require results of the site assessment efforts to be submitted with land use approval.
  - Establish more explicit guidelines related to when infiltration testing is required. Memorialize, in Design Standards or another document.
  - Include a summary table identifying the use, constraints and application of various stormwater facilities, prior to introducing design criteria.
- Refine definitions to maintain consistency between the NPDES MS4 Permit, SRC, and Design Standards. BC conducted an initial review and prepared a definitions summary that compared definitions in Salem’s Phase I Permit, SRC 70.005, 75.0202, 82.005, and Design Standards *Ch. 109-001*. As the SRC and Design Standards are updated, further review of the definitions will be conducted to ensure the terms are: a) *used in the SRC or Design Standards updated language;* and, b) *are defined in a clear, concise, and technically accurate manner consistent with the Permit.*

Key areas where refinements are recommended include:

- Numerous inconsistent definitions exist between the SRC and Design Standards, which should be updated for consistency, including but not limited to: Best Management Practices, Design Storm/Design Storm Event, Flow Control/Flow Control Facility, and Source Controls.
- Definitions listed in the NPDES MS4 Permit that are not included in the SRC or Design Standards, that may be advantageous to add, including but not limited to Clean Water Act, Construction Activity, Control Measure, Discharge, Effective Impervious Area, Green Infrastructure, and Low Impact Development.
- Additional terms not currently included in SRC and/or Design Standards that may need to be added for consistency with current SRC and/or Design Standards language, including Large Project, New Impervious Surface, New Pervious Surface, Non-Stormwater Pollution Controls, NPDES MS4 Permit, Detention, Conveyance System, Downstream Analysis, Drywell, Pollution Generating Surfaces, Non-Pollutant Generating Surfaces, Point of Discharge, Post-Developed Condition, Pretreatment, Retention and Seasonal High Groundwater.
- See Attachment E for the detailed Definitions Comparison Summary.

## Section 6: Potential Policy Needs and Discussion

Based on recommendations detailed in Section 5, policy and technical topics recommended for inclusion in a more in-depth discussion with City staff during project workshops are listed in Table 6-1. Outcomes from discussions regarding these key topics, policy issues, and technical requirements will inform additional revisions to the SRC and Design Standards.

**Table 6-1. Performance Standards Policy and Technical Issues Matrix**

Topic	Policy Issue or Technical Question	Other Considerations
Thresholds	<ul style="list-style-type: none"> <li>• Should SFR projects to 10,000 SF thresholds be preserved as an SFR Project?</li> <li>• Should the SIM approach still be used for &lt; 10,000 SF?</li> </ul>	<ul style="list-style-type: none"> <li>• Prior to stakeholder meetings, may want to conduct an impervious threshold analysis to confirm:                             <ul style="list-style-type: none"> <li>– the number of additional large project development applications if adjusting the threshold from 10,000 SF to 5,000 SF</li> <li>– the number of SFR applications unable to use the simplified sizing method if the project range is changed from 1,300 to 5,000 SF (as opposed to 10,000 SF).</li> </ul> </li> </ul>
Numeric Stormwater Retention Requirement Site Performance and Treatment Standards	<ul style="list-style-type: none"> <li>• How will a numeric retention requirement be specified in Design Standards?</li> <li>• Does the City want to provide an incentive for sites that retain more than the required storm event?</li> <li>• Should the SIM form be revised? Does it currently reflect WQ or WQ and FC?</li> <li>• How are facility types (combination treatment and flow control, treatment only) prioritized?</li> <li>• Is the feasibility criteria of 10% of the total new plus replaced impervious surfaces based on facilities ability to service as a combined treatment and flow control facility? Should the 10% requirement be revised in this update?</li> </ul>	<ul style="list-style-type: none"> <li>• Prior to stakeholder meetings, consider conducting a sizing factor analysis to confirm facility sizing at various design infiltration rates, to confirm:                             <ul style="list-style-type: none"> <li>– Sizing limitations related to the 10% MEF standard</li> <li>– Minimum infiltration rates to support “partial infiltration applications”.</li> <li>– Whether adjustment of the height or location of underdrain in planters/raingardens/etc. supports additional infiltration capabilities.</li> </ul> </li> </ul>
Technical Infeasibility Criteria	<ul style="list-style-type: none"> <li>• <u>General Infeasibility Criteria:</u> What infeasibility criteria should be allowed for the NSRR? What are typical limitations or conditions encountered?                             <ul style="list-style-type: none"> <li>– Should infeasibility conditions be mapped or documented?</li> </ul> </li> <li>• <u>Infiltration Infeasibility Criteria:</u> <ul style="list-style-type: none"> <li>– How should feasibility be defined for infiltration, including a more quantitative metric for limiting the use of infiltration? When in the process should infiltration testing be conducted. Should it be submitted with land use approval?</li> <li>– What types of projects require onsite testing and which projects can rely on anecdotal information?</li> <li>– Should infiltration testing be conducted as part of site assessment activities?</li> <li>– What factor of safety should be applied to measured infiltration rates, and how should the factor of safety influence infiltration rates used for design? If yes, is two an appropriate factor of safety?</li> <li>– Should 0.5 inches per hour be reflected as the minimum infiltration rate supporting use of infiltration-based facilities?</li> <li>– The definition of GSI is specific to infiltration facilities. Can combined treatment and flow control facilities be prioritized if infiltration rates deem feasible?</li> <li>– Are partial infiltration facilities always required over other treatment facilities?</li> </ul> </li> </ul>	
Practical/Financial Infeasibility Criteria	How are limitations outlined in Appendix 4E confirmed?	If refining the technical infeasibility criteria, are the financial factors limiting implementation of GSI applicable or still needed to get at the MEF requirement? (Design Standards <i>Appendix 4E, Section 4E.9</i> ). The current financial factors are for large projects.

<b>Table 6-1. Performance Standards Policy and Technical Issues Matrix</b>		
<b>Topic</b>	<b>Policy Issue or Technical Question</b>	<b>Other Considerations</b>
Stormwater Facility Design	Are there any updates needed to the current facilities as detailed in the Design Standards the City has identified?	
Operation and Maintenance	<ul style="list-style-type: none"> <li>• Maintenance protocols–what is the issue or challenge with the existing maintenance protocols in the standards? Should any maintenance protocols be revised or updated?</li> <li>• How to include the required maintenance documentation for manufactured facilities?</li> </ul>	
Definitions <sup>7</sup>	Ensure Definitions are reviewed and revised to ensure consistency with the Salem NPDES MS4 Permit, the SRC and the Design Standards. Add new definitions.	

<sup>7</sup> Specific definitions to be reviewed can be found in Attachment E and summarized in Section 5.

## References

- NPDES MS4 Phase I City of Salem Permit, Oregon Department of Environmental Quality, 2021.
- 1200-CN General Permit NPDES Stormwater Discharge Permit, Oregon Department of Environmental Quality, 2018.
- Marion County's Stormwater Quality Treatment Engineering Standards (2022).
- Gresham's Stormwater Management Manual (GSMM, 2019).
- Eugene Municipal Code (EMC, 9.6792)
- City of Corvallis' Stormwater Design Standards (2015)
- City of Portland Stormwater Management Manual (2020)
- Oregon City's Stormwater and Grading Design Standards (2020)
- City of Wilsonville's Public Works Standards for Stormwater and Surface Water (2015)
- WES Stormwater Standards (2023)
- Salem Revised Code
- Administrative Rules - Design Standards (January 2014)
- City of Salem's Erosion Prevention and Sediment Control Technical Guidance Handbook.
- City of Salem's Erosion Prevention and Sediment Control Plans for Small Development (2014)
- ACWA Construction Site Stormwater Guide: Illustrated BMPs (2013)
- Erosion Sediment Control Site Plan Review (Minimum Requirements for all Development Projects, except Single-Family/Duplex) (2013)
- City's Project Management Manual (2013):
- 9.12 Erosion Control Plan Review Standard of Practice
  - 10.13 Erosion Control Inspection Procedure Standard of Practice
  - 10.14 Erosion Control Enforcement Standard of Practice
- Robert Chandler's *"How Salem Crafted its First-Ever stormwater ordinance and got unanimous approval"*.



## **Attachment A: Post-Construction Performance Standards: Comparison of Other Local Jurisdictions**

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Table A-1. Post-Construction Performance Standards FINAL Comparison of Other Local Jurisdictions			
Jurisdiction	NPDES MS4 Permit Update Compliance Date	Performance Standard A: NSRR Standard	Performance Standard B: Alternative Compliance Standard
City of Albany	Phase II General Permit Feb. 28, 2024	The City is currently coordinating with Corvallis and updating standards to include an established NSRR prioritizing retention of the water quality storm on-site, except in areas with technical infeasibility and/or site constraints. The updated standards will be customized for the City of Albany.	Not Applicable (N/A)
City of Corvallis	Phase II General Permit Feb. 28, 2024	<ul style="list-style-type: none"> <li>- The current City Stormwater Design Standards (2015) state that infiltration facilities are permissible and preferred where native soil infiltration rates support their function.</li> <li>- The City is in the process of updating standards to include an established NSRR prioritizing retention of the water quality storm on-site, except in areas with technical infeasibility and/or site constraints. The City has prepared a Citywide infiltration feasibility map to support their standards update. Infiltration testing requirements will be included.</li> <li>- The pending updated standards may include an NSRR for the water quality storm. In addition, the standards may limit infiltration facilities in Group D and related soils (A/D, B/D, C/D) soils. Facilities may be constructed with open bottoms (i.e., unlined) in these areas but sizing should be for treatment and not take infiltration into account. If infiltration facilities are desired, and an applicant thinks that the soils map is not reflective of actual on-site infiltration rates, the applicant should conduct in-situ testing to confirm the soil type and infiltration rates to confirm.</li> </ul>	N/A
City of Eugene	Phase II Individual Permit Dec. 1, 2024	<ul style="list-style-type: none"> <li>- In the Stormwater Quality section of the Eugene Municipal Code (EMC, 9.6792), infiltration facilities must be prioritized, but it doesn't specify an NSRR or say that full (or partial) infiltration/retention of the water quality design storm (or other identified storm) is required as specified in the permit.</li> <li>- The City anticipates updates to their standards to conform with the permit requirement more explicitly for retention.</li> </ul>	N/A
City of Gresham	Phase I Gresham Group Permit Nov. 1, 2024	<p>Gresham's Stormwater Management Manual (GSMM, 2019) requires infiltration of stormwater runoff to the maximum extent feasible, and a filtration (versus infiltration) facility is allowed for water quality treatment only in cases of infiltration infeasibility. In areas where infiltration is deemed infeasible, water quality treatment (filtration) using vegetated facilities shall be maximized.</p> <p>For subdivision and partitions the following options apply:</p> <ul style="list-style-type: none"> <li><b>A. Dispersed.</b> Infiltrate/retain the 10-yr storm event in a private facility located on the same residential taxlot as the impervious surface being treated. Conveyance must be provided, but no further downstream detention/flow control required.</li> <li><b>B. Hybrid.</b> Infiltrate (subject to technical infeasibility requirements) or manage the water quality event (1.2 in. in 24 hrs) at most localized scale possible, then meet the flow control requirements at a downstream centralized facility. Infiltration based facilities have a minimum infiltration rate of 0.5 in./hr to 2 in./hr depending on the facility type. Can assume impervious surfaces treated for water quality are 50% pervious for sake of downstream facility detention/flow control calculations.</li> <li><b>C. Centralized.</b> Use centralized facility to treat both water quality and flow control for all impervious surface within development.</li> </ul>	N/A
Marion County	Phase II General Permit Feb. 28, 2023	<p>Marion County's Stormwater Quality Treatment Engineering Standards (2022), Section 3 has an NSRR Standard:</p> <ol style="list-style-type: none"> <li>1. Projects that create or replace 10,890 square feet (1/4 acre) or more of impervious surface must retain the site runoff produced by the Design Storm of 1.38 ins. in 24 hrs to satisfy the performance requirements.</li> <li>2. For projects that demonstrate an inability to meet the retention requirement in Item 1 above, the remainder of the runoff generated by the Water Quality Design Storm must be treated prior to discharge from the project site. Treatment must be implemented to satisfy the performance requirements.</li> <li>3. If the retention and treatment performance requirements cannot be met, offsite mitigation may be allowed as an alternative compliance option for both public and private projects.</li> </ol>	N/A
City of Portland	Phase I Portland Group Permit Nov. 1, 2024	<p>City of Portland Stormwater Management Manual (SMM, 2020), Summary of Infiltration and Discharge Hierarchy Stormwater Management Requirements:</p> <ul style="list-style-type: none"> <li>- Level 1: Full Onsite Infiltration - Fully infiltrate the 10-yr design storm (3.4 in. is the retention storm and is volume based) for sites with infiltration rates of 2 in./hr +. Ecoroofs may receive exceptions. Level 2: Offsite Discharge to the Separated Stormwater System - If infiltration is determined infeasible (less than 2 in./hr) based on-site constraints, then water quality treatment is required for runoff from a storm. Pollution Reduction Required (achieve 70% TSS removal from the runoff resulting from 90% of the average annual rainfall) and Flow Control Required (match post-developed and pre-development rates for the one-half the 2-yr event, and for the 5-, 10-, 25-yr events).</li> </ul>	N/A

**Table A-1. Post-Construction Performance Standards FINAL Comparison of Other Local Jurisdictions**

Jurisdiction	NPDES MS4 Permit Update Compliance Date	Performance Standard A: NSRR Standard	Performance Standard B: Alternative Compliance Standard
<p>The cities of Wilsonville and Oregon City, and Water Environment Services (WES) have similar approaches to meeting both performance standards requirements of the permit. In general, the agencies are meeting the NSRR performance standard by requiring retention (infiltration) of the 10-yr storm event. If the full 10-yr storm event is retained, then both water quality and flow control requirements are met. If the 10-yr storm cannot be fully retained due to infeasibility criteria, then a water quality and flow control standard (<i>ensuring the predevelopment hydrologic function is maintained</i>) should be met. All three agencies promote the use of the BMP Sizing Tool to quantify the amount of infiltration achieved.</p>			
City of Oregon City	Phase I Clackamas County Group Permit Dec. 1, 2024	<p>Oregon City's Stormwater and Grading Design Standards (SGDS, 2020) 2.2.4: Stormwater Management Strategy states:</p> <ul style="list-style-type: none"> <li>- The City has a stormwater management hierarchy (Levels 1-4). Applicants must demonstrate that the strategies on the hierarchy are not feasible before selecting a lower-level strategy for stormwater management.</li> <li>- Level 1: Onsite retention of the 10-yr design storm for site with infiltration rates of 2 in./hr+. Utilization of infiltration stormwater facilities which can infiltrate the full 10-yr design storm will be considered the MEF to satisfy both water quality and flow control requirements. Infeasibility criteria are provided.</li> <li>- Level 2: Onsite Stormwater Management using LID: For sites with infiltration between 0.5 and 2.0 in./hr, the LID facility should be designed with infiltration as the primary means of flow control.</li> <li>- For sites with design infiltration rates less than 0.5 in./hr, the LID facility will require an underdrain connected to a flow control structure.</li> <li>- If the 10-yr storm can't be infiltrated, Oregon City has a flow control requirement to match flow duration for hydromodification. The BMP Sizing Tool is the mechanism for determining the amount infiltration.</li> </ul>	Oregon City is an agency that is meeting both performance standards. They use the BMP Sizing Tool to quantify the amount of infiltration achieved and if it meets the alternative compliance standard that is equivalent to the NSRR.
City of Wilsonville	Phase I Clackamas County Group Permit Dec. 1, 2024	<p>The City of Wilsonville's Public Works Standards for Stormwater and Surface Water (2015), requires:</p> <ul style="list-style-type: none"> <li>- LID to the MEF</li> <li>- Utilize LID facilities to address water quality and flow control requirements of the site. When site constraints limit surface area available for stormwater management facilities, MEF is defined as installing LID with a surface area of at least 10% of new and replaced impervious surface area.</li> <li>- Retain and fully infiltrate the 10-yr design storm onsite using LID facilities. Infiltration of the full 10-yr design storm is assumed to satisfy both water quality and flow control requirements.</li> <li>- Limited Infiltration-When conditions (fill, steep slopes, high groundwater table, well-head protection areas, and/or contaminated soils) restrict the practicality of using onsite infiltration and may require the use of lined, non-infiltrating stormwater management facilities or underground facilities to meet stormwater management requirements.</li> </ul>	Wilsonville is an agency that is meeting both performance standards. If the 10-yr storm can't be infiltrated, the applicant should use LID to the MEF and has a duration-based flow-control standard to meet predevelopment hydrologic function. They use the BMP Sizing Tool to quantify the amount of infiltration achieved, and if it meets the alternative compliance standard, that is equivalent to the NSRR.
WES	Phase I Clackamas County Group Permit Dec. 1, 2024	<ul style="list-style-type: none"> <li>- The WES Stormwater Standards (SS 2023), Section 6.2.1 states that when site conditions allow, infiltration is the preferred strategy to achieve the stormwater management performance standards. When a stormwater management facility is designed to fully infiltrate the 10-yr, 24-hr storm, the facility is assumed to meet the flow control performance standards without further analysis. Such facilities provide onsite stormwater retention for most rainfall conditions and should only result in partial downstream discharge during events larger than a 10-yr storm.</li> <li>- When site conditions do not allow infiltration of the full 10-yr, 24-hr design storm, infiltration can still be incorporated into the flow control facility design with partial infiltration should include an underdrain, and overflow system to manage the release rates from the facility. An infiltration rate of 0.5 in./hr is considered limiting for use of infiltration systems. Whether or not infiltration is incorporated into the design, release rates from the facility must meet the flow control performance standard.</li> </ul>	WES is an agency that is meeting both performance standards. The WES Stormwater Standard states there is a flow Control Performance Standard that requires the duration of peak flow rates from Post-Development Conditions shall be less than or equal to the duration of peak flow rates from pre-development conditions for all peak flows between 42% of the 2-yr peak flow rate up to the 10-yr peak flow rate.



## **Attachment B: Construction Gap Analysis Matrix**

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# Attachment B: Construction Gap Analysis Matrix

	Requirement from the Phase I Permit (effective October 1, 2021)	Current Status of Salem's Standards with Respect to Addressing the Requirement	Manual and/or Code Reference	Identified Gaps	Further Clarification or Discussion
Schedule A.3.d	<b>Construction Site Runoff Control</b> The permittee must continue to implement and enforce a construction site runoff control program to reduce discharges of pollutants from construction sites in its coverage area. The permittee must continue to implement their existing construction site runoff program as the new requirements are developed and implemented.	N/A - procedural (see the City's 2022 SWMP).			
I.	<b>Ordinance and/or Other Regulatory Mechanism</b>  Through ordinance or other regulatory mechanism, and to the extent allowable under state law, the permittee must continue to require erosion, sediment, and waste materials management controls to be used and maintained at all qualifying construction projects from initial clearing through final stabilization to reduce pollutants in stormwater discharges to the MS4 from construction sites.	SRC 75.050: Erosion Control is required. An erosion control permit for projects that area 1,000 square feet of ground disturbance, but it includes exemptions for home gardening and projects with less than 25 cubic yards of impact. City permits are not currently required for site that also require a 1200-CA. Erosion control permit exemptions are listed in SRC 75.050.  Design Standards Ch. 109, Division 007 7.1(b): The standards govern all construction and other land disturbing activities within the City of Salem in accordance with the administrative authority granted in SRC 65, 68, 69 and 75 and with the regulatory requirements and permits as referenced in this chapter. They apply to both publicly and privately owned lands and those projects within the ROW.	Salem Revised Code (SRC) 75.050 Administrative Rules - Design Standards (dated January 2014, referred to as Design Standards hereafter) Chapter 109 Div. 007, Erosion and Prevention Control Plan, 7.1(b)	None.	
	The permittee must require construction site operators to document site specific erosion and sediment controls for construction project sites that result in land disturbance of equal to or greater than 1,000 square feet.	SRC 75.050: (a) Except as provided in subsection (b) of this section, no person shall conduct ground disturbing activities that cause or are likely to cause a temporary or permanent increase in the rate of soil erosion from a site without first obtaining an erosion control permit from the Director. (b) Erosion control permits are not required for the following: (1) Home gardening and landscaping activities, unless the ground disturbing activity meets either of the following criteria: (A) The activity takes place within 50 feet of a waterway, and the work involves the disturbance of more than 1,000 square feet of land surface at one time; or (B) The slope of the land exceeds 25 percent. (2) Ground disturbing activities involving less than 25 cubic yards of material or 1,000 square feet of land surface at one time. (3) Interior improvements to an existing structure. (4) Activity for which there is no physical disturbance to the surface of the land. (5) Ground disturbing activities conducted under a 1200-CA General Permit issued by the DEQ in accordance with the Phase I and Phase II Stormwater Regulations adopted by the Environmental Protection Agency. (6) Activities within the City which constitute a "farm use" or "accepted farming practices" as those terms are defined or used in ORS Ch. 215. (7) Mining activities conducted under permits issued by the Oregon Department of Geology and Mineral Industries. (8) Routine maintenance of gravel roads, road shoulders, paths, parking lots, and storage yards. (9) Routine maintenance of sports fields or playgrounds surrounded by vegetative ground cover or permanently installed curbing. (c) An exception from the erosion control permit requirement does not exempt the applicant from the performance responsibilities of SRC 75.030, 75.090 and 75.140, except to the extent allowed under local, state, or federal permits issued for a specific site or purpose. (d) Applicants for construction activity within the City subject to the 1200-C or 1200-CA General Permit requirements must obtain the 1200-C or 1200-CA General Permit directly from the Oregon Department of Environmental Quality and provide evidence of such to the Director.	SRC 75.050 SWMP (2022)	None.	City may review/ confirm the exemptions in SRC 75.050 to ensure all construction projects that result in land disturbance of equal to or greater than 1,000 square feet document site specific erosion and sediment controls. For example, the City may want to remove the exemption for projects under 25 cubic yards of disturbance, as that is unrelated to the disturbance area thresholds outlined in the permit (and sites larger than 1,000 square feet may not be regulated if there is less than 25 cubic yards of disturbance).
		SRC 76.060 (b): A single EPSC plan may be submitted for multiple contiguous residential building lots or parcels or multiple building lots or parcels in the same subdivision or partition. SRC 75.060(c): EPSC plans for construction projects disturbing 10,000 square feet or more of land surface shall require the stamp or signature of a certified professional.  Design Standards Ch. 109, Division 007 7.1(d): (1) All ground disturbing activity shall conform to the applicable regulatory requirements including the NPDES MS4 Permit issued to the City. (2) SRC Chapter 75 - Erosion Prevention and Sediment Control (3) Oregon DEQ 1200C Permits - Required for private development sites greater than one acre. (4) Oregon DEQ 1200 CA Permits - General blanket DEQ permit issued to the City of capital construction (5) Requirements of other involved agencies such as Marion County, Polk County, City of Keizer, ODOT, UPRR, and/or BNSF (6) Oregon Department of Land (DSL) Permits - This includes special requirements of other state agencies such as the Oregon Department of Fish and Wildlife (ODFW) and Oregon DEQ. (7) United States Army Corps of Engineers (USACE) Permits - This includes special requirements of other federal agencies such as the EPA, the National Marine Fisheries Services (NMFS) and the U.S. Fish and Wildlife Service (USFWS).	SRC 75.060(c):	None.	Does the City want to adjust this threshold for requiring a stamp or signature on EPSC plans (note this is not a gap)?
	The permittee must use appropriate enforcement procedures and actions to ensure compliance with Schedule A.3.d,ii-vi, below.	See Schedule A.3.d.v below for enforcement procedures documentation.	Design Standards Ch. 109, Division 007, 7.1(d)	Explicitly add to the Design Standards the 1,000 square feet threshold, so the developer or other designer doesn't have to go to the NPDES Permit to find the threshold information.	
ii.	<b>Erosion and Sediment Control Plans (ESCPs)</b>  The permittee must continue to maintain written specifications that address the proper installation and maintenance of erosion and sediment controls during all phases of construction activity occurring in their coverage area. The written specifications must include an ESCP template, worksheet, checklist, or similar document for construction site operators to document how erosion, sediment, and waste material management controls for non-stormwater wastes (e.g., discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste) will be implemented and maintained at the construction project site. At a minimum, through ordinance or other regulatory mechanism the permittee must:	SRC 75.060 (a): An application for an erosion control permit shall include all information necessary for the determination of whether the permit should be issued. This information includes, but not limited to: an EPSC Plan that contains methods and interim facilities to be constructed, used, operated, and maintained during ground disturbing activities to prevent and to control erosion  Design Standards 7.2(f) Plan Review Checklist Appendix 7B - Plan Requirement Checklist will be used by the City during review evaluation of an EPSC Plan. The checklist is provided as part of these Design Standards to inform designers of the items the City will evaluate during plan review. HD: Seems like we could also add reference to DS Appendix A (109-007 - Standard Notes)?  Design Standards, Appendix 7A - Standard Notes (to be included on each ESCP)  The City also has a document titled "Erosion Prevention and Sediment Control (EPSC) Plans for Small Development" that provides the standards for EPSC Plans for small projects (1,000 to 10,000 square feet of ground disturbance). The purpose of this document is to provide small development builders and contractors with standard EPSC plans and specifications for their use and implementation on new construction projects within the City.	SRC 75.060 Design Standards Ch. 109, Division 007.7.2(f) City's Erosion Control Site Plan Review Checklist (Appendix B)  Design Standards Ch. 109, Appendix A General Notes  "ESCP Plans for Small Development" Guidance Document (January 1, 2014)	None.	Some considerations for updating the City's Plan Requirement Checklist require updates: 1. Add a line for the total ground disturbance area for the project. 2. Add a note at the bottom to remind the developer the EPSC Plan needs to be kept onsite at all times and written EPSC inspection logs need to be maintained onsite and available to City inspectors upon request.  The City makes the ACWA Construction Site Stormwater Guide available on their website. This document provides a guide that highlights the most common best management practices (BMPs) to help inspectors and construction contractors address common problems related to erosion and construction site stormwater pollution.
(A)	Require construction site operator to complete a site-specific Erosion and Sediment Control Plan or other documentation of site specific controls prior to beginning construction/land disturbance;	Design Standards Ch. 109, Division 007 7.2(a): An EPSC Plan is required to be submitted with site development plans, subdivision plans, grading plans and/or public improvement plans for review and approval by the City. An approved EPSC Plan is required to be available on site at all times for review. BMPs should be adjusted and modified in the field as necessary and as required to provide adequate EPSC.	Design Standards Ch. 109, Division 007, 7.1(a)	None.	
(B)	Require the Erosion and Sediment Control Plan be maintained and updated as site conditions change, or as specified by the permittee;	Design Standards Ch. 109, Division 007 7.1(c): The applicant is responsible to ensure that adequate erosion prevention and sediment control measures are planned, designed, constructed, operated and maintained to prevent sediment and pollutants from leaving the construction site. These requirements shall be upheld throughout the life of the construction project. Additional or revised erosion control measures may be necessary based upon field observations of the effectiveness of the original planned measures. The applicant shall revise and add measures as necessary to comply with SRC and regulatory permit requirements.	Design Standards Ch. 109, Division 007 7.1@	None.	
(C)	Require Erosion and Sediment Control Plans to be kept on site and made available for review by the permittee, DEQ, or another administrating entity during site inspections or upon request; and,	Design Standards Division 007, Appendix A: (1) The EPSC Plan must be kept onsite at all times (also noted in 7.2(a)). (2) Written EPSC inspection logs shall be maintained onsite and available to City inspectors upon request.	Design Standards Division 007, Appendix A	None.	
(D)	Continue to ensure that ESCPs for construction sites disturbing one acre or greater are consistent with the substantive requirements of the State of Oregon's 1200-C NPDES permit ESCPs.	SRC 75.050(d) Applicants for construction activity within the City are subject to the 1200-C or 1200-CS General Permit requirements must obtain the 1200-C or 1200-CA General Permit directly from DEQ and provide evidence as such to the City.  Design Standards Ch. 109, Division 007 7.1(d): (3) Oregon DEQ 1200C Permits - Required for private development sites greater than one acre. (4) Oregon DEQ 1200 CA Permits - General blanket DEQ permit issued to the City of capital construction.	SRC 75.050(d) Design Standards Ch. 109, Division 007, 7.1(d)	A 1200-CA permit cannot be obtained by a private entity, only authorized government entities. If the City holds a 1200-CA permit (or has obtained one), consider revising code language to reflect correct responsible party. Otherwise remove reference.	
	Permittee may require or issue a simplified ESCP or a list of expected outcomes with prescribed BMPs for small or low-risk construction sites, provided that the permittee's criteria and specifications are clear and documented or referenced in the SWMP Document, and provided that construction operators are required to meet expectations and keep documentation of how they meet those expectations on site for reference during operations, maintenance activities, and inspections. The permittee must include or refer to a description of all Erosion and Sediment Control Plan requirements in the SWMP Document.	N/A - procedural (see the City's 2022 SWMP).			The City also has a document titled "Erosion Prevention and Sediment Control (EPSC) Plans for Small Development" (January 1, 2014) that provides the standards for EPSC Plans for small projects (1,000 to 10,000 square feet of ground disturbance). The purpose of this document is to provide small development builders and contractors with standard EPSC plans and specifications for their use and implementation on new construction projects within the City.
iii.	<b>Erosion and Sediment Control Plans Review</b> At a minimum, the permittee must continue to implement procedures to review Erosion and Sediment Control Plans from construction projects that will result in land disturbance of equal to or greater than 1,000 square feet using a checklist or similar document to determine compliance with the ordinance or other regulatory mechanism required.	N/A - procedural (see the City's 2022 SWMP, City's Erosion Control Site Plan Review Checklist, and 9.12 Erosion Control Plan Review Standard of Practice (SOP)).		There are no gaps in the City's review processes or procedures.	The City has well documented processes and procedures for construction site inspections. There are no gaps in the City's review processes or procedures.
	Erosion and Sediment Control Plan review procedures must include consideration of the construction activities' potential water quality impacts, and remain in accordance with applicable state and local public notice requirements.	N/A - procedural (see the City's 2022 SWMP, City's Erosion Control Site Plan Review Checklist, and 9.12 Erosion Control Plan Review SOP).		There are no gaps in the City's review processes or procedures.	
iv.	<b>Construction Site Inspections</b>				

# Attachment B: Construction Gap Analysis Matrix

Requirement from the Phase I Permit (effective October 1, 2021)		Current Status of Salem's Standards with Respect to Addressing the Requirement	Manual and/or Code Reference	Identified Gaps	Further Clarification or Discussion
	The permittee must continue to perform inspections of construction sites to ensure that the approved ESCP or other documented set of controls is properly implemented. The SWMP Document must describe procedures, including:	SRC 75.080: The City may require erosion prevention and sediment control measures to be inspected and approved prior to the start of any ground disturbing activities including preliminary grading work. The City may require inspection at other times as deemed necessary or as specified in the erosion control permit. For individual single family residential and duplex construction, or manufactured home placement on individual lots or parcels or in manufactured home parks, erosion prevention and sediment control measures shall be properly installed either before or concurrent with the initial ground disturbing activity. 10.13 SOP: The SOP explains how to conduct high quality erosion control inspections. The SOP provides the accepted practices to ensure that inspectors have the understanding and guidance necessary to conduct thorough and comprehensive inspections that not only provide accurate documentation, but also provide guidance for contractors and permit holder to implement effective erosion control strategies.	SRC 75.080 10.13 Erosion Control Inspection Procedures SOP	None.	
(A)	Minimum Triggers for Inspection	Design Standards Division 007, Appendix A: (3) All BMPs shall be inspected at least every week. When a rainfall event exceed 1/2" in a 24-hour period, daily inspection of the erosion controls, sediment controls, and discharge outfalls must be conducted and documented. Inspections shall be done by a representative of the permit registrant who is knowledgeable and experienced in the principles, practices, installation, and maintenance of erosion and sediment controls.	Design Standards Division 007, Appendix A	None.	
	At a minimum, the permittee must inspect construction sites if:				
1	Sediment and/or turbidity is visible in reported stormwater discharge or dewatering activities from the construction site;	Design Standards Ch. 109, Division 007, 7.3(I): When groundwater is encountered is an excavation or other area; control, treat, and discharge it in a manner as to not exceed DEQ's turbidity and pollution standards. Uncontaminated dewatering water is an authorized non-stormwater discharge. If dewatering water comes into contact with pH-modifying substances, monitor and sample before discharge to surface waters of the State to ensure high-pH groundwater is not discharged into surface waters of the State. Examples of pH-modifying substances frequently found in construction are concrete, Portland cement, lime, ash, fuels etc. Infiltrate in designated areas or neutralize before discharge.	Design Standards Ch. 109, Division 007, 7.3(I)	None.	
2	A complaint or report is received; or	SRC 71.060 (a) Any person owning, engaging in any activity on, or occupying real property shall report the discharge of any pollutant from that property to the Public Works Department if the discharge has introduced, or is likely to introduce, a pollutant into the public stormwater system, a private stormwater system, or receiving water. The report shall be made at the earliest possible time, but in no case later than 24 hours after discovery of the discharge. Reporting pursuant to this section is in addition to, and not in lieu of, any other reporting requirements imposed by federal, state, or local laws.	SRC 71.060(a)	The SRC or Design Standards do not explicitly indicate that an inspection will be triggered if a public complaint or report is received. The City should ensure their internal processes address this response (in conjunction with illicit discharge investigations).	
3	A site meets any other minimum triggers established under the permittee's already established inspection program.	See Schedule A.3.d.iv(A) for minimum inspection triggers.			
(B)	Minimum Inspection & Documentation Requirements				
	Permittee inspections of construction sites must follow standardized procedures for inspection and documentation of inspections. Procedures and requirements for inspection and documentation must be detailed in a manual referenced or linked to in the SWMP Document, and include minimum required outcomes, criteria, and/or BMPs for disturbed areas of the site, as well as locations of material and waste storage areas, stockpile areas, construction site entrances and exits, sensitive areas, and points of discharge to the MS4 or receiving waters. The permittee must include or reference in the SWMP Document a description of how the permittee's site inspection procedures ensure, accomplish, or generate the following:	N/A - procedural (see the City's 2022 SWMP and 10.13 Erosion Control Inspection Procedures SOP).			
1	A review and evaluation of the ESCP or other documented set of site specific controls and the operator's records of maintenance or operation of BMPs where applicable, to determine if the described control measures were installed, implemented and maintained properly.	N/A - procedural (see the City's 2022 SWMP and 10.13 Erosion Control Inspection Procedures SOP).			The City should review their Erosion Control related SOPs to ensure compliance.
2	An assessment of the site's compliance with the permittee's ordinances or requirements.	N/A - procedural (see the City's 2022 SWMP and 10.13 Erosion Control Inspection Procedures SOP).			The City should review their Erosion Control related SOPs to ensure compliance.
3	Documentation of visual observations and of any existing or potential non-stormwater discharges, illicit connections, and/or discharge of pollutants from the site, as well as of recommendations to the construction site operator for follow-up.	N/A - procedural (see the City's 2022 SWMP and 10.13 Erosion Control Inspection Procedures SOP).			The City should review their Erosion Control related SOPs to ensure compliance.
4	A written or electronic inspection report, with photographs as necessary, including documentation of all necessary follow-up actions (e.g., re-inspection, enforcement) to ensure compliance with their applicable requirements.	N/A - procedural (see the City's 2022 SWMP and 10.13 Erosion Control Inspection Procedures SOP).			The City should review their Erosion Control related SOPs to ensure compliance.
5	Follow up to verify proper implementation of corrective measures in cases where a permittee-employed or contracted inspector finds evidence of erosion or of deficiencies in BMP maintenance or in adherence to ordinances or other regulations, as well as documentation of the corrective action.	N/A - procedural (see the City's 2022 SWMP and Design Standards Chapter 109 Div. 100-1, Enforcement of Public Works Regulations).			The City should review their Erosion Control related SOPs to ensure compliance.
v.	Enforcement Procedures				
	The permittee must continue to implement and maintain a written escalating enforcement and response procedure for all qualifying construction sites and summarize or reference in the SWMP Document. The procedure must address repeat violations through progressively stricter response, as needed, to achieve compliance. The escalating enforcement and response procedure must describe how the permittee will use enforcement techniques to ensure compliance. The enforcement procedures must include timelines for compliance and, when formulating response procedures and penalties should consider factors (or multipliers) such as the type and severity of pollutant discharge, and whether the discharge was intentional or accidental. If the escalating enforcement procedure already in place does not meet these requirements, a revision or update must be submitted with the Annual Report due November 1, 2023, and, if necessary as specified under Schedule A.2.f, added to the SWMP Document at that time.	SRC 71.060(b): Failure to report a discharge under subsection SRC 71.060(a) is an infraction. SRC 75.175: Describes the following a) stop work orders and permit revocation, civil penalty, civil penalty against agents, prohibition of further approvals; injunctive relief, appeals. SRC 75.200: It is a violation of the SRC 75, if any person to knowingly make any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained by SRC 75. SRC 75.210: Violations of SRC 75.170, 75.175(a) and 75.200 is a misdemeanor. Violation of any other provision of this chapter is an infraction. SRC 75.220: The remedies of SRC 75 are not exclusive. The City may seek any remedy or combination of remedies provided by law for violation of any provision of this chapter or failure to comply with any order issued under SRC 75. 10.14 SOP: Provides enforcement steps when efforts fail to generate the required action to correct or implement EPSC measures: 1) Inspection Notice of Correction 2) Notice of Non-Compliance Incident 3) Stop Work Order 4) Civil Penalties for Violations (refers to Design Standards Chapter 109 Div. 100-1) Design Standards: 1.4 Determination of Civil Penalties and Enforcement Evaluation Criterion and Criteria Rating Guidance (Points 0 to 3 based on violation severity).	SRC 71.060(b), SRC 75.175, SRC 75.200, SRC 75.210, SRC 75.220 10.14 Erosion Control Enforcement SOP Design Standards Chapter 109 Div. 100-1, Enforcement of Public Works Regulations	The City's escalating enforcement procedures were reviewed. A summary of the findings can be found in a separate document titled "Escalating Enforcement Summary Memo".	
vi.	Construction Runoff Control Training and Education				
	The permittee must ensure that all staff responsible for ESCP reviews, site inspections, and enforcement of the permittee's requirements are trained or otherwise qualified to conduct such activities, and training strategies and frequencies must be described or referenced in the SWMP Document.	N/A - procedural (see the City's 2022 SWMP).			
vii.	Tracking and Assessment				
	The permittee must routinely or continuously track all construction sites that result in a total land disturbance of equal to or greater than 1,000 square feet. The inventory must include relevant contact information for each project (e.g., name, address, phone, etc.), the size of the project including area and/or volume of disturbance, the date the permittee approved the ESCP in accordance with Schedule A.4.d.ii or in accordance with coverage under the 1200-CN permit as applicable, and whether any complaints have been received or inspections made.	N/A - procedural (see the City's 2022 SWMP).			
	The permittee must also track implementation of activities required by the Construction Site Runoff program. In each corresponding Annual Report, the permittee must summarize metrics or tracking measures related to implementation of the program, which may include but is not limited to number of regulated construction projects, number of inspections, and number of enforcement actions.	N/A - procedural (see the City's 2022 SWMP).			

Note: Cells shaded in this color indicate that the requirement in the NPDES MS4 Permit is not one that is typically addressed in code or standards.

- Acronyms and Abbreviations:**
- DEQ Oregon Department of Environmental Quality
  - DSL Department of State Lands
  - ESCP Erosion and Sediment Control Plan
  - N/A Not Applicable
  - NMFS National Marine Fisheries Services
  - MS4 Municipal Separate Storm Sewer System
  - ODFW Oregon Department of Fish and Wildlife
  - ODOT Oregon Department of Transportation
  - ROW Right of Way
  - SOP Standard Operating Procedure
  - SRC Salem Revised Code
  - SWMP Stormwater Management Program
  - USACE United States Army Corps of Engineers
  - USFWS U.S. Fish and Wildlife Services

## **Attachment C: Construction Escalating Enforcement Memo**





# Research Summary

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**Prepared for:** City of Salem  
**Project Title:** NPDES MS4 Phase I Permit–Escalating Enforcement for Construction Sites Research Summary  
**Project No.:** 180289  
**Summary by:** Jessica Christofferson  
**Reviewed by:** Angela Wieland, PE  
**Date:** June 20, 2023, Revised September 7, 2023

Schedule A.3.d.v of the City of Salem’s National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) Permit requires permittees to implement and maintain written escalating enforcement and response procedures for all qualifying construction sites. The procedures must:

1. Address repeat violations through progressively stricter response.
2. Use enforcement techniques to ensure compliance.
3. Include timelines for compliance and, when formulating response procedures and penalties, should consider factors such as the type and severity of pollutant discharge, and whether the discharge was intentional or accidental.

BC conducted a detailed review of the Salem Revised Code (SRC) Section as well as the City’s Erosion Control Enforcement Standard of Practice (Section 10.14) and Administrative Rules, Chapter 109, Division 100 to confirm documentation for each of the four major areas of compliance:

- Repeat violations
- Timelines for compliance
- Type and severity of pollutant discharge
- Whether the discharge was intentional or accidental.

Findings from the review are documented in Table 1 and detailed in Attachment 1: Escalating Enforcement Regulations for Construction Sites–Research Summary.

Table 1. Summary of Findings–Reviewed Against Requirements in Schedule A.3.d.v*	
Permit Requirement Summary	City of Salem
Repeat Violations	Yes
Timelines for Compliance	Yes
Type and Severity of Pollutant Discharge	Yes <sup>a</sup>
Whether the Discharge was Intentional or Accidental	Yes

*a. Salem has escalating enforcement in the form of notifications, stop work orders, and civil penalties; if there is an imminent threat to sediment leaving the site then an immediate stop work order is authorized.*



## **Attachment 1: Escalating Enforcement Regulations for Construction Sites Summary (June 2023)**

**Escalating Enforcement Regulations for Construction Sites Summary (June 2023)**

Document References	10.14 Erosion Control Enforcement-Standard of Practice	Administrative Rules-Chapter 109 Division 100-1 Enforcement of Public Works Regulations	Salem Municipal Code, Section 75
<p><b>Considers Repeat Violations</b></p>	<p>Not directly reflected in the progression of Steps 1-4, but may be implied.</p>	<p>Chapter 109, Division 100-1, Section 1.5 addresses repeat violations as an enforcement evaluation criterion.</p>	<p>SRC 75 does not specifically address repeat violations. Below is what is stated in that section:</p> <ul style="list-style-type: none"> <li>• “No person shall cause or suffer visible and measurable erosion or sediment which enters or is likely to enter the public storm drainage system, drainage courses, or wetlands. Any visible and measurable erosion and sediment shall be immediately abated or removed by the person using hand labor or approval mechanical needs (per SMC 75.090).</li> <li>• Visible and measurable erosion or sediment means (per SMC Section 75):</li> <li>• Deposits or tracking of mud, dirt, sediment, or similar material which exceeds one-half cubic foot in volume, on public or private streets, adjacent property, or into the storm drainage system or a drainage course, either by direct deposit, dropping, discharge, or as a result of the action of erosion;</li> <li>• Evidence of concentrated flows of water over bare soils; turbid or sediment laden flows; or evidence of on-site erosion such as rivulets on bare soil slopes, where the flow of water is not filtered or captured before leaving the site; or</li> <li>• Earth slides, mud flows, earth sloughing, or other earth movement in excess of one-half cubic foot in volume, which leaves the site.”</li> </ul>
<p><b>Timelines for Enforcement</b></p>	<ul style="list-style-type: none"> <li>• Inspection Notice of Correction: The intent of this notice is to alert the responsible person(s) that corrective action must be taken within <b>3</b> calendar days.</li> <li>• Notice of Non-Compliance Incident: If the responsible EPSC person does not complete correction items documented and distributed under “Inspection Notice of Correction” within the <b>3 days</b> allowed, follow-up formal notice will be given using <i>Notification of Erosion Sediment Control Non-Compliance Incident (Attachment B of the SOP)</i>.</li> <li>• This notice indicates that serious consequences will result if non-compliant EPSC measures are not brought into compliance within <b>1 day</b> of this notice.</li> </ul>	<p>Not addressed.</p>	<ul style="list-style-type: none"> <li>• Per SMC 75.175-For a Stop Work Order appeal: Any person affected by any decision, action, or determination made by the Director, interpreting or implementing the provisions of this chapter, may file a written request for reconsideration with the Director <b>within 10 days of such decision, action, or determination</b>, setting forth in detail the facts supporting the person’s request for reconsideration.</li> <li>• The Director’s final order upon reconsideration may be appealed to the Hearings Officer by filing a written notice of appeal <b>no later than 10 days</b> after notification of the Director’s final order. The Director’s final order shall remain in effect during such pendency of reconsideration and appeal (per SMC 75.175).</li> </ul>
<p><b>Considers Severity of the Discharge</b></p>	<p>Step 1–Inspection Notice of Correction                      Step 2–Notice of Non-Compliance Incident                      Step 3–Stop Work Order: Step 3 includes if there is an imminent threat to sediment leaving the site then an immediate stop work order is authorized. This considers the severity of the discharge.                      Step 4–Civil Penalties for Violations</p>	<p>Section 1.4–Determination of Civil Penalties:</p> <ul style="list-style-type: none"> <li>• Table 1 includes an Enforcement Penalty Matrix that provides the following evaluation criterion:</li> <li>• Was the violation the result of events or circumstances not reasonably within the person’s control?</li> <li>• Was the person negligent by failing to obtain or comply with the necessary permits and approvals?</li> <li>• Was the action a willful and knowing violation?</li> <li>• Was the person unresponsive in correcting the violation?</li> <li>• Is this a repeat violation of the same or related provisions of the Salem Revised Code?</li> </ul>	<p>Under SMC 75.175–Stop Work Orders, Permit Revocation, Civil Penalties and Enforcement:</p> <ul style="list-style-type: none"> <li>• Stop Work Orders</li> <li>• Civil Penalty</li> <li>• Civil Penalties against agents</li> <li>• Prohibition of further approval, injunctive relief</li> <li>• Appeals</li> </ul> <p><i>These are in order of implementation regarding enforcement. This would be considered escalation of enforcement.</i></p>
<p><b>Penalties and Cost Recovery considers whether the discharge was accidental or intentional</b></p>	<ul style="list-style-type: none"> <li>• City Code SRC Chapter 75 provides for civil penalties to be issued to the responsible person(s) when there is an EPSC violation. Civil penalties will be levied in accordance with established processes in the amounts dictated by code and prescribed by Administrative Rule 109-001 Enforcement of the Utility Code (Attachment D of SOP).</li> <li>• Typical civil penalties will not be issued unless the Stop Work Order does not achieve the desired results; however, if the non-compliance issue is repeated offense and/or the violation is serious enough, civil penalties may be levied at any time in the enforcement process.</li> <li>• Administrative Rules (Design Standards) 109-001 Enforcement of Utility Code (Attachment D of SOP) is a guideline for uniform procedures and methodology for the imposition of civil penalties for SRC violations.</li> </ul>	<p>Chapter 109, Division 100-1, Section 1.5 addresses willful violations as an enforcement evaluation criterion.</p> <p>Section 1.5–Criteria Rating Guidance: Points assigned based on a person’s involvement and knowledge of a violation. Points range from 0 to 3 per criteria.</p>	<ul style="list-style-type: none"> <li>• <i>Civil penalty.</i> Any person who fails to comply with the requirements of this chapter, or the terms of a permit issued hereunder, who undertakes an activity regulated by this chapter without first obtaining a permit, or who fails to comply with a stop work order issued pursuant to this chapter shall also be subject to a civil penalty, not to exceed \$2,000.00 per violation. Each day that a permit violation continues shall constitute a separate violation (Per SMC 75.175).</li> <li>• <i>Falsifying Information.</i> It shall be a violation for any person to knowingly make any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to this SMC 75 (per SMC 75.200).</li> </ul>
<p><i>Yes, Salem considers if the discharge was accidental or intentional through the falsifying information clause.</i></p>			

## **Attachment D: Post-Construction Gap Analysis**

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# Attachment D: Post-Construction Gap Analysis

	Requirement from the Phase I Permit (effective October 1, 2021)	Current Status of Salem's Standards with Respect to Addressing the Requirement	Manual and/or Code Reference	Identified Gaps	Further Clarification or Discussion
Schedule A.3.e	Post-Construction Site Runoff for New Development and Redevelopment				
	The Permittee must continue to implement their post-construction stormwater pollutant and runoff control program as they develop, implement, and enforce the requirements of Schedule A.3.e to control stormwater runoff from new development and redevelopment project sites in its coverage area and reduce the discharge of pollutants. The Permittee must describe or refer to full documentation of its programs in the SWMP Document.	N/A - procedural (see the City's 2022 SWMP).			
i.	Ordinance and/or Other Regulatory Mechanism				
	Through ordinance or other regulatory mechanism, to the extent allowable under state law and within the constraints of land use and zoning regulations, the permittee must require the following for project sites discharging stormwater to the MS4 that create or replace impervious 1,300 SF or more of impervious surface area for single family residential projects or 5,000 SF or more of impervious surface area for all other development projects:	<p>In Administrative Rules - Design Standards Div 400, Section 4.2(a), Project types include:</p> <ul style="list-style-type: none"> <li>• <b>Single Family Residential</b> (total impervious surface is 1,300 to 10,000 SF) shall be designed and constructed with GSI to the MEF except where flow control facilities and treatment facilities have already been constructed per Salem Revised Code (SRC) Chapter 71 to serve the lot or parcel.</li> <li>• <b>Non Single Family Residential</b> (less than 10,000 SF of new or replaced impervious surface), SRC does not require Non-SFR projects consisting of less than 10,000 SF of new or replaced impervious surface to provide stormwater flow control or general stormwater treatment.</li> <li>• <b>Large Projects</b> (new or replaced impervious surface greater than 10,000 SF). Large projects are required to provide both flow control and treatment facilities using GSI to the MEF and conforming to these Design Standards. This includes all projects with 10,000 SF or more of ground disturbing activities. To fully meet the requirements for large projects, both treatment and flow control facilities must meet the standards for GSI/MEF.</li> <li>• <b>All Projects</b>. Refers to SRC Chapter 71 for other requirements for all projects regardless of size such as source control, discharge to wetlands, preserving trees, providing landscaping. Project that are adjacent to an existing open channel waterway or within the 100-year floodplain of any waterway must meet the requirements of SRC Chapter 140.</li> </ul>	<p>Administrative Rules - Design Standards (dated January 2014, referred to as Design Standards hereafter) Div 400, Section 4.2(a) Project Type Thresholds and Discharge Requirements</p> <p>SRC 70.005 Definitions (SFR, Large Projects, Projects, Replaced Impervious)</p> <p>SRC Sec 71.085 (requirements for single family residential projects)</p> <p>SRC Sec. 71.090 (requirements for large projects)</p>	<p>The 10,000 SF threshold for large projects/non-single family residential projects to require flow control or treatment does not meet the 5,000 SF Permit requirement.</p> <p>Note - SRC Sec. 71.095 lists projects exempt from flow control requirements. This includes road maintenance projects "replacing existing impervious surface down to earth material". The Permit definition of "replace or replacement" mirrors the SRC definition of replacement does not include repair or maintenance activities on structures or facilities, or impervious surface, as long as no additional hydrologic impact results from the repair or maintenance activity.</p> <p>Clarify where duplex projects fit into the thresholds. It appears when reading the SRC and Admin Rules, that duplexes have the same stormwater requirements as Single-Family Residential.</p>	The Design Standards reference to SFR development lists TOTAL impervious surface area as the threshold. This needs to be revised to be specific to new or replaced in accordance with SRC 71.005. New and replaced impervious surface are both not defined in the Design Standards definitions.
(A)	The use of stormwater controls at all qualifying sites.	See previous row.	See previous row.	See previous row.	
(B)	A site-specific stormwater management approach that targets natural surface or predevelopment hydrological function through the installation and long-term operation and maintenance of stormwater controls, with focus on management of quantity and quality of stormwater discharge.	<p>SRC 71.095.(c) Flow Control Performance Standard:</p> <p>(1) The post-development peak runoff rates from design storm events equal to or less than one-half the 2-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for one-half the 2-year, 24-hour design storm event;</p> <p>(2) The post-development peak runoff rates from design storm events equal to or less than the 10-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for the 10-year, 24-hour design storm event; and</p> <p>(3) The post-development peak runoff rates from design storm events equal to or less than the 25-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for the 25-year, 24-hour design storm event; and</p> <p>(4) The post-development peak runoff rates from design storm events equal to or less than the 100-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for the 100-year, 24-hour design storm event.</p> <p>Design Standards Div 400, Section 4.2(b) Green Stormwater Infrastructure to the Maximum Extent Feasible (GSI/MEF):</p> <ul style="list-style-type: none"> <li>• GSI means a stormwater facility that mimics natural surface hydrologic functions through infiltration and evotranspiration, or that involves stormwater reused (SRC Chapter 71.005(7)).</li> </ul> <p>SRC Chapter 71 requires the use of GIS to the MEF for SFR project or large projects.</p>	<p>SRC Sec. 71.095(c)</p> <p>Administrative Rules - Design Standards Div 400, Section 4.2(b) Green Stormwater Infrastructure to the Maximum Extent Feasible (GSI/MEF)</p> <p>Administrative Rules - Design Standards Div 400, Section 4.5(b)(2)(b) Flow control volume calculations, Peak discharge rate</p>	None.	<p>Definition in Design Standards: GSI indicate it HAS to be an infiltration facility. Stormwater management facilities is used for other treatment, conveyance and detention. The permit references "structural or extended filtration control". May want to expand definitions to better reflect permit terminology.</p> <p>The City does not require flow duration targets for matching predeveloped hydrology. However, enhancing infiltration: matching pre-development conditions that are more historic than current conditions; and matching peak flow for a range of storms does address flow duration. Given peak flow duration matching is not specifically required, Salem's standards are okay as is.</p>
(C)	Long-term operation and maintenance of stormwater controls at project sites that are under the ownership of a private entity.	<p>Design Standards Div 400, Section 4.2(s):</p> <ul style="list-style-type: none"> <li>• Operations and Maintenance (O&amp;M) requirements apply to all private stormwater treatment facilities and related facility components. Owners are required to provide access to the City and check their facilities regularly to determine maintenance needs. In addition, privately owned and maintained stormwater facilities require the submittal of a "Private Facility Agreement" and a "Facility Maintenance Form". See Administrative Rule 109-011—Operations and Maintenance of Stormwater Facilities.</li> </ul>	<p>Design Standards Div 400, Section 4.2(s) Operations and Maintenance Requirements</p> <p>Administrative Rule 109-011—Operations and Maintenance of Stormwater Facilities.</p>	N/A	
	The permittee must use appropriate enforcement procedures and actions to ensure compliance with Schedule A.3.e.v. The local ordinance or other regulatory mechanism adopted must meet the requirements of Schedule A.3.e.ii-vi.	<p><u>SRC 71.120 - Civil Penalties:</u></p> <ul style="list-style-type: none"> <li>• Any person who is found to have violated an order of the Director, or who willfully or negligently failed to comply with any provision of this chapter, and the orders, rules, and regulations issued hereunder, shall forfeit and pay not more than \$1,000.00 for each offense as determined by the Hearings Officer. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense.</li> </ul>	SRC Sec. 71.120	N/A	
ii.	Prioritization of Low Impact Development and Green Infrastructure				
	The Permittee must, by November 1, 2023, review and update or develop and begin implementation of a strategy to require to the maximum extent feasible, the use of Low Impact Development and Green Infrastructure (LID/GI) design, planning, and engineering strategies intended to minimize effective impervious area or surfaces, and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects. This LID/GI strategy must be documented in the subsequent Annual Report and incorporated into or referenced in the SWMP Document after completion and DEQ approval. In development of this strategy, the Permittee must review ordinance and development code for opportunities to reduce the volume of discharge by design, engineering, and planning methods that prioritize onsite retention, infiltration, and evapotranspiration and the option of reuse where feasible, in order to make LID/GI the preferred and commonly used approach to site development. The Permittee may include evapotranspiration and reuse of stormwater in accounting for retention volumes but are not required to exhaust those options prior to allowing treatment or offsite options as described below. Where LID/GI controls that infiltrate or otherwise retain stormwater onsite are infeasible, extended filtration shall be required.	<p><u>SRC Chapter 71.085 - Requirements for SFR and SRC Chapter 71.090 Requirements for Large Projects:</u></p> <ul style="list-style-type: none"> <li>• Except as provided in SRC 71.085(b), all SFR projects shall be designed and constructed with GSI to the MEF, except where flow control facilities and treatment facilities have already been constructed per SRC 71.080 (Requirements of land divisions) to serve the lot or parcel. For large projects, flow control and treatment facilities using GSI to the MEF are required.</li> </ul> <p><u>Design Standards - Multiple Sections</u></p> <ul style="list-style-type: none"> <li>• To fully meet the requirements for SFR projects, all SFR projects must meet the standards for GSI/MEF.</li> <li>• To fully meet the requirements for large projects, both treatment and flow control facilities must meet the standards for GSI/MEF. Although site constraints, limitations in engineering design, and financial costs should rarely completely restrict the use of GSI, the City recognizes that some projects will be unable to exclusively provide GSI. Appendix 4E—Implementing GSI to the MEF establishes the criteria for meeting the requirements to meet MEF for GSI (MEF/GSI).</li> </ul>	<p>SRC Chapter 71.085 and 71.090</p> <p>Design Standards Div 400, Section 4.2(a) Project Type Thresholds and Discharge Requirements</p> <p>Design Standards Div 400, Section 4.2(b) Green Stormwater Infrastructure to the Maximum Extent Feasible (GSI/MEF)</p> <p>Design Standards Div 400, Appendix 4E - Implementing Green Stormwater Infrastructure to the Maximum Extent Feasible</p>	As a result of the review and update of the LID/GI Strategy, the City must review applicable ordinances and development codes to identify any necessary updates.	The review and update of the LID/GI Strategy is procedural.
iii.	Post-Construction Stormwater Management Requirements				
	The Permittee must by November 1, 2024, develop and implement enforceable post-construction stormwater management requirements in ordinance or other regulatory mechanism that, at a minimum, prioritize onsite retention of stormwater and pollutant removal, and include technical standards according to either of the following options:	It is clear from the Design Standards that onsite GSI to the MEP is prioritized. See Schedule A.e.ii above.	N/A	N/A	
	<p><u>Numeric Stormwater Retention Requirement Site Performance and Treatment Standards</u></p> <p>If this option is selected, the Permittee must establish a site performance standard with a Numeric Stormwater Retention Requirement (NSRR) that retains stormwater onsite and minimizes the offsite discharge of pollutants in runoff by utilizing stormwater controls that infiltrate and facilitate evapotranspiration. The NSRR volume must be determined using one of the following methods:</p> <ol style="list-style-type: none"> <li>1. Volume-based method (e.g., retain volume created from the first inch of rainfall).</li> <li>2. Storm event/kilometer-based method (e.g., retain the 95th%ile storm event—95% of the time the data is below this value).</li> <li>3. Annual average runoff-based method (e.g., retain 85% of annual average runoff).</li> </ol>	<p>SRC 71.095(b)(4): Construction of a flow control facility at a location other than the site is allowed if:</p> <p>(A) The Director has determined that it is in the public interest to construct a flow control facility at a location other than the site. This determination shall consider the feasibility of constructing the flow control facility on the site; the costs associated with construction, operations, and maintenance of the flow control facility; and the benefits provided by the flow control facility in terms of accomplishing the purposes of this chapter; and</p> <p>(B) The flow control facility constructed at a location other than the site will mitigate similar impacts that have been identified as a consequence of the project.</p> <p>SRC 71.100(c): Treatment facilities must be designed to capture and treat at least 80% of the average runoff volume predicted by the water quality design storm (defined in SRC 70.005 as the total inches of rainfall, distributed during a 24-hour period using a standard synthetic rainfall distribution identified as Type I-A by the Natural Resources Conservation Service).</p> <p>Design Standards 4.2(b): GSI by definition means a stormwater facility that mimics natural hydrologic function through infiltration or evapotranspiration.</p> <p>Design Standards 4.2(p) and 4.2(p)(2): Treatment facilities must be designed to capture and treat at least 80% of the average runoff volume predicted by the water quality design storm of 1.38 inches/24 hours.</p> <p>Design Standards 4.3: Combined treatment and flow control facilities can be designed as infiltration, partial infiltration or filtration (treatment) systems. Infiltration &gt;=0.5 in/hr requires full infiltration. Filtration facilities are required with A. sites with slope stability concerns; B. Sites with a high groundwater table; C. Sites with contaminated soils; D. Where the physical limitations of the site do not allow for the setback from building foundations.</p>	<p>SRC Sec 71.095(b)(4), 71.100(c), and SRC 70.0005</p> <p>Design Standards Section 4.2(p) and 4.2(p)(2)</p>	<p>Salem does not explicitly have a numerical retention standard in place. However, because of the definition of GSI (infiltration facility) and requirement to use GSI to the MEF, infiltration (or retention) is prioritized. Design criteria associated with GSI facilities indicate sizing for infiltration of the water quality storm is required.</p> <p>It is not clear if combined treatment and flow control facilities (infiltration based facilities) are prioritized. Is infiltration testing required to qualify their use?</p>	<p>Were the SIM form sizing factors based on a specific design storm?</p> <p>Is the feasibility criteria of 10% of the site area based on a facilities ability to serve as a combined treatment and flow control facility?</p>
(A)	The NSRR is met when the NSRR runoff volume (as determined by the method chosen above) from new and/or replaced impervious surfaces is managed by one or more structural stormwater controls with sufficient capacity to retain the stormwater runoff onsite without adversely impacting groundwater quality per DEQ's groundwater protection requirements (OAR 340-40). The Permittee may require retention or detention in excess of the NSRR in order to prevent hydromodification or other capacity issues that might result from stormwater runoff discharging from the site.	N/A - see above	N/A	See above.	
	The first priority of this option is onsite retention, but at sites where the NSRR cannot be met due to technical infeasibility and/or site constraints (including zoning or land use regulations), the Permittee must require treatment of the runoff volume up to a specified water quality design storm, or at least 80% of average annual runoff, in structural or extended filtration stormwater control prior to discharge.	<p>Design Standards 4.3: Combined treatment and flow control facilities can be designed as infiltration, partial infiltration or filtration (treatment) systems. Infiltration &gt;=0.5 in/hr requires full infiltration. Filtration facilities are required with A. sites with slope stability concerns; B. Sites with a high groundwater table; C. Sites with contaminated soils; D. Where the physical limitations of the site do not allow for the setback from building foundations.</p> <p>Design Standards, Appendix 4E Implementing GSI to the MEF: Financial and non-financial factors are listed to substantiate not using GSI to the MEF (i.e., no infiltration).</p>	Design Standards Appendix 4E.8 and 9	Appendix 4E appears to primarily pertain only to large projects, are SFR projects regulated similarly?	How are these confirmed during plan review?
	The evaluation of technical infeasibility or site constraints should be based on justification provided in the site plan (see Schedule A.3.e.iv and v.).			Technical infeasibility criteria are listed in Design Standards Section 4.3, but do not include those readily identified during site assessment (distance to GW, min infiltration rate, slopes and setbacks).	

# Attachment D: Post-Construction Gap Analysis

Requirement from the Phase I Permit (effective October 1, 2021)	Current Status of Salem's Standards with Respect to Addressing the Requirement	Manual and/or Code Reference	Identified Gaps	Further Clarification or Discussion
<p>The procedures for allowing treatment of a portion of the NSRR (as opposed to 100% retention of the NSRR, in situations where 100% retention of the NSRR is infeasible or impracticable) should include a description of allowable structural stormwater controls that are designed to target the removal of TSS. The description of allowable structural stormwater controls must include site-specific design requirements, design requirements that do not inhibit maintenance, conditions where each control applies, and the operation and maintenance standards for each type of control. The Permittee may include an upper and lower bound on the effluent TSS concentration that reflects the practical limitation of an engineered control (e.g., 80% removal of TSS for typical influent concentrations ranging from 20 mg/L to greater than 200 mg/L).</p> <p>The Permittee must give priority to implementing green infrastructure before considering hardscaped structural stormwater controls (such as concrete vaults and piping, proprietary technologies, or other static non-GI facilities) for stormwater treatment. The Permittee may adopt specifications created by another entity that comply with these requirements.</p>	<p>SRC 71.100(c): Treatment facilities must be designed to capture and treat at least 80% of the average runoff volume predicted by the water quality design storm (defined in SRC 70.005 as the total inches of rainfall, distributed during a 24-hour period using a standard synthetic rainfall distribution identified as Type I-A by the Natural Resources Conservation Service).</p> <p>Design Standards 4.3: Combined treatment and flow control facilities can be designed as infiltration, partial infiltration or filtration (treatment) systems. Infiltration &gt;=0.5 in/hr requires full infiltration. Design requirements for various facility types are provided</p> <p>Design Standards 4.4: Stormwater treatment facilities require additional detention/ retention and must be situated offline. Design requirements for various facility types are provided</p>	Design Standards Section 4.3 and 4.4	N/A	
<p>All stormwater discharged offsite from new and/or replaced impervious surfaces, at least up to the NSRR volume must target natural surface or predevelopment hydrology (in terms of rate, duration, and/or volume) to minimize the potential for hydromodification impacts offsite except in circumstances where the Permittee can demonstrate that the risk of hydromodification impacts is negligible, (e.g., large tidally-influenced waterways or flow-managed waterways). The use of treatment trains of post-construction stormwater controls should be encouraged where appropriate for treating stormwater runoff that is managed offsite before discharging to receiving waters, to improve stormwater runoff quality and reduce discharge quantity.</p>	N/A - see above	N/A	The City does not require flow duration targets for matching predeveloped hydrology. However, enhancing infiltration; matching pre-development conditions that are more historic than current conditions; and matching peak flow for a range of storms does address flow duration. Given peak flow duration matching is not specifically required, Salem's standards are okay as is.	
<p><u>Alternative Site Performance Standards</u></p> <p>As an alternative or in addition to Option A in Schedule A.3.e.iii, the Permittees may establish design requirements including site performance standards determined to generate water quality benefits comparable to the NSRR approach for new development and redevelopment. The alternative site performance standards shall be included in ordinances or other enforceable documents adopted by the Permittee. <u>Such local requirements and thresholds shall provide equal or similar protection of receiving waters and equal or similar levels of treatment as the NSRR approach.</u> The Permittee must demonstrate how alternative compliance approaches <u>prioritize infiltration and LID/GI, include pollutant removal performance goals, target natural surface or pre-development site hydrology, and reduce the discharge of pollutants from new and/or replaced impervious surfaces.</u></p>	Salem requires projects that meet their thresholds to implement both flow control and treatment measures, as detailed above. These requirements are listed in the Salem Revised Code and Administrative Rules Design Standards, as referenced in the rows above.	N/A	Salem's standards appear to satisfy the criteria identified in the remainder of this subsection (B).  However, there may be a gap in requirements, depending on how the criteria of "comparable to the NSRR approach" and "provide equal or similar protection of receiving waters and equal or similar levels of treatment as compared to the NSRR approach" will be evaluated.	It is unclear from the Permit, other than the remaining paragraphs in this section, how the criteria of "comparable to the NSRR approach" and "provide equal or similar protection of receiving waters and equal or similar levels of treatment as compared to the NSRR approach" will be evaluated.  In the previous gap analysis Salem thought that their standards are "a better reflection of the state-of-the-practice and that our regulations produce higher benefits to receiving waters than DEQ's proposed requirements."  How is infiltration testing enforced?
<p>(B) The Permittee shall set requirements for site layout plans and a minimum set of specific onsite stormwater controls (collectively "site design measures") based on the GI approach of emphasizing infiltration, evapotranspiration and/or harvesting/reuse of stormwater. Site design measures shall be used to reduce the amount of runoff, comparable to the NSRR, to the extent technically feasible and not prohibited by other constraints such as land use regulations or other state or federal regulations. Any remaining runoff from impervious drainage management areas may be directed to one or more LID/GI facilities, extended filtration facilities, or other area. Site planning procedures shall require projects to consider site layout options that optimize retention of stormwater.</p>	<p><u>Prioritize LID/GI:</u> SRC Chapter 71 requires projects exceeding specified thresholds to use GSI/MEF to mitigate the impacts of stormwater runoff from the new and replaced impervious surfaces. This means the extent to which a requirement or Standard must be complied with as constrained by the physical limitations of the site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts. Design Standards include site planning and impervious reduction techniques.</p> <p><u>Include pollutant removal performance goals:</u> Gap in compliance</p> <p><u>Adequately maintain pre-development site hydrology:</u> SRC flow control performance standards include (1) The post-development peak runoff rates from design storm events equal to or less than one-half the 2-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for one-half the 2-year, 24-hour design storm event; (2) The post-development peak runoff rates from design storm events equal to or less than the 10-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for the 10-year, 24-hour design storm event; and (3) If a volume-based stormwater flow control facility is used, the detention volume shall be sufficient to detain a 100-year design storm event without overflow.</p> <p><u>Reduce the discharge of pollutants from new/replaced impervious surfaces:</u> "Treatment facilities shall be designed and installed to capture and treat at least 80% of the average runoff volume predicted by the design storm event for that portion of the site requiring treatment." Both flow control and treatment are required for projects meeting thresholds. Where flow-control only measures are constructed, treatment measures must also be constructed to meet the requirements in SRC Sec. 71, and vice versa.</p>	SRC Sec. 71.095 (c)  Design Standards Div 400, Section 4.2(b) Green Stormwater Infrastructure to the Maximum Extent Feasible (GSI/MEF)	Current standards do not specify pollutant removal performance goals beyond the volume-based requirement to treat 80% of the average runoff.  Salem will need to document how their program meets overall goals of retention and treatment similar to the retention performance standard.	"Adequately" maintaining pre-development hydrology appears to be defined in the following paragraphs as "measured by rate, duration, and volume of discharge".
<p>At sites where retention is infeasible due to technical and/or site constraints, the Permittee must develop a process whereby at least 80% of average annual runoff from new and/or replaced impervious surfaces, must be treated with an extended filtration stormwater control prior to discharge, to target removal of TSS.</p> <p>Stormwater discharged offsite must target natural surface or predevelopment hydrology (as measured by rate, duration, and/or volume of discharge) to minimize the potential for hydromodification impacts, except in circumstances where the Permittee can demonstrate that the risk of hydromodification impacts is negligible, (e.g., large tidally influenced waterways or flow-managed waterways). More stringent requirements may be used, and/or certain requirements may be tailored to local circumstances through the use of sub-basin plans or other similar stormwater management planning efforts.</p>	<p>SRC 71.095(c) and Sec 71.100(c): Treatment facilities shall be designed and installed to capture and treat at least 80% of the average runoff volume predicted by the design storm event for that portion of the site requiring treatment.</p> <p>SRC flow control performance standards have peak flow rate and volume-based criteria. Flow duration requirements are not included.</p> <p>(1) The post-development peak runoff rates from design storm events equal to or less than one-half the 2-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for one-half the 2-year, 24-hour design storm event;</p> <p>(2) The post-development peak runoff rates from design storm events equal to or less than the 10-year, 24-hour design storm event shall not exceed the predevelopment peak runoff rate for the 10-year, 24-hour design storm event; and (3) If a volume-based stormwater flow control facility is used, the detention volume shall be sufficient to detain a 100-year design storm event without overflow.</p>	SRC Sec 71.095(c) and Sec 71.100(c)	The City does not require flow duration targets for matching predeveloped hydrology. However, enhancing infiltration does address flow duration. Given peak flow duration matching is not specifically required, Salem's standards are okay as is, and they are meeting the 80% of average annual runoff volume requirement.	
<p>iv. <u>Water Quality Benefit Offset Programs</u></p> <p>The Permittee may develop water quality benefit offset programs as options for sites that, under Option A of Schedule A.3.e.iii, cannot meet the NSRR and for which full treatment of the NSRR design storm event is impracticable, or for sites under Option B that require special consideration for other reasons, or for sites unable to meet other stormwater requirements established by the Permittee. Economic considerations alone are insufficient reason for not requiring adherence to the retention or treatment standards above. The options may include, but are not limited to stormwater mitigation options, a payment-in lieu program, groundwater replenishment program, or another option that matches the water quality goals of retaining or treating stormwater at any given site. If the Permittee choose to provide one or more water quality benefit offset programs, the Permittee must develop and document how the alternative option works and what the standards and management systems are to value, estimate, and/or account for the ecological impact of untreated stormwater at qualifying sites. All programs developed should implement mitigation or other projects in the same sub-watershed (as defined in Schedule D) as the proposed project, to the degree possible. Exceptions should be documented with appropriate rationale.</p>	<p>SRC 71.025(a) Fee-in-lieu of Construction: City code authorizes the Director to "allow a developer to enter into a voluntary agreement with the City for the payment of a fee-in-lieu of constructing a stormwater facility". A requirement of this program is: "in no event shall the Director allow a developer to enter into a fee-in-lieu agreement with the City if the resulting post-development conditions could result in a violation of the City's NPDES municipal stormwater permit."</p> <p>SRC 71.025(a) Fee-in-lieu of Construction: The fee-in-lieu program includes specifications that "This determination shall consider the feasibility of constructing the stormwater facility on the site; the costs associated with construction, operations, and maintenance of the stormwater facility; and the benefits provided by the stormwater facility in terms of accomplishing the purposes of this chapter."</p> <p>SRC 71.025(b) Fee-in-lieu of Construction: The code language says that the fee can (not must) be used to fund all or a portion of the cost of planning, designing, acquiring land for, or constructing a new or existing public stormwater facility.</p> <p>SRC 71.030 Fee-in-lieu amount: The fee-in-lieu amount shall be in accordance with a fee schedule approved by Council and will be based on 100% of the average cost of constructing an equivalent stormwater facility.</p>	SRC Sec. 71.025, 71.030	N/A	
<p>v. <u>Post-Construction Site Runoff Plan Review</u></p> <p>The Permittee must have documented, standardized procedures for the review and approval of structural stormwater control plans for new development and redevelopment projects, and procedures must be detailed or referenced in the SWMP Document.</p> <p>At a minimum, the Permittee must review and approve or disapprove plans for structural stormwater control at new development and redevelopment sites that result from the creation or replacement of impervious surface equal to or greater than 1,300 SF for single family residential or 5,000 SF for all other development projects; and sites that use alternative compliance to meet the retention requirement, before construction permits are issued. The Permittee must review plans for consistency with the ordinance/regulatory mechanism and specifications required by Schedule A.3.e.i.</p> <p>The Permittee must require and subsequently review and approve or disapprove the written technical justification to evaluate any technical infeasibility or site constraints which prevent the onsite management of the runoff amount stipulated in the NSRR or the site's ability to meet the alternative site performance standard. The written technical justification must be in the form of a site-specific hydrologic or technical analysis. The Permittee must establish criteria or circumstances under which such analysis must be conducted, and the results of the Permittee's review must be documented. Such infeasibility or constraint factors may include, but are not limited to, low infiltration rates, shallow bedrock, high groundwater, groundwater contamination, soil instability as documented by geotechnical analysis, or land use or zoning constraints. The determination that the NSRR or Alternative Site Performance Standard cannot be achieved at a project site must be based on documented infeasibility criteria or constraints considering multiple technical factors.</p>	<p><u>Design Standards Appendix 4A</u> contains Stormwater Submittal Requirements.</p> <p>Design Standards Appendix 4A.1 and 4A.2: The Simplified Method may be used to design stormwater facilities for SFR projects and for other projects where the total impervious area is less than 10,000 SF. For projects where the impervious surface area is 10,000 SF or more, the Engineered Method must be used to design the stormwater facilities. For these projects, the applicant will submit all the items listed in Subsection 4A.1—Simplified Method Submittal Guide in addition to a Stormwater Management Report.</p> <p><u>Design Standards Appendix 4E.10 (c) - Implementing Green Stormwater Infrastructure to the Maximum Extent Feasible, Approval Process:</u> Stipulates that The Director may require an applicant to provide an engineering report, signed and stamped by a licensed professional.</p>	Design Standards Div 400, Appendix 4A  Design Standards Div 400, Appendix 4A including 4A.1 and 4A.2  Design Standards Appendix 4E.10(c)	N/A  The 10,000 SF threshold for large projects/non-single family residential projects to require flow control or treatment does not meet the 5,000 SF threshold requirement.  It is also not clear from the SRC or Design Standards that SFR projects must submit a stormwater submittal. The use of "may be used" does not specify that they must use either the Simplified or Engineered Method.  This standard does not require a site-specific hydrologic report stamped by a licensed professional. The standard is the Director "may require" an engineering report, signed and stamped by a licensed professional.  Need to determine the review criteria considering multiple technical factors for determining if the NSRR cannot be achieved.	Following updates to the post construction design standards, 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, review and update (if necessary) the internal SOP for stormwater plan review that guides the review and approval of structural stormwater control plans.  Change the language from "may be used" to something more definitive.  Did not identify any other standards relating to justification of technical infeasibility besides this one for the GSI to MEF when conducting this analysis

# Attachment D: Post-Construction Gap Analysis

	Requirement from the Phase I Permit (effective October 1, 2021)	Current Status of Salem's Standards with Respect to Addressing the Requirement	Manual and/or Code Reference	Identified Gaps	Further Clarification or Discussion
vi.	<b>Long-Term Operation and Maintenance (O&amp;M)</b>  The Permittee must continue to maintain an inventory and implement a strategy to ensure that all public and private stormwater controls that discharge to the MS4 are operated and maintained to the maximum extent practicable. This strategy must, at minimum, include the following:	Design Standards Div 400, Sec. 4.2(s) Operations and Maintenance Requirements: specifies that "Operations and Maintenance (O&M) requirements apply to all private stormwater treatment facilities and related facility components. Owners are required to provide access to the City and check their facilities regularly to determine maintenance needs." In addition, privately owned and maintained stormwater facilities require the submittal of a "Private Facility Agreement" and a "Facility Maintenance Form".	Design Standards Div 400, Sec. 4.2(s)	N/A	Do the Private Facility Agreement or Facility Maintenance Forms needs to be updated?
(A)	Legal authority allowing the Permittee to inspect and require effective operation and maintenance of privately owned and operated stormwater controls that discharge to the MS4.	<u>Administrative Rule 109-011 1.1(c ) Introduction. Authority to Adopt:</u> The requirements for O&M are outlined and cite legal authorization as SRC Chapters 20J, 70, and 71. The requirements contained in the Administrative Rule 109-011 shall be consistent with the SRC. In the cases where a conflict may exist, the SRC takes precedence.	Administrative Rule 109-011	N/A	
(B)	Continued maintenance of the inventory and mapping developed under the previous permit term for all public stormwater facilities, as well as private facilities which discharge to the MS4 and which have been either constructed since January 1, 2011, used to estimate pollutant load reduction as part of the TMDL benchmark evaluation, or otherwise determined by the Permittee to be major stormwater facilities or controls.	N/A - procedural (see the City's 2022 SWMP).			
(C)	Maintenance and inspection criteria, rationale, priorities, frequency, and procedures, and an inspection schedule ensuring compliance with the O&M requirements of each type of stormwater control operated by the Permittee and by other private entities.	All specified in Administrative Rule 109-011 - Operations and Maintenance of Stormwater Facilities	Administrative Rule 109-011	N/A	
(D)	Tracking mechanism(s) for documenting inspections, as well as verification that site owners are prepared to meet the O&M requirements for private stormwater controls. The tracking mechanism(s) must document enforcement actions and compliance response. For stormwater controls that include vegetation, the O&M requirements must at minimum include requirements to remove sediment accumulation and manage the vegetation community to ensure the functionality of the control. For stormwater controls that include soils in the treatment process, O&M requirements must at minimum include requirements for practices to maintain soil permeability. For manufactured stormwater technology, O&M requirements must include, as applicable, documentation of the model number, manufacturer, or equivalent identifiers where available, information about suppliers and/or vendors, and schedules for replacement at regular intervals, as well as plans or contracts for an appropriate supply of such components to ensure proper treatment function and timely maintenance.	Administrative Rule 109-011 - O&M, 1.5 Maintenance or Private Stormwater Facilities and 1.6 Minimum Requirements for Operations and Maintenance These sections specify the recordkeeping requirements. The Private Stormwater Facilities Agreement is required. It provides address and contact info of property owner, documents locations of facilities, establishes the responsibility of the owner for inspection, operations, and maintenance, identifies the specific maintenance activities that will be implemented, and grants the City access for inspection and emergency action.  Administrative Rule 109-011 Appendix B contains Facility Maintenance forms. These include specifications for vegetations including schedule and direction for maintenance, specification that amended soils shall function properly. Item number 8 contains specifications for Manufactured Treatment Technology to be maintained in accordance with manufacturer specs.	Administrative Rule 109-011 - O&M, Sections 1.5 and 1.6; Appendices A and B	Documentation of a tracking mechanism for documenting enforcement actions and compliance was not identified.  Appendix B, item 8 - Manufactured Treatment Technology does not require documentation of the model number, manufacturer, etc. for manufactured facilities.	
(E)	Required training or appropriate qualifications to inspect private stormwater facilities.	<u>Administrative Rule 109-011 Most</u> facilities listed in Appendix B contain the requirement that "Training and/or written guidance information for operating and maintaining treatment wetlands shall be provided to all property owners and tenants. This Facility Maintenance Form can be used to meet this requirement."	Administrative Rule 109-011 - O&M, Appendix B	All facilities should have this requirement for training.	Will need to evaluate whether the language that "This Facility Maintenance Form can be used to meet this requirement" will be enough to fulfill the permit requirement.  Is this training provided to all those private facility owners sufficient to meet Permit requirements?
(F)	Reporting requirements, where appropriate as determined by the Permittee, for privately owned and operated stormwater controls.	<u>Administrative Rule 109-011 Appendix B</u> is an O&M plan for existing stormwater controls	Administrative Rule 109-011 - O&M, Appendix B	N/A	
(G)	The location of all public and private stormwater controls installed in compliance with this permit must be included with the MS4 Map and Digital Inventory described in Schedule A.3.c.i.	N/A - procedural (see the City's 2022 SWMP).			
vii.	<b>Training and Education</b>  The Permittee must ensure that staff responsible for performing post-construction runoff site plan reviews, administering the post-construction program requirements, and performing O&M practices or evaluating compliance with long-term O&M requirements, are trained or otherwise qualified to conduct such activities, and training strategies and frequencies for staff must be described or referenced in the SWMP Document.	N/A - procedural (see the City's 2022 SWMP).			
viii.	<b>Tracking and Assessment</b>  The Permittee must maintain records for activities conducted to meet the requirements of the Post-Construction Site Runoff program, and include a descriptive summary of their activities and report on metrics or tracking measures related to implementation of the program in the corresponding Annual Report.	N/A - procedural (see the City's 2022 SWMP).			

Note:      Cells shaded in this color indicate that the requirement in the NPDES MS4 Permit is not one that is typically addressed in code or standards.

- Acronyms and Abbreviations:**
- SRC Salem Revised Code
  - O&M Operation and Maintenance
  - N/A Not Applicable
  - MEF Maximum Extent Feasible
  - LID Low Impact Development
  - GI Green Infrastructure
  - GSI Green Stormwater Infrastructure
  - MS4 Municipal Separate Storm Sewer System

## **Attachment E: Definitions Comparison Summary**



# Attachment E: Definitions Comparison Summary

List of documents consulted:

Salem's Phase I Permit

Salem's Revised Code Sections 70.005, 75.0202, 82.005

Admin Rules - Chapter 109-001 Acronyms and Definitions

New Definitions to be added.

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Definitions defined in the Permit, SRC and/or Admin Rules that should be defined in both standards consistency, if the term is used in the standards update.

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Term	Salem's Phase I Permit Definition	Salem Revised Code Sections 70.005, 75.0202, 82.005 Definitions	Admin Rules-Chapt 109-001 Acronyms and Definitions	Notes/Suggestions for Updating Definitions
<b>Adaptive Management</b>	A structured, iterative process designed to refine and improve stormwater programs over time by evaluating results and adjusting actions based on what has been learned.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Antecedent Dry Period</b>	The period of dry time between precipitation events that include less than 0.1 inch of precipitation.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Best Management Practices (BMPs)</b>	Schedules of activities, prohibition of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state. BMPs are also treatment requirements operating procedures, and practices to control runoff, spillage, or leads, sludge, or waste disposal, or drainage from raw material storages. See 40 CFR § 122.2 and 122.44(k). For the purposes of this permit, BMPs are synonymous with structural and non-structural stormwater controls and include the schedule of activities, controls, prohibition of practices, maintenance procedures and other management practices designed to prevent or reduce pollution	Activities, prohibitions of practices, operational and maintenance procedures, structural facilities, or managerial practices or devices that, when used singly or in combination, prevent, reduce, or treat contamination in drainage water, prevent or reduce soil erosion, or prevent or reduce other adverse effects of drainage water on receiving waters. BMPs prescribed by the Director, whether or not adopted by ordinance, shall be the BMPs required for compliance with this Code.	The technique, measure, or structural control that is used for a given set of conditions to manage and prevent erosion, control sediment, and improve the quality of storm water runoff.	Review and revise this definition for consistency between the Permit and the SRC and Admin Rules, if the term is used in the standards update.
<b>CFR</b>	The Code of Federal Regulations, which is the official annual compilation of all regulations and rules promulgated during the previous year by the agencies of the United States government, combined with all the previously issued regulations and rules of those agencies that are still in effect.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Chronic Illicit Discharges</b>	Continuous or repeated illicit discharges to an MS4 potentially resulting from sanitary/wastewater connections to an MS4, sanitary/wastewater inflows into an MS4, unpermitted industrial wastewater discharges to the MS4, or other types of illegal dumping or poor housekeeping practices upstream from an outfall where irregular flows, color, smell, or other monitoring parameters indicate an issue that may need repeat investigations over time to ensure cross connections or illegal dumping are remedied. Chronic illicit discharges may not be long-term and ongoing as in the case of illicit connections that can be stopped easily. Chronic illicit discharges may be defined by inconclusive findings of outfall investigations indicating pollutant discharge or repeated reports by members of the public that have not been traced back to a definite source.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>City</b>	Not defined.	Not defined.	Not defined.	Add this definition to the SRC and Admin Rules.
<b>Clean Water Act (CWA)</b>	Refers to what was formally called the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483, and Public Law 97-117, 33 U.S.C. § 1251 et seq. [40 CFR §122.2].	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Construction activity</b>	Includes, but is not limited to, clearing, grading, excavation, and other site preparation or ground disturbing work related to the construction of residential buildings and non-residential buildings, and heavy construction (e.g., highways, streets, bridges, tunnels, pipelines, transmission lines and industrial non-building structures).	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Control Measure</b>	As used in this permit, refers to any action, activity, Best Management Practice or other method used to control the discharge of pollutants in MS4 discharges.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Conveyance System</b>	Not defined.	Not defined.	Not defined.	Add this definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Design Storm</b>	Not defined.	Not defined.	The distribution of rainfall intensity over time, identified to have a probability of recurrence, given in years (i.e., five-year design storm). Often, the term "design storm" is truncated when describing design storm characteristics (i.e., five-year flow).	Add this definition to the SRC.
<b>Design Storm Event</b>	Not defined.	The size of the storm event used to calculate runoff volumes and peak rates of discharge when designing stormwater facilities. The design storm event is the total inches of rainfall, distributed during a 24-hour period using a standard synthetic rainfall distribution identified as Type I-A by the Natural Resources Conservation Service.	Not defined.	Add this definition to the Admin Rules.
<b>Detention</b>	Not defined.	Not defined.	Not defined.	Add this definition to the SRC and Admin Rules, if the term is used in the standards update.



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<b>Discharge</b>	Of a pollutant means any addition of any "pollutant" or combination of pollutants to "waters of the state" from any "point source," or any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This definition includes additions of pollutants into waters of the state from surface runoff, which is collected or channeled by humans; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person, which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any "indirect discharger" [40 CFR §122.2].	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Downstream Analysis</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Drywell</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Effective Impervious Area</b>	The subset of the total impervious area often hydrologically connected to stream networks via stormwater infrastructure. Many methods of calculating effective impervious area have been developed, and its importance in runoff modeling and watershed health has been well established in stormwater related academic and scientific literature, making it a governing characteristic of urban watersheds.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Erosion</b>	The process of carrying away soil particles by the action of water, wind, or other process.	The wearing away of the ground surface, or the movement, detachment or dislocation and transport of sediment including soil particles by the action of water or wind.	Not defined.	Review and revise this definition for consistency between the Permit and the SRC and Admin Rules, if the term is used in the standards update.
<b>Erosion Control Permit</b>	Not defined.	A permit issued by the City for the construction of facilities for the prevention or control of erosion, runoff, or sediment.	Not defined.	Review and revise this definition for consistency between the Permit and the SRC and Admin Rules, if the term is used in the standards update.
<b>Erosion Prevention</b>	Not defined.	A measure that prevents or reduces the creation of sediment.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Erosion and Sediment Control Plan</b>	A site-specific plan, map, or document that illustrates and/or lists erosion and sediment control measures that are implemented by type and location on a construction site, that for operators and inspectors alike: (1) identifies potential sources of stormwater pollution at the construction site; (2) describes stormwater controls to prevent pollutants in stormwater discharges from the construction site; (3) tracks or records updates and corrective actions implemented as site conditions or needs change; and (4) identifies procedures the operator will implement to comply with the terms and conditions of this permit.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Evaporate</b>	Rainfall that is changed or converted into a vapor.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Evapotranspiration</b>	The sum of evaporation and transpiration of water from the earth's surface to the atmosphere. It includes evaporation of liquid or solid water plus the transpiration from plants.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Extended Filtration</b>	The technique of using stormwater facilities designed to promote stormwater runoff filtration through natural or engineered media. The runoff is treated through physical, biological, and chemical processes as it filters through the media of the facility. Filtration is promoted by constructing the facility with media of an appropriate infiltration rate and typically includes an underlying aggregate rock reservoir or other engineered flow-through and filtration media, with an underdrain to convey to a discharge location.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Final Stabilization</b>	Is determined by satisfying the following criteria: (1) there is no reasonable potential for discharge of a significant amount of construction related sediment or turbidity to surface waters; (2) construction materials and waste have been removed and disposed of properly. This includes any sediment that was being retained by the temporary erosion and sediment controls; (3) all temporary erosion and sediment controls have been removed and disposed of properly, unless doing so conflicts with local requirements; (4) all soil disturbance activities have stopped and all stormwater discharges from construction activities that are authorized by this permit have ceased; (5) all disturbed or exposed areas of the site are covered by either final vegetative stabilization or permanent stabilization measures. However, temporary or permanent stabilization measures are not required for areas that are intended to be left unvegetated or unsterilized following construction (such as dirt access roads, utility pole pads, areas being used for storage of vehicles, equipment, or materials), provided that measures are in place to eliminate or minimize erosion.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.

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Flow Control	Not defined.	Not defined.	The practice of limiting the release of peak flow rates and volumes from a site. Flow control is intended to protect downstream properties, infrastructure, and natural resources from the increased stormwater runoff peak flow rates and volumes resulting from development.	Add the Admin Rules definition to the SRC, if the term is used in the standards update.
Flow Control Facility	Not defined.	A stormwater facility designed to control the flow rate, flow volume, or flow duration of drainage water.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
Green Infrastructure (GI)	A specific type of stormwater control using vegetation, soils, and natural processes to manage stormwater. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems designed to mimic nature by reducing and/or storing stormwater through infiltration, evaporation, and transpiration. At the site level, such measures may include the use of plant or soil systems, permeable pavement or other pervious surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspiration stormwater and reduce flows to sewer systems or to surface waters. At the scale of city or county, green infrastructure refers to the patchwork of natural areas that provides flood protection and natural processes that remove pollutants from stormwater.	Not defined.	Not defined.	GSI (SRC and Admin Rules) vs GI: GI definition is broader to include plant or soil systems. GSI requires infiltration. Revise definitions if needed, and review how the terms are used in the SRC and Admin Rules for consistency.
Green Stormwater Infrastructure	Not defined.	a stormwater facility that mimics natural surface hydrologic functions through infiltration or evapotranspiration, or that involves stormwater reuse.	A stormwater facility that mimics natural surface hydrologic functions through infiltration or evapotranspiration, or that involves stormwater reuse (SRC 71.005(7)).	
Ground Disturbing Activity	Not defined.	Any activity that exposes soil through the use of mechanical equipment, including, but not limited to, grading, excavating, filling, clearing, or working of land. Such disturbance may be permanent (i.e., gravel mining, farming, gardening, sports fields, etc.); or temporary or short-term duration such as construction, excavation, fill, grading, landscape installation, or other vegetative clearing activities.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
Impaired Water	Any waterbody that does not meet applicable water quality standards for one or more parameters as identified on Oregon's 303(d) list.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
Infiltration	The process by which storm water penetrates into soil.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
Illicit Connections	Include, but are not limited to, pipes, drains, open channels, or other conveyances that are connected to the MS4 but were constructed for or are currently being used to convey non-stormwater discharges to the public stormwater system or waters of the state and are controlled under the permittee's IDDE program.	any drain or conveyance system that results in a discharge to a stormwater system or receiving water that is not entirely drainage water.	Not defined.	Review and revise this definition for consistency between the Permit and the SRC and Admin Rules, if the term is used in the standards update.
Illicit Discharge	Any discharge to a municipal separate storm sewer system that is not composed entirely of stormwater except discharges authorized under Section A.4.a.xii., discharges permitted by a NPDES permit or other state or federal permit, or otherwise authorized by DEQ.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
Impervious	Not defined.	Not defined.	Areas or surfaces located above ground, at the ground surface, or below ground which retard saturation of direct rainfall into the land subsurface or otherwise cause stormwater to run off the land surface at an increased rate of flow from that present under natural, undeveloped conditions.	Review and revise these definitions for consistency of use and the Permit definition, if the term is used in the standards update. Impervious can imply land coverage below grade and may be used to indicate threshold exceedance. Clarify in definitions of impervious to include gravel.
Impervious Surface	Any surface resulting from development activities that prevents the infiltration of water or results in more runoff than in the undeveloped condition. Common impervious surfaces may include but are not limited to building roofs, traditional concrete or asphalt paving on walkways, driveways, parking lots, gravel lots and roads, and packed earthen materials.	Any surface exposed to rainwater from which most water runs off.	Not defined.	
Integrated Pest Management	An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant plant varieties.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
Landscape Architect	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
Large Project	Not defined.	Not defined.	Not defined.	Add a definition for Large Project to the SRC and Admin Rules.

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<b>Low Impact Development (LID)</b>	A stormwater management approach that seeks to mitigate the impacts of increased runoff and stormwater pollution using a set of planning, design and construction approaches and stormwater management practices that promote the use of natural systems, green infrastructure, and other techniques for infiltration, filtration, evapotranspiration, and reuse of rainwater, and can occur at a wide range of landscape scales (e.g., regional, community and site). Low impact development is a comprehensive land planning and engineering design approach to stormwater management with a goal of mimicking the pre-development hydrologic regime of urban and developing watersheds.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update. The City should include a definition of LID to cover site planning and impervious reduction practices.
<b>Maximum Extent Feasible</b>	Not defined.	the extent to which a requirement or standard must be complied with as constrained by the physical limitations of the site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts	The extent to which a requirement or standard must be complied with as constrained by the physical limitations of the site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts (SRC 71.005(12)).	Same definition between the SRC and Admin Rules.
<b>Maximum Extent Practicable (MEP)</b>	The technology-based discharge standard for municipal separate storm sewer systems to reduce pollutants in storm water discharges that was established by Section 402(p)(3)(B)(iii) of the Clean Water Act [33 U.S.C §1342(p)(3)(B)(iii)].	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Minimize</b>	To reduce and/or eliminate to the extent achievable using control measures (including BMPs) that are technologically available, economically practicable, and achievable in light of best industry or municipal practices.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Municipal Separate Storm Sewer System (MS4)</b>	Defined in 40 CFR §122.26(b) and means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the Clean Water Act that discharges to waters of the United States; (ii) Designed or used for collecting or conveying storm water; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works as defined at 40 CFR §122.2.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Municipality</b>	A city, town, borough, county, parish, district, association, or other public body created by or under state law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the Clean Water Act.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>National Pollutant Discharge Elimination System (NPDES)</b>	The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of Clean Water Act [40 CFR §122.2].	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>New Impervious Surface</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>New Pervious Surface</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>NPDES MS4 Phase I Permit</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Non-Stormwater Pollution Controls</b>	Not defined.	Not defined.	Not defined.	*Used in the Admin Rules.* Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.

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<b>Non-structural Stormwater Controls or BMPs</b>	Stormwater controls in the form of development standards or other regulatory mechanisms intended to minimize and treat stormwater by minimizing impervious surfaces and by using soil infiltration, evaporation, and transpiration. These controls may also take the form of procedural practices to prevent pollutants from contaminating stormwater. The use of this term in this Permit is consistent with the discussion of non-structural stormwater BMPs in 64 Federal Register 68760 (December 9, 1999) which encompasses preventative actions that involve management and source controls such as: (1) policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive waterbodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; (2) policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure; (3) education programs for developers and the public about project designs or stormwater design standards that minimize water quality impacts; and (4) other measures such as minimization of the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, and other source control measures such as good housekeeping, street sweeping, preventive maintenance, spill prevention, and public education and outreach.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Outfall</b>	A point source at the point where a municipal separate storm sewer discharges to waters of the State, and does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Owner or Operator</b>	The owner or operator of any "facility or activity" subject to regulation under the NPDES program.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Pesticide</b>	As used in this Permit carries the same definition as used in the Federal Insecticide, Fungicide, and Rodenticide Act and is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Under FIFRA, pest is any insect, rodent, nematode, fungus, weed, or any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Pollutant</b>	Dredged spoil; solid waste; incinerator residue; sewage; garbage; sewerage sludge; munitions; chemical wastes; biological materials; radioactive materials; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water. [40 CFR §122.2]	Any substance that affects, or has the potential to affect, water quality in a manner that is detrimental to human health or safety or to the environment.	Not defined.	Review and revise this definition for consistency between the Permit and the SRC and Admin Rules, if the term is used in the standards update.
<b>Pollutants of Concern</b>	Defined in NPDES permitting as 1) pollutants with applicable Technology Based Effluent Limitations (TBELs) defined in an NPDES permit based on national or state standards or on a case by case basis, 2) pollutants for which a wasteload allocation (WLA) has been assigned to a discharge through a TMDL, 3) those pollutants identified in a previous iteration of the discharger's permit as needing Water Quality Based Effluent Limitations (WQBELs), 4) pollutants identified through monitoring as present in the effluent or stormwater discharges, or 5) pollutants not in any of the previous categories but otherwise expected to be present in the discharge. For this permit, use of the term is intended to focus on pollutants known by the permittee to be present in stormwater per categories 4) and 5), and prioritized for reduction via stormwater controls identified in this permit.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Pollution Control Measures</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Pollution Generating Activities</b>	Not defined.	Not defined.	Not defined.	*Current term used in the Admin Rules and are defined in SRC 71. Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Pollution Generating Surfaces</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Non-Pollutant Generating Surfaces</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Point of Discharge</b>	Not defined.	Not defined.	Not defined.	*As it related to the downstream analysis*. Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.

# Attachment E: Definitions Comparison Summary

List of documents consulted:

- Salem's Phase I Permit
- Salem's Revised Code Sections 70.005, 75.0202, 82.005
- Admin Rules - Chapter 109-001 Acronyms and Definitions

New Definitions to be added.
Permit definitions to be added to the SRC and Admin Rules, if the term is used in the standards update.
Definitions defined in the Permit, SRC and/or Admin Rules that should be defined in both standards consistency, if the term is used in the standards update.

**Note: This is an initial review of the definitions and is subject to be updated and reviewed further as the standards are updated.**

Term	Salem's Phase I Permit Definition	Salem Revised Code Sections 70.005, 75.0202, 82.005 Definitions	Admin Rules-Chapt 109-001 Acronyms and Definitions	Notes/Suggestions for Updating Definitions
<b>Post-Construction Site Runoff Plan</b>	A plan developed by a site owner or operator and/or their designer to demonstrate compliance with the post-construction stormwater management and long-term operation and maintenance requirements of this permit.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Post-Developed Condition</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Predevelopment</b>	Not defined.	The conditions on a site in its natural, undeveloped state, generally characterized by a mixture of trees, brush, weeds, and grass, and which is used to determine the allowable post-development discharge peak rates and flow volumes.	Not defined.	Currently defined in the SRC has site in its natural, undeveloped state. Review and revise the definition to be more clearly defined (i.e. is undeveloped state = Lewis and Clark?). In Appendix 4 pre-developed conditions are defined as "A homogeneous basin area will be assumed, regardless of the current conditions, when determining the peak runoff for pre-development conditions. The runoff characteristics for calculating allowable outflow are based on the combination of woods and grassland. These curve numbers have been calculated and provided in Appendix 4D—Hydrologic Analysis, Table 4D-6, "City of Salem Predevelopment." These curve numbers shall always be used for determining pre-development flow condition selected for the predominate soil type where the project is located."
<b>Predevelopment Hydrologic Function</b>	The hydrology of a site reflecting the local rainfall patterns, soil characteristics, land cover, evapotranspiration, and topography. The term predevelopment as used in predevelopment hydrologic function is consistent with the term predevelopment as discussed in Federal Register Volume 64, Number 235 and refers to the runoff conditions that exist onsite immediately before the planned development activities occur. Predevelopment is not intended to be interpreted as the period before any human-induced land disturbance activity has occurred.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Pretreatment</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Private Stormwater Facility</b>	Not defined.	any facility that is not owned or operated by the City that has been installed or constructed for the purpose of removing pollutants from stormwater, or for controlling the discharge flow rate, flow duration, or flow quantity of stormwater.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Private Stormwater System</b>	Not defined.	Not defined.	Owned and operated by a private property owner, a storm collection and conveyance system located outside the building envelope which serves one or multiple building storm drains, catch basins, area drains, or other drainage facilities. Generally synonymous with private storm sewer and private storm drain.	Add the Admin Rules definition to the SRC, if the term is used in the standards update.
<b>Professional Engineer</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Receiving Water</b>	Not defined.	the surface water, groundwater, or wetland receiving any discharge of drainage water or pollutants.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Redevelopment</b>	A project on a previously developed site that results in the addition or replacement of impervious surface.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Replaced Impervious Surface</b>	Not defined.	The removal of impervious surface down to earth material and replacement with new impervious surface. Replacement does not include repair or maintenance activities on structures, paved surfaces, or facilities taken to prevent decline, lapse, or cessation in the use of the existing impervious surfaces as long as no additional hydrologic impact results from the repair or maintenance activity.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.

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List of documents consulted:

Salem's Phase I Permit

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**Note: This is an initial review of the definitions and is subject to be updated and reviewed further as the standards are updated.**

Term	Salem's Phase I Permit Definition	Salem Revised Code Sections 70.005, 75.0202, 82.005 Definitions	Admin Rules-Chapt 109-001 Acronyms and Definitions	Notes/Suggestions for Updating Definitions
<b>Replace or Replacement</b>	in the context of this permit, these words will usually refer to the removal of an impervious surface that exposes soil followed by the placement of an impervious surface. Replacement does not include repair or maintenance activities on structures or facilities taken to prevent decline, lapse or cessation in the use of the existing structures, facilities, or impervious surface, as long as no additional hydrologic impact results from the repair or maintenance activity.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Retention</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Retrofit</b>	Not defined.	Not defined.	The creation or modification of an urban runoff management system in a previously developed area. This may include wet ponds, infiltration systems, wetland plantings, stream bank stabilization, and other BMP techniques for improving water quality and creating aquatic habitat. A retrofit can consist of the construction of a new BMP in a developed area, the enhancement of an older urban runoff management structure, or a combination of improvement and new construction.	Add the Admin Rules definition to the SRC, if the term is used in the standards update.
<b>Seasonal High Groundwater</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Sediment Control</b>	Not defined.	A measure that prevents or reduces the amount of eroded material leaving the site.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Single Family Residential Project</b>	Not defined.	The construction of one single family dwelling or two attached single family dwellings on a single existing unit of land that is zoned Single Family Residential (RS) where the total new and replaced impervious surface is 1,300 square feet or more, but less than 10,000 square feet.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Source Controls</b>	Not defined.	Structures or operations that minimize or prevent pollutants from coming in contact with drainage water through physical separation or management of activities.	Facilities and/or actions that address site activities and characteristics with the potential to generate pollutants that may not be addressed solely through the pollution reduction facilities.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Stream</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Storm Drainage System</b>	Not defined	All conduits, ditches, gutters, catch basins, or any other facilities convenient or necessary to carry away and dispose of stormwater and subsurface drainage, surface water, or unpolluted surplus water.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Stormwater</b>	Not defined	That portion of precipitation and snowmelt that does not naturally percolate into the ground or evaporate, but flows into receiving water by overland flow, interflow, pipes, and other features of a stormwater system.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Stormwater or Stormwater runoff</b>	Includes snow melt runoff, and surface runoff and drainage, and is defined in 40 CFR §122.26(b)(13). "Stormwater" means that 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 stormwater control or infiltration facility.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Stormwater Control</b>	Refers to non-structural, structural stormwater controls and/or BMPs.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update. The Permit's definition is confusing, especially with the existence of "Structural Stormwater Controls or BMPs" as a separately defined term. Revise and revise the definition as needed.
<b>Stormwater Facility</b>	Not defined.	A facility designed to control the flow rate, flow volume, or flow duration of drainage water, or a facility designed to remove pollutants from drainage water.	Not defined.	Review and revise these definitions for consistency of use.

# Attachment E: Definitions Comparison Summary

List of documents consulted: Salem's Phase I Permit

Salem's Revised Code Sections 70.005, 75.0202, 82.005

Admin Rules - Chapter 109-001 Acronyms and Definitions

New Definitions to be added.

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Definitions defined in the Permit, SRC and/or Admin Rules that should be defined in both standards consistency, if the term is used in the standards update.

**Note: This is an initial review of the definitions and is subject to be updated and reviewed further as the standards are updated.**

Term	Salem's Phase I Permit Definition	Salem Revised Code Sections 70.005, 75.0202, 82.005 Definitions	Admin Rules-Chapt 109-001 Acronyms and Definitions	Notes/Suggestions for Updating Definitions
<b>Stormwater Management Facilities</b>	Not defined.	Not defined.	Pipes, catch basins, waterways, detention basins, culverts, and other related facilities, used singularly or in combination for the purpose of collecting, conveying, storing, and/or treating stormwater runoff	Admin Rules definition includes conveyance; consistent terminology to be used for treatment facilities and flow control facilities not classified as GSI.
<b>Stormwater Management Program (SWMP)</b>	Refers to a comprehensive program that includes legal authority, permitting and stormwater control and facility design standards, capital projects and retrofits, monitoring and a stormwater management plan that collectively manages the quality of stormwater discharged from the municipal separate storm sewer system. For the purposes of this permit, the SWMP consists of the actions and activities conducted by the permittee as required by the permit and described in the permittee's SWMP Document.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>SWMP Document</b>	The written summary that describes the comprehensive management practices, structural and non-structural controls (or BMPs), techniques, systems, and design and engineering methods employed to reduce the discharge of pollutants from the MS4 to the MEP in accordance with the terms of the permit. A SWMP Document includes or references stormwater plans, manuals, documents or code/ordinances, as applicable, describing the unique and/or cooperative means by which an individual permittee or entity implements the specific stormwater management control measures required by the permit.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Stormwater Mitigation Bank Program</b>	A program for offsite compliance that establishes a market with an entity that tracks the life cycle of an offsite mitigation credit by certifying the credit, issuing a tradable credit to the seller, transferring the ownership of the credit from the seller to the buyer, and use or retirement of the credit to receive a benefit when buyer of the credit is unable to meet a retention requirement on their site.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Stormwater Payment-in-Lieu Program</b>	A program for offsite compliance where the permittee or site owner/operator pays a fee in lieu of full compliance with Schedule A.3.e.iii on the development site with this fee based on volume ratios (e.g., volume of stormwater to be retained onsite to the volume to be retained at the mitigation site) or impervious area unavailable for infiltration, at a rate or rates specified by the permittee. The permittee can aggregate fees and apply them to a public stormwater structural or non-structural control at a later point in time.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Stormwater System</b>	Not defined.	all stormwater facilities and improvements such as catch basins, curbs, gutters, ditches, manmade channels, and storm drains, that collect, convey, or control the flow of drainage water or remove pollutants from drainage water.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Structural Stormwater Controls or BMPs</b>	Stormwater controls that are physically designed, installed, and maintained to prevent or reduce the discharge of pollutants in stormwater to minimize the impacts of stormwater on waterbodies. As noted in the 64 Federal Register 68760 (December 9, 1999), examples of structural stormwater controls or BMPs include: (1) storage practices such as wet ponds and extended-detention outlet structures; (2) filtration practices such as grassed swales, sand filters and filter strips; and, (3) infiltration practices such as infiltration basins and infiltration trenches.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Subwatershed</b>	A subdivision of a Watershed and is the sixth-level, 12-digit unit of the hydrologic unit hierarchy as defined by the National Watershed Boundary Dataset (USGS et al. 2013)	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Total Maximum Daily Load (TMDL) or applicable TMDL</b>	Any TMDL, which has been issued or approved by EPA on or before the issuance date of this permit.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>TMDL Pollutant Load Reduction Benchmark (TMDL benchmark)</b>	An estimated total pollutant load reduction target for each parameter or surrogate, where applicable, for waste load allocations established under an EPA-approved or EPA-issued TMDL. A benchmark is the anticipated pollutant load reduction goal to be achieved during the permit cycle through the implementation of the stormwater management program and BMPs identified in the SWMP Document. A benchmark is used to measure the effectiveness of the stormwater management program in making progress toward the waste load allocation, and is a tool for guiding adaptive management. A benchmark is not a numeric effluent limit; rather it is an estimated pollutant reduction target that is subject to the MEP standard. Benchmarks may be stated as a pollutant load range based upon the results of a pollutant reduction empirical model.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Transpiration</b>	To release water vapor into the atmosphere through plant stomata or pores.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Uncontaminated</b>	For the purposes of this Permit, means that the MS4 discharge does not: result in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 117.21 or 40 CFR 302.6 at any time since November 16, 1987; or result in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 110.6 at any time since November 16, 1987; or contribute to a violation or exceedance of an applicable Oregon water quality standard.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.

# Attachment E: Definitions Comparison Summary

List of documents consulted: Salem's Phase I Permit  
 Salem's Revised Code Sections 70.005, 75.0202, 82.005  
 Admin Rules - Chapter 109-001 Acronyms and Definitions

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 Definitions defined in the Permit, SRC and/or Admin Rules that should be defined in both standards consistency, if the term is used in the standards update.

**Note: This is an initial review of the definitions and is subject to be updated and reviewed further as the standards are updated.**

Term	Salem's Phase I Permit Definition	Salem Revised Code Sections 70.005, 75.0202, 82.005 Definitions	Admin Rules-Chapt 109-001 Acronyms and Definitions	Notes/Suggestions for Updating Definitions
<b>Underground Injection Control</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Variance</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Violation</b>	Not defined.	Not defined.	Not defined.	Write a new definition for this term to be added to the Admin Rules and SRC, if the term is used in the standards update.
<b>Waters of the State</b>	Lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters) that are located wholly or partially within or bordering the state, or within its jurisdiction.	Not defined.	Not defined.	Add the Permit definition to the SRC and Admin Rules, if the term is used in the standards update.
<b>Waterway</b>	Not defined.	Means any watercourse within the City as designated by the Director.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.
<b>Wetland</b>	Not defined.	Any area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.	Not defined.	Add the SRC definition to the Admin Rules, if the term is used in the standards update.



## Attachment 6: LID/GI Strategy



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# Technical Memorandum

Prepared for: City of Salem

Project Title: City of Salem Code Review

Project No.: 180289

## Technical Memorandum 3


Subject: Low Impact Development and Green Infrastructure Strategy


Date: November 1, 2023

To: Heather Dimke, City of Salem Project Manager

From: Jessica Christofferson and Angela Wieland, PE

Copy to: Robert Chandler, Ph.D, P.E., City of Salem, Asst. Public Works Director

Prepared by:   
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Krista Reininga, P.E., Water Resources Manager

### Limitations:

*This document was prepared solely for City of Salem in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Salem and Brown and Caldwell dated April 11, 2023. This document is governed by the specific scope of work authorized by City of Salem; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Salem and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.*

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## List of Abbreviations

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City	City of Salem
DEQ	Oregon Department of Environmental Quality
GI	Green Infrastructure
GSI	Green Stormwater Infrastructure
LID	Low Impact Development
MEF	Maximum Extent Feasible
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NSRR	Numeric Stormwater Retention Requirement
Permit	NPDES MS4 Phase I General Permit
SF	square feet
SFR	Single-Family Residential
SRC	Salem Revised Code
SWMP	Stormwater Management Plan Program Document



## Section 1: Introduction and Background

Schedule A.3.e.ii of the City of Salem’s (City’s) 2021 Phase I National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) Permit (Permit) requires the City to “review and update or develop and begin implementation of a strategy to require to the maximum extent feasible, the use of Low Impact Development (LID) and Green Infrastructure (GI) design, planning and engineering strategies intended to minimize effective impervious area or surfaces, and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects” by November 1, 2023. The Permit requires the City to document an LID/GI Strategy in the subsequent annual report (due November 1, 2023) and incorporate or reference the strategy in the Stormwater Management Program Document (SWMP) after completion and Department of Environmental Quality (DEQ) approval of the strategy.

The City of Salem’s (City’s) Administrative Rules-Design Standards (*dated January 2014, referred to as Design Standards hereafter*) and the Salem Revised Code (SRC) were adopted by City Council in November 2013<sup>1</sup> following a significant public outreach process and public hearing. The SRC gives the City the legal authority to require the Design Standards for development projects.

The City’s LID/GI strategy is implemented in accordance with their Design Standards, and consistent with the current NPDES MS4 Permit language (Schedule A.3.e.ii) as referenced above. The Design Standards require the use of Green Stormwater Infrastructure (GSI) to the Maximum Extent Feasible (MEF) for new and redevelopment activities that meet defined project thresholds. Although LID is not currently defined in the Design Standards or SRC, site planning is required to minimize impervious surfaces and reduce stormwater runoff volumes, consistent with the requirements for an LID/GI Strategy. Based on the City’s definition of GSI, infiltration-based facilities are prioritized and used where feasible and emphasized particularly on Single Family Residential (SFR) projects.

The purpose of this document is to summarize and document the City’s current LID/GI Strategy to meet the 2021 Permit requirements. The Strategy includes a review of the LID/GI requirements in the City’s Design Standards.

This Strategy is organized as follows:

- **Section 2** provides the City’s existing LID/GI Strategy in the Design Standards, including a brief history of the City’s Design Standards as they relate to LID/GI.
- **Section 3** provides a summary of next steps.

## Section 2: Salem’s LID/GI Strategy

The purpose of this section is to summarize how the City’s current Design Standards incorporate GSI facilities and LID approaches to development projects. The City’s Design Standards prioritize LID through site planning techniques and GSI for stormwater management.

### 2.1 Definitions

Below is a summary of GI, GSI, LID and MEF definitions from both the Design Standards and the 2021 NPDES MS4 Permit to help inform the understanding of the City’s LID/GI Strategy:

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<sup>1</sup> Documents dated January 2014. An additional update to the SRC, Chapter 71 was made in 2020 to clarify flow control requirements.

- **2021 NPDES MS4 Permit definition for Green Infrastructure (GI):** *a specific type of stormwater control using vegetation, soils, and natural processes to manage stormwater. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems designed to mimic nature by reducing and/or storing stormwater through infiltration, evaporation, and transpiration. At the site level, such measures may include the use of plant or soil systems, permeable pavement or other pervious surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters. At the scale of city, green infrastructure refers to the patchwork of natural areas that provides flood protection and natural processes that remove pollutants from stormwater.*
- **Design Standards definition for Green Stormwater Infrastructure (GSI):** *a stormwater facility that mimics natural surface hydrologic functions through infiltration or evapotranspiration, or that involves stormwater reuse.*

The City's current definition for GSI is consistent with the NPDES MS4 permit definition of GI in that both apply to facilities that retain and infiltrate stormwater runoff.

- **2021 MS4 Permit definition for Low Impact Development (LID):** *Low Impact Development (LID) means a stormwater management approach that seeks to mitigate the impacts of increased runoff and stormwater pollution using a set of planning, design and construction approaches and stormwater management practices that promote the use of natural systems, green infrastructure, and other techniques for infiltration, filtration, evapotranspiration, and reuse of rainwater, and can occur at a wide range of landscape scales (e.g., regional, community and site). Low impact development is a comprehensive land planning and engineering design approach to stormwater management with a goal of mimicking the pre-development hydrologic regime of urban and developing watersheds.*

The City does not explicitly define LID in the Design Standards, but does include various site assessment and site planning principals to be addressed with applicable new and redevelopment activities.

- **Design Standards definition of Maximum Extent Feasible (MEF):** *the extent to which a requirement or Standard must be complied with as constrained by the physical limitations of the site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts.*

The City's definition of GSI (infiltration facility) and requirement to use GSI to the MEF indicates infiltration (or retention) is prioritized as required in the Permit. Use of GSI facilities is based on site infiltration rates, and sizing for GSI assumes that, at a minimum, the water quality storm is captured. However, the Design Standards do not currently define a storm event with which GSI needs to be sized for.

The City's application and definition of GSI and alignment to the Numeric Stormwater Retention Requirement (NSRR) design storm will be clarified in the Design Standards as part of the City's 2024 Design Standards update.

## 2.2 Design Standards LID/GI Strategy

This section summarizes the LID/GI Strategy as laid out in the City's existing Design Standards.<sup>2</sup>

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<sup>2</sup> Design Standards Div 400, Section 4.2(a) Project Type Thresholds and Discharge Requirements, Design Standards Div 400, Section 4.2(b) Green Stormwater Infrastructure to the Maximum Extent Feasible (GSI/MEF), Design Standards Div 400, Appendix 4E – Implementing Green Stormwater Infrastructure to the Maximum Extent Feasible.

**Table 1. Summary of the Existing LID/GI Strategy**

Design Standards Section Reference	Design Standards Content/Short Description
<b>Section 4.1: Introduction</b>	
Section 4.1(a) Objectives	<p>Three of the City’s nine documented Design Standards objectives relate to LID/GI and include the following:</p> <ol style="list-style-type: none"> <li>1. Reduce surface runoff volumes by prioritizing stormwater interception, evapotranspiration, and infiltration.</li> <li>2. Substantially maintain the runoff characteristics of the original undeveloped drainage basin.</li> <li>3. Achieve stormwater pollutant efficiency removal goals through the application of GSI to the MEF.</li> </ol>
Section 4.1(c)(3) and (5): How to Use These Standards, Green Stormwater Infrastructure	<p>This section states that it is critical to perform a site assessment to determine soil types, infiltration rates, topography, existing trees and vegetation, etc. and that infiltration rates are required to determine types and sizes of facilities required. Conducting a site assessment reflects site planning activities (i.e., LID). This section also states that GSI is required to be used to the MEF and site design, including determination of necessary horizontal and vertical elevation design data will be necessary to determine if the MEF requirement has been met.</p>
<b>Section 4.2: General Design Requirements</b>	
Section 4.2(a)(1): Project Type Thresholds and Discharge Requirements, Single Family Residential	<p>All SFR projects where the total impervious surface is between 1,300 and 10,000 SF shall be designed and constructed with GSI to the MEF except where flow control facilities and treatment facilities have already been constructed to serve the lot or parcel.</p>
Section 4.2(a)(3): Project Type Thresholds and Discharge Requirements, Large Projects	<p>Large projects (current thresholds &gt; 10,000 SF) are required to provide both flow control and treatment facilities using GSI to the MEF and conforming to these Design Standards.</p>
Section 4.2 (b): Green Stormwater Infrastructure to the Maximum Extent Feasible (GSI/MEF)	<p>GSI and MEF definitions are included in this section (see Section 2.1 above).                      For large projects, both treatment and flow control facilities must meet the standards for GSI to the MEF. Although site constraints, limitations in engineering design, and financial costs should rarely restrict the use of GSI completely, the City recognizes that some projects will be unable to exclusively provide GSI.  <i>Appendix 4E of the Standards establishes the criteria for meeting GSI to the MEF requirement.</i></p>
Section 4.2(c): Site Assessment	<p>The following, applicable site assessment elements are required to be identified early in the design process to provide for the more efficient sizing of stormwater treatment and flow control facilities, assist in providing GSI to the MEF, and meet regulatory requirements:</p> <ul style="list-style-type: none"> <li>• Site topography, boundaries, and existing improvements.</li> <li>• Existing soil types and infiltration capacity.</li> <li>• Geologic hazards such as landslides.</li> <li>• On-site contamination and hazardous materials.</li> <li>• Ground water elevations.</li> <li>• Existing trees and native vegetation.</li> <li>• Existing and proposed impervious areas.</li> <li>• Floodplains and floodways.</li> <li>• Sensitive natural areas (waterways, streams, wetlands, wildlife habitat, etc.).</li> </ul>



**Table 1. Summary of the Existing LID/GI Strategy**

Design Standards Section Reference	Design Standards Content/Short Description
Section 4.2(d): Preserve Existing Trees and Vegetation	Existing trees and native vegetation must be preserved as specified in Salem’s code. Plans must identify all trees and native vegetation that are being retained. Protecting existing trees/planting new trees on the site can reduce the amount of treatment that is needed.
Section 4.2(e): Ground Disturbing Activities	Site design and construction should minimize ground disturbing activities and retain the undisturbed state of the duff layer, topsoil, and native vegetation where feasible. Impervious development areas should be minimized, preserving natural features (i.e., LID).
Section 4.2(f): Other Design Considerations	<p>The following design considerations are applicable to site planning activities (i.e., LID):</p> <ul style="list-style-type: none"> <li>• Incorporate the stormwater facilities into the site’s landscaping features to minimize the impact on the available green space.</li> <li>• Utilize construction techniques and landscape designs that minimize soil compaction/preserve soil permeability.</li> <li>• Use permeable pavement in parking lots and on private property where practicable, to minimize surface runoff and reduce the amount of impervious area.</li> </ul>
Section 4.2(g): Impervious Area Reduction Technique	The following measures can be applied to reduce the amount of impervious area requiring stormwater management: tree preservation, planting new trees, pervious pavement, green roofs, rainwater harvesting, amending soils. All these measures are either site planning techniques or facilities and considered LID and/or GSI.
Section 4.2(l): Infiltration Testing	Infiltration testing is required to determine the location, size and capacity of a stormwater treatment facility.
Section 4.2(n): Design Sizing Methodology	This section includes design sizing methodologies. A simplified sizing form is provided which provides incentives for reducing impervious surfaces.
Section 4.3: Combined Stormwater Flow Control and Treatment Facilities	<p>This section specifies the requirements for designing combined stormwater flow control and treatment facilities. Combined stormwater flow control and treatment facilities are encouraged (Design Standards Section 4.1(c)(6) and include planters/rain gardens/swales, flow dispersion, pervious pavement, green roofs, and constructed wetland treatment systems. All of these are GSI facilities.</p> <p>If the infiltration rate is 0.5 inch/hour or greater, the GSI must be designed without an underdrain. If the measured infiltration rate is less than 0.5 inches/hour; if the facility size is greater than 10% of the total impervious area it serves; or if the rock storage areas used in the sizing calculation has reached the maximum depth of 48 inches, the GSI must be designed as a partial infiltration facility with a perforated underdrain pipe.</p> <p>Filtration facilities are required when a list of limiting site conditions are encountered regardless of infiltration rate (e.g., slope stability concerns, high groundwater table, contaminated soils, setbacks).</p>
Section 4.4: Stormwater Treatment Facilities	This section summarizes design requirements for facilities designed for Stormwater Treatment only. This section references GSI facilities, as well as manufactured treatment facilities, but stipulates that GSI facilities can be designed for the stormwater generated by the water quality design storm, clarifying that GSI sizing should meet water quality requirements even if flow control requirements cannot be fully met.
Section 4.6: Retention Systems (GSI) (Private Only)	Underground retention and infiltration systems, such as soakage trenches, manufactured chambers, and drywells can be used to collect and recharge stormwater runoff into the ground. These systems may be approved for either partial or full retention of stormwater onsite, thereby defined as a GSI facility.
Appendix 4E: Implementing GSI to the MEF	This appendix establishes criteria for determining whether an applicant for a development project is meeting the requirements to implement GSI to the MEF.





## Section 3: Summary

As the Design Standards currently read, they are meeting the 2021 Permit requirements in Schedule A.3.e.ii which states that by November 1, 2023, the City must “begin implementation of a strategy to require to the maximum extent feasible, the use of LID and GI design, planning, and engineering strategies intended to minimize effective impervious area or surfaces, and reduce the volume of stormwater discharge and the discharge of pollutants in stormwater runoff from development and redevelopment projects”.

Additional Design Standards and SRC updates will be completed by November 1, 2024. The Design Standards updates are anticipated to include more explicit language related to infiltration rates (measured vs. design) and technical exemption criteria to qualify the use and sizing of GSI.

The Design Standards updates will also clarify an NSRR design storm and require the use of GSI facilities to manage the NSRR, if use of GSI is feasible. Adjustment of the impervious area threshold for large projects will be documented to align with the NPDES MS4 Permit requirements. Additional updates may include refined site planning guidelines and a definition of LID as well as priorities around GSI facility selection (e.g., manufactured facilities should be chosen only when GSI is infeasible).

These updates will collectively support and build upon the City’s LID/GI Strategy.



## References

*NPDES MS4 Phase I City of Salem Permit*, Oregon Department of Environmental Quality, 2011.

*NPDES MS4 Phase I City of Salem Permit*, Oregon Department of Environmental Quality, 2021.

Salem Revised Code (2020).

Administrative Rules - Design Standards (January 2014).

# Attachment 7: Hydromodification Assessment and Retrofit Strategy



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# Technical Memorandum

Prepared for: City of Salem

Project Title: Salem Code Review

Project No.: 180289


## Technical Memorandum 2

Subject: Hydromodification Assessment and Retrofit Assessment Update

Date: November 1, 2023

To: Heather Dimke, City of Salem Project Manager

From: Angela Wieland, PE and Natalie Chow, PE

Prepared by:   
Angela Wieland, PE

Reviewed by:   
Jessica Christofferson

### Limitations:

*This document was prepared solely for City of Salem in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Salem and Brown and Caldwell dated April 11, 2023. This document is governed by the specific scope of work authorized by City of Salem; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Salem and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.*

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## List of Abbreviations

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CIP	capital improvement project
City	The City of Salem
FY	fiscal year
GSI	Green Stormwater Infrastructure
H/H	hydrology and hydraulic
MS4	Municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
NSRR	Numeric Stormwater Retention Requirement
O&M	operation and maintenance
SRC	Salem Revised Code
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
VBA	Visual Basic for Applications
WQ	water quality



## Section 1 Introduction/Background

The City of Salem’s (City) 2010 Phase 1 National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) permit (Permit), Schedule A.5, required the City to conduct a hydromodification assessment to examine the City’s hydromodification impacts related to MS4 discharges, including erosion, sedimentation and/or alteration to stormwater flow, volume, and duration that may cause or contribute to water quality degradation. The assessment and accompanying report were required to “identify strategies and priorities for preventing or reducing hydromodification impacts related to the permittees MS4 discharges... and identify or develop effective tools to reduce hydromodification.” The report was required for submittal to DEQ by November 1, 2014.

Also included in the 2010 Permit, in Schedule A.6, the City was required to develop a stormwater quality retrofit strategy applicable to developed areas of the City identified as impacting water quality and underserved or lacking stormwater controls. The strategy and resulting plan were required to include “a retrofit control measure project or approach priority list, including rationale, identification and map of potential stormwater retrofit locations where appropriate, and an estimated timeline and cost for implementation of each project or approach.” As with the hydromodification assessment, the plan was also due to DEQ by November 1, 2014.

Schedule A.3.h of the City’s 2021 NPDES MS4 Permit requires permittees, by November 1, 2023, to “consider the impacts of policy, capital improvements, and retrofit projects on MS4 discharges to receiving waters, considering the goals and proposed actions described in the 2010 permit’s Hydromodification Assessment and Stormwater Retrofit Strategy reports (i.e., the 2014 submittals). Specifically, permittees are required to prepare “an assessment of any outcomes related to the Hydromodification Assessment and Stormwater Retrofit Strategy Reports.” This assessment is required to include the following:

1. An assessment of how the Hydromodification Assessment and Stormwater Retrofit Strategy have been used, considered, or implemented since the time the reports were completed (see Sections 2.1 and 3.1);
2. Progress toward or completion of projects identified in the Retrofit Strategy priority list, and a qualitative assessment of the benefits of those projects (see Section 2.2);
3. Description of any further actions taken as a result of the Hydromodification Assessment, and a rationale for those actions since the writing of the reports (see Section 3.3);
4. Narrative describing progress toward addressing gaps in the hydromodification information or data related to waterbodies within the permittees’ jurisdiction as identified in the Hydromodification Assessment (see Section 3.2); and,
5. New goals, tools, priorities, and planned or potential projects for addressing ongoing hydromodification and/or water quality impacts resulting from historical development/infrastructure, and for improving retrofit planning, considering information gathered in the time since the completion of the reports (see Sections 2.3 and 3.4).

The Permit requires the permittees to document this assessment in the third annual report (i.e., the 2023 annual report) as an appendix or subsection. This documented assessment was prepared to fulfill this requirement. Information used to compile this summary is outlined in Table 1 and findings and results are based on the City’s review of completed and in-progress projects, historic code implementation and pending programmatic and regulatory activities.



Table 1. Retrofit and Hydromodification Assessment Documents		
Title	Author	Date
Stormwater Retrofit Plan	City of Salem Public Works Department	October 1, 2014
City of Salem Hydromodification Assessment	ESA	January 2013
Salem Hydromodification Technical Memo	ESA	July 2013
Salem Hydromodification - Review of City Codes and Design Standards	ESA	January 2014
Personal Communication, City of Salem staff	N/A	August-September 2023

In this assessment, Section 2 provides a summary of the previous retrofit strategy, progress made since the strategy was submitted in 2014, and goals for moving forward. Section 3 provides a summary of the previous hydromodification assessment, progress made since the assessment was submitted in 2014, and goals for moving forward.

## Section 2 Retrofit Strategy Summary

### 2.1 What was included in the Retrofit Strategy and how has it been used, considered, or implemented since 2014?

Incorporating water quality facilities into the existing stormwater system is known as a stormwater treatment retrofit. The 2014 Salem Stormwater Retrofit Plan (Retrofit Plan) established retrofit strategies and identified retrofit opportunities (projects) for future implementation.

The City’s Retrofit Plan identified the following strategies:

- Incorporate stormwater treatment control measures into existing stormwater CIP projects whenever possible.
- Employ treatment retrofits with stormwater operation and maintenance (O&M) projects whenever possible.
- Develop treatment retrofits on City-owned detention basins, parks, and drainage ditches.
- Pursue a partnership with the Salem-Keizer School District for retrofit opportunities on school properties.

These strategies aim to reduce pollutants of concern, reduce hydromodification impacts, demonstrate and educate residents, and alleviate chronic flooding problems. As documented in the Retrofit Plan, retrofit projects will be ranked in accordance with the following criteria:

1. Location in TMDL Drainage Basin
2. Potential for pollutant reduction
3. Potential for reducing hydromodification impacts
4. Potential for reducing localized flooding
5. Potential for outreach and education
6. Ownership
7. Ease/cost of construction

To develop the 2014 Retrofit Plan, the City conducted an initial GIS desktop analysis, using the prioritization criteria listed above, to identify a preliminary list of retrofit sites for further investigation. Field investigations were conducted in conjunction with preferred retrofit structural control measures established by retrofit site





(i.e., city-owned property, public schools, private property). A final priority retrofit project list and map were documented in the Retrofit Plan, and projects were organized based on incorporation into existing stormwater CIP projects (6 projects), installation on City-owned property (6 projects), and installation on public school property (3 projects). The order of implementation ultimately depends on the immediate needs of the community and available funding.

With implementation of the 2014 Retrofit Plan, tracking project opportunities presented difficulties for the City. Project opportunities were often identified by a variety of sources or departments. Field investigations and GIS desktop analysis conducted by different departments often resulted in inconsistent information being collected and tracked. Therefore, in 2018, the City developed a Stormwater Retrofit Prioritization Tool (Retrofit Tool), an Excel-based tool using Visual Basic for Applications (VBA), to track and prioritize stormwater retrofit opportunities associated with implementation of an existing capital improvement project (CIP) or associated with ongoing operational activities.

The City's Retrofit Tool provides a mechanism for the City to consistently track project opportunities, record baseline project information, and prioritize projects for implementation. One unique feature of the Tool is its ability to automatically identify pollutants of concern and hydromodification risks based on the proposed project location and receiving water. This information is based on DEQ's 2012 303(d) list, which identifies impaired water bodies under the federal Clean Water Act, and findings from the City's hydromodification assessment. This information is automatically populated by the Tool when the receiving water is identified for a specified retrofit project. Project prioritization criteria were expanded from the 2014 Retrofit Plan, although major categories remain consistent. Cost was intentionally not included, so that the Retrofit Tool would provide an independent evaluation and prioritization of project opportunities based solely on water quality objectives.

The status of project implementation is provided in Section 2.2.

## **2.2 What progress has been made toward completion of projects identified in the Retrofit Strategy priority list, and what have been the benefits of those projects?**

As detailed in the 2014 Retrofit Plan, a total of 15 potential retrofit projects were identified that reflect the City's objectives to 1) incorporate water quality into existing stormwater CIPs; 2) install new water quality projects on city-owned property; and 3) integrate projects on school property. At the time, no projects were identified to integrate water quality into O&M activities. Projects timeframes ranged from fiscal year (FY) 2014-15 to FY 2017-18, but eight projects had an unspecified timeframe.

City staff reviewed the retrofit project list per the 2014 Retrofit Plan and three identified projects were completed, although the scope for some varied from what was originally defined. These included:

- 12<sup>th</sup> Street Stormwater Improvements. Completed during FY 2017-18. Included the addition of piped detention; mechanical WQ treatment; the replacement of a corrugated culvert with a box culvert and bank restoration; and 8 water quality planters as part of a street widening project.
- Eola Ridge Park Detention Basin. Completed during FY 2015-16. Included the addition of a pretreatment hydrodynamic separator and subsurface flow wetland.
- Woodmansee Park East Detention Basin. Completed during FY 2020-21. Project reflected installation of swales and raingardens in conjunction with park improvements instead of retrofitting of the existing detention basin.

Some originally-identified projects were discontinued due to site constraints (i.e., infiltration rates were lower than anticipated, alternative treatment installations conducted by private development [Woodscape Park



East]; etc.). Other projects were not completed because of schedule and/or budget constraints. Projects identified in conjunction with public schools presented challenges because of the need external stakeholder coordination and City staff availability. The City has implemented a Watershed Protection and Preservation grant program since 2001 (approx. \$50,000/year) in support of water quality or natural resource enhancement projects. These grants can be applied for by the school district for retrofits and other projects on school property even if dedicated retrofit projects are not identified in accordance with the City's retrofit strategy. The Watershed Protection and Preservation grant is also a strategy identified in the Public Involvement Section (PI-2) of the 2022 DEQ-approved Stormwater Management Plan (SWMP) Document.

However, the City has constructed 27 retrofit projects since 2014, as detailed in Table 2. These projects include 1) incorporation of water quality into existing stormwater CIPs—specifically transportation-related projects as well as projects where application of the City's stormwater design standards prompts the addition of treatment for public properties<sup>1</sup>; 2) the employment of a stormwater retrofit in conjunction with a O&M need; and 3) installation of new water quality projects on city-owned property.

Projects detailed in Table 2 also include projects that provide hydromodification benefit, as discussed in Section 3.

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<sup>1</sup> Salem Revised Code (SRC) Section 71.100 (a)(2) provides water quality treatment exemptions for road maintenance projects, including those that replace impervious surface to earth materials. As such, installation of water quality treatment would qualify as a retrofit in select applications where the exemption is not applied.



**Table 2. City of Salem Retrofit and Hydromodification Projects**

Project Name	Anticipated Construction Date	Actual Construction Date	Project Description	Project Benefit	Additional Water Quality Treatment? (Y/N)	Hydromodification Mitigation? (Y/N)	City Notes
<b>Retrofit Strategy: Integration of Water Quality into Existing CIPs</b>							
Center/Marion St Bridge Stormwater Retrofit Phase 1-3		2013-2015	Retrofit to treat runoff from the ODOT bridges and provide detention	Water Quality (WQ), infiltration, detention	Y	Y	Work done in partnership with ODOT Retrofit Program Grant
Hawthorne/Hyacinth Ave NE Corridor Improvements		2014	Stormwater quality and detention were included	WQ, infiltration, detention	Y	Y	Mitigation work with culvert replacement
Waln Creek at Woodside Culvert replacement		2014	Undersized galvanized culvert replaced with a box culvert and 3 WQ swales were added	WQ, infiltration, flow control	Y	Y	
Rosemont/Edgewater Off-ramp improvements		2014	Addition of two rain gardens	WQ, detention, infiltration	Y	Y	
Skyline Corridor Improvements		2015	Added stormwater planters and mechanical treatment	WQ, detention	Y	Y	
Eola Drive Improvements		2015	Added stormwater quality and detention	WQ, detention	Y	N	
Market/Swegle NE Corridor Improvements		2015	Stormwater planters and WQ detention basins added, Filterra bioretention units	WQ, infiltration, detention	Y	Y	
Glenn Creek Rd NW at Wallace Street Widening		2015	Addition of on small planter and several Filterra treatment boxes to treat stormwater	WQ, infiltration	Y	Y	
Winter Street Bridge Replacement over Shelton Ditch		2015-2016	Stormwater planters added with bridge replacement	WQ, detention	Y	N	
Kuebler Widening and Kuebler and Commercial intersection		2016	Added pervious concrete sidewalks on north side and Filterra bioretention units	WQ, detention, infiltration	Y	Y	
Madrona & 25 <sup>th</sup> re-alignment and widening		2016	1,000 feet of water quality swales, 2 rain gardens, 6 water quality planters, 1 hydro-upflo, 4 Contech catch basins, one detention pipe and culvert replacement and creek realignment.	WQ, detention, infiltration	Y	Y	



**Table 2. City of Salem Retrofit and Hydromodification Projects**

Project Name	Anticipated Construction Date	Actual Construction Date	Project Description	Project Benefit	Additional Water Quality Treatment? (Y/N)	Hydromodification Mitigation? (Y/N)	City Notes
Clark Creek at Summer Street Culvert Replacement		2017	City staff designed and constructed the replacement of an existing culvert and added several stormwater planters	WQ	Y	Y	
Union Street NE @ Commercial		2017-2018	Intersection improvements including the installation of two stormwater planters	WQ, detention	Y	N	
Brown Road NE		2019	Retrofit of existing roadside ditches into 19 planters within City limits, as well as pervious concrete sidewalks and several WQ vaults.	WQ, detention, infiltration	Y	Y	
Fisher Rd extension at Market St.		2021	Addition of combination detention and water quality swale, as well as a mechanical treatment, as part of the extension of the road	WQ, detention, infiltration	Y	Y	
Gaia St extension		2023	Addition of combination detention and water quality swale as part of the extension of the road	WQ, detention, infiltration	Y	Y	
2 <sup>nd</sup> Street Improvements	2023	2023-2024	Addition of planters along 2 <sup>nd</sup> street with a road expansion project	WQ	Y	N	This project is in progress
<b>Retrofit Strategy: Employ with O&amp;M Projects</b>							
Doaks Ferry HOA Retrofit		2018	Retrofit of existing back up detention basin into a flow through detention basin with a water quality swale	WQ, detention, infiltration	Y	Y	
Marion and 13 <sup>th</sup> Stormwater Improvements		2018	Retrofit existing piped storm system with new neighborhood rain garden	WQ, detention, infiltration, educational outreach	Y	Y	\$210,000 1,000 SF rain garden and 125 LF of 10-inch pipe. Outfalls to Mill Creek after the rain garden
Mossy Ridge Retrofit		2019	Retrofit and alteration of orifice and perf pipe to meet new storm standards and prevent basin from being in bypass frequently	Detention, infiltration	Y	Y	
15 <sup>th</sup> and Marion St NE Rain Garden		2020	Retrofit existing storm system with new rain garden	WQ, detention, infiltration	Y	Y	



**Table 2. City of Salem Retrofit and Hydromodification Projects**

Project Name	Anticipated Construction Date	Actual Construction Date	Project Description	Project Benefit	Additional Water Quality Treatment? (Y/N)	Hydromodification Mitigation? (Y/N)	City Notes
Kuebler and Stroh		2021-2022	A detention basin had soil removed and replaced with water quality media and was planted to address water quality	WQ, infiltration, detention	Y	N	
<b>Retrofit Strategy: Projects on City-owned Property</b>							
Eola Ridge Park Detention Basin	FY 2014-15	2015/2016	Retrofit existing surface detention basin with a hydrodynamic separator and subsurface flow wetland treatment train	Target the removal of bacteria in a residential neighborhood.	Y	Y	Completed October 30, 2015
City Operations Complex Retrofit		2016-2017	In order to control sediment from storage bins and prevent from entering the storm system a collection trench with 3 baffles, settling chambers, a catch basin, and an oil/water separator added	WQ	Y	N	
Fire Station 6 Retrofit		2018-2019	Installation of 300 LF of 8-inch sanitary sewer pipe, 2 additional manholes, 1 catch basin, and a grass swale were added so that runoff from the airport fire station training facility could be diverted to the sanitary sewer system for training foam, and so hydrant water would go into a grassy swale	WQ, infiltration	Y	N	Project done to also address issues as part of the City's 1200-Z permit
2020 Stormwater Improvements Package		2021	Retrofit existing piped storm drain system at Salem Airport with area rain garden	WQ, detention, infiltration	Y	Y	\$300,000
<b>Other Hydromodification Related Projects</b>							
Geren Island Bank Stabilization project		2016-2017	Project included 180 feet of bioengineering along the North Channel at Geren Island		N	Y	
Pringle Creek Restoration (Boise Site Demo)		2019-2020	This project daylighted the lower section of Pringle Creek under the Commercial St bridge and removed stream barriers and an old fish ladder. Banks were restored and vegetated and it is an active mitigation project	Educational outreach, stream bank improvements, addressing hydromod	Y	Y	



**Table 2. City of Salem Retrofit and Hydromodification Projects**

Project Name	Anticipated Construction Date	Actual Construction Date	Project Description	Project Benefit	Additional Water Quality Treatment? (Y/N)	Hydromodification Mitigation? (Y/N)	City Notes
Mill Creek Corporate Wetlands- North and South		South complex completed in 2022	2 large wetlands projects were completed to offset large development projects that added fill in the floodplain	WQ, detention, infiltration, habitat	Y	Y	
Goldcrest Brook Hydromodification Plan		2023	A study/modeling was first completed, and a separate hydromodification plan with specific designs/improvements was prepared.	Educational outreach, stream bank improvements, addressing hydromod	N	Y	Phase 1 improvements to stabilize the creek are in design.
Shelton Ditch Bank Stabilization Plan	2024-2025		This is a bank stabilization project with some habitat improvements that will address erosion issues on Shelton Ditch. An initial collection of data and assessment memo was done to determine priority areas, and then they were programmed into the CIP program. The first sections will be done in 2024.	Educational outreach, stream bank improvements, addressing hydromod	N	Y	
Clark Creek/Ratcliff/Salem Heights Culvert & Habitation Enhancement	2025-2026		Creek channel has been temporarily stabilized but is insufficient. Culvert replaced.	Stabilize creek channel.	N	Y	Project has been delayed. Previously anticipated 2014-15. Currently funded in CIP in FY 25-26
Waller Dam/Mill Creek Restoration		Undetermined	Project is in the evaluation phase and may include replacement or removal of Waller Dam and associated fish ladder. Stream restoration work would be incorporated.	Restoration and potential dam removal	N	Y	
Chambers Swale Stabilization in Bailey Ridge Park		Undetermined	Priority project in the Parks Master Plan to address stream downcutting and sedimentation.	Hydromodification	N	Y	
W Middle Fork Pringle Creek Enhancement at Fairview Park		Undetermined	Priority project in the Parks Master Plan to address local flooding potential and improve stream habitat	Capacity, Hydromod	N	Y	



## **2.3 What are the new goals, tools, priorities and planned or potential projects for improving retrofit planning to address water quality impacts resulting from historical development/infrastructure?**

The City anticipates continuation of its retrofit strategy in conjunction with the following drivers and activities. In-progress and pending, future projects are also identified in Table 2.

### **2.3.1 Property Acquisition**

Since FY 2022, funding has been allocated in the City's Capital Improvement Plan (CIP) for the purpose of purchasing property that may be needed for stormwater and surface water benefits.

Such property acquisition can be used to support projects that provide additional treatment, retention/storage, and improve connectivity the floodplain. Current funding is \$100,000 in FY 2024.

### **2.3.2 Updated Retrofit Tool**

Although the Retrofit Tool was calibrated in 2018 using identified capital improvement projects, City staff report the scoring system for the Tool varies from prioritization criteria set for other CIPs. As such, this made the tool difficult for Engineering staff to use, and inclusion of retrofit projects with existing CIPs continues to be one of the primary ways retrofits are funded.

Retrofits currently completed using Operations funding are limited to very small projects. Over the past several years \$100,000 per year has been added to the City's CIP specifically for Stormwater Retrofit projects.

The City anticipates updates to the Retrofit Tool to 1) integrate more efficiently with the Engineering Department project scoring needs; 2) prioritize hydromodification projects in consideration of water quality objectives; and 3) reflect stream restoration project potential in conjunction with temperature TMDL (WQ drivers) as well as hydromodification. The City also anticipates updates to the Engineering-based CIP prioritization process to better reflect water quality and hydromodification initiatives. Intra-departmental coordination on updates to the prioritization approaches may ensure that multi-objective project needs are better promoted within Engineering and Public Works Operations.

### **2.3.3 Stormwater Master Plan Update**

The City updated their Stormwater Master Plan (Master Plan) in 2020, integrating updated hydrologic and hydraulic (H/H) modeling and identifying stormwater capital improvement projects (CIPs) to accommodate current condition/capacity deficiencies, as well as account for future growth. Updating the Stormwater Master Plan is a continuous process. It is being conducted in a rotating series of three basin planning projects. The Battle, Mill and Pringle Creek Basin Master Plans were completed in 2020. Glenn-Gibson, Upper Claggett, and West Bank Basin Master Plans are anticipated to be complete in 2023. The next set of Basin Master Plans for Croisan, East Bank, and Little Pudding will be completed in 2025. Then the basin planning work will return to Battle, Mill, and Pringle Creek Basin Plans for updates.

Each basin plan describes the drainage basin characteristics, modeling methodologies, and facilities/projects identified to accommodate current conditions and future growth. Existing and built-out hydrology for a range of design storm events was developed in support of modeling efforts. The Basin Plans to date have considered data from the Hydromodification Assessment Report and Retrofit Plan, as well as collected survey information from these basins to create project lists. Projects include stream restoration/channel enhancement CIPs, as well as detention facilities that may be constructed with water quality features.



Per the 2020 Master Plan, stormwater projects are prioritized based on various criteria, including the following that support retrofit initiatives:

- Provides multiple benefits from a single facility, such as managing stormwater flows, reducing stormwater pollutants, enhancing environmental conditions, providing aesthetic qualities, and incorporating park and recreation activities;
- Reduces pollutant loadings to assist with meeting applicable Total Maximum Daily Load waste load allocations; and
- Meets state or federal regulatory requirements.

Capital projects, when identified per the Stormwater Master Plan, will continually be prioritized, and scheduled, and additional criteria supporting water quality and hydromodification objectives will be added to future Basin planning efforts.

## Section 3 2014 Hydromodification Assessment Summary

### 3.1 What were the results of the Hydromodification Assessment? How has it been used, considered, or implemented?

The City's Hydromodification Assessment (January 2013) used landscape-level geologic and land cover characteristics, in combination with current stream conditions, to assess channel condition and channel susceptibility to hydromodification.

The observations and analyses confirm that hydromodification impacts have occurred and continue to occur throughout the City's network of streams. The impacts vary and locations with the highest risk featured bedrock-dominated slopes that transition to lower, more erodible landscape. Direct hydromodification impacts (instream armoring, diversion, etc.) are most notable on Mill Creek and Pringle Creek. Locations susceptible to indirect hydromodification risk, specifically bed and bank erosion as a function of altered rainfall-runoff activities, are specifically listed in the Hydromodification Assessment, Section 6.3. Overall, the rate of channel adjustment is reported to be low throughout the study area, likely due to the relatively small contributing drainage area for many of the stream channels and cohesive nature of the bank sediment (Hydromodification Assessment, p 45). Battle, Croisan, and Glenn-Gibson Basins, which have less urban development in the upper watershed, are also located in areas with soils that are more amendable to infiltration and thus use of infiltration-related BMPs may help avoid future hydromodification impacts in the channels.

The Hydromodification Assessment included a variety of recommendations that centered on: 1) continued physical condition/geomorphic monitoring; 2) implementation of capital projects that include floodplain connectivity to improve flow attenuation, channel stability, reduced flood risk, and improved habitat; 3) implementation of design standards that require infiltration BMPs and detention requirements that include flow duration matching at thresholds applicable to Salem's streams; and 4) refinement to code and policies to address riparian protection and setbacks, forest cover, soil health, and wetland protection.

Following completion of the Hydromodification Assessment, two supplemental Technical Memorandums (TMs) were prepared for the City to provide additional supporting information. The Salem Hydromodification Technical Memo (June 2013) provides additional background on hydromodification as a concept and highlights various high-level strategies that address hydrology, coarse sediment supply, and stream resilience. The Salem Hydromodification Review of City Codes and Design Standards TM (January 2014), reviewed current city code excerpts, identifying those with potential to influence hydromodification and recommendations for code/policy changes. Reviewed code excerpts with the highest potential to influence





hydromodification include the Design Standards (Administrative Rules 109-004), Stormwater Code (SRC Chapter 71), and Floodplain Overlay Zone (SRC Chapter 601).

Outcomes from the Hydromodification Assessment and supporting TMs have been used to inform the identification and prioritization of capital projects as part of the existing capital improvement program, in the context of the City's 2020 Stormwater Master Plan update and associated Basin Master Plans (see Table 2 and Section 2.3.3), and in updates to design standards and code/policies. Additional details on the updates to design standards and code/policies is provided in Section 3.3 of this assessment.

### **3.2 Were there any identified gaps in the hydromodification information or data related to waterbodies within the City's jurisdiction and, if so, what progress has been made in addressing gaps?**

The City's Hydromodification Assessment (Section 7.1.1) identified data gaps that could help inform findings. These data gaps are primarily related to ongoing monitoring and include:

1. The rates of geomorphic channel change in these strong, fine-grained, cohesive sediment are not well understood. City monitoring of selected channel sections could inform this question over time.
2. The fate of stream gravels in the Mill Creek system being delivered to the series of impoundments is not clear. If the Mill Creek channel is aggrading or scouring in these reaches, it would have significant implications that are not captured in the 2014 assessment.
3. Further integration of the stream crew data collection effort will improve knowledge of existing conditions.
4. The City's network of stream gauges is providing valuable information that could be used to calibrate hydrologic runoff models to cover ungauged streams and potentially support a BMP design tool.
5. To inform flow duration thresholds, perform a hydraulic sensitivity analysis on typical channel cross sections from each landscape position. This analysis would investigate the potential for altered runoff rates to mobilize the channel bed and determine appropriate flow control standards that would be effective for drainage and hydromodification.

Related to data gaps #1-3 above, the City's Stream Crew has been working since 2016 to collect and map stream cross section survey data that can be used for future hydromodification monitoring efforts. The Stream Crew Channel Morphology Monitoring document was created for collecting data in 2017. Mapped data includes areas with observed streambank erosion, stream substrate changes, streambed erosion (head cuts), and other points of interest. Specific survey locations have included:

- 2016 - All of Pringle and Mill Basins – including Clark Creek and Shelton Ditch, 2016
- 2017 - Clark Creek Park
- 2020 - Waln Creek from Woodside to Madras
- 2020 - All of Goldcrest Brook
- 2022 - All of Turnage, Anchor Brook, Glenn, Wilark, Gibson, Claggett
- 2022 - Waln Mitigation Area - south of Madras, and West Middle Fork Pringle off Old Strong Rd from Reed Rd to Fairview.

Continued monitoring will be conducted to expand coverage of the physical/geomorphic condition mapping to aid in the identification of future capital project needs.



Per data gap #4 above, in 2016-2017, the City installed additional stream gauges, rain gauges, and new software/hardware to provide a robust community early flood warning system and also provides additional flow and rainfall data for use in future stream modeling efforts.

Finally, related to data gap #5, design standards that support a flow duration matching standard were recommended to be included in the City's 2014 and 2020 update to the Salem Revised Code (SRC) Chapter 71 and the City's 2014 update to the Public Works Design Standards (Administrative Rule Chapter 109, Division 004). However, SRC 71 and the Public Works Design Standards ultimately established a detention standard based on peak flow matching, which is intended more to reduce risks of flooding than to address potential hydromodification impacts. Therefore, continued evaluation of the mobilization of channel bed sediment and reach-specific channel forming flow thresholds was not needed.

### **3.3 What further actions have been taken as a result of the Hydromodification Assessment, and what was the rationale for those actions?**

The City established stormwater design standards in 2014, as outlined in SRC Chapter 71 as well as Administrative Rules Chapter 109, Division 004, both of which prioritize the use of Green Stormwater Infrastructure (GSI). Per Salem's code, GSI is defined as stormwater facilities that mimic natural surface hydrologic functions through infiltration or evapotranspiration. In addition, the City established flow control detention standards that require peak flow matching from ½ of the 2-year, pre-development flow to the 10-year predevelopment flow. This was done to help mitigate peak flow associated with the range of potential channel forming flows. Development of the City's stormwater design standards considered recommendations in the Hydromodification Assessment, specifically to require infiltration BMPs where feasible.

The City is currently (2023) updating and refining its stormwater design standards for consistency with the City's current NPDES MS4 permit. This work will further clarify the use of infiltration-based facilities (i.e., GSI) to meet the Numeric Stormwater Retention Requirement (NSRR), as well as adhere to a reduced impervious area threshold for large projects. The update will be completed by November 1, 2024, to meet the 2021 NPDES MS4 Permit deadline.

In conjunction with other code and policy recommendations, the City has begun work related to Statewide Planning Goal 5 specific to waterways and riparian areas. Phase 1 is underway and includes an inventory (approximately 100 stream-miles in total) of fish-bearing waterways and their non-fish-bearing tributaries. Once the inventory is done, Phase 2 will commence which will be to establish/revise codes related to setbacks. The City's current intention is to use the "Safe Harbor" approach which is a consistent 50-foot setback for most waterways and connected wetlands and 75-foot setback for the Willamette River.

### **3.4 What are the City's new goals, tools, priorities, and planned or potential projects for addressing ongoing hydromodification?**

Ongoing and new goals to address hydromodification impacts specific to design standards and code/policy are outlined in Section 3.3 above.

In addition, in conjunction with Basin Master Planning efforts, the City anticipates that additional hydromodification-related project needs will continue to be identified and prioritized (see Table 2). The City's Retrofit Tool (2018) includes hydromodification risk as an evaluation criterion, and future updates to the Retrofit Tool will continue to build upon monitoring information to inform hydromodification risk as well as project prioritization based on hydromodification criteria.