



Water Quality Protection
Surface Water Management
Wastewater Collection & Treatment

Gregory L. Geist
Director

October 31, 2018

Mr. Mark Riedel-Bash, Municipal Stormwater Coordinator
Oregon Dept. of Environmental Quality, NW Region
700 NE Multnomah Street, Ste. 600
Portland, OR 97232

RE: WES (Clackamas County Service District No. 1 and Surface Water Management Agency of Clackamas County) and the Cities of Happy Valley and Rivergrove NPDES MS4 Discharge Permit 2017-2018 Annual Report

Dear Mr. Riedel-Bash,

Enclosed, please find the 2017-2018 Annual Report for WES and the Cities of Happy Valley and Rivergrove as required by our NPDES Municipal Separate Storm Sewer System Discharge Permit, renewed in March 2012. A hard copy will follow via USPS. An electronic copy has been forwarded to each basin coordinator.

We look forward to your comments. Please call if you have any questions or need additional information at (503) 742-4581.

Sincerely,

Ron Wierenga
Environmental Services Manager
Water Environment Services

Enclosures

cc: Kristi Asplund
Andrea Matzke
Wade Peerman

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WATER ENVIRONMENT SERVICES

NPDES MS4 Discharge Permit

Annual Report for July 1, 2017 – June 30, 2018

Submitted by:

Water Environment Services, a Department of Clackamas County, on behalf of WES (Clackamas County Service District No. 1 and Surface Water Management Agency of Clackamas County) and the cities of Happy Valley and Rivergrove

Prepared for:

Oregon Department of Environmental Quality

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November 1, 2018

**Water Environment Services
and the
Cities of Happy Valley and Rivergrove**

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)
DISCHARGE PERMIT No. 101348**

We, the undersigned, hereby submit this National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater System Annual Report in accordance with NPDES Permit Number 101348. We certify under penalty of law that this document and all attachments were prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our 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 our knowledge and belief, true, accurate and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Gregory L. Geist, Director
Water Environment Services

10/30/18

Date



Jason Tuck, City Manager
City of Happy Valley

10/25/18

Date



Leanne Moll,
City Manager/City Recorder
City of Rivergrove

10/25/18

Date

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SECTION 1 MS4 PERMIT REQUIREMENTS FOR ANNUAL REPORTING

This annual report provides a summary of MS4 Permit program implementation activities by Water Environment Services (WES) and the Cities of Rivergrove and Happy Valley from July 1, 2017 to June 30, 2018. WES is a municipal partnership formed under ORS 190 by the Clackamas County Service District No. 1 (CCSD#1), the Surface Water Management Agency of Clackamas County (SWMACC) and the Tri-City Service District. WES administers MS4 activities in SWMACC and CCSD#1, both of which are service districts under the municipal partnership. In October 2016, SWMACC transferred its assets to WES. Clackamas County Service District No. 1 joined the municipal partnership on July 1, 2018. Table 1 (below) includes the 2017-2018 MS4 Permit annual report submittal requirements found in Permit Schedule (B)(5) and the location in this document with the applicable program implementation information and data.

Table 1: MS4 Permit Annual Report Submittal Requirement Locations in the Document

Schedule B(5) Requirements for 2017-2018	Document Section Where Annual Report Requirement is Met:
a. The status of implementing the stormwater management program and each SWMP program element, including progress in meeting the measurable goals identified in the SWMP.	Section 1.1
b. Status or results, or both, of any public education program effectiveness evaluation conducted during the reporting year and a summary of how the results were or will be used for adaptive management.	Section 1.2
c. A summary of the adaptive management process implementation during the reporting year, including any proposed changes to the stormwater management program (e.g., new Best Management Practices) identified through implementation of the adaptive management process.	Section 1.3
d. Any proposed changes to SWMP program elements that are designed to reduce TMDL pollutants to the maximum extent practicable (MEP).	Section 1.4
e. A summary of total stormwater program expenditures and funding sources over the reporting fiscal year, and those anticipated in the next fiscal year.	Section 1.5
f. A summary of monitoring program results, including monitoring data that are accumulated throughout the reporting year and any assessments or evaluations conducted.	Section 1.6
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of new post-construction permits issued and an estimate of the total new and replaced impervious surface area related to development projects that commenced during the reporting year must also be included.

- j.** A summary, as related to MS4 discharges, describing concept planning or other activities conducted in preparation of UGB expansion or land annexation, if anticipated for the following year.

Section 1.10

1.1 SCHEDULE B(5)(A) -- THE STATUS OF IMPLEMENTING THE STORMWATER MANAGEMENT PROGRAM AND EACH STORMWATER MANAGEMENT PLAN (SWMP) PROGRAM ELEMENT, INCLUDING PROGRESS IN MEETING THE MEASURABLE GOALS IDENTIFIED IN THE SWMP.

See Appendix A in this annual report for this data and information. This appendix includes the tracking measures and measurable goal status from BMPs in the Stormwater Management Plans.

1.2 SCHEDULE B(5)(B). -- STATUS OR RESULTS, OR BOTH, OF ANY PUBLIC EDUCATION PROGRAM EFFECTIVENESS EVALUATION CONDUCTED DURING THE REPORTING YEAR AND A SUMMARY OF HOW THE RESULTS WERE OR WILL BE USED FOR ADAPTIVE MANAGEMENT.

MS4 Permit Schedule A(4)(d)(vi) contains a requirement to create a Public Education Effectiveness Evaluation (Evaluation) and to submit it to the DEQ no later than July 1, 2015. CCSD#1, the SWMACC, Clackamas County, and the Cities of Rivergrove and Happy Valley submitted the Evaluation to DEQ on June 30, 2015. The results of this Evaluation were used in the adaptive management of the education and outreach program; see the June 30, 2015 Evaluation for more information.

1.3 SCHEDULE B(5)(C) – A SUMMARY OF THE ADAPTIVE MANAGEMENT PROCESS IMPLEMENTATION DURING THE REPORTING YEAR, INCLUDING ANY PROPOSED CHANGES TO THE STORMWATER MANAGEMENT PROGRAM (E.G., NEW BMPS) IDENTIFIED THROUGH IMPLEMENTATION OF THE ADAPTIVE MANAGEMENT PROCESS.

Permit Schedule D(10)(a) defines adaptive management as a structured, iterative process designed to refine and improve stormwater programs over time by evaluating results and adjusting actions on the basis of what has been learned. Our October 2012 "Outline for Adaptive Management Approach" was used to guide our adaptive management process in 2017-2018. A review of BMP implementation and an analysis of environmental monitoring data was performed. The Shared MS4 Permit SWMP is a recent product of our Adaptive Management Approach. At the present time, Clackamas County, WES, and the Cities of Rivergrove and Happy Valley implement their MS4 permit programs through three separate SWMPs. To improve coordination and overall program effectiveness, a single, combined, Shared MS4 Permit SWMP (Shared SWMP) was created. The Shared SWMP was submitted to DEQ with WES' MS4 Permit renewal application package in February 2017, but as of October 25, 2018, DEQ hasn't authorized the implementation of this SWMP.

An extensive Adaptive Management-based process was undertaken as the three SWMPs were integrated into one Shared SWMP. This process, which was facilitated and supported by Otak, Inc., included a project kickoff meeting, three separate Workshops, three separate Visioning sessions, and over a dozen other meetings to receive input and direction which was subsequently used to determine the depth and breadth of the program which is described in the Shared SWMP. Attendees at the Workshops, Visioning sessions, and meetings included numerous staff from Clackamas County's WES, DTD and BCS, the City of Happy Valley and the City of Rivergrove.

WES completed a Gap Analysis in October 2016 which compared the Coordinated Participants' current SWMPs with requirements in the March 2012 MS4 permit to ensure that the February 2017 Shared SWMP fully complies with the MS4 permit.

A substantial number of modifications were made to various BMPs (Best Management Practices) during the process of integrating the three existing SWMPs into the Shared SWMP. The Shared SWMP has thirty-six (36) BMPs, many of which have new, improved measurable goals and tracking measures. For a summary of these modifications, please see Appendix B of the February 2017 MS4 Permit Renewal Application Package:

<https://dochub.clackamas.us/documents/drupal/2da8983d-d7e4-4241-9184-9ded9357e491>

1.4 SCHEDULE B(5)(D) -- ANY PROPOSED CHANGES TO SWMP PROGRAM ELEMENTS THAT ARE DESIGNED TO REDUCE TMDL POLLUTANTS TO THE MAXIMUM EXTENT PRACTICABLE (MEP).

Please see section 1.3 (above). As the three existing SWMPs were integrated into the Shared SWMP, many BMPs were modified, and several of these proposed modifications are expected to reduce levels of TMDL pollutants which are discharged. Examples include:

- Portions of some proposed Construction Site Runoff BMPs are expected to reduce levels of these pollutants in stormwater: total phosphorus (Tualatin River only), settleable volatile solids (Load Allocation for Tualatin River's dissolved oxygen TMDL), mercury, and DDT and dieldrin (Johnson Creek only).
- Portions of some proposed Post-Construction Site Runoff BMPs, BMP PREV-6 ("Storm System Retrofit Program"), and BMPs MAINT-3 & MAINT-4 & MAINT-7 ("Structural Stormwater Facility Operations and Maintenance" BMPs) are expected to reduce levels of these pollutants in stormwater: E. coli, total phosphorus (Tualatin River only), settleable volatile solids (Load Allocation for Tualatin River's dissolved oxygen TMDL), mercury, and DDT and dieldrin (Johnson Creek only).

1.5 SCHEDULE B(5)(E) – A SUMMARY OF TOTAL STORMWATER PROGRAM EXPENDITURES AND FNDING SOURCES OVER THE REPORTING FISCAL YEAR, AND THOSE ANTICIPATED IN THE NEXT FISCAL YEAR.

WES and the City of Happy Valley dedicated sufficient resources to implement the Stormwater Management Plan. WES dedicated over 17,912 employee hours (the equivalent of 10.5 FTEs) to the Surface Water Program.

Operating and Construction Fund resources, including Fund Balances, budgeted in the recent past, during the reporting period and in the current fiscal year for are below:

CCSD#1

CCSD#1	15/16 Actual	16/17 Actual	17/18 Budget	17/18 Estimate	18/19 Adopted
Resources	15,354,408	16,563,769	22,648,386	18,152,675	0
Materials & Services	3,395,971	3,419,047	4,668,386	3,818,422	0
Capital Outlay	200,194	159,147	2,830,000	2,248,475	0
Transfers	0	0	0	0	0
Special Payments (footnote #1)	0	0	15,150,000	12,085,778	0
Contingency	0	0	0	0	0
Ending Fund Balance (footnote #2)	11,758,243	12,985,575	0	0	0
Total Requirements	15,354,408	16,563,769	22,648,386	18,152,675	0

- 1 *Special Payments* represent the contribution of CCSD#1’s assets to the WES Partnership, a legal agreement between SWMACC and Tri-City Service District, and in 2017-2018 anticipated to include CCSD#1, to co-join assets from the different districts.
- 2 In 2017-2018, there is a zero CCSD#1 ending fund balance due to the integration of the district into the WES Partnership. The next reporting period will be the last year for CCSD#1 Surface Water Fund, whose assets will transfer to the WES Surface Water Fund.

Annual funding for the Stormwater Management Program for CCSD#1 came from four sources (unaudited numbers):

Monthly Stormwater Utility Fees \$ 4,180,674

Maintenance Fees	\$ 332,978
Systems Development Charges (SDCs)	\$ 103,710
Stormwater and Erosion Control Permit Fees	\$ 511,474

During 2017-2018, customers in the North Clackamas unit of CCSD#1 paid the monthly program fee of \$6.70 per Equivalent Service Unit (ESU), which is defined as one single-family residence or 2,500 square feet of impervious surface for nonresidential customers. Note that the fee was increased to \$6.95 per ESU soon after this reporting period ended on June 30, 2018. New single-family residential customers, since 1998, also pay a monthly maintenance agreement fee of \$3 per ESU which is dedicated for maintenance of local subdivision stormwater conveyance, detention, treatment, and infiltration facilities.

SDCs are collected from new development and dedicated to planning, design, and construction of additional stormwater infrastructure capacity needed to accommodate growth. The current SDC rate is \$205 per ESU.

WES (SWMACC)

Formerly Tri-City and SWMACC	15/16 Actual	16/17 Actual	17/18 Budget	17/18 Estimate	18/19 Adopted (footnote #1)
Resources	599,548	696,673	9,180,647	12,769,090	19,387,335
Materials & Services	103,599	134,240	351,033	209,883	5,218,049
Capital Outlay	0	0	0	0	2,980,000
Transfers	0	0	0	0	1,000,000
Contingency	0	0	35,000	0	1,615,000
Special Payments (footnote #2)	0	562,433	0	0	0
Ending Fund Balance (footnote #3)	495,949	0	8,794,614	12,559,207	8,574,286
Total Requirements	599,548	696,673	9,180,647	12,769,090	19,387,335

- 17/18 Adopted Budget information shown for WES Surface Water Fund. SWMACC does not have a FY 17/18 budget due to the integration of the district's operations into the WES Partnership on July 1, 2017.
- Special Payments* represent the contribution of SWMACC's assets to the WES Partnership.
- The 16/17 column includes changes to the original budget from a Supplemental Budget adopted in June 2017.

Annual funding for the Stormwater Management Program for SWMACC came from the following (preliminary):

Monthly Stormwater Utility Fees	\$ 185,646
Miscellaneous Income	\$ 7,038

As shown above, the vast majority of the SWMACC's revenues are derived from monthly program fees which are levied per Equivalent Service Unit (ESU). An ESU is one single-family residence or 2,500 square feet of impervious surface for nonresidential customers. The monthly fee per ESU is \$4.10, which increased to \$4.25 per ESU at the beginning of this fiscal year.

Only a portion of the SWMACC's revenues are collected within the SWMACC's MS4-permitted area. Other revenue is collected from portions of the SWMACC which are: I) rural, and II) served by stormwater injection devices, such as drywells (the Stormwater WPCF Permit area).

City of Happy Valley

The City has five FTEs in the Public Works Department who, in part, perform MS4 duties.

MS4 Permit Program Funding Sources:

- **Permit fees for development** of land (plan review and inspection) are based upon the construction value of the project. In 2017-2018, the City generated \$641,845 in fees from 48 land development permits (The City expects to receive a similar amount of permit fee revenue in 2018-2019). Only a portion of these \$641,845 support the implementation of the MS4 Permit Program, such as erosion control and plan review.
- Twenty **Erosion Control Permits** yielded \$21,630 in revenue in 2017-2018. The City expects to receive a range from \$15,000 to \$20,000 in Erosion Control Permit revenue in 2018-2019. The \$21,630 of MS4 permit program revenue is a subset of \$641,845.
- \$93,840 from the **Streets Maintenance** portion of the budget for street sweeping. Street sweeping is also conducted to improve road safety and for aesthetic reasons.
- Approximately \$6,300 from the City of Happy Valley's **General Operating Budget** was dedicated by the City of Happy Valley during 2017-2018 to administer the overall MS4 Permit Program (e.g., attendance at monthly Watershed Protection Program meetings, compiling data for this annual report). The City of Happy Valley expects to dedicate a similar amount of money from this portion of this budget during 2018-2019 for administration of the overall MS4 Permit Program.

MS4 Permit Program Expenditures:

- **Street Sweeping Program:** The City of Happy Valley spent \$93,840 on their street sweeping program in 2017-2018. The City of Happy Valley expects to spend a similar amount of money on street sweeping in 2018-2019.

- **Erosion Control Program:** Erosion Control Permit fee revenue is spent by the City of Happy Valley to administer this program. The City spent approximately \$21,630 to administer this program in 2017-2018 and the City expects to spend a similar amount in 2018-2019.
- **MS4 Permit Program Administration:** Approximately \$6,300 were spent by the City of Happy Valley during 2017-2018 to administer the overall MS4 Permit Program (e.g., attendance at monthly Watershed Protection Program meetings, compiling data for this annual report). The City of Happy Valley expects to spend a similar amount of money during 2018-2019 for administration of the overall MS4 Permit Program.

1.6 SCHEDULE B(5)(F) -- A SUMMARY OF MONITORING PROGRAM RESULTS, INCLUDING MONITORING DATA THAT ARE ACCUMULATED THROUGHOUT THE REPORTING YEAR AND ANY ASSESSMENTS OR EVALUATIONS CONDUCTED.

See Appendix B for the summary of the monitoring program’s results and for information about any assessments or evaluations which were conducted.

1.7 SCHEDULE B(5)(G) -- ANY PROPOSED MODIFICATIONS TO THE MONITORING PLAN THAT ARE NECESSARY TO ENSURE THAT ADEQUATE DATA AND INFORMATION ARE COLLECTED TO CONDUCT STORMWATER PROGRAM ASSESSMENTS

No additional modifications are proposed in this annual report. WES, Clackamas County, and the Cities of Rivergrove and Happy Valley are co-owners of a combined Comprehensive Clackamas County NPDES MS4 Stormwater Monitoring Plan (Monitoring Plan). Other co-owners of this Monitoring Plan include, but aren’t limited to, the Cities of Milwaukie and Oregon City. This Monitoring Plan was revised most recently in January 2017 and was implemented on July 1, 2017. Please see the January 2017 Monitoring Plan for more information.

1.8 SCHEDULE B(5)(H) -- A SUMMARY DESCRIBING THE NUMBER AND NATURE OF ENFORCEMENT ACTIONS, INSPECTIONS, AND PUBLIC EDUCATION PROGRAMS, INCLUDING RESULTS OF ONGOING FIELD SCREENING AND FOLLOW-UP ACTIVITIES RELATED TO ILLICIT DISCHARGES.

See the sections of the BMP table in Appendix A which apply to BMP #1 (titled “Conduct Dry Weather Inspections” for illicit discharges) and BMP #12 (titled “Facilitate Public Reporting of Illicit Discharges...”) for portions of the response to this requirement. See the following table (below) for the responses to the other portions of this requirement.

Date of illicit discharge	Inspection Date	Incident Description, including follow-up activity	Enforcement action taken?
7/9/2017	7/9/2017	On July 9, 2017, an unknown amount of sewage was discharged from one of WES' sanitary sewer manholes and into the dry bed of a Mt. Scott Creek tributary near the house at 12100 SE Alexa Rose Lane in Happy Valley (OERS 2017-1973). WES responded and cleaned up the spilled sewage.	No
7/17/2017	7/17/2017	On July 17, 2017, about 100 gallons of sewage were discharged from WES' sanitary sewer system in Clackamas (OERS 2017-2069). This sewage was spilled onto the ground and no waterways were affected. WES responded and cleaned up the spilled sewage.	No
7/28/2017	7/28/2017	On July 28, 2017, about 100 gallons of sewage were discharged from WES' sanitary sewer system (OERS 2017-2216) near 15631 SE Roethe Road in an unincorporated portion of CCSD#1. Some of this sewage entered the MS4. WES responded and cleaned up the spilled sewage.	No
8/4/2017	8/4/2017	On August 4, 2017, DEQ staff conducted an inspection of Dakine Reconditioning's facility on SE Wilde Road in an unincorporated portion of CCSD#1 and noted that an employee was washing material to the stormdrain and observed oil sheen, discoloration, and hydrocarbon odors in both onsite stormwater catch basins.	No
8/11/2017	8/11/2017	On August 11, 2017, about 20 gallons of diesel fuel leaked from a refrigerated rail car (OERS 2017-2384) which was parked next to the J & D Refrigerated Services facility at 12300 SE Carpenter Drive in Clackamas (97015). This fuel was promptly cleaned up by the responsible party before it could reach the storm sewer system or Carli Creek.	No
8/12/2017 (illicit discharge on this date was not verified)	12/5/2017	On August 12, 2017, WES received a report that the same business on SE Wilde Road in CCSD#1 was discharging waste materials to a storm sewer system. On December 5, 2017, WES staff conducted a joint inspection with DEQ. No evidence of discharge was found, but WES sent a guidance letter about the need for improved material disposal practices. Dakine Reconditioning moved out of this facility a couple of months later.	No

Date of illicit discharge	Inspection Date	Incident Description, including follow-up activity	Enforcement action taken?
8/17/2017	8/17/2017	On August 17, 2017, about 100 gallons of sewage were discharged from WES' sanitary sewer system in Clackamas (OERS 2017-2462). No sewage entered any storm sewer system, creek, wetland, or river. WES responded and cleaned up the spilled sewage.	No
8/30/2017	8/30/2017	On August 30, 2017, an unknown amount of sewage was discharged from WES' sanitary sewer system into a ditch in Happy Valley (OERS 2017-2614). WES responded and cleaned up the spilled sewage.	No
9/15/2017	9/15/2017	On September 15, 2017, about ten gallons of fuel were spilled from a citizen's vehicle after it crashed into a ravine near 11300 SE 147 th Avenue in Happy Valley (OERS 2017-2759). The fuel was cleaned up and no storm sewer systems or waterways were affected.	No
10/2/2017	10/2/2017	About 50 gallons of diesel were spilled at the Unified Grocers facility on October 2, 2017 at 6433 SE Lake Road in unincorporated portion of CCSD#1 (OERS 2017-2907). Some of the diesel flowed through a storm sewer system and into Mt. Scott Creek. The spill cleanup work was performed by Cowlitz Clean Sweep.	No
10/12/2017	10/12/2017	On October 12, 2017, a Tri-Met bus spilled 6-8 gallons of oil as it drove on various roads, such as SE Hubbard Rd, SE 135 th Ave and Highway 212/224, which are in an unincorporated portion of CCSD#1 (OERS 2017-2982). Tri-Met oversaw the cleanup, which was performed by NRC. A street sweeper and a vacuum truck were deployed for this cleanup.	No
11/16/2017	11/16/2017	West Pacific Drilling hit an underground oil line while drilling bore holes in the 12500 block of SE 93 rd Avenue in Clackamas (97015) on November 16, 2017 (OERS 2017-3302). The oil was contained by the boring hole, and didn't enter any storm sewer system or Mt. Scott Creek. The oil was promptly cleaned up the company.	No
11/20/2017	11/20/2017	About 2 gallons of paint were spilled into a storm sewer system by the E.A. White Company in the area near the intersection of	No

Date of illicit discharge	Inspection Date	Incident Description, including follow-up activity	Enforcement action taken?
		SE 84 th Avenue and Sunnybrook Blvd. in an unincorporated portion of CCSD#1 on November 20, 2017. The company cleaned up the spilled material and none reached Phillips Creek.	
11/28/2017	11/28/2017	About 30 gallons of diesel were spilled at the Gustav's restaurant at 12605 SE 97 th Avenue in Clackamas on November 28, 2017 (OERS 2017-3397). Some of the diesel flowed into the privately owned storm sewer system which serves the restaurant. The spill was cleaned up.	No
12/5/2017	12/5/2017	During an IDDE inspection of an adjacent business on SE Wilde Road, evidence was noted of a discharge into the MS4 of an unknown amount of wastewater created from melted ice used to store freshly killed fish. WES staff met with the owner, ordered them to stop discharging this to the storm sewer system, and identified connection points to the sanitary sewer system.	Yes
1/12/2018	1/12/2018	About ½ of a gallon of slurry generated by concrete cutting was discharged into a County-owned storm sewer system catch basin on SE Harmony Rd in an unincorporated portion of CCSD#1 by Nikoli Concrete Cutting on January 12, 2018 (OERS 2018-0073). The company cleaned it up after WES staff asked them to do so.	No
1/18/2018	1/18/2018	On January 18, 2018, a citizen reported that diesel fuel had been spilled onto some roads in the area around SE Sunnyside Road and I-205 in Clackamas (OERS 2018-0119). Rain was falling at the time and although WES staff promptly responded, they were unable to corroborate the citizen's report. WES staff believe it is likely that fuel had indeed been spilled by an unknown vehicle, but that it quickly washed into the storm sewer system and some probably was discharged into Phillips Creek and/or Mt. Scott Creek.	No
2/7/2018	2/7/2018	About 1 gallon of motor oil was spilled as the result of a car wreck near the intersection of SE 84 th Ave and Sunnyside Rd in an unincorporated portion of CCSD#1 on February 7, 2018 (OERS 2018-0290). The car was owned by a citizen. Some of the oil flowed through the County-owned storm sewer system	No

Date of illicit discharge	Inspection Date	Incident Description, including follow-up activity	Enforcement action taken?
		and into Phillips Creek. WES and Clackamas Fire District No. 1 partnered on the spill cleanup work.	
2/22/2018	2/22/2018	An unknown amount of gasoline was spilled as the result of a car wreck near the home at 12142 SE Mt. Scott Blvd in Happy Valley on February 22, 2018 (OERS 2018-0403). The car was owned by a citizen. Some of the gasoline spilled onto the roadside, but none made it to Mt. Scott Creek or to a nearby spring. WES and Clackamas Fire District No. 1 partnered on the spill cleanup work.	No
2/22/2018	2/22/2018	About 20 gallons of paint were spilled out of a truck trailer at a dock at the XPO Logistics facility on February 22, 2018 at 12250 SE Ford St in an unincorporated portion of CCSD#1 (OERS 2018-0398). Some of the paint entered the privately owned storm sewer system which serves this facility, but none reached the public storm sewer system or Carli Creek. The spill cleanup work was performed by NRC.	No
2/26/2018	2/26/2018	About 264 gallons of diesel were spilled as the result of theft on February 26, 2018 at the Scouter's Mountain residential construction site in Happy Valley (OERS 2018-0445). Kerr Construction, the owner of the heavy equipment from which the fuel was stolen, hired Point Environmental, an environmental services company, to clean up the spill. Spill cleanup involved the use of many booms, absorbent mats, and the removal of ~60 cubic yards of contaminated soil. About 1 or 2 gallons of diesel flowed into a creek.	No
About a month prior to 3/7/2018. Incident was reported to WES on 3/7/2018.	3/7/2018	Over the past year, a citizen allegedly has repeatedly dumped an unknown quantity of used motor oil and an unknown type of dangerous/harmful liquid into the public storm sewer system near the home at 14700 SE Pebble Beach Drive in Happy Valley. A crew from WES, who inspected the site and cleaned the catch basin, verified that the catch basin did have: I) oily material/residue which appeared to be used motor oil, and II) a foul odor.	No
4/5/2018	4/5/2018	On April 5, 2018, an unknown amount of petroleum/oil was spilled at the Precision Castparts facility at 13350 SE Johnson Road in an unincorporated portion of CCSD#1 (OERS 2018-	No

Date of illicit discharge	Inspection Date	Incident Description, including follow-up activity	Enforcement action taken?
		0770). Some of the material flowed through a privately owned storm sewer system and into Dean Creek. An environmental services company cleaned up the spill.	
3/21/2018	3/21/2018	On March 21, 2018, a bucket of greasy, foamy sludge was dumped on the street by a citizen near the home at 16200 SE Katie Court in an unincorporated portion of CCSD#1. WES cleaned up the material, preventing it from reaching the storm sewer system.	No
5/1/2018	5/1/2018	About 20 gallons of hydraulic fluid was spilled as the result of a vehicle collision in the intersection of SE 82 nd Drive and Tolbert St., which is in an unincorporated portion of CCSD#1, on May 1, 2018 (OERS 2018-0973). A citizen is the responsible party for this spill. Some of the fluid entered the County's storm sewer system, but it didn't reach Dean Creek. This spilled material was cleaned up.	No
5/8/2018	5/8/2018	An unknown amount of sewage was discharged onto the ground by a motor home within 50 feet of a County-owned storm sewer system catch basin. The discharge occurred while the motor home was near Mill Park, which is located at the intersection of SE Linwood Ave. and Overland St. in an unincorporated portion of CCSD#1. WES cleaned up the sewage spill, preventing it from reach the storm sewer system and Johnson Creek	No
Illicit discharge was ongoing for years	5/24/2018	On May 23, 2018, as WES staff ran a TV camera through a storm sewer line, they discovered the sanitary sewer lateral which serves the home at 11839 Red Hawk Lane in Happy Valley had been cross-connected to a public storm sewer line for several years (OERS 2018-1141). A significant amount of sewage was discharged into Mt. Scott Creek over a period of several years. WES cleaned up the sewage which was present in May 2018 and made sure the home's lateral was quickly connected to WES' sanitary sewer system.	No
6/26/2018	6/26/2018	An unknown amount of sewage was discharged from a privately owned sanitary sewer line on private property (OERS 2018-1385) in Happy Valley. The sewage entered a ditch, but it	No

Date of illicit discharge	Inspection Date	Incident Description, including follow-up activity	Enforcement action taken?
		was cleaned up before it could move downstream towards a creek.	
Numerous days prior to June 28, 2018	6/28/2018	WES investigated a possible cross connection at the U-Haul facility at 8045 SE McBride St. in unincorporated Clackamas County. WES staff verified that an oil-water separator serving a washing bay was cross-connected to a storm sewer system which discharges to Phillips Creek. OERS was notified on June 28 th (incident #2018-1400). Also on June 28 th , U-Haul staff were verbally notified of the need to promptly make plumbing repairs and cease illicitly discharging wastewater. WES issued a Notice of Non-compliance to U-Haul on July 2, 2018. U-Haul hired a contractor who made corrections and passed plumbing final inspection on August 28, 2018.	Yes

1.9 SCHEDULE B(5)(I) -- A SUMMARY, AS IT RELATES TO MS4 DISCHARGES, DESCRIBING LAND USE CHANGES, URBAN GROWTH BOUNDARY (UGB) EXPANSION, LAND ANNEXATIONS, AND NEW DEVELOPMENT ACTIVITIES THAT OCCURRED WITHIN THESE AREAS DURING THE REPORTING YEAR. THE NUMBER OF NEW POST-CONSTRUCTION PERMITS ISSUED AND AN ESTIMATE OF THE TOTAL NEW AND REPLACED IMPERVIOUS SURFACE AREA RELATED TO DEVELOPMENT PROJECTS THAT COMMENCED DURING THE REPORTING YEAR MUST ALSO BE INCLUDED.

Land Use Changes – City of Happy Valley:

- Number of zone changes approved in Happy Valley: 7
- Number of new residential building lots approved by partition, subdivision, and planned unit development in Happy Valley: 119

Land Use Changes – Clackamas County¹:

- Number of New Land Partitions: 15

¹ These land use statistics capture the entire unincorporated area of Clackamas County regulated by the MS4 permit, which is primarily comprised of lands in the Oak Lodge Water Services District, Clackamas County Service District No. 1 and the Surface Water Management Agency of Clackamas County.

- Number of New Land Subdivisions: 9
- Number of Approved Zone Changes: 1 (from R10 to R7)

UGB Expansion:

- During 2017-2018, the UGB was not expanded in or near the Cities of Happy Valley or Rivergrove, the SWMACC, or CCSD#1.

Land Annexations:

- Acreage annexed into CCSD#1: 76 acres
- Acreage annexed into the City of Happy Valley: 334 acres
- Acreage de-annexed from the SWMACC: None

New development activities (Number of New Post-Construction Permits Issued, etc.):

- Number of building division permits in Happy Valley: 251
- Number of engineering division development permits in Happy Valley: 30
- Total number of plans reviewed and approved by WES in CCSD#1 and the SWMACC: 124
- Number of building division site plan reviews in Happy Valley: 251
- Number of engineering division site plan reviews in Happy Valley: 87
- Number of new units of multi-family housing approved in Happy Valley: 0
- Square feet of new commercial/office development approved in Happy Valley: 182,170

Estimated total new and replaced impervious surface area related to development projects:

- 46 acres

When the lands described here in section 1.9 were developed, post-construction stormwater management program requirements implemented by the City of Happy Valley, Clackamas County, and/or WES reduced storm sewer system pollution levels to the maximum extent practicable. For more information, see the post-construction program-related sections of this annual report.

1.10 SCHEDULE B(5)(J) -- A SUMMARY, AS RELATED TO MS4 DISCHARGES, DESCRIBING CONCEPT PLANNING OR OTHER ACTIVITIES CONDUCTED IN PREPARATION OF UGB EXPANSION OR LAND ANNEXATION, IF ANTICIPATED FOR THE FOLLOWING YEAR.

City of Happy Valley

No UGB expansion occurred in the City of Happy Valley in 2017-2018 and the UGB is not expected to be expanded in 2018-2019. With respect to the 334 acres annexed into the City of Happy Valley in 2017-2018, along with the 1,050 acres which were annexed into the City of Happy Valley in 2016-2017, the City has begun concept planning for a roughly 2,700-acre area on the eastern edge of the City, including areas that were previously in western Damascus. This plan is known as the Pleasant Valley/North Carver Comprehensive Plan. The City received a Metro 2040 Planning and Development grant and began the project this past spring. The project is expected to be completed in 2020. When the lands described here are developed, post-construction stormwater management program requirements will be implemented by the City of Happy Valley and/or WES to reduce storm sewer system pollution levels to the maximum extent practicable.

Clackamas County

No concept planning or other activities were conducted in preparation of UGB expansion or land annexation in 2017-2018 and none is expected in 2018-2019.

Appendix A

MS4 Best Management Practices

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BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #1: Illicit Discharge Detection and Elimination	Conduct Dry Weather Inspections	1	1	CCSD#1 and SWMACC			Tracking Measure	Number of outfalls inspected during dry-weather	37	37 dry weather inspections were conducted.
Component #1: Illicit Discharge Detection and Elimination	Conduct Dry Weather Inspections	1	1	CCSD#1 and SWMACC			Tracking Measure	Number and type of illicit discharges that were encountered and controlled	0	No illicit discharges were found during outfall inspections.
Component #1: Illicit Discharge Detection and Elimination	Conduct Dry Weather Inspections	1	1	CCSD#1 and SWMACC			Tracking Measure	Status of updating procedures to address new permit requirements	Attained	On February 15, 2017, we updated our written summary of the current Priority Locations for conducting dry-weather storm sewer system field screening work
Component #1: Illicit Discharge Detection and Elimination	Conduct Dry Weather Inspections	1	1	CCSD#1 and SWMACC			Measurable Goal	Inspect major or priority outfalls for the presence of illicit discharges at least once per year	Attained	Of the 37 dry weather inspections conducted, 32 were at major outfalls. The remaining five were minor outfalls.
Component #1: Illicit Discharge Detection and Elimination	Conduct Dry Weather Inspections	1	1	CCSD#1 and SWMACC			Measurable Goal	Update maps of major outfalls on an annual basis	Attained	An updated map of major outfalls is found in a written procedures (updated February 15, 2017) of the current Priority Locations for conducting dry-weather storm sewer system field screening work.
Component #1: Illicit Discharge Detection and Elimination	Conduct Dry Weather Inspections	1	1	CCSD#1 and SWMACC			Measurable Goal	Update dry weather field screening program to address new permit requirements by November 1, 2012	Attained	The dry weather field screening program was updated to address new permit requirements by November 1, 2012.
Component #1: Illicit Discharge Detection and Elimination	Implement the Spill Response Program	2	2	CCSD#1 and SWMACC			Tracking Measure	Number of reported spills to the MS4 system	8	Eight of the 29 entries found in Section 1.8's list of illicit discharges were reported spills to the MS4 system.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #1: Illicit Discharge Detection and Elimination	Implement the Spill Response Program	2	2	CCSD#1 and SWMACC			Tracking Measure	Number and type of response to the reported spills	8	WES staff responded to the spill at the time the spill was reported. WES staff ensured that the responsible parties cleaned up the spill in an appropriate manner.
Component #1: Illicit Discharge Detection and Elimination	Implement the Spill Response Program	2	2	CCSD#1 and SWMACC			Measurable Goal	Implement the spill response program and associated protocols.	Attained	WES has developed and maintains an appropriate spill response program. The spill response standard operating procedure has been reviewed and WES staff have been trained on its use.
Component #1: Illicit Discharge Detection and Elimination	Respond to reports involving illicit discharges	3	3	CCSD#1 and SWMACC			Tracking Measure	Number of alleged illicit discharges and non-stormwater (i.e., fire suppression flows and dechlorinated flows from swimming pools) discharges which were reported each year	19	Nineteen of the 29 entries found in Section 1.8's list of illicit discharges were alleged illicit discharges and non-stormwater discharges.
Component #1: Illicit Discharge Detection and Elimination	Respond to reports involving illicit discharges	3	3	CCSD#1 and SWMACC			Tracking Measure	Number of illicit discharges that were controlled	19	All illicit discharges were controlled by either WES staff or the responsible party.
Component #1: Illicit Discharge Detection and Elimination	Respond to reports involving illicit discharges	3	3	CCSD#1 and SWMACC			Measurable Goal	Respond to reports involving alleged illicit discharges within two weeks.	Attained	All illicit discharges were responded to upon receiving the report
Component #2: Industrial and Commercial Facilities	Screen Existing and New Industrial Facilities	4	4	CCSD#1 and SWMACC			Tracking Measure	Track the number of existing or new industrial facilities subject to a stormwater industrial NPDES permit during the permit term.	26 1200Z 1 1200A	Twenty-six (26) facilities in CCSD#1 are currently in possession of a 1200Z permit and an additional facility has a 1200A permit.
Component #2: Industrial and Commercial Facilities	Screen Existing and New Industrial Facilities	4	4	CCSD#1 and SWMACC			Measurable Goal	Review new industrial development applications once during the permit term to identify additional facilities needing to obtain 1200Z permits.	Attained	This review of building permit applications for new industrial facilities was completed in March 2017

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #2: Industrial and Commercial Facilities	Address Other Industrial Facilities	5	5	CCSD#1 and SWMACC			Tracking Measure	The number of inspections performed, and where applicable, monitoring data collected	6	Six inspections were conducted, but no stormwater quality monitoring data was collected. The following stormwater quality inspection was performed by WES: June 7, 2018 inspection at the Sunnyside Village Apartments. Note: The PPRC (Pacific NW Pollution Prevention Resource Center) also provided technical assistance/pollution prevention inspections in CCSD#1 under contract w/the CRWP in 2017-2018: Pacificmark Construction (SE 98th Ave/Clackamas), Same Day Auto Service (SE 106th Ave/Clackamas), Bill's Datsun Shoppe (SE Evelyn/Clackamas), FMI Truck Sales and Service (Hwy 212/Clackamas), and Precision Truss & Lumber (SE Jennifer/Clackamas). PPRC also contacted and offered EcoBiz program technical assistance to 11 auto repair shops/car washes and to 4 landscaping service contractors in CCSD#1.
Component #2: Industrial and Commercial Facilities	Address Other Industrial Facilities	5	5	CCSD#1 and SWMACC			Tracking Measure	The number of letters, enforcement actions, or other contacts made	4	Four additional facilities were inspected in 2017-2018. Three of the facilities were inspected to determine if their process wastewater required a discharge permit, which they did not. The fourth inspection was conducted at Tethy Oceanic in response to a complaint of spent fish water being discharged into the catch basin in their parking lot. During the inspection, a drain to the sanitary sewer inside of the facility was approved as a discharge point. A new business, Northwest Superfish Company now occupies the site.
Component #2: Industrial and Commercial Facilities	Address Other Industrial Facilities	5	5	CCSD#1 and SWMACC			Tracking Measure	Number of pretreatment inspections performed (CCSD#1-only)	28 permitted 2 non-permitted	For 2017-2018, the Industrial Permits group conducted a total of 28 annual inspections of permitted industrial users. Of the 28 inspections, 3 facilities were inspected twice in in this period. In addition, two non-discharging, unpermitted industrial manufacturer facilities were inspected.
Component #2: Industrial and Commercial Facilities	Address Other Industrial Facilities	5	5	CCSD#1 and SWMACC			Measurable Goal	Notify and work with industries to improve stormwater management if an inspection is conducted that indicates improvement is needed.	Attained	Worked with Sunnyside Village Apartments in an attempt to improve stormwater management following elevated levels of Dissolved Copper recorded during WES' ongoing outfall monitoring.
Component #3 Construction Site Runoff	Conduct Procedures for Site Planning	6	6	CCSD#1 and SWMACC	HV		Tracking Measure	Annual number of permitted, active construction projects (i.e., those projects disturbing 800 sq. ft. or more)	524	243 Active construction projects in WES. There were 251 building division permits and 30 engineering division development permits in Happy Valley.
Component #3 Construction Site Runoff	Conduct Procedures for Site Planning	6	6	CCSD#1 and SWMACC	HV		Tracking Measure	Annual number of site plan reviews and approved plans	462	124 site plan reviews and approved plans in WES. In addition, there were 251 building division site plan reviews and 87 engineering division site plan review in Happy Valley.
Component #3 Construction Site Runoff	Conduct Procedures for Site Planning	6	6	CCSD#1 and SWMACC	HV		Measurable Goal	Review all applicable erosion and sediment control plans submitted as part of the building permit.	Attained	All applicable erosion and sediment control plans were reviewed, approved and permitted.
Component #3 Construction Site Runoff	Implement Requirements for Structural and Non-Structural Best Management Practices	7	7	CCSD#1 and SWMACC	HV		Tracking Measure	Annual number of permitted, active construction projects (i.e., those projects disturbing 800 sq. ft. or more)	524	See tracking measure comment in BMP #6.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #3 Construction Site Runoff	Implement Requirements for Structural and Non-Structural Best Management Practices	7	7	CCSD#1 and SWMACC	HV		Tracking Measure	Annual number of site plan reviews and approved plans	462	See tracking measure comment in BMP #6.
Component #3 Construction Site Runoff	Implement Requirements for Structural and Non-Structural Best Management Practices	7	7	CCSD#1 and SWMACC	HV		Measurable Goal	CCSD#1 and SWMACC: Require structural and non-structural BMPs for erosion prevention and sediment control on all construction sites disturbing 800 sq. ft. of land or more	Attained	All construction sites disturbing 800 sq. ft. of land or more require structural and non-structural BMPs for erosion prevention and sediment control.
Component #3 Construction Site Runoff	Conduct Training for Construction Site Operators	8	8	CCSD#1 and SWMACC	HV		Tracking Measure	Track the number and type of educational and training events the District conducts and/or participates in annually	2	WES has made the Erosion Prevention and Sediment Control Planning and Design Manual available on the website. ACF West gave a presentation at the Clackamas County Development Services building on the erosion control and storm products they have available. The City did not sponsor training courses this year for construction site operators.
Component #3 Construction Site Runoff	Conduct Training for Construction Site Operators	8	8	CCSD#1 and SWMACC	HV		Measurable Goal	Conduct training for new employees as appropriate and whenever there is a significant update to the Erosion Prevention and Sediment Control Planning and Design Manual.	Attained	Two new employees were hired within WES division of Environmental Services, both of whom completed the necessary course training to become certified as a Certified Erosion Sediment Control Lead (CESCL) and Erosion & Sediment Control Inspector. Additional training will be provided as needed. Happy Valley engineering had two people attend an Erosion Control and Stormwater Management Summit in Jan 2018 and one person attend a Wetland Law and Compliance training in Oct 2017. In addition, Happy Valley's Engineering Inspector Consultant became CESCL certified in July 2017. Happy Valley Public Works staff attended the following conferences and events: APWA Street Maintenance and Collection Services, Oct 2017 and Mar 2018. 4-County CWMA Pull-Together Jan 2018. ORWEF Water Environment School, Mar 2018.
Component #3 Construction Site Runoff	Identify Priorities for Inspecting Sites and Conducting Enforcement Actions	9	9	CCSD#1 and SWMACC	HV		Tracking Measure	Annual number of permitted sites and percentage of sites inspected	100%	Inspected 100% of 281 permitted sites in Happy Valley and 243 permitted sites in WES.
Component #3 Construction Site Runoff	Identify Priorities for Inspecting Sites and Conducting Enforcement Actions	9	9	CCSD#1 and SWMACC	HV		Tracking Measure	Annual number of erosion control inspections conducted	1,922	WES inspections - 820 Happy Valley Building Division Inspections - 661 Happy Valley Engineering Division Inspections - 441
Component #3 Construction Site Runoff	Identify Priorities for Inspecting Sites and Conducting Enforcement Actions	9	9	CCSD#1 and SWMACC	HV		Tracking Measure	Annual number of enforcement actions	12	10 Happy Valley and 2 WES Erosion Control enforcement actions
Component #3 Construction Site Runoff	Identify Priorities for Inspecting Sites and Conducting Enforcement Actions	9	9	CCSD#1 and SWMACC	HV		Measurable Goal	Inspect construction sites disturbing 800 s.f. of land or more a minimum of three times during construction to verify proper implementation of required BMPs	Attained	100% of the erosion control permits were inspected a minimum of three times.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #3 Construction Site Runoff	Identify Priorities for Inspecting Sites and Conducting Enforcement Actions	9	9	CCSD#1 and SWMACC	HV		Measurable Goal	Monitor compliance with the erosion control regulations for sites disturbing 800 s.f. of land or more and, when necessary, issue deficiency notices, charge re-inspection fees, issue fines and stop land-disturbing development work at the site until provisions of the regulations are met	Attained	In Happy Valley, nine of the ten erosion control cases resulted in fines. WES did not issue any re-inspection fee, or fines.
Component #4 Education and Outreach	Public Education to Reduce Discharges of Pesticides, Herbicides and Fertilizers	10	10	CCSD#1 and SWMACC			Tracking Measure	Track program messages delivered, type of communication piece, and where appropriate, the number of people affected.	16	16 messages delivered via articles and ads. Reach varied per publication from 17,000 to 400,000. <ol style="list-style-type: none"> Ad: "Help Keep Chlorinated Pool Water and Other Forms of Water Pollution out of Storm Drains and Streams," Happy Valley Monthly, Sept. 2017. Reach: 17,000 Ad: "River Starts Here: yard and garden products wash into our rivers and streams. Protect our water by using compost and slow-release fertilizer," Happy Valley Monthly, May 2018. Article: "Happy Valley Residents Invited to Participate in Expanded Backyard Habitat Certification Program," Happy Valley Monthly, June 2018. Ad: "Help Protect our Watersheds," Happy Valley Monthly, April 2018. Ad: "Do You have an idea on how to protect our watersheds?", Happy Valley Monthly, Feb. 2018. Ad: "Clear Storm Drains to Protect your Property and our Water," Happy Valley Monthly, Dec. 2017. Ad: Protecting your Family's Health and our Rivers and Streams, Happy Valley Monthly, Nov. 2017. Article: "Good Stewardship of our Waterways is Good Stewardship of our Community," #ClackCoQuarterly, Winter 2017. Reach: 400,000. Watershed Education Program Provides Unique Learning Experiences," #ClackCoQuarterly, Winter 2017. Article: "Protecting the Clackamas River: Carli Creek Water Quality and Habitat Project," #ClackCoQuarterly, Feb. 2018. Ad: ECOBIZ Landscape Certification, #ClackCoQuarterly, Feb. 2018. Article: "Students Attend Celebrating Water Day Event," #ClackCoQuarterly, May 2018. Article: "County Staff support student-led Development of Sustainable Stormwater Selection Guide," #ClackCoQuarterly, August 2018. Article: "Protecting the Clackamas River: The Carli Creek Water Quality and Habitat Project is Underway," #ClackCoQuarterly, August 2018. Article: "Water Environment Services Partners with SOLVE for Summer Waterway Cleanups," #ClackCoQuarterly, August 2018.
Component #4 Education and Outreach	Public Education to Reduce Discharges of Pesticides, Herbicides and Fertilizers	10	10	CCSD#1 and SWMACC			Measurable Goal	Continue to maintain relevant public education materials on the County's website	Attained	Various articles, ads, videos, and brochures were displayed on website: <ol style="list-style-type: none"> Garden Awareness Chemical Flier. Love your Lawn without pesticides fact sheet. Moss on Roofs: Pesticide-free control. Weed and Pesticide Information and Tips. Spring 2018 Got Weeds? Get help from CRISP. Parting with Pesticides Pledge Program for the Clackamas Watershed.
Component #4 Education and Outreach	Public Education to Reduce Discharges of Pesticides, Herbicides and Fertilizers	10	10	CCSD#1 and SWMACC			Measurable Goal	Prepare a minimum of one relevant article per year for inclusion with Clackamas County customer billing statements	Attained	<ol style="list-style-type: none"> A Creek Runs Through it – Carli Creek Project Taking Shape in 2018 Keep the Wipes Out Yard and garden chemicals can contaminate our community's water
Component #4 Education and Outreach	Public Education to Reduce Discharges of Pesticides, Herbicides and Fertilizers	10	10	CCSD#1 and SWMACC			Measurable Goal	Pursue additional relevant USGS studies if the opportunity presents itself	Attained	No additional USGS studies were funded during the 2017-2018 MS4 permit year. Note that CCSD#1, the SWMACC, and the Cities of Rivergrove and Happy Valley contributed funds towards a USGS pesticide monitoring study, which assessed pesticide concentrations in creek water, creek bed sediments, and discharges from MS4 outfalls, during the current 2012-2017 MS4 permit term. This monitoring study satisfies the pesticide monitoring requirement in table B-1 of the MS4 permit. The USGS wrote an article about this study which was published in the Journal of Environmental Monitoring Assessment, a scientific journal, in May 2016.
Component #4 Education and Outreach	Proper Disposal Practices to Reduce Discharges of Pesticides, Herbicides and Fertilizers	11	11	CCSD#1 and SWMACC			Tracking Measure	Number of calls received and referred to Metro annually.	1	All calls about hazardous materials are referred to Metro.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #4 Education and Outreach	Proper Disposal Practices to Reduce Discharges of Pesticides, Herbicides and Fertilizers	11	11	CCSD#1 and SWMACC			Measurable Goal	Refer all pesticide/herbicide disposal related calls to Metro.	Attained	All calls about hazardous materials are referred to Metro.
Component #4 Education and Outreach	Facilitate Public Reporting of Illicit Discharges and Spills and Other Types of Improper Disposal of Materials	12	12	CCSD#1 and SWMACC			Tracking Measure	Describe news articles reported per year when appropriate	9	1. "Rebates offered for Local Businesses to Protect the Clackamas River: When Chemicals Spill on a Property or Street, they travel to the River Quickly," Happy Valley Monthly, Oct. 2017. Reach: 17,000. 2. "Happy Valley Residents Invited to Participate in Expanded Backyard Habitat Certification Program," Happy Valley Monthly, June 2018. 3. Article: "Good Stewardship of our Waterways is Good Stewardship of our Community," #ClackCoQuarterly, Winter 2017. Reach: 400,000. 4. Watershed Education Program Provides Unique Learning Experiences," #ClackCoQuarterly, Winter 2017. 5. "Protecting the Clackamas River: Carli Creek Water Quality and Habitat Project," #ClackCoQuarterly, Feb. 2018. 6. "Students Attend Celebrating Water Day Event," #ClackCoQuarterly, May 2018. 7. "County Staff support student-led Development of Sustainable Stormwater Selection Guide," #ClackCoQuarterly, August 2018. 8. "Protecting the Clackamas River: The Carli Creek Water Quality and Habitat Project is Underway," #ClackCoQuarterly, August 2018. 9. "Water Environment Services Partners with SOLVE for Summer Waterway Cleanups," #ClackCoQuarterly, August 2018.
Component #4 Education and Outreach	Facilitate Public Reporting of Illicit Discharges and Spills and Other Types of Improper Disposal of Materials	12	12	CCSD#1 and SWMACC		Public & Government Relations	Tracking Measure	Describe type of public complaints received. Resulting follow up actions per year will be kept in a database.	Illicit Discharge complaints	Information about the illicit discharge complaints, including results, are maintained in the WES' Maintenance Management System, Lucity software.
Component #4 Education and Outreach	Facilitate Public Reporting of Illicit Discharges and Spills and Other Types of Improper Disposal of Materials	12	12	CCSD#1 and SWMACC			Measurable Goal	Include a relevant article in The Citizen News (for the County) once a permit term (where permit term is from March 2012 through March 1, 2017)	Attained	1. Key partnerships keep the Clackamas River a source of safe drinking water #ClackCoQuarterly Nov. 2017: Reach 400,000 2. ECOBIZ Landscape Certification, #ClackCoQuarterly, Feb. 2018. Reach: 400,000. 3. Students attend Celebrating Water Day Event, #ClackCoQuarterly May. 2018: Reach 400,000
Component #4 Education and Outreach	Facilitate Public Reporting of Illicit Discharges and Spills and Other Types of Improper Disposal of Materials	12	12	CCSD#1 and SWMACC			Measurable Goal	Continue to include area for public complaints on the County's website and track number of complaints for reporting	Attained	WES provides a problem-reporting form on its website. Data is tracked by WES customer service team and WES field technicians.
Component #4 Education and Outreach	Participate in a Public Education Effectiveness Evaluation	13	13	CCSD#1 and SWMACC			Tracking Measure	Report on activities annually.	Attained	WES partners with organizations to provide public education on pollutants that impact watershed health followed by effectiveness evaluations: 1. Portland State University annual report 2. Regional Coalition for Clean Rivers and Streams annual report 3. Ecology in the Classroom and Outdoors annual report.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #4 Education and Outreach	Participate in a Public Education Effectiveness Evaluation	13	13	CCSD#1 and SWMACC			Measurable Goal	Provide/compile information regarding a public education effectiveness evaluation over the permit term.	Attained	Completed and submitted to DEQ in June 2015. WES also conducted multiple non-scientific surveys during various public education events throughout the permit term, including surveys pre/post tours and field trips.
Component #4 Education and Outreach	Training for Employees	14	14	CCSD#1 and SWMACC			Tracking Measure	Track the number of employees receiving training in stormwater management annually.	50	No comment.
Component #4 Education and Outreach	Training for Employees	14	14	CCSD#1 and SWMACC			Measurable Goal	Attend relevant stormwater management related training based on need and availability	Attained	Fifty employees received stormwater management training in six different workshops relevant to stormwater management.
Component #4 Education and Outreach	Training for Employees	14	14	CCSD#1 and SWMACC			Measurable Goal	Check in with the Fire Department regarding stormwater issues during the permit's 5-year term.	Attained	No comment.
Component #5 Public Involvement and Participation	Provide for Public Participation with SWMP and Benchmark Submittals	15	15	CCSD#1 and SWMACC			Measurable Goal	Provide for public participation with the SWMP and pollutant load reduction benchmarks prior to the permit renewal application deadline	Attained	The public comment period for documents related to the MS4 permit renewal application submittal was from January 20, 2017 to February 21, 2017. These documents were submitted to DEQ on February 24, 2017.
Component #5 Public Involvement and Participation	Provide for Public Participation with SWMP and Benchmark Submittals	15	15	CCSD#1 and SWMACC			Measurable Goal	Provide for public participation with the monitoring plan due to the Department by September 1, 2012	Attained	No comment.
Component #6 Post-Construction Site Runoff	Planning Procedures for New Development and Significant Redevelopment	16	16	CCSD#1 and SWMACC			Tracking Measure	The number and type of flow control, water quality treatment or infiltration facilities installed in accordance with the requirements	30	Includes water quality, infiltration and flow control ponds.
Component #6 Post-Construction Site Runoff	Planning Procedures for New Development and Significant Redevelopment	16	16	CCSD#1 and SWMACC			Tracking Measure	Narrative to describe the status of the private facility database	Attained	The upgrades to the GIS and maintenance management system software and databases is undergoing installation and testing. These systems will be used for the private facility database for commercial/industrial properties. In the interim, the enhanced notification efforts begun in 2015-2016 continue to improve tracking accuracy and aid in the removal of properties that do not have a private system. Recent hiring of additional staff will provide resources to start a series of prioritized onsite inspections which will help revise the dataset.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component # 6 Post-Construction Site Runoff	Planning Procedures for New Development and Significant Redevelopment	16	16	CCSD#1 and SWMACC			Tracking Measure	Narrative to describe results of tracking compliance with private facility maintenance agreements	Attained	143 Commercial Maintenance Agreement Properties 42 properties submitted reports 318 structures cleaned
Component # 6 Post-Construction Site Runoff	Planning Procedures for New Development and Significant Redevelopment	16	16	CCSD#1 and SWMACC			Measurable Goal	Continue to implement and enforce controls for stormwater quality treatment from new and re-development	Attained	CCSD#1 and SWMACC continue to implement and enforce controls for stormwater quality treatment from new and re-development.
Component # 6 Post-Construction Site Runoff	Planning Procedures for New Development and Significant Redevelopment	16	16	CCSD#1 and SWMACC			Measurable Goal	Track the location, type, and drainage area of new water quality facilities using GIS	Attained	In GIS, CCSD#1 and SWMACC staff track areas that drain to water quality and flow control facilities by mapping project areas from as-builts. For the past year, staff have been improving existing data and have not mapped new stormwater projects. Staff completed redesigning the GIS database and the subsequent data migration. Mapping of new stormwater projects will resume this year.
Component # 6 Post-Construction Site Runoff	Planning Procedures for New Development and Significant Redevelopment	16	16	CCSD#1 and SWMACC			Measurable Goal	Continue with work to compile a database of private facilities	Attained	Please see response comment immediately above.
Component # 6 Post-Construction Site Runoff	Planning Procedures for New Development and Significant Redevelopment	16	16	CCSD#1 and SWMACC			Measurable Goal	Annually, check in on compliance with terms of private facility maintenance agreements	Attained	WES made further enhancements to the Storm Drain Cleaning Assistance Program (SCAP) for private facilities (See BMP 28). WES sent one mailing to not only the properties within the MS4 area that had Commercial Maintenance Agreements, but rather to all commercial/industrial stormwater accounts. The letter was to remind them of the cleaning and reporting requirements. Six more properties with agreements responded with reports than last year and our onsite inspection program for 2018-2019 should continue to increase compliance. (Total cleaning of all private commercial/industrial facilities through SCAP (See BMP 28) and other methods: 175 businesses reported, 1026 structures inspected and cleaned, and 45,000 gallons of material removed.)
Component # 6 Post-Construction Site Runoff	Update Procedures for New Development and Significant Redevelopment	17	17	CCSD#1 and SWMACC			Tracking Measure	Track status of adopting proposed changes to the stormwater standards for new and re-development.	Attained	The revised Stormwater Standards took effect on July 1, 2013. In July 2018 Water Environments Services started a project to update WES's stormwater standards which includes the MS4 requirement to capture and treat 80% of the annual average runoff volume, which roughly equates to 1" of rainfall on a development site. The project is anticipated to take about 12-months to complete, and the process will include internal staff involvement from applicable divisions of WES, Clackamas County engineering & planning, City of Happy Valley and regional stakeholders.
Component # 6 Post-Construction Site Runoff	Update Procedures for New Development and Significant Redevelopment	17	17	CCSD#1 and SWMACC			Measurable Goal	CCSD#1: Complete updates to standards to meet new permit requirements by June 30, 2013	Attained	The revised Stormwater Standards took effect on July 1, 2013. In July 2018 Water Environments Services started a project to update WES's stormwater standards which includes the MS4 requirement to capture and treat 80% of the annual average runoff volume, which roughly equates to 1" of rainfall on a development site. The new standards will prioritize Low Impact Development Approach (LIDA) to mitigate stormwater runoff. The project is anticipated to take about 12-months to complete, and the process will include internal staff involvement from applicable divisions of WES, Clackamas County engineering & planning, City of Happy Valley and regional stakeholders.
Component # 6 Post-Construction Site Runoff	Update Procedures for New Development and Significant Redevelopment	17	17	CCSD#1 and SWMACC			Measurable Goal	CCSD#1: Complete guidance manual for developers to facilitate the implementation of the new standards by June 30, 2013	Attained	In July 2018 Water Environments Services started a project to update WES's stormwater standards. The new standards will prioritize Low Impact Development Approach (LIDA) to mitigate stormwater runoff. The project is anticipated to take about 12-months to complete, and the process will include internal staff involvement from applicable divisions of WES, Clackamas County engineering & planning, City of Happy Valley and regional stakeholders.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component # 6 Post-Construction Site Runoff	Update Procedures for New Development and Significant Redevelopment	17	17	CCSD#1 and SWMACC			Measurable Goal	SWMACC: Policy development and implementation by November 1, 2014.	Attained	In July 2018 Water Environments Services started a project to update WES's stormwater standards which includes the MS4 requirement to capture and treat 80% of the annual average runoff volume, which roughly equates to 1" of rainfall on a development site. The new standards will prioritize Low Impact Development Approach (LIDA) to mitigate stormwater runoff. The project is anticipated to take about 12-months to complete, and the process will include internal staff involvement from applicable divisions of WES, Clackamas County engineering & planning, City of Happy Valley and regional stakeholders.
Component # 6 Post-Construction Site Runoff	Sizing Tool Development to Address Hydro-modification	18	N/A	CCSD#1			Tracking Measure	Net impervious area treated by LID	12.7 acres	CCSD#1 -- Development Services approved 6 development permits which treated stormwater runoff by LID BMPs with the net impervious area of 12.7 acres.
Component # 6 Post-Construction Site Runoff	Sizing Tool Development to Address Hydro-modification	18	N/A	CCSD#1			Tracking Measure	Number of applications submitted using sizing tool	6	Six development projects utilized the BMP Sizing Tool to mitigate stormwater runoff.
Component # 6 Post-Construction Site Runoff	Sizing Tool Development to Address Hydro-modification	18	N/A	CCSD#1			Tracking Measure	Customer feedback and community relations about the simplified tool (for development engineers) that sizes LID BMPs (in order to address the duration of elevated flow levels in addition to addressing flow volumes and peaks; and in order to address the long-term impacts of increased runoff from development).	Attained	As part of the ongoing update to the SW standards, WES in partnership with Brown and Caldwell will conduct a robust public outreach and comment period on proposed changes alongside WES Staff, meeting with major WES stakeholders such as regional watershed councils, and community planning organizations.
Component # 6 Post-Construction Site Runoff	Sizing Tool Development to Address Hydro-modification	18	N/A	CCSD#1			Measurable Goal	The primary goal is to develop, by June 30, 2013, a tool to assist development engineers with the design/sizing of stormwater management facilities in order to reduce target pollutants and stream degradation impacts (i.e., hydromodification) associated with the development of impervious surfaces.	Attained	In July 2018 Water Environments Services started a project to update WES's stormwater standards which includes the MS4 requirement to capture and treat 80% of the annual average runoff volume, which roughly equates to 1" of rainfall on a development site. The new standards will prioritize Low Impact Development Approach (LIDA) to mitigate stormwater runoff. The project is anticipated to take about 12-months to complete, and the process will include internal staff involvement from applicable divisions of WES, Clackamas County engineering & planning, City of Happy Valley and regional stakeholders.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Street Sweeping	19	18		HV	DTD	Tracking Measure	Number of miles that were swept in Happy Valley	2,517	1,493 miles in Happy Valley 1,024 miles in Clackamas County
Component # 7 Pollution Prevention for Municipal Operations BMPs	Street Sweeping	19	18		HV	DTD	Tracking Measure	Mass or volume of material removed during sweeping in Happy Valley	1,180 cubic yards	Happy Valley removed 649 cubic yards and Clackamas County removed 531 cubic yards of street sweeping debris.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component # 7 Pollution Prevention for Municipal Operations BMPs	Street Sweeping	19	18		HV	DTD	Tracking Measure	For DTD, see tracking measures in the DTD MS4 NPDES SWMP.	See DTD 2017-2018 MS4 Annual Report	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Street Sweeping	19	18		HV	DTD	Measurable Goal	City of Happy Valley Roads: Sweep approximately 100 lane miles of curbed streets per year on average	Attained	Happy Valley exceeded their goal.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Street Sweeping	19	18		HV	DTD	Measurable Goal	SWMACC: See DTD's MS4 NPDES SWMP	See DTD 2017-2018 MS4 Annual Report	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Operations & Maintenance for Public Streets	20	19		HV	DTD	Tracking Measure	Mass or volume of material removed by the City of Happy Valley "Adopt-a-Road" program	0	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Operations & Maintenance for Public Streets	20	19		HV	DTD	Tracking Measure	Number of illegal solid waste dumps that are removed in the City of Happy Valley	11 illegal dumping cases in Happy Valley	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Operations & Maintenance for Public Streets	20	19		HV	DTD	Tracking Measure	Mass or volume of material that is removed by the elimination of illegal solid waste dumping sites in the City of Happy Valley	Unknown	Metro partners with Happy Valley to remove the illegal dump sites in the City. Metro tracks the amount of material removed in Happy Valley
Component # 7 Pollution Prevention for Municipal Operations BMPs	Operations & Maintenance for Public Streets	20	19		HV	DTD	Tracking Measure	Amount of sand applied and then removed by Happy Valley as a result of a snow/ice event and time of removal after the event	Sand Applied -- 66 cubic yards Sand Picked up -- 35 cubic yards	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Operations & Maintenance for Public Streets	20	19		HV	DTD	Measurable Goal	Remove illegal solid waste dumps as they are discovered	Attained	No comment.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component # 7 Pollution Prevention for Municipal Operations BMPs	Operations & Maintenance for Public Streets	20	19		HV	DTD	Measurable Goal	Collect sand applied for ice/snow events within 10 days of the end of the event	Attained	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Operations & Maintenance for Public Streets	20	19		HV	DTD	Measurable Goal	DTD: See DTD's MS4 NPDES SWMP	See DTD 2017-2018 MS4 Annual Report	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Proper Road Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	21	20		HV	DTD	Tracking Measure	Happy Valley - The quantity of herbicide products used per zip code. This is the same data that will be reported to Oregon's Department of Agriculture per the Pesticide Use Reporting System.	0	No herbicides used
Component # 7 Pollution Prevention for Municipal Operations BMPs	Proper Road Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	21	20		HV	DTD	Tracking Measure	DTD: See tracking measures in the DTD MS4 NPDES SWMP	See DTD 2017-2018 MS4 Annual Report	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Proper Road Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	21	20		HV	DTD	Measurable Goal	Happy Valley Roads: Continue to implement the integrated pest management portion of the ODOT Routine Road Maintenance Manual	Attained	Happy Valley is continuing to implement the IPM portion of the ODOT Routine Road Maintenance Manual
Component # 7 Pollution Prevention for Municipal Operations BMPs	Proper Road Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	21	20		HV	DTD	Measurable Goal	DTD: See DTD's MS4 NPDES SWMP for measurable goals	See DTD 2017-2018 MS4 Annual Report	No comment.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component # 7 Pollution Prevention for Municipal Operations BMPs	Landscape Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	22	21	CCSD#1 and SWMACC	HV	DTD	Tracking Measure	The number of meetings conducted	1	Happy Valley held one (1) IPM meeting. Clackamas County held no additional meetings in 2017-2018, although 4 meetings were held in 2016-2017.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Landscape Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	22	21	CCSD#1 and SWMACC	HV	DTD	Tracking Measure	The results and follow-up activities conducted as a result of the meetings	0	No follow-up activities were conducted as a result of the meetings which were held in 2016-2017 or during 2015-2016
Component # 7 Pollution Prevention for Municipal Operations BMPs	Landscape Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	22	21	CCSD#1 and SWMACC	HV	DTD	Measurable Goal	Check back in with all County & City of Happy Valley buildings and facilities that were visited (during the last permit cycle) at least once during this permit cycle	Attained	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Landscape Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers	22	21	CCSD#1 and SWMACC	HV	DTD	Measurable Goal	Develop and implement an Integrated Pest Management plan by December 31, 2012	Attained	No comment.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Control Infiltration and Cross Connections to the District's Stormwater System	23	22	CCSD#1 and SWMACC			Tracking Measure	Number of cross-connections/ sanitary discharges identified	1	There was one cross connection found within the MS4 system this year for a private residence. The connection was removed.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component # 7 Pollution Prevention for Municipal Operations BMPs	Control Infiltration and Cross Connections to the District's Stormwater System	23	22	CCSD#1 and SWMACC			Tracking Measure	The number and type of inspections performed, abatement actions and enforcement actions taken	2,662 assets inspected 1 abatement or enforcement actions	Through preventative maintenance activities within the MS4, staff visually inspect structures for condition assessment to include evidence of cross connections. WES staff actively look for evidence of cross connection during daily inspection and cleaning activities. Staff also conduct routine video servalliance using closed-circuit television activities of the sanitary system in an effort to find and eliminate any cross connection.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Control Infiltration and Cross Connections to the District's Stormwater System	23	22	CCSD#1 and SWMACC			Measurable Goal	Eliminate any identified sanitary discharges to the storm system.	Attained	WES experienced 4 sanitary sewer overflows this year that entered the MS4. All debris and sewer was removed, and all MS4 assets were cleaned.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Flood Management Projects and Water Quality	24	N/A	CCSD#1			Tracking Measure	Number of retrofits constructed that address water quality treatment	1	Carli Creek retrofit project is currently under construction and will be completed by December 2018.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Flood Management Projects and Water Quality	24	N/A	CCSD#1			Tracking Measure	Number of flood management projects implemented or constructed and the percentage of those projects that include water quality Components	0	No flood management projects identified or in progress.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Flood Management Projects and Water Quality	24	N/A	CCSD#1			Measurable Goal	Ensure all planned stormwater CIPs include consideration of water quality.	Attained	The Carli Creek retrofit project is water quality driven. Carli Creek retrofit project is currently under construction and will be completed by December 2018.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Detention Pond Retrofit Program	25	N/A	CCSD#1			Tracking Measure	Track pilot testing activities	3	Opti equipment is fully operational in 3 detention ponds. Performance data shows an increase in retention time and a decrease in wet weather discharges from the ponds.
Component # 7 Pollution Prevention for Municipal Operations BMPs	Detention Pond Retrofit Program	25	N/A	CCSD#1			Tracking Measure	Number, type, and location of retrofits	3	Opti equipment is fully operational in 3 detention ponds. Performance data shows an increase in retention time and a decrease in wet weather discharges from the ponds.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component # 7 Pollution Prevention for Municipal Operations BMPs	Detention Pond Retrofit Program	25	N/A	CCSD#1			Measurable Goal	The primary goal of the retrofit program is to retrofit existing ponds to improve their function to better meet watershed health goals. The goal will be to conduct 2 to 5 retrofits per year.	Attained	Opti equipment is fully operational in 3 detention ponds. Performance data shows an increase in retention time and a decrease in wet weather discharges from the ponds.
Component #8 Structural Stormwater Facility Operations and Maintenance	Maintenance of Conveyance System Components and Structural Controls	26	23	CCSD#1 and SWMACC			Tracking Measure	Miles of ditches and storm lines maintained	834 linear feet	WES used video surveillance using closed-circuit television on 370.2 linear feet of storm pipe. WES staff cleaned 284 liner feet of storm pipe. Happy Valley maintained 180 linear feet of ditch line.
Component #8 Structural Stormwater Facility Operations and Maintenance	Maintenance of Conveyance System Components and Structural Controls	26	23	CCSD#1 and SWMACC			Tracking Measure	Number and type of components inspected and/or cleaned	2,662 storm structures including, but not limited to, 2,064 catch basins, 24 drywells and 60 manholes inspected and/or cleaned	WES cleaned 2,110 of 2662 storm structures that WES inspected. Highlights include: o cleaning 1993 of 2064 catch basins that WES inspected o cleaning 21 of 24 drywells that WES inspected o cleaning 37 of 60 manholes that WES inspected o cleaning 4 of 9 vortex separators that WES inspected.
Component #8 Structural Stormwater Facility Operations and Maintenance	Maintenance of Conveyance System Components and Structural Controls	26	23	CCSD#1 and SWMACC			Tracking Measure	Mass or volume of material removed during cleaning	Apporoximately 250 Cubic Yards	The County's tracking measures for this activity were not established for our daily records keeping activities for this reporting year. Tracking measures for the County will be established for this reporting year.
Component #8 Structural Stormwater Facility Operations and Maintenance	Maintenance of Conveyance System Components and Structural Controls	26	23	CCSD#1 and SWMACC			Measurable Goal	CCSD#1: Clean storm lines and ditches on an as-needed basis. Identify inspection frequency.	Attained	No comment.
Component #8 Structural Stormwater Facility Operations and Maintenance	Maintenance of Conveyance System Components and Structural Controls	26	23	CCSD#1 and SWMACC			Measurable Goal	CCSD#1: Maintain structural water quality facilities on a 3-year cycle.	Attained	Water quality structures are scheduled for inspection annually and cleaning is scheduled as needed.
Component #8 Structural Stormwater Facility Operations and Maintenance	Maintenance of Conveyance System Components and Structural Controls	26	23	CCSD#1 and SWMACC			Measurable Goal	CCSD#1: Conduct conveyance system assessment by January 31, 2013.	Attained	Assessments of the collection system are being made through the GIS system. As built drawings are being used to build and update the GIS system
Component #8 Structural Stormwater Facility Operations and Maintenance	Conduct Catch Basin Cleaning and Maintenance	27	24	CCSD#1 and SWMACC			Tracking Measure	Track the percent of District owned or District operated/maintained catch basins cleaned per year	19.90%	1993 of all catch basins were cleaned

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #8 Structural Stormwater Facility Operations and Maintenance	Conduct Catch Basin Cleaning and Maintenance	27	24	CCSD#1 and SWMACC			Tracking Measure	Track the volume of debris removed during cleaning activities	Apporoximately 250 Cubic Yards	No comment.
Component #8 Structural Stormwater Facility Operations and Maintenance	Conduct Catch Basin Cleaning and Maintenance	27	24	CCSD#1 and SWMACC			Measurable Goal	Clean 15% of District owned or District operated/maintained public catch basins each year	Attained	1993 catch basins cleaned or 19.9 % of all catch basins
Component #8 Structural Stormwater Facility Operations and Maintenance	Conduct Catch Basin Cleaning and Maintenance	27	24	CCSD#1 and SWMACC			Measurable Goal	Schedule repair or replacement of catch basins based on inspection results	Attained	All repairs were made as found by inspections
Component #8 Structural Stormwater Facility Operations and Maintenance	Storm Drain Cleaning Assistance Program	28	25	CCSD#1 and SWMACC			Tracking Measure	Number of agreement holders compared with the number of annual reports received and the number devices being serviced by the vendor	143 Commercial Maint Agreements 42 reports received 318 devices serviced (69 of these serviced by vendor.)	No comment.
Component #8 Structural Stormwater Facility Operations and Maintenance	Storm Drain Cleaning Assistance Program	28	25	CCSD#1 and SWMACC			Tracking Measure	Total number of businesses serviced by the vendor with total number of devices maintained and volume of debris removed	By Vendor: 39 businesses, 329 devices & over 31,000 gallons. By Vendor and Others: 175 businesses, 1026 devices and over 45,000 gallons	No comment.
Component #8 Structural Stormwater Facility Operations and Maintenance	Storm Drain Cleaning Assistance Program	28	25	CCSD#1 and SWMACC			Measurable Goal	Continue to provide assistance to commercial and industrial facilities to support their water quality facility maintenance.	Attained	In 2017-2018 WES continued to partner with the cities of Milwaukie, Gresham, Fairview, Wood Village and the Oak Lodge Sanitary District on a Storm Drain Cleaning Assistance Program (SCAP) for private stormwater facilities. The program consisted of one mailing in the fall. To improve compliance, in the fall of 2018 staff will start a series of prioritized onsite inspections that will include assessments and guidance on avoiding possible onsite practices that could serve as sources of pollution to the MS4.
Component #8 Structural Stormwater Facility Operations and Maintenance	Private Water Quality Facility Maintenance Program	29	26	CCSD#1 and SWMACC			Tracking Measure	Number of structures inspected and cleaned	398 vegetation control sessions/inspections 65 water quality facilities cleaned 690 inspections	No comment.

BMP Matrix

Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	Implementation Responsibility			Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2017-2018 Tracking Measure or Measurable Goal Response	2017-2018 Response Comment
				WES	Happy Valley	Other				
Component #8 Structural Stormwater Facility Operations and Maintenance	Private Water Quality Facility Maintenance Program	29	26	CCSD#1 and SWMACC			Measurable Goal	Inspect 70% of our maintenance agreement sub-divisions annually	100%	100% of maintenance agreement sub-division water quality facilities were inspected.
Component #8 Structural Stormwater Facility Operations and Maintenance	Private Water Quality Facility Maintenance Program	29	26	CCSD#1 and SWMACC			Measurable Goal	Cleaning and repair schedules will be developed based on inspection outcomes	Attained	Any repairs or cleaning were schedule or completed based on the inspections.
Component #8 Structural Stormwater Facility Operations and Maintenance	Private Water Quality Facility Maintenance Program	29	26	CCSD#1 and SWMACC			Measurable Goal	All non-maintenance agreement cleaning and repairs will be request or service driven	Attained	Any repairs or cleaning were schedule or completed based on the inspections.
Component #8 Structural Stormwater Facility Operations and Maintenance	Private Water Quality Facility Maintenance Program	29	26	CCSD#1 and SWMACC			Measurable Goal	Emergency driven cleaning and maintenance will be addressed within 24 hours of the call being received	Attained	All emergency request were responded when the request was received.
Component #8 Structural Stormwater Facility Operations and Maintenance	Private Water Quality Facility Maintenance Program	29	26	CCSD#1 and SWMACC			Measurable Goal	All non-emergency requests for service will be addressed within 72 hours of the call received	Attained	All non-emergency request were responded to or completed within the 72 hour time frame.

Appendix B

MS4 Pollutant Monitoring Results

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National Pollutant Discharge Elimination System (NPDES)
Municipal Separate Storm Sewer System (MS4) Discharge Permit No. 101348

**Annual
MONITORING REPORT**

**Fiscal Year 2017-2018
(July 1, 2017 – June 30, 2018)**

Prepared for:
Oregon Department of Environmental Quality

Submitted by:
Clackamas County Water Environment Services (WES)
on behalf of Clackamas County Service District #1 (CCSD#1), the Surface Water Management Agency of
Clackamas County (SWMACC), Clackamas County, and the cities of Rivergrove and Happy Valley

Submitted on:
November 1, 2018

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1 Summary of Monitoring Activities

The following annual monitoring report describes environmental monitoring activities conducted by Clackamas County Water Environment Services (WES), on behalf of Clackamas County Service District #1 (CCSD#1), the Surface Water Management Agency of Clackamas County (SWMACC), Clackamas County, and the cities of Rivergrove and Happy Valley during the 2017-2018 reporting year to comply with NPDES MS4 Permit requirements. The 2017-2018 reporting year extends from July 1, 2017 to June 30, 2018.

WES also provides environmental monitoring for the City of Gladstone via an intergovernmental agreement (IGA).

Data summaries for the following monitoring activities are included in this annual report:

1. Stormwater Monitoring (five land-use based stormwater monitoring locations including four locations in CCSD#1/Happy Valley and one location in SWMACC/Rivergrove), and
2. Instream Monitoring (nine fixed instream locations including eight locations in CCSD#1/Happy Valley, and one location in SWMACC/Rivergrove)

Monitoring results are summarized and graphed in Section 3 (Stormwater Monitoring) and Section 4 (Instream Monitoring). Appendix A includes a tabulation of monitoring results, baseline statistics, and comparison to water quality standards or criteria (as applicable).

For detailed background on monitoring objectives, locations, methods and strategy, refer to the Comprehensive Clackamas County NPDES MS4 Monitoring Plan (CCCSMP), dated January 2017. The 2017 CCCSMP was prepared following completion of monitoring activities associated with the 2012 NPDES MS4 Permit. While this annual report includes only data collected on behalf of CCSD#1, SWMACC, Clackamas County, and the cities of Happy Valley and Rivergrove, the 2017 CCCSMP serves as an established agreement to conduct a coordinated monitoring effort. Data collected by other participating co-permittees' service areas including the cities of Gladstone, Oregon City, West Linn, Wilsonville, and Milwaukie and Oak Lodge Water Services District (OLWSD) collectively address the monitoring requirements and needs of the 2017 CCCSMP.

Monitoring objectives addressed by monitoring activities in the CCCSMP are listed below. Monitoring activities reflected in this annual report are listed below each applicable monitoring objective. Please note that biological sampling and geomorphic condition sampling are conducted by WES, but such activities were not conducted during the 2017-18 reporting year.

1. *Evaluate the source(s) of the 2004/2006 303(d) listed pollutants applicable to the co-permittee's permit area;*

Stormwater Monitoring: Five land use-based locations are monitored for 303(d) pollutants including metals, nutrients, and sediment (as a surrogate for organics). See Section 3.

2. *Evaluate the effectiveness of Best Management Practices (BMPs) in order to help determine BMP implementation priorities;*

Instream Monitoring: Paired instream sampling locations on Kellogg Creek are used to compare upstream and downstream water quality conditions and evaluate stormwater program effectiveness and BMP implementation, as observed by resulting water quality. See Section 4.

Stormwater Monitoring: Five land use-based locations are monitored. Long term monitoring may inform BMP effectiveness for specific contributing drainage areas and parameters. See Section 3.

3. *Characterize stormwater based on land use type, seasonality, geography or other catchment characteristics;*

Stormwater Monitoring: Five land use-based locations are monitored. Results are used to characterize runoff quality for contributing land use categories. See Section 3.

4. *Evaluate status and long-term trends in receiving waters associated with MS4 discharges;*

Instream Monitoring: Nine instream locations are monitored, each with a long-term period of record. Trends are assessed every five years minimum, and can be performed for both wet and dry weather conditions. See Section 4.

5. *Assess the chemical, biological, and physical effects of MS4 stormwater discharges on receiving waters; and,*

Instream Monitoring: Nine instream locations are monitored. Chemical effects of MS4 discharges may be assessed by comparing results reflecting wet and dry weather conditions. See Section 4. Biological and physical effects are assessed with instream biological and geomorphic condition monitoring, but such efforts were not conducted during the 2017-18 reporting year.

Stormwater Monitoring: Five land use-based locations are monitored. Chemical effects of MS4 discharges may be assessed by comparing stormwater monitoring results with instream monitoring results. See Section 3.

6. *Assess progress towards meeting TMDL pollutant load reduction benchmarks.*

Stormwater Monitoring: Five land use-based locations are monitored. Historical land-use event mean **concentration** (EMC) data, used in the development of TMDL benchmarks is compared with current land use-based stormwater monitoring results to indicate whether programs are improving water quality.

1.1 Land Use Stormwater Monitoring Sites

Number of sites: 5

Focus of data evaluation for this annual report:

- How do data from different land uses compare to each other?
- How do data compare with criteria values?
- How do data compare with historical land use-based EMCs?

Number of sampling events required per year: 3

Sampling method: Timed composite grab samples (individual grabs for parameters analyzed in the field)

Rain Gauge: City of Portland HYDRA rainfall network station 145 (Pleasant Valley School)

FY 17-18 Sampling Summary – Sampling Event #1

Sampling Location	WES Sampling Location ID	Receiving Water	Land Use Represented	Date	Time first sample was collected	Time last sample was collected	Rainfall total during the storm (in.)	Antecedent Rainfall total 72 hours prior to collection of the first sample (in.)
Outfall #19 at SE Webster Rd.	102	Kellogg Creek	Residential	2/14/18	8:52 am	10:52 am	0.38	Yes
Outfall #12 at SE Pheasant Ct.	101	Mt Scott Creek	Mixed Use	2/14/18	8:35 am	10:35 pm	0.38	Yes
Sunnyside Village Apartments	105	Sieben Creek	Multi-family Residential	2/14/18	8:29 am	10:29 am	0.38	Yes
SE Oregon Trail near SE Sieben Park Way	103	Sieben Creek	Commercial	2/14/18	8:30 am	10:30 am	0.38	Yes
Rivergrove Boat Ramp at SW Dogwood Dr.	203	Tualatin River	Residential	2/14/18	8:50 am	10:54 am	0.38	Yes

FY 17-18 Sampling Summary – Sampling Event #2

Sampling Location	WES Sampling Location ID	Receiving Water	Land Use Represented	Date	Time first sample was collected	Time last sample was collected	Rainfall total during the storm (in.)	Antecedent Rainfall total 72 hours prior to collection of the first sample (in.)
Outfall #19 at SE Webster Rd.	102	Kellogg Creek	Residential	3/8/18	10:05 am	12:14 am	0.38	Yes
Outfall #12 at SE Pheasant Ct.	101	Mt Scott Creek	Mixed Use	3/8/18	10:15 am	152:27 am	0.38	Yes
Sunnyside Village Apartments	105	Sieben Creek	Multi-family Residential	3/8/18	10:19 am	12:36 am	0.38	Yes
SE Oregon Trail near SE Sieben Park Way	103	Sieben Creek	Commercial	3/8/18	10:20 am	12:27 am	0.38	Yes
Rivergrove Boat Ramp at SW Dogwood Dr.	203	Tualatin River	Residential	3/8/18	10:16 am	12:16 am	0.38	Yes

FY 17-18 Sampling Summary – Sampling Event #3

Sampling Location	WES Sampling Location ID	Receiving Water	Land Use Represented	Date	Time first sample was collected	Time last sample was collected	Rainfall total during the storm (in.)	Antecedent Rainfall total 72 hours prior to collection of the first sample (in.)
Outfall #19 at SE Webster Rd.	102	Kellogg Creek	Residential	6/8/18	5:12 pm	7:50 pm	0.22	Yes
Outfall #12 at Pheasant Ct.	101	Mt Scott Creek	Mixed Use	6/8/18	8:10 pm	10:10 pm	0.22	Yes
Sunnyside Village Apartments	105	Sieben Creek	Multi-family Residential	6/8/18	5:32 pm	7:40 pm	0.22	Yes
SE Oregon Trail near SE Sieben Park Way	103	Sieben Creek	Commercial	6/8/18	5:30 pm	7:39 pm	0.22	Yes
Rivergrove Boat Ramp at SW Dogwood Dr.	203	Tualatin River	Residential	6/8/18	7:11 pm	9:11 pm	0.22	Yes

Parameters analyzed in the lab:	Parameters analyzed in the field:
<ul style="list-style-type: none"> • Total and dissolved copper • Total and dissolved lead • Total and dissolved zinc • Ammonia-nitrogen • Nitrate-nitrogen • Total phosphorus • Ortho-phosphorus • <i>E. coli</i> • Hardness • Total solids • Total dissolved solids • Total suspended solids • Volatile solids (site #203 only) 	<ul style="list-style-type: none"> • Dissolved oxygen • Specific conductivity • pH • Temperature

Summary of any noteworthy issues (e.g., missed samples, etc.)

- Based on tabulated data for the 2017-2018 reporting period (Appendix A), there is a potential QA/QC issue associated with the 2/14/18 sampling event at the Rivergrove boat ramp monitoring location (Location #203). Dissolved zinc reading is higher than the total zinc reading.

Map of sampling sites

- Stormwater monitoring locations specific to CCSD#1, SWMACC, Clackamas County, and the cities of Happy Valley and Rivergrove are provided in Appendix B Figure B-1.
- Locations are consistent with those documented in the 2017 CCCSMP.

1.2 Instream Monitoring Sites

Number of sampling locations: 9

Focus of evaluation for this annual report:

- How do data compare with instream water quality criteria and goals outlined in WES' Strategic Plan?
- How do this year's (2017-18) data compare with previously collected data?
- How do upstream and downstream sites on a water body compare with each other?

Number of sampling events required per year: 9

Number of sampling events conducted (for most locations): 11

Sampling method: Grab

Rain Gauge: City of Portland HYDRA rainfall network station 145 (Pleasant Valley School)

FY 17-18 Summary of Sampling Locations

Sampling Location	WES Sampling Location ID	Service District	Receiving Water Body	Monitoring Data Range ¹	Upstream or Downstream Site
SE 120 th Ave. and Carpenter Drive	05	CCSD#1	Carli Creek	1994 – present	
Hwy 212 and SE 135 th	07	CCSD#1	Sieben Creek	1994 – present	
Hwy 212 and SE 142 nd	16	CCSD#1	Rock Creek	1998 – present	
SE 84 th Ave. and SE Sunnybrook	11 (CCSD)	CCSD#1	Phillips Creek	1994 – present	
Hwy 224	15	CCSD#1	Mt. Scott Creek	1994 – present	
SE Rusk Rd.	14	CCSD#1	Kellogg Creek	1994 – present	US
SE Last Rd.	24	CCSD#1	Cow Creek	2002 – present	
Rowe Middle School (SE Lake Rd.)	27	CCSD#1	Kellogg Creek	2012 – present	DS
SW Mossy Brae Rd.	11 (SWMACC)	SWMACC	Pecan Creek	1996 – present	

1. The date range on the monitoring data may vary by parameter.

FY 17-18 Summary of Sampling Events

Sampling Date	Locations Sampled	Wet or Dry Weather condition?	Rainfall total during the storm (in.), if applicable
08/29/17	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 27	Dry	NA
09/28/17	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 27	Dry	NA
10/26/17	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
11/13/17	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Wet	0.61
12/19/17	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Wet	0.99
01/29/18	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Wet	0.42
02/20/18	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
03/07/18	24	Dry	NA
03/29/18	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
04/13/18	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
05/03/18	24	Dry	NA
05/23/18	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
06/06/18	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA

Parameters analyzed in the lab:	Parameters analyzed in the field:
<ul style="list-style-type: none"> • Total and dissolved copper • Total and dissolved lead • Total and dissolved zinc • Ammonia-nitrogen • Nitrate-nitrogen • Total phosphorus • Ortho-phosphorus • <i>E. coli</i> • Hardness • Total solids • Total dissolved solids • Total suspended solids • Volatile solids (Pecan Creek only) 	<ul style="list-style-type: none"> • Dissolved oxygen • Specific conductivity • pH • Temperature

Summary of any noteworthy issues (e.g., missed samples, etc.)

- Based on tabulated data for the 2017-2018 reporting period (Appendix A), there is a potential QA/QC issue associated with the 8/29/17 sampling event at the Rock Creek monitoring location (Location #16). The dissolved zinc reading is higher than the total zinc reading. This result has been flagged with red font within Appendix A.
- Based on the tabulated data for the 2017-2018 reporting period, there is a potential QA/QC issue associated with multiple sampling events where Total Dissolved Solids results are higher than Total Solids. These results have been flagged with red font within Appendix A.
- Adherence to the time-composite sampling methodology for routine sampling during storm events, as described in the CCCSMP, was not followed. This was due to a concern about altering the sample collection methodology based on an unscheduled circumstance (rainfall). WES modified their sample collection procedure to consistently collect grab samples during all routine events, including during storms. Refinement of procedures will be made in accordance with future updates to the 2017 CCCSMP.

Map of sampling sites

- Instream monitoring locations specific to CCSD#1, SWMACC, Clackamas County, and the cities of Happy Valley and Rivergrove are provided in Appendix B, Figure B-2.
- Locations are consistent with those documented in the 2017 CCCSMP.

2 Water Quality Criteria for Comparison

Instream and stormwater monitoring results presented in Sections 3 and 4 are compared to water quality criteria and benchmarks to assess results and impacts to overall watershed health (see Table 2.1).

Selecting appropriate comparison criteria can be challenging for various reasons. Local instream water quality data are best compared with Oregon Water Quality Standards, but these standards are only available for a limited number of pollutants. In addition, the water quality standards for some pollutants vary depending on the measurement of additional analytes. For example, some metals criteria are dependent on the hardness concentration of the water. The need to consider multiple variables to assess a single parameter further limits the ability to directly compare monitoring data to water quality standards. Finally, water quality standards apply only to data collected from directly instream and they do not apply to stormwater data collected from the municipal storm system.

NPDES MS4 permits do not contain numeric effluent limits for pollutants and instead are based on controlling pollution to the “maximum extent practicable” per federal regulations. The use of “criteria” in this report for stormwater monitoring is solely intended to compare to stormwater data and aid in understanding the relative quality of the data. For the purposes of this report, we used stormwater comparison criteria from the most recently issued industrial stormwater permit (1200-Z) to provide a general guide for evaluating the data. However, it should be noted that the industrial stormwater benchmarks were developed to regulate stormwater runoff from industrial sites with known pollutant generating activities and potentially elevated levels of pollutants. That land-use characteristic is not consistent with stormwater monitoring locations sampled for this report.

Table 2-1: Comparison Criteria Used for Data Evaluation Purposes

Parameter	Units	Instream		Parameter	Units	Stormwater	
		Criteria Value	Reference Source			Criteria Value	Reference Source
Copper (dissolved)	µg/L	Varies with hardness	-- ¹	Copper (total)	µg/L	20	-- ⁴
Lead (dissolved)	µg/L	Varies with hardness	-- ¹	Lead (total)	µg/L	15	-- ⁴
Zinc (dissolved)	µg/L	Varies with hardness	-- ¹	Zinc (total)	µg/L	90	-- ⁴
Dissolved oxygen	mg/L	6.5	-- ²	Dissolved oxygen	mg/L	none	NA
<i>E.coli</i>	mpn/100 mL	406	-- ¹	<i>E.coli</i>	mpn/100 mL	406	-- ⁴
Phosphorus (total)	mg/L	0.14	-- ³	Phosphorus (total)	mg/L	none	NA
TSS	mg/L	none	NA	TSS	mg/L	100	-- ⁴

1. *OR Water Quality Criteria. Please note that the copper criteria are now based on the biotic ligand model (BLM) which requires additional parameters for evaluation. For purposes of this annual report, the copper criteria were calculated based on hardness instead of using the BLM.*

2. *Minimum target for cool water habitat.*

3. *Tualatin TMDL for all sources to the Tualatin River below Dairy Creek.*

4. *1200-Z Benchmark.*

3 Stormwater Data Results

This section presents an evaluation of data results from WES' stormwater monitoring efforts during FY 2017-18. The focus of the evaluation is to address the following questions:

- How do data from different land uses compare to each other?
- How do data compare with criteria values?
- How do data compare with historical land use-based EMCs?

3.1 Results Summary

The following plots (Figures 3-1 to 3-10) show stormwater data collected by contributing land use during the 2017-2018 reporting year for the following parameters: total copper, lead and zinc; *E. coli*; and total suspended solids (TSS). Actual data for these parameters along with temperature; dissolved oxygen; nitrate; total and ortho phosphorus; dissolved copper, lead, zinc and hardness; are provided in Appendix A.

A total of five storm outfall monitoring locations are included in the following figures, reflecting two residential land use monitoring locations, a multi-family residential location, a commercial location, and a mixed-use location. Three monitoring events were collected at each location, and the results for each event are specifically plotted.

Plots include data ranges reflecting historical land-use based event mean concentrations (EMCs). The historical land-use based EMCs reflect regional stormwater data collected from 1990-1996 and supplemented in 2008 as part of a larger Oregon Association of Clean Water Agencies (ACWA) study. These land-use-based EMCs were used to represent untreated stormwater runoff quality when TMDL pollutant load reduction benchmarks were developed as required under the effective 2012 NPDES MS4 permit. For each parameter, two plots (one residential and one commercial) are provided to compare stormwater monitoring results against the respective historical land use EMC data.

Comparison criteria values consistent with Table 2-1 are also reflected on the plots.

Total Copper

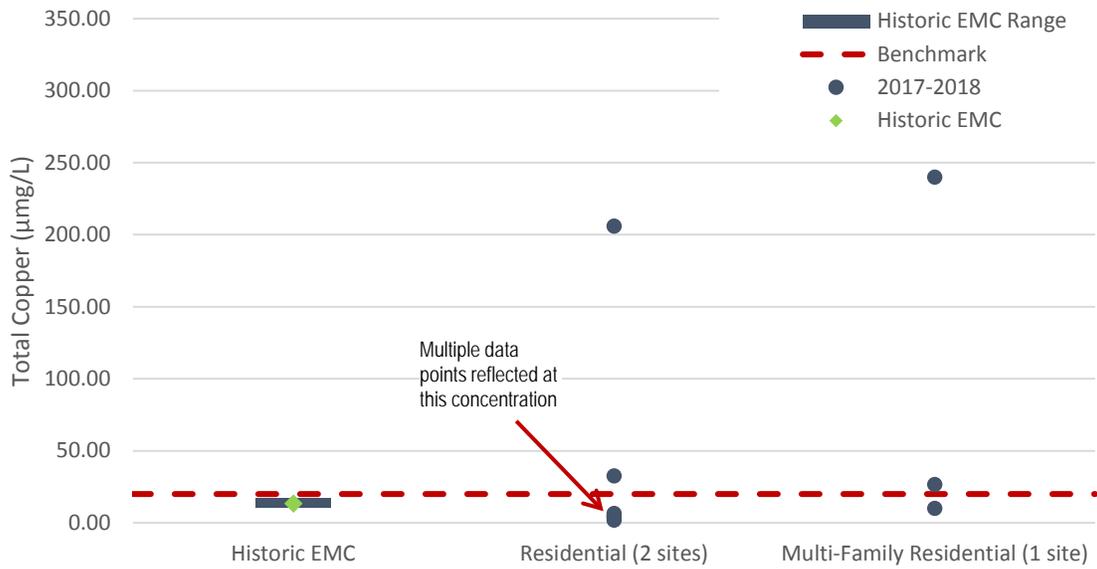


Figure 3-1: Residential Stormwater Monitoring Comparison, Total Copper

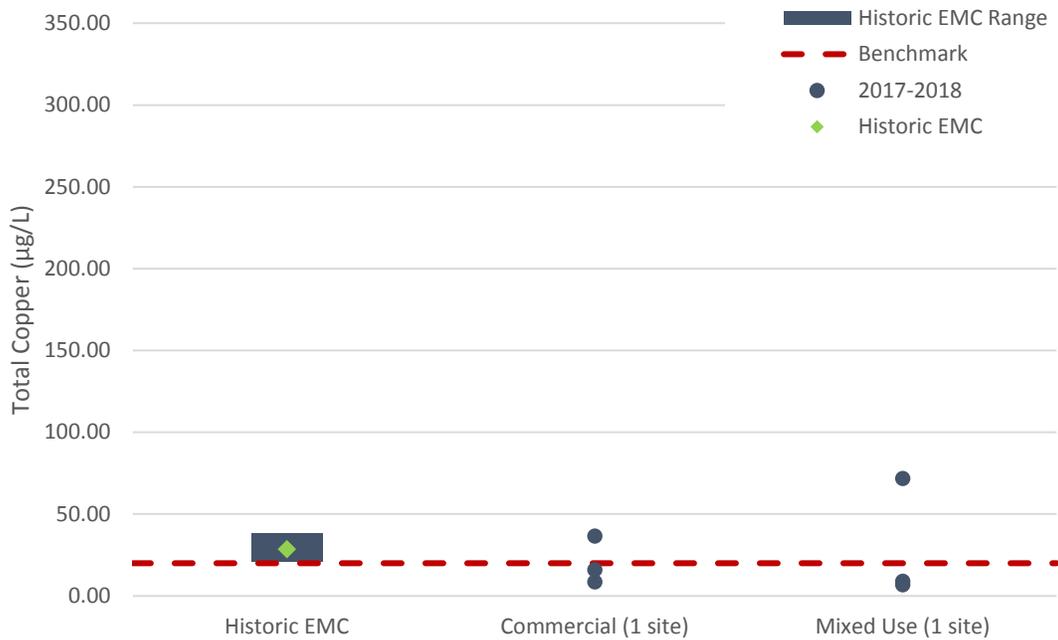


Figure 3-2: Commercial Stormwater Monitoring Comparison, Total Copper

Total Lead

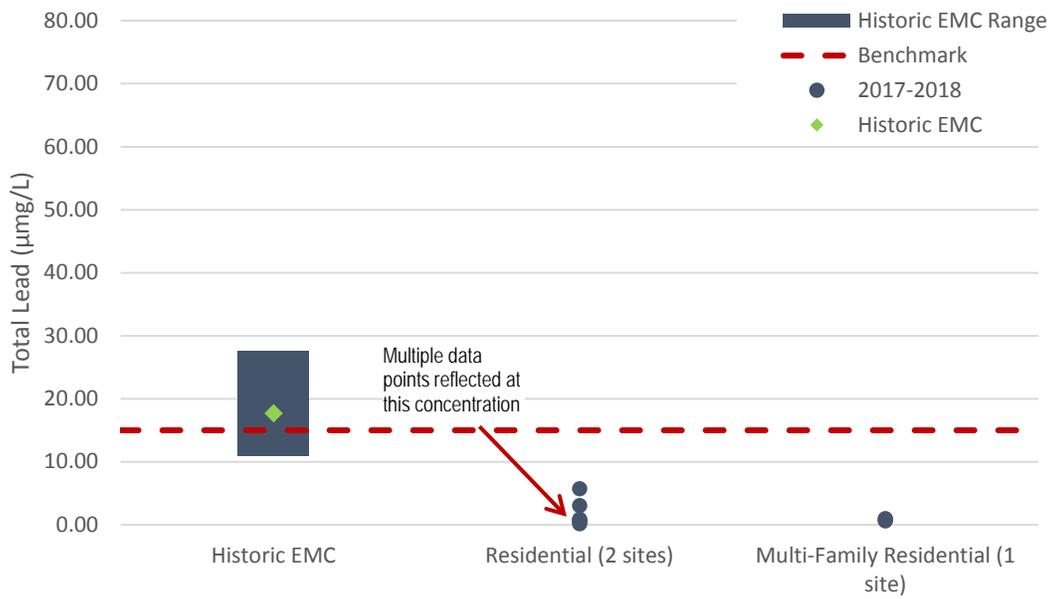


Figure 3-3: Residential Stormwater Monitoring Comparison, Total Lead

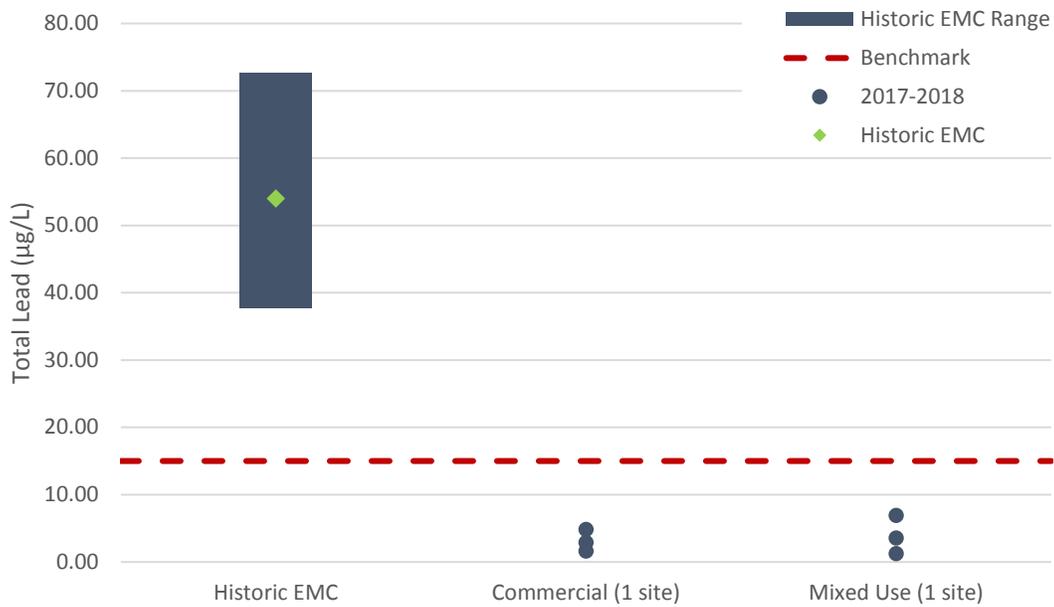


Figure 3-4: Commercial Stormwater Monitoring Comparison, Total Lead

Total Zinc

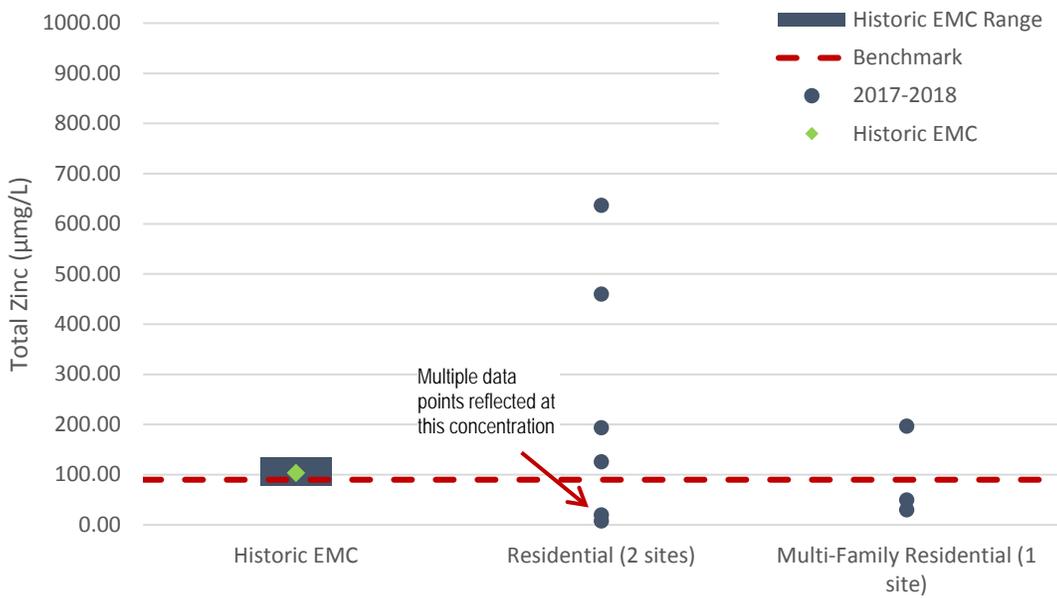


Figure 3-5: Residential Stormwater Monitoring Comparison, Total Zinc

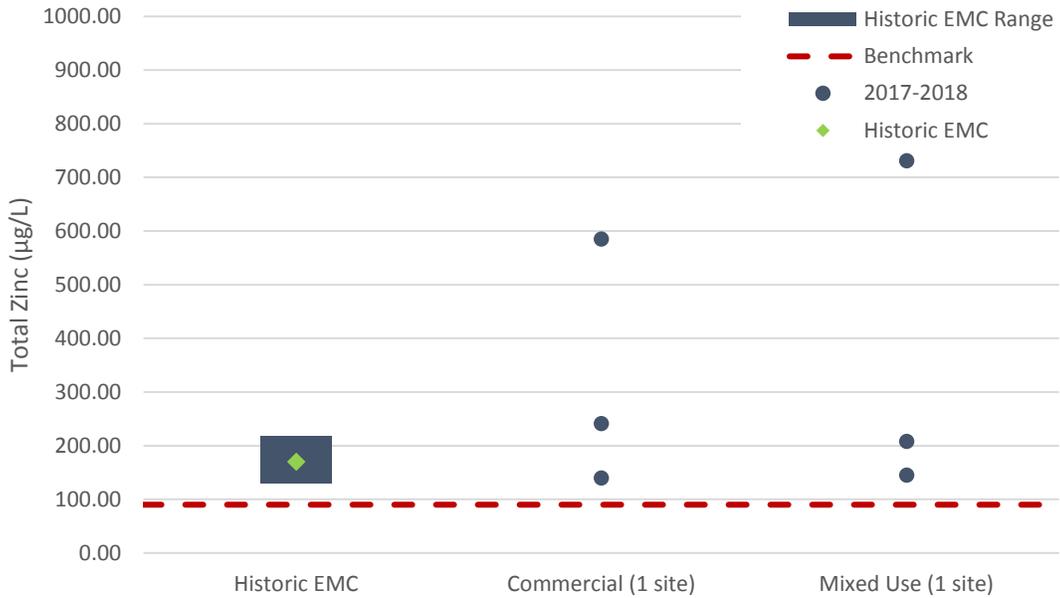


Figure 3-6: Commercial Stormwater Monitoring Comparison, Total Zinc

Total Suspended Solids

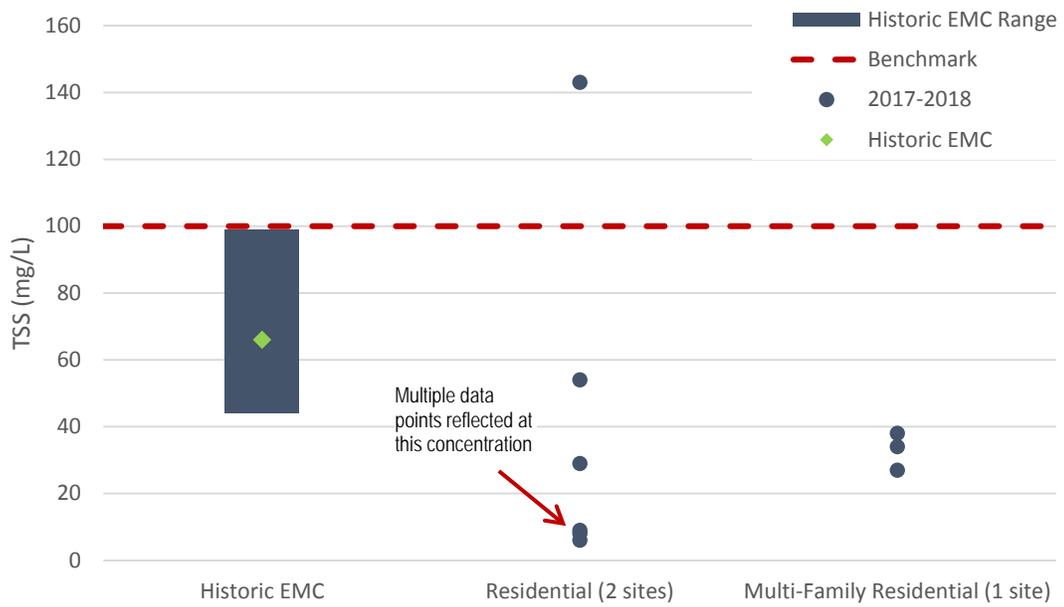


Figure 3-7: Residential Stormwater Monitoring Comparison, Total Suspended Solids

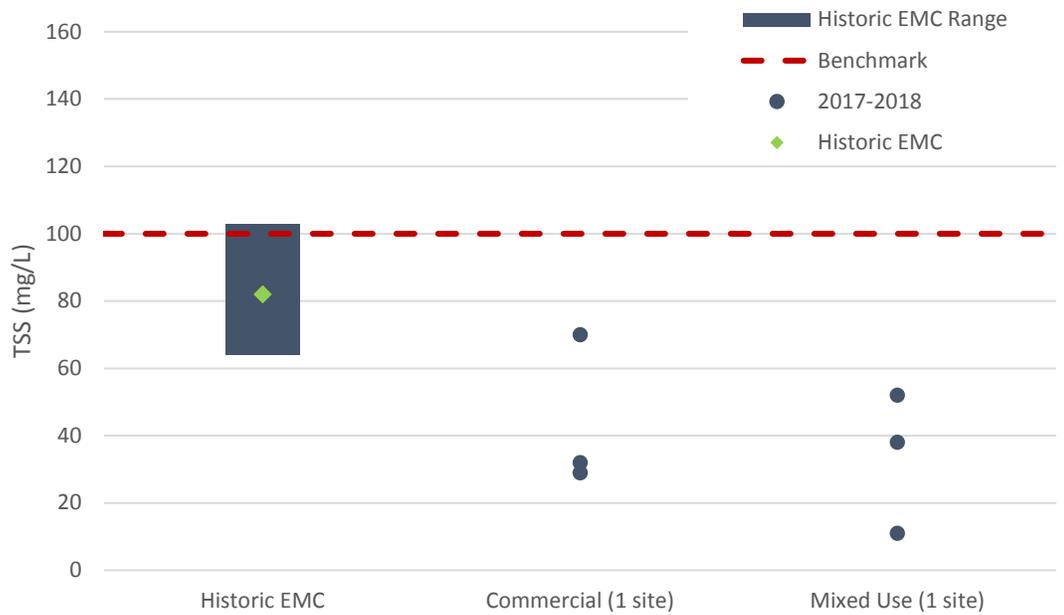


Figure 3-8: Commercial Stormwater Monitoring Comparison, Total Suspended Solids

Bacteria (*E. coli*)

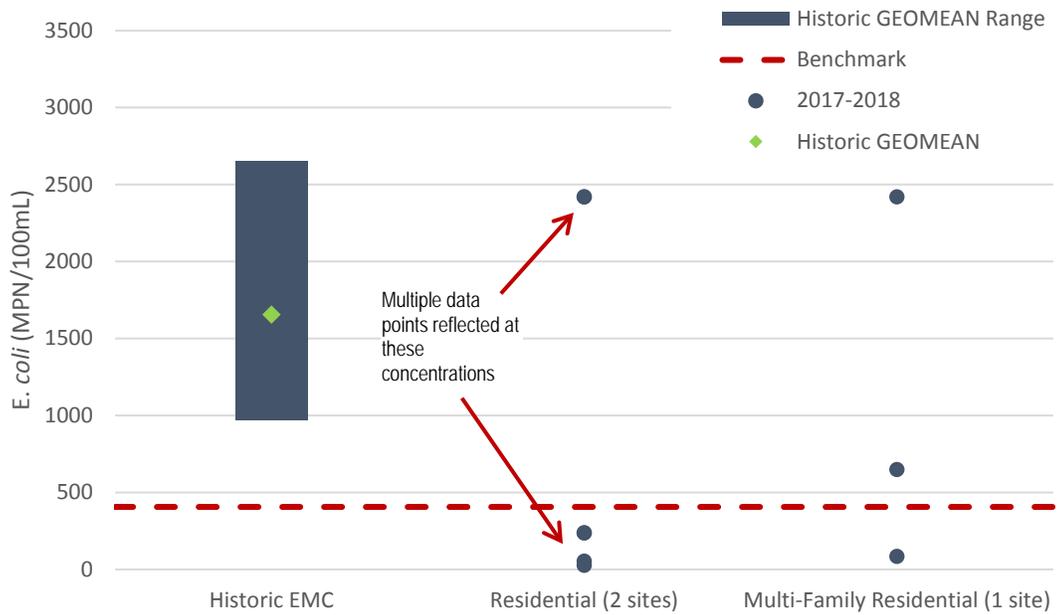


Figure 3-9: Residential Stormwater Monitoring Comparison, Bacteria

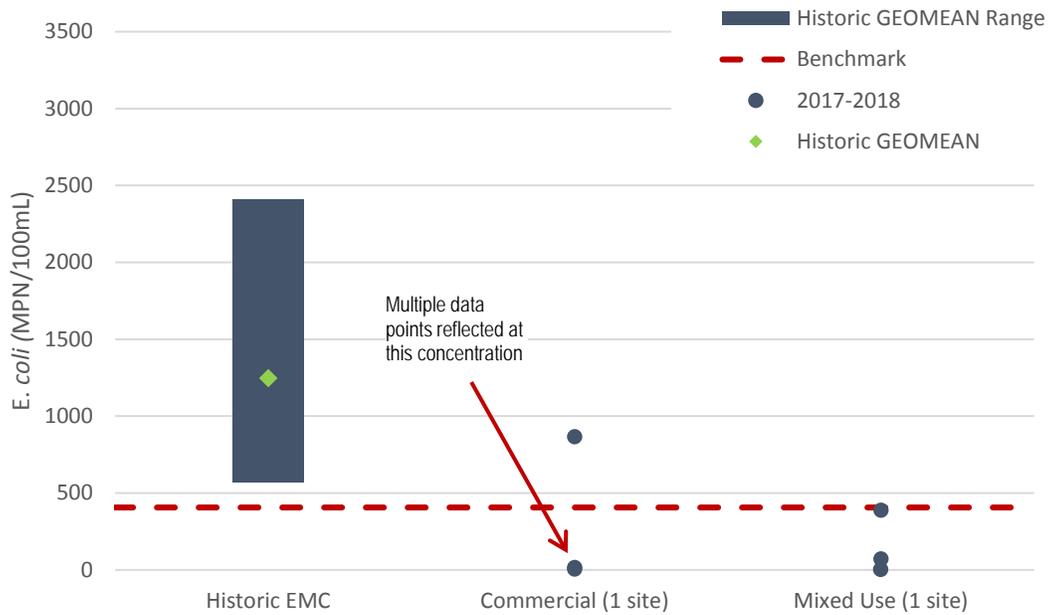


Figure 3-10: Commercial Stormwater Monitoring Comparison, Bacteria

3.2 Evaluation

Figures 3-1 to 3-10 compare land-use-based stormwater monitoring results for five select parameters.

How do data from different land uses compare to each other?

Given the limited number of data points, and the variability of the data, no specific observations were noted when comparing results by land use.

How do data compare with criteria values?

- None of the 2017-2018 monitoring data for total lead exceeded the water quality comparison criteria values from Table 2-1.
- Select 2017-2018 monitoring events had data that exceeded the water quality comparison criteria values for total zinc, total copper, *E. coli*, and TSS.
- Total zinc consistently exceeded the water quality comparison for the 2017-2018 monitoring data, with 56% and 100% of all residential and commercial samples, respectively. The 6/8/18 storm event consistently had the highest total zinc concentrations for each monitoring location.
- Figure 3-11 reflects the percent exceedance of 2017-2018 stormwater monitoring data with respect to water quality comparison criteria values from Table 2-1. Note that there were no water quality exceedances for total lead for the residential or commercial land use, or for TSS in commercial land use.

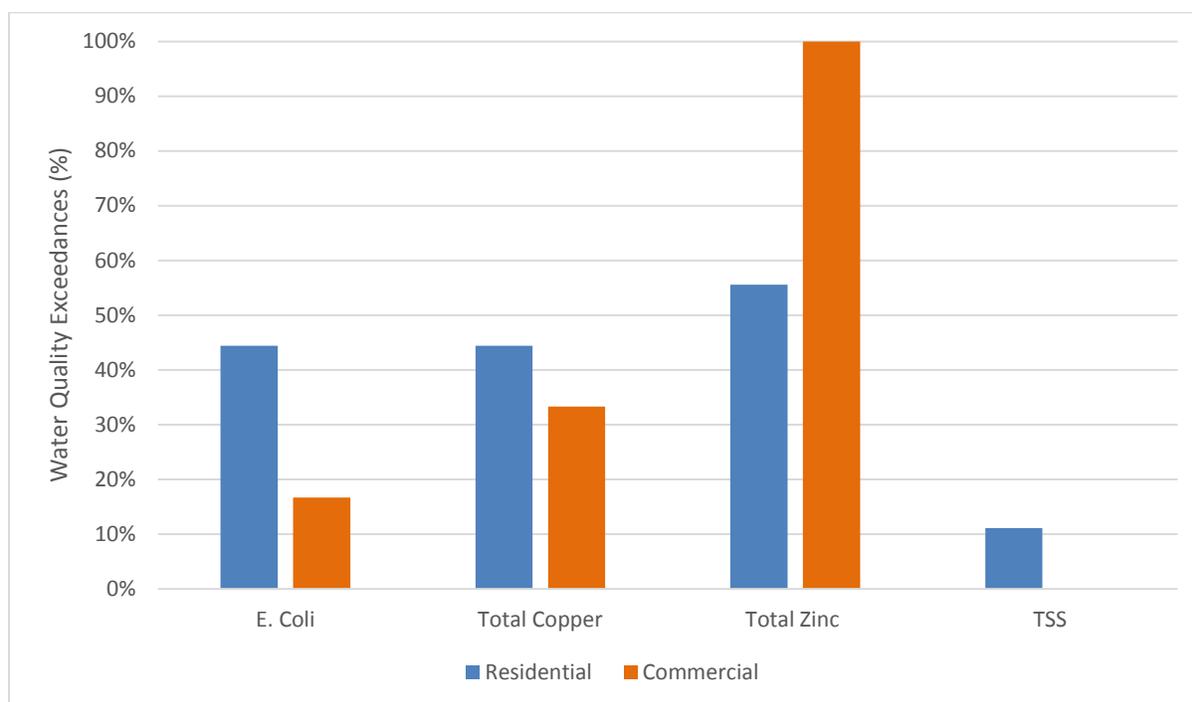


Figure 3-11: 2017-18 Stormwater Monitoring Data Percent Exceedance of Water Quality Comparison Criteria

How do data compare with historical land-use-based EMCs?

- The 2017-2018 concentration range for both residential and commercial land use sites is markedly higher than historical data for total copper and total zinc. The range in data was not observed in the 2016-2017 monitoring data. The 6/8/18 storm event consistently had the highest total zinc concentrations for each monitoring location.
- The 2017-2018 monitoring data from the commercial and residential sites for total lead were consistently lower than the historical data.
- The 6/8/18 monitoring event reflected the highest concentrations of total zinc and total copper at each monitoring location and exceeded the historic EMC.
- Feedback from WES staff indicates that in recent years (2013-2016), total and dissolved zinc concentrations at the SE Webster Road location (#102) have occasionally been elevated. Although the same observations were not made during the 2016-2017 reporting year, the 2017-2018 data reflects elevated concentrations of total zinc, including exceedances of water quality criteria values and historical EMCs for all events.
- 2017-2018 monitoring data for TSS and bacteria were generally consistent with historical data.
- The compilation of stormwater monitoring data collected since 2012 (the current NPDES MS4 permit period) could be used to further evaluate current runoff quality and determine whether more recent data reflects improvement over baseline or historic EMCs. Future TMDL benchmark efforts could then use updated land use EMCs, reflecting improvements and progress towards meeting TMDL wasteload allocations (WLAs).

4 Instream Data Results

This section presents an evaluation of data results from WES' instream monitoring efforts during 2017-2018 reporting period. The focus of the evaluation is to address the following questions:

- How do data compare with instream water quality criteria and goals outlined in WES' Strategic Plan?
- How do this year's (2017-18) data compare with previously collected data?
- How do upstream and downstream sites on a water body compare with each other?

Table 4-1 outlines the TMDL and 303(d) parameters by waterbody and has been included for reference.

Table 4-1: Summary of TMDL and 303(d) Parameters Applicable to WES Monitoring Locations

Monitored water body	Bacteria	Temperature	Dissolved oxygen (DO)	Ammonia	Phosphorus	pH/chlorophyll a	Mercury	PCBs	TCE	PAHs	DDE/DDT	Pesticides (dieldrin, aldrin aldehyde, endosulfan)	Arsenic	Thallium	Iron	Lead	Copper	Manganese	Zinc
TMDLs																			
Willamette River (and tributaries) (2006)	✓	✓					✓												
Johnson Creek (2006)	✓	✓					✓				✓	✓							
Tualatin River (1998/2001)	✓	✓	✓		✓	✓	✓												
2012 (effective) 303(d) list																			
Johnson Creek											✓	✓				✓			
Kellogg Creek			✓																
Willamette River (direct and tributaries)			✓				✓									✓	✓		
Fanno Creek			✓						✓				✓	✓	✓	✓	✓		✓
Tualatin River				✓			✓									✓	✓		✓

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorophenyltrichloroethane

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

TCE = trichloroethylene

4.1 Results Summary – Water Quality Criteria

Table 4-2 summarizes the percentage of instream monitoring data from the 2017-2018 reporting year that exceeded instream water quality criteria as defined in Table 2-1. WES’ strategic plan includes a metric for 30% of streams to meet/ exceed water quality standards. As shown in Table 4-2, exceedances vary by parameter and location, with each monitoring location exceeding standards for a minimum of one parameter. The largest number of exceedances occurred for *E. coli*.

Table 4-2: Percentage of 2017-2018 instream monitoring data exceeding water quality criteria¹

Waterbody	Dissolved oxygen	<i>E. coli</i>	Copper, Dissolved		Lead, Dissolved		Zinc, Dissolved		Total Phosphorus
			Chronic	Acute	Chronic	Acute	Chronic	Acute	
Carli Creek	27%	9%	0	0	0	0	0	0	18%
Sieben Creek	18%	45%	0	0	0	0	9%	9%	9%
Phillips Creek	9%	36%	0	0	0	0	9%	9%	9%
Kellogg Creek – US	64%	9%	0	0	0	0	0	0	27%
Kellogg Creek – DS	36%	27%	0	0	0	0	0	0	0
Mt Scott Creek	27%	18%	0	0	0	0	0	0	9%
Rock Creek	9%	0	0	0	0	0	0	0	0
Cow Creek	9%	9%	9%	9%	0	0	9%	9%	0
Pecan Creek	0	27%	0	0	0	0	0	0	0

1. Water quality exceedances for metals are based on actual monitored hardness values for each monitoring event.

4.2 Results Summary – Historical Comparison

The following plots (Figures 4-1 to 4-7) compare current (2017-2018) and historical instream water quality data by monitoring location. Historical data reflects data collected at each monitoring location for the available period of record. Section 1.2 lists the historical monitoring date ranges for each sampling location.

Box and whisker plots were developed for each of the following parameters: dissolved copper, lead and zinc; *E. coli*; total suspended solids (TSS); total phosphorus and dissolved oxygen. Historical data were not compiled for dissolved lead or dissolved oxygen, so plots for these parameters reflect 2017-2018 data only. 2017-18 data for additional parameters including temperature, nitrate, total and ortho phosphorus, total copper, total lead, total zinc, and hardness are provided in Appendix A.

Box and whisker plots graphically show the distribution of a data set including maximum and minimum values, median values, and the upper and lower quartiles. The upper and lower quartiles are calculated based on the medians of the upper and lower half of the data sets. The highest and lowest values in the data set represent the whiskers on the plot. For this effort, the box and whisker plots include data combined from both wet and dry weather conditions to provide sufficient data to allow for creation of a box and whisker plot for a single year (2017-2018) of monitoring data. Future efforts may include compilation and comparison of more than a single year of data, which would allow for additional data evaluations (i.e., dry versus wet weather conditions to assess MS4 impacts on receiving waters).

Criteria values consistent with Table 2-1 are reflected in the figures. As instream water quality standards for dissolved metals are hardness dependent, chronic instream water quality comparison criteria values based on a hardness of both 50 mg/L and 100 mg/L are plotted for reference. Calculated chronic and acute criteria based on actual hardness for each monitoring event is provided in Appendix A.

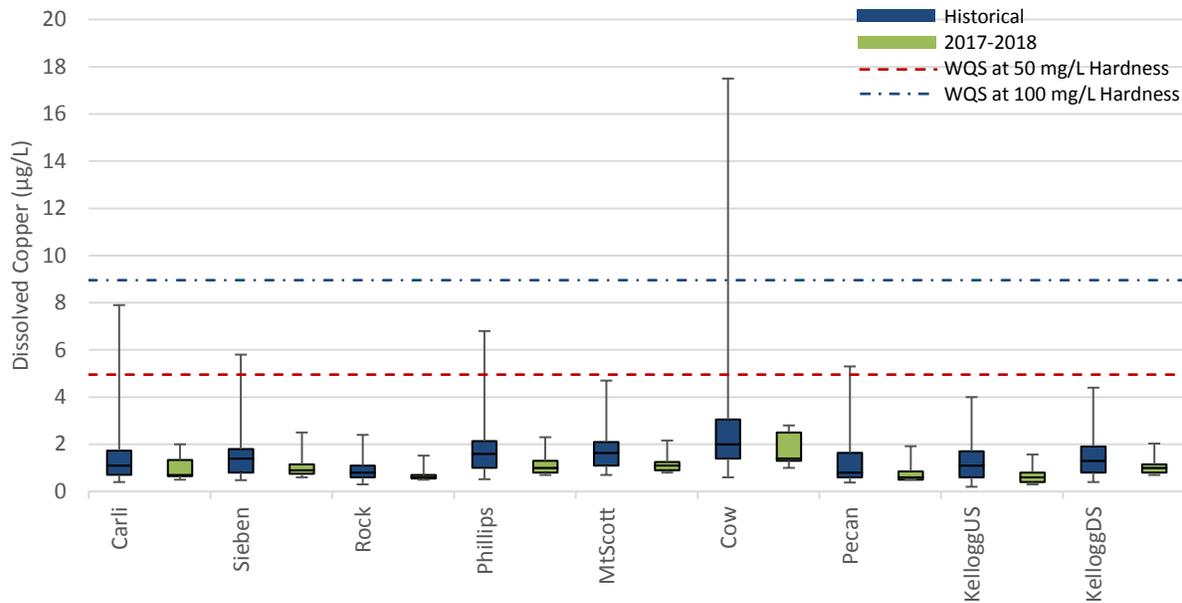


Figure 4-1: Instream Monitoring Historical Comparison, Dissolved Copper

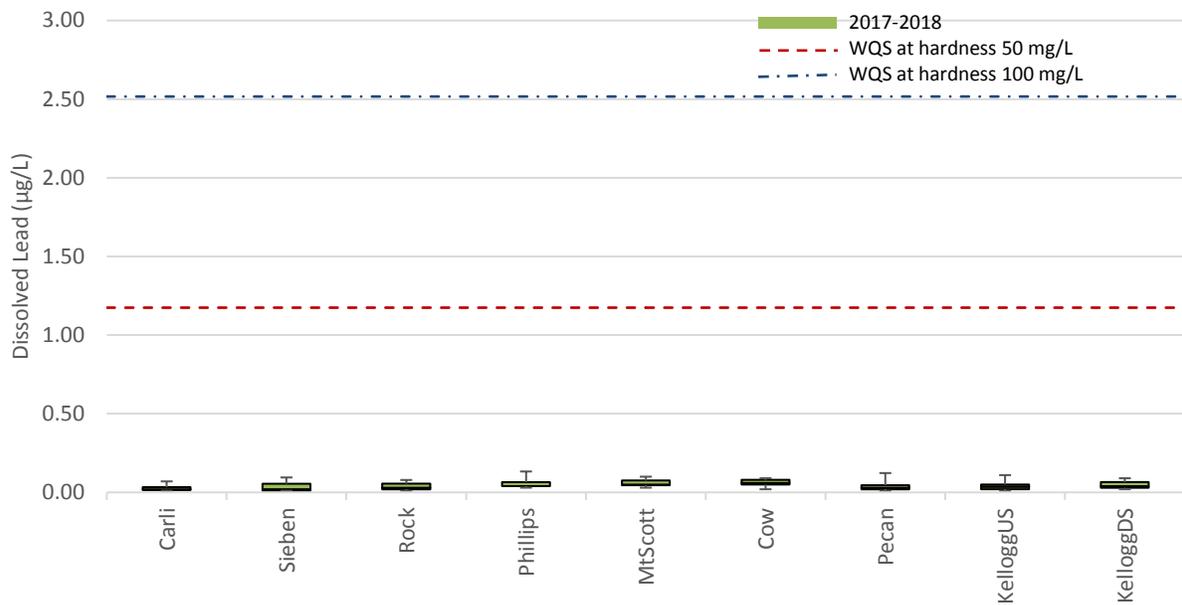


Figure 4-2: Instream Monitoring Comparison, Dissolved Lead

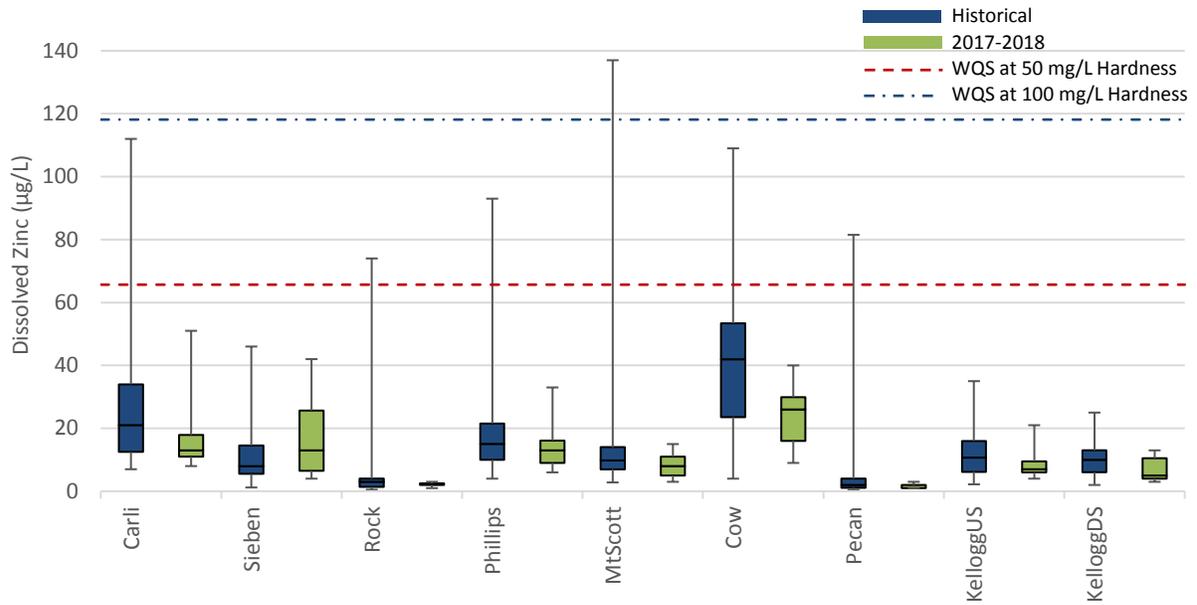


Figure 4-3: Instream Monitoring Historical Comparison, Dissolved Zinc

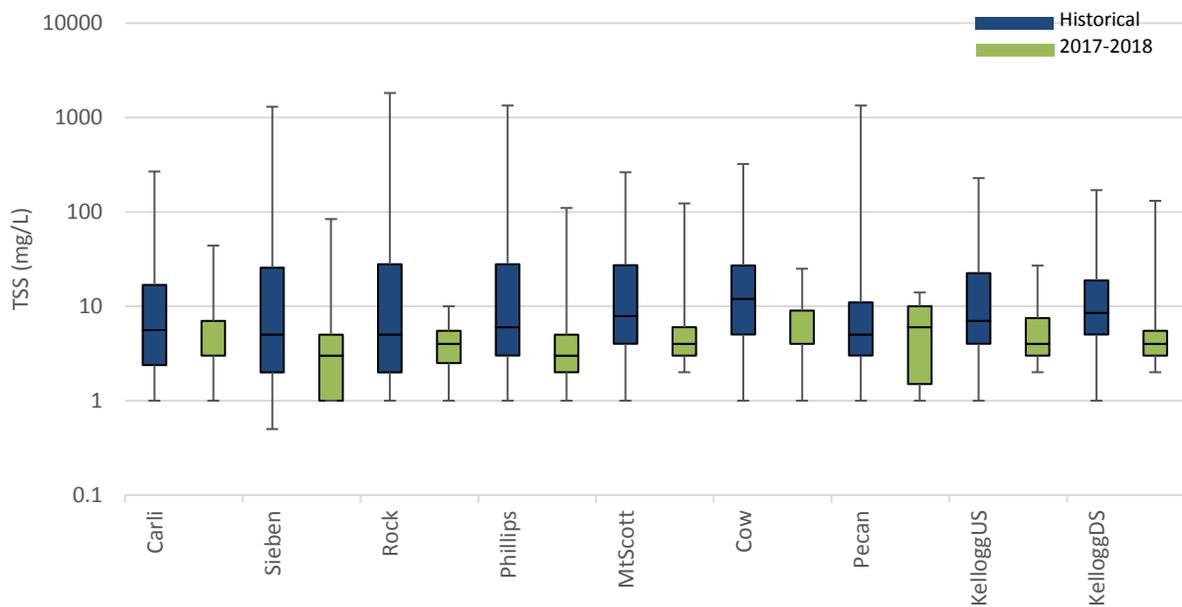


Figure 4-4: Instream Monitoring Historical Comparison, Total Suspended Solids

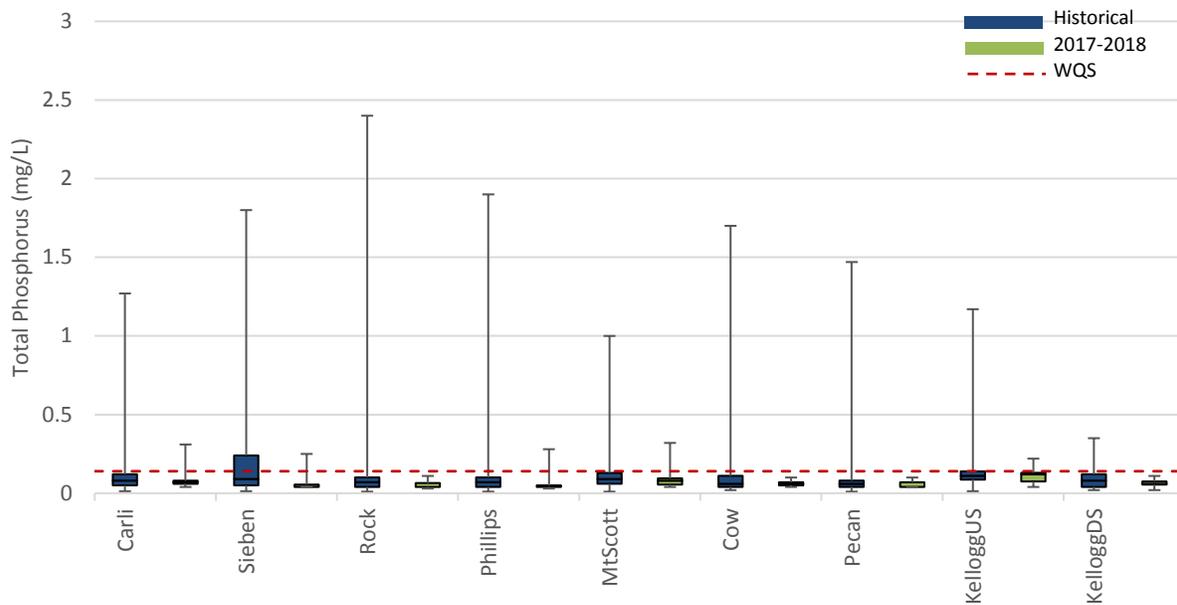


Figure 4-5: Instream Monitoring Historical Comparison, Total Phosphorus

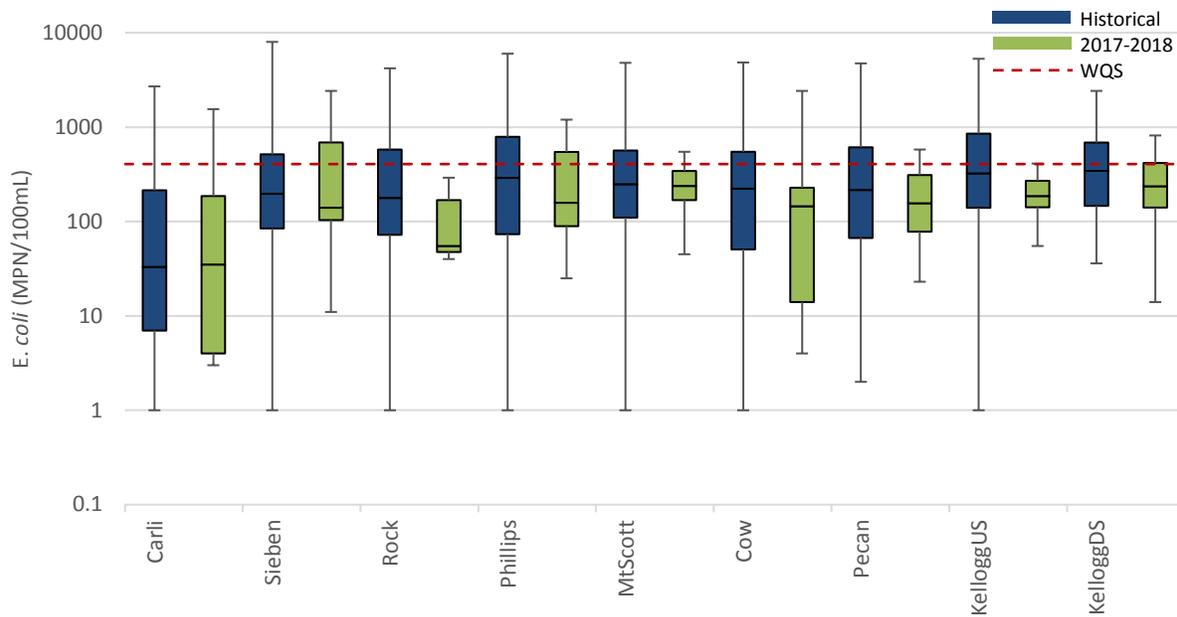


Figure 4-6: Instream Monitoring Historical Comparison, Bacteria

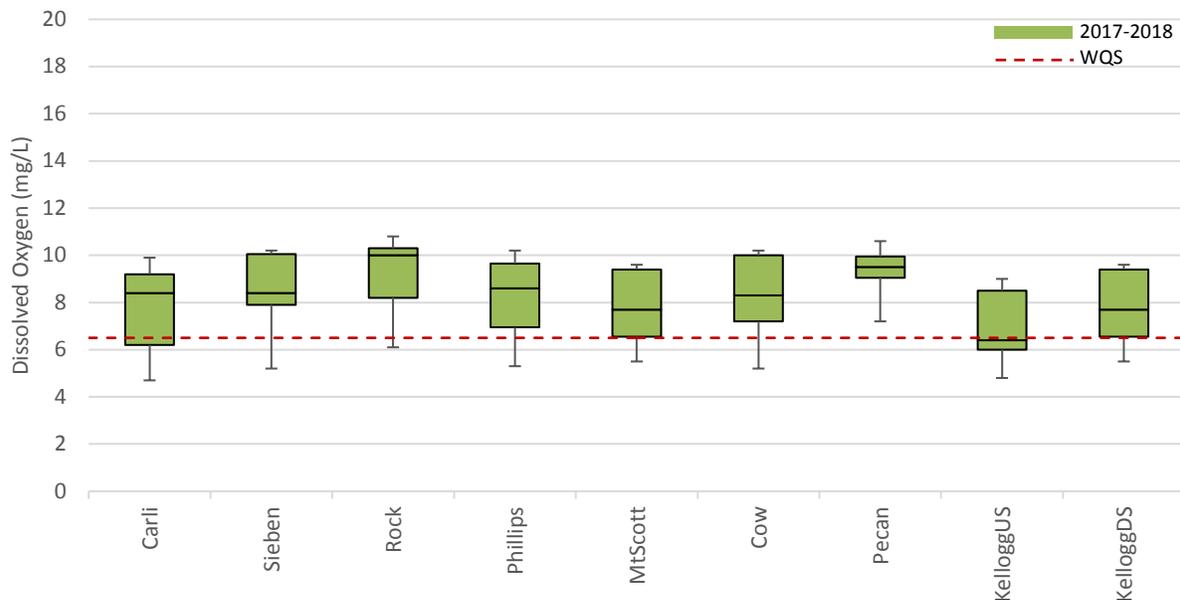


Figure 4-7: Instream Monitoring Comparison, Dissolved Oxygen

4.3 Evaluation

The data evaluations below are based on Table 4-2, which summarizes current (2017-2018) monitoring data exceedances of water quality criteria by parameter and location, and on Figures 4-1 to 4-7, which show box and whisker plots comparing current (2017-2018) and historical data.

With respect to water quality criteria for metals, Table 4-2 exceedances are based on actual hardness levels measured during the sampling event. Figures 4-1 to 4-7 compare historical and current data to water quality criteria based on hardness values of 50 mg/L and 100 mg/L.

How do data compare with instream water quality criteria and goals outlined in WES’s Strategic Plan?

- Per Table 4-2, most current exceedances of the water quality comparison criteria were for dissolved oxygen, bacteria, and total phosphorus.
- Per Table 4-2, dissolved oxygen exceedances occurred in every stream monitored except for Pecan Creek. Dissolved oxygen exceedances occurred more frequently in every stream monitored (except for Pecan Creek), compared to 2016-2017 monitoring results. The Kellogg Creek (upstream) location had the highest percentage of dissolved oxygen (64%) exceedances.
- Per Table 4-2, bacteria exceedances occurred in every stream monitored except for Rock Creek. The Sieben Creek location had the highest percentage of bacteria (45%) exceedances.
- Per Table 4-2, Cow Creek, Sieben Creek and the Phillips Creek locations reported water quality exceedances for the most number of parameters monitored.
- No current exceedances of the chronic water quality criteria were observed for dissolved copper, lead, or zinc.
- The two Kellogg Creek locations have the overall lowest historical and current metals concentrations and are the only locations with no metal criteria exceedances of both historical and current data.

- All locations have historical exceedances of the total phosphorus comparison criteria. Five of the nine locations had current data exceeding the criteria.
- All locations had historical and/or current exceedances of the bacteria criteria; however, for all locations the median value did not exceed the criteria. Rock Creek is the only location observed where no monitoring events during 2017-2018 reporting year were higher than the criteria.
- Based on the 8 streams that were monitored, results indicate that WES' strategic plan goal of having 30% of streams meet/ exceed water quality standards was not met.

How do this year's data compare with historical data or last year (2016-2017) data?

For the most part, the current (2017-2018) monitoring results were in the same range as those from the historical data.

How do upstream and downstream sites on a water body compare with each other?

- Historical data sets are generally consistent between the upstream and downstream Kellogg Creek monitoring locations for all parameters.
- For dissolved copper and bacteria, the current and historical data sets and median values are higher at the downstream location than upstream, indicating the potential for deteriorating water quality. For TSS, although the same observation was observed for the historical data set, the current data set shows a more consistent concentration range for the upstream and downstream locations.
- For dissolved lead, dissolved zinc, and dissolved oxygen, the current and historical data sets and median values at the downstream location are equal to or lower than the upstream location (higher in the case of DO), indicating the potential for improving water quality.

5 Adaptive Management Considerations

As required by the permit, documented approaches to adaptive management of stormwater programs were submitted by permittees to DEQ on November 1, 2012. Separate approaches were submitted by CCSD#1 and the City of Happy Valley; SWMACC; and the City of Rivergrove, and Clackamas County. The approaches include two elements:

1. An **annual** process to determine if the stormwater program is being implemented in accordance with the DEQ-approved Stormwater Management Plan (SWMP). The annual process may include program adjustments, if needed.
2. A comprehensive process at the **end of the permit term** and submitted as part of the permit renewal package, to identify proposed program modifications including modification, addition, or removal of BMPs incorporated into the SWMP or modifications to the monitoring program. Such program modifications are based on a more in-depth evaluation of submitted program documentation and studies, including monitoring data.

The 2017-2018 reporting year is the first year implementing the 2017 CCCSMP and reflects results of a comprehensive adaptive management process implemented by WES, on behalf of the regulated Districts, cities and County, and other participants in the CCCSMP. Specific to review of the monitoring program and monitoring data collected, the following section outlines the future monitoring data analyses considerations and potential stormwater management program refinements considering the monitoring data presented herein.

5.1 Future Data Analyses

Data evaluation and results presented in Sections 3 and 4 provide insights into the water quality of municipal stormwater outfalls and receiving waters within the MS4-permitted area and help to identify additional evaluations that could be helpful in providing additional insights. Based on results and conclusions in this annual monitoring report, recommended future monitoring and data evaluation include the following:

- Continued instream data review based on wet versus dry weather conditions. Current instream data analysis did not include comparison by weather conditions, although the 2016-2017 monitoring report did conduct this review specific for the 2012-2017 CCCSMP implementation period. Periodic review and analysis of wet versus dry weather conditions can continue to inform how/ if MS4 sources are contributing to instream water quality conditions.
- Review of monitoring data based on a classification of instream locations by the degree impact from MS4 discharges.
- Source evaluations. Based on results reported in Section 3 and 4, additional investigation into bacteria sources in Sieben Creek may be warranted. Additionally, exceedance of the dissolved oxygen water quality criteria occurred in most instream monitoring locations, which reflects a change from monitoring results reflecting the 2016-2017 reporting year. Additional follow up may be warranted related to dissolved oxygen concentrations instream, and a review of the sample collection and analysis procedures by WES staff.
- Future instream monitoring needs. With the recent completion of the Carli Creek water quality facility in the summer of 2018, the addition of a Carli Creek instream monitoring location downstream of the facility could help inform effectiveness of the facility for pollutant removal.
- Comprehensive stormwater monitoring comparison with historic EMCs. Per Section 3, comparison of the current land use-based stormwater monitoring results with historic land use-based EMCs indicates that for select parameters, the historic EMCs may be overestimating the pollutant load generated from that land use. Compilation of additional stormwater data for the same monitoring sites may indicate whether modifications to land use EMCs in future TMDL benchmark efforts is warranted.

5.2 Potential Program Revisions

Ongoing review of monitoring data can help identify future stormwater management program revisions and capital project needs. Once the administrative extension period has concluded and the Clackamas NPDES MS4 permit is reissued, program modifications will be considered and implemented through the adaptive management process and in consideration of results from the annual monitoring report.

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Appendix A

Data Tables

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Table A-1. CCSD #1 Instream Water Quality Monitoring Results (2017-2018)

Carli Creek

WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Water Quality Standard Comparison													Additional Parameters of Concern							Supporting Parameters										
				Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁵	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁵	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#05 SE 120th & Carpenter Dr. MH	8/29/17	N	Routine	17.3	18	6.8	6.5	0.96	10	1550	406	0.07	0.14	0.7	10.17	15.46	0.02	2.96	75.88	13.0	133.97	132.88	229	3	210	<0.05	0.08	0.9	0.120	19.00	116	7.3	240.0	
#05 SE 120th & Carpenter Dr. MH	9/28/17	N	Routine	17.3	18	4.7	6.5	0.96	10	29	406	0.31	0.14	0.7	9.94	15.08	0.03	2.87	73.75	15.0	131.03	129.97	341	21	276	0.1	0.12	1.6	0.160	40.00	113	7.3	259.0	
#05 SE 120th & Carpenter Dr. MH	10/26/17	N	Routine	17.0	18	4.8	6.5	1.40	10	35	406	0.07	0.14	1.5	7.95	11.79	0.02	2.16	55.48	20.0	104.99	104.14	178	3	185	<0.05	0.05	3.0	0.170	26.00	87	7.1	225.0	
#05 SE 120th & Carpenter Dr. MH	2/20/18	N	Routine	10.2	18	8.2	6.5	0.97	10	4	406	0.08	0.14	0.7	3.56	4.86	0.020	0.76	19.61	13.0	47.36	46.98	155	5	132	<0.05	0.05	1.20	0.220	20.00	34	6.8	199.7	
#05 SE 120th & Carpenter Dr. MH	3/29/18	N	Routine	11.5	18	5.6	6.5	1.10	10	4	406	0.07	0.14	0.6	7.72	11.40	<0.01	2.08	53.39	11.0	101.91	101.09	164	6	149	<0.05	0.05	1.2	0.260	17.00	84	7.3	220.0	
#05 SE 120th & Carpenter Dr. MH	4/13/18	N	Routine	11.4	18	8.8	6.5	0.74	10	39	406	<0.04	0.14	1.4	4.87	6.86	0.07	1.15	29.47	32.0	64.55	64.03	150	8	89	0.06	0.04	2.40	0.910	49.00	49	6.8	140.4	
#05 SE 120th & Carpenter Dr. MH	5/23/18	N	Routine	14.8	18	9.2	6.5	0.93	10	4	406	<0.04	0.14	0.5	8.80	13.19	<0.01	2.46	63.18	8.0	116.13	115.19	165	3	160	<0.05	0.06	1.3	0.210	14.00	98	7.1	231.0	
#05 SE 120th & Carpenter Dr. MH	6/6/18	N	Routine	15.0	18	9.4	6.5	0.85	10	81	406	0.05	0.14	0.5	8.80	13.19	<0.01	2.46	63.18	9.0	116.13	115.19	189	2	161	<0.05	0.07	0.7	0.140	11.00	98	6.9	233.0	
Median				14.9		7.5		0.96		32		0.07		0.7					13.0				172	4	161	0.025	0.055	1.25	0.190	19.50	93	7.1	228.0	
Maximum				17.3		9.4		1.40		1550		0.31		1.5					32.0				341	21	276	0.1	0.12	3.0	0.910	49.00	116	7.3	259.0	
Minimum				10.2		4.7		0.74		4		0.02		0.5				0.005		8.0			150	2	89	0.025	0.04	0.7	0.120	11.00	34	6.8	140.4	
Water Quality Exceedance (number of samples)				0		3		0		1		1			0	0		0	0	0	0	0												
#05 SE 120th & Carpenter Dr. MH	11/13/17	Y	Routine	13.0	18	9.2	6.5	0.92	10	291	406	0.08	0.14	1.27	1.57	1.97	0.035	0.26	6.62	15.8	20.97	20.80	104	3	142	<0.05	0.05	1.83	0.232	32.80	44.4	6.5	141.8	
#05 SE 120th & Carpenter Dr. MH	12/19/17	Y	Routine	10.4	18	9.9	6.5	0.17	10	313	406	0.17	0.14	2.0	6.60	9.60	0.070	1.70	43.71	51.0	87.33	86.62	90	44	47	0.11	0.03	7.10	1.990	107.00	13	6.3	55.2	
#05 SE 120th & Carpenter Dr. MH	1/29/18	Y	Routine	12.3	18	8.4	6.5	1.40	10	3	406	0.08	0.14	0.7	3.56	4.86	0.020	0.76	19.61	11.0	47.36	46.98	181	<1	91	<0.05	0.05	1.10	0.250	16.00	70	6.7	227.0	
Median				12.3		9.2		0.92		291		0.08		1.27					15.8				104	5	91	0.025	0.05	1.83	0.250	32.80	44	6.5	141.8	
Maximum				13.0		9.9		1.40		313		0.17		2.0					51.0				181	44	142	0.11	0.05	7.10	1.990	107.00	70	6.7	227.0	
Minimum				10.4		8.4		0.17		3		0.02		0.7				0.020		11.0			90	1	47	0.025	0.03	1.10	0.232	16.00	13	6.3	55.2	
Water Quality Exceedance (number of samples)				0		0		0		0		1			0	0		0	0	0	0	0												

Sieben Creek

WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Water Quality Standard Comparison													Additional Parameters of Concern							Supporting Parameters										
				Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁵	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁵	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#07 Sieben Creek at Hwy 212/214	8/29/17	N	Routine	17.3	18	6.0	6.5	1.5	10	121	406	0.05	0.14	0.8	6.44	9.34	<0.01	1.65	42.33	4.0	85.21	84.52	180	<1	179	<0.05	0.09	1.00	0.07	5.0	68	7.5	162.5	
#07 Sieben Creek at Hwy 212/214	9/28/17	N	Routine	14.6	18	7.6	6.5	1.5	10	125	406	0.04	0.14	0.9	6.12	8.83	<0.01	1.54	39.60	6.0	80.94	80.28	149	1	157	<0.05	0.08	1.00	0.06	7.0	64	7.4	173.1	
#07 Sieben Creek at Hwy 212/214	10/26/17	N	Routine	13.3	18	5.2	6.5	1.6	10	86	406	0.06	0.14	0.9	5.46	7.78	0.01	1.33	34.17	6.0	72.28	71.70	148	5	139	<0.05	0.06	1.20	0.07	8.0	56	7.2	157.4	
#07 Sieben Creek at Hwy 212/214	2/20/18	N	Routine	4.8	18	10.2	6.5	1.1	10	579	406	0.04	0.14	1.2	4.70	6.60	0.050	1.10	28.13	28.0	62.31	61.81	121	4	106	<0.05	<0.03	1.70	0.26	35.0	47	6.5	191.2	
#07 Sieben Creek at Hwy 212/214	3/29/18	N	Routine	8.2	18	8.3	6.5	1.4	10	11	406	0.04	0.14	0.7	4.61	6.47	0.02	1.07	27.47	13.0	61.19	60.69	111	2	131	<0.05	0.03	0.90	0.19	15.0	46	7.5	149.0	
#07 Sieben Creek at Hwy 212/214	4/13/18	N	Routine	9.8	18	8.2	6.5	1.3	10	140	406	<0.04	0.14	1.1	4.27	5.93	0.040	0.97	24.82	32.0	56.65	56.19	138	5	83	<0.05	<0.04	1.40	0.35	38.0	42	7.2	114.8	
#07 Sieben Creek at Hwy 212/214	5/23/18	N	Routine	14.9	18	10.0	6.5	1.4	10	689	406	<0.04	0.14	0.6	5.54	7.91	0.01	1.36	34.84	9.0	73.37	72.78	124	3	116	<0.05	0.06	0.80	0.19	12.0	57	7.6	157.0	
#07 Sieben Creek at Hwy 212/214	6/6/18	N	Routine	13.2	18	9.6	6.5	1.4	10	687	406	<0.04	0.14	0.6	5.71	8.17	0.01	1.41	36.20	7.0	75.55	74.94	148	6	126	<0.05	0.06	0.80	0.15	10.0	59	7.1	175.7	
Median				13.3		8.3		1.4		133		0.04		0.9					8.0				143	3.5	129	0.025	0.06	1.00	0.17	11.0	57	7.3	160.0	
Maximum				17.3		10.2		1.6		689		0.06		1.2					32.0				180	6	179	0.025	0.09	1.70	0.35	38.0	68	7.6	191.2	
Minimum				4.8		5.2		1.1		11		0.02		0.6				0.005		4.0			111	0.5	83	0.025	0.015	0.80	0.06	5.0	42	6.5	114.8	
Water Quality Exceedance (number of samples)				0		2		0		3		0			0	0		0	0	0	0	0												
#07 Sieben Creek at Hwy 212/214	11/13/17	Y	Routine	11.0	18	10.2	6.5	0.9	10	2420	406	0.07	0.14	2.01	2.76	3.67	0.095	0.55	14.01	23.3	36.75	36.45	87	1	135	<0.05	0.04	2.62	0.27	34.8	25.2	6.7	109.3	
#07 Sieben Creek at Hwy 212/214	12/19/17	Y	Routine	9.8	18	10.1	6.5	0.5	10	816	406	0.25	0.14	2.5	2.93	3.91	0.060	0.59	15.14	42.0	38.96	38.64	170	84	90	<0.05	0.04	8.70	2.39	148.0	27	6.5	120.3	
#07 Sieben Creek at Hwy 212/214	1/29/18	Y	Routine	10.0	18	8.4	6.5	1.7	10	47	406	0.05	0.14	0.8	4.44	6.20	0.060	1.02	26.14	13.0	58.92	58.45	138	<1	126	<0.05	<0.4	1.20	0.30	18.0	44	6.7	313.0	
Median				10.0		10.1		0.9		816		0.07		2.0					23.3				138	1	126	0.025	0.04	2.62	0.30	34.8	27	6.7	120.3	
Maximum				11.0		10.2		1.7		2420		0.25		2.5					42.0				170	84	135	0.025	0.2	8.70	2.39	148.0	44	6.7	313.0	
Minimum				9.8		8.4		0.5		47		0.05		0.8				0.060		13.0			87	0.5	90	0.025	0.04	1.20	0.27	18.0	25	6.5	109.3	
Water Quality Exceedance (number of samples)				0		0		0		2		1			0	0		0	0	1	1													

Phillips Creek

WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Water Quality Standard Comparison													Additional Parameters of Concern							Supporting Parameters					
				Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁵	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁵	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)
#11 Phillips Creek at SE 84th Ave.	8/29/17	N	Routine	19.2	18	5.3	6.5	0.8	10	649	406	<0.04	0.14	1.20	7.40	10.89	0.05	1											

Table A-1. CCSD #1 Instream Water Quality Monitoring Results (2017-2018)

Kellogg Creek - Upstream Location

		Water Quality Standard Comparison															Additional Parameters of Concern							Supporting Parameters										
WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#14 Kellogg Creek at SE Rusk Rd.	8/29/17	N	Routine	16.7	18	6.4	6.5	2.3	10	162	406	0.06	0.14	0.30	7.56	11.15	0.01	2.03	52.00	4.00	99.85	99.04	218	3	196	<0.05	0.05	0.40	0.14	4.00	82	6.9	184.4	
#14 Kellogg Creek at SE Rusk Rd.	9/28/17	N	Routine	15.2	18	6.2	6.5	2.6	10	186	406	0.08	0.14	0.40	7.87	11.66	0.02	2.13	54.78	6.00	103.97	103.12	187	4	196	0.08	0.06	0.60	0.17	8.00	86	7	211.0	
#14 Kellogg Creek at SE Rusk Rd.	10/26/17	N	Routine	14.1	18	4.8	6.5	2.1	10	133	406	0.17	0.14	0.70	7.08	10.38	0.03	1.86	47.84	8.00	93.63	92.87	208	13	168	0.06	0.06	1.40	0.64	15.00	76	7.4	193.9	
#14 Kellogg Creek at SE Rusk Rd.	2/20/18	N	Routine	6.9	18	6.0	6.5	2.0	10	55	406	0.14	0.14	0.50	6.44	9.34	0.05	1.65	42.33	8.00	85.21	84.52	167	8	140	0.06	0.06	0.90	0.34	10.00	68	6.8	190.6	
#14 Kellogg Creek at SE Rusk Rd.	3/29/18	N	Routine	10.3	18	4.8	6.5	2.2	10	291	406	0.12	0.14	0.60	6.52	9.47	0.05	1.68	43.02	7.00	86.27	85.57	160	5	153	<0.05	0.07	0.80	0.30	8.00	69	7.1	185.1	
#14 Kellogg Creek at SE Rusk Rd.	4/13/18	N	Routine	10.9	18	6.0	6.5	1.7	10	150	406	0.07	0.14	0.90	5.95	8.57	0.05	1.49	38.24	21.00	78.79	78.15	169	7	115	<0.05	0.06	1.10	0.42	23.00	62	6.9	164.8	
#14 Kellogg Creek at SE Rusk Rd.	5/23/18	N	Routine	15.5	18	8.5	6.5	2.5	10	365	406	0.1	0.14	0.40	7.32	10.76	0.01	1.95	49.92	6.00	96.75	95.97	169	3	161	<0.05	0.06	0.60	0.19	8.00	79	7.1	194.0	
#14 Kellogg Creek at SE Rusk Rd.	6/6/18	N	Routine	15.0	18	8.5	6.5	2.3	10	411	406	<0.04	0.14	0.40	8.88	13.31	0.02	2.49	63.88	5.00	117.14	116.19	186	3	165	<0.05	0.06	0.60	0.21	7.00	99	7.2	196.1	
Median ⁴				14.6		6.1		2.3		174		0.09		0.45			0.03			6.50			178	5	163	0.025	0.06	0.70	0.26	8.00	78	7.1	192.3	
Maximum ⁴				16.7		8.5		2.6		411		0.17		0.90			0.05			21.00			218	13	196	0.08	0.07	1.40	0.64	23.00	99	7.4	211.0	
Minimum ⁴				6.9		4.8		1.7		55		0.02		0.30			0.01			4.00			160	3	115	0.025	0.05	0.40	0.14	4.00	62	6.8	164.8	
Water Quality Exceedance (number of samples)				0		6		0		1		2			0	0		0	0		0	0												
#14 Kellogg Creek at SE Rusk Rd.	11/13/17	Y	Routine	11.3	18	8.9	6.5	1.2	10	249	406	0.12	0.14	1.57	3.85	5.29	0.036	0.84	21.68	6.40	51.11	50.70	131	2	139	<0.05	0.07	2.15	0.34	12.80	37.2	6.3	124.3	
#14 Kellogg Creek at SE Rusk Rd.	12/19/17	Y	Routine	11.1	18	9.0	6.5	2.2	10	192	406	0.22	0.14	0.90	6.28	9.09	0.050	1.60	40.97	11.00	83.08	82.41	201	27	169	0.08	0.09	2.20	1.11	21.00	66	6.5	193.2	
#14 Kellogg Creek at SE Rusk Rd.	1/29/18	Y	Routine	10.6	18	6.5	6.5	2.3	10	84	406	0.12	0.14	0.70	5.79	8.31	0.110	1.44	36.88	13.00	76.63	76.01	185	4	154	0.06	0.07	1.30	0.43	16.00	60	7	194.8	
Median ⁴				11.1		8.9		2.2		192		0.12		0.90			0.050			11.00			185	4	154	0.06	0.07	2.15	0.43	16.00	60	6.5	193.2	
Maximum ⁴				11.3		9.0		2.3		249		0.13		1.57			0.110			13.00			201	27	169	0.08	0.09	2.20	1.11	21.00	66	7.0	194.8	
Minimum ⁴				10.6		6.5		1.2		84		0.05		0.70			0.036			6.40			131	2	139	0.025	0.07	1.30	0.34	12.80	37	6.3	124.3	
Water Quality Exceedance (number of samples)				0		1		0		0		1			0	0		0	0		0	0												

Mt Scott Creek

		Water Quality Standard Comparison															Additional Parameters of Concern							Supporting Parameters										
WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#15 Mt. Scott Creek in NCCP	8/29/17	N	Routine	19.4	18	5.8	6.5	0.48	10	548	406	0.11	0.14	0.8	8.42	12.55	0.04	2.33	59.67	3.00	111.09	110.19	189	3	180	<0.05	0.11	1.20	0.23	6.00	93	7.5	217.0	
#15 Mt. Scott Creek in NCCP	9/28/17	N	Routine	17.2	18	5.5	6.5	0.72	10	387	406	0.07	0.14	1.1	8.03	11.91	0.04	2.19	56.17	5.00	106.01	105.15	177	3	182	0.07	0.09	1.40	0.17	8.00	88	7.4	223.0	
#15 Mt. Scott Creek in NCCP	10/26/17	N	Routine	14.4	18	7.2	6.5	0.71	10	179	406	0.08	0.14	1.3	6.52	9.47	0.05	1.68	43.02	6.00	86.27	85.57	166	3	159	<0.05	0.04	1.70	0.21	9.00	69	7.5	170.6	
#15 Mt. Scott Creek in NCCP	2/20/18	N	Routine	4.9	18	9.6	6.5	0.58	10	45	406	0.04	0.14	1.2	6.28	9.09	0.05	1.60	40.97	15.00	83.08	82.41	141	5	120	<0.05	<0.03	1.70	0.36	22.00	66	7.2	174.3	
#15 Mt. Scott Creek in NCCP	3/29/18	N	Routine	10.1	18	5.9	6.5	0.69	10	291	406	0.05	0.14	0.9	6.36	9.22	0.03	1.62	41.65	8.00	84.14	83.46	132	4	123	<0.05	0.03	1.30	0.30	11.00	67	7.4	170.9	
#15 Mt. Scott Creek in NCCP	4/13/18	N	Routine	10.0	18	7.7	6.5	0.59	10	238	406	<0.04	0.14	1.2	5.37	7.65	0.08	1.31	33.49	12.00	71.19	70.61	143	16	92	<0.05	<0.04	2.10	0.82	20.00	55	7.2	143.6	
#15 Mt. Scott Creek in NCCP	5/23/18	N	Routine	17.7	18	7.7	6.5	0.77	10	461	406	0.08	0.14	0.9	8.18	12.17	0.05	2.24	57.57	5.00	108.05	107.17	167	3	157	<0.05	0.1	1.30	0.29	7.00	90	7.6	215.0	
#15 Mt. Scott Creek in NCCP	6/6/18	N	Routine	16.5	18	8.5	6.5	1.50	10	158	406	0.1	0.14	0.8	8.26	12.30	0.05	2.27	58.27	4.00	109.07	108.18	191	4	162	<0.05	0.09	1.30	0.29	6.00	91	7.3	217.0	
Median ⁴				15.5		7.5		0.70		265		0.08		1.0			0.05			5.50			167	4	158	0.025	0.065	1.35	0.29	8.50	79	7.4	194.7	
Maximum ⁴				19.4		9.6		1.50		548		0.11		1.3			0.08			15.00			191	16	182	0.07	0.11	2.10	0.82	22.00	93	7.6	223.0	
Minimum ⁴				4.9		5.5		0.48		45		0.02		0.8			0.03			3.00			132	3	92	0.025	0.015	1.20	0.17	6.00	55	7.2	143.6	
Water Quality Exceedance (number of samples)				1		3		0		2		0			0	0		0	0		0	0												
#15 Mt. Scott Creek in NCCP	11/13/17	Y	Routine	11.4	18	9.4	6.5	0.51	10	225	406	0.09	0.14	2.16	3.13	4.21	0.10	0.64	16.53	9.70	41.63	41.29	139	7	111	<0.05	0.04	3.31	0.786	22.20	29.2	6.7	108.3	
#15 Mt. Scott Creek in NCCP	12/19/17	Y	Routine	9.8	18	9.6	6.5	0.44	10	299	406	0.32	0.14	1.5	4.78	6.73	0.07	1.12	28.80	14.00	63.43	62.92	243	123	97	0.07	0.05	9.20	4.900	87.00	48	6.4	131.1	
#15 Mt. Scott Creek in NCCP	1/29/18	Y	Routine	10.0	18	9.4	6.5	0.98	10	45	406	0.06	0.14	1.0	5.46	7.78	0.08	1.33	34.17	10.00	72.28	71.70	149	2	114	<0.05	<0.04	1.50	0.400	14.00	56	6.8	172.6	
Median ⁴				10.0		9.4		0.51		225		0.07		1.5			0.08			10.00			149	7	111	0.025	0.04	3.31	0.786	22.20	48	6.7	131.1	
Maximum ⁴				11.4		9.6		0.98		299		0.13		2.16			0.10			14.00			243	123	114	0.07	0.05	9.20	4.90	87.00	56	6.8	172.6	
Minimum ⁴				9.8		9.4		0.44		45		0.02		1.0			0.07			9.70			139	2	97	0.025	0.02	1.50	0.40	14.00	29	6.4	108.3	
Water Quality Exceedance (number of samples)				0		0		0		0		1			0	0		0	0		0	0												

Rock Creek

		Water Quality Standard Comparison															Additional Parameters of Concern							Supporting Parameters									
WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)
#16 Rock Creek near Mouth	8/29/17	N	Routine	17.5	18	6.7	6.5	0.6	10	42	406	0.07	0.14	0.6	6.92	10.12	0.02	1.81	46.46	3.00	91.54	90.79	167	1	175	<0.05	0.09	0.70	0.08	1.00	74	7.6	173.4
#16 Rock Creek near Mouth	9/2																																

Table A-1. CCSD #1 Instream Water Quality Monitoring Results (2017-2018)

Cow Creek

WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Water Quality Standard Comparison														Additional Parameters of Concern							Supporting Parameters									
				Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#24 Cow Creek at SE Last Road	10/26/17	N	Routine	13.9	18	5.2	6.5	0.24	10	387	406	0.06	0.14	2.5	5.71	8.17	0.09	1.41	36.20	18.00	75.55	74.94	136	4	123	<0.05	0.03	3.10	0.24	22.00	59	6.9	163.9	
#24 Cow Creek at SE Last Road	2/20/18	N	Routine	4.5	18	10.2	6.5	<0.21	10	228	406	0.07	0.14	1.4	5.71	8.17	0.06	1.41	36.20	26.00	75.55	74.94	119	12	100	<0.05	0.03	2.70	0.78	46.00	59	6.4	160.4	
#24 Cow Creek at SE Last Road	3/7/18	N	Routine	7.5	18	10.0	6.5	<0.09	10	4	406	0.05	0.14	1.1	7.40	10.89	0.05	1.97	50.61	10.00	97.79	96.99	126	5	135	<0.06	0.03	1.50	0.36	14.00	80	6.5	179.2	
#24 Cow Creek at SE Last Road	3/29/18	N	Routine	8.7	18	7.2	6.5	0.14	10	25	406	0.05	0.14	1.3	7.08	10.38	0.04	1.86	47.84	16.00	93.63	92.87	130	4	125	<0.05	0.03	1.80	0.31	20.00	76	7.1	226.0	
#24 Cow Creek at SE Last Road	4/13/18	N	Routine	10.4	18	6.8	6.5	0.23	10	2420	406	<0.04	0.14	1.6	5.37	7.65	0.06	1.31	33.49	34.00	71.19	70.61	143	9	88	<0.05	<0.04	2.10	0.42	37.00	55	6.8	146.0	
#24 Cow Creek at SE Last Road	5/3/18	N	Routine	13.4	18	9.3	6.5	0.17	10	11	406	<0.04	0.14	1.0	7.87	11.66	0.02	2.13	54.78	9.00	103.97	103.12	152	4	136	<0.05	0.03	1.20	0.27	12.00	86	6.8	194.7	
Median ⁴				9.6		8.3		0.155		127		0.05		1.4			0.06			17.0			133	5	124	0.025	0.03	1.95	0.34	21.00	68	6.8	171.6	
Maximum ⁴				13.9		10.2		0.24		2420		0.07		2.5			0.09			34.0			152	12	136	0.03	0.03	3.10	0.78	46.00	86	7.1	226.0	
Minimum ⁴				4.5		5.2		0.045		4		0.02		1.0			0.02			9.0			119	4	88	0.025	0.02	1.20	0.24	12.00	55	6.4	146.0	
Water Quality Exceedance (number of samples)				0		1		0		1		0		0	0	0	0	0	0	0	0	0												
#24 Cow Creek at SE Last Road	11/13/17	Y	Routine	10.8	18	8.2	6.5	0.21	10	192	406	0.08	0.14	2.57	3.13	4.21	0.082	0.64	16.53	29.90	41.63	41.29	79	3	90	<0.05	0.04	4.08	0.815	42.70	29.2	6.3	104.9	
#24 Cow Creek at SE Last Road	12/19/17	Y	Routine	9.9	18	10.2	6.5	0.19	10	145	406	0.10	0.14	2.80	1.46	1.82	0.080	0.24	6.04	40.00	19.60	19.44	65	25	58	0.15	0.03	8.10	1.990	85.00	12	6.6	52.3	
#24 Cow Creek at SE Last Road	1/29/18	Y	Routine	9.6	18	8.3	6.5	0.48	10	14	406	0.07	0.14	1.30	6.36	9.22	0.050	1.62	41.65	28.00	84.14	83.46	151	<1	138	<0.05	<0.04	1.60	0.320	37.00	67	6.6	248.0	
Median ⁴				9.9		8.3		0.21		145		0.08		2.57			0.080			29.90			79	3	90	0.025	0.03	4.08	0.815	42.70	29.2	6.6	104.9	
Maximum ⁴				10.8		10.2		0.48		192		0.10		2.80			0.082			40.00			151	25	138	0.15	0.04	8.10	1.990	85.00	67	6.6	248.0	
Minimum ⁴				9.6		8.2		0.19		14		0.07		1.30			0.050			28.00			65	0.5	58	0.025	0.02	1.60	0.320	37.00	12	6.3	52.3	
Water Quality Exceedance (number of samples)				0		0		0		0		0		1	1	0	0	0	0	1	1	0												

Kellogg Creek - Downstream Location

WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/ Storm)	Water Quality Standard Comparison														Additional Parameters of Concern							Supporting Parameters									
				Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Total Phosphorus (mg/L)	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#27 Rowe Middle School SE Lake	8/29/17	N	Routine	18.4	18	5.9	6.5	1.40	10	687	406	0.07	0.14	0.8	8.11	12.04	0.03	2.22	56.87	4.00	107.03	106.16	207	5	203	<0.05	0.08	1.30	0.19	11.00	89	7.5	195.4	
#27 Rowe Middle School SE Lake	9/28/17	N	Routine	16.3	18	7.4	6.5	1.50	10	317	406	0.06	0.14	0.8	7.87	11.66	0.03	2.13	54.78	3.00	103.97	103.12	187	6	198	<0.05	0.08	0.90	0.18	6.00	86	7.5	238.0	
#27 Rowe Middle School SE Lake	10/26/17	N	Routine	14.5	18	4.6	6.5	1.30	10	236	406	0.11	0.14	1.1	7.08	10.38	0.03	1.86	47.84	5.00	93.63	92.87	179	3	151	<0.05	0.05	1.90	0.17	7.00	76	7.5	218.0	
#27 Rowe Middle School SE Lake	2/20/18	N	Routine	5.3	18	7.5	6.5	0.98	10	61	406	0.06	0.14	1.0	6.52	9.47	0.06	1.68	43.02	11.00	86.27	85.57	154	5	131	<0.05	0.03	1.50	0.29	14.00	69	7.3	193.7	
#27 Rowe Middle School SE Lake	3/29/18	N	Routine	10.6	18	6.2	6.5	1.10	10	155	406	0.07	0.14	0.9	6.60	9.60	0.04	1.70	43.71	5.00	87.33	86.62	144	3	133	<0.05	0.04	1.20	0.31	9.00	70	7.6	188.8	
#27 Rowe Middle School SE Lake	4/13/18	N	Routine	10.4	18	7.6	6.5	0.89	10	126	406	<0.04	0.14	1.2	5.79	8.31	0.05	1.44	36.88	11.00	76.63	76.01	155	8	110	<0.05	0.04	1.70	0.48	15.00	60	7.3	149.6	
#27 Rowe Middle School SE Lake	5/23/18	N	Routine	17.8	18	3.7	6.5	1.50	10	272	406	0.05	0.14	0.7	7.95	11.79	0.02	2.16	55.48	4.00	104.99	104.14	168	4	160	<0.05	0.09	1.00	0.22	7.00	87	7.0	208.0	
#27 Rowe Middle School SE Lake	6/6/18	N	Routine	16.9	18	9.4	6.5	1.40	10	214	406	0.06	0.14	0.7	7.87	11.66	0.04	2.13	54.78	4.00	103.97	103.12	187	2	163	<0.05	0.08	1.00	0.25	6.00	86	7.6	208.0	
Median ⁴				15.4		6.8		1.35		225		0.06		0.9			0.04			4.50			174	5	156	0.025	0.07	1.25	0.24	8.00	81	7.5	201.7	
Maximum ⁴				18.4		9.4		1.50		687		0.11		1.2			0.06			11.00			207	8	203	0.025	0.09	1.90	0.48	15.00	89	7.6	238.0	
Minimum ⁴				5.3		3.7		0.89		61		0.02		0.7			0.02			3.00			144	2	110	0.025	0.03	0.90	0.17	6.00	60	7.0	149.6	
Water Quality Exceedance (number of samples)				1		4		0		1		0		0	0	0	0	0	0	0	0	0												
#27 Rowe Middle School SE Lake	11/13/17	Y	Routine	11.4	18	10.0	6.5	0.62	10	816	406	0.09	0.14	2.03	3.38	4.59	0.086	0.71	18.32	8.50	44.99	44.62	88	4	99	<0.05	0.04	3.00	0.619	18.90	32	6.7	108.7	
#27 Rowe Middle School SE Lake	12/19/17	Y	Routine	10.2	18	9.7	6.5	0.72	10	517	406	0.02	0.14	1.4	4.95	6.99	0.070	1.17	30.14	13.00	65.66	65.13	251	131	96	0.08	0.06	8.70	4.530	86.00	50	6.5	129.1	
#27 Rowe Middle School SE Lake	1/29/18	Y	Routine	10.2	18	8.5	6.5	1.20	10	14	406	0.08	0.14	1.0	5.62	8.04	0.090	1.38	35.52	10.00	74.46	73.86	157	2	138	<0.05	0.04	1.50	0.440	15.00	58	7.1	148.4	
Median ⁴				10.2		9.7		0.72		517		0		1.4			0.086			10.0			157	4	99	0.025	0.04	3.00	0.619	18.90	50	6.7	129.1	
Maximum ⁴				11.4		10		1.20		816		0.09		2.03			0.090			13.0			251	131	138	0.08	0.06	8.70	4.530	86.00	58	7.1	148.4	
Minimum ⁴				10.2		8.5		0.62		14		0.02		1.0			0.070			8.5			88	2	96	0.025	0.04	1.50	0.440	15.00	32	6.5	108.7	
Water Quality Exceedance (number of samples)				0		0		0		2		0		0	0	0	0	0	0	0	0	0												

Notes

- General: Red font indicates that the dissolved values are higher than the total. Potential QA/QC need.
- 1) WQ Standard of 18 C per DEQ's Temperature Water Quality Standard Implementation IMD 2008 for salmon and trout rearing and migration.
 - 2) No DO TMDL for the Willamette River; 6.5 mg/L selected as target minimum DO concentration for cool water habitat.
 - 3) Table 20 - Protection of human health for water and fish ingestion.
 - 4) Non-detects were replaced with one half the detection limit for statistical calculations.
 - 5) WQ Standard of 0.14 mg/L selected based on the load allocation referenced in the Tualatin TMDL for all sources downstream of Dairy Creek.
 - 6) Acute and chronic water quality standards for metals based on hardness only. The

Table A-2. CCSD #1 Stormwater Monitoring Results (2017-2018)

Mt Scott Creek (Lower) - Stormwater Outfall Monitoring - Mixed Use

WES ID and Location	Date	Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
		Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Copper, Total (ug/L)	WQ Criteria (ug/L) ⁵	Lead, Total (ug/L)	WQ Criteria (ug/L) ⁵	Zinc, Total (ug/L)	WQ Criteria (ug/L) ⁵	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Total Phosphorus (mg/L)	Ortho-phosphate (mg/L)	Copper, Dissolved (ug/L)	Lead, Dissolved (ug/L)	Zinc, Dissolved (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#101 SE Pheasant Ct. Outfall	2/14/18	7.1	18	10.7	6.5	0.35	10	72	406	6.9	20.00	1.23	15.00	145	90.00	55	11	61	0.14	0.10	0.04	4.6	0.08	110.00	<5	7.1	57.5	
#101 SE Pheasant Ct. Outfall	3/8/18	8.3	18	2.7	6.5	0.63	10	2	406	9.1	20.00	6.90	15.00	208	90.00	122	52	68	0.18	0.15	0.04	4.0	0.12	139.00	30	6.6	98.3	
#101 SE Pheasant Ct. Outfall	6/8/18	18.4	18	2.8	6.5	2.8	10	388	406	71.9	20.00	3.55	15.00	731	90.00	385	38	324	2.00	0.80	0.50	48.8	0.79	584.00	78	6.5	239	
Median ⁴		8.3		2.8		0.6		72		9.1		3.55		208		122	38	68	0.18	0.15	0.04	4.6	0.12	139.00	30	6.6	98.3	
Maximum ⁴		18.4		10.7		2.8		388		71.9		6.90		731		385	52	324	2.00	0.80	0.50	48.8	0.79	584.00	78	7.1	239.0	
Minimum ⁴		7.1		2.7		0.35		2		6.9		1.23		145		55	11	61	0.14	0.10	0.04	4.0	0.08	110.00	2.5	6.5	57.5	
WQ Exceedance (number of samples)		1		2		0		0		1		0		3														

Kellogg Creek (Upstream) - Stormwater Outfall Monitoring - Residential

WES ID and Location	Date	Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
		Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Copper, Total (ug/L)	WQ Criteria (ug/L) ⁵	Lead, Total (ug/L)	WQ Criteria (ug/L) ⁵	Zinc, Total (ug/L)	WQ Criteria (ug/L) ⁵	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Total Phosphorus (mg/L)	Ortho-phosphate (mg/L)	Copper, Dissolved (ug/L)	Lead, Dissolved (ug/L)	Zinc, Dissolved (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#102 SE Webster Rd. Outfall	2/14/18	8	18	9.5	6.5	0.6	10	238	406	6.7	20.00	0.74	15.00	126	90.00	65	9	59	0.08	0.09	0.04	4.7	0.13	101	16	7.1	70.2	
#102 SE Webster Rd. Outfall	3/8/18	9.5	18	7.1	6.5	0.7	10	2420	406	32.7	20.00	5.76	15.00	460	90.00	226	143	106	0.29	0.34	0.04	12.8	0.15	245	41	6.4	118.9	
#102 SE Webster Rd. Outfall	6/8/18	17.9	18	2.1	6.5	2.4	10	>2420	406	206.0	20.00	3.06	15.00	637	90.00	415	54	338	2.20	0.88	0.46	132.0	0.73	489	75	6.8	166.0	
Median ⁴		9.5		7.1		0.7		2420		32.7		3.06		460		226	54	106	0.29	0.34	0.04	12.8	0.15	245	41	6.8	118.9	
Maximum ⁴		17.9		9.5		2.4		>2420		206.0		5.76		637		415	143	338	2.20	0.88	0.46	132.0	0.73	489	75	7.1	166.0	
Minimum ⁴		8.0		2.1		0.6		238		6.7		0.74		126		65	9	59	0.08	0.09	0.04	4.7	0.13	101	16	6.4	70.2	
WQ Exceedance (number of samples)		0		1		0		2		2		0		3														

Sieben Creek - Stormwater Outfall Monitoring - Commerical

WES ID and Location	Date	Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
		Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Copper, Total (ug/L)	WQ Criteria (ug/L) ⁵	Lead, Total (ug/L)	WQ Criteria (ug/L) ⁵	Zinc, Total (ug/L)	WQ Criteria (ug/L) ⁵	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Total Phosphorus (mg/L)	Ortho-phosphate (mg/L)	Copper, Dissolved (ug/L)	Lead, Dissolved (ug/L)	Zinc, Dissolved (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#103 SE Oregon Trail Dr. Outfall	2/14/18	6.2	18	10.3	6.5	0.28	10	16	406	8.7	20.00	1.64	15.00	140	90.00	93	32	79	0.23	0.23	0.05	3.6	0.16	88	21	6.5	50.4	
#103 SE Oregon Trail Dr. Outfall	3/8/18	11.3	18	7.1	6.5	0.37	10	866	406	16.1	20.00	2.90	15.00	241	90.00	168	70	102	0.34	0.33	<0.03	6.8	0.13	129	52	6.7	137.0	
#103 SE Oregon Trail Dr. Outfall	6/8/18	17.9	18	4.4	6.5	0.95	10	5	406	36.7	20.00	4.83	15.00	585	90.00	306	29	254	1.20	0.23	0.10	25.8	2.49	439	87	6.7	265.0	
Median ⁴		11.3		7.1		0.37		16		16.1		2.90		241		168	32	102	0.34	0.23	0.05	6.8	0.16	129	52	6.7	137.0	
Maximum ⁴		17.9		10.3		0.95		866		36.7		4.83		585		306	29	254	1.20	0.33	0.10	25.8	2.49	439	87	6.7	265.0	
Minimum ⁴		6.2		4.4		0.28		5		8.7		1.64		140		93	29	79	0.23	0.23	0.015	3.6	0.07	88	21	6.5	50.4	
WQ Exceedance (number of samples)		0		1		0		1		1		0		3														

Sieben Creek - Stormwater Outfall Monitoring - Multi-Family Residential

WES ID and Location	Date	Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
		Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	Water Quality Std (MPN per 100ml)	Copper, Total (ug/L)	WQ Criteria (ug/L) ⁵	Lead, Total (ug/L)	WQ Criteria (ug/L) ⁵	Zinc, Total (ug/L)	WQ Criteria (ug/L) ⁵	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Ammonia (mg/L)	Total Phosphorus (mg/L)	Ortho-phosphate (mg/L)	Copper, Dissolved (ug/L)	Lead, Dissolved (ug/L)	Zinc, Dissolved (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)	
#105 Sunnyside Village @Pond	2/14/18	6	18	9.7	6.5	0.26	10	649	406	10.1	20.00	0.64	15.00	30	90.00	77	27	64	0.22	0.11	0.04	5.2	0.02	15	17	6.3	45.8	
#105 Sunnyside Village @Pond	3/8/18	11	18	8.6	6.5	0.21	10	85	406	26.8	20.00	0.99	15.00	50	90.00	99	38	63	0.14	0.14	<0.03	18.7	0.04	30	24	6.8	70.6	
#105 Sunnyside Village @Pond	6/8/18	17.7	18	1.3	6.5	1.2	10	2420	406	240.0	20.00	0.87	15.00	197	90.00	371	34	307	1.50	0.72	0.60	177.0	0.27	159	75	6.5	200.0	
Median ⁴		11.0		8.6		0.3		649		26.8		0.87		50		99	34	64	0.22	0.14	0.04	18.7	0.04	30	24	6.5	70.6	
Maximum ⁴		17.7		9.7		1.2		2420		240.0		0.99		197		371	38	307	1.50	0.72	0.60	177.0	0.27	159	75	6.8	200.0	
Minimum ⁴		6.0		1.3		0.2		85		10.1		0.64		30		77	27	63	0.14	0.11	0.015	5.2	0.02	15	17	6.3	45.8	
WQ Exceedance (number of samples)		0		1		0		2		2		0		1														

Notes

General: Red font indicates that the dissolved values are higher than the total. Potential QA/QC need.

- 1) WQ Standard of 18 C per DEQ's Temperature Water Quality Standard Implementation IMD 2008 for salmon and trout rearing and migration.
- 2) No DO TMDL for the Willamette River; 6.5 mg/L selected as target minimum DO concentration for cool water habitat.
- 3) Table 20 - Protection of human health for water and fish ingestion.
- 4) Non-detects were replaced with one half the detection limit for statistical calculations.
- 5) Water quality criteria values based on current 1200-Z permit.

Table A-3. SWMACC Instream Water Quality Monitoring Results (2017-2018)

Pecan Creek

WES ID and Location	Date	Rain Event (Y/N)	Visit Type (Routine/Storm)	Water Quality Standard Comparison														Additional Parameters of Concern								Supporting Parameters								
				Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	WQ Std (MPN per 100ml)	Total Phosphorus (mg/L) ⁵	WQ Std (mg/L)	Copper, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Lead, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Zinc, Dissolved (ug/L) ⁶	WQ Std (Chronic) (ug/L)	WQ Std (Acute) (ug/L)	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Total Volatile Solids (mg/L)	Ammonia (mg/L)	Ortho-phosphate (mg/L)	Copper, Total (ug/L)	Lead, Total (ug/L)	Zinc, Total (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)
#11 Pecan Creek at SW Mossy Brae Rd.	8/29/17	N	Routine	15.8	18	7.2	6.5	2.5	10	435	406	0.04	0.14	0.50	7.00	10.25	0.01	1.84	47.15	1.0	92.58	91.83	193	2	195	65	<0.05	0.05	0.7	0.08	2	75	7	173.6
#11 Pecan Creek at SW Mossy Brae Rd.	9/28/17	N	Routine	14.0	18	7.5	6.5	1.8	10	579	406	0.04	0.14	0.80	5.12	7.26	0.02	1.23	31.48	1.0	67.88	67.33	133	1	152	39	<0.05	0.04	0.9	0.08	2	52	7.1	281.0
#11 Pecan Creek at SW Mossy Brae Rd.	10/26/17	N	Routine	12.3	18	9.5	6.5	1.10	10	210	406	0.10	0.14	1.00	3.74	5.13	0.03	0.81	20.90	1.0	49.71	49.31	114	11	84	57	<0.05	0.04	1.8	0.21	3	36	6.8	212.0
#11 Pecan Creek at SW Mossy Brae Rd.	2/20/18	N	Routine	4.0	18	10.6	6.5	1.0	10	156	406	0.04	0.14	0.50	6.44	9.34	0.04	1.65	42.33	2.0	85.21	84.52	101	6	89	32	<0.05	0.03	0.9	0.21	3	68	7.2	100.6
#11 Pecan Creek at SW Mossy Brae Rd.	3/29/18	N	Routine	6.3	18	9.0	6.5	0.88	10	23	406	0.06	0.14	0.50	3.38	4.59	0.04	0.71	18.32	2.0	44.99	44.62	103	14	98	30	<0.05	0.03	0.9	0.37	2	32	6.9	326.0
#11 Pecan Creek at SW Mossy Brae Rd.	4/13/18	N	Routine	9.1	18	9.1	6.5	0.7	10	57	406	0.04	0.14	0.90	3.38	4.59	0.05	0.71	18.32	3.0	44.99	44.62	118	12	74	54	<0.05	0.05	1.5	0.57	5	32	6.4	98.6
#11 Pecan Creek at SW Mossy Brae Rd.	5/23/18	N	Routine	13.8	18	9.4	6.5	1.30	10	167	406	0.04	0.14	0.50	4.44	6.20	0.02	1.02	26.14	1.0	58.92	58.45	99	4	100	26	<0.05	0.05	0.7	0.18	2	44	6.6	142.9
#11 Pecan Creek at SW Mossy Brae Rd.	6/6/18	N	Routine	11.7	18	9.9	6.5	1.50	10	411	406	0.04	0.14	0.50	4.78	6.73	0.01	1.12	28.80	1.0	63.43	62.92	119	1	112	26	<0.05	0.04	0.7	0.16	2	48	6.7	139.6
Median ⁴				12.0		9.3		1.2		189		0.04		0.5			0.03			1.0			116	5	99	36	0.025	0.04	0.9	0.20	2	46	6.9	158.3
Maximum ⁴				15.8		10.6		2.5		579		0.10		1.0			0.05			3.0			193	14	195	65	0.025	0.05	1.8	0.57	5	75	7.2	326.0
Minimum ⁴				4.0		7.2		0.7		23		0.04		0.5			0.01			1.0			99	1	74	26	0.025	0.03	0.7	0.08	2	32	6.4	98.6
Water Quality Exceedance (number of samples)				0		0		0		3		0		0	0	0	0	0	0	0	0	0	99	1	74	26	0.025	0.03	0.7	0.08	2	32	6.4	98.6
#11 Pecan Creek at SW Mossy Brae Rd.	11/13/17	Y	Routine	11.0	18	10.0	6.5	0.79	10	99	406	0.09	0.14	1.92	3.05	4.10	0.12	0.62	16.02	<2	40.66	40.33	108	1	135	60	<0.05	0.04	2.23	0.288	3.4	28.4	7.1	283.0
#11 Pecan Creek at SW Mossy Brae Rd.	12/19/17	Y	Routine	8.9	18	10.6	6.5	1.3	10	105	406	0.07	0.14	0.60	3.74	5.13	0.02	0.81	20.90	1.0	49.71	49.31	114	9	93	50	<0.05	0.03	0.8	0.26	3	36	6.3	117.8
#11 Pecan Creek at SW Mossy Brae Rd.	1/29/18	Y	Routine	9.5	18	9.7	6.5	1.0	10	53	406	0.07	0.14	0.70	3.11	4.19	0.06	0.64	16.40	2.0	41.39	41.05	121	6	100	41	<0.05	<0.04	1.2	0.48	5	29	6.5	190.2
Median ⁴				9.5		10.0		1.0		99		0.07		0.70			0.06			1.0			114	6	100	50	0.025	0.03	1.2	0.288	3.4	29	6.5	190.2
Maximum ⁴				11.0		10.6		1.3		105		0.09		1.92			0.12			2.0			121	9	135	60	0.025	0.04	2.23	0.48	5	36	7.1	283.0
Minimum ⁴				8.9		9.7		0.79		53		0.07		0.60			0.02			1.0			108	1	93	41	0.025	0.020	0.8	0.26	3	28.4	6.3	117.8
Water Quality Exceedance (number of samples)				0		0		0		0		0		0	0	0	0	0	0	0	0	0	108	1	93	41	0.025	0.020	0.8	0.26	3	28.4	6.3	117.8

Notes

General: Red font indicates that the dissolved values are higher than the total. Potential QA/QC need

- 1) WQ Standard of 18 C per DEQ's Temperature Water Quality Standard Implementation IMD 2008 for salmon and trout rearing and migration
- 2) No instream monitoring locations specifically referenced in the Tualatin River TMDL - 6.5 mg/L selected as target minimum DO concentration for cool water habitat
- 3) Table 20 - Protection of human health for water and fish ingestion.
- 4) Non-detects were replaced with one half the detection limit for statistical calculations.
- 5) WQ Standard of 0.14 mg/L selected based on the load allocation referenced in the Tualatin TMDL for all sources downstream of Dairy Creek
- 6) Acute and chronic water quality standards for metals based on hardness only. The current copper WQ standards now reflect use of the biotic ligand model (BLM), but was not evaluated for this report.

Table A-4. SWMACC Stormwater Monitoring Results (2017-2018)

Direct to Tualatin River - Stormwater Outfall Monitoring - Residential

WES ID and Location	Date	Visit Type (Routine/ Storm)	Water Quality Standard Comparison													Additional Parameters of Concern								Supporting Parameters					
			Temp (C)	WQ Std ¹ (C)	DO (mg/L)	WQ Std ² (mg/L)	Nitrate (mg/L)	WQ Std ³ (mg/L)	E. coli (MPN per 100ml)	WQ Std (MPN per 100ml)	Copper, Total (ug/L)	WQ Criteria (ug/L) ⁵	Lead, Total (ug/L)	WQ Criteria (ug/L) ⁵	Zinc, Total (ug/L)	WQ Criteria (ug/L) ⁵	Total Solids (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Total Volatile Solids (mg/L)	Ammonia (mg/L)	Total Phospho- rus (mg/L)	Ortho- phosphate (mg/L)	Copper, Diss- olved (ug/L)	Lead, Dissolved (ug/L)	Zinc, Dissolved (ug/L)	Hardness (mg/L)	pH	Conductivity (uS/cm)
#203 River Grove Boat Ramp	2/14/18	Storm	7.6	18	7.7	6.5	3.1	10	54	406	2.0	20.00	0.19	15.00	8	90.00	164	6	164	64	<0.05	0.06	0.04	1.5	0.02	9	77	6.7	196
#203 River Grove Boat Ramp	3/8/18	Storm	9.5	18	8	6.5	1.6	10	238	406	4.1	20.00	0.50	15.00	20	90.00	123	8	123	40	<0.05	0.07	0.04	3.3	0.03	16	60	6.6	261
#203 River Grove Boat Ramp	6/8/18	Storm	18.6	18	6.6	6.5	3.4	10	26	406	4.6	20.00	0.93	15.00	194	90.00	283	29	283	68	0.09	0.09	0.05	2.5	0.08	135	84	6.6	344
Median ⁴			9.5		7.7		3.1		54		4.1		0.50		20		164	8	164	64	0.025	0.07	0.04	2.5	0.03	16	77	6.6	261
Maximum ⁴			18.6		8.0		3.4		238		4.6		0.93		194		283	29	283	68	0.09	0.09	0.05	3.3	0.08	135	84	6.7	344
Minimum ⁴			7.6		6.6		1.6		26		2.0		0.19		8		123	6	123	40	0.025	0.06	0.04	1.5	0.02	9	60	6.6	196
Water Quality Exceedance (number of samples)			1		0		0		0		0		0		1														

Notes

General: Red font indicates that the dissolved values are higher than the total. Potential QA/QC need.

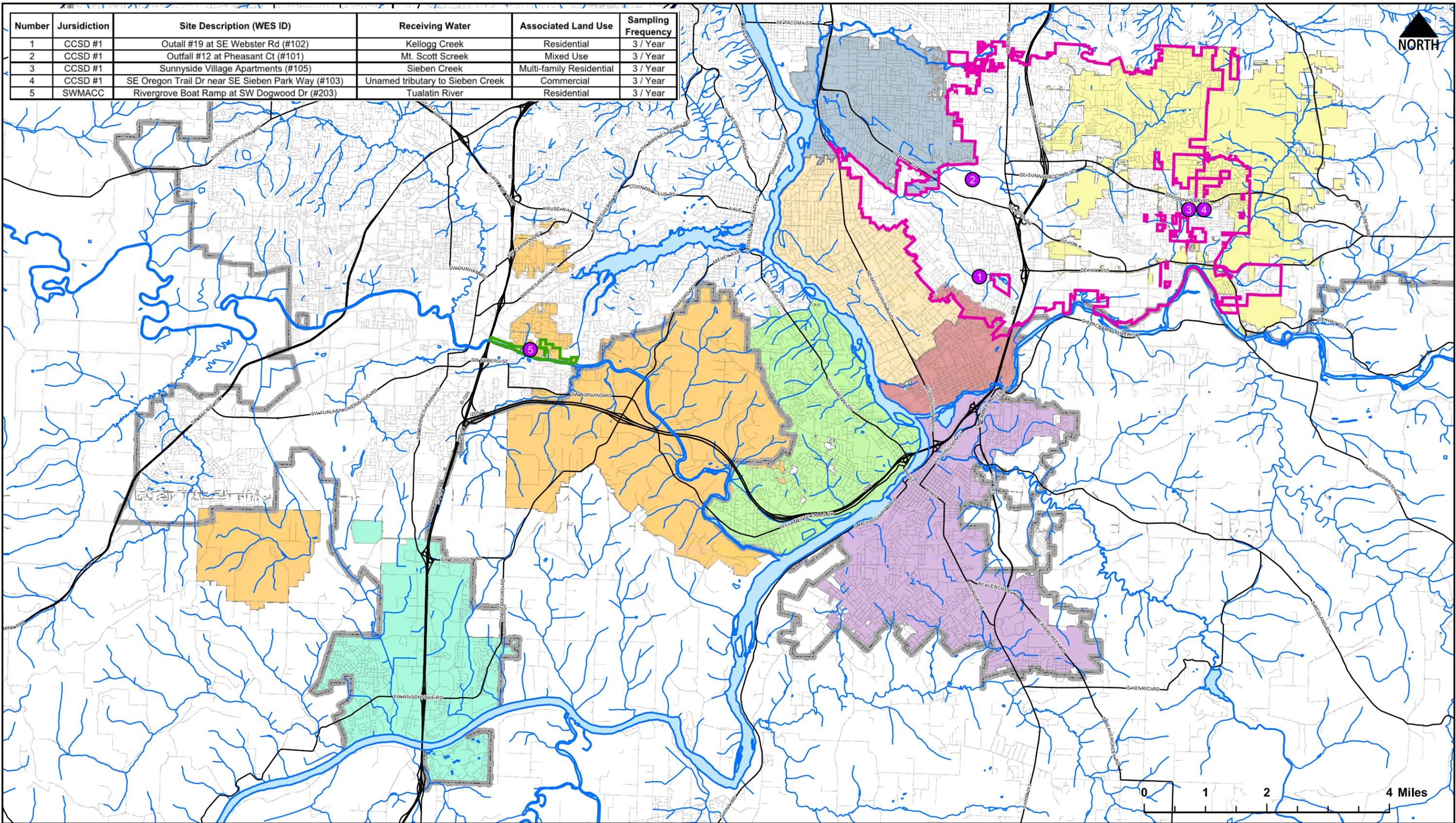
- 1) WQ Standard of 18 C per DEQ's Temperature Water Quality Standard Implementation IMD 2008 for salmon and trout rearing and migration.
- 2) 6.5 mg/L selected as the standard for the direct discharge to Tualatin River.
- 3) Table 20 - Protection of human health for water and fish ingestion.
- 4) Non-detects were replaced with one half the detection limit for statistical calculations.
- 5) Water quality criteria values based on current 1200-Z permit.

Appendix B

Maps

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Number	Jurisdiction	Site Description (WES ID)	Receiving Water	Associated Land Use	Sampling Frequency
1	CCSD #1	Outfall #19 at SE Webster Rd (#102)	Kellogg Creek	Residential	3 / Year
2	CCSD #1	Outfall #12 at Pheasant Ct (#101)	Mt. Scott Creek	Mixed Use	3 / Year
3	CCSD #1	Sunnyside Village Apartments (#105)	Sieben Creek	Multi-family Residential	3 / Year
4	CCSD #1	SE Oregon Trail Dr near SE Sieben Park Way (#103)	Unnamed tributary to Sieben Creek	Commercial	3 / Year
5	SWMACC	Rivergrove Boat Ramp at SW Dogwood Dr (#203)	Tualatin River	Residential	3 / Year



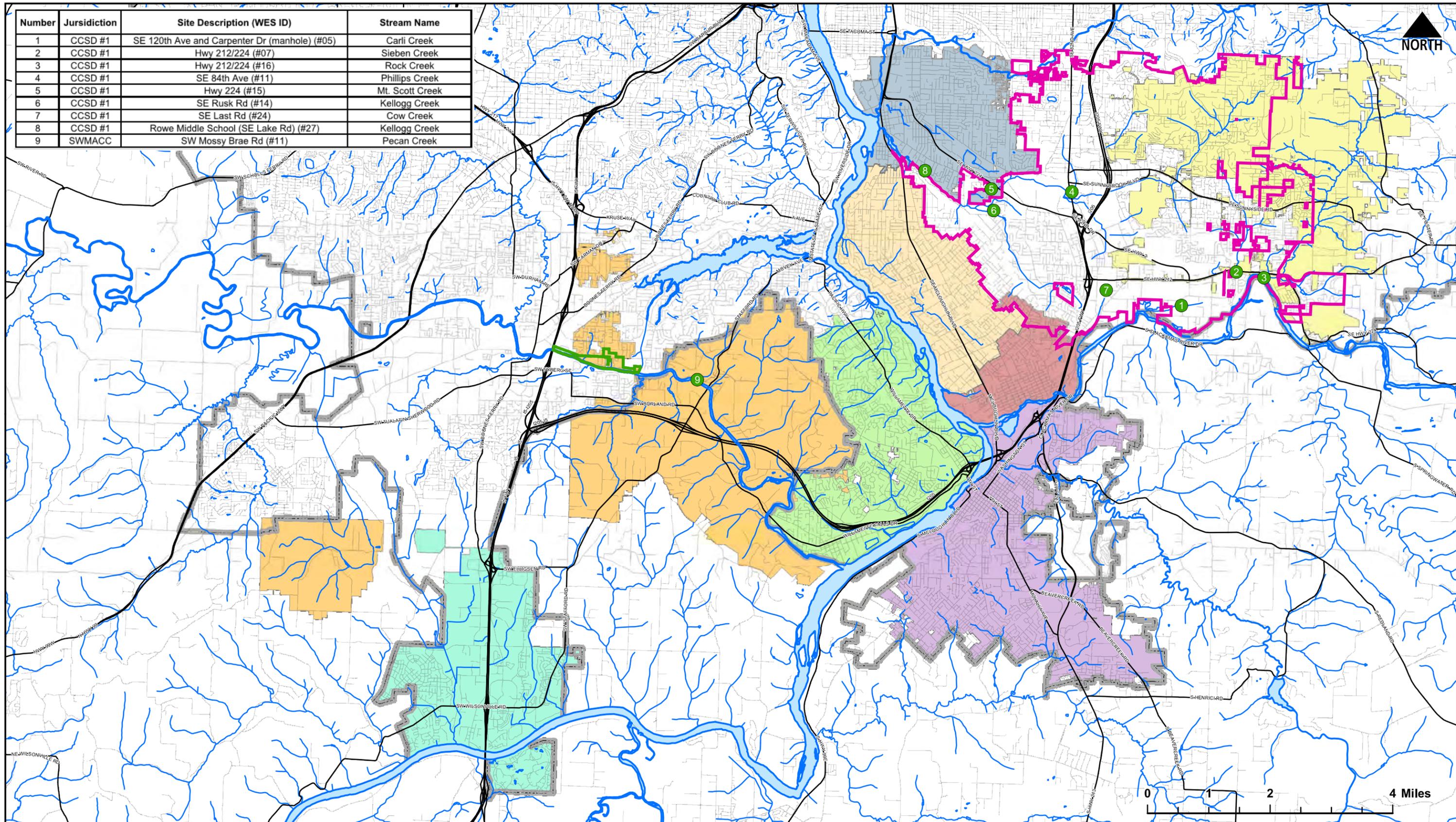
OCTOBER 2018

FIGURE B-1. STORMWATER MONITORING LOCATIONS

NPDES MS4 Monitoring Annual Report
 CCSD #1, SWMACC, Happy Valley, and Rivergrove

- Stormwater Monitoring Locations
- CCSD #1
- Gladstone
- Oregon City
- Urban Growth Boundary
- Rivergrove
- Happy Valley
- West Linn
- Oak Lodge Water Services District
- SWMACC
- Milwaukie
- Wilsonville

Number	Jurisdiction	Site Description (WES ID)	Stream Name
1	CCSD #1	SE 120th Ave and Carpenter Dr (manhole) (#05)	Carli Creek
2	CCSD #1	Hwy 212/224 (#07)	Sieben Creek
3	CCSD #1	Hwy 212/224 (#16)	Rock Creek
4	CCSD #1	SE 84th Ave (#11)	Phillips Creek
5	CCSD #1	Hwy 224 (#15)	Mt. Scott Creek
6	CCSD #1	SE Rusk Rd (#14)	Kellogg Creek
7	CCSD #1	SE Last Rd (#24)	Cow Creek
8	CCSD #1	Rowe Middle School (SE Lake Rd) (#27)	Kellogg Creek
9	SWMACC	SW Mossy Brae Rd (#11)	Pecan Creek



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FIGURE B-2. INSTREAM MONITORING LOCATIONS

NPDES MS4 Monitoring Annual Report
 CCSD #1, SWMACC, Happy Valley, and Rivergrove

Instream Monitoring Locations	CCSD #1	Gladstone	Oregon City
Urban Growth Boundary	Rivergrove	Happy Valley	West Linn
Oak Lodge Water Services District	SWMACC	Milwaukie	Wilsonville