WATER ENVIRONMENT SERVICES

Water Quality Protection
Surface Water Management
Wastewater Collection & Treatment

Gregory L. Geist
Director

October 31, 2017

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

RE: **CCSD #1, SWMACC, City of Happy Valley, and the City of Rivergrove NPDES Permit Annual Report**

Dear Mr. Riedel-Bash,

Enclosed, please find the 2016-2017 Annual Report for CCSD #1, SWMACC, City of Happy Valley, and the City of Rivergrove as required by our NPDES 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 on these reports. Please call if you have any questions or need additional information at (503) 742-4581.

Ron Wierenga
Surface Water Manager
Water Environment Services

/mcj

Enclosures

Cc: Andrea Matzke
Wade Peerman
Karen Williams

MS4 NPDES Permit Annual Report

for

Clackamas County Service District No. 1

(including the City of Happy Valley) and the

Surface Water Management Agency of Clackamas County (including the City of Rivergrove)

July 1, 2016 – June 30, 2017

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October 31, 2017

Clackamas County Service District No. 1

Surface Water Management Agency of Clackamas County

The Cities of Rivergrove and Happy Valley

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

10/27/17
Date

Jason Tuck, City Manager
City of Happy Valley

10/26/17
Date

Leanne Moll,
City Manager/City Recorder
City of Rivergrove

Oct 26, 2017
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 CCSD#1, the SWMACC, and the Cities of Rivergrove and Happy Valley from July 1, 2016 to June 30, 2017. Table 1 includes the 2016-2017 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 2016-2017	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
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	Section 1.7
h. A summary describing the number and nature of enforcement actions, inspections, and public education programs, including results of ongoing field screening and follow-up activities related to illicit discharges.	Section 1. 8
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.	Section 1.9
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

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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 2016-2017. A review of BMP implementation and an analysis of environmental monitoring data was performed by Clackamas County WES on behalf of the SWMACC, CCSD#1, and the Cities of Rivergrove and Happy Valley for the 2016-2017 reporting period. This 2016-2017 review occurred during the process which led to the creation of the Shared MS4 Permit SWMP. At the present time, the five Coordinated MS4 Permit Program Participants (Coordinated Participants) – Clackamas County, CCSD#1, the SWMACC, the Cities of Rivergrove and Happy Valley – implement their MS4 permit programs through three separate SWMPs. The co-owners/implementers of these three SWMPs are: I) Clackamas County, II) The City of Happy Valley & CCSD#1, and III) The City of Rivergrove & the

SWMACC. To improve coordination and overall program effectiveness, the Coordinated Participants recently chose to create a single, combined, Shared MS4 Permit SWMP (Shared SWMP). The Shared SWMP was submitted to DEQ in February 2017; The Shared SWMP is one of the elements of the MS4 Permit renewal application package. As of October 19, 2017, DEQ hasn't approved the Shared SWP yet, so the Coordinated Participants are forced to continue to separately implement the three outdated, inferior SWMPs.

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.

Otak, Inc. 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: http://www.clackamas.us/wes/documents/ms4submittal.pdf

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 FUNDING SOURCES OVER THE REPORTING FISCAL YEAR, AND THOSE ANTICIPATED IN THE NEXT FISCAL YEAR.

The Districts dedicated sufficient resources to implement the Districts' Stormwater Management Plans. Combined, CCSD#1 and SWMACC dedicated over 19,310 employee hours (the equivalent of 11.3 FTEs) to the Surface Water Program.

Resources budgeted in the recent past, during the reporting period and in the current fiscal year for are below:

CCSD#1

CCSD#1	14/15 Actual	15/16 Actual	16/17 Budget	16/17 Estimate	17/18 Adopted
Resources	**14,619,334**	**15,354,408**	**16,131,655**	**16,422,271**	**17,446,019**
Materials & Services	3,039,918	3,395,971	4,149,836	3,950,752	4,668,386
Capital Outlay	690,548	200,194	1,495,000	240,000	2,830,000
Transfers	378,742	0	0	0	0
Special Payments[1]	0	0	0	0	8,462,133
Contingency	0	0	1,065,390	0	1,485,500
Ending Fund Balance[2]	10,510,126	11,758,243	9,421,429	12,231,519	0
Total Requirements	**14,619,334**	**15,354,408**	**16,131,655**	**16,422,271**	**17,446,019**

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.

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

Monthly Stormwater Utility Fees	$ 4,031,573
Maintenance Fees	$ 321,594
Systems Development Charges (SDCs)	$ 85,546
Stormwater and Erosion Control Permit Fees	$ 226,869

During 2016-2017, customers in the North Clackamas unit of CCSD#1 paid the monthly program fee of $6.50 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 $6.70 per ESU soon after this reporting period ended on June 30, 2017. 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.

SWMACC

SWMACC	14/15 Actual	15/16 Actual	16/17 Budget	16/17 Estimate	17/18 Adopted[1]
Resources	**493,709**	**599,548**	**852,960**	**695,641**	**6,499,653**
Materials & Services	87,104	103,599	202,960	181,927	351,033
Contingency	0	0	0	0	35,000
Special Payments[2]	0	0	650,000	513,714	0
Ending Fund Balance[3]	406,605	495,949	0	0	6,113,620
Total Requirements	**493,709**	**599,548**	**852,960**	**695,641**	**6,499,653**
Capital Outlay	0	0	0	0	0

1 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.
2 *Special Payments* represent the contribution of SWMACC's assets to the WES Partnership.
3 The 16/17 column includes changes to the original budget from a Supplemental Budget adopted in June 2017.

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

Monthly Stormwater Utility Fees	$ 180,015
Miscellaneous Income	$ 15,678

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.

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).

Permit fees for stormwater and erosion control plan review and inspection are collected with every new development application. The current stormwater plan review fee is $400 or 4% of the installed cost of the surface water management system (whichever is greater) per subdivision or commercial/industrial development and $55 per single-family residential building permit. The erosion control review and inspection fee is $460 for the first acre, plus $80 per additional acre for subdivisions and commercial/industrial developments, while new single family residences are charged a flat rate of $310.

City of Happy Valley

The City has five FTEs in the Public Works Department who perform MS4 duties. Staff has attended four conferences and events which support the MS4.

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 2016-2017, the City generated $490,000 in fees from 29 land development permits. Only a portion of these $490,000 were spent on the implementation of the MS4 Permit Program.
- Thirteen **Erosion Control Permits** yielded $15,300 in revenue in 2016-2017. The City expects to receive a range from $15,000 to $20,000 in Erosion Control Permit

revenue in 2017-2018. The $15,300 of MS4 permit program revenue is a subset of $490,000.

- $90,349 from the **Streets Maintenance** portion of the budget for street sweeping. Street sweeping is also conducted to improve road safety and for aesthetic reasons. An undefined portion of the $90,349 was spent to improve stormwater quality.
- Approximately $5,750 from the City of Happy Valley's **General Operating Budget** were spent by the City of Happy Valley during 2016-2017 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 2017-2018 for administration of the overall MS4 Permit Program.

MS4 Permit Program Expenditures:

- **Street Sweeping Program:** The City of Happy Valley spent $90,349 on their street sweeping program in 2016-2017. The City of Happy Valley expects to spend a similar amount of money on street sweeping in 2017-2018.
- **Erosion Control Program**: Erosion Control Permit fee revenue is spent by the City of Happy Valley to administer this program. The City spent approximately $15,300 to administer this program in 2016-2017 and the City expects to spend a similar amount in 2017-2018.
- **MS4 Permit Program Administration:** Approximately $5,750 were spent by the City of Happy Valley during 2016-2017 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 2017-2018 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.

Elevated levels of dissolved copper and total copper were recently measured in stormwater at the Sunnyside Village Apartments MS4 outfall (site #105), so a source control investigation was conducted by WES in June 2017. Potential sources of these pollutants (such as outdoor wood which was manufactured with the "chromated copper arsenate" process) were identified during an inspection of the outfall's drainage area.

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. CCSD#1, the SWMACC, 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?
8/12/2016	8/12/2016	An unknown amount of wastewater created from melted ice used to store freshly killed fish was discharged into the MS4 from a facility on SE Wilde Road in CCSD#1. A WES employee ordered them to stop illicitly discharging this wastewater to the storm sewer system.	No
11/7/2016	11/7/2016	About 510 gallons of milk were spilled at the Safeway Distribution Center on SE Evelyn St. in CCSD#1 (OERS 2016-2699)	No
11/17/2016	11/17/2016	About 100 gallons of sewage was discharged into Mt. Scott Creek from a privately owned sanitary sewer line at an apartment complex in CCSD#1 (OERS 2016-2778).	No

2/3/2017	2/3/2017	An unknown amount of wash water from mopping floors was discharged into the MS4 from the Elmer's restaurant at 16087 SE 82nd Drive in CCSD#1. The WES inspector ordered them to stop illicitly discharging this wastewater to the storm sewer system.	Yes (verbal enforcement action)
2/6/2017	2/6/2017	About 500 gallons of sewage were discharged into a creek from a CCSD#1-owned owned sanitary sewer line in Happy Valley (OERS 2017-0476).	No
3/15/2017	WES inspection was not necessary	About 10 gallons of engine oil spilled on a rainy day at an industrial facility on SE Ford Street in CCSD#1 (OERS 2017-0895).	No
4/19/2017	4/19/2017	Muddy water from a trench (built for sanitary sewer system construction) was discharged into the MS4. The amount of muddy water discharged is unknown.	No

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: 1,352

Land Use Changes – Clackamas County:

- Some minor changes in land use occurred. Contact Clackamas County's Planning Department at 503-742-4500.

UGB Expansion:

- During 2016-2017, 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: 241 acres
- Acreage annexed into the City of Happy Valley: 1,050 acres
- Acreage de-annexed from the SWMACC: None

New development activities:

- See below:

The Number of New Post-Construction Permits Issued and related information:

- Number of active construction projects in CCSD#1 and the SWMACC: 207
- Number of permits issued for construction of single-family homes in CCSD#1 and the SWMACC: 319
- Number of permits issued for construction of commercial projects and multi-family residential housing in CCSD#1 and the SWMACC: 13
- Number of building division permits in Happy Valley: 368
- Number of engineering division development permits in Happy Valley: 15
- Total number of plan reviews and approved plans in CCSD#1 and the SWMACC: 97
- Number of building division site plan reviews in Happy Valley: 371
- Number of engineering division site plan reviews in Happy Valley: 32
- Number of new units of multi-family housing approved in Happy Valley: 131
- Square feet of new commercial/office development approved in Happy Valley: 104,679

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

- 28 acres (18.3 from residential development and 9.7 acres from non-residential development).

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

As discussed above, no UGB expansion occurred in the City of Happy Valley in 2016-2017 and the UGB is not expected to be expanded in 2017-2018. With respect to the 1,050 acres which were annexed into the City of Happy Valley in 2016-2017, as well as with respect to annexations anticipated for 2017-2018, the City did not begin concept planning or other related activities during the 2016-2017 MS4 Permit annual report period. In 2017-2018, subject to approval of a Metro 2040 Planning and Development grant, the City anticipates starting work an integrated land use and transportation plan, for a roughly 2,600-acre area on the eastern edge of the City, known as the Pleasant Valley/North Carver Comprehensive

Plan, which includes most of the 1,050 acres annexed. When these lands are eventually urbanized, regulations are expected to be applied by the City of Happy Valley and CCSD#1 as properties are developed (to construct stormwater treatment systems, for example) which will reduce 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 2016-2017 and none is expected in 2017-2018.

Appendix A

MS4 Best Management Practices

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BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
Component #1: Illicit Discharge Detection and Elimination	**Conduct Dry Weather Inspections**	**1**	**1**	**CCSD#1**	**SWMACC**			Tracking Measure	Number of outfalls inspected during dry-weather	36	36 dry weather inspections were conducted. One site was under construction.
Component #1: Illicit Discharge Detection and Elimination	**Conduct Dry Weather Inspections**	**1**	**1**	**CCSD#1**	**SWMACC**			Tracking Measure	Number and type of illicit discharges that were encountered and controlled	0	No illicit discharges were found.
Component #1: Illicit Discharge Detection and Elimination	**Conduct Dry Weather Inspections**	**1**	**1**	**CCSD#1**	**SWMACC**			Tracking Measure	Status of updating procedures to address new permit requirements	1	On 2-15-2017, 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**	**SWMACC**			Measurable Goal	Inspect major or priority outfalls for the presence of illicit discharges at least once per year	Attained	Of the 36 dry weather inspections conducted, 30 inspections were at major outfalls. The remaining six were minor outfalls.
Component #1: Illicit Discharge Detection and Elimination	**Conduct Dry Weather Inspections**	**1**	**1**	**CCSD#1**	**SWMACC**			Measurable Goal	Update maps of major outfalls on an annual basis	Attained	An updated map of major outfalls is found in a written summary (dated 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**	**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**	**SWMACC**			Tracking Measure	Number of reported spills to the MS4 system	1	WES staff responded to milk spilled into the MS4 system at 16800 SE Evelyn
Component #1: Illicit Discharge Detection and Elimination	**Implement the Spill Response Program**	**2**	**2**	**CCSD#1**	**SWMACC**			Tracking Measure	Number and type of response to the reported spills	1	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**	**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**	**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	7	WES staff responded to all seven reports.
Component #1: Illicit Discharge Detection and Elimination	**Respond to reports involving illicit discharges**	**3**	**3**	**CCSD#1**	**SWMACC**			Tracking Measure	Number of illicit discharges that were controlled	7	An investigation of one of the seven illicit discharges is still in progress.
Component #1: Illicit Discharge Detection and Elimination	**Respond to reports involving illicit discharges**	**3**	**3**	**CCSD#1**	**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**	**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 and 1 1200A	Twenty-six (26) facilities in CCSD#1 are currently in possession of a 1200Z permit and an additional facility is in possession of a 1200A permit. During the 2016-2017 reporting period, WES notified 4 industrial facilities they might be required to apply for a 1200Z permit [required by MS4 permit schedule A(4)(b)(ii)].
Component #2: Industrial and Commercial Facilities	**Screen Existing and New Industrial Facilities**	**4**	**4**	**CCSD#1**	**SWMACC**			Measurable Goal	Review new industrial development applications once during the permit term to identify additional facilities needing to obtain 1200Z permits.	Attained	Conducted review in 2016-2017. Four facilities which appeared to be eligible for a 1200-Z permit were referred to DEQ.

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
Component #2: Industrial and Commercial Facilities	**Address Other Industrial Facilities**	**5**	**5**	**CCSD#1**	**SWMACC**			Tracking Measure	The number of inspections performed, and where applicable, monitoring data collected	50	PPRC provided the following "other contacts made" during 2016-2017: I) They visited and offered technical assistance to fifty (50) businesses within the Carli Creek Watershed; every business visited was provided with a copy of the outreach flyer which includes a storm sewer system-based water pollution prevention/control message, and II) They contacted and offered EcoBiz program technical assistance to 2 automotive repair shops and 3 landscaping services contractors in CCSD#1.
Component #2: Industrial and Commercial Facilities	**Address Other Industrial Facilities**	**5**	**5**	**CCSD#1**	**SWMACC**			Tracking Measure	The number of letters, enforcement actions, or other contacts made	0	
Component #2: Industrial and Commercial Facilities	**Address Other Industrial Facilities**	**5**	**5**	**CCSD#1**	**SWMACC**			Tracking Measure	Number of pretreatment inspections performed (CCSD#1- only)	26	Industry inspections
Component #2: Industrial and Commercial Facilities	**Address Other Industrial Facilities**	**5**	**5**	**CCSD#1**	**SWMACC**			Measurable Goal	Notify and work with industries to improve stormwater management if an inspection is conducted that indicates improvement is needed.	Attained	Pacific Seafood pressured washed large fish totes outdoors and drained to its retention pond: This retention pond has a high-water infiltration rate. Following inquiries and discussion, DEQ responded March 1, 2017 that wash water cannot be drained to the retention pond. The reason why the DEQ forced Pacific Seafood from draiining into the retention pond is because residual pollutants that remain could be directed to the MS4 in a subsequent rain event. Pacific Seafood now collects the wash water and disposes it down their sanitary sewer.
Component #3 Construction Site Runoff	**Conduct Procedures for Site Planning**	**6**	**6**	**CCSD#1**	**SWMACC**	**HV**		Tracking Measure	Annual number of permitted, active construction projects (i.e., those projects disturbing 800 sq. ft. or more)	590	207 Active construction projects in CCSD1 and SWMACC. In addition, there were 368 building division permits and 15 engineering division development permits in Happy Valley.
Component #3 Construction Site Runoff	**Conduct Procedures for Site Planning**	**6**	**6**	**CCSD#1**	**SWMACC**	**HV**		Tracking Measure	Annual number of site plan reviews and approved plans	500	97 site plan reviews and approved plans in CCSD1 and SWMACC. In addition, there were 371 building division site plan Reviews - 371 and 32 engineering division site plan reviews in Happy Valley.
Component #3 Construction Site Runoff	**Conduct Procedures for Site Planning**	**6**	**6**	**CCSD#1**	**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**	**SWMACC**	**HV**		Tracking Measure	Annual number of permitted, active construction projects (i.e., those projects disturbing 800 sq. ft. or more)	590	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**	**SWMACC**	**HV**		Tracking Measure	Annual number of site plan reviews and approved plans	500	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**	**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**	**SWMACC**	**HV**		Tracking Measure	Track the number and type of educational and training events the District conducts and/or participates in annually	7	WES has made the Erosion Prevention and Sediment Control Planning and Design Manual available on the website, and received three hits. In addition, WES posted on its website notices of upcoming erosion control training events by private firms. The City did not sponsor training courses this year for construction site operators.

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
Component #3 Construction Site Runoff	**Conduct Training for Construction Site Operators**	**8**	**8**	**CCSD#1**	**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	No applicable new employees were hired and there have been no changes to the manual. In January, 2017 an existing inspector took training in (and was certified as) a Certified Erosion Sediment Control Lead (CESCL). Additional training will be provided as needed. Happy Valley Public Works attended 4 trainings: 1. Landscape Product Training Seminar - Feb 2017 2. APWA Street Maintenance & Collection Services - Oct 2016 and Mar 2017 3. ORWEF Water Environment School - Mar 2017 4. Public Pesticide Applicator License - May 2017
Component #3 Construction Site Runoff	**Identify Priorities for Inspecting Sites and Conducting Enforcement Actions**	**9**	**9**	**CCSD#1**	**SWMACC**	**HV**		Tracking Measure	Annual number of permitted sites and percentage of sites inspected	100%	Inspected 100% of 383 permitted sites in Happy Valley and 207 permitted sites in CCSD#1 and SWMACC.
Component #3 Construction Site Runoff	**Identify Priorities for Inspecting Sites and Conducting Enforcement Actions**	**9**	**9**	**CCSD#1**	**SWMACC**	**HV**		Tracking Measure	Annual number of erosion control inspections conducted	2,466	CCSD#1 and SWMACC inspections -- 773 Happy Valley Building Division Inspections - 1162 Happy Valley Engineering Division Inspections - 531
Component #3 Construction Site Runoff	**Identify Priorities for Inspecting Sites and Conducting Enforcement Actions**	**9**	**9**	**CCSD#1**	**SWMACC**	**HV**		Tracking Measure	Annual number of enforcement actions	12	7 Happy Valley Erosion Control Cases and 5 CCSD#1 and SWMACC enforcement actions
Component #3 Construction Site Runoff	**Identify Priorities for Inspecting Sites and Conducting Enforcement Actions**	**9**	**9**	**CCSD#1**	**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	
Component #3 Construction Site Runoff	**Identify Priorities for Inspecting Sites and Conducting Enforcement Actions**	**9**	**9**	**CCSD#1**	**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, two of the seven erosion control cases resulted in fines.
Component #4 Education and Outreach	**Public Education to Reduce Discharges of Pesticides, Herbicides and Fertilizers**	**10**	**10**	**CCSD#1**	**SWMACC**			Tracking Measure	Track program messages delivered, type of communication piece, and where appropriate, the number of people affected.	9	Nine messages delivered via articles and ads, reach varied per publication from 17,000 to 400,000. **1**. Article: *Stream study reveals pesticides in the water* , Citizen News Summer 2016, reach 400,000; **2**. Article: *Watershed education program provides unique learning program* , Citizen News Winter 2017, reach 400,000; **3**. Article: *Fertilizers and pesticides can contaminate our community's water* , Citizen News Spring 2017, reach 400,000; **4**. Advertisement: EcoBiz Certification for safe landscapers services, Citizen News Spring 2017, reach 400,000; **5**. Advertisement: The River Starts Here protect water of yard and garden chemicals, Citizen News Spring 2017, reach 400,000; **6**. Article: *Managing Moss Madness* , Citizen News; Spring 2017, reach 400,000; **7**. Advertisment: EcoBiz Certification for safe landscapers services and spill reporting info, Happy Valley Monthly October 2016, reach 17,000; **8**. Article: *Fertilizers & pesticides can contaminate our community's water* , Happy Valley Monthly May 2017, reach 17,000; **9**. Article: *Report pollution entering storm drains and waterways* , Happy Valley Monthly June 2017, reach 17,000.
Component #4 Education and Outreach	**Public Education to Reduce Discharges of Pesticides, Herbicides and Fertilizers**	**10**	**10**	**CCSD#1**	**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.

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	**Best Management Practice (BMP)**	**CCSD#1 BMP #**	**SWMACC BMP #**	**CCSD#1**	**SWMACC**	**Happy Valley**	**Other**	**Type**	**Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)**	**2016-2017 Tracking Measure or Measurable Goal Response**	**2016-2017 Response Comment**
Component #4 Education and Outreach	**Public Education to Reduce Discharges of Pesticides, Herbicides and Fertilizers**	**10**	**10**	**CCSD#1**	**SWMACC**			Measurable Goal	Prepare a minimum of one relevant article per year for inclusion with Clackamas County customer billing statements	Attained	One article appeared in a newsletter as a bill insert. WES Newsletter Feb 2017 bill insert featured *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**	**SWMACC**			Measurable Goal	Pursue additional relevant USGS studies if the opportunity presents itself	Attained	No additional USGS studies were funded during the 2016-2017 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**	**SWMACC**			Tracking Measure	Number of calls received and referred to Metro annually.	1	All calls about hazardous materials are referred to Metro.
Component #4 Education and Outreach	**Proper Disposal Practices to Reduce Discharges of Pesticides, Herbicides and Fertilizers**	**11**	**11**	**CCSD#1**	**SWMACC**			Measurable Goal	Refer all pesticide/herbicide disposal related calls to Metro.	Attained	Our call center no longer tracks if the calls referred to Metro relate to pesticide / herbicide disposal.
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**	**SWMACC**		**Public & Government Relations**	Tracking Measure	Describe news articles reported per year when appropriate	Attained	Four articles were published to address, facilitate and encourage public reporting in *Happy Valley Monthly* and *Citizen News* publications. **1**. Article: *Report pollution entering storm drains and waterways* , Happy Valley Monthly June 2017, reach 17,000; **2**. Advertisment: EcoBiz Certification for safe landscapers services and spill reporting info, Happy Valley Monthly October 2016, reach 17,000; 3. Article: *Fertilizers & pesticides can contaminate our community's water* , Happy Valley Monthly May 2017, reach 17,000; **4**. Article: Fertilizers and pesticides can *contaminate our community's water* , Citizen News Spring 2017, 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**	**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 dishcarge 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**	**SWMACC**		**Public & Government Relations**	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	A minimum of one relevant article appeared in Citizen News annually. *Fertilizers and pesticides can contaminate our community's water* , Citizen News Spring 2017, 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**	**SWMACC**		**Public & Government Relations**	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**	**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; and, 3. Ecology in the Classroom and Outdoors annual report.

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
Component #4 Education and Outreach	**Participate in a Public Education Effectiveness Evaluation**	**13**	**13**	**CCSD#1**	**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**	**SWMACC**			Tracking Measure	Track the number of employees receiving training in stormwater management annually.	72	
Component #4 Education and Outreach	**Training for Employees**	**14**	**14**	**CCSD#1**	**SWMACC**			Measurable Goal	Attend relevant stormwater management related training based on need and availability	Attained	72 employees received stormwater management training in 16 different workshops relevant to stormwater management
Component #4 Education and Outreach	**Training for Employees**	**14**	**14**	**CCSD#1**	**SWMACC**			Measurable Goal	Check in with the Fire Department regarding stormwater issues during the permit's 5-year term.	Attained	
Component # 5 Public Involvement and Participation	**Provide for Public Participation with SWMP and Benchmark Submittals**	**15**	**15**	**CCSD#1**	**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 delivered 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**	**SWMACC**			Measurable Goal	Provide for public participation with the monitoring plan due to the Department by September 1, 2012	Attained	
Component # 6 Post-Construction Site Runoff	**Planning Procedures for New Development and Significant Redevelopment**	**16**	**16**	**CCSD#1**	**SWMACC**			Tracking Measure	The number and type of flow control, water quality treatment or infiltration facilities installed in accordance with the requirements	41	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**	**SWMACC**			Tracking Measure	Narrative to describe the status of the private facility database	The private facility database for commercial/industrial properties is awaiting upgrades to the GIS and maintenance management system software and databases.	In the interim, the enhanced notification efforts made in 15/16 and 17/18 have resulted in over 100 properties being removed from the current database as these properties do not have a private system. Further follow up and the start of a series of prioritized onsite inspections will help revise the dataset.
Component # 6 Post-Construction Site Runoff	**Planning Procedures for New Development and Significant Redevelopment**	**16**	**16**	**CCSD#1**	**SWMACC**			Tracking Measure	Narrative to describe results of tracking compliance with private facility maintenance agreements	139 District agreements 36 of the 139 businesses reported Of those 36 businesses, 304 structures were inspected and/or cleaned	WES made further enhancements to the Storm Drain Cleaning Assistance Program (SCAP) for private facilities (See BMP 28). In addition to the three mailings staff decided not to send letters to 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. While only 37 of the approximately 140 properties with agreements responded with reports, overall these efforts tripled the number of businesses that reported and more than doubled the number of devices maintained and the gallons of material removed from the system. (Total cleaning of all private commercial/industrial facilities through SCAP (See BMP 28) and other methods: 326 businesses reported, 1634 structures inspected and cleaned, and 162,154 gallons of material removed.)
Component # 6 Post-Construction Site Runoff	**Planning Procedures for New Development and Significant Redevelopment**	**16**	**16**	**CCSD#1**	**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**	**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 storm water projects. Staff is currently redesigning the GIS database and preparing for the data conversion. Mapping of new storm water projects will resume when the improvements are complete.

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
Component # 6 Post-Construction Site Runoff	**Planning Procedures for New Development and Significant Redevelopment**	**16**	**16**	**CCSD#1**	**SWMACC**			Measurable Goal	Continue with work to compile a database of private facilities	Attained	
Component # 6 Post-Construction Site Runoff	**Planning Procedures for New Development and Significant Redevelopment**	**16**	**16**	**CCSD#1**	**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). In addition to the three mailings staff decided not to send letters to 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. While only 37 of the approximately 140 properties with agreements responded with reports, overall these efforts tripled the number of businesses that reported and more than doubled the number of devices maintained and the gallons of material removed from the system. (Total cleaning of all private commercial/industrial facilities through SCAP (See BMP 28) and other methods: 326 businesses reported, 1634 structures inspected and cleaned, and 162,154 gallons of material removed.)
Component # 6 Post-Construction Site Runoff	**Update Procedures for New Development and Significant Redevelopment**	**17**	**17**	**CCSD#1**	**SWMACC**			Tracking Measure	Track status of adopting proposed changes to the stormwater standards for new and re-development.	Attained	Completed July 1, 2013. Water Environments Services adopted new CCSD#1 stormwater standards which included 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 standard allows Low Impact Development Approach (LIDA) to mitigate stormwater runoff. The newly adopted stormwater standards are a guide for the development community to assist in the planning and design of a stormwater management plan. The District through the Permitting Program communicates with land owners, developers and engineers to educate them on the value of implementing a low impact development approach to treat stormwater runoff. As part of the permitting and land-use process, the District emphasizes the feasibility of a low impact development/green infrastructure approach to mitigate stormwater runoff. SWMACC is not proposing to implement any substantial changes to the SWMACC Rules and Regulations or standards at this time. The District will continue to discuss the stormwater requirements within SWMACC with developers, customers and engineers to assure the MS4 permit requirements are being fully implemented. The MS4 area within the SWMACC boundary is a geographically small area within the City of Rivergrove and the District only receives a couple of new proposals for development each year.
Component # 6 Post-Construction Site Runoff	**Update Procedures for New Development and Significant Redevelopment**	**17**	**17**	**CCSD#1**	**SWMACC**			Measurable Goal	CCSD#1: Complete updates to standards to meet new permit requirements by June 30, 2013	Attained	CCSD#1 completed the updates to the standards on July 1, 2013 by adopting new CCSD#1 stormwater standards. These standards included the MS4 requirement to capture and treat the 80th percentile storm event. SWMACC is not proposing to implement any substantial changes to the SWMACC Rules and Regulations or standards at this time.
Component # 6 Post-Construction Site Runoff	**Update Procedures for New Development and Significant Redevelopment**	**17**	**17**	**CCSD#1**	**SWMACC**			Measurable Goal	CCSD#1: Complete guidance manual for developers to facilitate the implementation of the new standards by June 30, 2013	Attained	The newly adopted stormwater standards combined with the BMP Sizing Tool and Planning Tool are guides to assist the development community with planning and design of SWM facilities to mitigate stormwater runoff. A new guidance manual was not created.
Component # 6 Post-Construction Site Runoff	**Update Procedures for New Development and Significant Redevelopment**	**17**	**17**	**CCSD#1**	**SWMACC**			Measurable Goal	SWMACC: Policy development and implementation by November 1, 2014.	Attained	SWMACC is not proposing to implement any substantial changes to the SWMACC Rules and Regulations or standards at this time.
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	7.4 acres	CCSD#1 -- Development Services approved 2 development permits which treated stormwater runoff by LID with the net impervious area of 7.36-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	2	

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
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	No customer feedback was solicited for the sizing tool as it has been in effect since 2013.
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	The sizing tool has been developed and is available to the public for use.
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	1,592	1592 miles in Happy Valley Clackamas County - 1012.5 miles; street sweeping by Happy Valley 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	762 cubic yards	Happy Valley - 762 cubic yards Clackamas County - 502 cubic yards
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 2016-2017 MS4 Annual Report	
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 2016-2017 MS4 Annual Report	
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	
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	16 Illegal Dumping Cases in Happy Valley 1 Fine for Illegal Dumping Issued in Happy Valley	
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 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 -- 206 cubic yards Sand Picked up -- 180 cubic yards	
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	

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	**Best Management Practice (BMP)**	**CCSD#1 BMP #**	**SWMACC BMP #**	**CCSD#1**	**SWMACC**	**Happy Valley**	**Other**	**Type**	**Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)**	**2016-2017 Tracking Measure or Measurable Goal Response**	**2016-2017 Response Comment**
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	
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 2016-2017 MS4 Annual Report	
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.	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 2016-2017 MS4 Annual Report	
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 2016-2017 MS4 Annual Report	
Component # 7 Pollution Prevention for Municipal Operations BMPs	**Landscape Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers**	**22**	**21**	**CCSD#1**	**SWMACC**	**HV**	**DTD**	Tracking Measure	The number of meetings conducted	4	Three (3) meetings were held during the 2016-2017 MS4 Permit year with Happy Valley, Clackamas County's Facilities Management Dept., Clackamas County's Housing Authority, and WES' Field Operations Division. Happy Valley held one (1) IPM meeting.
Component # 7 Pollution Prevention for Municipal Operations BMPs	**Landscape Maintenance Practices to Reduce the Discharge of Pesticides, Herbicides and Fertilizers**	**22**	**21**	**CCSD#1**	**SWMACC**	**HV**	**DTD**	Tracking Measure	The results and follow-up activities conducted as a result of the meetings	3 results 0 follow-up activities	The meetings' results were all positive. In every instance, the message (encouragement to use less herbicides, pesticides, and fertilizer if the smaller amount will still get the job done, for example) was received. No follow-up activities were conducted as a result of the meetings which were held in 2016-2017 or during the previous year (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**	**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	The last one of these "BMP 21/22 meetings" occurred on February 2, 2017 which is about a month prior to the MS4 permit's expiration date.

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response 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**	**SWMACC**	**HV**	**DTD**	Measurable Goal	Develop and implement an Integrated Pest Management plan by December 31, 2012	Attained	
Component # 7 Pollution Prevention for Municipal Operations BMPs	**Control Infiltration and Cross Connections to the District's Stormwater System**	**23**	**22**	**CCSD#1**	**SWMACC**			Tracking Measure	Number of cross-connections/ sanitary discharges identified	0	There were no cross connections found within the MS4 system this year. WES staff actively look for evidence of cross connection during daily inspection and cleaning activities. Staff also conduct routine CCTV activities of the sanitary system in an effort to find and eliminate any cross connection. There were no cross connection found within the MS4 system this year.
Component # 7 Pollution Prevention for Municipal Operations BMPs	**Control Infiltration and Cross Connections to the District's Stormwater System**	**23**	**22**	**CCSD#1**	**SWMACC**			Tracking Measure	The number and type of inspections performed, abatement actions and enforcement actions taken	3,845 assets inspected 0 abatement or enforcment actions	Through daily activities within the MS4 staff visually inspect and structure for condition assessment to include evidence of cross connections
Component # 7 Pollution Prevention for Municipal Operations BMPs	**Control Infiltration and Cross Connections to the District's Stormwater System**	**23**	**22**	**CCSD#1**	**SWMACC**			Measurable Goal	Eliminate any identified sanitary discharges to the storm system.	Attained	WES experienced 3 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
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.
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 pilot test equipment was installed in 3 ponds. Will collect data starting this winter.
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 pilot test equipment was installed in 3 ponds.
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 pilot test equipment was installed in 3 ponds.
Component #8 Structural Stormwater Facility Operations and Maintenance	**Maintenance of Conveyance System Components and Structural Controls**	**26**	**23**	**CCSD#1**	**SWMACC**			Tracking Measure	Miles of ditches and storm lines maintained	3,059 linear feet	2,839 LF of storm pipe was maintained by WES staff. Happy Valley maintained 220 linear feet of ditch.

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
Component #8 Structural Stormwater Facility Operations and Maintenance	**Maintenance of Conveyance System Components and Structural Controls**	**26**	**23**	**CCSD#1**	**SWMACC**			Tracking Measure	Number and type of components inspected and/or cleaned	2,495 catch basins 724 manholes 125 Vortex separators 504 other structures	Cleaned 1,717 of the 2,494 catch basins that were inspected. 723 manhole were cleaned or inspected. 125 Vortex separators were cleaned or inspected. 503 other structures were cleaned or inspected. Happy Valley cleaned and repaired one catch basin and inlet pipe.
Component #8 Structural Stormwater Facility Operations and Maintenance	**Maintenance of Conveyance System Components and Structural Controls**	**26**	**23**	**CCSD#1**	**SWMACC**			Tracking Measure	Mass or volume of material removed during cleaning	236 cubic yards	An estimated 325 cubic yards of material were removed. Happy Valley removed 11 cubic yards of material removed.
Component #8 Structural Stormwater Facility Operations and Maintenance	**Maintenance of Conveyance System Components and Structural Controls**	**26**	**23**	**CCSD#1**	**SWMACC**			Measurable Goal	CCSD#1: Clean storm lines and ditches on an as-needed basis. Identify inspection frequency.	Attained	
Component #8 Structural Stormwater Facility Operations and Maintenance	**Maintenance of Conveyance System Components and Structural Controls**	**26**	**23**	**CCSD#1**	**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**	**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**	**SWMACC**			Tracking Measure	Track the percent of District owned or District operated/maintained catch basins cleaned per year	16.1%	Cleaned 1,717 catch basins or 16.1% of all catch basins.
Component #8 Structural Stormwater Facility Operations and Maintenance	**Conduct Catch Basin Cleaning and Maintenance**	**27**	**24**	**CCSD#1**	**SWMACC**			Tracking Measure	Track the volume of debris removed during cleaning activities	325 cubic yards	
Component #8 Structural Stormwater Facility Operations and Maintenance	**Conduct Catch Basin Cleaning and Maintenance**	**27**	**24**	**CCSD#1**	**SWMACC**			Measurable Goal	Clean 15% of District owned or District operated/maintained public catch basins each year	Attained	Cleaned 1,717 catch basins or 16.1% of all catch basins.
Component #8 Structural Stormwater Facility Operations and Maintenance	**Conduct Catch Basin Cleaning and Maintenance**	**27**	**24**	**CCSD#1**	**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**	**SWMACC**			Tracking Measure	Number of agreement holders compared with the number of annual reports received and the number devices being serviced by the vendor	140 Commercial maint Agreements, 41 reports received, 63 devices serviced by vendor.	
Component #8 Structural Stormwater Facility Operations and Maintenance	**Storm Drain Cleaning Assistance Program**	**28**	**25**	**CCSD#1**	**SWMACC**			Tracking Measure	Total number of businesses serviced by the vendor with total number of devices maintained and volume of debris removed	By Vendor: 122 businesses, 513 devices & 125,682 gallons. By Vendor and Others: 334 businesses, 1,634 devices and 162,154 gallons	

BMP Matrix

				Implementation Responsibility							
Surface Water Management Plan Component	Best Management Practice (BMP)	CCSD#1 BMP #	SWMACC BMP #	CCSD#1	SWMACC	Happy Valley	Other	Type	Tracking Measures and Measurable Goals (as listed in the 2012 SWMP)	2016-2017 Tracking Measure or Measurable Goal Response	2016-2017 Response Comment
Component #8 Structural Stormwater Facility Operations and Maintenance	**Storm Drain Cleaning Assistance Program**	**28**	**25**	**CCSD#1**	**SWMACC**			Measurable Goal	Continue to provide assistance to commercial and industrial facilities to support their water quality facility maintenance.	Attained	In 2016/17 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 joint program consisted of 3 postcard mailings (two in the fall and one in the spring). As the response was insufficient, WES staff followed up in May by mailing letters specifying the cleaning and reporting requirements to each of the commercial/industrial accounts that had not responded. This significantly improved compliance. Further, 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. For 2017-2018, staff have decided to: o Send multiple mailings each year to applicable commercial/industrial accounts o Begin onsite inspections of prioritized commercial/industrial properties to conduct pollution prevention and structural component inspections and o Continue to improve database and increase follow up on properties that fail to respond.
Component #8 Structural Stormwater Facility Operations and Maintenance	**Private Water Quality Facility Maintenance Program**	**29**	**26**	**CCSD#1**	**SWMACC**			Tracking Measure	Number of structures inspected and cleaned	372 vegetation control sessions/inspections 163 water quality facilities cleaned 522 inspections	
Component #8 Structural Stormwater Facility Operations and Maintenance	**Private Water Quality Facility Maintenance Program**	**29**	**26**	**CCSD#1**	**SWMACC**			Measurable Goal	Inspect 70% of our maintenance agreement sub-divisions annually	100%	100% of privately owned water quality facilities were inspected
Component #8 Structural Stormwater Facility Operations and Maintenance	**Private Water Quality Facility Maintenance Program**	**29**	**26**	**CCSD#1**	**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**	**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**	**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**	**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 2016-2017
(July 1, 2016 – June 30, 2017)

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, 2017

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1 Summary of Monitoring Activities

The following monitoring annual 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 2016-2017 reporting year to comply with NPDES MS4 Permit requirements. The 2016-2017 reporting year extends from July 1, 2016 to June 30, 2017.

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 the CCSD#1/Happy Valley jurisdictions and one location in SWMACC/Rivergrove), and

2. Instream Monitoring (nine fixed instream locations including eight locations in the CCSD#1/Happy Valley jurisdiction, 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 September 1, 2012, and last updated June 30, 2014. The CCCSMP was prepared to comply with the 2012 NPDES MS4 Permit requirements. While the CCCSMP specifies that samples shall be collected from other participating co-permittees' service areas including the cities of Gladstone, Oregon City, West Linn, and Milwaukie, this annual report includes only data collected on behalf of CCSD#1, SWMACC, Clackamas County, and the cities of Happy Valley and Rivergrove.

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 additional monitoring activities including instream biological sampling and geomorphic condition sampling are conducted, but such activities were not conducted during the 2016-17 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 2016-17 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)

FY 16-17 Sampling Summary – Sampling Event #1[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	9/17/16	11:22 am	2:16 pm	0.88	Yes
Outfall #12 at Pheasant Ct.	101	Mt Scott Creek	Mixed Use	9/17/16	11:22 am	2:16 pm	0.88	Yes
Sunnyside Village Apartments	105	Sieben Creek	Multi-family Residential	9/17/16	11:22 am	2:16 pm	0.88	Yes
SE Oregon Trail near SE Sieben Park Way	103	Sieben Creek	Commercial	9/17/16	11:22 am	2:16 pm	0.88	Yes
Rivergrove Boat Ramp at SW Dogwood Dr.	203	Tualatin River	Residential	10/13/16	8:30 am	11:52 am	1.75	Yes

1. This storm event followed a 9-day antecedent dry period and reflects a unique summer season storm event.

FY 16-17 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	10/13/16	8:30 am	11:52 am	1.75	Yes
Outfall #12 at Pheasant Ct.	101	Mt Scott Creek	Mixed Use	10/13/16	8:30 am	11:52 am	1.75	Yes
Sunnyside Village Apartments	105	Sieben Creek	Multi-family Residential	10/13/16	8:30 am	11:52 am	1.75	Yes
SE Oregon Trail near SE Sieben Park Way	103	Sieben Creek	Commercial	10/13/16	8:30 am	11:52 am	1.75	Yes
Rivergrove Boat Ramp at SW Dogwood Dr.	203	Tualatin River	Residential	4/6/17	8:25 am	10:25 am	0.38	Yes

FY 16-17 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	5/11/17	9:55 am	12:13 pm	0.40	Yes
Outfall #12 at Pheasant Ct.	101	Mt Scott Creek	Mixed Use	5/11/17	9:55 am	12:13 pm	0.40	Yes
Sunnyside Village Apartments	105	Sieben Creek	Multi-family Residential	5/11/17	9:55 am	12:13 pm	0.40	Yes
SE Oregon Trail near SE Sieben Park Way	103	Sieben Creek	Commercial	5/11/17	9:55 am	12:13 pm	0.40	Yes
Rivergrove Boat Ramp at SW Dogwood Dr.	203	Tualatin River	Residential	6/8/17	6:58 am	8:58 am	0.34	Yes

Parameters analyzed in the lab:	Parameters analyzed in the field:
• Total and dissolved copper • Total and dissolved lead • Total and dissolved zinc • Ammonia-nitrogen • Nitrate-nitrogen • Total phosphorus • Ortho-phosphorus • E. *coli* • Hardness • BOD_5 • Total solids • Total dissolved solids • Total suspended solids • Volatile solids (site #203 only)	• Dissolved oxygen • Specific conductivity • pH • Temperature

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

- None reported.

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 CCCSMP (dated June 30, 2014) except for the Sunnyside Village Apartments (Location #105). Due to a major transportation construction project, the former monitoring location at SE Tolbert Road, which drains to Dean Creek (tributary to Mt Scott Creek) was relocated two years ago. Inclusion of the new monitoring location at Sunnyside Village allows for analysis of multi-family residential land use, previously uncharacterized in the 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 (2016-17) 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

Sampling method: Grab (time weighted grabs during targeted wet weather events)

Number of targeted wet-weather sampling events per year: 3

FY 16-17 Summary of Sampling Locations

Sampling Location	WES Sampling Location ID	Service District	Receiving Water Body	Monitoring Data Range[1]	Upstream or Downstream Site
SE 120th Ave. and Carpenter Drive	5	CCSD#1	Carli Creek	1994 - Present	
Hwy 212 and SE 135th	7	CCSD#1	Sieben Creek	1994 - Present	
Hwy 212 and SE 142nd	16	CCSD#1	Rock Creek	1998 – Present	
SE 84th 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 16-17 Summary of Sampling Events

Sampling Date	Locations Sampled	Wet or Dry Weather condition?	Rainfall total during the storm (in.), if applicable
9/16/16	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 27	Dry	NA
10/5/16	5, 7, 11 (CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Wet	0.47
12/5/16	11 (CCSD), 14, 15, 27	Wet	0.29
12/20/16	5, 7, 11(SWMACC), 16, 24	Wet	0.65
2/16/17	5, 7, 11(CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Wet	1.38
3/2/17	5, 7, 11(CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
3/16/17	5, 7, 11(CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
3/30/17	5, 7, 11(CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
4/13/17	5, 7, 11(CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
4/27/17	5, 7, 11(CCSD), 11(SWMACC), 14, 15, 16, 24, 27	Dry	NA
6/15/17	24	Dry	NA

Parameters analyzed in the lab:	Parameters analyzed in the field:
• Total and dissolved copper • Total and dissolved lead • Total and dissolved zinc • Ammonia-nitrogen • Nitrate-nitrogen • Total phosphorus • Ortho-phosphorus • *E. coli* • Hardness • BOD_5 • Total solids • Total dissolved solids • Total suspended solids • Volatile solids (Pecan Creek only)	• Dissolved oxygen • Specific conductivity • pH • Temperature

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

- Based on tabulated data for the 2016-2017 reporting period (Appendix A), there is a potential QA/QC issue associated with the 6/15/17 sampling event at the Cow Creek monitoring location (Location #24). Dissolved copper and zinc readings are higher than the respective total copper and zinc readings.
- Based on tabulated data for the 2016-2017 reporting period (Appendix A), there is a potential QA/QC issue associated with the 3/16/17 sampling event at the Mt. Scott Creek monitoring location (Location #15). Dissolved zinc readings are higher than the total zinc readings.

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 CCCSMP (dated June 30, 2014).

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 MS4 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
E.*coli*	mpn/100mL	406	-- [1]	E.*coli*	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 2016-17. 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 2016-2017 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, and zinc; hardness, and BOD_5 are provided in Appendix A.

A total of five 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 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

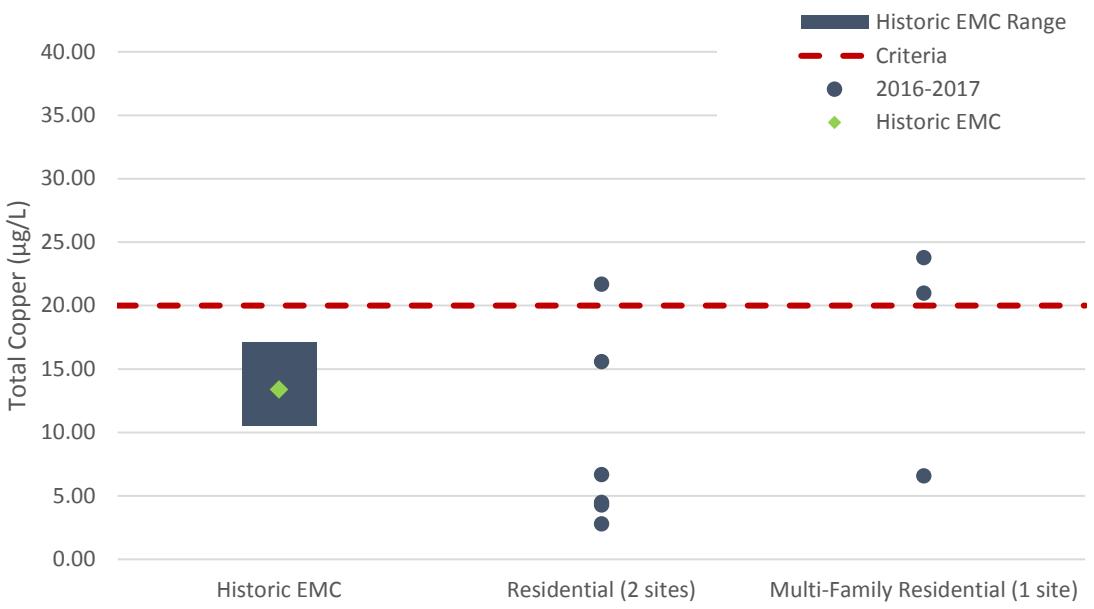

Figure 3-1: Residential Stormwater Monitoring Comparison, Total Copper

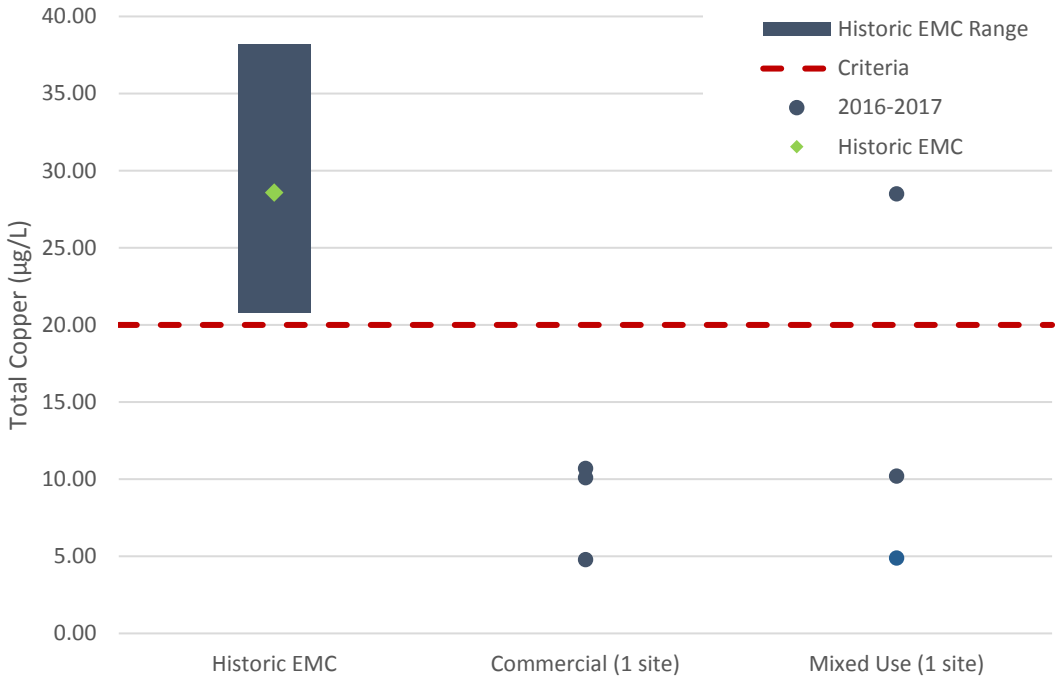

Figure 3-2: Commercial Stormwater Monitoring Comparison, Total Copper

Total Lead

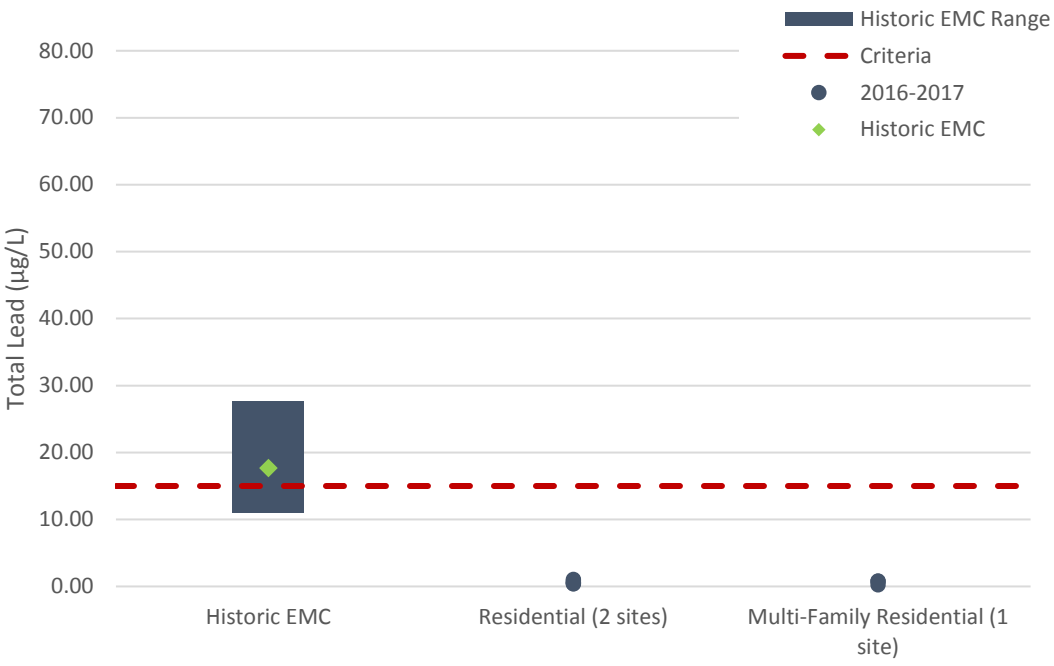

Figure 3-3: Residential Stormwater Monitoring Comparison, Total Lead

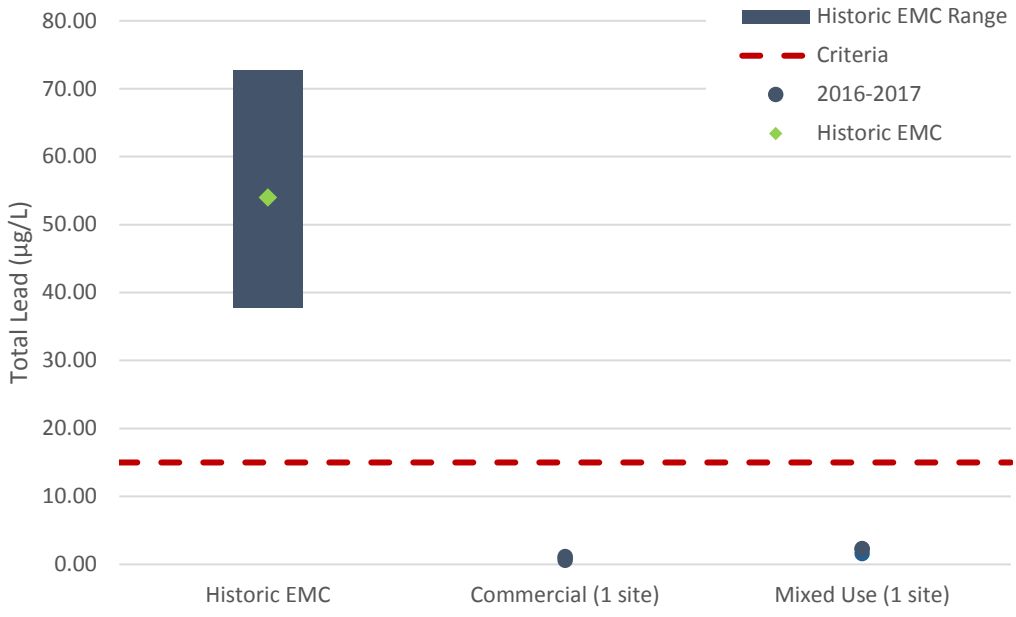

Figure 3-4: Commercial Stormwater Monitoring Comparison, Total Lead

Total Zinc

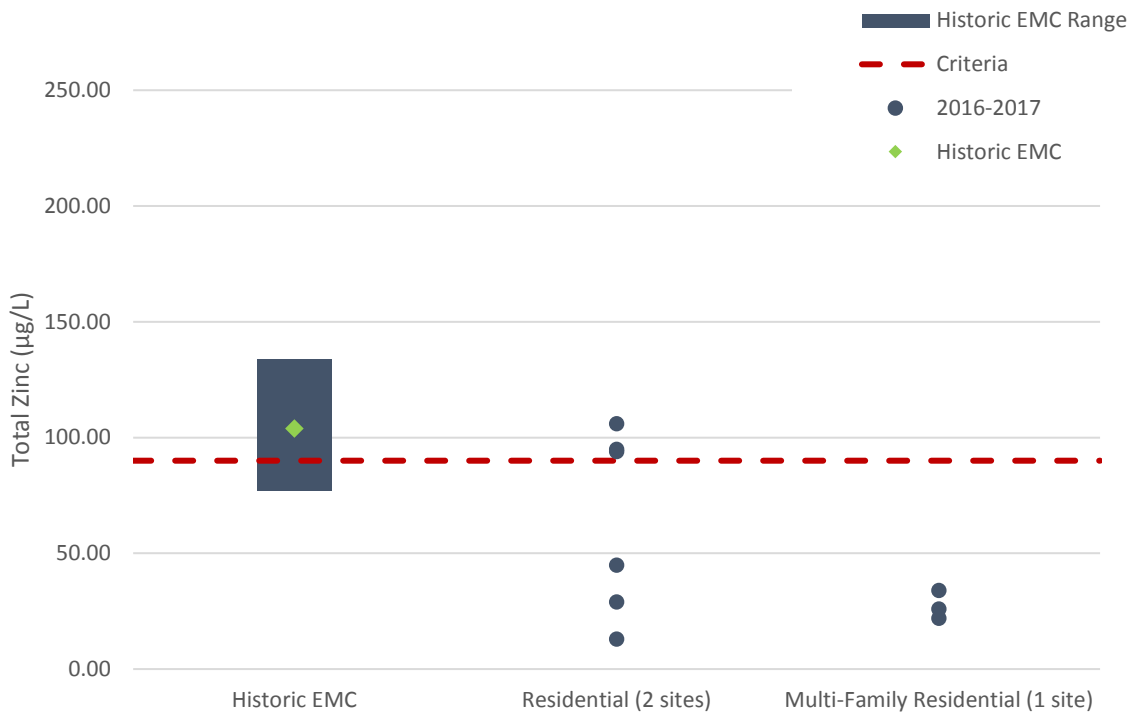

Figure 3-5: Residential Stormwater Monitoring Comparison, Total Zinc

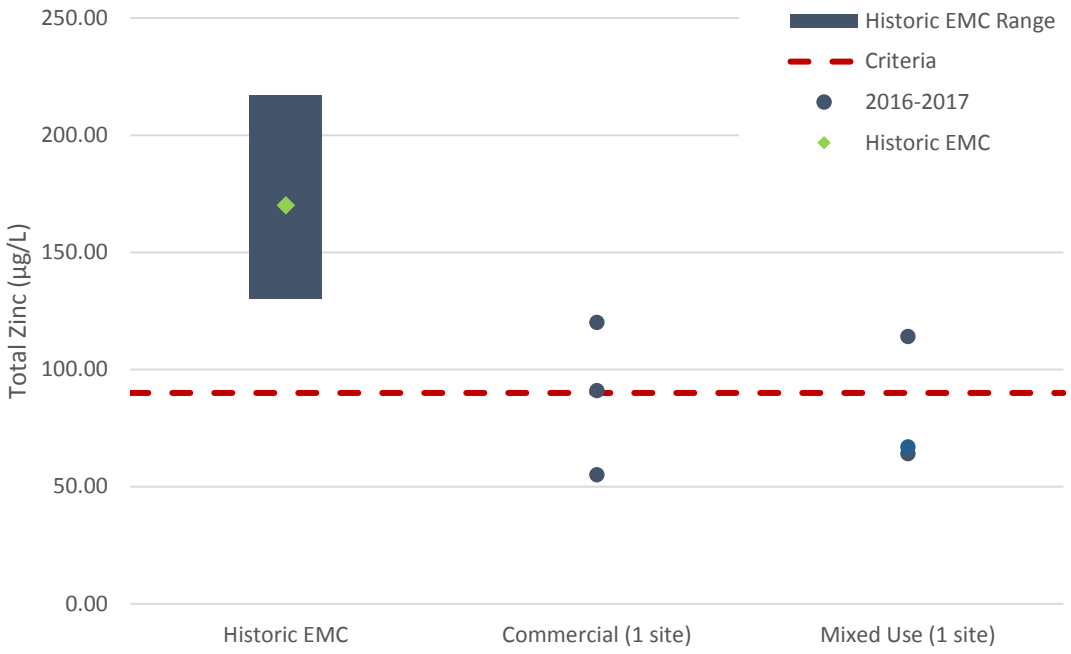

Figure 3-6: Commercial Stormwater Monitoring Comparison, Total Zinc

Total Suspended Solids

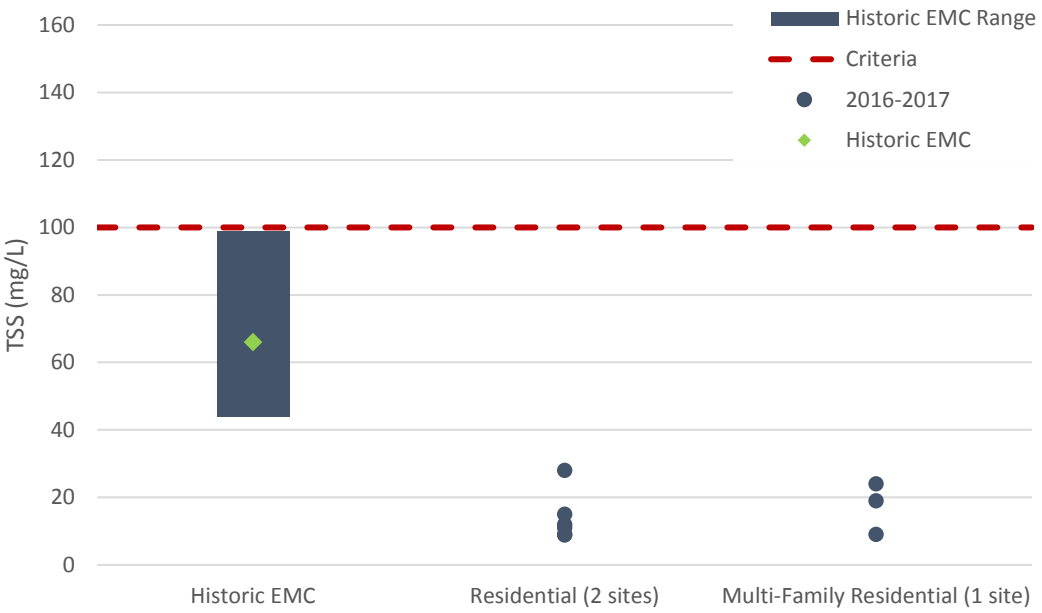

Figure 3-7: Residential Stormwater Monitoring Comparison, Total Suspended Solids

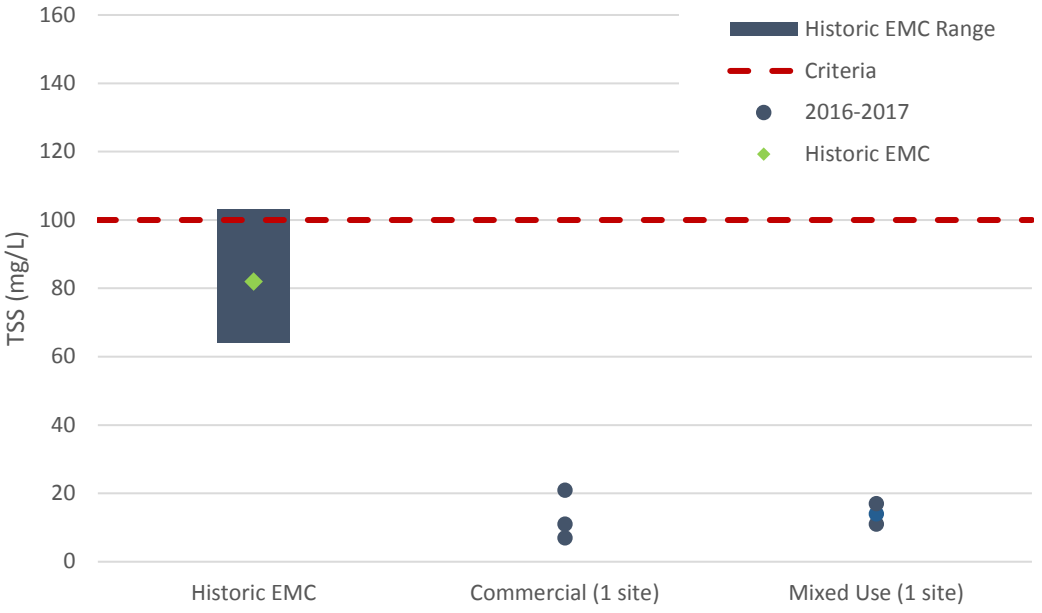

Figure 3-8: Commercial Stormwater Monitoring Comparison, Total Suspended Solids

Bacteria (E. Coli)

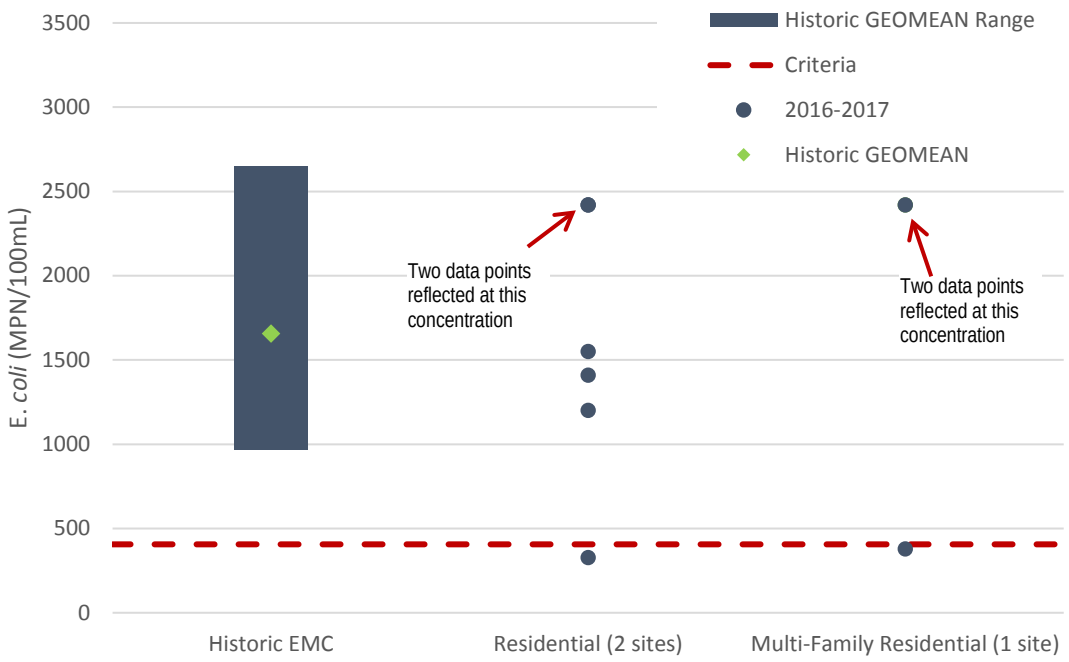

Figure 3-9: Residential Stormwater Monitoring Comparison, Bacteria

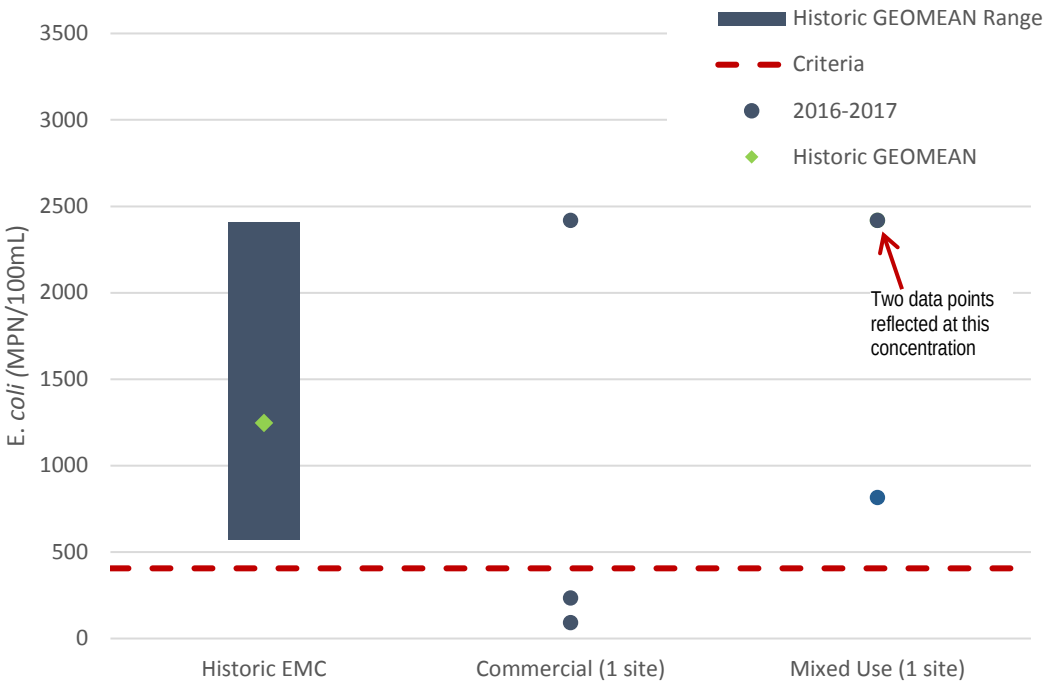

Figure 3-10: Commercial Stormwater Monitoring Comparison, Bacteria

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 2016-2017 monitoring data for TSS and total lead exceeded the water quality comparison criteria values from Table 2-1.
- Select 2016-2017 monitoring events had data that exceeded the water quality comparison criteria values for total zinc and total copper.
- Bacteria monitoring data for 2016-2017 more consistently exceeded the water quality comparison criteria. After review of rainfall totals by event, the highest bacteria levels were reported during the Fall 2016 (September and October) sampling events, which also had the most significant rainfall totals.
- Figure 3-11 reflects the percent exceedance of 2016-2017 stormwater monitoring data with respect to water quality comparison criteria values from Table 2-1.

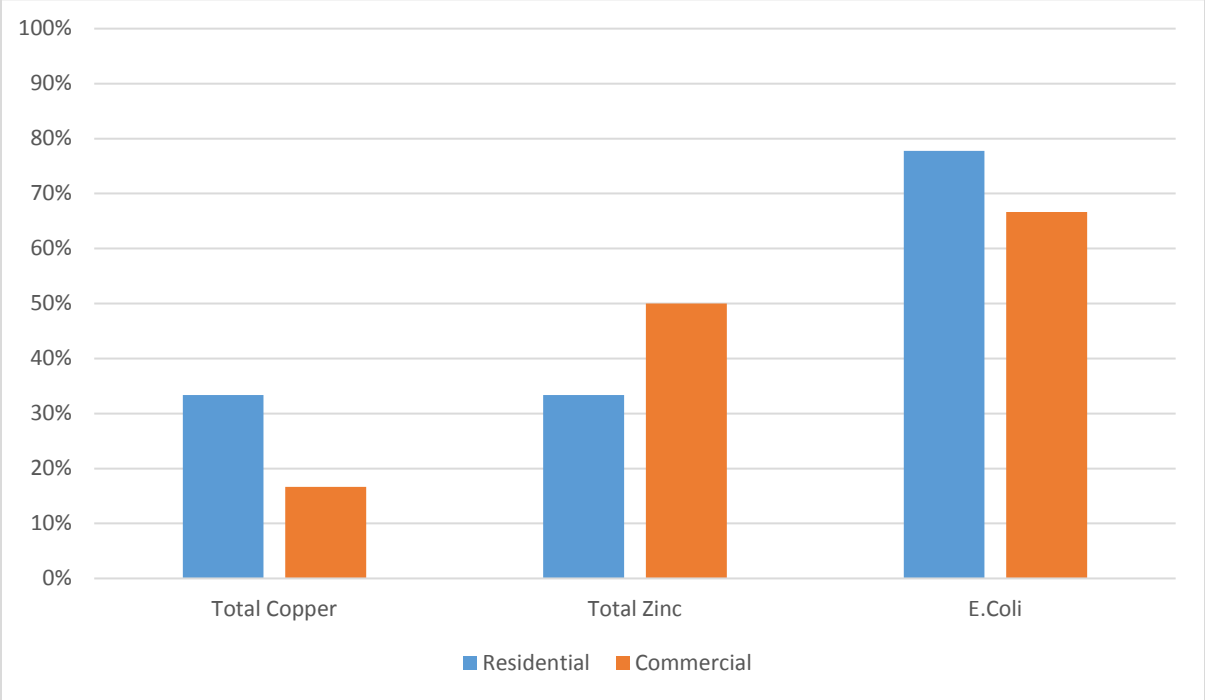

Figure 3-11: 2016-17 Stormwater Monitoring Data Percent Exceedance of Water Quality Comparison Criteria

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

- With respect to historical data, concentration ranges are markedly higher for commercial land use sites than they are for residential land use sites for total copper, lead and zinc. These differences between commercial and residential land use were not observed in the 2016-2017 monitoring data.
- Except for total copper data from residential sites, the 2016-2017 monitoring data from the commercial and residential sites for total metals and TSS were consistently lower than the historical data.
- 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. Follow up investigations were conducted, and the 2016-2017 measured total and dissolved zinc concentrations were not elevated.
- Compilation of additional stormwater data collected over the 2012-2017 CCCSMP implementation term could be used to further investigate current runoff quality (specific for metals and TSS) and determine whether more recent data reflects improvement over baseline EMCs. Future TMDL benchmark efforts could then include updates to select land use EMCs to reflect improvements and progress towards meeting TMDL wasteload allocations (WLAs).
- 2016-2017 monitoring data for bacteria were in line with historical data.

4 Instream Data Results

This section presents an evaluation of data results from WES' instream monitoring efforts during FY 2016-17. 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 (2016-17) 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, eldrin 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 2016-2017 reporting year that exceeded instream water quality comparison 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 bacteria.

Table 4-2: Percentage of 2016-2017 instream monitoring data exceeding water quality criteria[1]

Waterbody	Dissolved oxygen	E. *coli*	Copper, Dissolved		Lead, Dissolved		Zinc, Dissolved		Total Phosphorus
			Chronic	Acute	Chronic	Acute	Chronic	Acute	
Carli Creek	0	11%	0	0	0	0	0	0	22%
Sieben Creek	0	56%	11%	0	0	0	0	0	22%
Phillips Creek	0	11%	0	0	0	0	0	0	0
Kellogg Creek – US	0	22%	0	0	0	0	0	0	0
Kellogg Creek – DS	11%	33%	0	0	0	0	0	0	33%
Mt Scott Creek	22%	22%	0	0	0	0	0	0	11%
Rock Creek	0	44%	0	0	0	0	0	0	0
Cow Creek	0	22%	0	0	0	0	22%	22%	11%
Pecan Creek	0	22%	11%	0	0	0	0	0	33%

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 (2016-2017) and historical instream water quality data by monitoring location. Historical data reflects data collected between 2012 to 2016, consistent with implementation of the effective CCCSMP in 2012. Thus, the historical data comparison is intended to inform whether instream water quality is changing over the CCCSMP implementation term.

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 2016-2017 data only. 2016-17 data for additional parameters including temperature; nitrate; total and ortho phosphorus; total copper, lead, and zinc; hardness, and BOD_5 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 (2016-2017) 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 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.

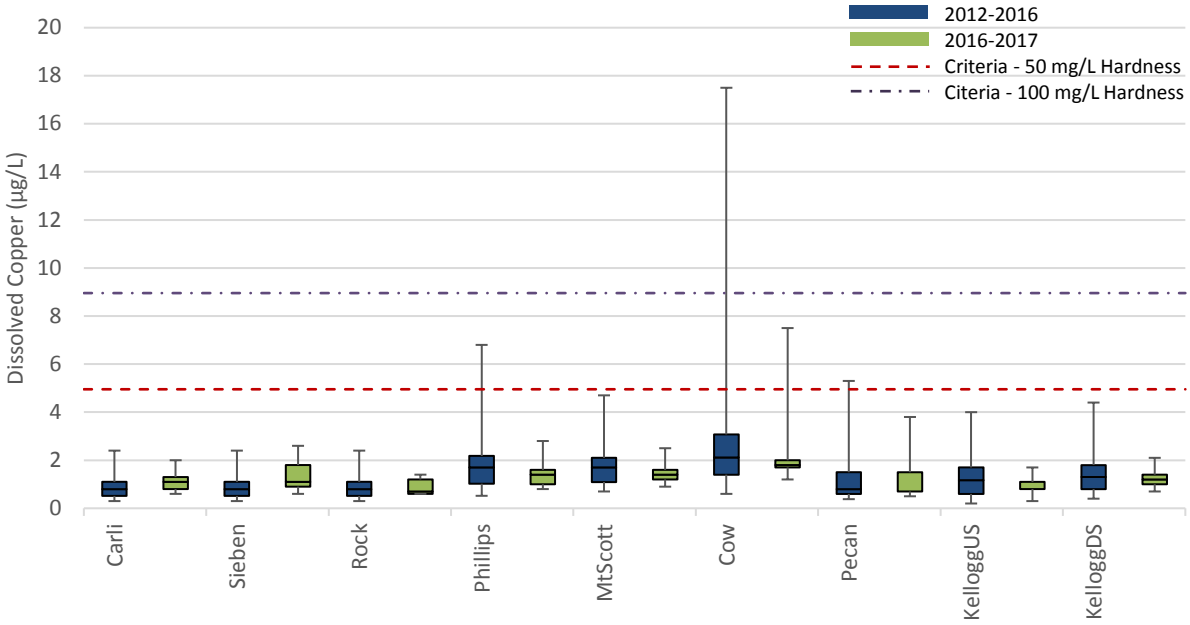

Figure 4-1: Instream Monitoring Historical Comparison, Dissolved Copper

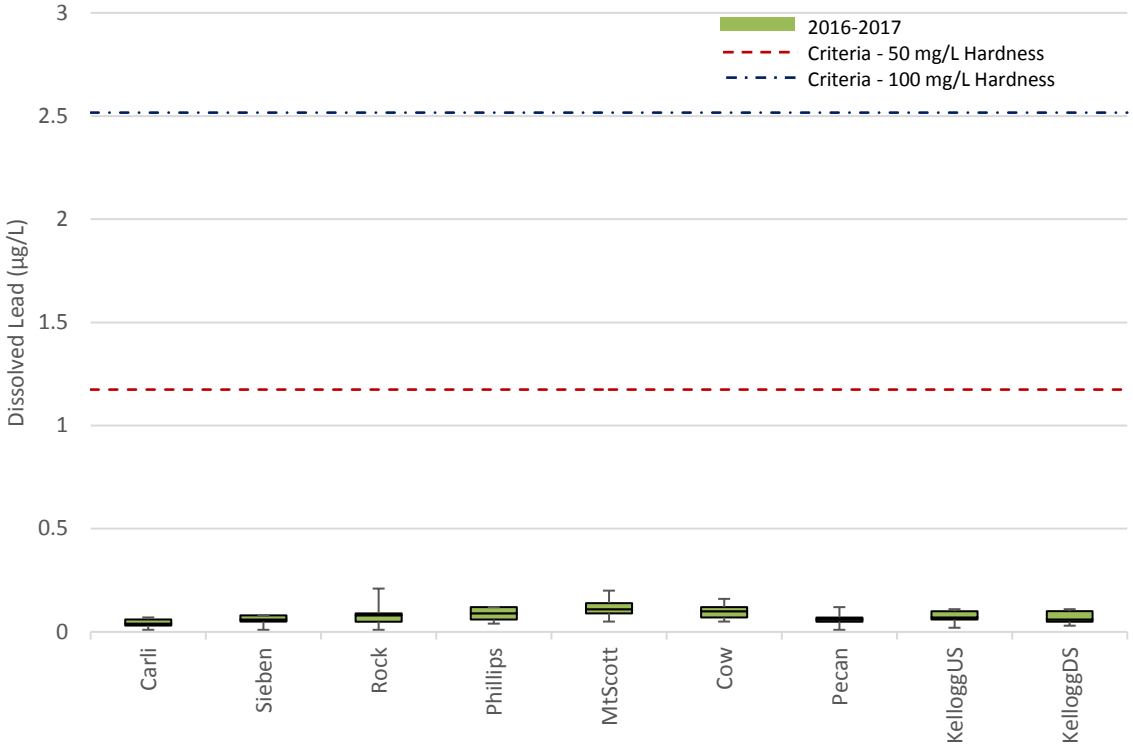

Figure 4-2: Instream Monitoring Comparison, Dissolved Lead

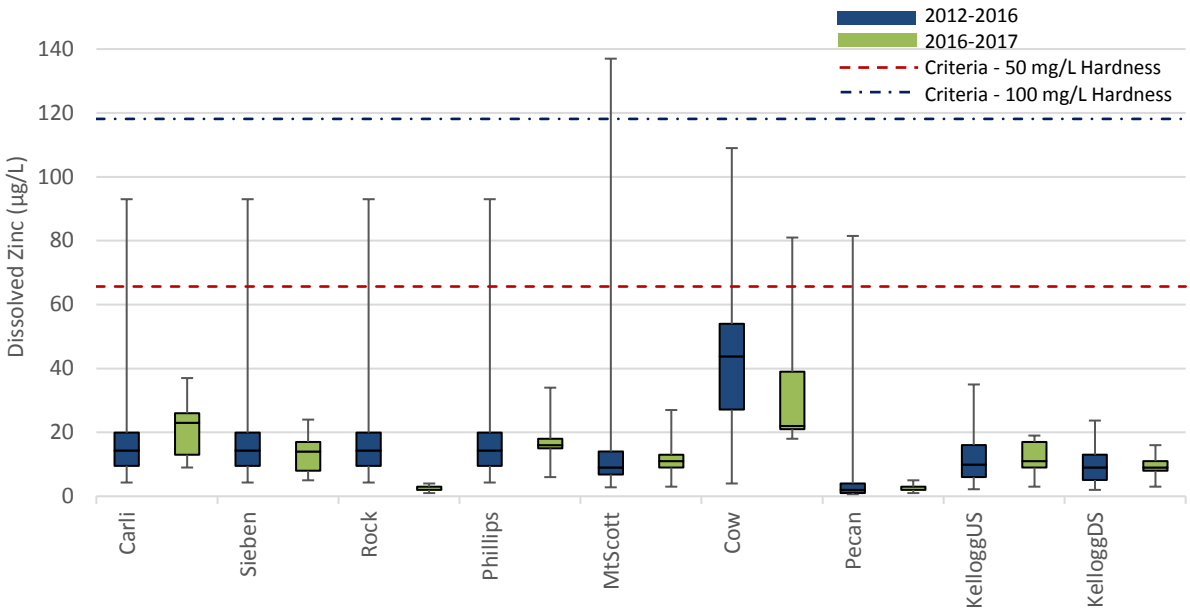

Figure 4-3: Instream Monitoring Historical Comparison, Dissolved Zinc

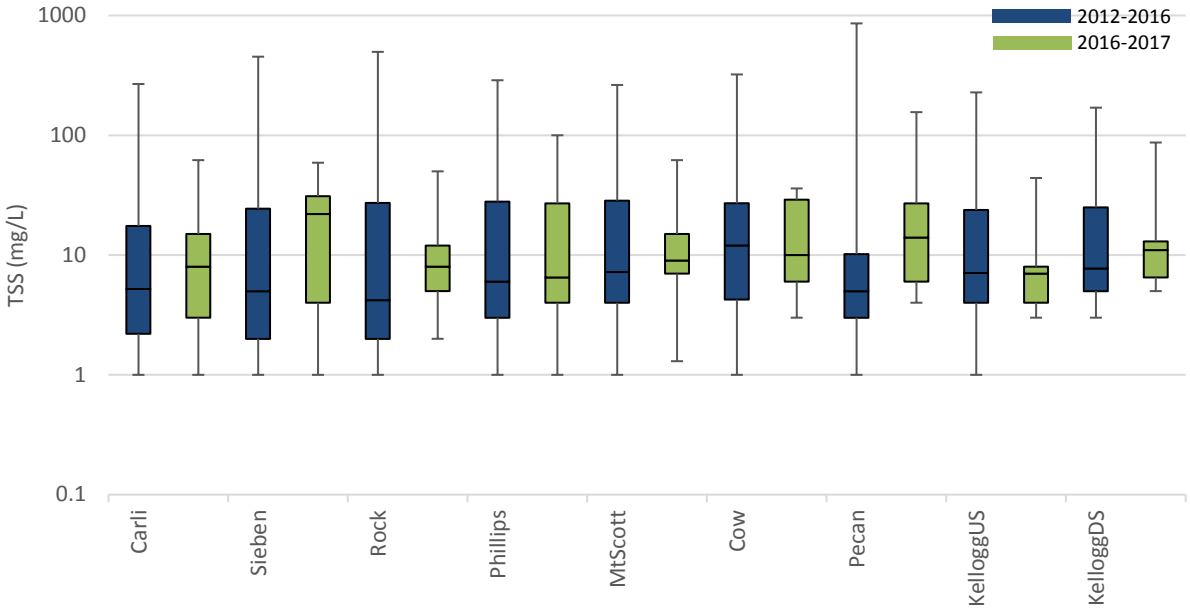

Figure 4-4: Instream Monitoring Historical Comparison, Total Suspended Solids

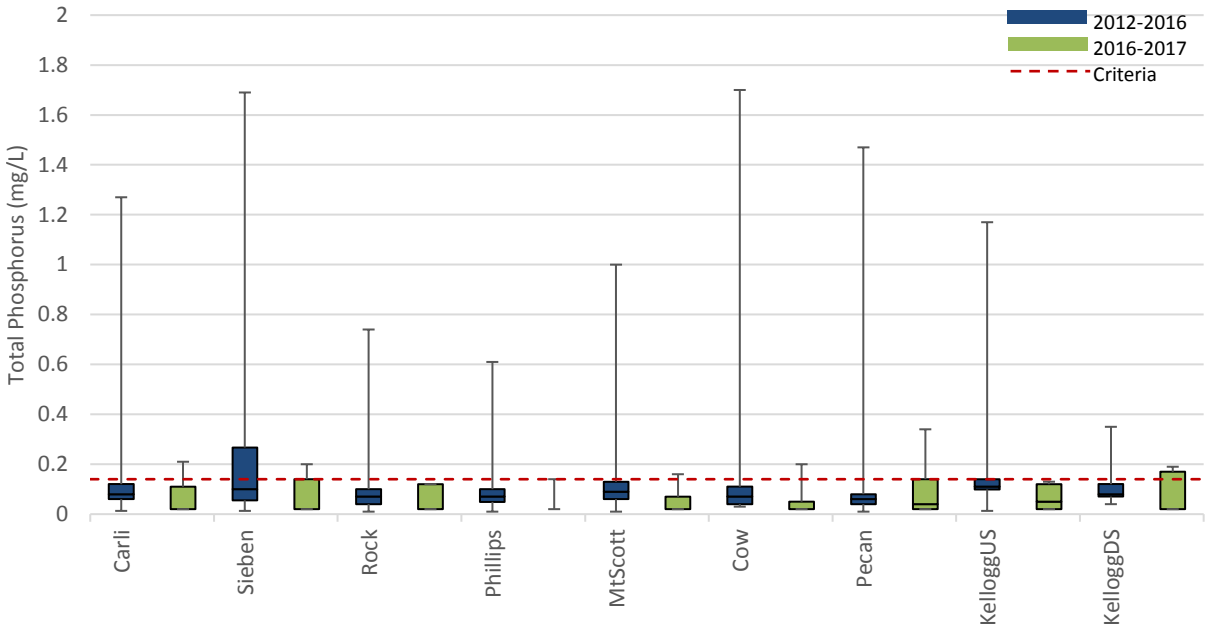

Figure 4-5: Instream Monitoring Historical Comparison, Total Phosphorus

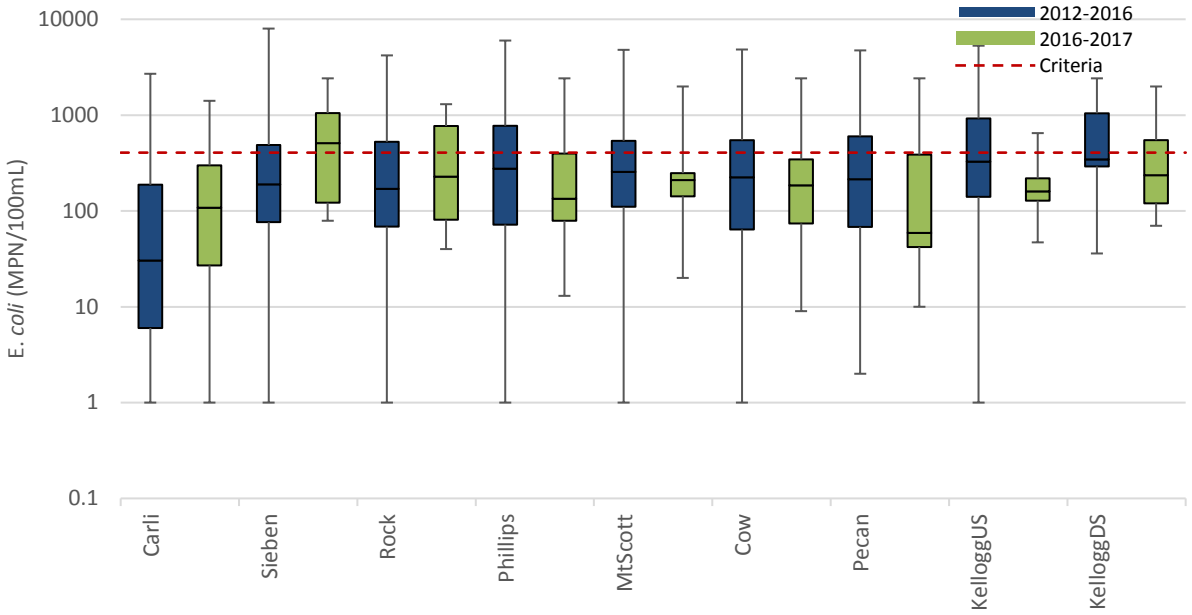

Figure 4-6: Instream Monitoring Historical Comparison, Bacteria

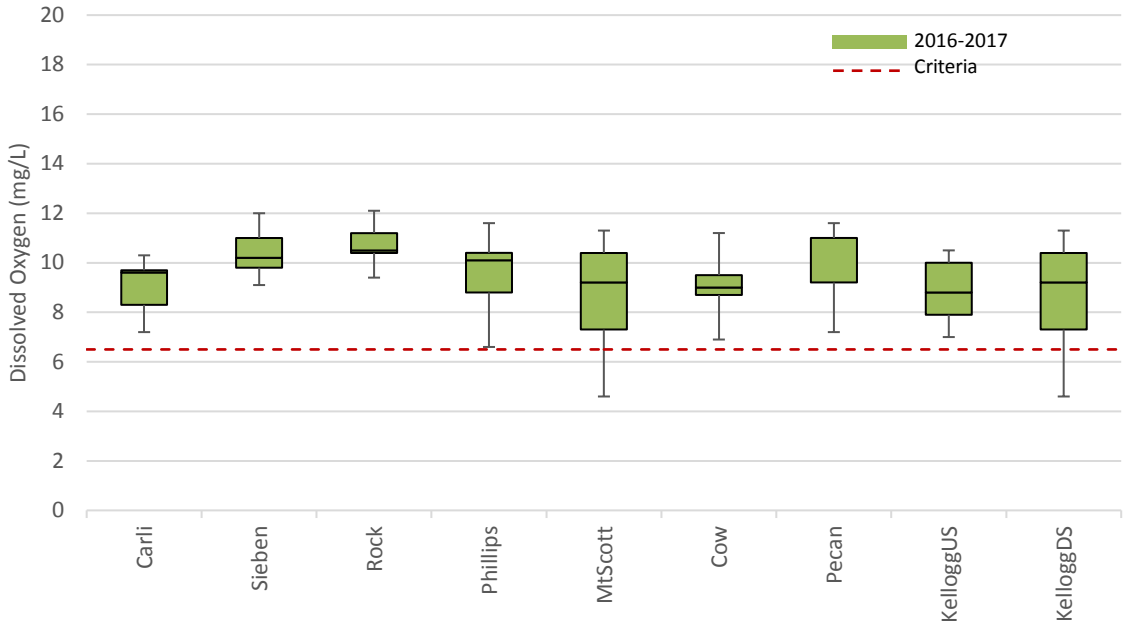

Figure 4-7: Instream Monitoring Comparison, Dissolved Oxygen

4.3 Evaluation

The data evaluations below are based on Table 4-2, which summarizes current (2016-2017) 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 (2016-2017) and historical (2012-2016) data collected over the 5-year implementation term of the CCCSMP.

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 bacteria and total phosphorus. Bacteria exceedances occurred in every stream monitored. Sieben Creek had the highest percentage of bacteria exceedances.
- Per Table 4-2, Cow Creek, Sieben Creek and the Kellogg Creek (downstream) locations reported the most number of current water quality exceedances.
- For dissolved copper, historical exceedances of chronic water quality criteria (based on an assumed hardness of 50 mg/L) were observed at three locations (Phillips Creek, Cow Creek, and Pecan Creek). In comparison, for current data (2016-2017), only the Cow Creek location exceeded criteria. This may be due to a QAQC issue as the total copper concentration was less than the dissolved copper concentration for the 6/15/17 sampling event.
- No current exceedance of criteria was observed for dissolved lead.
- For dissolved zinc, historical exceedances of chronic water quality criteria (based on an assumed hardness of 50 mg/L) were observed at all locations except for the two Kellogg Creek locations. In comparison, for current data (2016-2017), only the Cow Creek location exceeded criteria. This may

be due to a QAQC issue as the total zinc concentration was less than the dissolved zinc concentration for the 6/15/17 sampling event.

- 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 had historical exceedances of the total phosphorus comparison criteria. Six of the nine locations had current data exceeding the criteria. Figure 4-5 does not show the box portion of the current box and whisker plot for Phillips Creek, as total phosphorus results for 7 of the 9 events were below detection limits.
- All locations had historical and current exceedances of the bacteria criteria. Sieben Creek is the only location where a median value was also above the criteria. This was observed for the current data set.
- Only two locations (Mt Scott Creek and the downstream Kellogg Creek location) had current 2016-2017 monitoring data that did not meet the dissolved oxygen criteria. All samples collected at the other locations had concentrations above the 6.5 mg/L 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 previously collected data?

For the most part, the current (2016-2017) monitoring results were in the same range as those from the previous years (2012 to mid-2016). Two exceptions were noted:

- For dissolved copper, the current maximum concentration in Sieben Creek was slightly higher than the historic maximum concentration associated with 2012-2016.
- For dissolved zinc, the current concentrations in Rock Creek were lower than historic (previous 4-years) concentrations.

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, total suspended solids, 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 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 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.

For the 2016-2017 reporting year, because the NPDES MS4 permit renewal applications were due in February 2017, a more comprehensive adaptive management process was implemented by WES, on behalf of the regulated Districts, cities and County. Specific to review of the monitoring program and monitoring data collected, the following section outlines the CCCSMP revisions, future monitoring data analyses considerations and potential program considerations considering monitoring data presented herein.

5.1 Summary of the CCCSMP Revisions

The CCCSMP was initially developed in 2006 by Clackamas County WES (on behalf of Clackamas County Service District #1 or CCSD #1, the Surface Water Management Agency of Clackamas County or SWMACC, and the cities of Happy Valley and Rivergrove), and the cities of Oregon City, Milwaukie, West Linn, and Gladstone. The CCCSMP was initially implemented beginning July 1, 2007. In 2012, significant modifications to monitoring locations and frequencies were made to reflect requirements of the reissued 2012 NPDES MS4 permit.

In the spring of 2016, WES, along with other CCCSMP participants participated in a series of workshops to review and determine proposed adjustments to the 2012 CCCSMP in conjunction with the permit renewal process. Key modifications included the following:

- Inclusion of OLWSD and Wilsonville instream, stormwater, and biological monitoring activities
- Removal of mercury and pesticide monitoring activities, as those obligations were met
- Removal of biochemical oxygen demand (BOD) and total volatile solids (for co-permittees outside of the Tualatin basin) from the analyte list, due to the limited usefulness of the data collected to date
- Adjustment of analytical methods and reporting limits based on consistency with Code of Federal Regulations (CFR) Title 40 and current laboratory capabilities
- Adjustment of selected monitoring locations to ensure geographic distribution of data and to continue to inform trends analyses
- Inclusion of routine instream sampling, in addition to targeted dry weather/wet weather instream sampling activities

- Removal of CCSD #1's geomorphic monitoring activities from the Plan, as physical conditions are evaluated during biological (macroinvertebrate) monitoring activities
- Minor editorial updates to improve clarity and consistency with current practices

The updated (2017) CCCSMP was submitted to DEQ on December 16, 2016. No comments were received from DEQ, and the final 2017 CCCSMP was included in participating co-permittees' NPDES MS4 permit renewal applications with an implementation start date of July 1, 2017.

5.2 Future Data Analyses

Data evaluation and results presented in Sections 3 and 4 provide insights into water quality and also help to identify additional evaluations that could be helpful in providing additional insights. Based on results and conclusions in this annual report, recommended future monitoring and data evaluation include the following:

- Updating water quality trends analyses. WES will be updating the trends analysis that was submitted to DEQ in 2015 to reflect completion of the 2012-2017 CCCSMP implementation term. Updated trends will provide a more comprehensive comparison of instream water quality in consideration of historical data.
- Comprehensive 5-year (2012-2017) data review based on wet versus dry weather conditions. Current instream data analysis did not include comparison by weather conditions. Results from this analysis could inform how/if MS4 sources are contributing to instream water quality conditions and to what extent.
- Source evaluations. Based on results reported in Section 3 and 4, additional investigation into bacteria sources in Sieben Creek may be warranted. Additionally, total phosphorus concentrations appear elevated in a majority of instream monitoring locations, including Pecan Creek that has a TMDL in place for pH/ chlorophyll a (with total phosphorus as a surrogate measure).
- Future instream monitoring needs. With completion of the Carli Creek water quality facility anticipated 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 5-year (2012-2017) 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.

5.3 Program Revisions

Ongoing review of monitoring data can help identify future 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.

Appendix A

Data Tables

Table A-1. CCSD #1 Instream Water Quality Monitoring Results (2016-2017)

Carli 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)	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)	Biological Oxygen Demand (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 MH	9/16/16	N	Routine	16.8	18	8.0	6.5	0.9	10	1	406	0.19	0.14	0.60	10.47	15.96	0.03	3.07	78.72	13.00	137.87	136.76	207	1	190	0.00	<0.05	0.09	1.00	0.21	20.00	120	7.3	191.1
#05 SE 120th & Carpenter MH	3/2/17	N	Routine	10.9	18	10.3	6.5	<0.09	10	3	406	<0.04	0.14	0.60	7.32	10.76	0.01	1.95	49.92	11.00	96.75	95.97	155	3	167	0.06	<0.05	0.06	1.00	0.13	16.00	79	7.2	199.5
#05 SE 120th & Carpenter MH	3/16/17	N	Routine	10.9	18	9.7	6.5	0.93	10	326	406	<0.04	0.14	1.30	4.70	6.60	0.04	1.10	28.13	9.00	62.31	61.81	115	8	111	0.35	<0.05	0.04	2.20	0.31	16.00	47	7.3	137.5
#05 SE 120th & Carpenter MH	3/30/17	N	Routine	11.5	18	9.6	6.5	0.98	10	108	406	<0.04	0.14	0.80	6.03	8.70	0.03	1.52	38.92	25.00	79.87	79.22	135	4	156	0.43	<0.05	0.04	1.50	0.31	33.00	63	6.9	271.0
#05 SE 120th & Carpenter MH	4/13/17	N	Routine	12.2	18	9.7	6.5	0.92	10	27	406	<0.04	0.14	1.30	6.60	9.60	0.06	1.70	43.71	23.00	87.33	86.62	137	2	143	0.36	<0.05	0.05	1.50	0.26	27.00	70	7.4	172.9
#05 SE 120th & Carpenter MH	4/27/17	N	Routine	11.4	18	9.3	6.5	0.50	10	299	406	<0.04	0.14	1.60	3.56	4.86	0.06	0.76	19.61	37.00	47.36	46.98	98	12	103	1.40	<0.05	0.03	3.10	0.86	55.00	34	7.1	98.0
Median[4]				11.5		9.7		0.9		68		0.02		1.1			0.0			18.0			136	4	150	0.36	0.025	0.05	1.50	0.29	23.50	67	7.3	182.0
Maximum[4]				16.8		10.3		1.0		326		0.19		1.6			0.1			37.0			207	12	190	1.40	0.025	0.09	3.10	0.86	55.00	120	7.4	271.0
Minimum[4]				10.9		8.0		0.04		1		0.02		0.6			0.0			9.0			98	1	103	0.00	0.025	0.03	1.00	0.13	16.00	34	6.9	98.0
Water Quality Exceedance (number of samples)				0		0		0		0		1			0	0		0	0		0	0											
#05 SE 120th & Carpenter MH	10/5/16	Y	Storm	14.1	18	8.3	6.5	0.4	10	1410	406	0.11	0.14	2.00	3.47	4.73	0.06	0.74	18.96	31.00	46.18	45.80	90	15	104	4.00	<0.05	0.05	3.90	0.82	52.00	33	6.5	37.9
#05 SE 120th & Carpenter MH	12/20/16	Y	Storm	10.5	18	9.6	6.5	0.6	10	225	406	<0.04	0.14	1.00	4.53	6.33	0.03	1.04	26.81	20.00	60.06	59.57	109	19	114	1.70	<0.05	0.05	3.30	0.70	36.00	45	7	118.2
#05 SE 120th & Carpenter MH	2/16/17	Y	Storm	10.8	18	7.2	6.5	0.4	10	61	406	0.21	0.14	1.10	2.65	3.50	0.07	0.52	13.26	26.00	35.26	34.97	113	62	54	1.40	<0.05	<0.025	6.20	2.99	77.00	24	7	112.4
Median[4]				10.8		8.3		0.4		225		0.11		1.1			0.1			26.0			109	19	104	1.70	0.025	0.05	3.90	0.82	52.00	33	7	112.4
Maximum[4]				14.1		9.6		0.6		1410		0.21		2.0			0.1			31.0			113	62	114	4.00	0.025	0.05	6.20	2.99	77.00	45	7	118.2
Minimum[4]				10.5		7.2		0.4		61		0.02		1.0			0.0			20.0			90	15	54	1.40	0.025	0.0125	3.30	0.70	36.00	24	6.5	37.9
Water Quality Exceedance (number of samples)				0		0		0		1		1			0	0		0	0		0	0											

Sieben 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)	Biological Oxygen Demand (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	9/16/16	N	Routine	13.0	18	9.3	6.5	1.8	10	86	406	0.16	0.14	0.80	6.60	9.60	0.01	1.70	43.71	5.00	87.33	86.62	158	1	153	0.01	<0.05	0.1	1.00	0.15	7.00	70	7.3	127.1
#07 Sieben Creek at Hwy 212	3/2/17	N	Routine	7.8	18	12.0	6.5	1.7	10	122	406	<0.04	0.14	0.60	4.70	6.60	0.03	1.10	28.13	8.00	62.31	61.81	107	3	125	0.00	<0.05	<0.04	0.90	0.13	11.00	47	7.1	129.2
#07 Sieben Creek at Hwy 212	3/16/17	N	Routine	9.2	18	11.0	6.5	1.40	10	548	406	<0.04	0.14	1.00	4.18	5.80	0.08	0.94	24.17	24.00	55.50	55.05	129	29	108	0.20	<0.05	<0.04	1.90	0.41	22.00	41	7.4	108.5
#07 Sieben Creek at Hwy 213	3/30/17	N	Routine	9.5	18	11.0	6.5	1.30	10	248	406	<0.04	0.14	0.90	4.27	5.93	0.05	0.97	24.82	14.00	56.65	56.19	118	15	100	0.00	<0.05	0.03	1.30	0.24	21.00	42	7	147.7
#07 Sieben Creek at Hwy 214	4/13/17	N	Routine	9.9	18	11.3	6.5	1.10	10	79	406	<0.04	0.14	1.10	4.44	6.20	0.05	1.02	26.14	7.00	58.92	58.45	106	4	118	0.41	<0.05	0.03	1.50	0.22	11.00	44	7.2	116.5
#07 Sieben Creek at Hwy 214	4/27/17	N	Routine	10.4	18	10.2	6.5	0.91	10	510	406	<0.04	0.14	1.60	4.01	5.53	0.08	0.89	22.86	23.00	53.20	52.77	111	22	120	0.73	<0.05	0.03	3.00	0.54	39.00	39	7.3	99.0
Median[4]				9.7		11.0		1.4		185		0.02		1.0			0.1			11.0			115	10	119	0.11	0.025	0.03	1.40	0.23	16.00	43	7.3	121.8
Maximum[4]				13.0		12.0		1.8		548		0.16		1.6			0.1			24.0			158	29	153	0.73	0.025	0.10	3.00	0.54	39.00	70	7.4	147.7
Minimum[4]				7.8		9.3		0.9		79		0.02		0.6			0.0			5.0			106	1	100	0.00	0.025	0.02	0.90	0.13	7.00	39	7.0	99.0
Water Quality Exceedance (number of samples)				0		0		0		2		1			0	0		0	0		0	0											
#07 Sieben Creek at Hwy 212	10/5/16	Y	Storm	13.2	18	9.8	6.5	0.3	10	>2420	406	0.14	0.14	2.60	2.36	3.09	0.06	0.44	11.40	16.00	31.49	31.23	89	31	80	2.10	<0.05	0.04	4.90	0.92	41.00	21	6.9	44.6
#07 Sieben Creek at Hwy 212	12/20/16	Y	Storm	8.7	18	9.1	6.5	0.9	10	1120	406	0.07	0.14	2.20	3.29	4.46	0.08	0.69	17.68	17.00	43.79	43.44	137	49	101	1.50	<0.05	0.04	6.20	1.46	43.00	31	7.1	88.6
#07 Sieben Creek at Hwy 212	2/16/17	Y	Storm	9.8	18	10.2	6.5	0.8	10	1050	406	0.2	0.14	1.80	3.02	4.05	0.08	0.61	15.77	11.00	40.18	39.85	140	59	100	0.64	0.12	0.03	5.60	1.82	39.00	28	6.9	157.8
Median[4]				9.8		9.8		0.8		>2420		0.14		2.2			0.1			16.0			137	49	100	1.50	0.025	0.04	5.60	1.46	41.00	28	6.9	88.6
Maximum[4]				13.2		10.2		0.9		1120		0.2		2.6			0.1			17.0			140	59	101	2.10	0.12	0.04	6.20	1.82	43.00	31	7.1	157.8
Minimum[4]				8.7		9.1		0.3		1050		0.07		1.8			0.1			11.0			89	31	80	0.64	0.025	0.03	4.90	0.92	39.00	21	6.9	44.6
Water Quality Exceedance (number of samples)				0		0		0		3		1			1	0		0	0		0	0											

Phillips 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)	Biological Oxygen Demand (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 Phillips Creek at SE 84th Ave.	9/16/16	N	Routine	15.8	18	6.6	6.5	0.7	10	134	406	0.14	0.14	0.90	7.16	10.51	0.04	1.89	48.53	6.00	94.67	93.90	155	7	161	0.14	<0.05	0.06	1.40	0.34	9.00	77	7.1	137.1
#11 Phillips Creek at SE 84th Ave.	3/2/17	N	Routine	9.3	18	11.6	6.5	1.0	10	13	406	<0.04	0.14	0.80	6.03	8.70	0.04	1.52	38.92	11.00	79.87	79.22	125	34	125	0.00	<0.05	<0.04	1.20	0.21	15.00	63	7.4	164.2
#11 Phillips Creek at SE 84th Ave.	3/16/17	N	Routine	10.2	18	9.7	6.5	0.94	10	79	406	<0.04	0.14	1.20	4.53	6.33	0.12	1.04	26.81	34.00	60.06	59.57	108	2	96	0.08	<0.05	<0.04	2.10	0.67	52.00	45	7.5	123.8
#11 Phillips Creek at SE 84th Ave.	3/30/17	N	Routine	10.5	18	10.4	6.5	0.82	10	31	406	<0.04	0.14	1.00	5.21	7.39	0.07	1.25	32.15	18.00	68.99	68.43	121	7	135	0.08	<0.05	0.03	1.50	0.32	25.00	53	7.1	162.7
#11 Phillips Creek at SE 84th Ave.	4/13/17	N	Routine	11.6	18	10.5	6.5	0.58	10	111	406	<0.04	0.14	1.50	4.78	6.73	0.09	1.12	28.80	16.00	63.43	62.92	101	4	91	0.13	<0.05	0.12	2.10	0.46	24.00	48	7.4	118.9
#11 Phillips Creek at SE 84th Ave.	4/27/17	N	Routine	11.2	18	10.4	6.5	0.70	10	365	406	<0.04	0.14	1.40	4.70	6.60	0.10	1.10	28.13	22.00	62.31	61.81	101	6	107	0.15	<0.05	0.02	2.40	0.56	32.00	47	7.3	118.5
Median[4]				10.9		10.4		0.8		95		0.02		1.1			0.1			17.0			115	6	116	0.11	0.025	0.03	1.80	0.40	24.50	51	7.4	130.5
Maximum[4]				15.8		11.6		1.0		365		0.14		1.5			0.1			34.0			155	34	161	0.15	0.025	0.12	2.40	0.67	52.00	77	7.5	164.2
Minimum[4]				9.3		6.6		0.6		13		0.02		0.8			0.0			6.0			101	2	91	0.00	0.025	0.02	1.20	0.21	9.00	45	7.1	118.5
Water Quality Exceedance (number of samples)				0		0		0		0		1			0	0		0	0		0	0											
#11 Phillips Creek at SE 84th Ave.	10/5/16	Y	Storm	12.6	18	8.8	6.5	0.2	10	2420	406	0.08	0.14	2.80	3.20	4.32	0.12	0.66	17.04	15.00	42.59	42.25	184	1	91	2.60	<0.05	0.09	4.80	1.64	29.00	30	7.3	382.0
#11 Phillips Creek at SE 84th Ave.	12/5/16	Y	Storm	9.5	18	8.6	6.5	0.6	10	461	406	<0.04	0.14	1.60	3.20	4.32	0.06	0.66	17.04	18.00	42.59	42.25	127	100	73	2.10	<0.05	0.04	4.90	1.84	48.00	30	6.4	246.0
#11 Phillips Creek at SE 84th Ave.	2/16/17	Y	Storm	9.8	18	10.1	6.5	0.6	10	397	406	<0.04	0.14	1.80	3.11	4.19	0.12	0.64	16.40	15.00	41.39	41.05	115	27	108	0.91	<0.05	<0.025	5.90	2.64	47.00	29	6.9	84.0
Median[4]				9.8		8.8		0.6		461		0.02		1.8			0.1			15.0			127	27	91	2.10	0.025	0.04	4.90	1.84	47.00	30	6.9	246.0
Maximum[4]				12.6		10.1		0.6		2420		0.08		2.8			0.1			18.0			184	100	108	2.60	0.025	0.09	5.90	2.64	48.00	30	7.3	382.0
Minimum[4]				9.5		8.6		0.2		397		0.02		1.6			0.1			15.0			115	1	73	0.91	0.025	0.0125	4.80	1.64	29.00	29	6.4	84.0
Water Quality Exceedance (number of samples)				0		0		0		1		0			0	0		0	0		0	0											

Table A-1. CCSD #1 Instream Water Quality Monitoring Results (2016-2017)

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)	Biological Oxygen Demand (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.	9/16/16	N	Routine	14.7	18	7.0	6.5	2.2	10	72	406	0.13	0.14	0.30	7.40	10.89	0.02	1.97	50.61	3.00	97.79	96.99	194	8	180	0.29	<0.05	0.05	0.80	0.27	4.00	80	6.6	143.8
#14 Kellogg Creek at SE Rusk Rd.	3/2/17	N	Routine	9.6	18	10.5	6.5	2.2	10	219	406	<0.04	0.14	0.60	6.12	8.83	0.06	1.54	39.60	9.00	80.94	80.28	150	3	156	0.21	<0.05	0.06	0.90	0.28	11.00	64	7.1	169.0
#14 Kellogg Creek at SE Rusk Rd.	3/16/17	N	Routine	9.8	18	10.2	6.5	1.90	10	179	406	<0.04	0.14	1.10	5.12	7.26	0.11	1.23	31.48	14.00	67.88	67.33	136	8	124	0.37	<0.05	0.06	1.60	0.47	16.00	52	7.4	135.0
#14 Kellogg Creek at SE Rusk Rd.	3/30/17	N	Routine	10.9	18	7.9	6.5	2.00	10	47	406	<0.04	0.14	0.80	5.87	8.44	0.07	1.46	37.56	10.00	77.71	77.08	149	4	148	0.36	<0.05	0.06	1.00	0.29	12.00	61	6.8	253.0
#14 Kellogg Creek at SE Rusk Rd.	4/13/17	N	Routine	11.6	18	10.0	6.5	1.90	10	128	406	<0.04	0.14	0.80	6.28	9.09	0.06	1.60	40.97	19.00	83.08	82.41	154	4	153	0.71	<0.05	0.05	1.10	0.25	23.00	66	7.1	166.3
#14 Kellogg Creek at SE Rusk Rd.	4/27/17	N	Routine	11.5	18	9.9	6.5	1.90	10	148	406	0.08	0.14	0.80	5.95	8.57	0.07	1.49	38.24	11.00	78.79	78.15	152	5	164	0.54	<0.05	0.06	1.20	0.29	13.00	62	7.1	154.0
Median [4]				11.2		10.0		2.0		138		0.02		0.8			0.1			10.5			151	5	155	0.37	0.025	0.06	1.05	0.29	12.50	63	7.1	160.2
Maximum [4]				14.7		10.5		2.2		219		0.13		1.1			0.1			19.0			194	8	180	0.71	0.025	0.06	1.60	0.47	23.00	80	7.4	253.0
Minimum [4]				9.6		7.0		1.9		47		0.02		0.3			0.0			3.0			136	3	124	0.21	0.025	0.05	0.80	0.25	4.00	52	6.6	135.0
Water Quality Exceedance (number of samples)				0		0		0		0		0			0	0		0	0		0	0											
#14 Kellogg Creek at SE Rusk Rd.	10/5/16	Y	Storm	13.9	18	8.2	6.5	1.7	10	579	406	0.12	0.14	0.80	6.20	8.96	0.06	1.57	40.28	8.00	82.01	81.35	183	7	176	0.81	0.058	0.06	1.40	0.50	10.00	65	6.6	434.0
#14 Kellogg Creek at SE Rusk Rd.	12/5/16	Y	Storm	8.9	18	8.8	6.5	1.9	10	160	406	0.05	0.14	1.20	5.37	7.65	0.10	1.31	33.49	17.00	71.19	70.61	188	11	130	0.90	<0.05	0.09	2.00	0.66	23.00	55	6.9	149.8
#14 Kellogg Creek at SE Rusk Rd.	2/16/17	Y	Storm	9.8	18	7.3	6.5	1.0	10	649	406	0.13	0.14	1.70	3.38	4.59	0.11	0.71	18.32	17.00	44.99	44.62	125	44	104	0.70	<0.05	0.04	4.50	1.99	36.00	32	6.9	108.1
Median [4]				9.8		8.2		1.7		579		0.12		1.2			0.1			17.0			183	11	130	0.81	0.03	0.06	2.00	0.66	23.00	55	6.9	149.8
Maximum [4]				13.9		8.8		1.9		649		0.13		1.7			0.1			17.0			188	44	176	0.90	0.058	0.09	4.50	1.99	36.00	65	6.9	434.0
Minimum [4]				8.9		7.3		1.0		160		0.05		0.8			0.1			8.0			125	7	104	0.70	0.025	0.04	1.40	0.50	10.00	32	6.6	108.1
Water Quality Exceedance (number of samples)				0		0		0		2		0			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)	Biological Oxygen Demand (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	9/16/16	N	Routine	15.6	18	6.1	6.5	0.8	10	248	406	0.16	0.14	0.90	8.49	12.68	0.05	2.35	60.37	3.00	112.10	111.20	189	1	173	0.21	<0.05	0.09	1.20	0.28	6.00	94	6.8	159.5
#15 Mt. Scott Creek in NCCP	3/2/17	N	Routine	8.9	18	11.3	6.5	1.1	10	20	406	<0.04	0.14	0.90	6.12	8.83	0.06	1.54	39.60	9.00	80.94	80.28	131	6	123	0.09	<0.05	<0.04	1.60	0.68	15.00	64	7.4	161.9
#15 Mt. Scott Creek in NCCP	3/16/17	N	Routine	9.6	18	10.5	6.5	0.94	10	210	406	<0.04	0.14	1.40	4.95	6.99	0.14	1.17	30.14	27.00	65.66	65.13	126	12	100	0.45	<0.05	<0.04	2.50	0.76	26.00	50	7.5	123.4
#15 Mt. Scott Creek in NCCP	3/30/17	N	Routine	10.3	18	4.6	6.5	0.87	10	152	406	<0.04	0.14	1.20	5.71	8.17	0.09	1.41	36.20	10.00	75.55	74.94	125	7	136	0.29	<0.05	0.03	1.90	0.46	16.00	59	7.1	197.9
#15 Mt. Scott Creek in NCCP	4/13/17	N	Routine	10.5	18	10.4	6.5	0.48	10	77	406	<0.04	0.14	1.60	5.12	7.26	0.20	1.23	31.48	11.00	67.88	67.33	109	7	108	0.74	<0.05	0.02	2.30	0.49	17.00	52	7.5	127.6
#15 Mt. Scott Creek in NCCP	4/27/17	N	Routine	10.9	18	10.0	6.5	0.77	10	214	406	<0.04	0.14	1.20	5.12	7.26	0.09	1.23	31.48	12.00	67.88	67.33	112	9	12	0.41	<0.05	0.03	1.90	0.47	20.00	52	7.4	126.9
Median [4]				10.4		10.2		0.8		181		0.02		1.2			0.1			10.5			126	7	116	0.35	0.025	0.03	1.90	0.48	16.50	56	7.4	143.6
Maximum [4]				15.6		11.3		1.1		248		0.16		1.6			0.2			27.0			189	12	173	0.74	0.025	0.09	2.50	0.76	26.00	94	7.5	197.9
Minimum [4]				8.9		4.6		0.5		20		0.02		0.9			0.1			3.0			109	1	12	0.09	0.025	0.02	1.20	0.28	6.00	50	6.8	123.4
Water Quality Exceedance (number of samples)				0		2		0		0		1			0	0		0	0		0	0											
#15 Mt. Scott Creek in NCCP	10/5/16	Y	Storm	13.6	18	9.2	6.5	0.6	10	1990	406	0.13	0.14	2.50	3.56	4.86	0.14	0.76	19.61	8.00	47.36	46.98	119	30	108	1.90	<0.05	0.05	5.40	1.75	29.00	34	7.3	76.5
#15 Mt. Scott Creek in NCCP	12/5/16	Y	Storm	8.3	18	8.8	6.5	0.8	10	142	406	<0.04	0.14	1.50	4.78	6.73	0.11	1.12	28.80	13.00	63.43	62.92	172	15	98	0.80	<0.05	0.05	2.70	0.72	25.00	48	7.2	131.1
#15 Mt. Scott Creek in NCCP	2/16/17	Y	Storm	9.5	18	7.3	6.5	0.6	10	613	406	0.07	0.14	1.90	3.20	4.32	0.13	0.66	17.04	14.00	42.59	42.25	136	62	108	0.97	<0.05	0.03	6.60	3.02	42.00	30	7.1	82.4
Median [4]				9.5		8.8		0.6		613		0.07		1.9			0.1			13.0			136	30	108	0.97	0.025	0.05	5.40	1.75	29.00	34	7.2	82.4
Maximum [4]				13.6		9.2		0.8		1990		0.13		2.5			0.1			14.0			172	62	108	1.90	0.025	0.05	6.60	3.02	42.00	48	7.3	131.1
Minimum [4]				8.3		7.3		0.6		142		0.02		1.5			0.1			8.0			119	15	98	0.80	0.025	0.03	2.70	0.72	25.00	30	7.1	76.5
Water Quality Exceedance (number of samples)				0		0		0		2		0			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)	Biological Oxygen Demand (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	9/16/16	N	Routine	13.3	18	9.4	6.5	0.7	10	40	406	0.12	0.14	0.60	6.92	10.12	0.01	1.81	46.46	1.00	91.54	90.79	145	3	141	0.00	<0.05	0.1	0.70	0.11	1.00	74	7	128.7
#16 Rock Creek near Mouth	3/2/17	N	Routine	7.3	18	12.1	6.5	1.2	10	45	406	<0.04	0.14	0.60	3.29	4.46	0.05	0.69	17.68	4.00	43.79	43.44	76	2	83	0.00	<0.05	<0.04	0.80	0.18	5.00	31	7.3	90.1
#16 Rock Creek near Mouth	3/16/17	N	Routine	8.5	18	11.3	6.5	1.30	10	228	406	<0.04	0.14	0.60	2.93	3.91	0.09	0.59	15.14	3.00	38.96	38.64	85	10	75	0.32	<0.05	<0.04	1.40	0.56	6.00	27	7.3	75.5
#16 Rock Creek near Mouth	3/30/17	N	Routine	9.1	18	10.4	6.5	0.96	10	81	406	<0.04	0.14	0.60	3.11	4.19	0.07	0.64	16.40	2.00	41.39	41.05	78	5	104	0.20	<0.05	0.03	1.00	0.27	6.00	29	7.2	149.9
#16 Rock Creek near Mouth	4/13/17	N	Routine	9.9	18	11.2	6.5	0.65	10	613	406	<0.04	0.14	0.90	3.56	4.86	0.21	0.76	19.61	2.00	47.36	46.98	83	5	88	0.71	<0.05	0.03	1.10	0.28	4.00	34	7.5	94.2
#16 Rock Creek near Mouth	4/27/17	N	Routine	10.1	18	10.5	6.5	0.96	10	770	406	<0.04	0.14	0.70	3.11	4.19	0.08	0.64	16.40	3.00	41.39	41.05	80	12	101	0.40	<0.05	0.03	1.30	0.44	6.00	29	7.2	79.4
Median [4]				9.5		10.9		1.0		155		0.02		0.6			0.1			2.5			82	5	95	0.26	0.025	0.03	1.05	0.28	5.50	30	7.3	92.2
Maximum [4]				13.3		12.1		1.3		770		0.12		0.9			0.2			4.0			145	12	141	0.71	0.025	0.10	1.40	0.56	6.00	74	7.5	149.9
Minimum [4]				7.3		9.4		0.7		40		0.02		0.6			0.0			1.0			76	2	75	0.00	0.025	0.02	0.70	0.11	1.00	27	7.0	75.5
Water Quality Exceedance (number of samples)				0		0		0		2		0			0	0		0	0		0	0											
#16 Rock Creek near Mouth	10/5/16	Y	Storm	12.5	18	10.6	6.5	0.5	10	228	406	0.12	0.14	1.20	5.71	8.17	0.03	1.41	36.20	2.00	75.55	74.94	127	8	117	0.52	<0.05	0.07	1.70	0.30	4.00	59	7.1	144.6
#16 Rock Creek near Mouth	12/20/16	Y	Storm	7.4	18	9.6	6.5	1.1	10	1300	406	0.08	0.14	1.40	2.65	3.50	0.08	0.52	13.26	4.00	35.26	34.97	122	50	86	1.10	<0.05	0.04	3.60	1.43	14.00	24	7.1	67.5
#16 Rock Creek near Mouth	2/16/17	Y	Storm	9.0	18	10.4	6.5	1.0	10	770	406	0.12	0.14	1.20	2.65	3.50	0.12	0.52	13.26	3.00	35.26	34.97	131	46	69	0.64	<0.05	0.03	3.60	1.74	15.00	24	7.1	227.0
Median [4]				9.0		10.4		1.0		770		0.12		1.2			0.1			3.0			127	46	86	0.64	0.025	0.04	3.60	1.43	14.00	24	7.1	144.6
Maximum [4]				12.5		10.6		1.1		1300		0.12		1.4			0.1			4.0			131	50	117	1.10	0.025	0.07	3.60	1.74	15.00	59	7.1	227.0
Minimum [4]				7.4		9.6		0.5		228		0.08		1.2			0.0			2.0			122	8	69	0.52	0.025	0.03	1.70	0.30	4.00	24	7.1	67.5
Water Quality Exceedance (number of samples)				0		0		0		2		0			0	0		0	0		0	0											

Table A-1. CCSD #1 Instream Water Quality Monitoring Results (2016-2017)

Cow 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)	Biological Oxygen Demand (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	3/2/17	N	Routine	7.7	18	11.2	6.5	0.6	10	9	406	<0.04	0.14	1.20	6.44	9.34	0.05	1.65	42.33	21.00	85.21	84.52	115	3	128	0.02	<0.05	<0.04	1.70	0.23	26.00	68	7.3	164.2
#24 Cow Creek at SE Last Road	3/16/17	N	Routine	9.8	18	8.7	6.5	0.5	10	74	406	<0.04	0.14	1.80	5.37	7.65	0.14	1.31	33.49	22.00	71.19	70.61	116	10	109	0.63	<0.05	<0.04	8.50	1.91	86.00	55	7.1	133.8
#24 Cow Creek at SE Last Road	3/30/17	N	Routine	10.3	18	9.1	6.5	0.32	10	37	406	<0.04	0.14	1.30	5.54	7.91	0.05	1.36	34.84	21.00	73.37	72.78	111	4	140	0.36	<0.05	0.03	6.90	2.02	78.00	57	6.8	164.4
#24 Cow Creek at SE Last Road	4/13/17	N	Routine	10.9	18	9.5	6.5	0.11	10	185	406	<0.04	0.14	1.80	5.21	7.39	0.11	1.25	32.15	18.00	68.99	68.43	92	6	98	0.65	<0.05	0.03	5.40	1.98	59.00	53	7.2	122.9
#24 Cow Creek at SE Last Road	4/27/17	N	Routine	11.3	18	8.9	6.5	0.22	10	133	406	<0.04	0.14	1.70	5.37	7.65	0.10	1.31	33.49	21.00	71.19	70.61	103	8	43	0.87	<0.05	0.03	1.70	0.23	26.00	55	7.3	127.9
#24 Cow Creek at SE Last Road	6/15/17	N	Routine	16.8	18	6.9	6.5	0.50	10	276	406	0.09	0.14	7.50	2.26	2.95	0.10	0.42	10.79	81.00	30.21	29.97	152	33	96	9.70	0.22	0.03	3.40	1.28	35.00	20	6.3	52.7
Median [4]				10.6		9.0		0.4		104		0.02		1.8			0.1			21.0			113	7	104	0.64	0.03	0.03	1.90	0.30	26.00	55	7.2	130.9
Maximum [4]				16.8		11.2		0.6		276		0.09		7.5			0.1			81.0			152	33	140	9.70	0.22	0.03	2.50	0.52	27.00	68	7.3	164.4
Minimum [4]				7.7		6.9		0.1		9		0.02		1.2			0.1			18.0			92	3	43	0.02	0.025	0.02	2.90	0.70	33.00	20	6.3	52.7
Water Quality Exceedance (number of samples)				0		0		0		0		0			0	0		0	0		1	1							12.2	2.13	137.00			
#24 Cow Creek at SE Last Road	10/5/16	Y	Storm	13.9	18	8.3	6.5	0.3	10	>2420	406	0.2	0.14	5.40	2.83	3.78	0.16	0.57	14.51	63.00	37.73	37.43	86	20	84	3.60	0.081	0.09	8.50	1.91	86.00	26	6.6	191.5
#24 Cow Creek at SE Last Road	12/20/16	Y	Storm	7.9	18	9.8	6.5	0.2	10	345	406	0.05	0.14	2.00	3.83	5.27	0.07	0.84	21.55	39.00	50.88	50.47	107	36	88	1.50	<0.05	<0.04	6.90	2.02	78.00	37	6.5	100.9
#24 Cow Creek at SE Last Road	2/16/17	Y	Storm	9.9	18	9.0	6.5	0.4	10	727	406	<0.04	0.14	2.00	3.56	4.86	0.12	0.76	19.61	31.00	47.36	46.98	93	29	87	1.20	<0.05	<0.025	5.40	1.98	59.00	34	6.7	160.4
Median [4]				9.9		9.0		0.3		>2420		0.05		2.0			0.1			39.0			93	29	87	1.50	0.03	0.05	6.90	1.98	78.00	34	6.6	160.4
Maximum [4]				13.9		9.8		0.4		727		0.20		5.4			0.2			63.0			107	36	88	3.60	0.08	0.09	8.50	2.02	86.00	37	6.7	191.5
Minimum [4]				7.9		8.3		0.2		345		0.02		2.0			0.1			31.0			86	20	84	1.20	0.03	0.01	5.40	1.91	59.00	26	6.5	100.9
Water Quality Exceedance (number of samples)				0		0		0		2		1			0	0		0	0		1	1												

Kellogg Creek - Downstream 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)	Biological Oxygen Demand (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	9/16/16	N	Routine	15.4	18	8.4	6.5	2.3	10	548	406	0.17	0.14	0.70	8.03	11.91	0.03	2.19	56.17	3.00	106.01	105.15	192	7	171	0.22	<0.05	0.09	0.90	0.25	6.00	88	7.1	155.3
#27 Rowe Middle School	3/2/17	N	Routine	9.5	18	12.2	6.5	1.5	10	70	406	<0.04	0.14	0.80	6.44	9.34	0.06	1.65	42.33	8.00	85.21	84.52	139	5	149	0.08	<0.05	0.04	1.30	0.26	11.00	68	7.2	173.1
#27 Rowe Middle School	3/16/17	N	Routine	10.0	18	7.3	6.5	1.20	10	236	406	0.05	0.14	1.30	4.95	6.99	0.09	1.17	30.14	12.00	65.66	65.13	126	11	127	0.29	<0.05	<0.04	2.40	0.78	23.00	50	7.3	125.2
#27 Rowe Middle School	3/30/17	N	Routine	10.4	18	9.3	6.5	1.10	10	133	406	<0.04	0.14	1.00	5.62	8.04	0.04	1.38	35.52	8.00	74.46	73.86	26	5	126	0.41	<0.05	0.04	1.70	0.42	14.00	58	7.2	178.5
#27 Rowe Middle School	4/13/17	N	Routine	10.8	18	11.3	6.5	0.89	10	112	406	<0.04	0.14	1.40	6.03	8.70	0.06	1.52	38.92	9.00	79.87	79.22	135	7	137	0.84	<0.05	0.05	2.00	0.44	16.00	63	7.2	146.5
#27 Rowe Middle School	4/27/17	N	Routine	11.5	18	10.0	6.5	0.98	10	326	406	<0.04	0.14	1.10	5.87	8.44	0.05	1.46	37.56	11.00	77.71	77.08	136	13	135	0.72	<0.05	0.04	2.10	0.64	21.00	61	7.3	151.9
Median [4]				10.6		9.7		1.2		185		0.02		1.1			0.1			8.5			136	7	136	0.35	0.025	0.04	1.85	0.43	15.00	62	7.2	153.6
Maximum [4]				15.4		12.2		2.3		548		0.17		1.4			0.1			12.0			192	13	171	0.84	0.025	0.09	2.40	0.78	23.00	88	7.3	178.5
Minimum [4]				9.5		7.3		0.9		70		0.02		0.7			0.0			3.0			26	5	126	0.08	0.025	0.02	0.90	0.25	6.00	50	7.1	125.2
Water Quality Exceedance (number of samples)				0		0		0		1		1			0	0		0	0		0	0												
#27 Rowe Middle School	10/5/16	Y	Storm	13.6	18	10.6	6.5	0.6	10	1990	406	0.18	0.14	2.10	4.44	6.20	0.11	1.02	26.14	6.00	58.92	58.45	114	32	114	1.70	<0.05	0.05	4.70	1.75	30.00	44	7.1	127.2
#27 Rowe Middle School	12/5/16	Y	Storm	7.8	18	5.6	6.5	1.8	10	120	406	<0.04	0.14	1.20	5.37	7.65	0.10	1.31	33.49	16.00	71.19	70.61	197	11	126	0.80	<0.05	0.09	2.00	0.54	23.00	55	7.3	128.0
#27 Rowe Middle School	2/16/17	Y	Storm	9.5	18	7.2	6.5	0.6	10	816	406	0.19	0.14	2.00	3.20	4.32	0.11	0.66	17.04	11.00	42.59	42.25	159	87	77	1.10	<0.05	0.03	6.60	3.75	45.00	30	7	72.1
Median [4]				9.5		7.2		0.6		816		0.18		2.0			0.1			11.0			159	32	114	1.10	0.025	0.05	4.70	1.75	30.00	44	7.1	127.2
Maximum [4]				13.6		10.6		1.8		1990		0.19		2.1			0.1			16.0			197	87	126	1.70	0.025	0.09	6.60	3.75	45.00	55	7.3	128.0
Minimum [4]				7.8		5.6		0.6		120		0.02		1.2			0.1			6.0			114	11	77	0.80	0.025	0.03	2.00	0.54	23.00	30	7	72.1
Water Quality Exceedance (number of samples)				0		1		0		2		2			0	0		0	0		0	0												

Notes

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

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 current copper WQ standards now reflect use of the biotic ligand model (BLM), but was not evaluated for this report.

Table A-2. CCSD #1 Stormwater Monitoring Results (2016-2017)

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

		Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
WES ID and Location	Date	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)	Biological Oxygen Demand (mg/L)	Ammonia (mg/L)	Total Phosph-orus (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 Court Outfall	9/17/16	17.5	18	8.5	6.5	0.4	10	2420	406	10.20	20.00	2.23	15.00	64.00	90.00	50	11	38	6.10	0.13	0.15	0.08	8.30	0.25	52.00	9	6.2	18.2
#101 SE Pheasant Court Outfall	10/13/16	13.8	18	8.9	6.5	0.14	10	816	406	4.90	20.00	1.60	15.00	67.00	90.00	47	14	74	2.20	0.052	0.06	0.06	2.60	0.13	42.00	8	6.47	95.6
#101 SE Pheasant Court Outfall	5/11/17	14.6	18	6.4	6.5	0.41	10	2420	406	28.50	20.00	2.34	15.00	114.00	90.00	93	17	87	11.00	0.24	0.12	0.07	22.10	0.32	88.00	16	7.1	45
Median [4]		14.6		8.5		0.4		2420		10.20		2.23		67.00		50	14	74	6.1	0.13	0.12	0.07	8.30	0.25	52.00	9	6.5	45.0
Maximum [4]		17.5		8.9		0.4		2420		28.50		2.34		114.00		93	17	87	11.0	0.24	0.15	0.08	22.10	0.32	88.00	16	7.1	95.6
Minimum [4]		13.8		6.4		0.1		816		4.90		1.60		64.00		47	11	38	2.2	0.05	0.06	0.06	2.60	0.13	42.00	8	6.2	18.2
er Quality Exceedance (number of samples)		0		1		0		3		1		0		1														

Kellogg Creek (Upstream) - Stormwater Outfall Monitoring - Residential

		Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
WES ID and Location	Date	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)	Biological Oxygen Demand (mg/L)	Ammonia (mg/L)	Total Phosph-orus (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	9/17/16	17.4	18	9	6.5	0.49	10	2420	406	15.60	20.00	0.87	15.00	106.00	90.00	66	9	47	7.10	0.23	0.2	0.11	12.10	0.21	87.00	10	6.2	21.2
#102 SE Webster Rd Outfall	10/13/16	14	18	9.5	6.5	0.35	10	1200	406	4.50	20.00	0.63	15.00	94.00	90.00	38	11	63	1.80	0.05	<0.04	0.06	2.40	0.10	67.00	10	6.6	169.2
#102 SE Webster Rd Outfall	5/11/17	14.9	18	7.5	6.5	0.32	10	>2420	406	21.70	20.00	1.08	15.00	95.00	90.00	93	15	85	8.70	0.13	0.1	0.08	17.20	0.24	72.00	18	7	63.6
Median [4]		14.9		9.0		0.4		2420		15.60		0.87		95.00		66	11	63	7.1	0.13	0.10	0.08	12.10	0.21	72.00	10	6.6	63.6
Maximum [4]		17.4		9.5		0.5		>2420		21.70		1.08		106.00		93	15	85	8.7	0.23	0.20	0.11	17.20	0.24	87.00	18	7.0	169.2
Minimum [4]		14.0		7.5		0.3		1200		4.50		0.63		94.00		38	9	47	1.8	0.05	0.02	0.06	2.40	0.10	67.00	10	6.2	21.2
er Quality Exceedance (number of samples)		0		0		0		3		1		0		3														

Sieben Creek - Stormwater Outfall Monitoring - Commerical

		Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
WES ID and Location	Date	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)	Biological Oxygen Demand (mg/L)	Ammonia (mg/L)	Total Phosph-orus (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	9/17/16	16.9	18	8.7	6.5	0.5	10	93	406	10.70	20.00	0.97	15.00	91.00	90.00	51	11	41	6.00	0.18	0.1	0.03	6.00	0.09	73.00	10	6.5	18.4
#103 SE Oregon Trail Dr. Outfall	10/13/16	13.5	18	9.2	6.5	0.1	10	2420	406	4.80	20.00	0.60	15.00	55.00	90.00	35	7	50	1.00	0.05	<0.04	<0.04	1.80	0.07	40.00	8	6.4	69.3
#103 SE Oregon Trail Dr. Outfall	5/11/17	15.5	18	7.5	6.5	0.25	10	236	406	10.10	20.00	1.14	15.00	120.00	90.00	96	21	83	8.40	0.17	0.06	<0.04	7.20	0.25	90.00	18	6.6	75.1
Median [4]		15.5		8.7		0.3		236		10.10		0.97		91.00		51	11	50	6.0	0.17	0.06	0.02	6.00	0.09	73.00	10	6.5	69.3
Maximum [4]		16.9		9.2		0.5		2420		10.70		1.14		120.00		96	21	83	8.4	0.18	0.10	0.03	7.20	0.25	90.00	18	6.6	75.1
Minimum [4]		13.5		7.5		0.1		93		4.80		0.60		55.00		35	7	41	1.0	0.05	0.02	0.02	1.80	0.07	40.00	8	6.4	18.4
er Quality Exceedance (number of samples)		0		0		0		1		0		0		2														

Sieben Creek - Stormwater Outfall Monitoring - Multi-Family Residential

		Water Quality Standard Comparison														Additional Parameters of Concern										Supporting Parameters		
WES ID and Location	Date	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)	Biological Oxygen Demand (mg/L)	Ammonia (mg/L)	Total Phosph-orus (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	9/17/16	16.5	18	8.5	6.5	0.27	10	2420	406	21.00	20.00	0.76	15.00	34.00	90.00	57	19	45	4.40	0.13	0.13	0.05	15.90	0.04	21.00	9	7	26.3
#105 Sunnyside Village @Pond	10/13/16	13.9	18	7.8	6.5	0.38	10	2420	406	6.60	20.00	0.85	15.00	22.00	90.00	73	24	74	2.40	0.05	<0.04	0.04	2.80	0.05	11.00	15	6.5	68.3
#105 Sunnyside Village @Pond	5/11/17	15.4	18	7.5	6.5	0.29	10	378	406	23.80	20.00	0.28	15.00	26.00	90.00	74	9	68	5.80	0.062	0.08	0.07	20.50	0.06	24.00	23	6.5	33.1
Median [4]		15.4		7.8		0.3		2420		21.00		0.76		26.00		73	19	68	4.4	0.06	0.08	0.05	15.90	0.05	21.00	15	6.5	33.1
Maximum [4]		16.5		8.5		0.4		2420		23.80		0.85		34.00		74	24	74	5.8	0.13	0.13	0.07	20.50	0.06	24.00	23	7.0	68.3
Minimum [4]		13.9		7.5		0.3		378		6.60		0.28		22.00		57	9	45	2.4	0.05	0.02	0.04	2.80	0.04	11.00	9	6.5	26.3
er Quality Exceedance (number of samples)		0		0		0		2		2		0		0														

Notes

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

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 (2016-2017)

Pecan 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)	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)	Biological Oxygen Demand (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	9/16/16	N	Routine	12.3	18	9.2	6.5	1.8	10	308	406	0.14	0.14	0.70	6.12	8.83	0.01	1.54	39.60	1.00	80.94	80.28	154	7	160	43	0.1	<0.05	0.07	0.90	0.18	2.00	64	7.1	125.1
#11 Pecan Creek at SW Mossy Brae Rd	3/2/17	N	Routine	7.4	18	11.6	6.5	0.9	10	49	406	<0.04	0.14	0.50	3.11	4.19	0.04	0.64	16.40	2.00	41.39	41.05	87	4	108	22	0	<0.05	<0.04	1.00	0.34	5.00	29	7.2	90.7
#11 Pecan Creek at SW Mossy Brae Rd	3/16/17	N	Routine	7.7	18	11.4	6.5	0.76	10	15	406	<0.04	0.14	0.70	3.11	4.19	0.07	0.64	16.40	2.00	41.39	41.05	99	14	96	34	0.1	<0.05	<0.04	1.40	0.49	6.00	29	7.3	173.1
#11 Pecan Creek at SW Mossy Brae Rd	3/30/17	N	Routine	9.0	18	11.0	6.5	0.74	10	10	406	<0.04	0.14	0.60	3.38	4.59	0.05	0.71	18.32	2.00	44.99	44.62	95	6	118	23	0.1	<0.05	0.03	0.90	0.31	3.00	32	6.7	196.8
#11 Pecan Creek at SW Mossy Brae Rd	4/13/17	N	Routine	8.9	18	11.0	6.5	0.68	10	42	406	0.04	0.14	0.70	3.74	5.13	0.06	0.81	20.90	2.00	49.71	49.31	98	6	125	32	0.1	<0.05	0.03	1.20	0.31	2.00	36	7.3	115.1
#11 Pecan Creek at SW Mossy Brae Rd	4/27/17	N	Routine	9.7	18	10.9	6.5	0.72	10	59	406	0.04	0.14	0.70	3.56	4.86	0.05	0.76	19.61	2.00	47.36	46.98	90	16	109	24	0.2	<0.05	0.03	1.30	0.46	6.00	34	7.2	98.1
Median [4]				9.0		11.0		0.8		46		0.03		0.7			0.1			2.0			97	6	114	28	0.1	0.025	0.03	1.10	0.33	4.00	33	7.2	120.1
Maximum [4]				12.3		11.6		1.8		308		0.14		0.7			0.1			2.0			154	16	160	43	0.2	0.025	0.07	1.40	0.49	6.00	64	7.3	196.8
Minimum [4]				7.4		9.2		0.7		10		0.02		0.5			0.0			1.0			87	4	96	22	0.0	0.025	0.02	0.90	0.18	2.00	29	6.7	90.7
Water Quality Exceedance (number of samples)				0		0		0		0		1			0	0		0	0		0	0													
#11 Pecan Creek at SW Mossy Brae Rd	10/5/16	Y	Storm	12.6	18	7.2	6.5	0.6	10	2420	406	0.34	0.14	3.80	3.20	4.32	0.07	0.66	17.04	3.00	42.59	42.25	184	100	91	50	2.6	<0.05	0.09	9.70	2.93	28.00	30	7.3	382.0
#11 Pecan Creek at SW Mossy Brae Rd	12/20/16	Y	Storm	8.8	18	11.0	6.5	1.0	10	387	406	0.06	0.14	1.80	3.11	4.19	0.11	0.64	16.40	5.00	41.39	41.05	112	27	83	31	0.8	<0.05	0.05	3.60	0.91	11.00	29	7.09	180.2
#11 Pecan Creek at SW Mossy Brae Rd	2/16/17	Y	Storm	9.9	18	8.6	6.5	0.6	10	613	406	0.22	0.14	1.50	2.46	3.23	0.12	0.47	12.02	3.00	32.75	32.49	206	156	87	45	0.8	<0.05	0.04	6.00	3.57	26.00	22	6.8	187.6
Median [4]				9.9		8.6		0.6		613		0.22		1.80			0.11			3.00			184	100	87	45	0.8	0.025	0.05	6.00	2.93	26.00	29	7.1	187.6
Maximum [4]				12.6		11.0		1.0		2420		0.34		3.80			0.12			5.00			206	156	91	50	2.6	0.025	0.09	9.70	3.57	28.00	30	7.3	382.0
Minimum [4]				8.8		7.2		0.6		387		0.06		1.50			0.07			3.00			112	27	83	31	0.8	0.025	0.04	3.60	0.91	11.00	22	6.8	180.2
Water Quality Exceedance (number of samples)				0		0		0		2		2			1	0		0	0		0	0													

Notes

General:

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 (2016-2017)

Direct to Tualatin River - Stormwater Outfall Monitoring - Residential

			Water Quality Standard Comparison														Additional Parameters of Concern											Supporting Parameters		
WES ID and Location	Date	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)	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)	Biological Oxygen Demand (mg/L)	Ammonia (mg/L)	Total Phosph-orus (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	10/13/16	Storm	14.2	18	7.7	6.5	0.61	10	328	406	6.70	20.00	0.57	15.00	45.00	90.00	102	28	106	59	6.2	<0.05	0.1	0.06	3.40	0.05	29.00	29	6.6	165.5
#203 River Grove Boat Ramp	4/6/17	Storm	10.8	18	8.5	6.5	1.5	10	1410	406	2.80	20.00	0.40	15.00	13.00	90.00	151	8.8	148	69	0.47	<0.05	<0.04	0.05	1.70	0.03	9.00	66	6.5	125
#203 River Grove Boat Ramp	6/8/17	Storm	19	18	5.3	6.5	1.6	10	1550	406	4.30	20.00	0.44	15.00	29.00	90.00	146	12	133	51	1.1	<0.05	0.08	0.05	2.70	0.03	20.00	66	6.6	426
Median[4]			14.2		7.7		1.5		1410		4.30		0.44		29.00		146	12	133	59	1.10	0.03	0.08	0.05	2.70	0.03	20.00	66	6.60	165.5
Maximum[4]			19.0		8.5		1.6		1550		6.70		0.57		45.00		151	28	148	69	6.20	0.03	0.10	0.06	3.40	0.05	29.00	66.0	6.6	426.0
Minimum[4]			10.8		5.3		0.6		328		2.80		0.40		13.00		102	9	106	51	0.47	0.03	0.02	0.05	1.70	0.03	9.00	29.0	6.5	125.0
Water Quality Exceedance (number of samples)			0		0		0		2		0		0		0															

Notes

General:

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

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

NORTH

0 1 2 4 Miles

Brown AND Caldwell

OCTOBER 2017

FIGURE B-1. STORMWATER MONITORING LOCATIONS

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

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

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

NORTH

0 1 2 4 Miles

Brown AND Caldwell

OCTOBER 2017

FIGURE B-2. INSTREAM MONITORING LOCATIONS

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

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