

April 3, 2026

Pablo Martos, Municipal Stormwater Permit Coordinator  
Environmental Solutions Division  
Oregon Department of Environmental Quality  
700 NE Multnomah St., Suite 600  
Portland, Oregon 97232

RE: City of Gresham Permit Renewal Application Package, NPDES MS4 Permit #101315

Dear Pablo Martos:

On behalf of the City of Gresham, I am enclosing the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) discharge permit renewal application package with regard to our permit #101315, expiration date September 30, 2026.

As per Schedule B.4.b-h., the package contains the following:

1. Permit Renewal Submittal Overview
2. Updated Maps
3. TMDL Pollutant load reduction evaluation
4. TMDL Pollutant load reduction benchmarks
5. Updated estimate of total annual stormwater pollutant loads
6. Water Quality Trend Analysis
7. 303(d) pollutant evaluation
8. Service area expansion
9. Fiscal evaluation
10. Proposed modifications to Stormwater Management Program (SWMP)
11. Proposed changes to the Monitoring Plan
12. Maximum Extent Practicable (MEP) evaluation

If you have any questions about the contents of this package, please contact me at [Torrey.Lindbo@GreshamOregon.gov](mailto:Torrey.Lindbo@GreshamOregon.gov) or 503-618-2405.

Sincerely,



Torrey Lindbo  
Water Quality Program Manager  
Department of Environmental Services

cc: Kathy Majidi, Watershed and Parks Director  
Brian Staley, Assistant City Manager  
Eric Schmidt, City Manager

An impressionistic painting of a street scene. In the foreground, there are several trees with green and brown leaves, some supported by wooden stakes. A concrete curb runs along the edge of a road. The road surface is rendered with visible brushstrokes in shades of blue and grey, suggesting a wet or reflective surface. In the background, more trees and a glimpse of a building are visible. The overall style is textured and expressive.

# CITY OF GRESHAM

## MS4 Permit Renewal Submittal Application Package

National Pollutant Discharge Elimination System  
Permit #101315 | Expiration September 30, 2026

**National Pollutant Discharge Elimination System  
Permit No. 101315  
EPA Reference No. ORS108013  
Permit Renewal Submittal  
City of Gresham**

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



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Kathy Majidi  
Watershed & Parks Department Director  
City of Gresham

For additional information regarding this report, please contact:

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# CITY OF GRESHAM

## NPDES MS4 Permit Renewal Submittal Package

April 3, 2026

### 1. Permit Renewal Submittal Overview

The City of Gresham has compiled the following package of materials to meet the Permit Renewal Submittal requirements outlined in National Pollutant Discharge Elimination System (NPDES) Municipal Separated Storm Sewer System (MS4) permit #101315, issued by the Oregon Department of Environmental Quality, which is due 180 days prior to the permit expiration date of September 30, 2026.

To meet the requirements outlined in Schedule B.4.b-h, this Permit Renewal Submittal package is organized into the following sections found in Table 1-1 below.

**Table 1-1.** Page location of permit renewal sections

Permit Renewal Submittal Section	Page
1. Permit Renewal Submittal Overview	1
2. Updated Maps	2
3. TMDL Pollutant Load Reduction Evaluation	3
4. TMDL Pollutant Load Reduction Benchmarks	21
5. Updated Estimate of Total Annual Stormwater Pollutant Loads	30
6. Water Quality Trend Analysis	32
7. 303(d) Pollutant Evaluation	50
8. Service Area Expansion	78
9. Fiscal Evaluation	80
10. Proposed Modifications to Stormwater Management Program (SWMP)	83
11. Proposed Changes to Monitoring Plan	85
12. Maximum Extent Practicable (MEP) Evaluation	86

#### **Appendix A – Updated Maps**

- Map 1: Gresham Watersheds with Publicly Owned and Industrial Facilities
- Map 2: Gresham Land Use
- Map 3: Gresham Population and Projected Growth

#### **Appendix B – MEP Evaluation Criteria**

## 2. Updated Maps

MS4 permit schedule B.4.h requires:

*Updated MS4 maps, including the service boundary of the MS4, projected changes in land use and population densities, projected future growth, location of co-permittee-owned operations, facilities, or properties with storm sewer systems, and the location of facilities issued an industrial NPDES permit that discharge to the MS4.*

The City has much of the MS4 system information available on our publicly accessible website, Gresham Map (<https://www.greshamoregon.gov/services/maps-and-gis/>). For those items that are not always available, we also generated some maps which are included in the appendix to this report. The 3 maps in **Appendix A** are:

1. Map 1: Gresham Watersheds with Publicly Owned and Industrial Facilities
2. Map 2: Gresham Land Use
3. Map 3: Gresham Population and Projected Growth

Table 2-2 below summarizes where each required piece of information can be found.

**Table 2-2.** Location of map elements.

Requirement	Gresham Map	Map 1	Map 2	Map 3	Comments
Service boundary of the MS4	X	X	X	X	All maps show the current city boundary, as well as the plan areas that will eventually be annexed into the city.
Projected changes in land use	X		X		Current land use is shown on map 2. Gresham Map has zoning, which is what any currently vacant parcel in the city will become, or what newly annexed lands in the plan areas are slated to become.
Projected changes in population densities				X	Map 3 shows 2020 census data, as well as projections of population change from 2020 to 2030.
Projected future growth	X	X	X	X	Growth will occur within the existing city boundary, as well as the plan areas noted on each map.
Location of co-permittee-owned operations, facilities, or properties with storm sewer systems	X	X			City owned properties and the MS4 system are all available on Gresham Map, but map 1 provides an easy visual of where all city-owned properties are located.
Location of facilities issued an industrial NPDES permit		X			Map 1 shows the locations of all 1200-Z businesses, based on information provided by DEQ.

## 3. TMDL Pollutant Load Reduction Evaluation

This portion of Gresham’s permit renewal submittal is being submitted to DEQ to meet the TMDL Pollutant Load Reduction Evaluation requirement in the MS4 permit.

### 3.1 Permit requirements

**TMDL Pollutant Load Reduction Evaluation** requirement in Schedule D.3.c.:

*Progress towards reducing TMDL pollutant loads must be evaluated by the co-permittee through the use of a pollutant load reduction empirical model, water quality status and trend analysis, and other appropriate qualitative or quantitative evaluation approaches identified by the co-permittees. The results of the TMDL pollutant load reduction evaluation must be described in a report and submitted to DEQ with the MS4 Permit Renewal Application Package, in accordance with Schedule B.4. As indicated above in Schedule D.3.b.v, this exercise does not need to include mercury due to insufficient data volume. The report must contain the following;*

- i. The rationale and methodology used to evaluate progress towards reducing TMDL pollutant loads.*
- ii. An estimate of current pollutant loadings without considering BMP implementation, and an estimate of current pollutant loadings considering BMP implementation for each TMDL parameter with an established WLA. The difference between these two estimated loads is the pollutant load reduction.*
- iii. A comparison of the estimated pollutant loading with and without BMP implementation to the applicable TMDL WLA.*
- iv. A comparison of the estimated pollutant load reduction to the estimated TMDL pollutant load reduction benchmark established for the permit term, if applicable.*
- v. A description of the estimated effectiveness of structural BMPs.*
- vi. A description of the estimated effectiveness of non-structural BMPs, if applicable, and the rationale for the selected approach.*
- vii. A water quality trend analysis, as sufficient data are available, and the relationship to stormwater discharges for receiving waterbodies with the permittee’s jurisdictional area with an approved TMDL. If sufficient data to conduct a water quality trend analysis is unavailable for a receiving waterbody, the permittee must describe the data limitations. The collection of sufficient data must be prioritized and reflected as part of the monitoring project/task proposal required in Schedule B.4.e.*
- viii. A narrative summarizing progress towards the applicable TMDL WLAs and existing TMDL benchmarks, if applicable. If the co-permittee estimates that an existing TMDL benchmark was not achieved during the permit term, the co-permittee must apply their adaptive management process to reassess the SWMP and current BMP implementation in order to address TMDL pollutant load reduction over the next permit term; and,*
- ix. If a co-permittee estimates that TMDL WLAs are achieved with existing BMP implementation, the permittee must provide a statement supporting this conclusion.*

### 3.2 TMDL Pollutants

The TMDL parameters that apply to Gresham vary by watershed. The following table shows the current TMDL pollutants along with the current state water quality standard and the Waste Load Allocation (WLA) from the TMDL plan.

**Table 3-1.** Total Maximum Daily Loads (TMDLs) by watershed with Waste Load Allocations (WLAs) and current progress towards meeting WLA (based on 2025 TMDL Pollutant Load Reduction Evaluation). Constituents listed as “possibly” meeting the WLA are where the lower margin of error for the pollutant load would meet the WLA.

Waterbody	Constituent	Waste Load Allocation (WLA)	Meeting WLA
Willamette	Mercury*	75% reduction in total mercury	No
Columbia Slough	DO	BOD <sub>5</sub> load range 198 to 2608 kg/day	No
	Phosphorus	0.1549 mg/L (Upper Slough, spring and fall) 7.7 to 22.1 kg/day	No
	pH	TMDL for total phosphorus	N/A
	Lead	0.065 to 0.4397 kg/day dissolved lead based on flow and not normalized for area	No
	Bacteria	1.75 x 10 <sup>11</sup> to 7.51 x 10 <sup>11</sup> MPN/day, depending on flow and not normalized for area	No
	Chlorophyll-a	TMDL for total phosphorus	N/A
	DDT/DDE	3.24x10 <sup>-6</sup> kg/day (not normalized for area). A surrogate TSS concentration of 50 mg/L was applied	Possibly
	Dioxin (2,3,7,8 TCDD)	1.31x10 <sup>-9</sup> kg/day (not normalized for area). A surrogate TSS concentration of 50 mg/L was applied	Possibly
	PCBs	5.3 x10 <sup>-6</sup> kg/day (not normalized for area). A surrogate TSS concentration of 50 mg/L was applied	Possibly
	Dieldrin	9.6x10 <sup>-6</sup> kg/day (not normalized for area). A surrogate TSS concentration of 50 mg/L was applied	Possibly
Fairview	Bacteria	66% reduction in <i>E. coli</i>	No
Johnson	Bacteria	78% reduction in <i>E. coli</i>	No
	DDT/DDE	77% reduction in DDT	Possibly
	Dieldrin	77% reduction in DDT**	Possibly
Kelly/Beaver	Bacteria	86% reduction in <i>E. coli</i>	No

\*Per Schedule D.3.b.iii, “Due to data limitations, mercury benchmarks are not applicable in the first permit cycle after the TMDL is finalized.” The City has been collecting mercury data in stormwater and stream samples, however, land use based data and BMP removal data might still be lacking for modeling pollutant loads in the future. Since the two primary sources of mercury are air deposition and soil erosion, load reductions would be related to BMPs reducing TSS.

\*\*DDT and Dieldrin are highly correlated in the TMDL data and ensuing studies; therefore the TMDL considers that BMPs which address DDT will also address Dieldrin.

Pollutant load reduction benchmarks are required for TMDL pollutants where existing BMP implementation is not achieving the WLA. The TMDL Pollutant Load Reduction Evaluation section of this Permit Renewal Submittal shows that 1) the City had achieved our pollutant load reduction benchmark goals for the 5-year permit term, but 2) cannot definitively say we are achieving the WLA for any of the established TMDLs. Table 3-1 summarizes the relationship between the TMDL waste load allocations and the TMDL benchmark for each applicable TMDL parameter.

Because the WLA is likely not being achieved for any of the TMDL waterbodies, this document provides the rationale and pollutant load reduction strategies the City will take during the next permit term to achieve additional progress towards the TMDL WLAs.

### 3.3 Pollutant Load Model and Assumptions

The same spreadsheet model used to calculate the pollutant load reduction benchmarks for past submittals (see Table 3-6 for summary) was updated and used for this Pollutant Load Reduction Evaluation. This document evaluates the pollutant load reduction estimates with and without BMPs being implemented within the City of Gresham currently compared to the projected reductions the City committed to making by the end of the 5-year permit term when the last benchmarks were submitted. For consistency, these pollutant reduction estimates use the same model assumptions as the last submittal, with the exception of changes/updates noted below.

#### 3.3.1 Model Overview

The spreadsheet model for estimating pollutant loads is based on the EPA Simple Method (Schueler 1987), which is commonly used for estimating pollutant loads for urban land uses. The two equations required to calculate pollutant loads for each specified pollutant are:

1. Runoff coefficient equation:

$$Rvu = 0.05 + (0.009 \times lu)$$

where,

$Rvu$	=	Runoff coefficient for land use type $u$ (fraction of rainfall becoming runoff)
$lu$	=	Percent Imperviousness for land type $u$

The percent imperviousness values used for each watershed are listed in **Table 3-3**.

2. Pollutant load equation:

$$L = \sum u (P \times Pj \times Ru \times Cu \times Au \times [2.72/12])$$

where,

$L$	=	Total pollutant load for all land use types in watershed, $u$ (pounds/year)
$P$	=	Precipitation (inches/day or year)
$Pj$	=	Ratio of storms producing runoff (assume 0.9, since this accounts for evaporation and other losses)
$Ru$	=	Runoff coefficient for land use type $u$ (fraction of rainfall becoming runoff)
$Cu$	=	Event Mean Concentration for land use type $u$ (milligrams/liter)
$Au$	=	Area of land use type $u$ (acres)
12	=	conversion factor to convert inches to feet
2.72	=	conversion factor from mg/L and acre-feet to pounds

3. Stormwater runoff volume equation:

$$V = \sum u (P \times Pj \times Rvu \times Au \times [43560/12])$$

where,

$V$	=	Stormwater volume for all land use types in watershed, (ft <sup>3</sup> /year)
$P$	=	Precipitation (inches/year)
$Pj$	=	Ratio of storms producing runoff (assume 0.9, since this accounts for evaporation and other losses)
$Ru$	=	Runoff coefficient for land use type $u$ (fraction of rainfall becoming runoff)
$Au$	=	Area of land use type $u$ (acres)
12	=	conversion factor to convert inches to feet
43560	=	conversion factor from acre-feet

The model was used to estimate current and future pollutant loads under two scenarios: 1) assuming no structural BMPs in place and 2) with structural BMPs in place. Quantitative data is not currently available to assess the effectiveness of non-structural BMPs, so only structural BMPs are included in the model results.

### 3.3.2 Modeled Rainfall

An annual rainfall value of 45.48” was used in the pollutant load model. This is the same value used in past pollutant load calculations and was used again to maximize comparability between current and past pollutant load estimates. Since the Columbia Slough has flow-based waste load allocations, benchmarks for the Slough are based on a 24-hour design storm of 0.51” as opposed to the pollutant load estimates which are based on the 45.48” annual rainfall – this is also the same assumption used in past calculations.

### 3.3.3 Land Use Data

**Table 3-2** shows the land use acres by watershed within the city. There are some differences in land use totals between 2013 and 2025, primarily due to:

1. Updated watershed basins to be more consistent with the USGS HUC-12 watershed boundaries. Areas that the City had previously considered to be West Gresham or Columbia Slough are now included in the Johnson Creek watershed, however, much of this area drains to UICs, so it doesn’t make a big difference in the MS4 areas within each watershed.
2. The USGS watershed basin map change also included a new “basin” area that the City had previously lumped into Fairview Creek/Columbia Slough – this area is shown on the watershed map in section 2 of this Permit Renewal Submittal as the “Lake River Frontal Columbia River.” As this area within Gresham consists primarily of lands along Marine Drive that drain directly to the Columbia River, they were not considered in the benchmark calculations (approx. 17 acres total).
3. Simplifying the variety of detailed land use types to the simplified categories used in the model can sometimes result in differences in acreage of each land use type from one model period to the next. For example Downtown Mixed Use, Civic Neighborhood Transit Moderate Density, and Corridor Mixed Use were all considered “Commercial” land use, even though they could end up being Multi-family Residential.

**Table 3-2. Land use acres used in 2025 pollutant load calculations.** Acres which drain fully to UICs and have no connection to MS4 system are not included in land use values.

Land Use	Columbia Slough*	Fairview	Johnson Creek	Kelly/Beaver Creek
Agriculture	0	0	0	0
Industrial	980	220	119	1
Commercial	122	312	241	275
Parks & Open Space	74	186	484	282
Undeveloped	320	242	819	175
Residential	293	677	2,443	1,604
Multi-family Res	200	240	244	418
Natural Areas	16	151	1,184	76
<b>MS4 Total</b>	<b>2,006</b>	<b>2,023</b>	<b>5,534</b>	<b>2,831</b>
UIC Total	909	751	1,012	36
Total Acres	2,915	2,779	6,546	2,867

\*Values shown for Columbia Slough do not include Fairview Creek, however, these acres were included in all Columbia Slough pollutant load calculations.

**Natural Areas:**

Based on an evaluation of land uses in 2014, the City determined that some watersheds, like Johnson Creek, have large parcels of protected natural area that function differently than parks and open spaces utilized for recreational purposes – the primary difference being that these areas have natural vegetation and no impervious area. In order to more accurately reflect the function of natural areas, these areas were delineated separately and given an impervious percentage of 0% (which results in reduced runoff and therefore load based on the equation used to calculate runoff coefficients).

**UIC Area:**

The City has a WPCF permit for operation of 1,100 drywells (which are classified as Underground Injection Control devices, UICs). The area of the city where most public UICs exist do not have an MS4 system, so no runoff from the “designated drywell area” can enter surface water bodies and the UIC area is not included in this model.

There are some areas where UICs are used for stormwater management that have an overflow to the MS4 system. Any place where UICs could overflow to the MS4 system were treated like other infiltration-based BMPs (e.g. pervious pavement, rain gardens, areas with downspout disconnection) – they were included in the model and it is assumed that they infiltrate 100% of the design storm (which is 80% of the annual rainfall) – but some pollutant load is generated by these areas for the 20% of the annual rainfall assumed to not be treated by the BMP.

The imperviousness values used for each land use are listed in Table 3-3. These values are the same as those used in 2008 and 2014 to ensure that model results are as comparable as possible. The original values were pulled from stormwater master plans the City had conducted in the 2000’s. City staff know that some of these values are likely much lower than the imperviousness being created in newer developments, but chose to keep this model assumption the same to ensure model inputs were as consistent as possible.

**Table 3-3: Imperviousness Values Used in Model**

Land Use Category	Columbia Slough	Fairview Creek	Johnson Creek	Kelly/Beaver Creek
Agriculture	2%	NA	5%	10%
Residential	35%	35%	35%	35%
Multi-family Residential	60%	60%	55%	60%
Commercial	85%	90%	90%	90%
Industrial	75%	70%	90%	70%
Vacant	2%	10%	5%	10%
Parks & Open Space	2%	10%	5%	10%
Natural Areas	0%	0%	0%	0%

**3.3.4 Event Mean Concentrations (EMCs)**

The same land use event mean concentrations (EMCs) were used in this round of calculations as those submitted in 2008 and 2014. The initial source of the land use concentration data (in **Table 3-4**) was the ACWA report titled Analysis of Oregon Urban Runoff Water Quality Monitoring Data Collected from 1990 to 1996. This report included a compilation and summary of all of the land use stormwater runoff data collected by the Oregon Phase I NPDES MS4 permittees under the original permit.

**Table 3-4: Summary of ACWA Land Use Event Mean Concentrations (EMCs)**

Parameter	Land Use <sup>3</sup>	Count	Bootstrapped MEAN		
			95% L-CI	Mean	95% U-CI
<b>Cu,T</b> µg/L	C	63	20.8	28.6	38.2
	I	26	33.8	45.5	58.0
	POS	93	2.0	2.5	3.0
	R	53	10.5	13.4	17.1
	T	23	25.4	34.6	45.7
<b>Pb,d</b> µg/L	C	48	3.2	4.97	7.38
	I	21	1.52	2.58	3.77
	POS	76	0.109	0.118	0.128
	R	27	1.23	1.80	2.53
	T	23	1.26	3.59	7.71
<b>Pb,T</b> µg/L	C	55	37.8	54.0	72.7
	I	22	32.7	48.3	67.0
	POS	93	0.6	0.82	1.08
	R	48	11	17.7	27.6
	T	22	37.1	63.1	98.8
<b>Zn,T</b> µg/L	C	58	130	170	217
	I	24	283	674	1353
	POS	93	6.3	7.8	9.5
	R	54	77	104	134
	T	27	146	203	265
<b>BOD</b> mg/L	C	57	8.5	11.9	16.6
	I	23	26.1	39.6	56.1
	POS	57	2.0	2.0	2
	R	46	5.9	8.1	10.8
	T	16	10.0	17.9	29.1
<b>NO3</b> mg/L	C	46	0.27	0.38	0.53
	I	22	0.18	0.24	0.31
	POS	263	1.36	1.51	1.66
	R	32	0.60	0.91	1.33
	T	22	0.28	0.42	0.58
<b>Ortho-P</b> mg/L	C	46	0.085	0.108	0.137
	I	21	0.101	0.173	0.265
	POS	261	0.037	0.040	0.042
	R	30	0.079	0.112	0.148
	T	22	0.043	0.088	0.177
<b>TP</b> mg/L	C	65	0.28	0.38	0.50
	I	31	0.40	0.51	0.64
	POS	263	0.095	0.12	0.15
	R	53	0.23	0.34	0.48

	T	21	0.29	0.37	0.46
<b>TSS</b>	C	65	64	82	103
mg/L	I	25	117	184	284
	POS	263	16	31	50
	R	54	44	66	99
	T	23	124	169	227
<b>E. coli</b>	C	50	573	1247	2409
CFU/100 mL	I	28	154	438	1004
Geomean	POS	65	57	87	124
	R	41	970	1656	2651
	T	23	686	1507	2962
<b>DDT</b>	All	21	1.2	2.95	4.73
ng/L					

<sup>3</sup>Land Uses:

C = Commercial

R = Residential

POS = Parks & Open Space

I = Industrial

T = Transportation

The land use EMC for RES was used for MRES. The EMC for POS was used for VAC. All roadways had the adjacent land use extended to the centerline of roadway, so no areas were modeled using the Transportation land use. No AGR land was found in the current land use designations, but in the past, the EMC for COM was used for AGR land use.

### 3.3.5 Best Management Practices

Since the last pollutant load reduction benchmarks were calculated and submitted to DEQ in 2014, the City has continued to improve the accuracy of the BMP inventory within the City, including corrections and updates to facility types contained in GIS compared to what is known about facilities based on public and private facility inspections. The City uses our GIS system to track the locations of all structural BMPs, and also delineates a treatment area for all of the area treated by each BMP.

#### 3.3.5.1 Structural BMPs

The structural BMPs modeled in this submittal are the same as those included in the previous calculations, including 8 structural BMPs used in the original calculations: 1) Hydrodynamic Devices, 2) Filters, 3) Dry Pond, 4) Wet Pond, 5) Swale, 6) Wetlands, 7) Sedimentation Manholes, and 8) Regional Facilities. Areas of the City draining to drywells (UICs) were omitted from the modeled area, with the exception of UICs that have the potential to overflow into the MS4.

Green infrastructure BMPs were also modeled, including ecoroofs, rain gardens (both lined and infiltration) and pervious pavement. All infiltration-based BMPs (UICs that overflow to MS4, pervious pavement, rain gardens and downspout disconnection) were lumped together into a single category that was assumed to infiltrate the 80% annual rainfall design storm. Rain gardens installed in less porous soils, or those lined due to steep slopes or contamination, were assumed to only have a 30% volume reduction, and ecoroofs were assumed to have a 50% volume reduction.

The BMP effluent concentrations and flow reduction assumptions that were used in past pollutant load calculations were used again in this submittal. In the pervious benchmark submittal, the City included a few “hybrid” treatment BMPs added for those areas of the city treated by multiple BMPs. For example, there are some areas within the larger regional facility treatment areas that are also treated by a filter, swale, or other BMP. Similarly, there are also areas treated by ponds (that are not “regional facilities”) that also get treated by a filter,

which provides better water quality than the pond. The rationale for using these hybrid treatment areas is to ensure that areas treated by multiple BMPs get adequate credit for the most effective BMP they are treated by.

**Table 3-5. BMP Effluent Values used in Model**

Parameter	TSS	TP	ortho-P	E. coli	Cu, T	Pb,d	Pb,T	Zn,T	BOD	Flow Red
Units	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	%
Hydrodynamic Devices	115	0.22	0.06	5587	0.0142	0.00222	0.0132	0.0943	6	0%
Filter	42	0.15	0.09	91	0.0057	0.00013	0.008	0.015	3.4	0%
Dry Pond	44	0.34	0.12	1922	0.0225	0.00246	0.0328	0.1225	12.2	23%
Wet Pond	41	0.17	0.04	499	0.0076	0.00013	0.0024	0.077	6.1	5%
Swale	24	0.21	0.09	1922	0.0114	0.0005	0.0072	0.0483	5.4	29%
Wetlands	25	0.15	0.10	499	0.0076	0.00013	0.0024	0.0483	6.1	0%
Sed MH	66	0.22	0.06	5587	0.0147	0.00026	0.0091	0.092	6	0%
Ecoroofs	5	0.48	0.39	20	0.0121	0.00031	0.0011	0.0201	2.4	50%
Lined Planters/RG	42	0.15	0.09	91	0.0057	0.00013	0.008	0.015	3.4	30%
RG/Por Pav/UIC	1000	1000	1000	10000	10000	10000	10000	10000	1000	100%
Regional Facility	11	0.09	1000	576	1000	0.00023	1000	1000	3	0%
Filter + Dry Pond	42	0.15	0.09	91	0.0057	0.00013	0.008	0.015	3.4	23%
Filter + Wet Pond	42	0.15	0.09	91	0.0057	0.00013	0.008	0.015	3.4	5%
Filter + Swale	42	0.15	0.09	91	0.0057	0.00013	0.008	0.015	3.4	29%
Regional + Filter	11	0.09	0.09	91	1000	0.00013	1000	1000	3	0%
Regional + Dry Pond	11	0.09	1000	576	1000	0.00023	1000	1000	3	23%
Regional + Wet Pond	11	0.09	1000	499	1000	0.00013	1000	1000	3	5%
Regional + Swale	11	0.09	1000	576	1000	0.00023	1000	1000	3	29%

Note that the gray values above are placeholder values for parameters where there is either no available BMP effluent data, or in the case of “Rain Garden/Porous Pavement/UIC” where the effluent concentration is unimportant since 100% of the volume is reduced. The reason these values are very high is so that the spreadsheet model will evaluate the land use EMC value versus the BMP effluent value, and use the lower value – so in the case of those shown in gray, the model would use the EMC value.

### 3.3.5.2 Non-Structural BMPs

When the 2008 benchmarks were calculated, two non-structural BMPs were accounted for: 1) areas of the city receiving weekly street sweeping were assumed to have a 10% reduction in the pollutant concentrations, and 2) estimates were made for TSS reductions due to improvements in the City’s erosion inspection program using assumptions based on the universal soil loss equation. The City continues to run a highly effective erosion prevention and sediment control (EPSC) program, but chose not to account for additional reductions in pollutant loads from those BMPs starting in 2014. The estimated load reductions from these and other nonstructural BMPs

are likely reducing loads to somewhere between the mean and lower value of the ranges displayed in **Figures 3-1** through **3-9**. Other non-structural BMPs implemented as part of the City’s SWMP (e.g. education and outreach program, spill response, etc.) are difficult to quantify in terms of pollutant load reduction, but remain important components of our program.

### 3.4 Pollutant Load Reduction Results and Discussion

Figures 3-1 through 3-9 show the pollutant loading estimates with and without BMP implementation and compare those to the applicable TMDL WLA. Included on each figure is the pollutant load reduction benchmark the City of Gresham committed to meeting with the last benchmark submittal. **Table 3-6** is provided to summarize how various pollutant load reduction evaluation and benchmark calculations that have been submitted, and how those relate to permit dates and the land use values used in the calculations.

**Table 3-6. Summary of Pollutant Load Reduction Evaluations (PLRE) and Benchmark Submittals**

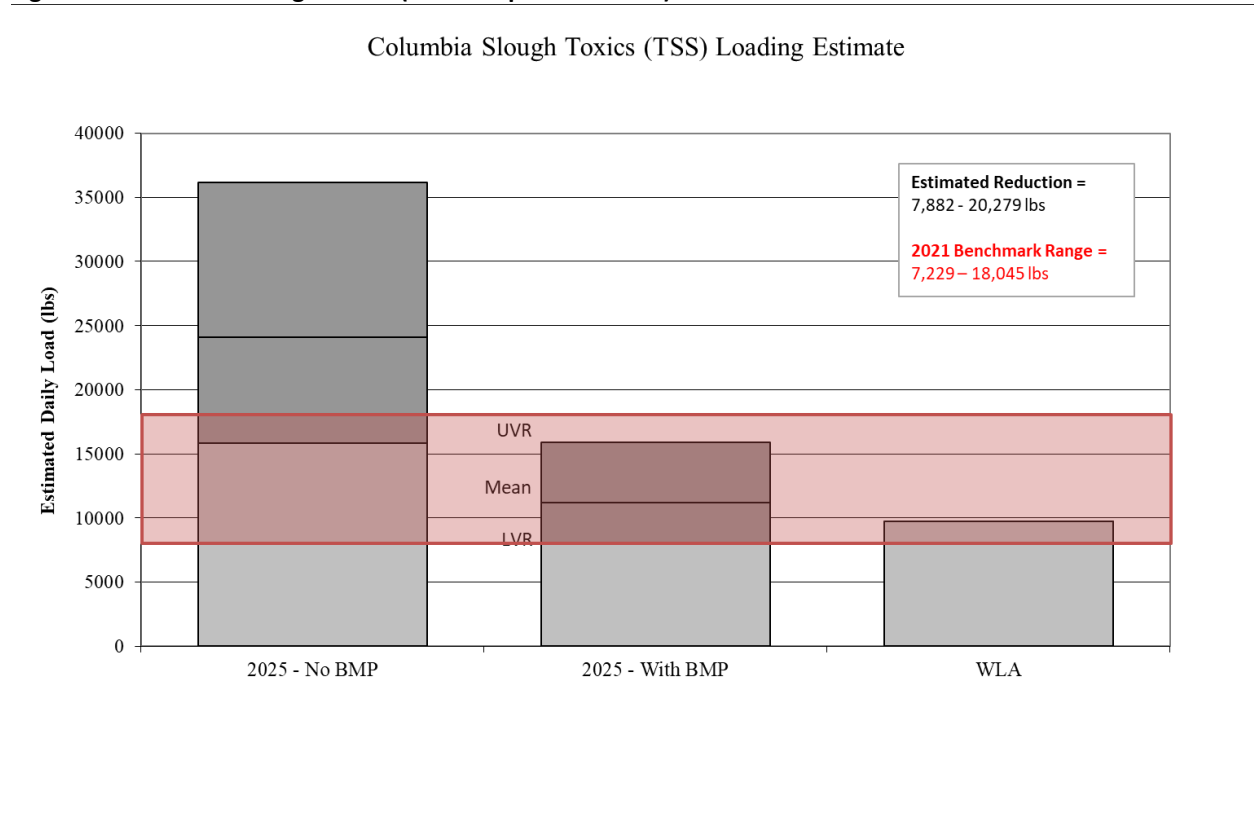
Submittal Year	Submittal Name	Benchmark Dates	Notes
1992	Original NPDES Permit Application	NA	Benchmarks not required in CFRs
Original Permit: 1995-2000			
2000	Permit Renewal Submittal	NA	DEQ sent a letter outlining what was due for renewal; benchmarks not included
<i>Administrative extension of 2000 permit until permit issued in 2004.</i>			
Permit 2.0: 2004-2009 (reissued in 2005, but 2009 expiration date remained)			
2006	Interim Evaluation Report (IER)	2005-2025	Benchmarks introduced in the 2004 permit, and were first due in 2006 with IER.
2008	Permit Renewal Submittal	2008-2013	Updated benchmarks required with permit renewal submittal
Permit 3.0: 2010-2015 (separated the benchmarks and pollutant load reduction evaluation)			
2014	Annual Report 4 of 2010 permit	2013-2021	2010 permit required an evaluation of whether benchmarks set in the previous submittal were met – the Pollutant Load Reduction Evaluation (PLRE)
2015	Permit Renewal Submittal	2013-2021	Benchmarks due the year after PLRE was submitted. Since the benchmarks use same model as PLRE, the same 2013 land use data was used and so the 5-year benchmarks are labeled as “2021 benchmarks” in this document, but were technically commitments for the current permit term (2021-2026)
<i>Administrative extension of 2010 permit until permit issued in 2021.</i>			
Permit 4.0: 2021-2026			
2026	Permit Renewal Submittal	2025-2030	Permit application due in spring 2026, so benchmark work was based on 2025 land use values.

The benchmarks submitted in 2015 consist of a range between the upper and lower 95% confidence intervals calculated for the load estimates with and without BMPs. Each of the following graphs shows the current estimated pollutant reduction along with the benchmark range, which is displayed on each figure as a reddish box. The red “target” box shows the load reduction submitted in 2015 benchmarks to be reduced during the current permit term; this is provided as a visual way to represent the current load estimate compared to the pollutant load reduction commitment made during the last permit renewal.

### 3.4.1 Columbia Slough Toxics (TSS)

**Figure 3-1** shows the current pollutant loading estimate for TSS in Columbia Slough. Pollutant loads and benchmark values are shown with the mean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

**Figure 3-1. Columbia Slough Toxics (Total Suspended Solids) Load Estimate**

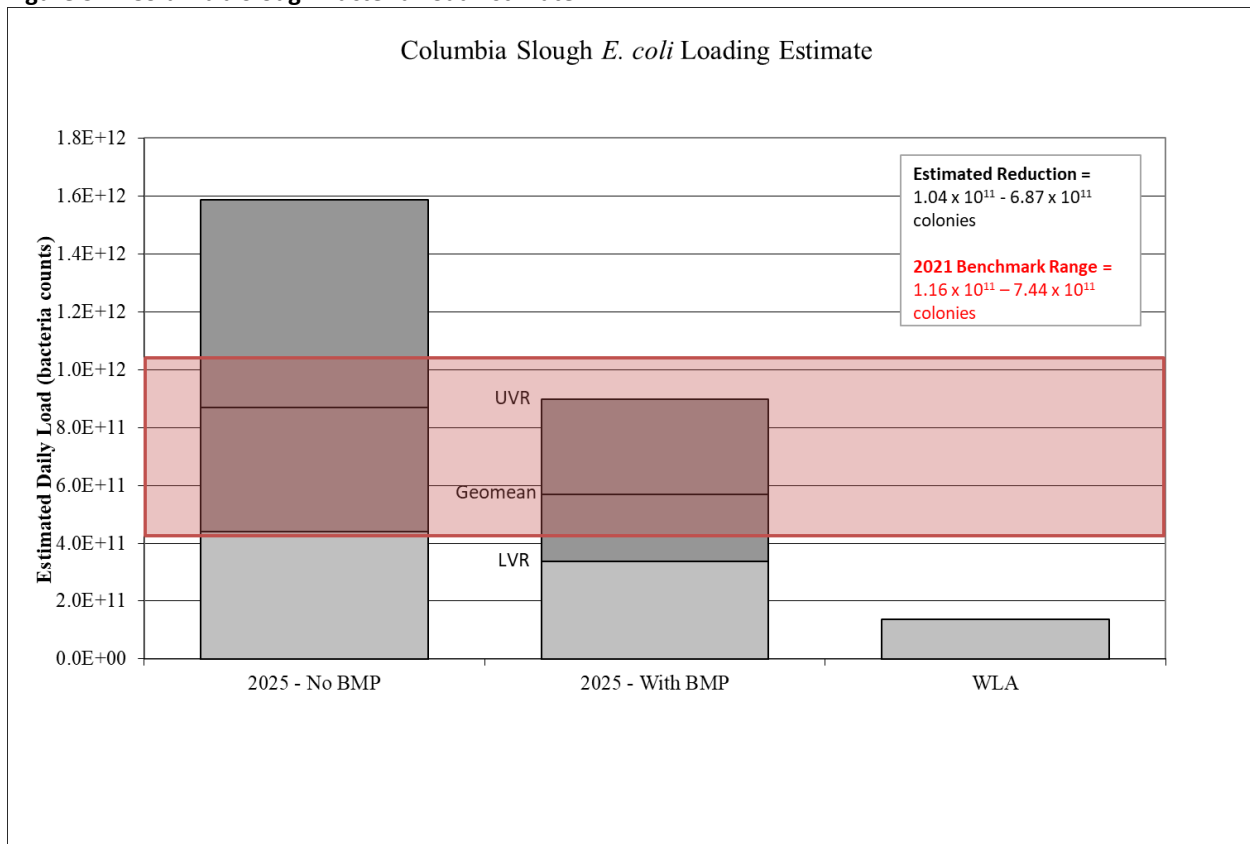


The estimated pollutant load reduction under current conditions with and without structural BMPs is 7,882 – 20,279 lbs/day. The pollutant load reduction benchmark established for the permit term is 7,229 – 18,045 lbs/day. The current pollutant load estimate is within the benchmark reduction target for the permit term, and the lower range of the estimated load with BMPs suggests that it could be meeting the wasteload allocation (WLA).

### 3.4.2 Columbia Slough Bacteria

Figure 3-2 shows the current pollutant loading estimate for *E. coli* in Columbia Slough. Pollutant loads and benchmark values are shown with the geomean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

Figure 3-2. Columbia Slough Bacteria Load Estimate

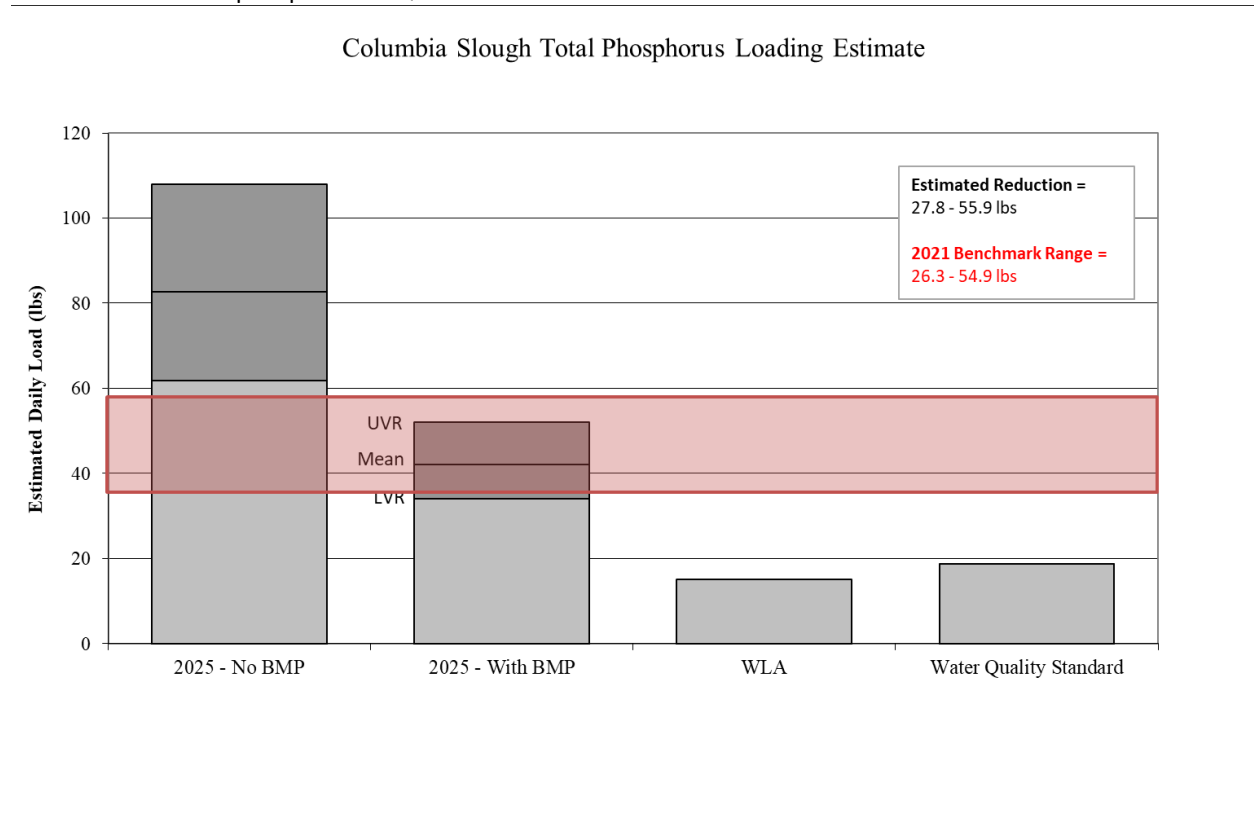


The estimated pollutant load reduction under current conditions with and without structural BMPs is  $1.06 \times 10^{11}$  –  $6.87 \times 10^{11}$  colonies/day. The pollutant load reduction benchmark established for the permit term is  $1.16 \times 10^{11}$  –  $7.44 \times 10^{11}$  colonies/day. The current pollutant load estimate is within the benchmark reduction target for the permit term, although the estimated load does not indicate that the wasteload allocation (WLA) is yet being achieved.

### 3.4.3 Columbia Slough Total Phosphorus

**Figure 3-3** shows the current pollutant loading estimate for total phosphorus in Columbia Slough. Pollutant loads and benchmark values are shown with the mean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

**Figure 3-3. Columbia Slough Total Phosphorus Load Estimate.** Because the WLA for total phosphorus in the Slough is more stringent than the water quality standard, an additional bar is shown for what the load would be if stormwater met the phosphorus WQ standard.

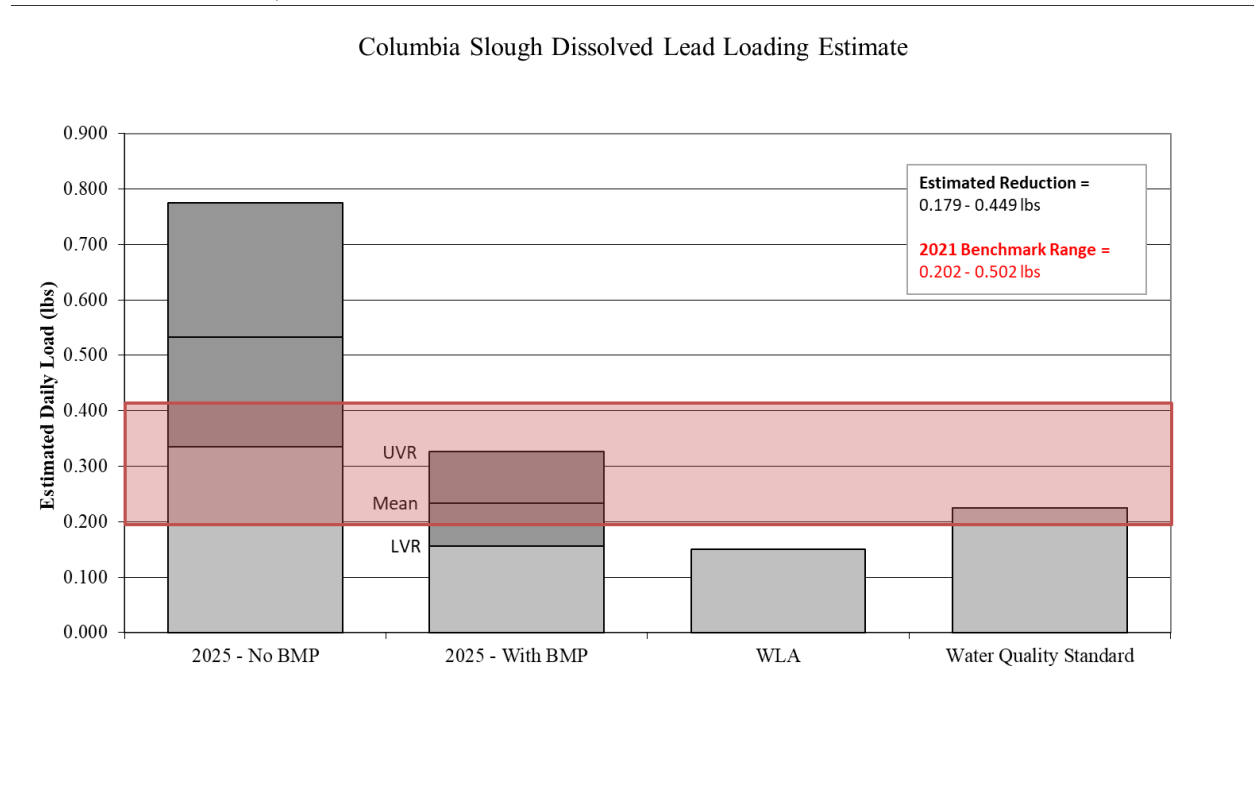


The estimated pollutant load reduction under current conditions with and without structural BMPs is 27.8 – 55.9 lbs/day. The pollutant load reduction benchmark established for the permit term is 26.3 – 54.9 lbs/day. The current pollutant load estimate is within the benchmark reduction target for the permit term, although the estimated load does not indicate that the wasteload allocation (WLA) is yet being achieved.

### 3.4.4 Columbia Slough Dissolved Lead

**Figure 3-4** shows the current pollutant loading estimate for dissolved lead in Columbia Slough. Pollutant loads and benchmark values are shown with the mean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

**Figure 3-4. Columbia Slough Dissolved Lead Load Estimate.** Because the WLA for dissolved lead in the Slough is more stringent than the water quality standard, an additional bar is shown for what the load would be if stormwater met the WQ standard.

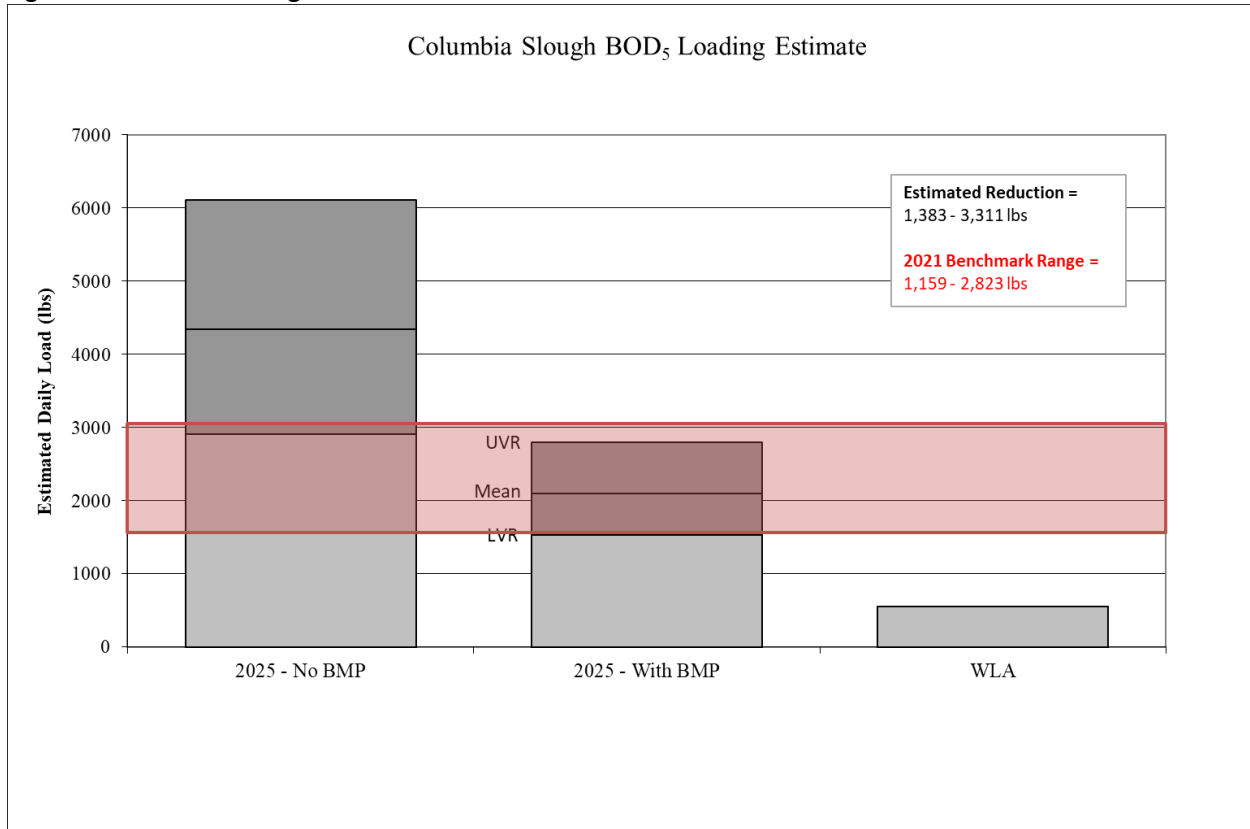


The estimated pollutant load reduction under current conditions with and without structural BMPs is 0.179 – 0.449 lbs/day. The pollutant load reduction benchmark established for the permit term is 0.202 – 0.502 lbs/day. The current pollutant load estimate is within the benchmark reduction target for the permit term, although the estimated load does not indicate that the wasteload allocation (WLA) is yet being achieved. The lower end of estimated load with BMPs indicates that the load could be meeting the water quality standard.

### 3.4.5 Columbia Slough BOD<sub>5</sub>

**Figure 3-5** shows the current pollutant loading estimate for BOD<sub>5</sub> in Columbia Slough. Pollutant loads and benchmark values are shown with the mean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

**Figure 3-5. Columbia Slough BOD<sub>5</sub> Load Estimate**

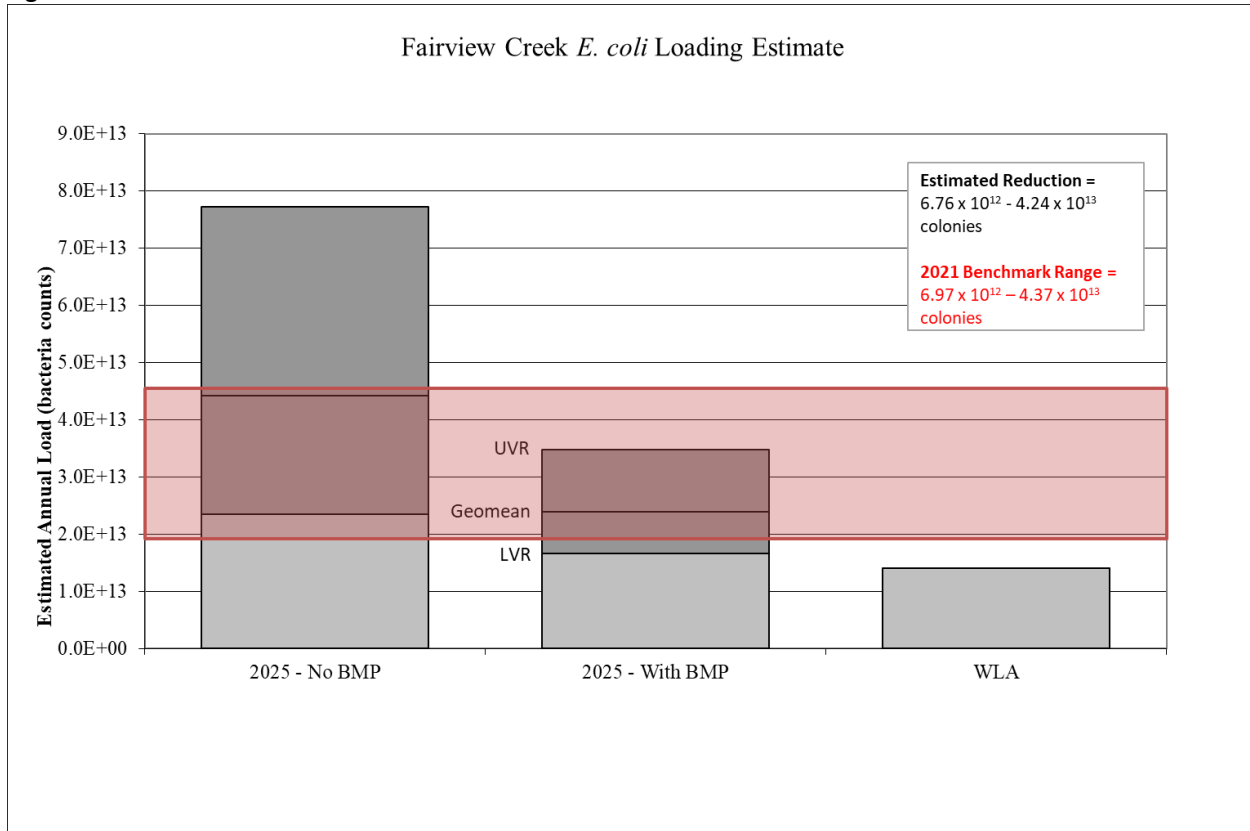


The estimated pollutant load reduction under current conditions with and without structural BMPs is 1,383 – 3,311 lbs/day. The pollutant load reduction benchmark established for the permit term is 1,159 – 2,823 lbs/day. The current pollutant load estimate is within the benchmark reduction target for the permit term, although the estimated load does not indicate that the wasteload allocation (WLA) is yet being achieved.

### 3.4.6 Fairview Creek Bacteria

Figure 3-6 shows the current pollutant loading estimate for *E. coli* in Fairview Creek. Pollutant loads and benchmark values are shown with the geomean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

Figure 3-6. Fairview Creek Bacteria Load Estimate

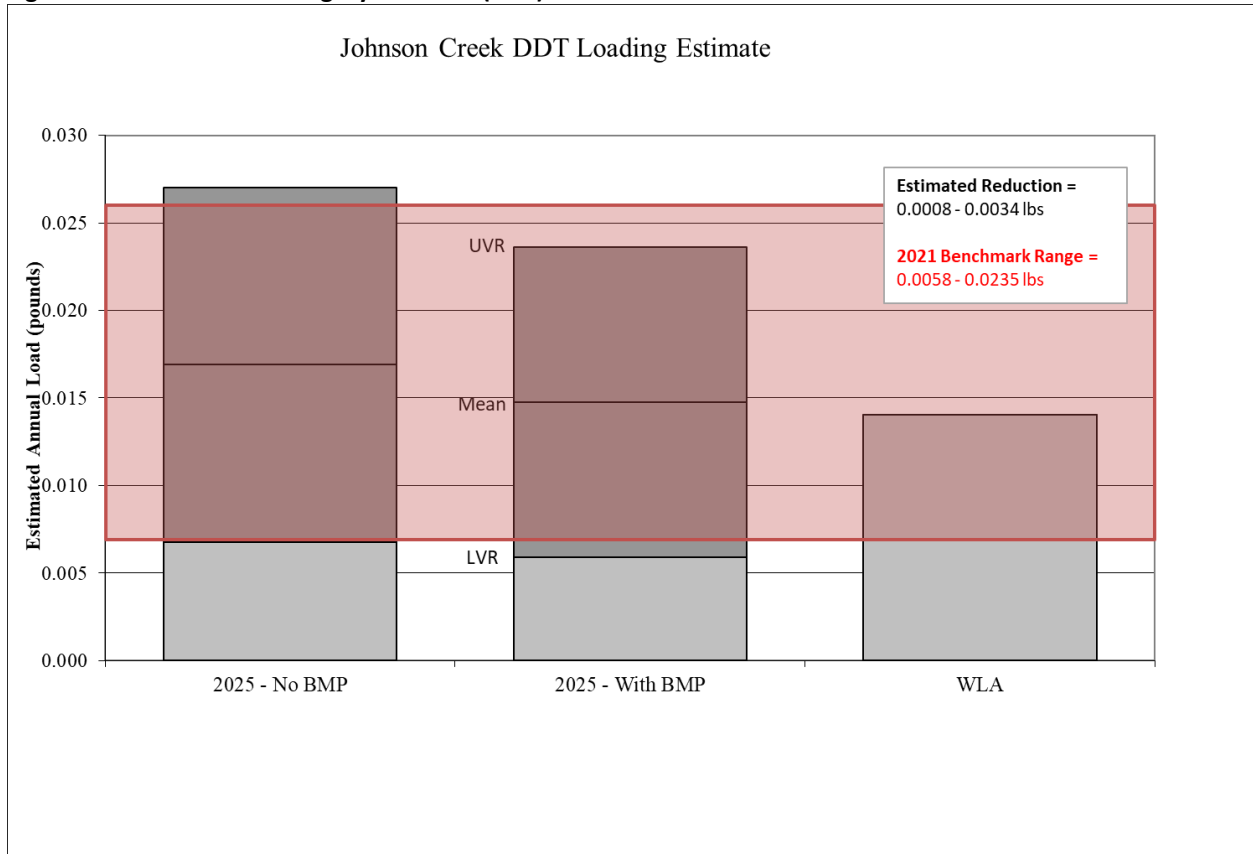


The estimated pollutant load reduction under current conditions with and without structural BMPs is  $6.76 \times 10^{12} - 4.24 \times 10^{13}$  colonies/year. The pollutant load reduction benchmark established for the permit term is  $6.97 \times 10^{12} - 4.37 \times 10^{13}$  colonies/year. The current pollutant load estimate is within the benchmark reduction target for the permit term, although the estimated load does not indicate that the wasteload allocation (WLA) is yet being achieved.

### 3.4.7 Johnson Creek DDT/Dieldrin

**Figure 3-7** shows the current pollutant loading estimate for DDT in Johnson Creek. Pollutant loads and benchmark values are shown with the mean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

**Figure 3-7. Johnson Creek Legacy Pesticide (DDT) Load Estimate**

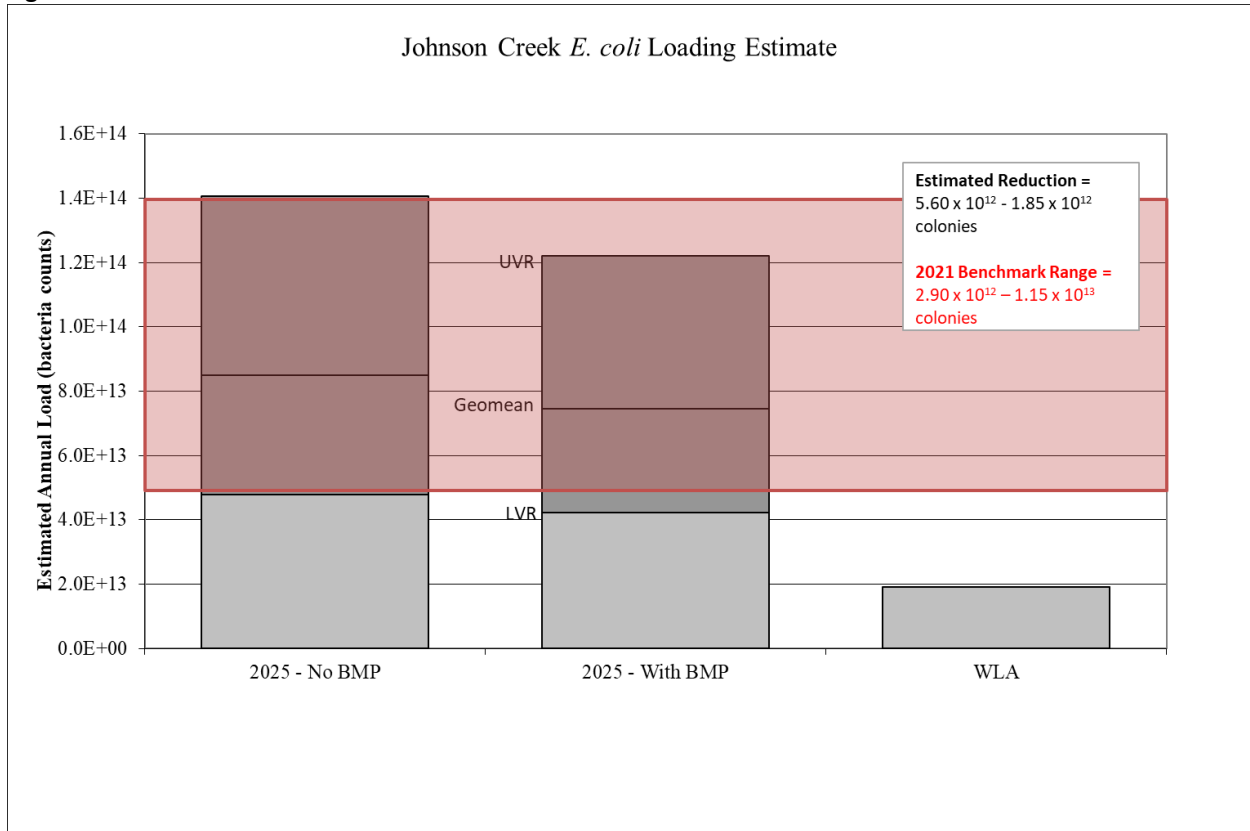


The estimated pollutant load reduction under current conditions with and without structural BMPs is 0.0008 – 0.0034 lbs/year. The pollutant load reduction benchmark established for the permit term is 0.0058 – 0.0235 lbs/year. The reason the estimated reduction is not within the 2021 benchmark range is because the reduction calculated in 2014 used an EMC of 2.8 ng/L for 2014 and assumed a 10-year half-life of DDT, so the 2021 estimate used 1.2 ng/L. This obviously resulted in an over-inflated reduction estimate, although the lower range of the estimated load with BMPs suggests that it could be meeting the wasteload allocation (WLA).

### 3.4.8 Johnson Creek Bacteria

Figure 3-8 shows the current pollutant loading estimate for *E. coli* in Johnson Creek. Pollutant loads and benchmark values are shown with the geomean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

Figure 3-8. Johnson Creek Bacteria Load Estimate

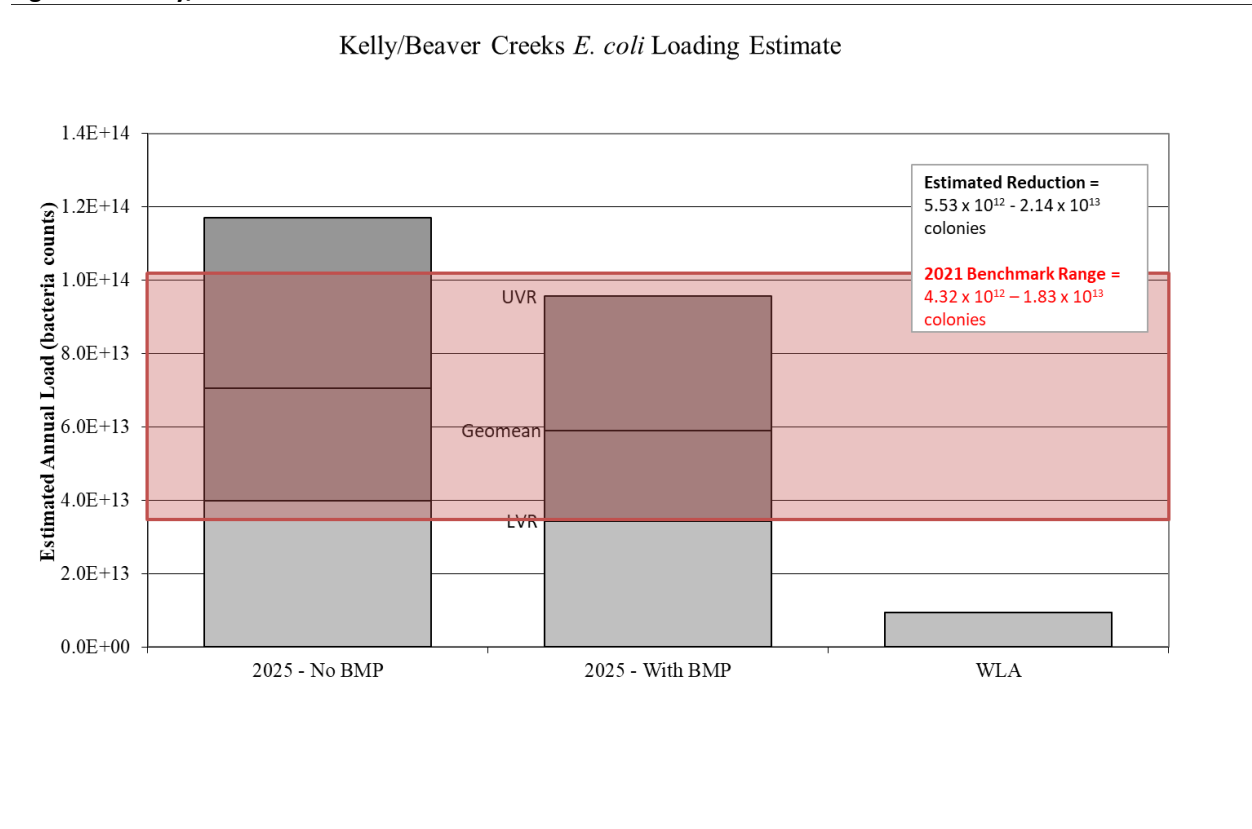


The estimated pollutant load reduction under current conditions with and without structural BMPs is  $2.87 \times 10^{12} - 1.13 \times 10^{13}$  colonies/year. The pollutant load reduction benchmark established for the permit term is  $1.14 \times 10^{12} - 3.58 \times 10^{12}$  colonies/year. The current pollutant load estimate is within the benchmark reduction target for the permit term, although the estimated load does not indicate that the wasteload allocation (WLA) is yet being achieved.

### 3.4.9 Kelly/Beaver Bacteria

**Figure 3-9** shows the current pollutant loading estimate for *E. coli* in Kelly/Beaver Creeks. Pollutant loads and benchmark values are shown with the geomean, as well as an upper value range (UVR) and lower value range (LVR), which are based on running the model using 95% confidence intervals on the land use event mean concentration data. The load reduction and the benchmark ranges are the difference between the UVR and LVR estimates for loads with and without BMPs.

**Figure 3-9. Kelly/Beaver Creek Bacteria Load Estimate**



The estimated pollutant load reduction under current conditions with and without structural BMPs is  $5.53 \times 10^{12} - 2.14 \times 10^{13}$  colonies/year. The pollutant load reduction benchmark established for the permit term is  $4.32 \times 10^{12} - 1.83 \times 10^{13}$  colonies/year. The current pollutant load estimate is within the benchmark reduction target for the permit term, although the estimated load does not indicate that the wasteload allocation (WLA) is yet being achieved.

## 4. Pollutant Load Reduction Benchmarks

### 4.1 Permit Requirements

The permit defines a TMDL Pollutant Load Reduction Benchmark as “an estimated total pollutant load reduction target for each parameter or surrogate, where applicable, for waste load allocations established under an EPA-approved TMDL. A benchmark is the anticipated pollutant load reduction goal to be achieved during the permit cycle through the implementation of the stormwater management program and BMPs identified in the SWMP. A benchmark is used to measure the effectiveness of the stormwater management program in making progress toward the waste load allocation, and is a tool for guiding adaptive management. A benchmark is not a numeric effluent limit; rather it is an estimated pollutant reduction target that is subject to the maximum extent practicable standard. Benchmarks may be stated as a pollutant load range based upon the results of a pollutant reduction empirical model.”

#### **Schedule D.3.d. requires:**

##### *Establishment of TMDL Pollutant Reduction Benchmarks*

A TMDL pollutant reduction benchmark must be developed for each applicable TMDL parameter where existing BMP implementation is not achieving the WLA. DEQ recognizes that not enough data may have been collected in the permit term to allow Benchmark development for mercury in stormwater, because it is a new parameter resulting from a new TMDL, so mercury is exempted from this requirement. The TMDL pollutant reduction benchmarks must be submitted with the MS4 Permit Renewal Application Package, as follows:

- i. The TMDL pollutant load reduction benchmark must reflect:
  - (A) Additional pollutant load reduction necessary to achieve the benchmark estimated for the permit term, if not achieved per Schedule D.3.c.iv.; and,
  - (B) The pollutant load reduction proposed to achieve additional progress towards the TMDL WLA during the next permit term.
- ii. The TMDL pollutant load reduction benchmark submittal must include the following:
  - (A) An explanation of the relationship between the TMDL waste load allocations and the TMDL benchmark for each applicable TMDL parameter;
  - (B) A description of how SWMP implementation contributes to the overall reduction of the TMDL pollutants during the next permit term;
  - (C) Identification of additional or modified BMPs that will result in further reductions in the discharge of the applicable TMDL pollutants, including the rationale for proposing the BMPs; and,
  - (D) An estimate of current pollutant loadings that reflect the implementation of the current BMPs and the BMPs proposed to be implemented during the next permit term.

### 4.2 Pollutant Load Reduction Benchmark Approach

The pollutant load reduction benchmark calculations were made using the same empirical model described in section 3 (TMDL Pollutant Load Reduction Evaluation). The primary difference between the figures in this section, versus those in section 3, is that the figured in section 4 also show the pollutant load reduction expected from existing BMPs plus additional BMPs that are being proposed to make additional progress towards to wasteload allocation for each TMDL pollutant.

### 4.3 Reduction of TMDL Pollutants through SWMP Implementation

Schedule D.3.d.ii(B) requires: “A description of how SWMP implementation contributes to the overall reduction of the TMDL pollutants during the next permit term”

The City's Stormwater Management Program (SWMP) contains a wide variety of BMPs that collectively contribute to reducing the amount of TMDL pollutants entering local waterways. Many of the BMPs are considered "nonstructural" and are difficult to quantify an exact amount of pollution reduction resulting from their implementation (for example, environmental education, business inspections and enforcement, and illicit discharge investigation). In the past, the City estimated the TSS load reduction from our erosion inspection program, but because of the large number of assumptions that go into estimating reduction, we implement erosion control and other programs knowing they are effectively reducing pollutants even if we don't take credit for them in pollutant load reduction benchmarks.

Some nonstructural BMPs are required for achieving the pollutant load assumptions for structural BMPs – for example, inspection and maintenance programs for private and public water quality facilities. Some BMPs in the SWMP require updating stormwater development standards or basin master plans, both of which result in construction of structural BMPs that are accounted for in the pollutant load reduction calculations. The City has a Water Quality Retrofit CIP fund, which is used to fund many of the additional BMPs in section 4.4.

#### 4.4 Additional BMPs to Reduce TMDL Pollutants

Schedule D.3.d.ii(C) requires: *"Identification of additional or modified BMPs that will result in further reductions in the discharge of the applicable TMDL pollutants, including the rationale for proposing the BMPs"*

Rather than try to predict future development and the stormwater BMPs that will be installed to meet the City's development standards for stormwater management, the City is focusing our benchmark assessment purely on BMPs that will be installed to treat existing developed area within the city. These additional BMPs will seek to retrofit existing streets, parking lots, and/or areas draining from currently untreated (or under-treated) areas of Gresham.

While the highest priority areas identified into the Retrofit Strategy and Plan submitted to DEQ in 2014 were high traffic streets (due to the high amount of impervious and high pollutant concentrations generated by vehicles using streets), there are other projects the City is considering for helping reduce pollutant loads. The City plans to do a more extensive retrofit "master plan" in the next couple years which will help prioritize projects designed and constructed using the Low Impact Development Practices Retrofit Program Capital Improvement Program budget. The retrofit master plan will produce a complete list of prioritized projects, but some potential projects that have already been identified are listed below by watershed.

##### 4.4.1 Columbia Slough/Fairview Creek

As presented in section 3, the pollutant load reduction benchmark commitment that was made in the last permit term was met, however, the wasteload allocation is not currently being met for all applicable TMDL pollutants, so additional progress is required during the coming permit term.

Retrofit opportunities being considered, include:

1. **Kirk Park infiltration project. The City plans to construct an infiltration facility in or adjacent to Kirk Park that will infiltrate water currently draining to the MS4 system.**
2. Stormwater Tree Wells. The City plans to install stormwater tree wells to provide bioretention/infiltration for runoff from Burnside Ave, some of which is in the Fairview Creek watershed. The City recently installed some stormwater tree wells in Rockwood, which is part of the Columbia Slough watershed, however, it all drains to UICs. But the City has also been looking at other potential locations for tree wells that are in the MS4 area of the watershed.
3. Add UICs. Several neighborhoods with MS4 pipes are on edge of designated drywell area/infiltration suitability zone. In the last permit term, the City successfully added a UIC to divert stormwater from the

MS4 and provide infiltration for up to 80% of the average annual rainfall. We have been considering whether we might do something similar.

4. Fujitsu Ponds. Gresham is perpetually looking for funding to separate Fairview Creek from in-line ponds. A project would likely create wetland areas, provide stormwater treatment, and address temperature TMDL.
5. Porous asphalt overlay. Stormwater staff continue to advocate for using an open graded friction course on road resurfacing projects, as this has been shown to significantly reduce the concentrations of many pollutants of concern.
6. Retrofit existing stormwater facilities. As the City has taken public ownership of multi-owner private stormwater facilities and is working to assess and maximize functionality of all existing public facilities, some modifications may be made to improve pollutant load removal efficiency.
7. Green streets, parking lot retrofits or other projects identified through Retrofit Master Plan process.

While all of these options may be considered, the retrofit project that the City assumes will occur during the next 5-year permit term is the Kirk Park infiltration project **bolded** above. The Kirk Park project is an infiltration basin planned to divert stormwater from the surrounding neighborhood into a facility within the park. The benchmarks assume a total of 5 acres of currently untreated residential land use will be treated using an infiltration rain garden or similar facility.

#### 4.4.2 Johnson Creek

As presented in section 3, the pollutant load reduction benchmark commitment that was made in the last permit term was met, however, the wasteload allocation is not currently being met for all applicable TMDL pollutants, so additional progress is required during the coming permit term.

Retrofit opportunities being considered, include:

1. **Powell Blvd Stormwater Tree Wells. The City plans to install stormwater tree wells to provide bioretention/infiltration for runoff from this arterial roadway.**
2. End of pipe treatment. The City evaluated several locations where existing stormwater could be routed to open space where it could be treated prior to entering Johnson Creek.
3. Porous asphalt overlay. Stormwater staff continue to advocate for using an open graded friction course on road resurfacing projects, as this has been shown to significantly reduce the concentrations of many pollutants of concern.
4. Retrofit existing stormwater facilities. As the City has taken public ownership of multi-owner private stormwater facilities and is working to assess and maximize functionality of all existing public facilities, some modifications may be made to improve pollutant load removal efficiency.
5. Green streets/parking lots. Several options in downtown Gresham to add treatment to publicly owned paved areas.
6. Retrofits for "self-cleaning" catch basins. City will evaluate the cost/benefit of retrofitting un-sumped catch basins with a more effective source control structure
7. Green streets, parking lot retrofits or other projects identified through Retrofit Master Plan process.

While all of these options may be considered, the retrofit project that the City will assume occurs during the next 5-year permit term is the Powell Blvd. Stormwater Tree Well project **bolded** above. The City is currently looking at locations for at least 30 tree wells along Powell that will provide treatment to the existing runoff from this arterial roadway. While the drainage area going into each stormwater tree well is relatively small, the cumulative treatment provided by 30 tree wells is expected to treat a minimum of 2 acres of currently untreated runoff, which mostly fronts commercial land use.

### 4.4.3 Kelly/Beaver Creek

As presented in section 3, the pollutant load reduction benchmark commitment that was made in the last permit term was met, however, the wasteload allocation is not currently being met for applicable TMDL pollutants, so additional progress is required during the coming permit term.

Retrofit opportunities being considered, include:

1. **Burnside Ave Stormwater Tree Wells. The City plans to install stormwater tree wells to provide bioretention/infiltration for runoff from this arterial roadway.**
2. Kane Road near Kelly Creek. MHCC may be willing to allow stormwater management of runoff from Kane Rd on property they own adjacent to Kelly Creek.
3. Stark Street by Legacy Mount Hood hospital. There is a wide landscape strip along Stark Street where the City could treat runoff from Stark Street prior to it discharging into Beaver Creek.
4. Porous asphalt overlay. Stormwater staff continue to advocate for using an open graded friction course on road resurfacing projects, as this has been shown to significantly reduce the concentrations of many pollutants of concern.
5. Retrofit existing stormwater facilities. As the City has taken public ownership of multi-owner private stormwater facilities and is working to assess and maximize functionality of all existing public facilities, some modifications may be made to improve pollutant load removal efficiency.
6. Green streets, parking lot retrofits or other projects identified through Retrofit Master Plan process.

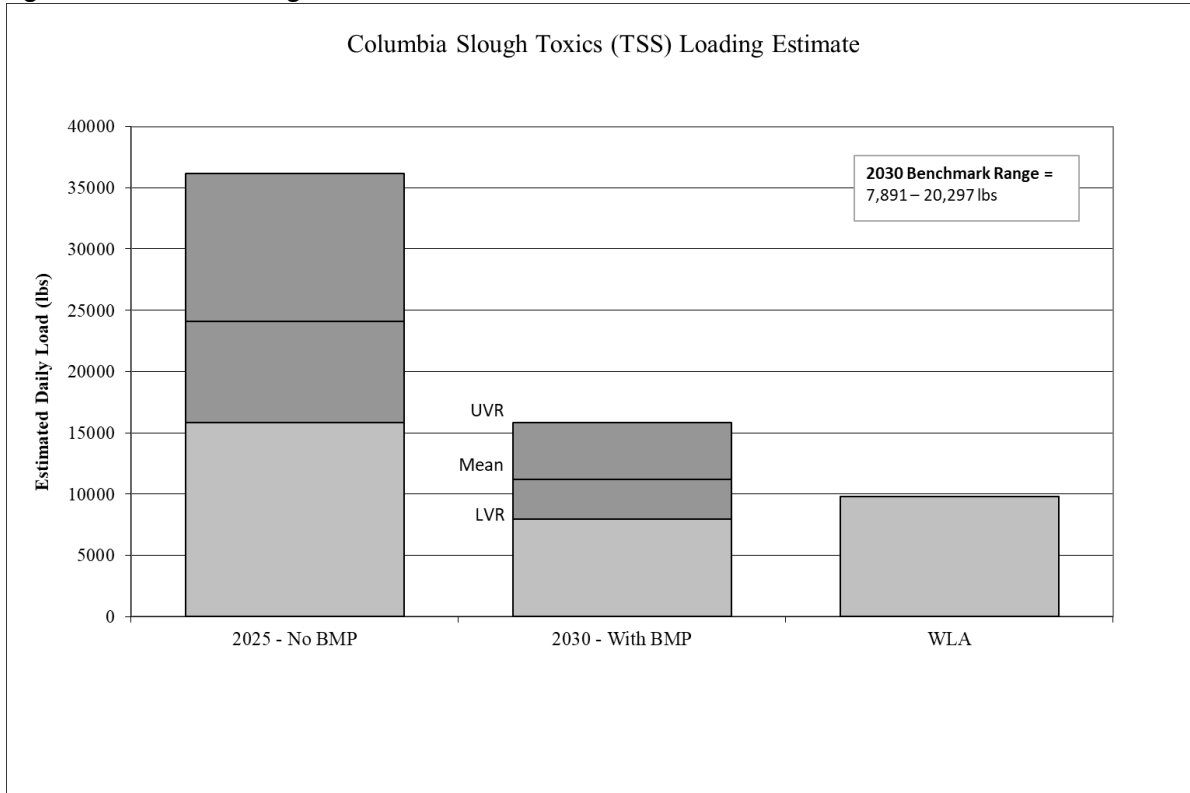
While all of these options may be considered, the retrofit project that the City will assume occurs during the next 5-year permit term is the Burnside Ave Stormwater Tree Wells project **bolded** above. The City is currently looking at locations for at least 30 tree wells along Burnside that will provide treatment to the existing runoff from this arterial roadway. While the drainage area going into each stormwater tree well is relatively small, the cumulative treatment provided by 30 tree wells is expected to treat a minimum of 2 acres of currently untreated runoff, which mostly fronts commercial land use.

## 4.5 Pollutant Load Reduction Benchmarks for Next Permit Term

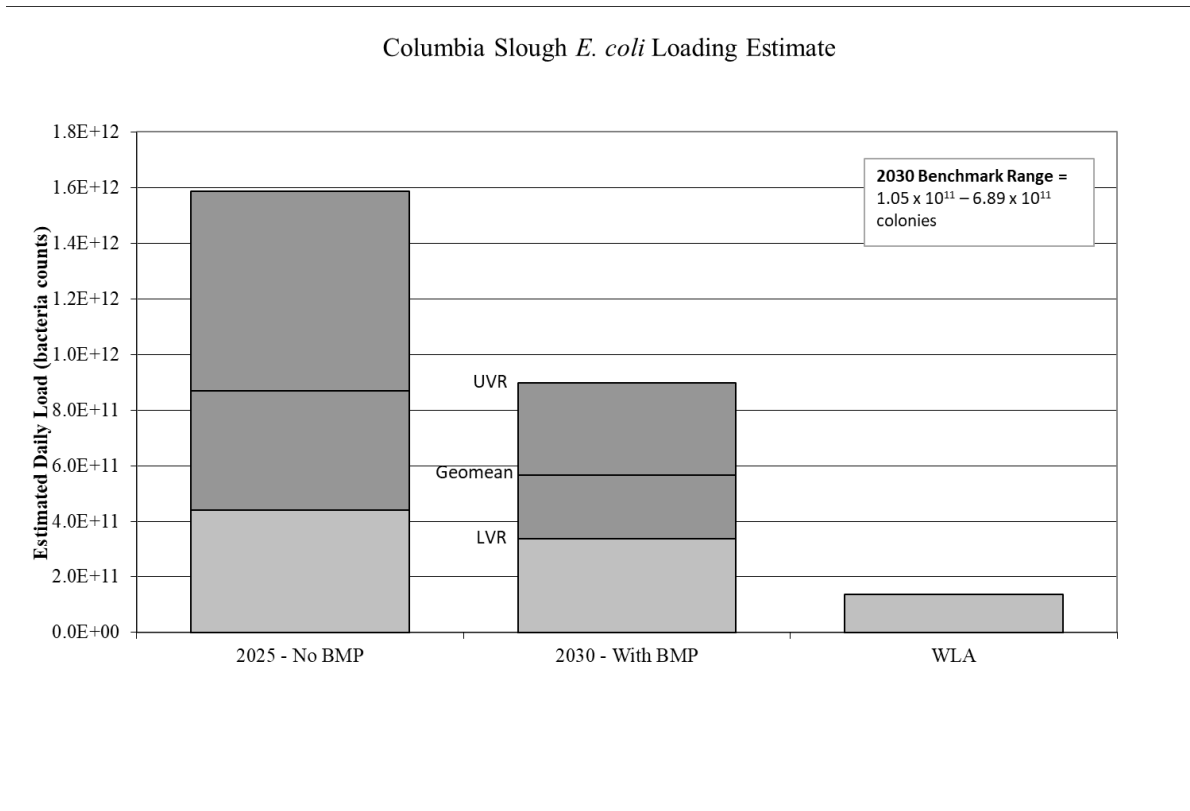
Figures 4-1 through 4-9 show:

1. the 2025 values with no BMP, which are the same as the 2025 values from the pollutant load reduction graphs in section 3 of this permit renewal submittal,
2. the estimated reductions that would be gained with current BMPs, as well as the additional BMPs highlighted in section 4.4 over the next permit term (through 2030), which are labeled as “2030 – With BMP”; and
3. the wasteload allocation (WLA).

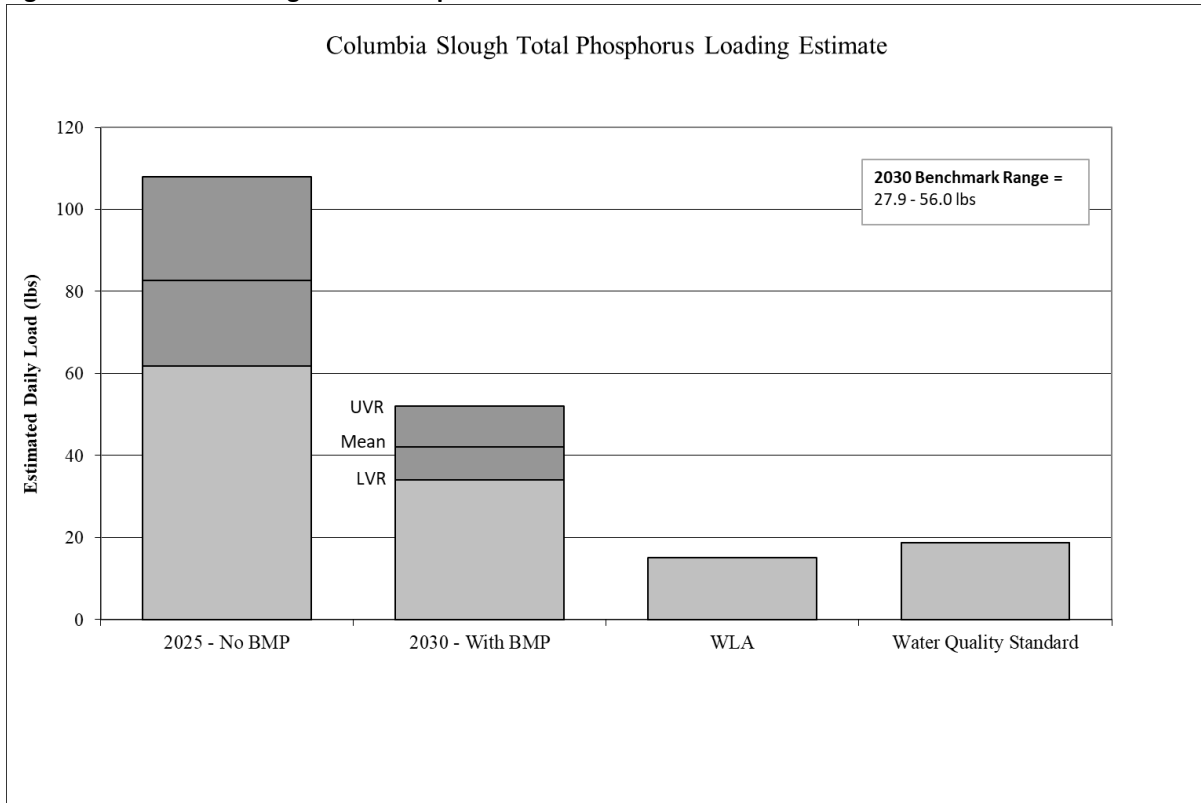
**Figure 4-1. Columbia Slough TSS Benchmark**



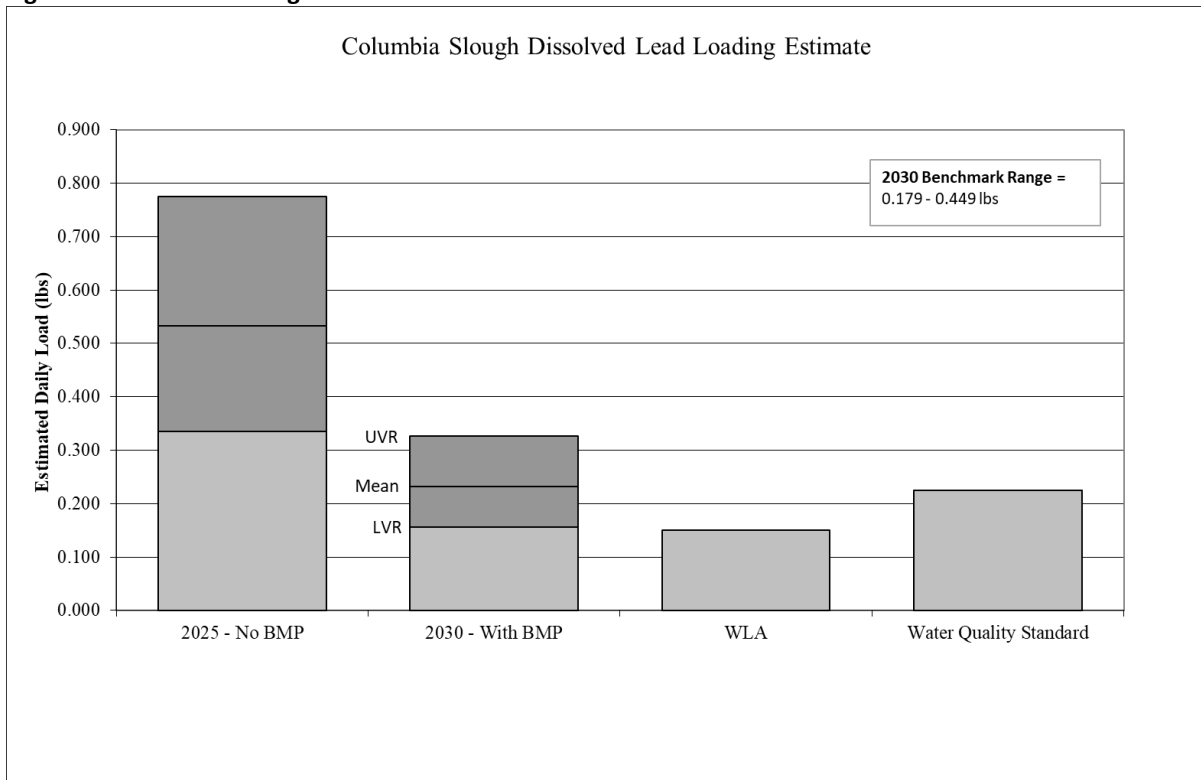
**Figure 4-2. Columbia Slough E. coli Benchmark**



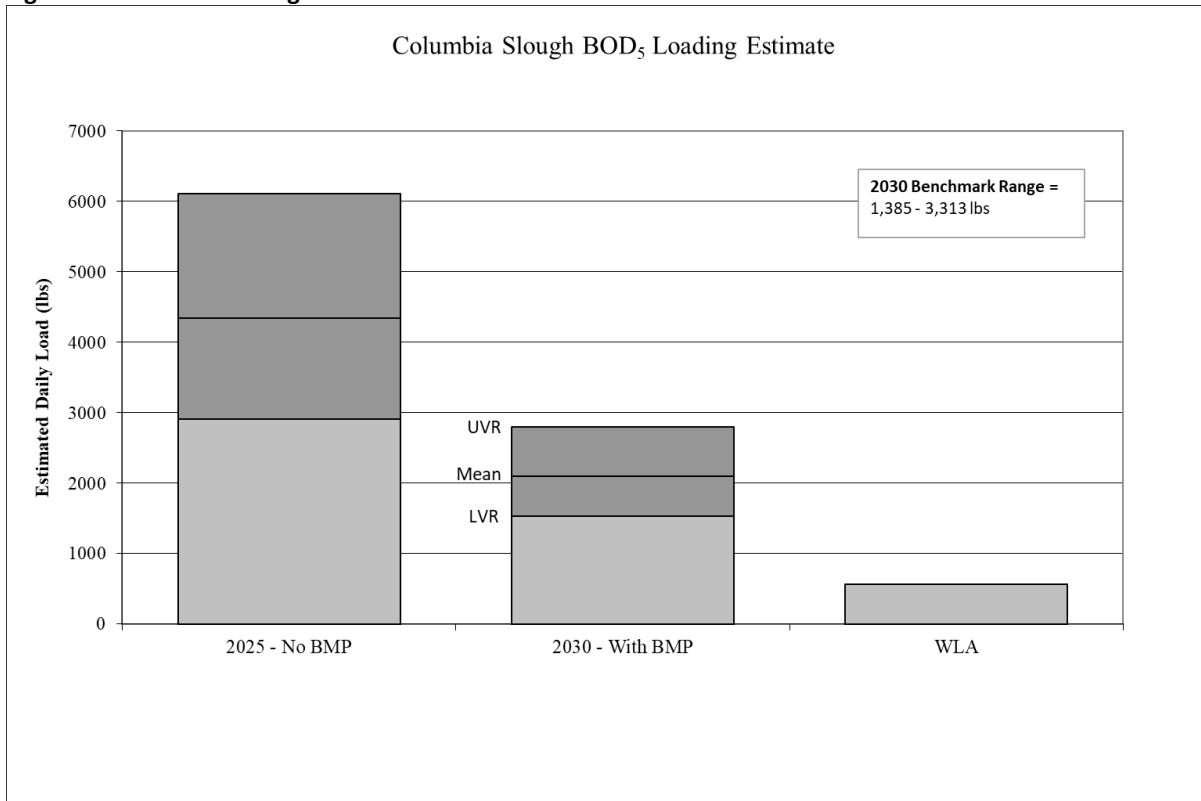
**Figure 4-3. Columbia Slough Total Phosphorus Benchmark**



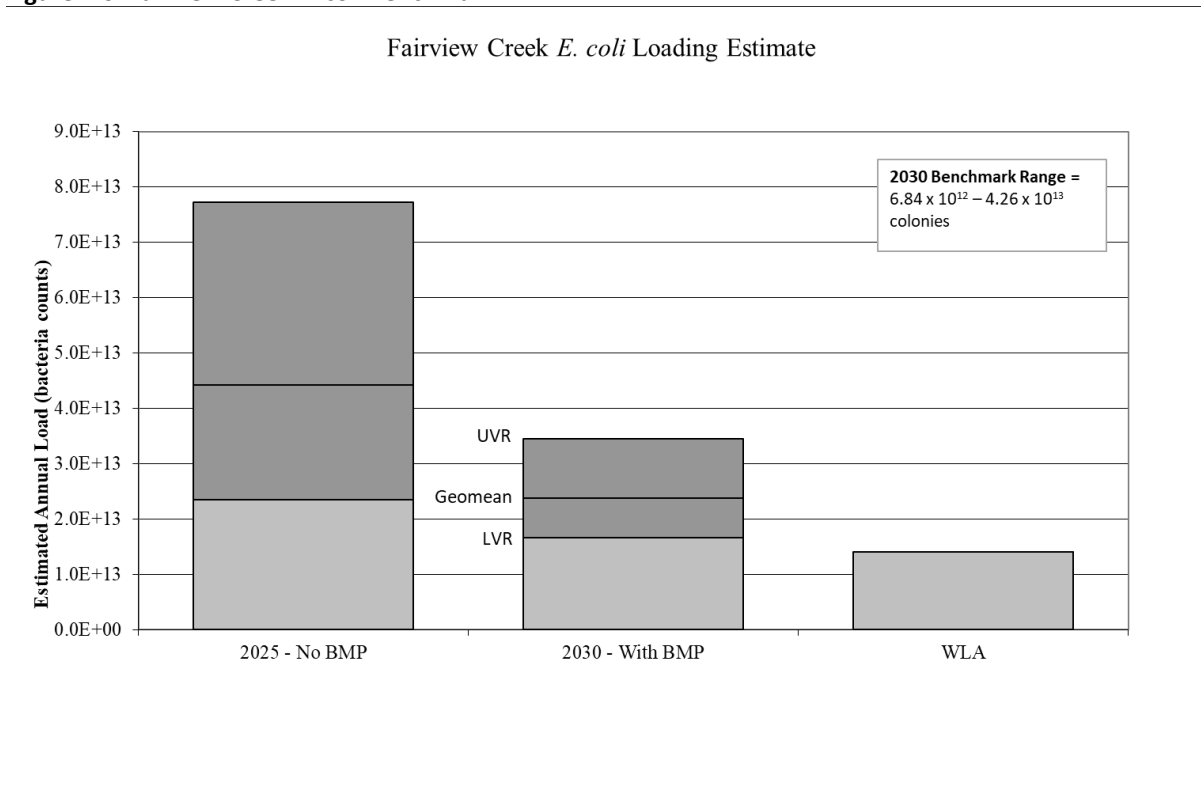
**Figure 4-4. Columbia Slough Dissolved Lead Benchmark**



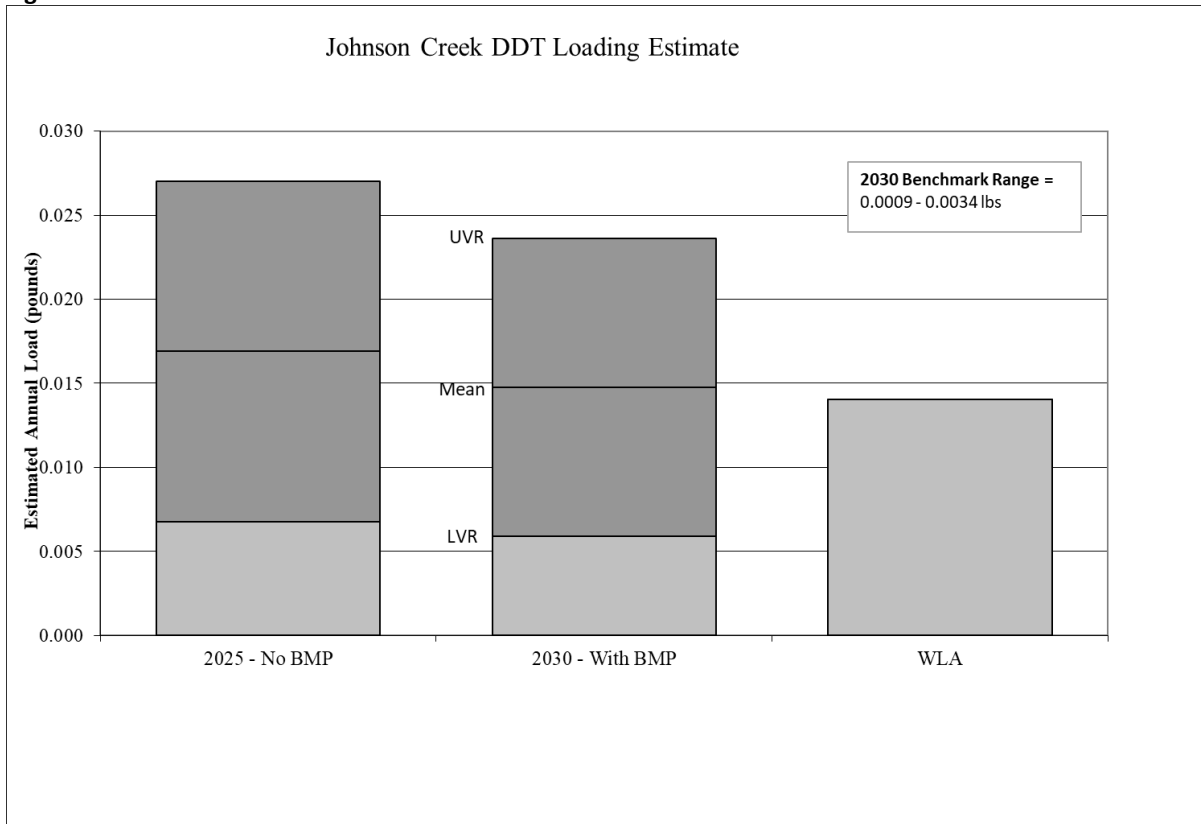
**Figure 4-5. Columbia Slough BOD<sub>5</sub> Benchmark**



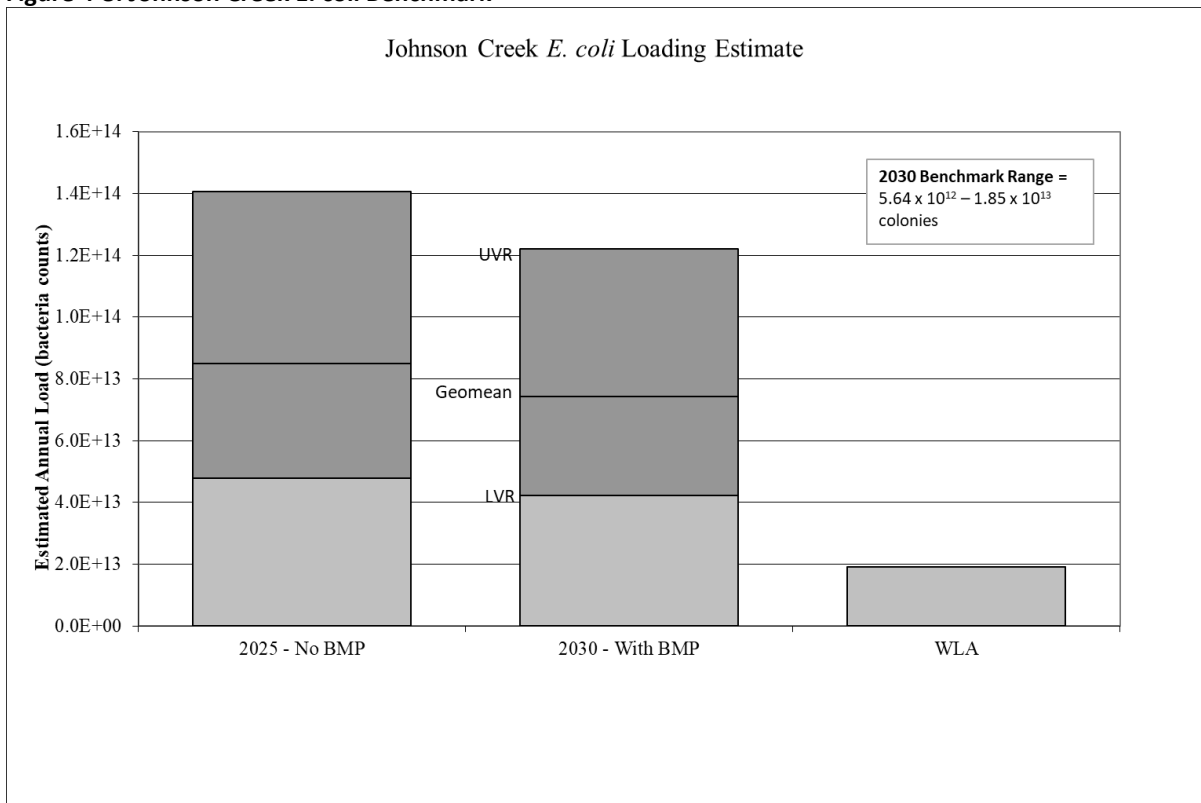
**Figure 4-6. Fairview Creek E. coli Benchmark**



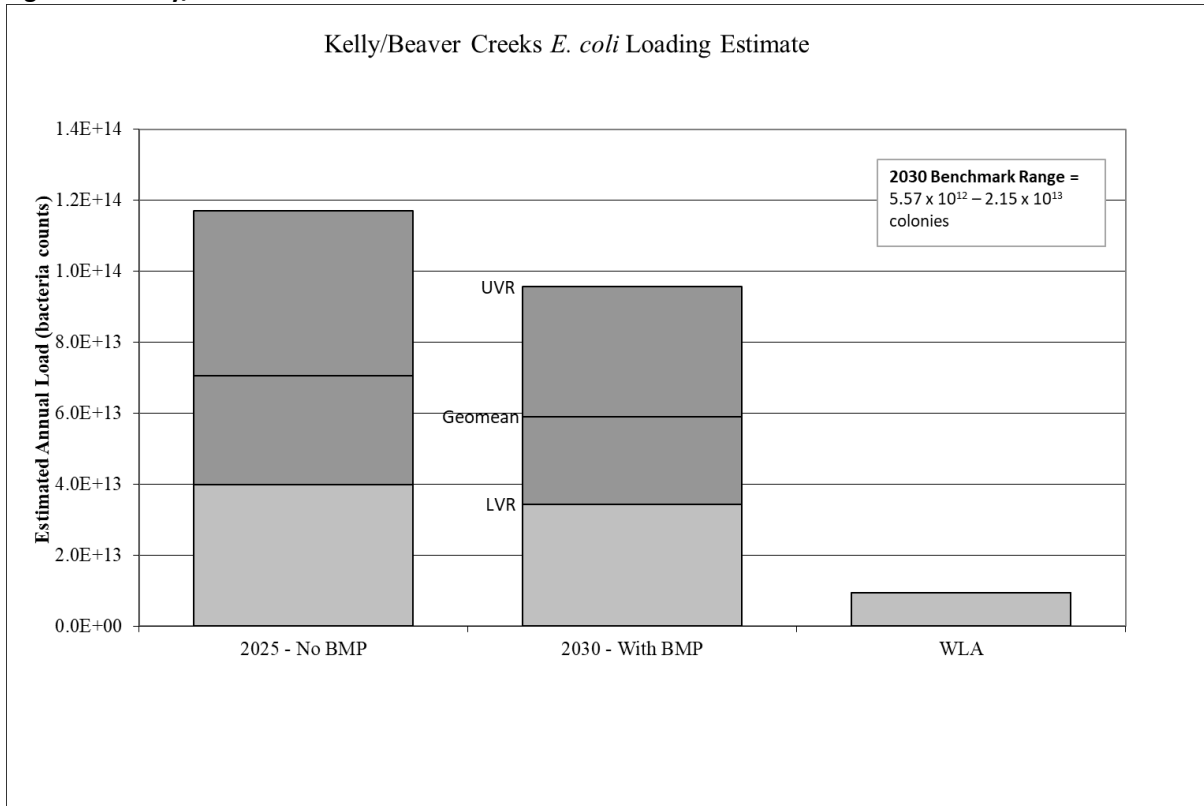
**Figure 4-7. Johnson Creek DDT Benchmark**



**Figure 4-8. Johnson Creek E. coli Benchmark**



**Figure 4-9. Kelly/Beaver Creek E. coli Benchmark**



**Table 4-1. Summary of 2030 Annual Pollutant Load Reduction Benchmarks.** Note that because Columbia Slough loads and reductions were calculated based on a 0.51"/24-hour storm, annual loads were estimated by multiplying by the ratio of the annual rainfall to storm (45.48"/0.51"=89.18) – so the values shown on the Columbia Slough figures do not match the annual pollutant load reductions listed in this table.

TMDL Parameter or Surrogate	Lower Value of Range	Upper Value of Range
<b>Columbia Slough</b>		
Total Suspended Solids	703,686 lbs.	1,810,114 lbs.
<i>E. coli</i>	9.37 x 10 <sup>12</sup> colonies	6.15 x 10 <sup>13</sup> colonies
Total Phosphorus	2,485 lbs.	4,996 lbs.
Dissolved Lead	16 lbs.	40 lbs.
Biochemical Oxygen Demand	123,477 lbs.	295,473 lbs.
<b>Fairview Creek</b>		
<i>E. coli</i>	6.84 x 10 <sup>12</sup> colonies	4.26 x 10 <sup>13</sup> colonies
<b>Johnson Creek</b>		
<i>E. coli</i>	5.64 x 10 <sup>12</sup> colonies	1.85 x 10 <sup>13</sup> colonies
DDT	0.0009 lbs.	0.0034 lbs.
<b>Kelly/Beaver Creek</b>		
<i>E. coli</i>	2.15 x 10 <sup>12</sup> colonies	5.57 x 10 <sup>13</sup> colonies

## 5. Annual Pollutant Load Estimates

Schedule B.4.d. requires:

*...an updated estimate of total annual stormwater pollutant loads for applicable TMDL pollutants or applicable surrogate parameters, and the following pollutant parameters: nitrate, total phosphorus, ortho-phosphorous, copper, lead and zinc. The estimates must be accompanied by a description of the procedures for estimating pollutant loads and concentrations, including any modeling, data analysis and calculation method*

Using the same model inputs as described in section 3, annual pollutant loads are being provided for the following pollutants:

- *E. coli*
- TSS
- BOD<sub>5</sub>
- DDT
- Nitrate
- Total phosphorus
- Orth-phosphorus
- Copper
- Lead
- Zinc

The annual pollutant loads are not being expressed as a range; just the loads based on mean values (or geomean for *E. coli*) are displayed in Table 5-1. The mean annual loads come from the same model used for pollutant load reduction benchmark calculations.

Nitrate has not expressly been requested in the past (TKN and Total Nitrogen were on the original list), so the model was set up to calculate loads for those. Since Total Nitrogen is TKN plus nitrate + nitrite, the load for TKN was subtracted from the Total N load to estimate the values displayed for nitrate.

The load for DDT is only shown for Johnson Creek, as the DDT data used to estimate the load in that watershed is limited to a small data set collected specifically in that watershed. TSS is the approved surrogate for DDT in the Columbia Slough watershed, so reductions in TSS will result in reductions in this legacy pesticide.

**Table 5-1: Annual Pollutant Load Estimates**

	<i>E. coli</i>	TSS	BOD <sub>5</sub>	DDT	Nitrate	Total Phos	Ortho-Phos	Total Copper	Total Lead	Diss Lead	Total Zinc
<b>Total Load (lbs) no BMPs (2025)</b>											
Columbia Slough/ Fairview Creek	7.76 x 10 <sup>13</sup>	2,148,595	387,150	N/A	9,264	7,371	2,412	539	668	47	6,595
Johnson Creek	8.48 x 10 <sup>13</sup>	1,012,249	135,303	0.017	12,173	4,650	1,504	230	319	29	1,968
Kelly/Beaver Creek	7.06 x 10 <sup>13</sup>	709,318	90,000	N/A	8,809	3,535	1,127	168	256	25	1,183
Total Load from Gresham	2.33 x 10 <sup>14</sup>	3,870,162	612,453	N/A	30,246	15,556	5,043	937	1,243	101	9,746
<b>Total Load (lbs) with nonstructural and structural BMPs (2025)</b>											
Columbia Slough/ Fairview Creek	5.06 x 10 <sup>13</sup>	997,513	186,832	N/A	7,329	3,755	1,974	414	517	21	5,104
Johnson Creek	7.45 x 10 <sup>13</sup>	885,186	121,268	0.015	10,778	4,085	1,345	199	278	25	1,662
Kelly/Beaver Creek	5.91 x 10 <sup>13</sup>	602,062	78,607	N/A	8,224	3,026	1,053	154	232	21	1,076
Total Load from Gresham	1.84 x 10 <sup>14</sup>	2,484,761	386,707	N/A	26,331	10,866	4,372	767	1,027	67	7,842

All loads are in pounds per year, except *E. coli* (which is in colonies per year)

## 6. Water Quality Trends Analysis

### 6.1 Background

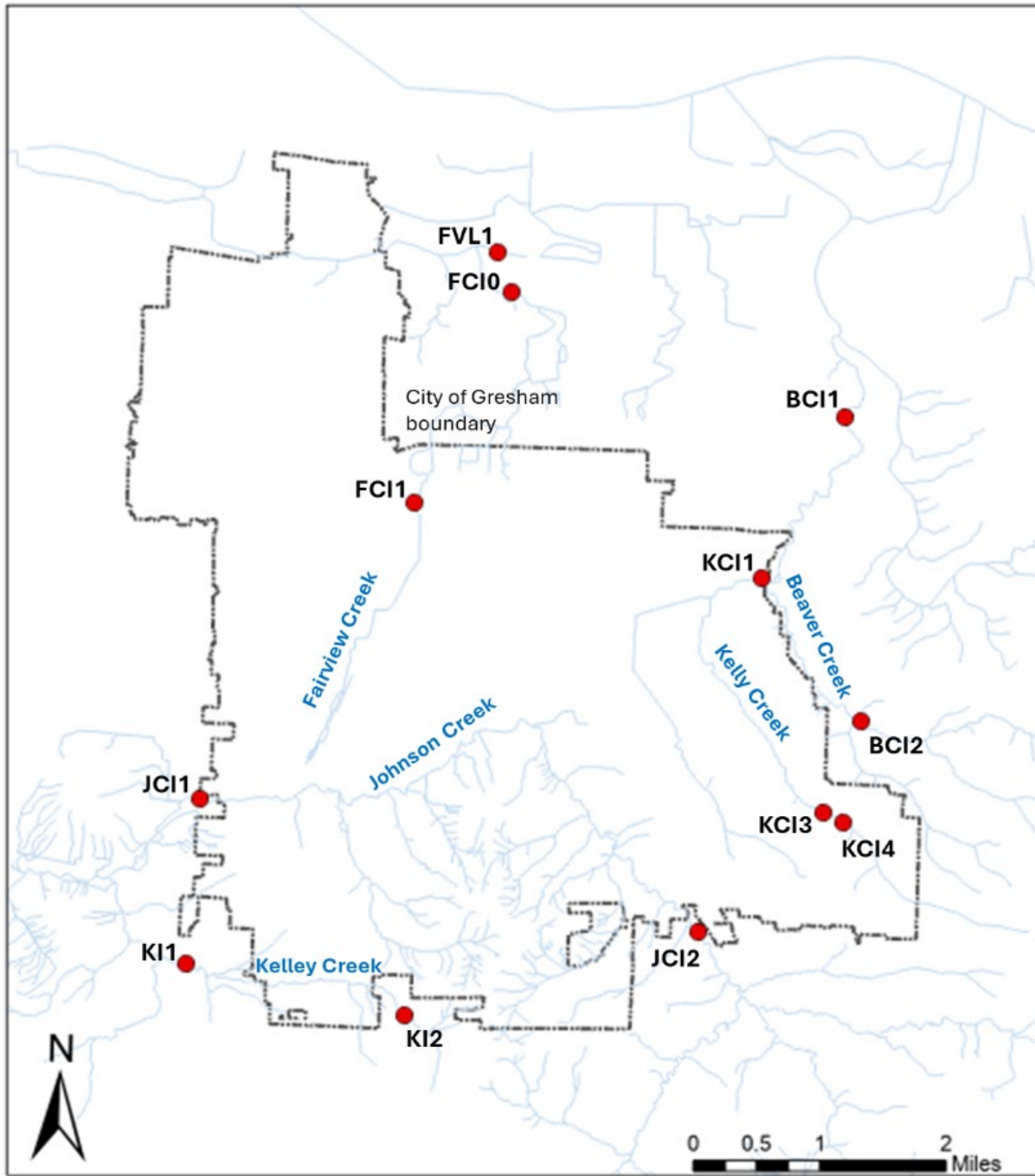
In addition to the pollutant load reduction calculations in section 3 of this permit renewal submittal, in order to demonstrate progress towards reducing TMDL pollutant loads, Schedule D.3.c.vii requires:

*A water quality trend analysis, as sufficient data are available, and the relationship to stormwater discharges for receiving waterbodies within the co-permittees' jurisdictional area with approved TMDL. If sufficient data to conduct a water quality trend analysis is unavailable for a receiving waterbody the co-permittees must describe the data limitations. The collection of sufficient data must be prioritized and reflected as part of the monitoring project/task proposal required in Schedule B.4.e.*

The City of Gresham has collected sufficient water quality data to conduct a trend analysis for all TMDL parameters in receiving waterbodies. Long-term instream monitoring locations were established in these water bodies between 1999 and 2008 (**Figure 6-1**). Each stream has at least two monitoring sites which represent the water body upstream and downstream of the influence of Gresham stormwater runoff. Sites in the Fairview Creek watershed are monitored through an IGA with the City of Fairview and sites in Beaver Creek are monitored through an IGA with Multnomah County.

While none of the TMDL parameters in section 3 for which pollutant load estimates were calculated indicate that the wasteload allocations for those parameters are being met, the analyses in this section of the report indicate that trends for all TMDL pollutants are either improving, or not changing.

Figure 6-1. Map of Long-Term Instream Monitoring Sites included in Gresham's environmental monitoring program.



## 6.2 Methods

The number of years that each site in Figure 6-1 has been monitored varies slightly, and the frequency at which samples were collected has varied as well. Water quality parameters have been collected at each instream location at least four times per year since each monitoring location was established. Before 2012, samples were collected monthly or bimonthly. Since 2012 samples were collected quarterly, generally in the last week of January, April, July, and October of each year. The field and laboratory parameters in Table 6-1 were analyzed at each site during each sampling event.

**Table 6-1. Water quality parameters collected at long-term instream monitoring locations.** These parameters were collected at each event.

Type	Parameter
Sediment	Turbidity
	Total suspended solids (TSS)*
Field	Dissolved oxygen*
	pH
Nutrients	NH3-N
	NO3-N
	TKN
	O-PO4
	Total-P*
Heavy metals	Copper
	Mercury*
	Lead*
	Zinc
	Dissolved copper
	Dissolved lead
	Dissolved zinc
Misc.	BOD <sub>5</sub> *
	Chlorophyll-a*
	E. coli*

\* Parameters marked with an "\*" are TMDL parameters for at least one receiving water body.

Trends were assessed using the Mann-Kendall test. This non-parametric test was used because the data did not meet the assumptions of normality. This test requires consistent frequency of observations through time, so early data was parsed down to quarterly observations which best matched the later time periods. Trends were evaluated at  $p=0.05$ , but weak trends ( $0.05 < p \leq 0.10$ ) were also considered, and particularly strong trends ( $p < 0.001$ ) were noted. Non-detects were evaluated at the detection limit. For parameters with changing detection limits, non-detects were evaluated at the limit described in the City of Gresham Environmental Monitoring Plan with lower values being brought up for consistency so that false trends were not observed due to a change in detection limits through time. Non-detects at occasionally high values above those outlined in the monitoring plan due to lab errors were deleted.

Trends were evaluated at each site during times when runoff was likely influencing the stream. This was done in two ways: during the wet season, and during monitoring events where there was runoff-producing precipitation prior to sampling. The wet season was defined as September-May of each year. Events with runoff-producing precipitation were defined as having  $\geq 0.1$ " of rain in the previous 24 hours.

### 6.3 General Results

Several trends were observed in water quality parameters at long-term instream locations both during events with runoff producing precipitation (Table 6-2) and during the wet season (Table 6-3). The majority of TMDL parameters showed improving trends. The remainder of the TMDL parameters showed no trend, with the exception of the worsening trend of chlorophyll-a in Fairview Lake. For non-TMDL parameters, both improving and declining trends were seen throughout water bodies assessed, but the majority of trends were improving.

Improving or flat trends were generally seen for E. coli, total phosphorus, turbidity, total suspended solids (TSS), ammonia nitrogen (NH<sub>3</sub>-N), total copper, total lead, and total mercury. Declining trends were generally seen for orthophosphate (O-PO<sub>4</sub>) and dissolved zinc. Flat or mixed trends were seen for the remaining parameters.

**Table 6-2. Water Quality Trends at Long-Term Instream Monitoring Sites in Gresham During Runoff Events.**  
 This table displays trends through time of field and lab-measured parameters collected during sampling events with  $\geq 0.1$ " of precipitation in previous 24 hours. Sites are shown in Figure 6-1. Trends were evaluated with the non-parametric Mann-Kendall test.

Parameter		Site											
		Johnson Creek		Kelley Creek		Beaver Creek		Kelly Creek			Fairview Creek		
		JCI1	JCI2	KI1	KI2	BCI1	BCI2	KCI1	KCI3	KCI4	FCI0	FCI1	FVL1
Sedi- ment	Turbidity	↓	-	↓	↓	↓	-	↓	↓	↓	↓	↓	↓
	TSS	↓	↓	-	↓	-	-	↓	↓	↓	↓	↓	↓
Field	Diss. oxygen	-	-	↓	↓	-	↓	-	-	-	-	-	-
	pH	-	-	-	-	-	-	↑	-	-	↑	-	↑
Nutri- ents	NH3-N	-	-	-	-	-	-	↓	-	↓	-	↓	-
	NO3-N	↓	↓	↓	↓	-	-	-	-	-	-	↑	↓
	TKN	↓	-	-	↓	-	-	↓	-	-	-	↓	-
	O-PO4	↑	-	↑	↑	↑	↑	↑	↑	↑	↑	↑	-
	Total-P	↓	↓	-	-	-	-	↓	↑	↓	↓	↓	↓
Heavy metals	Copper	-	-	-	-	-	-	-	↓	↓	↓	↓	↓
	Mercury	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Lead	↓	↓	↓	-	↓	-	↓	↓	↓	↓	↓	↓
	Zinc	-	-	-	↓	-	-	↑	-	-	↓	-	↓
	Diss. copper	↑	↑	-	↓	-	↑	↑	-	-	↓	-	-
	Diss. lead	-	-	-	-	-	-	-	-	-	-	↓	↓
	Diss. zinc	↑	↑	-	↓	-	↑	↑	↑	↑	↑	-	↑
Misc.	BOD <sub>5</sub>	↓	↓	-	-	-	-	-	-	↓	↓	↓	-
	Chl-a	-	-	-	-	-	-	-	-	-	-	-	-
	E. coli	↓	-	↓	-	↓	↓	-	↓	↓	↓	↓	↓

Legend	
↓	Improving trend
↑	Declining trend
□	TMDL parameter for a receiving waterbody
↑↑	Strong upward trend ( $p \leq 0.001$ )
↑	Upward trend ( $0.001 < p \leq 0.05$ )
↑	Weak upward trend ( $0.05 < p \leq 0.10$ )
-	No trend at $p = 0.10$
↓	Strong upward trend ( $0.05 < p \leq 0.10$ )
↓	Downward trend ( $0.001 < p \leq 0.05$ )
↓↓	Strong downward trend ( $p \leq 0.001$ )

**Table 6-3. Water Quality Trends at Long-Term Instream Monitoring Sites in Gresham During Wet Season.** This table displays trends through time of field and lab-measured parameters collected during sampling events which occurred in September-May. Sites are shown in Figure 6-1. Trends were evaluated with the non-parametric Mann-Kendall test.

Parameter		Site											
		Johnson Creek		Kelley Creek		Beaver Creek		Kelly Creek			Fairview Creek		
		JCI1	JCI2	KI1	KI2	BCI1	BCI2	KCI1	KCI3	KCI4	FCI0	FCI1	FVL1
Sedi-ment	Turbidity	↓	↓	-	-	-	-	↓	↓	↓	↓	↓	↓
	TSS	-	-	-	-	-	-	↓	↓	↓	↓	↓	↓
Field	Diss. oxygen	-	-	↓	↓	-	↓	-	-	-	-	-	-
	pH	-	↑	↑	↓	-	-	↑	-	↑	↓	-	↑
Nutri-ents	NH3-N	-	-	↑	↑	-	↑	↓	-	-	↓	↓	↑
	NO3-N	↓	↓	↓	↓	↑	-	-	-	-	↓	-	↓
	TKN	-	-	-	↑	↑	↑	-	-	-	-	↓	↑
	O-PO4	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	-
	Total-P	↓	↓	-	-	-	-	↓	↓	-	↓	↓	↓
Heavy metals	Copper	-	-	-	↓	↑	↑	-	-	-	↓	↓	↓
	Mercury	↓	↓	-	-	-	-	↓	↓	↓	↓	↓	↓
	Lead	↓	↓	-	↓	-	-	↓	↓	↓	↓	↓	↓
	Zinc	-	-	↑	↓	↑	-	↑	↑	↑	-	-	-
	Diss. copper	-	↑	-	↓	↑	↑	↑	↑	↑	↓	↓	↓
	Diss. lead	↓	-	-	-	↑	-	-	-	-	↓	↓	↓
	Diss. zinc	↑	↑	↑	↓	↑	↑	↑	↑	↑	↑	-	↑
Misc.	BOD5	↓	↓	-	-	-	-	-	-	↓	↓	↓	-
	Chl-a	-	-	-	-	-	-	-	-	-	-	-	↑
	E. coli	↓	-	↓	-	-	-	↓	-	↓	↓	-	↓

Legend

	Improving trend
	Declining trend
	TMDL parameter for a receiving waterbody
	Strong upward trend ( $p \leq 0.001$ )
	Upward trend ( $0.001 < p \leq 0.05$ )
	Weak upward trend ( $0.05 < p \leq 0.10$ )
-	No trend at $p = 0.10$
	Strong upward trend ( $0.05 < p \leq 0.10$ )
	Downward trend ( $0.001 < p \leq 0.05$ )
	Strong downward trend ( $p \leq 0.001$ )

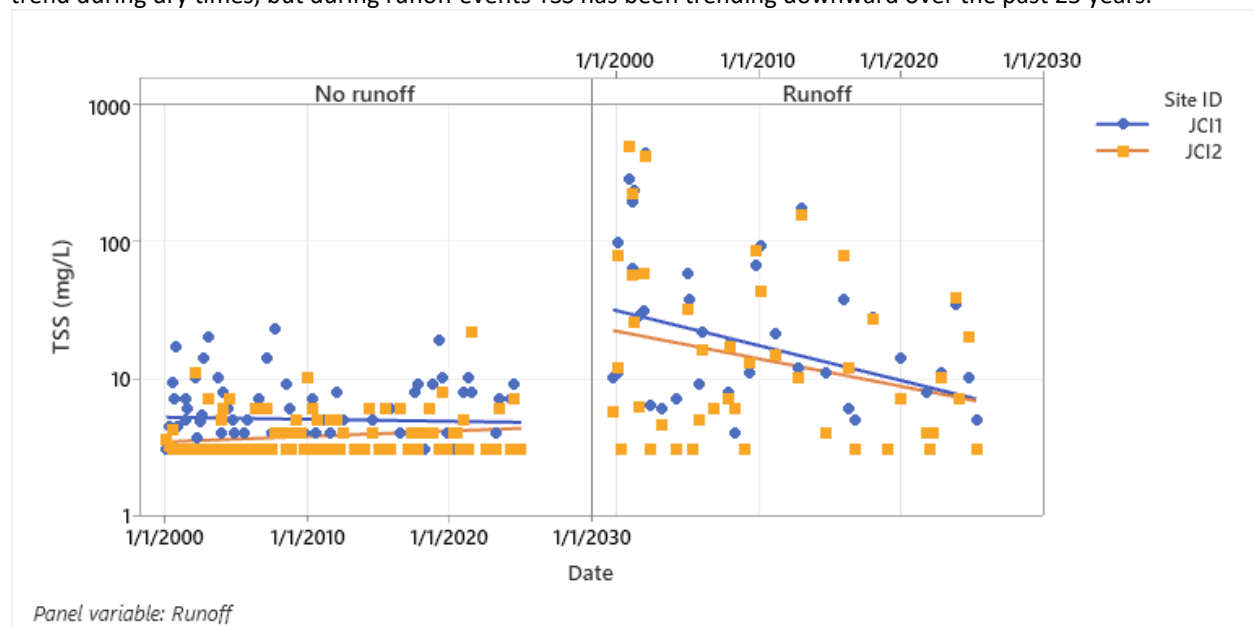
## 6.4 Results for Individual Streams

The following sections focus on impaired parameters in each creek. Graphs are displayed for each impaired parameter over time with the data grouped into events with/without runoff and include water quality standards as red dashed reference lines where applicable. The left panel of each graphs shows data points collected when runoff was unlikely to be entering the creek ( $<0.1$ " of precipitation in previous 24 hours), and the right panel shows data points collected when runoff was likely to be entering the creek ( $\geq 0.1$ " of precipitation in previous 24 hours). Trend lines represent the least-squares regression. Graphs and regressions other than field parameters are shown with a logarithmic y-axis.

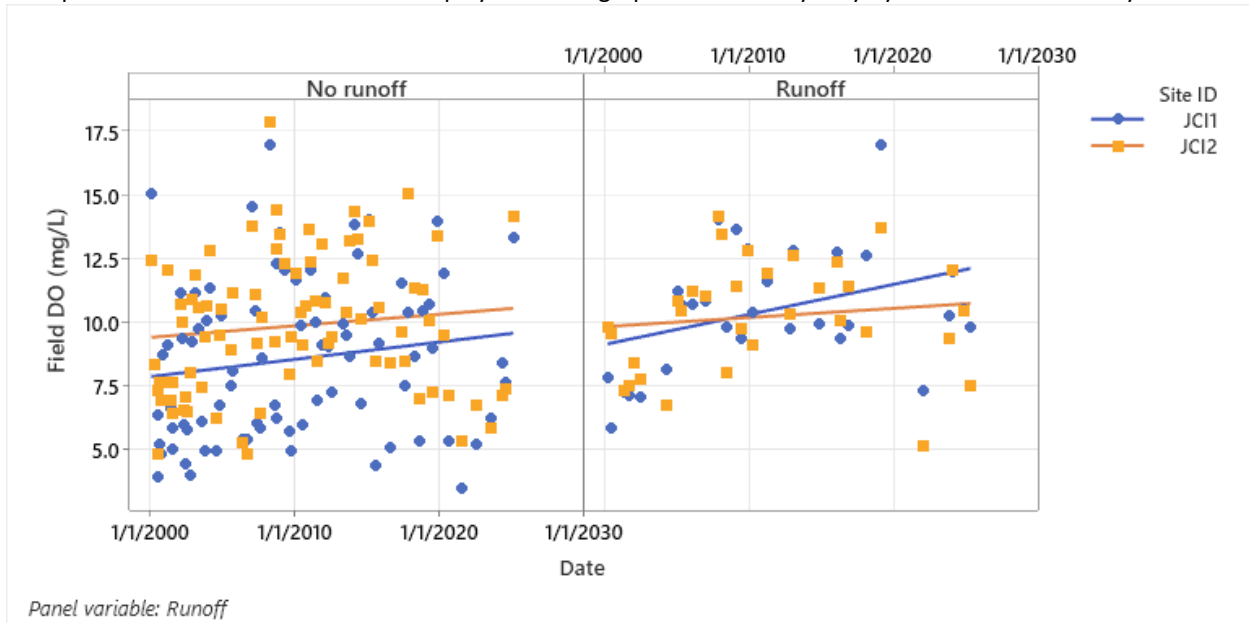
### 6.4.1 Johnson Creek

Two sites in Johnson Creek were evaluated: JCI1 is at the downstream edge of the Gresham boundary and receives runoff from the jurisdiction as well as land upstream of the city; JCI2 is at the upstream edge of the Gresham boundary and receives runoff primarily from agricultural and rural land uses. Johnson Creek has TMDLs for DDT and Dieldrin (with a TSS surrogate), mercury, and E. coli. It is also on the 303(d) list for impairments of dissolved oxygen and copper.

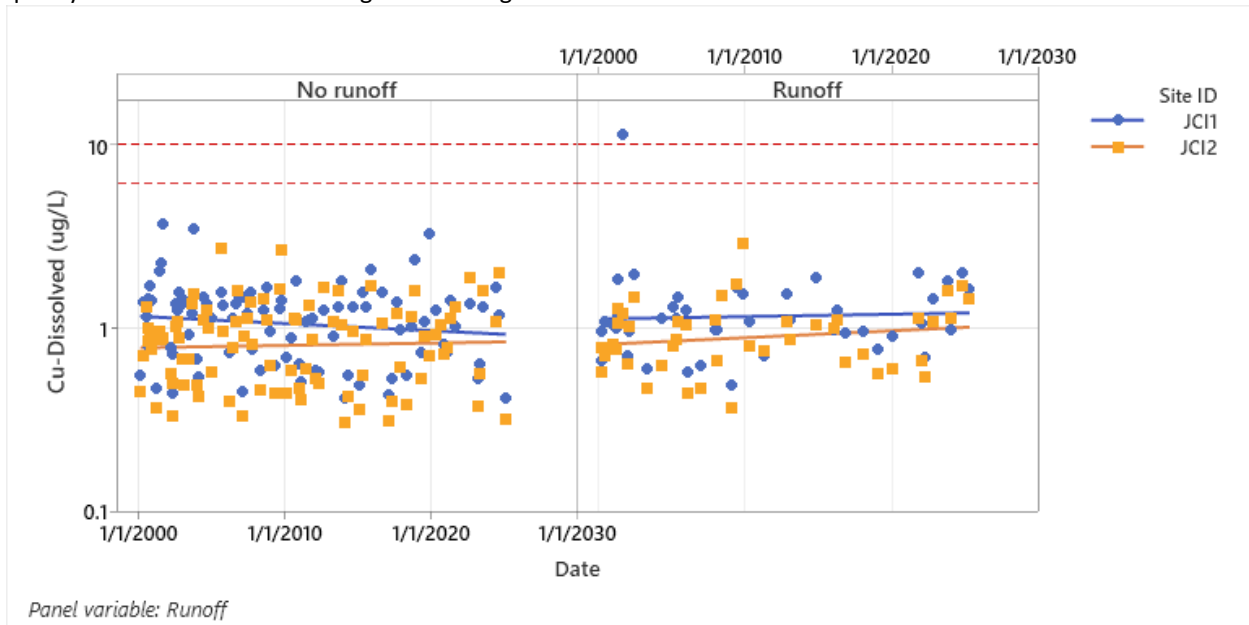
**Figure 6-1. Johnson Creek TSS.** TSS was generally higher during runoff events than during dry times. There was no trend during dry times, but during runoff events TSS has been trending downward over the past 25 years.



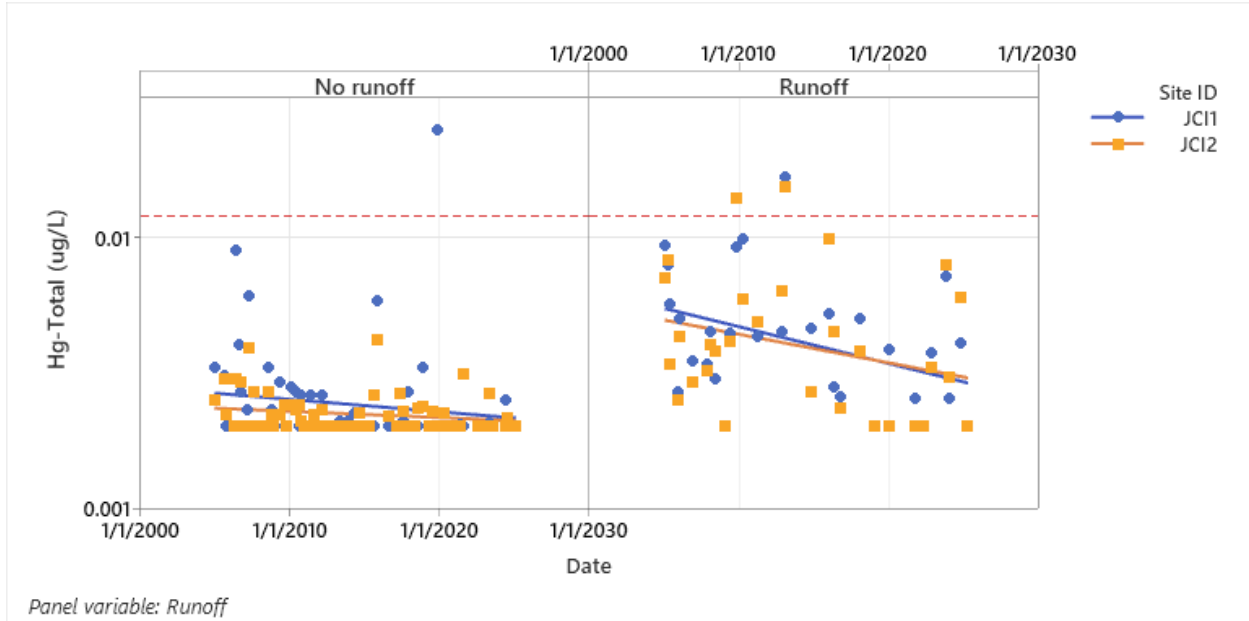
**Figure 6-2. Johnson Creek Dissolved Oxygen.** Dissolved oxygen did not show significant trends throughout the time period. Reference levels are not displayed on the graph because they vary by location and time of year.



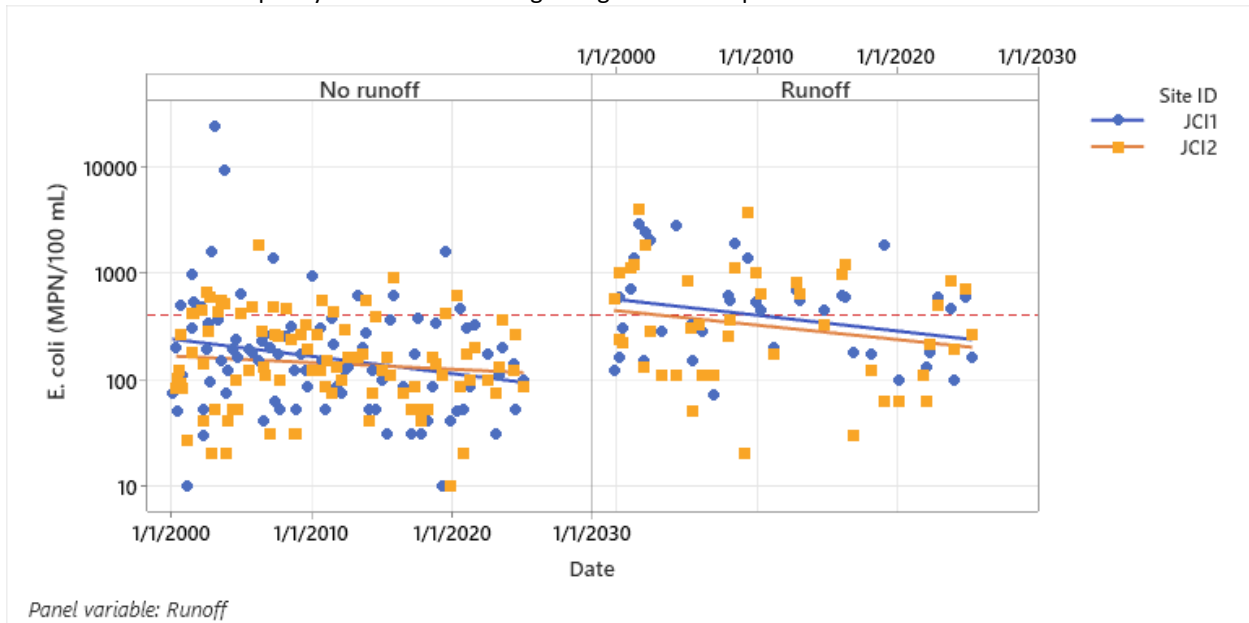
**Figure 6-3. Johnson Creek Dissolved Copper.** Dissolved copper had a statistically significant upward trend during runoff events; however, the values generally fell far below both the acute and chronic average instream water quality standards calculated using the biotic ligand model.



**Figure 6-4. Johnson Creek Total Mercury.** Mercury concentrations trended downward during runoff events and were generally below both the acute and chronic water quality standards.



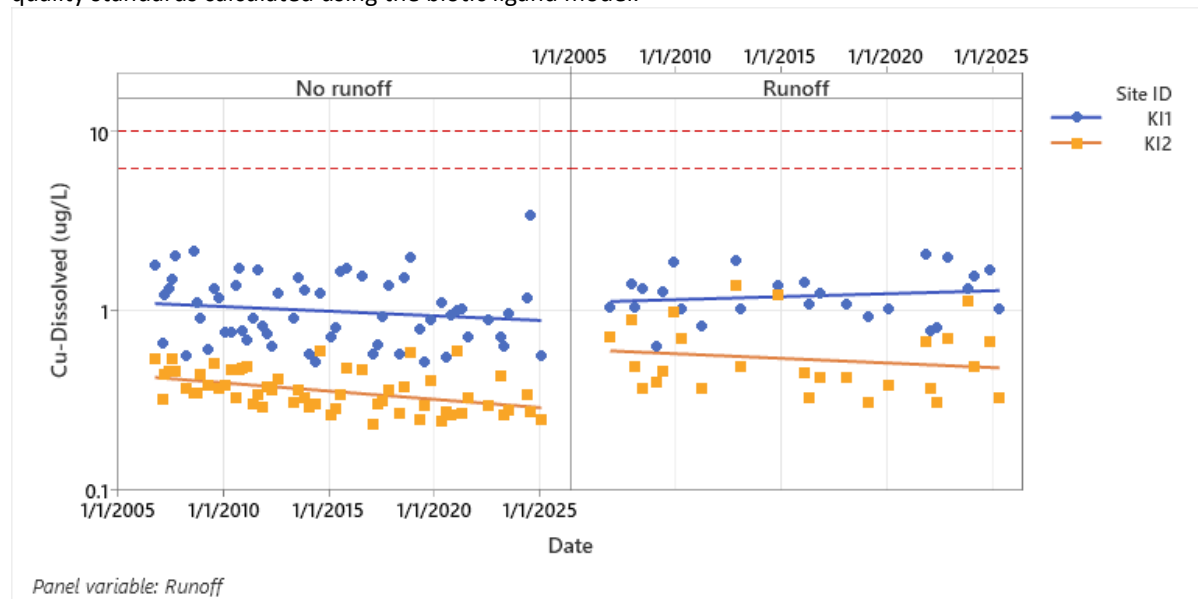
**Figure 6-5. Johnson Creek E. coli.** E. coli concentrations had a weak downward trend at JCI1 and no statistically significant trend at JCI2, but was potentially decreasing during runoff events. Averages during runoff for both sites were above the water quality standard at the beginning of the time period and below it at the end.



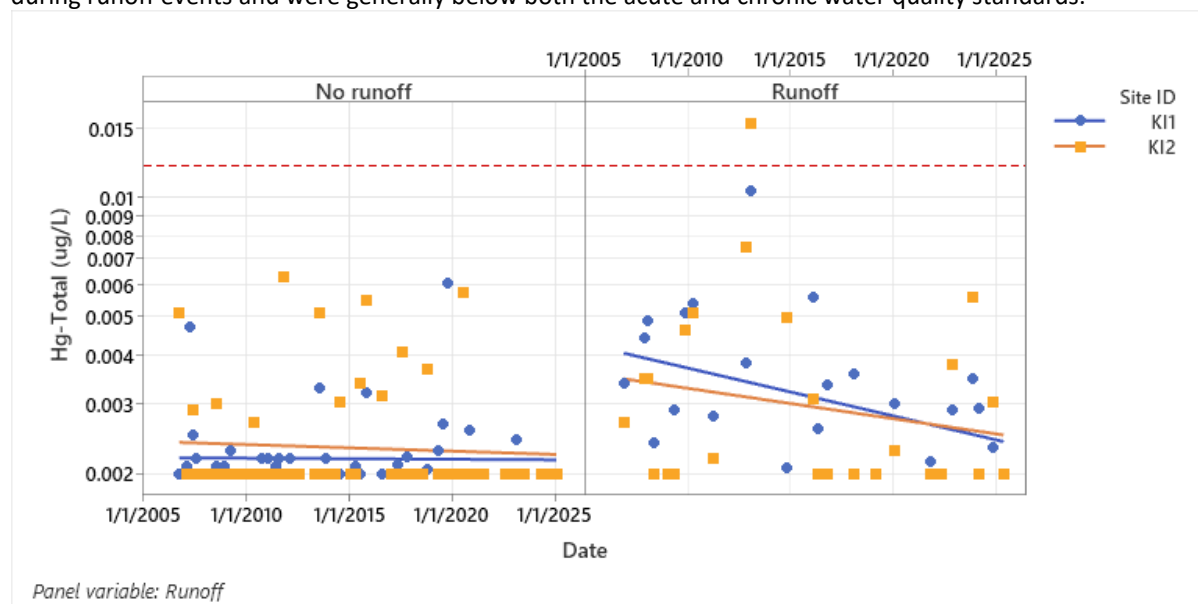
## 6.4.2 Kelley Creek

Kelley Creek is a tributary to Johnson Creek. Two sites in Johnson Creek were evaluated: K11 is at the downstream edge of the Gresham boundary and receives runoff from the jurisdiction as well as land upstream of the city; K12 is at the upstream edge of the Gresham boundary and near the headwaters of the creek on a forested butte. Kelley Creek has a TMDL for mercury and is on the 303(d) list for copper.

**Figure 6-6. Kelley Creek (Johnson Creek watershed) Dissolved Copper.** Dissolved copper showed a downward trend at K12 and no significant trend at K11. All values fell below both the acute and chronic average instream water quality standards calculated using the biotic ligand model.



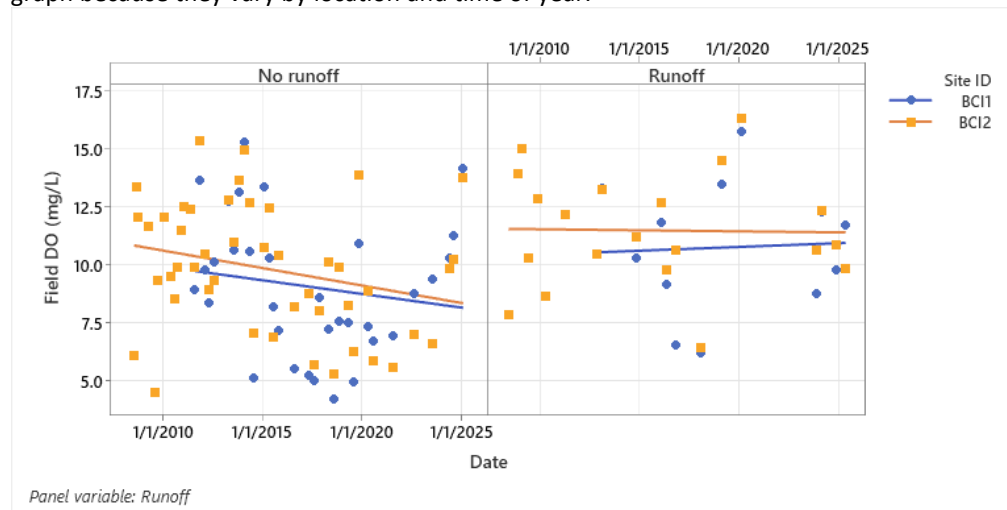
**Figure 6-7. Kelley Creek (Johnson Creek watershed) Total Mercury.** Mercury concentrations trended downward during runoff events and were generally below both the acute and chronic water quality standards.



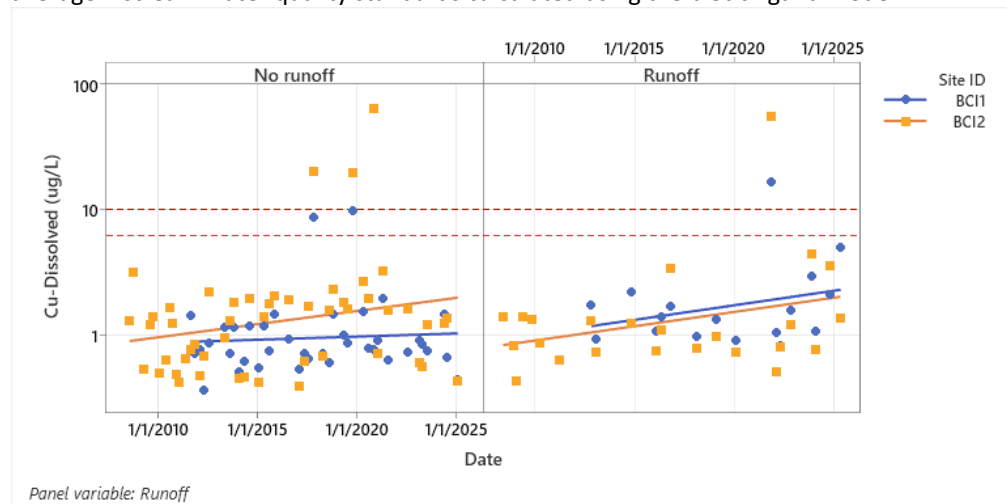
### 6.4.3 Beaver Creek

Two sites in Beaver Creek were evaluated through an intergovernmental agreement with Multnomah County: BCI1 is in the Beaver Creek canyon near the downstream edge of the urban area receiving runoff from mixed urban and rural landscapes; BCI2 is at the upstream edge of the urban area and receives runoff primarily from agricultural and rural land uses. Beaver Creek has a TMDL for E. coli and is on the 303(d) list for dissolved oxygen and copper.

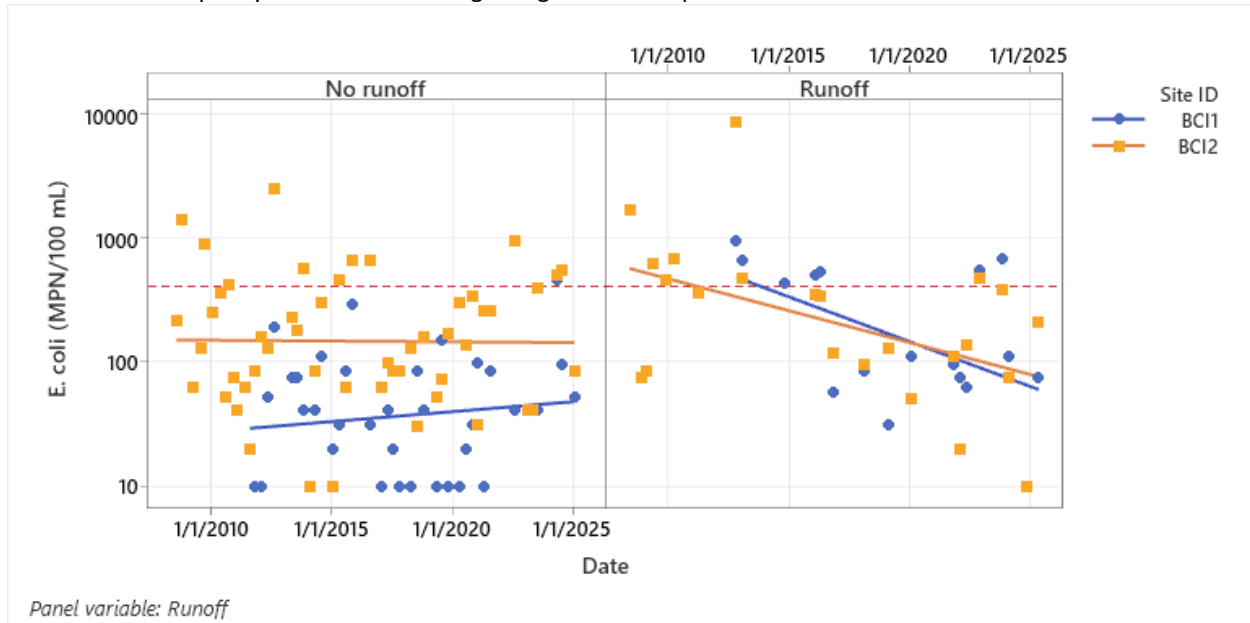
**Figure 6-8. Beaver Creek Dissolved Oxygen.** Dissolved oxygen did not have significant trends during runoff events, although there was a weak downward trend at K12 during dry times. Reference levels are not displayed on the graph because they vary by location and time of year.



**Figure 6-9. Beaver Creek Dissolved Copper.** Dissolved copper had a weak upward trend during rain events at BCI2. There was no significant trend at BCI1, perhaps due to fewer data points, but the pattern appears similar. Copper sources include vehicle brake pads and fungicides on plants. Values generally fell below both the acute and chronic average instream water quality standards calculated using the biotic ligand model.



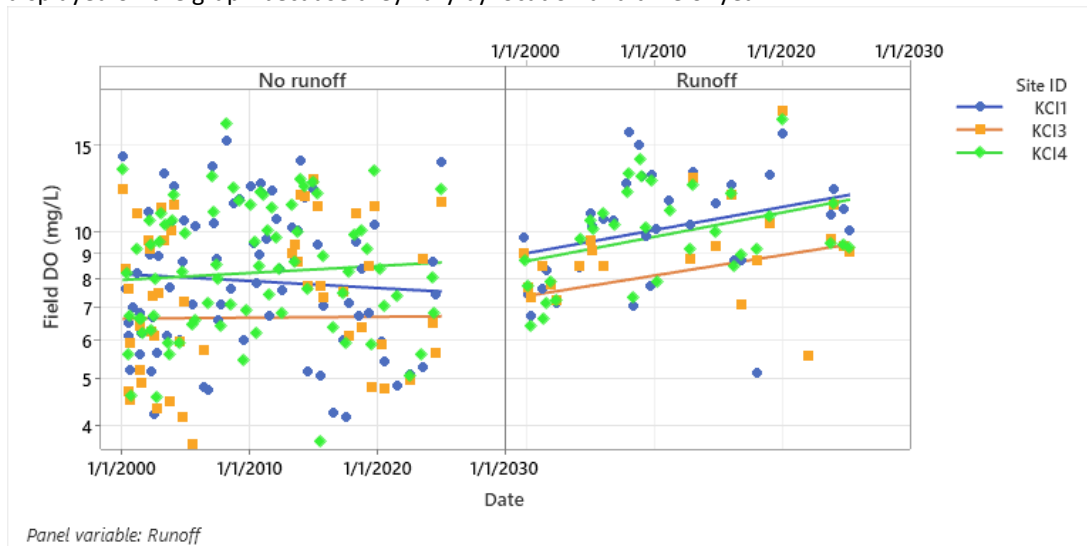
**Figure 6-10. Beaver Creek E. coli.** E. coli trended downward during runoff events. Averages at both sites were above the water quality standard at the beginning of the time period and below the standard at the end.



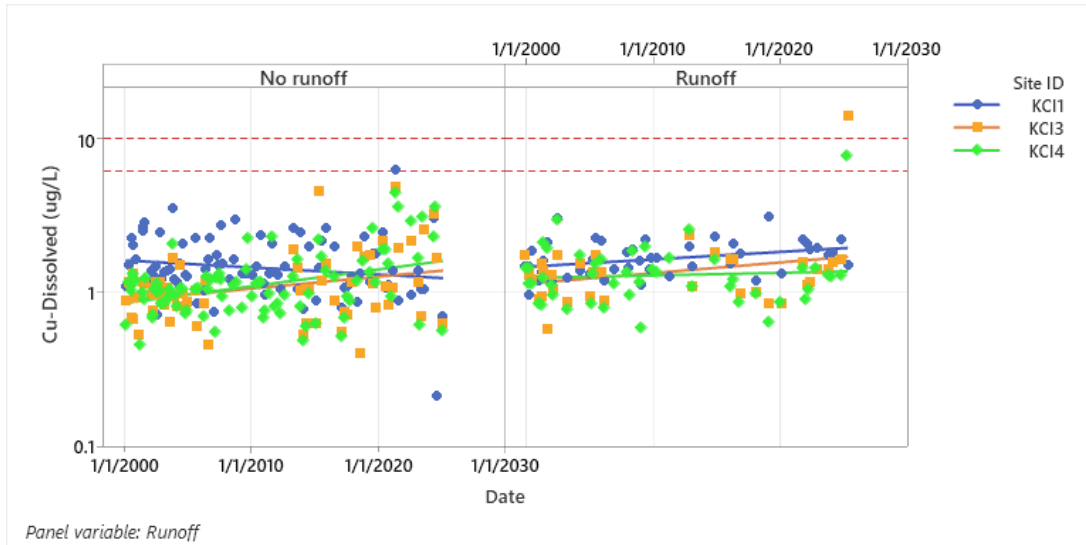
#### 6.4.4 Kelly Creek

Not to be confused with Kelley Creek described above in section 6.4.2, Kelly Creek (with one “e”) is a tributary to Beaver Creek in the Sandy River watershed. Three sites in Kelly Creek were evaluated: KCI1 is near the mouth of Kelly Creek (where it flows into Beaver Creek) and receives runoff from mixed urban and rural landscapes; KCI3 is upstream of most urban development and immediately downstream of an in-line water quality facility; KCI4 is upstream of most urban development and immediately upstream of the in-line water quality facility and receives runoff primarily from agricultural and rural land uses. Kelly Creek has a TMDL for E. coli and is on the 303(d) list for dissolved oxygen, copper, and zinc.

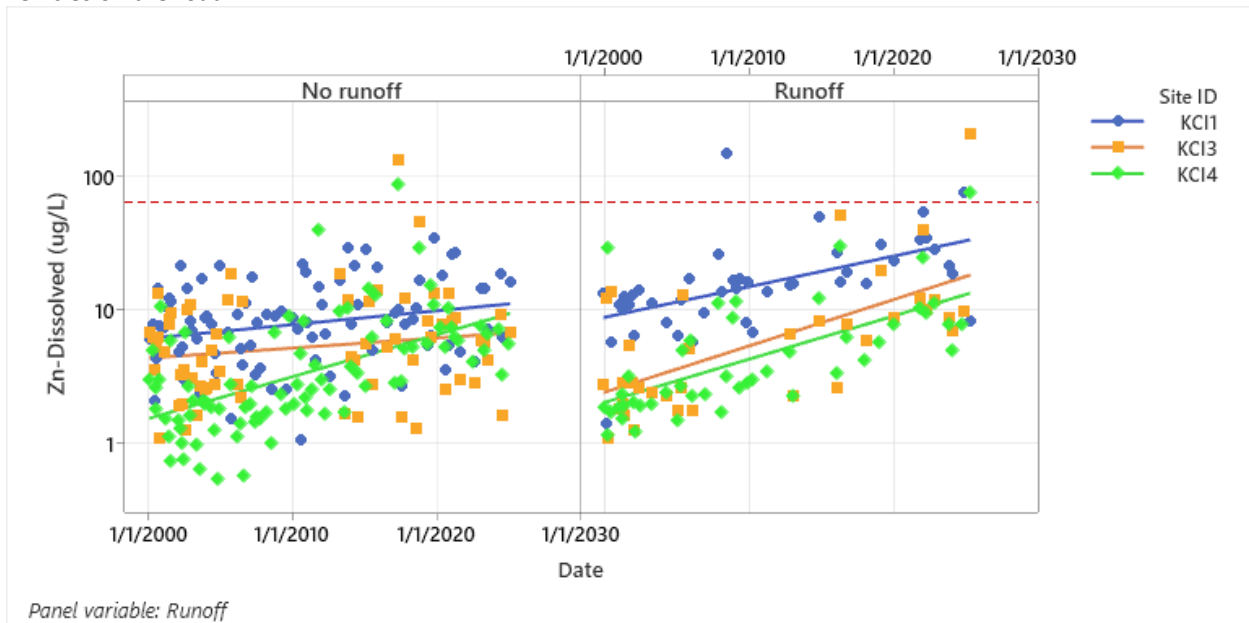
**Figure 6-11. Kelly Creek Dissolved Oxygen.** Dissolved oxygen did not have significant trends throughout the time period, although it appears that they may be trending downward during dry times. Reference levels are not displayed on the graph because they vary by location and time of year.



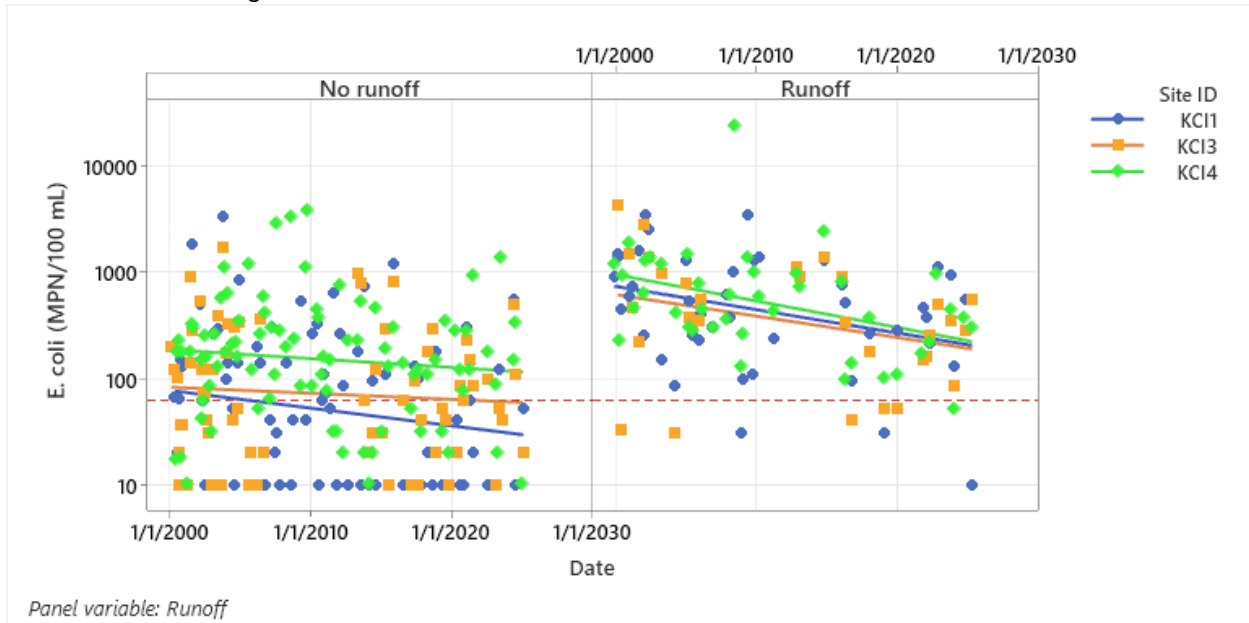
**Figure 6-12. Kelly Creek Dissolved Copper.** Dissolved copper had no significant trends and values generally fell below both the acute and chronic average instream water quality standards calculated using the biotic ligand model.



**Figure 6-13. Kelly Creek Dissolved Zinc.** Dissolved zinc trended upward at all three sites during runoff events. Current averages were below the average hardness-based instream water quality standard for this creek, but are possibly moving towards it. This upward trend was seen across watersheds. Possible sources include car tires, moss killer, and galvanized metal. There may be increases in uses of zinc-containing products and/or increased tire wear which can come from increased vehicle traffic and increased average vehicle weight with more electric vehicles on the road.



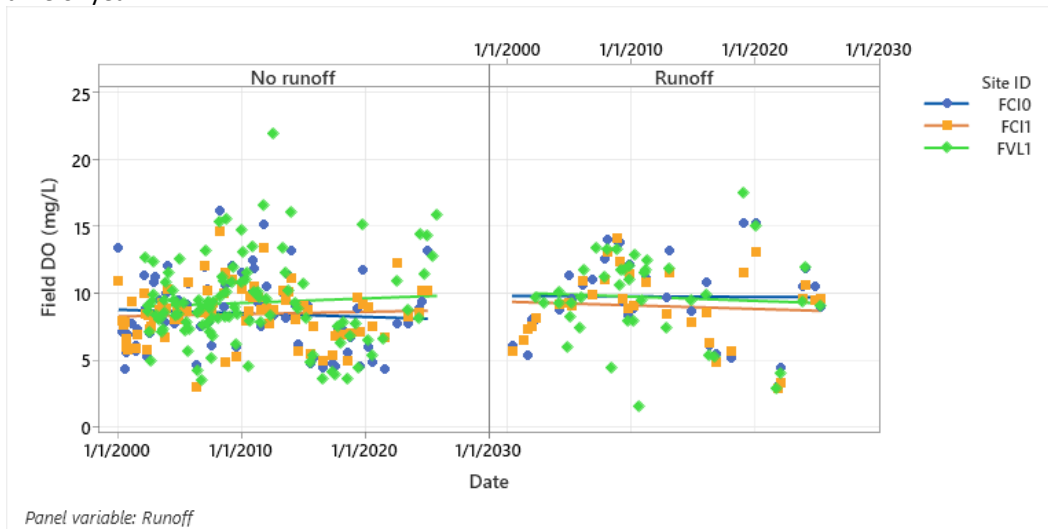
**Figure 6-14. Kelly Creek E. coli.** E. coli was generally above the instream water quality standard during runoff events but are trending downward.



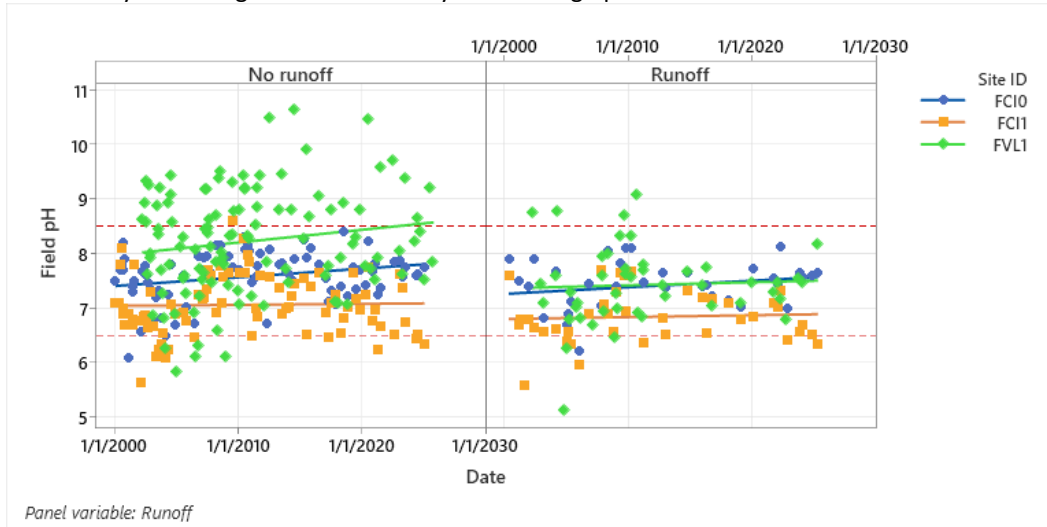
### 6.4.5 Fairview Creek

Three sites in the Fairview Creek watershed were evaluated in collaboration with the City of Fairview through an inter-governmental agreement: FCI0 is near the mouth of Fairview Creek just before it flows into Fairview Lake and drains an entirely urban area; FCI1 is the upstream extent of the perennial portion of Fairview Creek in the middle of Gresham and receives urban runoff as well as a substantial groundwater input; FVL1 is in Fairview Lake which receives water from Fairview Creek and is the start of the Columbia Slough. The Fairview Creek watershed is impaired for dissolved oxygen, pH, phosphorus, mercury, chlorophyll-a, and E. coli.

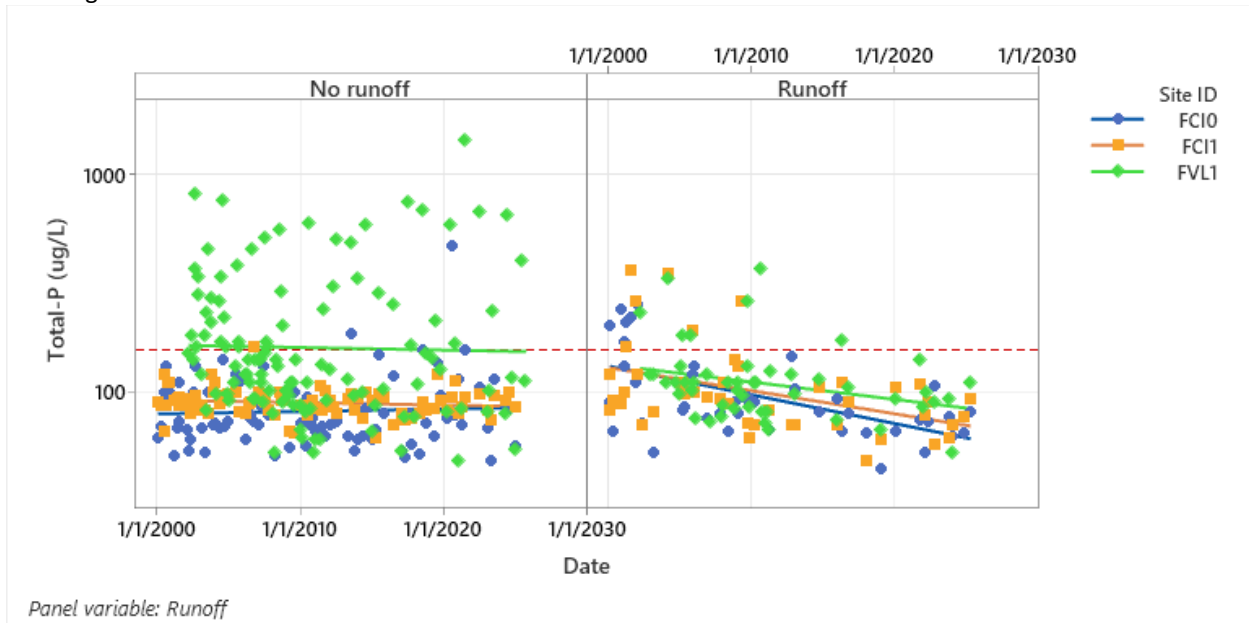
**Figure 6-15. Fairview Creek and Fairview Lake Dissolved Oxygen.** Dissolved oxygen did not have significant trends throughout the time period. Reference levels are not displayed on the graph because they vary by location and time of year.



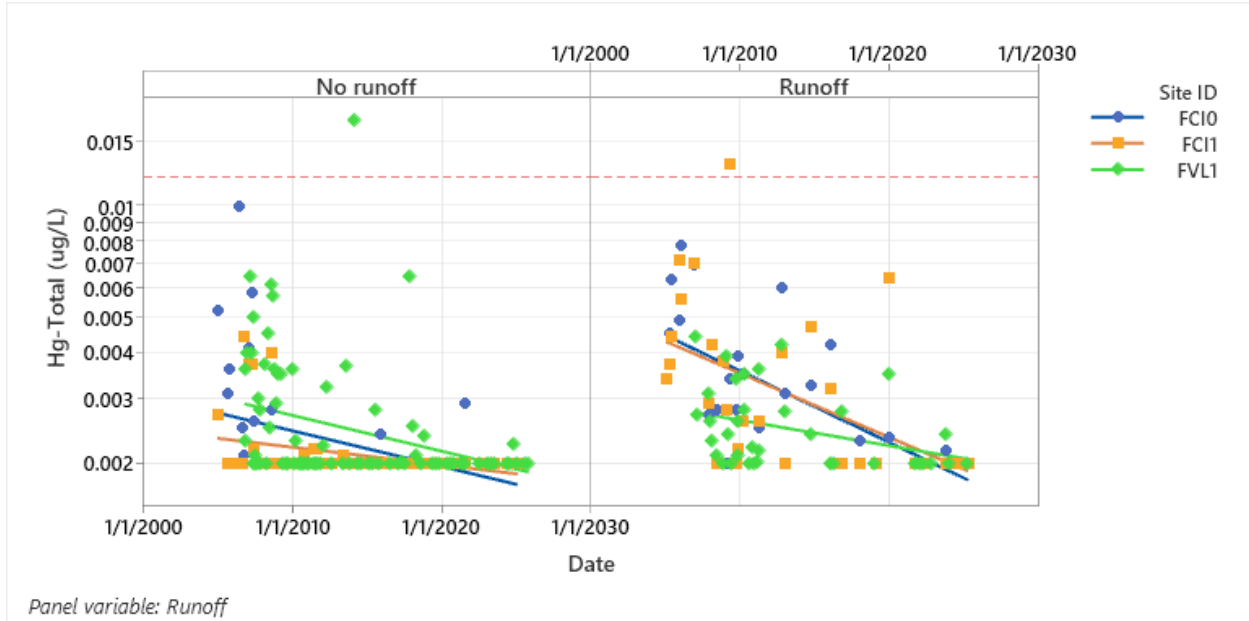
**Figure 6-16. Fairview Creek and Fairview Lake pH.** The pH was generally within water quality standard ranges in Fairview Creek, but often exceeded the upper pH limit during dry times in Fairview Lake with an increasing trend. This is likely due to algal blooms and may be trending upward.



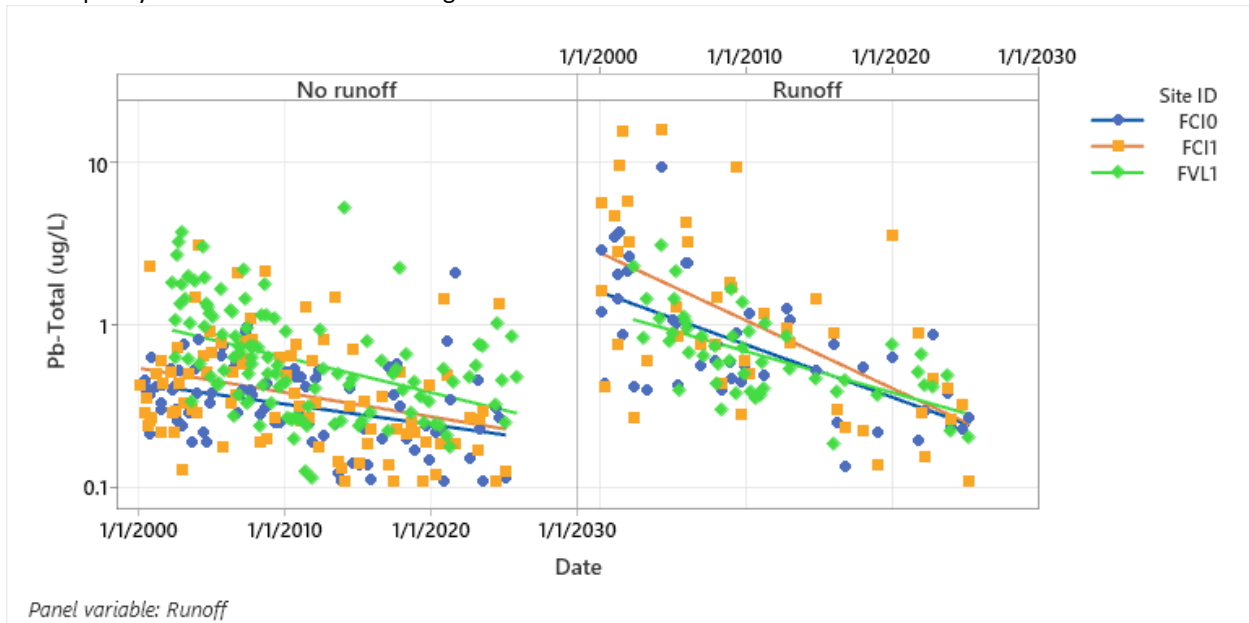
**Figure 6-17. Fairview Creek and Fairview Lake Total Phosphorus.** Phosphorus often exceeded the water quality standard during dry times in Fairview Lake, but generally met the standard during runoff events where it was also trending downward.



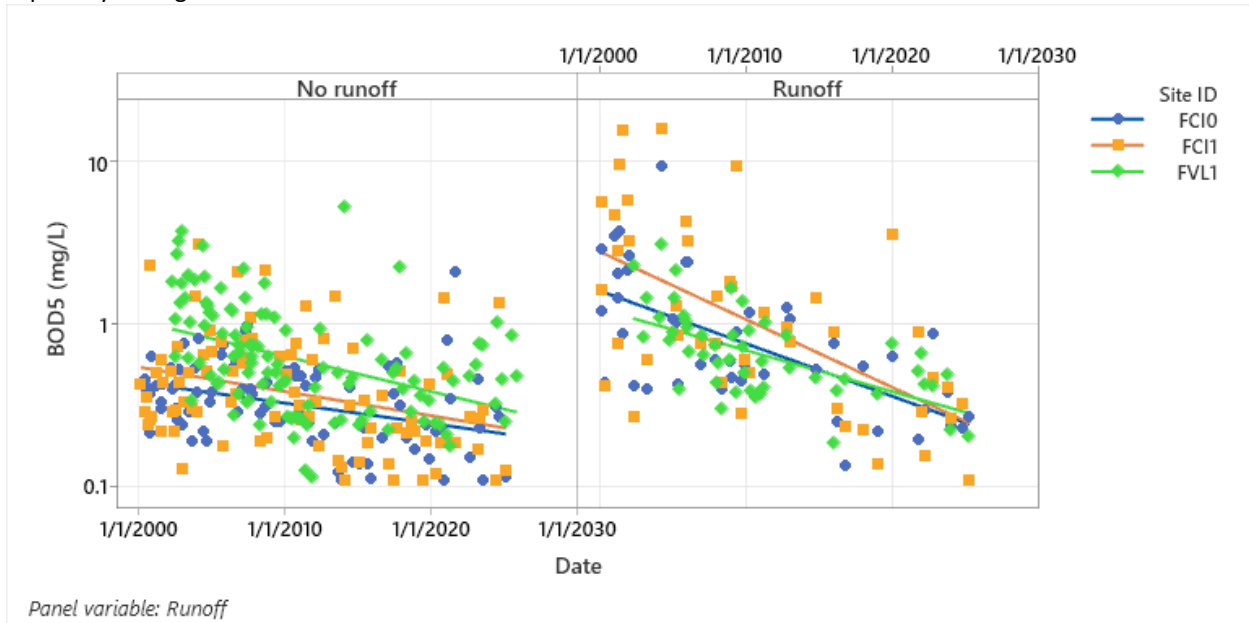
**Figure 6-18. Fairview Creek and Fairview Lake Total Mercury.** Total mercury was generally below the acute and chronic water quality standards and was trending downward.



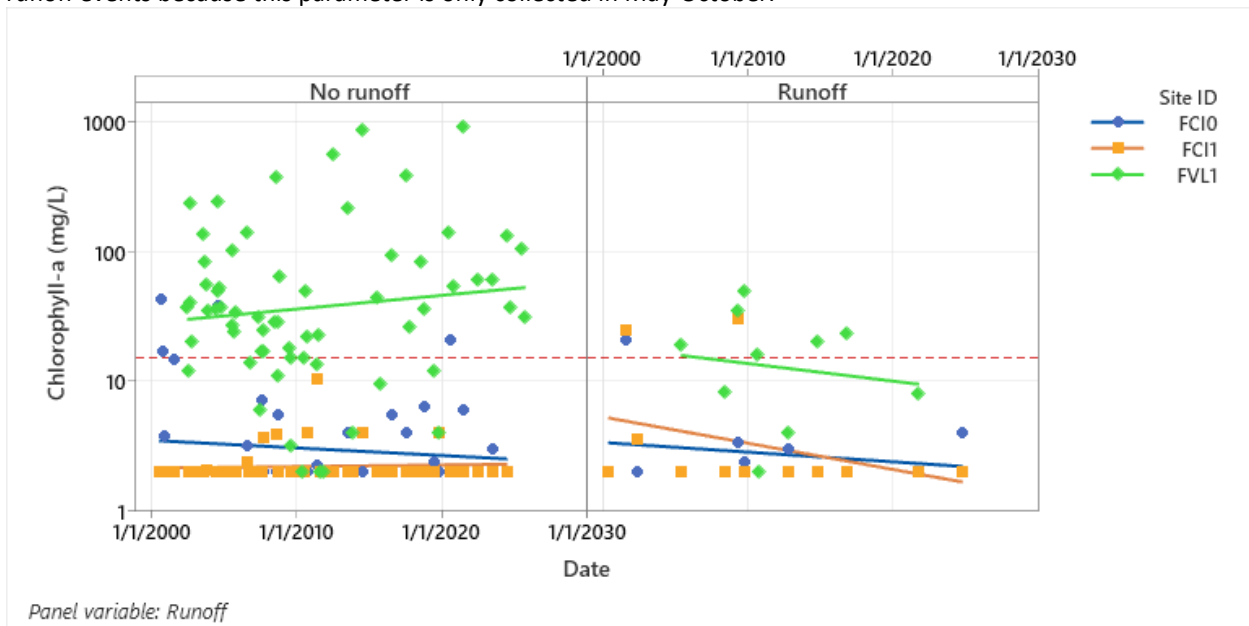
**Figure 6-19. Fairview Creek and Fairview Lake Total Lead.** Total lead was generally below the acute and chronic water quality standards and was trending downward.



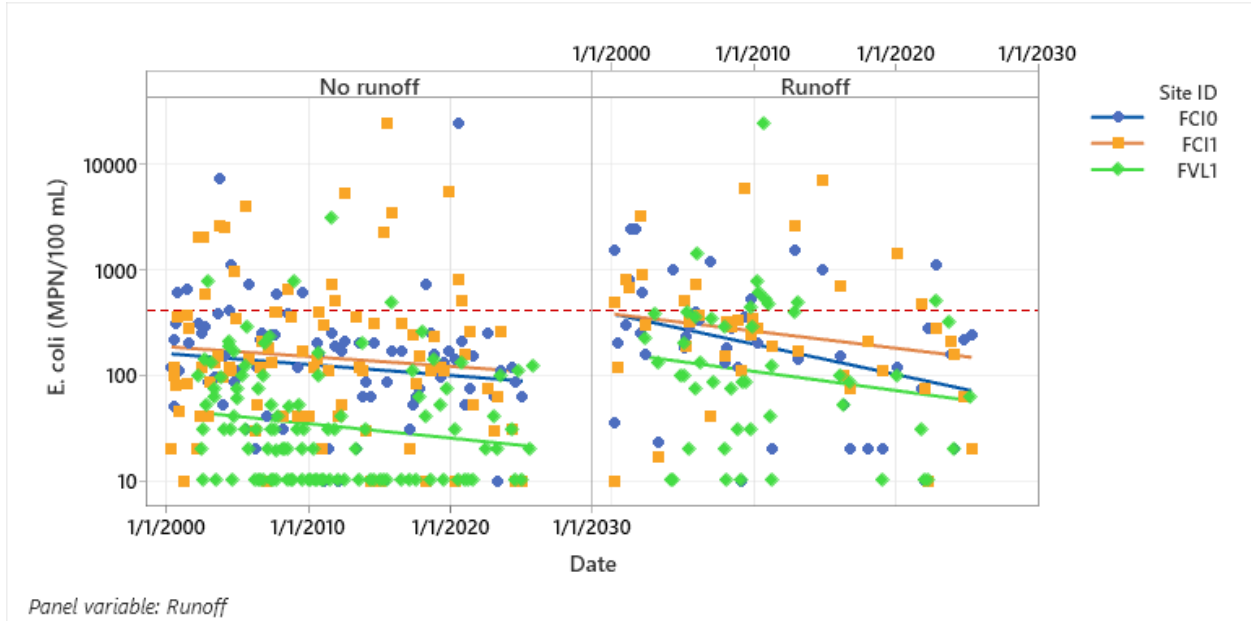
**Figure 6-20. Fairview Creek and Fairview Lake BOD<sub>5</sub>s.** BOD<sub>5</sub>s has been trending down at all sites in Fairview Creek, especially during runoff events.



**Figure 6-21. Fairview Creek and Fairview Lake Chlorophyll-a.** There were no significant trends in chlorophyll-a. It often exceeded the water quality standard during dry times in Fairview Lake. There were very few samples during runoff events because this parameter is only collected in May-October.



**Figure 6-22. Fairview Creek and Fairview Lake E. coli.** E. coli did not show statistically significant trends, but may be decreasing through time during runoff events at these sites with averages below the water quality standard.



## 7. 303(d) Pollutant Evaluation

The following section is being provided to meet the requirement to evaluate the 303(d) listed pollutants.

Schedule D(2)a requires:

- i. Review the applicable pollutants that are on the 2018/2020 Integrated Report's 303(d) list, or the most recent USEPA list if approved within three years of the issuance date of this permit, that are relevant to the co-permittees' MS4 discharges with the MS4 Permit Renewal Application Package. Based on a review of the most current 303(d) list at the time, evaluate whether there is a reasonable likelihood for stormwater from the MS4 to cause or contribute to water quality degradation of receiving waters.*
- ii. Evaluate whether the BMPs in the existing SWMP Document are effective in addressing and reducing the 303(d) pollutants. If a co-permittee determines that the BMPs in the existing SWMP Document are ineffective in addressing and reducing the applicable 303(d) pollutants, the co-permittee must describe how the SWMP will be modified or updated to address and reduce these pollutants to the MEP.*
- iii. Submit a report with the MS4 Permit Renewal Application Package summarizing the results of the review and evaluation, and identify any modifications or updates to the SWMP Document that are necessary to reduce applicable 303(d) pollutants to the MEP.*





As the 2022 303(d) list was the most recent list approved by EPA, that is the list that the City evaluated. Three receiving water bodies are located within or downstream of Gresham's NPDES permit boundary: Fairview Creek/Columbia Slough, Kelly/Beaver Creeks (Sandy River) and Johnson Creek (Lower Willamette). The following list of 303(d) pollutants are:

1. Biocriteria (Johnson Creek, Beaver/Kelly Creeks, Fairview Creek/Columbia Slough)
2. Alkalinity (Johnson Creek)
3. Dissolved Oxygen (Johnson Creek, Beaver/Kelly Creeks, Fairview Creek/Columbia Slough)
4. Organochlorine Pesticides
  - a. Chlordane (Johnson Creek, Beaver/Kelly Creeks)
  - b. DDD/DDE/DDT (Johnson Creek, Beaver/Kelly Creeks)
  - c. Dieldrin (Johnson Creek, Beaver/Kelly Creek)
  - d. Endosulfan (Johnson Creek)
  - e. Heptachlor Epoxide (Beaver/Kelly Creeks)
5. PAHs (Johnson Creek/Lower Willamette River)
6. PCBs (Johnson Creek/Lower Willamette River)
7. Heavy Metals
  - a. Copper (Johnson Creek, Beaver/Kelly Creeks, Fairview Creek/Columbia Slough)
  - b. Iron (Johnson Creek/Lower Willamette River)
  - c. Zinc (Kelly Creek)

Table 7-1 summarizes the BMPs that are in Gresham's Stormwater Management Program (SWMP) Document, and the colors in the table show the City's assessment of how effective each BMP is at addressing each of the 303(d) listed pollutants. In addition to the summary table, Tables 7-2 through 7-10 detail each pollutant and how the MS4 might be contributing to each pollutant, as well as covering whether the BMPs in the SWMP address each pollutant. This document summarizes information for BMPs; full BMP Descriptions/Measurable Goals can be found in the SWMP Document at [www.GreshamOregon.gov](http://www.GreshamOregon.gov).

**Table 7-1.** Gresham’s Stormwater Management Program (SWMP) summary table.

Key:

	= Control of the source of the pollutant entering the MS4
	= Control of the transport mechanism of discharge
	= Indirect pollutant reduction benefit
	= No applicable pollutant benefit

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals				
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc		
Stormwater Assets Maintenance Program (SMP)	A. Pipe Cleaning	Pipes are cleaned to remove excessive buildup, if the SOP threshold for cleaning is met.	Inspect 10 to 15 miles, clean if SOP threshold is met															
	B. CCTV Pipes (new/existing)	Inspect new pipe systems. CCTV inspect existing city pipes for repair, cleaning, asset management, resident concerns, IDDE.	CCTV 100% of new pipe (reported metric also contains CCTV miles for existing pipe as miles are not tracked separately)															
	C. Storm Drain Cleaning	Clean and inspect storm drains, removed sediment, note repair needs, monitor for illicit discharges	Inspect 90% of all drains, at a minimum clean if SOP threshold is met. Sediment removal from 5,000 to 8,000 drains/yr.															
	D. Maintain Green Infrastructure	Inspect and maintain vegetated facilities as needed publicly owned: detention ponds & swales, rain gardens, plus private multiple owner facilities	Inspect pond facilities, rehab/remove sediment based on facility capacity. Maintain regional facilities and remove forebay sediment.															
	E. Maintain Grey Infrastructure	Inspect and maintain underground (grey) structures; sedimentation manholes, Flow Control Manholes (FCMH), Detention lines.	Inspect 100% of sedimentation/inlet MH Clean per SOP criteria Inspect 100% FCMH Clean per SOP criteria Inspect 50% Detention lines Clean per SOP criteria Inspect 50% Detention MH Clean per SOP criteria															
	F. Proprietary Devices (grey)	Clean and maintain proprietary filter devices at the frequency recommended by the manufacturer.	Inspect 100% of Proprietary Devices Clean based on Manufacturers threshold rec. (about 150-300 cartridges replaced/yr.)															

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals				
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc		
	G. System Repair & Maintenance	Maintain and repair pipes, ditches, culverts, inlets, off road systems, UIC's	Maintain and repair based upon SOP criteria.															
	H. Spills, Illicit Discharge Investigation, Emergency Response	Respond to community reports of spills or illegal dumping & emergency flood concerns.	Follow City Spill Response and Illicit Discharge Investigation procedures Conduct Spill Response all Department training and procedure review twice during the permit cycle															
	I. Construction Inspections and Plan Review, Resident Concerns (O&M)	O&M staff plan review and construction site inspections of connections to the public system.	Conduct reviews and inspections to ensure compliance with Code															
	J. Good Housekeeping: O&M Yard	Manage the Operation yard, shop, and equipment in cooperation with other city departments to clean up spills, keep sediment from entering drains.	Follow City best practices for storage, repair, dumping, washing, etc.															
	K. Underground Injection Controls (UICs) Maintenance & Cleaning	Maintain the City's active UICs to ensure function and comply with the WPCF permit requirements.	Document and report maintenance and cleaning.															
	L. Proper Waste Disposal (O&M)	Ensure the debris collected from City O&M activities are handled and disposed of in a safe and responsible manner.	Follow City best practices for handling, storing, and disposing of O&M generated debris. Retain debris testing results per file retention standards															

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals			
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc	
Public Land Management (PLM)	A. Master Planning	City completed a City-wide Stormwater Master Plan that focused on pipe capacity limitations. The projects identified will become CIP expenditures over this permit cycle. Watershed Engineering Team made progress with the Kelley Creek Watershed Master Plan An updated project list for the City's Natural Resources Master Plan.	Plan, design, and build CIPs.														
	B. Water Quality Projects	Stormwater infiltration or treatment is a component of City funded projects are required by the Stormwater Manual. This BMP reports retrofit projects.	Implement Stormwater Manual requirements.														
	C. Integrated Pest Management	Limit the number of pesticides and fertilizers from city operations by implementing an Integrated Pest Management Plan to manage public land.	Update the Plan at least once during the permit cycle. At least biennially discuss land management strategies with staff. Applicators are licensed and complete licensure renewal schedule.														
	D. Urban Canopy Program	Supported by Watershed/Parks and Planning staff and coordinated with other departments as needed. Enhance the urban canopy to support the City's Climate Action Plan.	Code enforcement of tree removal violations Annual replacement of dead/dying street trees Urban Forestry Committee (public participation)														

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals			
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc	
	E. Natural Resource Program	Natural Resources Program focuses on enhancing & preserving the health of riparian area and stream corridors	Implement NR CIP. Actively manage and restore on average ~100 acres/yr. Track volunteers and community organizations engaged.														
Pollution Prevention from City Activities (PPCA)	A. O&M for Public Roads, bridges: sweeping	The City's Transportation Department oversees street sweeping and winter road safety measures and manages some of the vegetated right of ways	Prioritize sweeping of arterial roads Conduct 8-10 sweeps/yr.														
	B. O&M for Public Roads, bridges: deicing	The Transportation Department oversees the application of winter road safety chemicals follows the City's Winter Road Plan to minimize risk to the environment while achieving safe driving conditions	Remove winter road traction materials, as soon as practical post storm														
	C. Limit Releases from Fire Training Activities	The Fire Department Training Center follows a procedure to implement storm drain protection during training activities that may result in runoff.	Deploy storm drain protection techniques during training that cause runoff														
	D. Water Line Flushing	The Water Department (Operations) is responsible for minimizing impacts to the stormwater system by implementing an SOP for water line flushing.	Use of dechlorination														
	E. Limit Wastewater Pipe Seepage	The Wastewater Department is responsible for overseeing the system maintenance.	Implement wastewater pipe repairs as approved by the City budget.														

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals			
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc	
	F. Staff Training	The City of Gresham provides a variety of professional development and industry specific training opportunities for staff to ensure safe and effective delivery of programs and services for the public's benefit.	Document staff trainings in required program areas for permit compliance. Train new staff on all good housekeeping procedures, chemical storage, stormdrain protection procedures for outdoor work and management of the Operations yard within six months of hire.														
Public Reporting, Engagement, Outreach & Behavior Change (PREOB)	A. Spills & Illicit Discharges & Public Reporting	The City responds to calls of spills or dumping; For concerns that constitute threats to human health, welfare, or the environment, staff must respond within 24 hours or as soon as possible upon becoming aware	Document spill and illicit discharge reports and investigations and outcomes in City's database.														
	B. Litter/Hazardous Waste Control (Residents)	Solid Waste & Sustainability Program offers special collections events and also oversees residential garbage, recycling, and yard debris hauling and used oil is collected at curbside and reported to the City.	Document events offered and supported. Track residential used oil collected by haulers														
	C. Business Outreach	The Solid Waste & Sustainability Program offers outreach to businesses and apartments with services that help reduce litter and illegal dumping and increase the recycling of materials and composting of food waste.	Document businesses and apartments served.														

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals			
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc	
	D. Schools and youth outreach	Staff occasionally teach classrooms or lead field trips, support camps or events, etc. and also partner with local watershed councils to deliver some services to Gresham youth.	Document staff activities to deliver water protection, nature & wildlife education & experiences to youth.														
	E. Regional adult outreach	Invest a large portion of the budget and effort to leverage dollars and staffing using collaborative approaches to deliver stormwater pollutant reduction and water protection messaging to adults.	Educate key adult audiences as described in the E&O strategy with key pollutant reduction messages and positive actions they can take within their lives.														
	F. Public Involvement & Participation: City outreach	The City uses a variety of communication channels to reach its residents	Utilize City channels to deliver 3-5 messages to residents														
Control Impacts from Development and Business	A. Stormwater Management Manual (SWMM)	This manual contains the regulatory development thresholds that necessitate stormwater controls, the prioritization of green infrastructure, the design standards, plan review process, and long term maintenance requirements.	Review SWMM at least once within the permit cycle. Update, if necessary														

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals				
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc		
	B. Private Stormwater Facilities Tracking & Inspection	The Watershed Department ensures proper installation, planting, and GIS mapping of private stormwater facilities required by the SWMM. The types of facilities installed and the catchment areas that drain to them are recorded for future pollutant reduction modeling and also to ensure the long-term maintenance and function as required by Gresham Code.	Document and inspect new private stormwater facilities and associated treatment areas. Conduct QA/QC of GIS recording of these facilities at least once per year Inspect major structural controls Oversee proprietary device maintenance															
	C. Erosion Prevention & Sediment Control (EPSC) Manual	The City's EPSC Manual was reviewed as part of the process for the updated SWMP. The Manual functions well for the EPSC Plan Review and Inspection Program SOP	Review EPSC Manual at least once within the permit cycle. Update, if necessary															
	D. Erosion Prevention & Sediment Control (EPSC) Plan Review & Inspection Standard Operating Procedure	Ensure development permitted within the City obtains a DEQ's 1200-C permit, when applicable and apply the City's EPSC Manual requirements to sites to ensure sediment laden runoff is not entering the City's stormwater system or waterways.	Conduct active site inspections and QA/QC oversight as described in the Erosion Prevention & Sediment Control SOP. Ensure large sites obtain a DEQ 1200-C permit Assist DEQ with inspections if requested															
	E. Business Screening & Inspection Program	Implement the Business Inspection Program to address sectors that have high potential to contribute	Conduct routine and follow up inspections as described in the SOP, typically projected to be 100-200/year															

Category	Activity Name	Description	Measurable Goal	Biocriteria	Alkalinity	DO	Organochlorine Pesticides					PAHs	PCBs	Heavy Metals			
							DDT	Dieldrin	Chlordane	Endosulfan	Heptachlor			Copper	Iron	Zinc	
		to stormwater pollution in runoff from their site.															
	F. Private Storm Drain Maintenance Program	Voluntary outreach program called the Stormdrain Cleaning Assistance Program (SCAP)	Implement the SCAP program. Select additive portions of the City's business areas to request drain cleaning documentation.														
	G. Retrofit/ Hydromodification Assessment Update	City will provide an assessment of how the reports previously provided have been considered, updated, or implemented, remaining gaps of knowledge, if applicable, new goals, tools, priorities for future improvement.	Provide DEQ an assessment with outcomes related to the creation of the original reports.														

Table 7-2. 303(d) Evaluation for Biocriteria		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Johnson Creek, Beaver/Kelly Creeks, Fairview Creek/Columbia Slough</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>Oregon Administrative Rules (OAR) 340-041-0011 states “waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.”</li> <li>The biocriteria protocol is based on the observed versus expected population of macroinvertebrates compared to reference sites throughout Oregon. DEQ identifies sites in a given region that are least disturbed by anthropogenic activities and uses these as reference sites. (DEQ, 2022)</li> <li>The macroinvertebrate community of a stream can be impacted by multiple stressors, including temperature, dissolved oxygen, sediment, flashy flows, or the presence of a multiple of chemicals that negatively impact biological organisms (e.g. heavy metals, pesticides).</li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>Urban separate storm sewer systems rapidly convey runoff from impervious surfaces directly to waterways. This alters natural stream flow regimes by increasing peak flows and decreasing baseflows during dry periods. The effects include channel erosion, substrate destabilization, and habitat simplification- all of which constrain aquatic organisms diversity and abundance.</li> <li>Stormwater runoff contains a complex mixture of contaminants that are toxic or stressful to aquatic life, including nutrients, heavy metals, hydrocarbons, pesticides, and emerging contaminants. These pollutants influence biological communities in several ways: Elevated contaminants correlate with toxicity to multiple trophic levels reducing survival, growth, and reproductive success (Novotny, 1997).</li> <li>Studies show declines in biodiversity and shift toward pollution-tolerant taxa in streams influenced by stormwater discharge. Typically, sensitive groups such as Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) decline, while tolerant taxa (worms, midges) increase. (Godyn et al., 2018)</li> </ul>	
Does Gresham’s Stormwater Contribute to this Pollutant?	Likely yes. While we may not know the exact stressor(s) impacting macroinvertebrates in our local streams, the MS4 can contribute several pollutants that can impact biological communities.	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth)
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement

Table 7-2. 303(d) Evaluation for Biocriteria		
		and enforce the EPSC Manual and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.
Plan for Coming Permit Cycle		Continue to evaluate BMPs and results from macroinvertebrates monitoring at long-term sites and periodically evaluate trends.
SWMP Changes Necessary?		None

Table 7-3. 303(d) Evaluation for Alkalinity		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Johnson Creek</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>Alkalinity is the capacity of water to buffer itself against acids or bases and still maintain a stable pH level. (USGS, 2018)</li> <li>Natural rocks and soil can contribute alkalinity, particularly if there is carbonate rock present. While there is not a natural carbonate source or limestone in the Johnson Creek watershed, lime is often added to urban landscapes and agricultural fields. Lime is a major component of concrete, so sidewalks and other structures comprised of concrete could contribute some alkalinity to stormwater.</li> <li>Johnson Creek is a heavily urbanized watershed where impervious surfaces such as roads and roofs and drainage can increase stormwater runoff which can wash soil minerals and urban materials into the creek, mobilizing alkaline particulates and dissolved ions.</li> <li>During high flow events with storm runoff, surface waters can dilute or temporarily change ionic concentrations, including bicarbonates, which affect measured alkalinity. Low flows from primarily groundwater have more stable alkalinity signatures.</li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>If there are anthropogenic sources of alkalinity entering Johnson Creek from soil, landscaping activities, and concrete surfaces, then alkalinity might be affected by MS4 discharges.</li> </ul>	
Does Gresham's Stormwater Contribute to this Pollutant?	Inconclusive. Due to the lack of monitoring of groundwater sites in the region and the corresponding alkalinity levels, a direct relationship between city activities and alkalinity in Johnson Creek cannot be made. Alkalinity has been measured in stormwater discharges and streams over the past four years and found that the average concentration in stormwater (9 mg-CaCO <sub>3</sub> /L) was lower than the minimum concentration in Johnson Creek (12.4 mg-CaCO <sub>3</sub> /L). This indicates that MS4 discharges may not contribute substantially to alkalinity. The city implements a robust erosion control program that aims to prevent soil from leaving the site, and also includes best practices for and concrete removal and replacement.	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from fire fighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth)
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private land owners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Manual and perform inspections. Continue the business

Table 7-3. 303(d) Evaluation for Alkalinity		
		screening/inspections. Continue to run the SCAP for private storm drain owners.
Plan for Coming Permit Cycle		Continue to evaluate monitoring information to identify potential alkalinity influences, to better understand the relationship between alkalinity and stormwater, and to evaluate through the City's adaptive management process the need for any potential SWMP Document revisions to further address alkalinity.
SWMP Changes Necessary?		None

Table 7-4. 303(d) Evaluation for Dissolved Oxygen		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Johnson Creek, Beaver/Kelly Creeks, Fairview Creek/Columbia Slough</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>There are several factors that take part in variable dissolved oxygen levels in waterways to include elevated water temperatures, organic matter decomposition, nutrient pollution and eutrophication, aeration, and direct pollution. <ul style="list-style-type: none"> <li>Warm water holds less dissolved oxygen than colder water.</li> <li>Organic material like leaves, grass, dead plants, and animal waste decomposed by aerobic bacteria, consumes dissolved oxygen.</li> <li>Stagnant or slow flowing water has less turbulence and reduces gas exchange with the atmosphere, which decreases oxygen replenishment. (EPA; n.d.)</li> <li>Nutrients can stimulate plants and algal growth, which can cause DO levels to increase during the day, but decrease at night as these plants respire. (EPA; n.d.)</li> </ul> </li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>The MS4 could impact dissolved oxygen levels in receiving waters by contributing: landscape debris or yard waste (leaves, grass clippings and plant material), animal waste, sediment, fertilizers and pesticides, illicit discharges, and illegal dumping.</li> </ul>	
Does Gresham's Stormwater Contribute to this Pollutant?	Likely no. Monitoring data show no decrease in DO levels at downstream sites with the exception of lower Johnson Creek at dry times when it is less likely to be impacted by stormwater.	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth).
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Plan and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.
Plan for Coming Permit Cycle	Continue monitoring for DO levels and potential sources. Educate businesses and residents regarding best practices with fertilizers and yard/animal waste. Continue the City sweeping program and cleaning and maintenance of infrastructure that conveys runoff to waterways.	
SWMP Changes Necessary?	None	

**Table 7-5. 303(d) Evaluation for Organochlorinated Pesticides**

<p>Receiving Waters 2022 303(d)-listed</p>	<ul style="list-style-type: none"> <li>• Johnson Creek: Chlordane, DDD/DDE/DDT, Dieldrin, Endosulfan, Heptachlor Epoxide</li> <li>• Beaver Creek: Chlordane, DDD/DDE/DDT, Dieldrin, Endosulfan, Heptachlor Epoxide</li> <li>• Kelly Creek: Chlordane, DDD/DDE/DDT, Heptachlor Epoxide</li> </ul>
<p>Common Sources/Uses</p>	<ul style="list-style-type: none"> <li>• Chlordane             <ul style="list-style-type: none"> <li>▪ Chlordane is a synthetic organochlorine pesticide that was used widely from the 1940's through the 1980's to control insects, especially termites and agricultural pests. It was found to be toxic and was finally banned in the U.S. in 1988. (ATSDR, 2018)</li> <li>▪ It is a persistent, toxic legacy pesticide that binds to sediments and suspended particles. (Extension Toxicology Network, 1996)</li> <li>▪ It is generally introduced into waterways through runoff from contaminated soils from former agricultural land, lawns, or termite treated buildings, and erosion from contaminated sediments or the resuspension of sediments during floods.</li> <li>▪ Chlordane can bioaccumulate and biomagnifies in the food chain. (Baltimore County Government, n.d.)</li> </ul> </li> <li>• DDD/DDE/DDT             <ul style="list-style-type: none"> <li>▪ DDT (dichlorodiphenyltrichloroethane) was widely applied as an insecticide in the mid-20th century for agricultural pest control and public health programs (e.g., mosquito control). While banned in the U.S. in 1972, contemporary environmental reservoirs persist due to historical applications and continued use in some regions for disease vector control (Washington State Department of Health, n.d.; ATSDR, 2002). The metabolites DDE (dichlorodiphenyldichloroethylene) and DDD (dichlorodiphenyldichloroethane) originate mostly from environmental transformation of the parent compound rather than from new application because DDE has no commercial use and DDD use is also banned (Washington State Department of Health, n.d.)</li> <li>▪ Although agriculture was a primary historical source, urban environments also contributed via less-documented pest control uses, stormwater runoff, dumpsites, and legacy contamination in soils and building materials. Sediment analyses show urban waterways with elevated levels of DDE and DDD, reflecting historical urban pesticide use and sediment resuspension (USGS, 1999).</li> </ul> </li> <li>• Dieldrin             <ul style="list-style-type: none"> <li>▪ Is a synthetic organochlorine insecticide developed in the 1950s and used extensively in agriculture and for termite control before being banned or severely restricted in most countries by the 1970s–1990s. It does not occur naturally in the environment but persists due to its historical use and environmental stability.</li> <li>▪ It can be mobilized from contaminated soils by surface runoff during rainfall or snowmelt. Even decades after use, residues can detach with eroding soil particles and enter receiving waters (ATSDR, 2022; NIH toxicological profile, 2025)</li> </ul> </li> <li>• Endosulfan             <ul style="list-style-type: none"> <li>▪ Is a broad-spectrum organochlorine insecticide historically applied to crops such as cotton, vegetables, fruits, and soybeans to control insect pests. Its</li> </ul> </li> </ul>

**Table 7-5. 303(d) Evaluation for Organochlorinated Pesticides**

	<p>widespread use has made agricultural fields the primary source of environmental release.</p> <ul style="list-style-type: none"> <li>▪ During rainfall or irrigation events, water flowing over crop fields can detach and transport soil particles to surface waters. Because endosulfan binds to soil, sediment-associated runoff is a significant transport mechanism. (Connolly et al., 2001)</li> </ul> <ul style="list-style-type: none"> <li>• Heptachlor Epoxide             <ul style="list-style-type: none"> <li>▪ Heptachlor was widely used on agricultural crops (e.g., seed grain treatments), for termite control, and in public health pest control from the 1950s through the 1970s. As it degrades in soil and water, a major product is heptachlor epoxide, which is more toxic and more persistent than its parent compound. (EPA, 2014)</li> <li>▪ Heptachlor and its epoxide can enter soil and surface water directly through application or indirectly from spills, runoff from treated land, or legacy residues.</li> <li>▪ Heptachlor epoxide strongly adsorbs to soil and suspended sediment due to its high organic carbon partition coefficient (log K<sub>oc</sub>). During storm events, eroded soils and sediments containing bound epoxide can be washed into nearby streams, rivers, or lakes with runoff. (Agency for Toxic Substances and Disease Registry, 2007) Once in aquatic systems, adsorbed heptachlor epoxide tends to settle into sediments, where it can persist and potentially enter food webs via bioaccumulation and biomagnification. (Tsai, 2014.)</li> </ul> </li> </ul>	
<p>Relationship to MS4 Discharges</p>	<ul style="list-style-type: none"> <li>• Organochlorinated Pesticides remain widespread in urban and agricultural landscapes despite being banned or severely restricted for decades. This is due to their chemical stability, hydrophobicity, and strong sorption to soils and sediments.</li> <li>• The discharge of these pollutants occurs through soil and sedimentation mobilization. Legacy agricultural soils, landscape areas, vacant lots, and construction sites.</li> <li>• These pollutants accumulate in stream bed sediments and bioaccumulate in benthic invertebrates.</li> </ul>	
<p>Does Gresham’s Stormwater Contribute to this Pollutant?</p>	<p>Inconclusive. These are not tested for in stormwater samples. Concentrations are generally higher at upstream monitoring sites than downstream sites due to the erosion from agricultural sites. A possible cause of this could be the urban stormwater diluting the concentrations between the two monitoring sites.</p>	
<p>Control Measures to Effectively Address this Pollutant (SWMP BMPs)</p>	<p><b>BMPs</b></p>	<p><b>How BMP(s) Impacts Pollutant Reduction/Removal</b></p>
	<p><b>SMP</b> A-L</p>	<p>Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.</p>
	<p><b>PLM</b> A-C, E</p>	<p>Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.</p>
	<p><b>PPCA</b> A-C E-F</p>	<p>Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.</p>
	<p><b>PREOB</b> A-E</p>	<p>Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth)</p>

<b>Table 7-5. 303(d) Evaluation for Organochlorinated Pesticides</b>		
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Manual and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.
Plan for Coming Permit Cycle		Continue to monitor sites and implement BMPs mitigating TSS, removing sediments in gray infrastructure and the use of green infrastructure.
SWMP Changes Necessary?		None

<b>Table 7-6. 303(d) Evaluation for Polycyclic Aromatic Hydrocarbons (PAHs)</b>		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Johnson Creek/Lower Willamette River</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>In urban environments, PAHs are typically produced as by-products of incomplete combustion of organic materials such as; (Pietari et al., 2016) <ul style="list-style-type: none"> <li>Vehicle exhaust emissions released into the atmosphere which they deposit on the pavement and can be washed off during rain events.</li> <li>Industrial combustion and wood burning also emit PAHs that can contribute to atmospheric deposition on land surfaces.</li> </ul> </li> <li>Petroleum-Related Sources; <ul style="list-style-type: none"> <li>PAHs also originate from petroleum products and derivatives, which enter stormwater through leakage or runoff; motor fuels, lubricating oils, petroleum spills contribute petrogenic PAHs when they leak or are dripped onto roadways and paved surfaces (Pietari et al., 2016)</li> <li>Asphalt pavement and similar construction materials can contain PAHs that are washed off by rainfall.</li> </ul> </li> <li>Coal-tar-based sealants that are used on parking lots can release more PAHs into runoff than unsealed pavement. (Watts et al., 2010).</li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>There is a direct relationship between the amount of PAHs in a water body and the MS4 discharges. Stormwater runoff from impervious surfaces that are near or used by vehicles, like roads, sidewalks and parking lots collect the PAH particulates and are conveyed directly into receiving waters.</li> </ul>	
Does Gresham's Stormwater Contribute to this Pollutant?	Likely yes. Data show high concentrations of PAHs from high-traffic roads	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth).
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Manual and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.
Plan for Coming Permit Cycle	Continue to implement BMPs that focus on sediment removal, green infrastructure, and street sweeping. Use public education and outreach along with IDDE to bring awareness to the general public.	

**Table 7-6. 303(d) Evaluation for Polycyclic Aromatic Hydrocarbons (PAHs)**

SWMP Changes Necessary?	None
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<b>Table 7-7. 303(d) Evaluation for Polychlorinated Biphenyls (PCBs)</b>		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Johnson Creek/Lower Willamette River</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>PCBs were a widely used class of chemicals used in the U.S. until their ban in the late 1970's. There are materials and sites still in use that continue to contribute to PCBs in the environment.</li> <li>The coolant used in electrical transformers still contains PCBs (DEQ, 2003). While these units are generally well sealed, utilities can be impacted by weather or accidents, causing the sealed structures to rupture and spill PCB-containing fluids.</li> <li>Older buildings may have materials in them that contain PCBs such as; caulking, paints, sealants, fluorescent light ballasts, and tar paper. (Ecology, n.d.)</li> <li>Contamination from disposal sites, historical spill sites, or industrial emissions may result in PCB-laden soils being eroded and transported during runoff events. (Ecology; n.d.)</li> <li>Some manufacturing processes unintentionally generate PCBs which are present in inks, paints, printed materials, and packaging and can enter storm drains when littered or washed off surfaces. (Shephard et al., 2019)</li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>If PCBs are present in the sources/uses described above, they may be in MS4 discharges as a result of erosion, wash off, or litter during runoff events.</li> </ul>	
Does Gresham's Stormwater Contribute to this Pollutant?	Inconclusive. Not sufficient data currently	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth).
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Manual and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.
Plan for Coming Permit Cycle	Continue to implement BMPs that focus on sediment removal, green infrastructure, and street sweeping. Use public education and outreach along with IDDE to bring awareness to the public.	
SWMP Changes Necessary?	None	

Table 7-8. 303(d) Evaluation for Copper		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Johnson Creek, Beaver/Kelly Creeks, Fairview Creek/Columbia Slough</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>Copper is naturally present in soils and rocks. Volcanic rocks, shales, and certain metal bearing minerals are particularly copper rich. The erosion and weathering processes can release copper particles into runoff.</li> <li>The most common sources of copper in stormwater runoff are vehicular sources such as brake pad wear, vehicle fluids, exhaust residues, and tire wear (Davis et al. 2001). Ecology (2017) found that 59% of urban copper was from brake wear, 22% from roofing materials, 7% from parking lots, 6% from treated lumber, and then other smaller sources included siding materials, vehicle exhaust, road wear, metal salvage, fungicides, and vehicle leaks.</li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>With many of the sources of copper listed above being present on roadways or buildings, the MS4 would convey materials from these sources to local waterways</li> </ul>	
Does Gresham's Stormwater Contribute to this Pollutant?	Likely yes. Evidence shows that runoff contributes to copper in streams. Trends for total copper have been either stable or trending downwards in all water bodies during runoff events. Trends in dissolved copper have been mixed with some increases, mostly at sites upstream of Gresham which receive runoff from rural and agricultural areas.	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth).
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Manual and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.
Plan for Coming Permit Cycle	Continue to implement current BMPs focused on green infrastructure, sweeping and sediment removal and erosion control. Work to implement retrofit projects that address runoff from impervious roadways and parking lots.	
SWMP Changes Necessary?	None	

Table 7-9. 303(d) Evaluation for Iron		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Johnson Creek/Lower Willamette River</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>Iron is one of the most abundant elements in the Earth’s crust and is naturally present in soils and geological materials. When rain and storm events mobilize soil particles via erosion or sediment transport, iron associated with soil minerals is transported in runoff and eventually enters waterways.</li> <li>Iron and other metals in stormwater can originate from the wash-off of background soil and eroded materials during runoff events, leading to elevated iron loads in surface waters. Iron often correlates with total suspended solids (TSS) because it is a major component of soil and rock particles (Gander, 2007).</li> <li>Stormwater runoff from urbanized landscapes conveys pollutants from many human-influenced surfaces. While some iron may be natural in origin, its mobilization and contribution to waterways in an urban MS4 context are mediated by human land use and infrastructure.</li> <li>Road traffic also contributes iron particles (e.g., brake dust, tire wear, road surface wear) which are mobilized during storm events. (Bourcier, 1979)</li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>Sources of iron entering the MS4 include runoff associated with: <ul style="list-style-type: none"> <li>Poor erosion, sediment control, and construction runoff</li> <li>Grading, excavation, trenching, and vegetation removal</li> <li>Wash-off of dust and fine particles from; road surface wear, vehicle component wear, and deposited soil tracked onto streets</li> <li>Atmospheric deposition from; vehicle emissions, construction dust, and wind-blown soil.</li> </ul> </li> </ul>	
Does Gresham’s Stormwater Contribute to this Pollutant?	Inconclusive. Gresham does not monitor for iron, but assuming that it tracks with TSS and behaves like other metals, the MS4 is likely to contribute iron.	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth)
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Manual and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.

<b>Table 7-9. 303(d) Evaluation for Iron</b>	
Plan for Coming Permit Cycle	Continue to evaluate BMPs associated with TSS, sediment control, and erosion control. Maintain current street sweeper program and implementation of the ESCP
SWMP Changes Necessary?	None.

Table 7-10. 303(d) Evaluation for Zinc		
Receiving Waters 2022 303(d)-listed	<ul style="list-style-type: none"> <li>Kelly Creek</li> </ul>	
Common Sources/Uses	<ul style="list-style-type: none"> <li>Zinc enter stormwater runoff and receiving waterbodies through a combination of anthropogenic and natural sources. Some key sources that have been identified are. <ul style="list-style-type: none"> <li>Galvanized steel and zinc coated components on roofs, gutters, downspouts, HVAC equipment and other infrastructure where corrosion and weathering occur.</li> <li>Vehicular emissions, tire wear, brake dust, and exhaust particles that collect on paved surfaces. Motor oil and hydraulic fluids contain zinc additives and can introduce dissolved zinc when spilled or leaked onto paved surfaces or from industrial activities which are then mobilized with runoff events. (Stormwater Solutions, 2017)</li> <li>Industrial and commercial sites can contribute zinc via outdoor storage of zinc-containing materials, metal fabrication processes, and incidental releases of oils, greases, and metal particulates.</li> <li>Background zinc occurs naturally in soils and can be mobilized into waterways during land disturbance or agricultural activities during runoff events. (Davis et al., 2001)</li> <li>Moss control products that are applied to roofs and paved surfaces contain high concentrations of zinc sulfate which leach directly into runoff.</li> </ul> </li> </ul>	
Relationship to MS4 Discharges	<ul style="list-style-type: none"> <li>The MS4 does not generate zinc but does convey it from ubiquitous urban activities</li> </ul>	
Does Gresham's Stormwater Contribute to this Pollutant?	Likely yes. Monitoring data shows that zinc is present in stormwater runoff.	
Control Measures to Effectively Address this Pollutant (SWMP BMPs)	<b>BMPs</b>	<b>How BMP(s) Impacts Pollutant Reduction/Removal</b>
	<b>SMP</b> A-L	Continue to perform maintenance and inspections of new and existing systems, respond and investigate spills and illegal dumping and handle city operations waste and facilities using best practices.
	<b>PLM</b> A-C, E	Implement new Stormwater Master Plans to new and redevelopment projects with focuses on onsite mitigation. Continue to look for and implement projects with water quality benefits, to include sites in riparian areas.
	<b>PPCA</b> A-C E-F	Continue the street sweeping program, maintenance on public roads and limit releases from firefighting training activities. Continue to inspect and maintain wastewater pipes to avoid seepage. Document and maintain staff training on procedures and best practices.
	<b>PREOB</b> A-E	Respond, investigate, document spills and illicit discharges. Work with residents on solid waste and hazardous waste disposal collections. Perform outreach to local businesses, and residents (adult and youth).
	<b>CIDBA</b> A-G	Continue to implement and review the newest SWMM. Work with private landowners on maintaining private stormwater infrastructure. Implement and enforce the EPSC Manual and perform inspections. Continue the business screening/inspections. Continue to run the SCAP for private storm drain owners.

Table 7-10. 303(d) Evaluation for Zinc	
Plan for Coming Permit Cycle	Continue to implement current BMPs focused on green infrastructure, sweeping and sediment removal and erosion control. Work to implement retrofit projects that address runoff from impervious roadways and parking lots.
SWMP Changes Necessary?	None

**References:**

Agency for Toxic Substances and Disease Registry. 2022. Toxicological profile for DDT, DDE, and DDD (TP-35). Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. <https://www.atsdr.cdc.gov/toxprofiles/tp35.pdf>

Agency for Toxic Substances and Disease Registry. 2018. Toxicological profile for chlordane: Chapter 1, relevance to public health (NBK591481). National Center for Biotechnology Information. <https://www.ncbi.nlm.nih.gov/books/NBK591481/>

Agency for Toxic Substances and Disease Registry. 2007. Toxicological profile for heptachlor and heptachlor epoxide. U.S. Department of Health and Human Services, Public Health Service. <https://www.ncbi.nlm.nih.gov/books/NBK598049/>

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs), U.S. Department of Health and Human Services, Public Health Service. <https://www.atsdr.cdc.gov/toxprofiles/tp17-p.pdf>

Baltimore County Government. (n.d.). Chlordane in Baltimore Harbor: Total Maximum Daily Load (TMDL) implementation plan. Baltimore County, MD. <https://www.baltimorecountymd.gov/files/Documents/Environment/Watersheds/tmdls/baltimoreharbor/baltimoreharborchlordane.pdf>

Bourcier, D. R. 1979. *Lead, iron, chromium and zinc in road runoff at Pullman. Science of the Total Environment* <https://www.sciencedirect.com/science/article/abs/pii/004896977990086X>

Connolly, R. D., Kennedy, I. R., Silburn, D. M., Simpson, B. W., & Freebairn, D. M. (2001). *Simulating endosulfan transport in runoff from cotton fields in Australia with the GLEAMS model. Journal of Environmental Quality*, 30(3), 702–713. <https://doi.org/10.2134/jeq2001.303702x>

Davis, A.P., S. Mohammad, S. Ni. 2001. Loading estimates of lead, copper, cadmium, and zinc in urban runoff from specific sources. *Chemosphere* 44:5, 997-1009. <https://www.sciencedirect.com/science/article/abs/pii/S0045653500005610>

Environmental Protection Agency (EPA). 2014. Contaminant occurrence support (EPA 815-B-09-010). <https://www.epa.gov/sites/default/files/2014-12/documents/815b09010.pdf>

Environmental Protection Agency (EPA). (n.d.). Dissolved oxygen. [https://www.epa.gov/caddis/dissolved-oxygen?utm\\_source](https://www.epa.gov/caddis/dissolved-oxygen?utm_source)

- Extension Toxicology Network. 1996. EXTOXNET Pesticide Information Profile: Endosulfan. Oregon State University. <https://extoxnet.orst.edu/pips/endosulf.htm>
- Extension Toxicology Network. 1996. Chlordane. EXTOXNET Pesticide Information Profiles. Oregon State University. <https://extoxnet.orst.edu/pips/chlordan.htm>
- Gander, W. 2007. Buildup and Washoff Model for Dissolved Iron in Stormwater Runoff (unpublished thesis). University of New Orleans  
<https://scholarworks.uno.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1531&context=td>
- Gołdyn, R., Szpakowska, B., Świerk, D., Domek, P., Buxakowski, J., Dondajewska, R., Barańkiewicz, D., & Sajnog, A. 2018. Influence of stormwater runoff on macroinvertebrates in a small urban river and a reservoir. *Science of the Total Environment*, 625:743–751.  
<https://www.sciencedirect.com/science/article/abs/pii/S0048969717337610>
- Needham, T.P., Majcher, E., Foss, E., and Devereux, O.H., 2024, Evaluation and review of best management practices for the reduction of polychlorinated biphenyls to the Chesapeake Bay: U.S. Geological Survey Scientific Investigations Report 2023–5074, 18 p., <https://pubs.usgs.gov/publication/sir20235074>
- Novotny, V. and J.W. Witte. 1997. *Ascertaining aquatic ecological risks of urban stormwater*. *Water Research*, 31:10, 2573-2585. <https://www.sciencedirect.com/science/article/abs/pii/S0043135497000936>
- Oregon Secretary of State. (n.d.). *Oregon Administrative Rule 340-041-0011: Biocriteria*. Oregon Administrative Rules Database. <https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=68702>
- Oregon Department of Environmental Quality (DEQ). 2022. *Methodology for Oregon’s 2022 water quality report and list of water quality limited waters: Integrated report assessment method*. <https://www.oregon.gov/deq/wq/Documents/IR22AssessMethod.pdf>
- Oregon Department of Environmental Quality (DEQ), 2003. Fact Sheet: Sources of Polychlorinated Biphenyls. <https://www.oregon.gov/deq/FilterDocs/ph-SourcePCBs.pdf>
- Pietari, J., O’Reilly, K., & Boehm, P. 2016. A review of PAHs. *Stormwater Solutions*.  
<https://www.stormwater.com/stormwater-bmps/article/13024928/a-review-of-pahs>
- Pitt, R., & Lalor, M. 2000. Potential sources of copper and zinc contamination. Washington State Department of Ecology. Retrieved from <https://apps.ecology.wa.gov/publications/UIPages/documents/0803119.pdf>
- Rommel, S.H., V. Ebert, M. Huber, J.E. Drewes, B. Helmreich. 2019. Spatial distribution of zinc in the topsoil of four vegetated infiltration swales treating zinc roof runoff. *Science of The Total Environment*, 672:806-814.  
<https://www.sciencedirect.com/science/article/abs/pii/S0048969719315281>
- Shephard, Z.M., Conn, K.E., Beisner, K.R., Jornigan, A.D., and Bryant, C.F., 2019, Characterization and load estimation of polychlorinated biphenyls (PCBs) from selected Rio Grande tributary stormwater channels in the Albuquerque urbanized area, New Mexico, 2017–18: U.S. Geological Survey Open-File Report 2019–1106, 48 p., <https://pubs.usgs.gov/of/2019/1106/ofr20191106.pdf>

- Stormwater.com. 2017. What are you zincing about? Stormwater Solutions.  
<https://www.stormwater.com/transportation-and-construction/commercial-industrial-stormwater/blog/33053379/what-are-you-zincing-about>
- Tsai, W-T. 2014. Organochlorine insecticides. Encyclopedia of Toxicology (3<sup>rd</sup> Ed).  
<https://www.sciencedirect.com/topics/chemistry/organochlorine-insecticide>
- Washington Department of Ecology. 2017. Copper and Zinc in Urban Runoff: Phase 1 – Potential Pollutant Sources and Release Rates. Publication No. 17-03-018  
<https://apps.ecology.wa.gov/publications/documents/1703018.pdf>
- Washington Department of Ecology. 2019. Copper and Zinc in Urban Runoff: Phase 2 – Rainwater Washoff Monitoring. Publication 19-03-008. <https://apps.ecology.wa.gov/publications/documents/1903008.pdf>
- Washington Department of Ecology. (n.d.). PCBs in building materials and stormwater pathways.  
<https://ecology.wa.gov/regulations-permits/guidance-technical-assistance/dangerous-waste-guidance/common-dangerous-waste/construction-and-demolition/pcbs-in-buildings>
- Washington State Department of Health. (n.d.). DDT (dichlorodiphenyltrichloroethane)  
<https://doh.wa.gov/community-and-environment/contaminants/ddt>
- Watts, A. W., Ballester, T. P., Roseen, R. M., & Houle, J. P. (2010). Polycyclic aromatic hydrocarbons in stormwater runoff from sealcoated pavements. *Environmental science & technology*, 44(23), 8849–8854.  
<https://doi.org/10.1021/es102059r>
- US Geological Survey (USGS). 2018. Water Science School: Alkalinity and Water. <https://www.usgs.gov/water-science-school/science/alkalinity-and-water>
- U.S. Geological Survey. (n.d.). Investigating PCB concentrations and loads in urban stormwater channels.  
<https://www.usgs.gov/centers/new-mexico-water-science-center/science/investigating-polychlorinated-biphenyl-pcb>
- US Geological Survey (USGS). 1999. The Quality of Our Nation’s Waters—Nutrients and Pesticides: U.S. Geological Survey Circular 1225, 82 p. [https://pubs.usgs.gov/circ/circ1225/html/wq\\_urban.html](https://pubs.usgs.gov/circ/circ1225/html/wq_urban.html)

## 8. Service Area Expansion

### 8.1 Background

MS4 permit Schedule B.4.f. requires:

*A description of any service area expansions that are anticipated to occur during the following permit term and a finding as to whether the expansion is expected to result in a substantial increase in area, intensity or pollutant loads*

As acknowledged by the 2010 renewal of the City's original 1995 stormwater permit #101315, the urban service boundary was expanded from its original approximately 15,000 acres to become 17,000 acres including the area within the urban growth boundary (UGB). The UGB included three planned areas known as Pleasant Valley, Springwater, and Kelley Creek Headwaters.

The City's permit states the following:

**SOURCES COVERED BY THIS PERMIT:**

*This permit covers all existing and new discharges of stormwater from the Municipal Separate Storm Sewer System (MS4) within the incorporated areas of the City of Gresham and City of Fairview including, upon annexation into the City of Gresham, the Pleasant Valley Plan District, Springwater Plan District, and the Kelley Creek Headwaters Plan Area, which are located south and east of current city limits of the City of Gresham and within the approved Metro Urban Growth Boundary, in accordance with the requirements, limitations and conditions set forth.*

In 2008, the Oregon Department of Environmental Quality (DEQ) requested a Land Use Compatibility Statement (LUCS) from the City because of the physical expansion of the City's Urban Service Boundary to include the three planned areas. Based upon the LUCS, DEQ found that the City of Gresham had acknowledged Comprehensive Plan provisions and land use regulations that were compatible with the 2010 permit provisions.

The Land Conservation and Development Commission (LCDC) concluded that a determination of compliance with the statewide planning goals and compatibility with acknowledged comprehensive plans is not needed for the renewal of an existing permit except in certain circumstances. A LUCS is required for the *renewal or modification* of a permit if DEQ "determines the permit involves a substantial modification or intensification of the permitted activity." OAR 660-031-0040

OAR 340-018-0050(2)(b)(B) sets out three relevant circumstances in which "[m]odification permits" require a LUCS: where the activity (1) relates to use of additional property or a physical expansion on the existing property, (2) involves a significant increase in discharge to state waters or into the ground, or (3) involves the relocation of an outfall outside of the source property.

Because the prior permits included consideration of the area within the urban growth boundary, Gresham's MS4 permit renewal application does not constitute a substantial modification or intensification of currently permitted activity. Therefore, a LUCS is not required.

In addition to its Comprehensive Plan the City has other adopted code, manuals and plans that govern the management of stormwater impacts from development or redevelopment within the existing city boundary and the future development of planned areas within the UGB. These documents are also available on the City's website at [GreshamOregon.gov](http://GreshamOregon.gov) and include:

- Stormwater Master Plan Documents
- Stormwater Management Manual
- Public Works Standards
- Gresham Revised Code
- Development Code for Stormwater

## 8.2. Findings

In the 15 years since the 2010 permit renewal, 159 acres of the 2000 acres in the three expansion areas in the UGB have been developed and formally annexed into the City. The permit applications received by the City and new development are reported in the City's Annual Reports to DEQ.

While it is unknown precisely how many acres will be developed during the next permit cycle, it can be estimated by the previous rate in those three areas that approximately 10 acres per year will be developed and annexed in from the UGB expansion – so potentially 50 acres over the 5-year permit term, comprised entirely of areas acknowledged in the “sources covered by this permit” section of the permit. No additional physical expansions of the urban service boundary are expected.

The above-mentioned City codes, manuals and documents will continue to limit the impacts of stormwater intensity, and its associated pollutant loads on local streams. Furthermore, the permit renewal package includes a summary of the Total Maximum Daily Load (TMDL) Pollutant Load Benchmarks that set forth projections of the City's combined work to result in a net decrease in stormwater pollution discharges during the next permit cycle.

## 9. Fiscal Evaluation

MS4 permit Schedule B.4.g. requires:

*A fiscal evaluation of program expenditures for the current permit cycle and projected program allocations for the next permit cycle.*

### 9.1 Introduction

This section of Gresham's permit renewal application provides the fiscal evaluation including a summary of stormwater related expenses so far incurred in the current permit term (FY) 2021-22 through (FY) 2024-25 and utility rate revenue from 2015 to current, along with projections to 2032. This section is organized as follows:

- **Gresham's Stormwater Utility Rate History**
  - **Table 9-1:** Stormwater Expenses for Current Permit Cycle
- **Future Program Allocations**
  - **Table 9-2:** Stormwater Utility Rate Revenue Forecast (by Fiscal Year)

### 9.2 Gresham's Stormwater Utility Rate History

After a legal challenge in 1993 to the city's stormwater rate introduction, the rate was reinstated in August 1994. Initially, the rate was set at \$3.54 per month and is currently \$21.32 per month. The rate is based upon a 2,500 square foot drainage residential unit (DRU) and is the same for residential, commercial and industrial uses. The calculation includes the house/business, garage, driveway/parking lot and sidewalk. In other words, a house or business that has a total of 5,000 impervious square feet would currently pay a monthly fee of \$42.64. In 1995, stormwater rates generated \$1.8M and have grown to almost \$15.3M in 2025.

**Table 9-1. Stormwater Expenses for Current Permit Cycle**

Program Area	PY 26 21-22	PY 27 22-23	PY 28 23-24	PY 29 24-25
<b>Water Quality:</b> Policy Development Stormwater/Erosion Manual Oversight Permit Compliance Monitoring and Analysis Spill Response Public Education & Outreach Private Water Quality Facility Program Business Inspection & Enforcement Erosion Control Inspection & Enforcement TMDL Compliance Data QA/QC Training	\$ 943,220	\$ 1,089,642	\$ 1,157,708	\$ 1,238,305
<b>Natural Resources:</b> Restoration Encroachment Response Streambank Failure Response Capital Improvements Master Plan Updates Invasive Species Control TMDL Compliance Green Space Acquisition	\$ 513,329	\$ 654,679	\$ 700,851	\$ 854,942
<b>Engineering:</b> Capital Improvements Minor Drainage/Flood Control Public Works Standards Stormwater Manual Oversight Master Plan updates Mapping Stormwater Assets Management Training	\$506,836 \$2.25M CIP	\$356,491.36 \$9.47M CIP	\$633,176 \$1.63M CIP	\$887,262 \$12.11M CIP
<b>Operations &amp; Maintenance:</b> Systems Maintenance & Repair Equipment Repair & Replacement Spill Response Inspection IMP implementation Mapping Training	\$ 2,970,591	\$ 3,732,263	\$ 4,142,300	\$ 4,945,551
<b>Infrastructure Development:</b> Development Engineering Surveying Public Works Inspections Commercial Erosion Control Inspections	\$ 294,819	\$ 399,800	\$ 425,000	\$ 453,500
<b>City Admin Support</b> <b>GIS Support/Management</b> <b>Overhead</b>	\$ 2,863,912	\$ 2,517,887	\$ 2,736,686	\$ 3,050,856
<b>Total</b>	\$8.1M Operating/Salary \$2.3M CIP	\$9.80M Operating/Salary \$1.63M CIP	\$11.43M Operating/Salary \$12.11M CIP	\$11.43M Operating/Salary \$12.11M CIP

### 9.3 Future Program Allocations

Predicting the stormwater rate revenues in the future is somewhat difficult because the annual budgeting process considers many other factors such as the state of the general fund programs, community safety and stated priorities, overall utility costs to the public based upon national and local economic factors, and long-term asset management. The City creates 20 Year Finance Models for the Stormwater Utility for planning purposes. Any budget increases are subject to City Council approval.

As stated above, the city’s DRUs are assessed per house or business. Additional annual revenue is also gained from System Development Charges (SDCs) that help fund capital improvement projects related to system growth. The five-year average for SDC expenditure is \$340,000 per year. SDCs are legally restricted to system capacity development and do not apply to staff salaries, programs or operations and maintenance and are therefore not projected into the future for the purposes of this fiscal evaluation. The five-year average for Stormwater Capital Implementation Program expenditure is \$1.96 M.

**Table 9-2** reflects the City’s stormwater rate revenue forecast. This table includes the 2015-2025 figures reported in previous permit renewal submittals. Actual revenues from this time frame have been added. The predicted rate revenue has been extended out to year 2032 for purposes of the 2026 Permit Renewal Submittal.

**Table 9-2. Stormwater Utility Rate Revenue Forecast (by Fiscal Year)**

Year	DRUs*	Predicted Rate Revenue	Actual Rate Revenue
2015			\$7,057,585
2016			\$7,619,985
2017			\$7,917,159
2018			\$8,193,872
2019			\$8,782,721
2020			\$10,070,928
2021			\$10,558,899
2022			\$11,358,875
2023			\$12,432,285
2024			\$13,565,324
2025			\$15,279,577
2026	67,000	\$16,404,873	
2027	67,300	\$18,031,146	
2028	67,600	\$19,517,929	
2029	67,800	\$20,800,071	
2030	68,100	\$22,196,644	
2031	68,300	\$23,662,182	
2032	68,500	\$25,239,349	

*\*Drainage Residential Units of impervious area. 1 DRU = 2,500 impervious area.  
Figures are rounded and calculated.*

As noted above, rates are assumed to grow slightly to keep up with inflation, but exact rate growth increases are subject to approval by City Council and are unknown beyond 2027.

## 10. Proposed Modifications to Stormwater Management Program (SWMP)

Schedule B.4.b. requires the City to submit:

*Any proposed program modifications or new areas of focus for the coming permit term, including the modification, addition or removal of BMPs incorporated into the SWMP Document, and associated measurable goals.*

As the city conducted a thorough evaluation of the SWMP after the current permit was issued in 2021, and the permit allows for adaptive management to the SWMP that can be made and reported to DEQ with each annual report, Gresham is not proposing any changes to the stormwater management program at this time. The ability to use adaptive management allows the City to continuously explore, refine, expand or replace BMPs as new source control strategies are developed, monitoring parameters and inspection priorities change, and pollutants emerge.

The current SWMP Document can be accessed on the city's website, and the BMPs contained in the SWMP are summarized below in **Table 10-1**, with some additional details, including measurable goals, in the 303(d) pollutant evaluation (section 7). The City did not determine that any modifications to our existing SWMP were needed to address 303(d) pollutants in section 7, or to meet any of the TMDL and other pollutants discussed in sections 3, 4 and 5 of this permit renewal submittal.

Table 10-1. Gresham SWMP Document Summary		
SWMP Document Categories	BMPs	
Stormwater Asset Management Program ( <b>SMP</b> )	A.	Pipe Cleaning
	B.	CCTV Pipes (new/existing)
	C.	Storm Drain Cleaning
	D.	Maintain Green Infrastructure
	E.	Maintain Gray Infrastructure
	F.	Proprietary Devices (grey)
	G.	System Repair & Maintenance
	H.	Spills, Illicit Discharge Investigation, Emergency Response
	I.	Construction Inspection and Plan Review, Resident Concerns (O&M)
	J.	Good House Keeping: O&M Yard
	K.	Underground Injection Control (UICs)
	L.	Proper Waste Disposal (O&M)
Public Land Management ( <b>PLM</b> )	A.	Master Planning
	B.	Water Quality Projects
	C.	Integrated Pest Management
	D.	Urban Canopy Program
	E.	Natural Resource Program
Pollution Prevention from City Activities ( <b>PPCA</b> )	A.	O&M for Public Roads, Bridges; Sweeping
	B.	O&M for Public Roads, Bridges: Deicing
	C.	Limit Release from Fire Training Activities
	D.	Water Line Flushing
	E.	Limit Wastewater Pipe Seepage
	F.	Staff Training
Public Reporting, Engagement, Outreach & Behavior Change ( <b>PREOB</b> )	A.	Spills & Illicit Discharges & Public Reporting
	B.	Litter/Hazardous Waste Control (Residents)
	C.	Business Outreach
	D.	Schools and Youth Outreach
	E.	Regional Adult Outreach
	F.	Public Involvement & Participation; City Outreach
Control Impacts from Development & Business Activities ( <b>CIDBA</b> )	A.	Stormwater Management Manual (SWMM)
	B.	Private Stormwater Facilities Tracking & Inspection
	C.	Erosion Prevention & Sediment Control (ESPC) Plan
	D.	EPDC Inspection Program & New (Post Construction) Stormwater Facility Inspection
	E.	Business Screening & Inspection Program
	F.	Private Storm Drain Maintenance Program
	G.	Retro/Hydrmodification Assessment Update

# 11. Proposed Changes to Monitoring Plan

Schedule B.4.e. requires the City to submit:

*A description of proposed changes to the monitoring plan in the form of a monitoring objectives matrix with accompanying narrative describing the rationales supporting such changes, to be developed based on ongoing discussions with DEQ over the course of the permit term regarding the monitoring needs for the next permit*

The City of Gresham does not plan to change any aspects of the Environmental Monitoring Plan with this permit renewal submittal. The City has been able to make minor changes to the Environmental Monitoring Plan, as needed, based on the adaptive management language in the current MS4 permit. Once the City receives an updated permit, we will determine if there are changes that are needed to meet new permit requirements. At present, we feel that the City is allocating an appropriate level of resources to meet the requirements in our permit, while gaining an understanding of status and trends in water quality of our streams, stormwater, and structural BMPs.

The objectives matrix below (Table 11-1) shows the monitoring objects in section B.1.a of the NPDES permit and how they are being met with the current monitoring plan. The current monitoring plan can be found on the City’s website: <https://www.greshamoregon.gov/globalassets/city-departments/environmental-services/water-resources/watershed-management/2022-environmental-monitoring-plan.pdf>.

**Table 11-1. Monitoring Objectives Matrix**

Objective	Activity in Current Monitoring Plan
i. Evaluate the source(s) of and means for reducing the pollutants of concern applicable to the co-permittees' permit area, including 2018/2020 303(d) listed pollutants, as applicable;	Dry weather screening at 30 sites per year; wet weather storm event water quality sampling at 10 sites per year; instream water quality sampling at long-term sites four times per year
ii. Evaluate the effectiveness of Best Management Practices (BMPs) in order to help determine BMP implementation priorities;	BMP storm event water quality monitoring at a minimum of 2 sites-events per year
iii. Characterize stormwater based on land use type, seasonality, geography or other catchment characteristics;	Wet weather storm event sampling at a minimum of 10 land use-based sites per year
iv. Evaluate status and long-term trends in receiving waters associated with MS4 stormwater discharges;	Instream water quality monitoring at long-term sites four times per year; status and trends analysis of the data
v. Assess the chemical, biological, and physical effects of MS4 stormwater discharges on receiving waters; and,	Instream water quality monitoring and macroinvertebrate monitoring once per year at long-term sites
vi. Assess progress towards reducing TMDL pollutant loads.	Instream water quality and wet weather monitoring; status and trends and benchmark analysis

## 12. Maximum Extent Practicable (MEP) Evaluation

Schedule B.4.c. requires the City to submit:

*The information and analysis necessary to support DEQ’s independent assessment that the co-permittees’ stormwater management programs address the requirements of this permit. The co-permittees must describe how the proposed management practices, control techniques, and other provisions implemented as part of the stormwater program were evaluated using a co-permittee-defined and standardized set of objective criteria relative to the following MEP general evaluation factors:*

- i. Effectiveness – program elements effectively address stormwater pollutants*
- ii. Local Applicability – technically feasible considering local soils, geography, etc.*
- iii. Program Resources – program elements are being implemented considering availability to resources and the co-permittees’ stormwater management program priorities.*

During the last permit renewal submittal, Phase I communities members working collaboratively through the Oregon Association of Clean Water Agencies (ACWA) developed a list of criteria within each of the 3 evaluation areas identified in the permit: 1) effectiveness, 2) local applicability, and 3) program resources. That same list of criteria was reviewed again by not only Gresham staff, but members from all of the other Phase I MS4 communities in Oregon. Each permittee was asked to rate the three most important focus areas within those 3 categories based off the BMPs in their respective SWMP documents. Gresham’s responses closely correlated with the tabulated responses from the rest of the phase 1 permittees, which is included in **Appendix B**.

For the “effectiveness” factor, the most important criteria identified was that “the program includes BMPs that are technically feasible, effective, and implementable.” Gresham’s stormwater management program includes a comprehensive range of technically feasible, effective, and implementable BMPs that focus on pollution prevention, targeting pollutants of concern, as well as source control and treatment approaches.

For the “local applicability” factor, the most important criteria identified was that “the program is consistent with local ordinances and local authority.” Gresham’s stormwater management program considers local stream conditions, climate, geology, our community, and regulatory requirements. The stormwater standards and local regulatory program are consistent with local ordinances and the legal authority we have developed to ensure we gain compliance.

For the “program resources” factor, the most important criteria identified was that “the program considers implementation costs and practicability within the overall context of City priorities and resources.” In developing Gresham’s stormwater program elements, the practicability of implementing BMPs, the cost versus benefit of various BMPs, as well as public acceptance, were all used to create the current program levels that is reflected in Gresham’s SWMP. We believe the overall program is adequate for making continued progress towards reducing pollutants of concern, both existing TMDL requirements (as outlined in sections 3 through 6 of this permit renewal submittal), as well as 303(d) pollutants (in section 7).

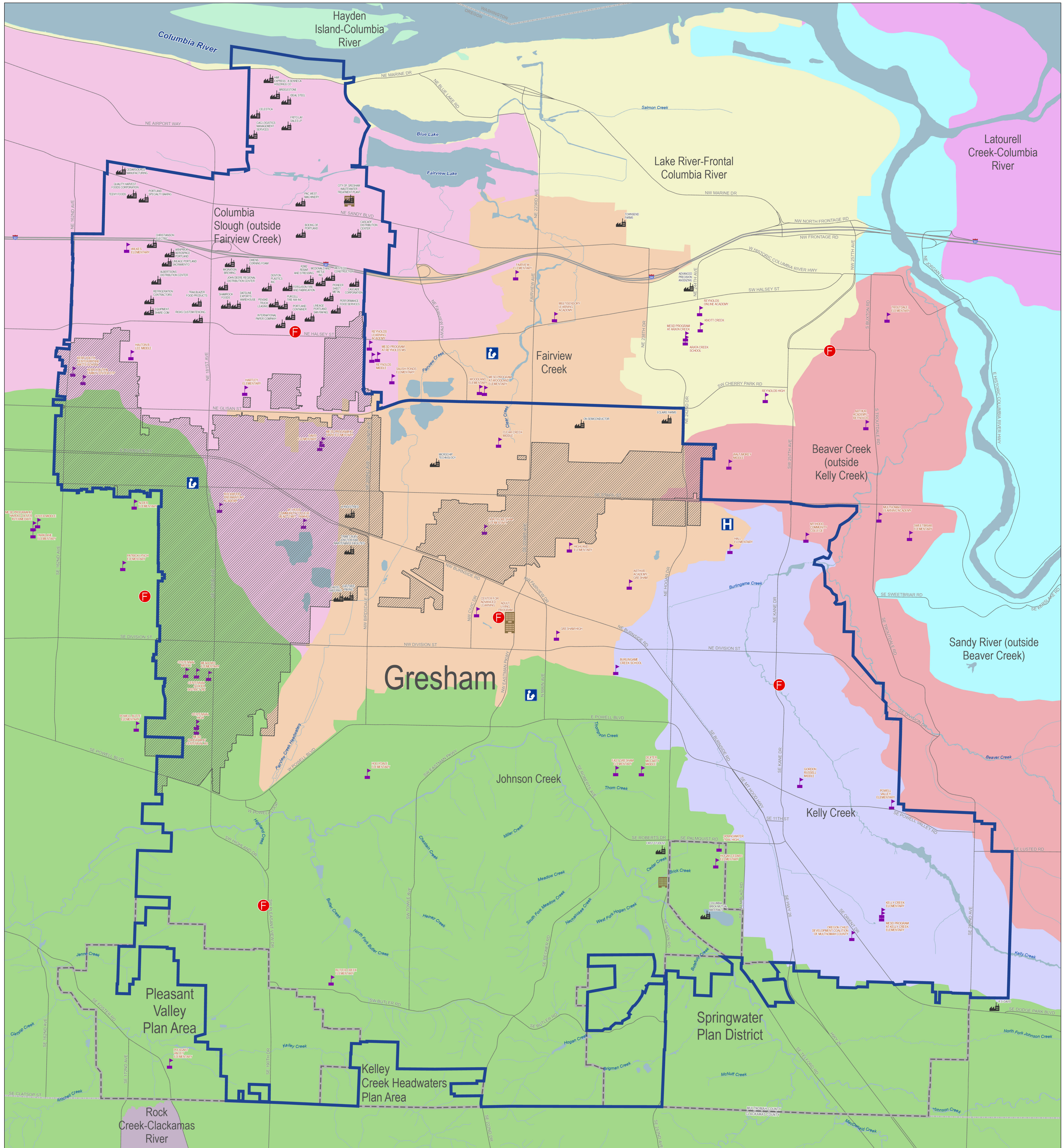
Based on the program assessment in various sections of this permit renewal submittal, there are no changes being proposed to the SWMP at this time. The current SWMP was developed following an extensive review process and MEP determination was approved by Gresham City Council in 2022 with Council Resolution 3506. City Council will be asked to evaluate the SWMP if any changes are deemed necessary once the permit has been re-issued.

## Appendix A – Updated Maps

Map 1: Gresham Watersheds with Publicly Owned and Industrial Facilities

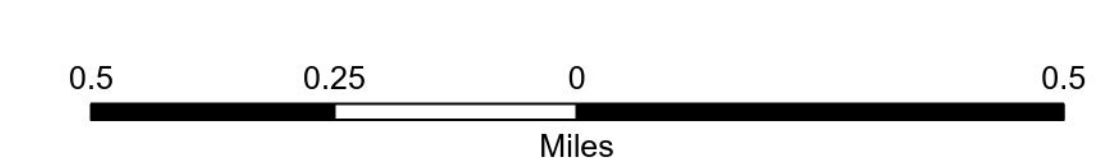
Map 2: Gresham Land Use

Map 3: Gresham Population and Projected Growth

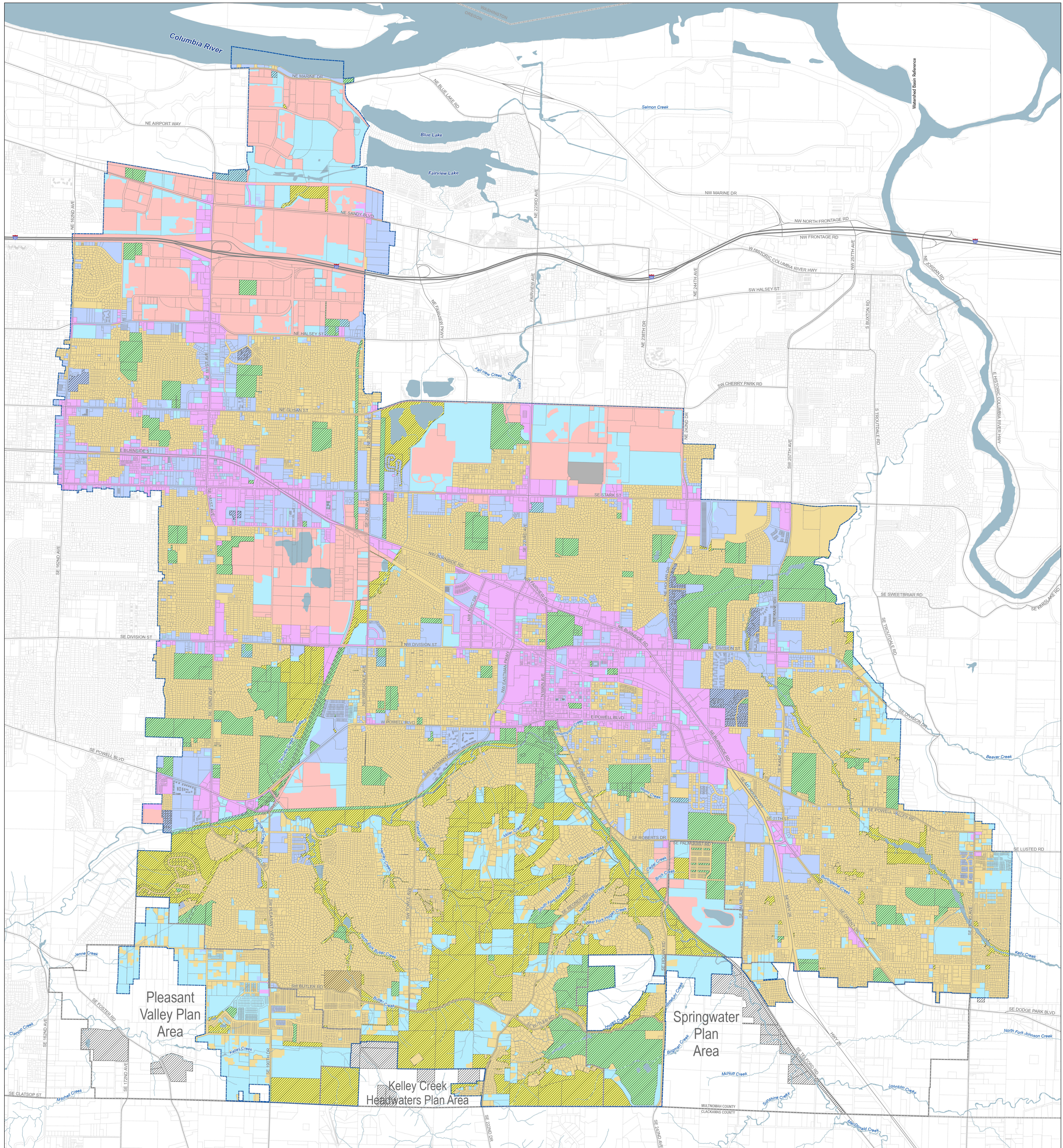


**Gresham Watersheds with Publicly Owned and Industrial Facilities**

- Lake River-Frontal Columbia River
- Latourell Creek-Columbia River
- Hayden Island-Columbia River
- Rock Creek-Clackamas River
- Fairview Creek
- Kelly Creek
- Johnson Creek
- Columbia Slough (outside Fairview Creek)
- Beaver Creek (outside Kelly Creek)
- Beaver Creek-Sandy River (outside Beaver Creek)
- Surface Water
- Gresham City Limits
- UIC Area
- Industrial Facilities
- Public School
- Library
- Hospital
- City Government
- Fire Station



DISCLAIMER AND NOTICE: The information on this map has been gathered from a variety of sources. Every attempt has been made to offer the most current, accurate, and complete information available. However, errors may occur or there may be a time delay between changes in information and updates. The information contained herein is subject to change at any time and without notice.

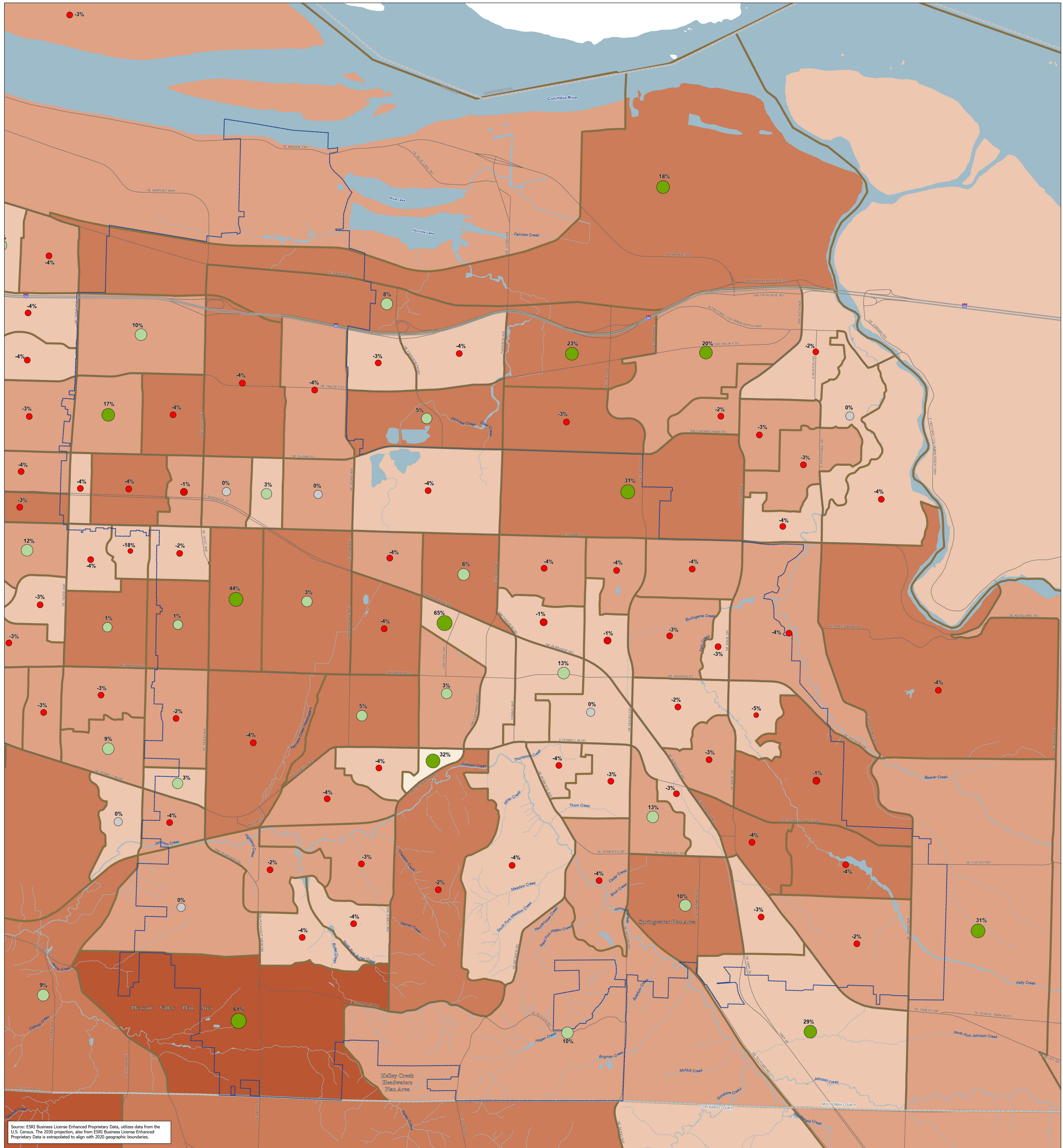


# Gresham Land Use

- Agricultural
- Multifamily Residential
- Residential
- Gresham City Limits
- Commercial
- Natural Areas
- Undeveloped
- Parks and Green Spaces
- Industrial
- Open Space
- Surface Water



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Source: ESRI Business License Enhanced Proprietary Data, utilizes data from the U.S. Census. The 2030 projection, also from ESRI Business License Enhanced Proprietary Data is extrapolated to align with 2020 geographic boundaries.

### Gresham Population and Projected Growth



- 2020 Population by Census Block Group
- County Boundary
- Stream
- Piped Stream
- Ponds or other water features

- Change from 2020 to 2030
- 0.00
- 1.99 - -0.01
- 4.99 - -2.00
- 18.00 - -5.00

- 0.01 - 2.00
- 2.01 - 5.00
- 5.01 - 15.00

- 15.01 - 30.00
- 30.01 - 60.00

- 60.01 - 98.00
- TYPE



DISCLAIMER AND NOTICE: The information on this map has been gathered from a variety of sources. Every attempt has been made to offer the most current, accurate, and complete information available. However, errors may occur or there may be a time delay between changes in information and updates. The information contained herein is subject to change at any time and without notice.

## Appendix B – MEP Evaluation Criteria

Summary of criteria assessed and ranked by Gresham and other Phase I communities through Oregon Association of Clean Water Agencies (ACWA)

# MEP Criteria 2026 Results

	Criterion	Importance (✓) Check all that apply	Ranking Results (1-3)	Score
Effectiveness	The program effectively addresses stormwater pollutants.			
	<ul style="list-style-type: none"> <li>The program includes program elements identified in EPA's MS4 program evaluation guidance (2007).</li> </ul>	5/8	Rank 1: 1 Rank 2: 0 Rank 3: 0	3
	<ul style="list-style-type: none"> <li>The program includes a comprehensive range of BMPs that encompass pollution prevention, source control, and treatment approaches.</li> </ul>	<b>8/8</b>	Rank 1: 1 Rank 2: 3 Rank 3: 0	9
	<ul style="list-style-type: none"> <li>The program targets pollutants of concern including applicable 303(d) and TMDL parameters.</li> </ul>	7/8	Rank 1: 1 Rank 2: 1 Rank 3: 2	7
	<ul style="list-style-type: none"> <li>The program includes BMPs that are technically feasible, effective, and implementable.</li> </ul>	<b>8/8</b>	<b>Rank 1: 6</b> Rank 2: 1 Rank 3: 0	<b>20</b>
	<ul style="list-style-type: none"> <li>The program includes measurable goals to help identify progress of program implementation.</li> </ul>	7/8	Rank 1: 0 Rank 2: 2 Rank 3: 0	4
	<ul style="list-style-type: none"> <li>The program includes BMPs that help achieve TMDL pollutant load reduction benchmarks and make progress toward TMDL wasteload allocations.</li> </ul>	<b>8/8</b>	Rank 1: 0 Rank 2: 0 Rank 3: 1	1
	<ul style="list-style-type: none"> <li>The program targets pollutant discharges from redevelopment and new development activities.</li> </ul>	7/8	Rank 1: 0 Rank 2: 0 Rank 3: 0	0
	<ul style="list-style-type: none"> <li>The program reflects the results of an adaptive management process, which provides for ongoing review and evaluation of program effectiveness.</li> </ul>	<b>8/8</b>	Rank 1: 0 Rank 2: 0 Rank 3: 4	4
	<ul style="list-style-type: none"> <li>Other: <i>The program targets pollutant discharges from existing city through retrofits.</i></li> </ul>	1/8	Rank 1: 0 Rank 2: 0 Rank 3: 0	0
Local Applicability	The program is appropriate and feasible for local conditions such as climate, geology, community values, and regulatory requirements.			
	<ul style="list-style-type: none"> <li>The program comprehensively addresses the entire extent of the permittee's MS4 system as covered under their NPDES MS4 permit.</li> </ul>	6/8	<b>Rank 1: 4</b> Rank 2: 1 Rank 3: 0	14
	<ul style="list-style-type: none"> <li>The program is consistent with local ordinances and current legal authority.</li> </ul>	<b>8/8</b>	Rank 1: 3 Rank 2: 4 Rank 3: 1	<b>18</b>
	<ul style="list-style-type: none"> <li>The program encourages and solicits feedback and involvement from stakeholders to ensure consistency with community-wide goals and objectives.</li> </ul>	6/8	Rank 1: 0 Rank 2: 0 Rank 3: 3	3
	<ul style="list-style-type: none"> <li>Stormwater design standards implemented as part of the program reflect local conditions specific to soils, rainfall, infiltration rates, and stream conditions.</li> </ul>	7/8	Rank 1: 2 Rank 2: 2 Rank 3: 2	12
	<ul style="list-style-type: none"> <li>Other: <i>The program takes into account the biological and human communities of the affected watersheds.</i></li> </ul>	1/8	Rank 1: 0 Rank 2: 0 Rank 3: 1	1

Program Resources	The program considers availability of resources and stormwater management program priorities.			
	<ul style="list-style-type: none"> <li>The program or program element is reflected in the current budget allocations.</li> </ul>	6/8	Rank 1: 2 Rank 2: 0 Rank 3: 1	7
	<ul style="list-style-type: none"> <li>The program considers implementation costs and practicability within the overall context of City priorities and resources.</li> </ul>	7/8	<b>Rank 1: 4</b> Rank 2: 2 Rank 3: 0	<b>16</b>
	<ul style="list-style-type: none"> <li>The program considers cost effectiveness in determining optimal stormwater management approaches.</li> </ul>	7/8	Rank 1: 1 Rank 2: 0 Rank 3: 3	6
	<ul style="list-style-type: none"> <li>The program considers public acceptance of program costs and benefits.</li> </ul>	4/8	Rank 1: 0 Rank 2: 2 Rank 3: 0	4
	<ul style="list-style-type: none"> <li>The program has dedicated staff for implementation.</li> </ul>	7/8	Rank 1: 0 Rank 2: 3 Rank 3: 1	7
	<ul style="list-style-type: none"> <li>Tools and training are provided to ensure the program or program element is implemented correctly.</li> </ul>	7/8	Rank 1: 0 Rank 2: 0 Rank 3: 2	2
	<ul style="list-style-type: none"> <li>Other:</li> </ul>	0/8	Rank 1: 0 Rank 2: 0 Rank 3: 0	0