

THE CITY OF Battle Ground WASHINGTON

2023 Stormwater Management Action Plan



CITY OF BATTLE GROUND

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STORMWATER MANAGEMENT ACTION PLAN

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City of Battle Ground

Stormwater Management Action Plan

1 – INTRODUCTION – GENERAL BACKGROUND

The City of Battle Ground (hereafter referred to as the 'City') encompasses 8.54 square miles and includes a population of approximately 22,257. The Washington State Department of Ecology administers the Clean Water Act National Pollutant Discharge Elimination System (NPDES) municipal stormwater permits in Washington. The City is designated as an NPDES Phase II Permittee by Ecology and must meet the requirements of the Western Washington Phase II Municipal Stormwater Permit. The 2019 Western Washington Phase II Municipal Stormwater Permit requires each permittee to develop a Stormwater Management Action Plan (SMAP). This memo summarizes the receiving water assessment and the development of Watershed Prioritization Criteria in preparation for developing the City's SMAP. A sub-watershed basin map was created in ArcGIS, consistent with these criteria.

Consor documented and assessed existing information related to local receiving waters and contributing area conditions to identify which receiving waters are most likely to benefit from stormwater management planning.

A watershed inventory was developed and includes a brief description of the relative conditions of the receiving waters and contributing areas. The watershed inventory includes a table with each receiving water name, its total watershed area, the percent of the total watershed area within the City's jurisdiction, and the findings of the stormwater management influence assessment for each basin. The 2019 Western Washington Phase II Municipal Stormwater Permit, Section S5.C.1.d.ii prioritization process will include all receiving waters within the City. This project created a map of the delineated basins with references to the watershed inventory table and developed criteria for watershed prioritization. Sub-watersheds were ranked to determine the priority sub-watershed and catchment. This SMAP summarizes the Stormwater Facility Retrofit Investigation; Land Management/Development Strategies; Targeted, Enhanced, or Customized Implementation of Stormwater Management Actions; and the Implementation Schedule and Funding Sources.

2 – SUB-WATERSHED SUMMARIES

Sub-watershed basin maps and a city limits map are included in **Appendix A.** The Sub-watershed Receiving Water Assessment is included in **Appendix C**.

East Fork Lewis (R.M. 07.25)

The East Fork Lewis (R.M. 07.25) Sub-watershed consists mostly of agricultural and rural properties that have water quality impacts. Agricultural farming has caused water quality impacts. Future growth is expected to be primarily residential and stormwater treatment and flow control will

meet the current Stormwater Management Manual for Western Washington (SWMMWW) requirements.

A small portion of the sub-basin is within the City and consists of residential areas that were developed under the 1992 Stormwater Management Manual for the Puget Sound Basin and recent and proposed developments under the current SWMMWW.

Water quality concerns include bacteria, temperature, and low dissolved oxygen. Zoning within the City is primarily residential.

The East Fork Lewis River Watershed Bacteria and Temperature Source Assessment Report (Ecology, May 2018) identifies the designated beneficial uses for the East Fork Lewis River as Recreational Use (Primary Contact) from the mouth upstream to Moulton Falls (R.M. 26.6). Desired Water Quality conditions to meet this use is a Bacteria Criteria with a geometric mean of 100cfu/100mL and 10% of samples not to exceed 200cfu/100mL. The East Fork Lewis River also has an Aquatic Life Use as Core Summer Habitat and a desired Water Quality temperature condition of 16.0°C (60.8°F).

Proposed protection and restoration goals for the East Fork Lewis (R.M. 07.25) Sub-watershed include applying current stormwater treatment and flow control Best Management Practices (BMPs) to all new development and redevelopment within the sub-watershed. Less than 10% of the basin lies within the City's Urban Growth Boundary (UGA) and the river is outside of the UGA. Therefore, there are limited opportunities for protection and restoration beyond applying the current SWMMWW requirements. At this time and because of these reasons, the East Fork Lewis Sub-watershed is expected to have a relatively low stormwater management influence for the City's SMAP.

Mill Creek (East Fork)

The Mill Creek (East Fork) Sub-watershed is primarily rural residential. The Sub-watershed is tributary to the East Fork Lewis River and has the same water quality goals as the East Fork Lewis R.M. 07.25 Sub-watershed.

A small portion of the Mill Creek East Fork Sub-watershed lies within the City's jurisdiction and is tributary to the East Fork Lewis River. Existing development was designed to the 1992 Stormwater Management Manual for the Puget Sound Basin and the SWMMWW that was effective at the time of development. Water quality concerns include bacteria and temperature.

Agricultural farming in this sub-watershed has created water quality concerns. Most of the current and future zoning within the City is residential. Water quality concerns associated with future residential development are likely to be mitigated by stormwater treatment and flow control meeting applicable SWMMWW requirements.

Proposed protection and restoration goals for the Mill Creek (East Fork) Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development and

redevelopment within the sub-watershed. Less than 10% of the basin lies within the City's UGA and is residential or rural residential. Therefore, there are limited opportunities for protection and restoration beyond applying the current SWMMWW requirements.

Salmon Creek (R.M. 08.96)

A very small portion of the Salmon Creek (R.M. 08.96) Sub-watershed lies within the City's jurisdiction and is tributary to Salmon Creek. Rural residential development has occurred from approximately 1940 to present. There have recently been several single-family residential units constructed. However, there has been no development within the City requiring stormwater BMPs. Water quality concerns include low dissolved oxygen, pH, turbidity, and bacteria. Future development is expected to be residential and will meet the current SWMMWW requirements.

The Salmon Creek Temperature Total Daily Maximum Load – Water Quality Improvement Report and Implementation Plan (October, 2011) identifies Washington State water quality standards based on the designated beneficial uses of a water body and the criteria to achieve those uses. For the Salmon Creek watershed, the designated beneficial uses are the aquatic life uses of core summer salmonid habitat and salmonid spawning, rearing, and migration. Other non-aquatic life uses include water supply (domestic; industrial; and agricultural); stock watering; fish and shellfish harvesting; wildlife habitat; recreation (primary contact recreation; sport fishing; boating; and esthetic enjoyment); and commerce and navigation.

In the Washington State Water Quality Standards, aquatic life use categories are described using key species (salmon versus warm-water species) and life-stage conditions (spawning versus rearing) [WAC 173-201A-200; 2003 edition].

1. To protect the designated aquatic life uses of core summer salmonid habitat, the highest 7-DADMax temperature must not exceed 16°C (60.8°F) more than once every ten years on average.
2. To protect the designated aquatic life uses of salmonid spawning, rearing, and migration, and salmonid rearing and migration only, the highest 7-DADMax temperature must not exceed 17.5°C (63.5°F) more than once every ten years on average.

The Mill Creek, Morgan Creek, Salmon Creek (R.M. 14.66), and Woodin Creek Sub-watersheds are included in the Salmon Creek Watershed and include the same designated uses and desired Water Quality conditions as above.

Proposed protection and restoration goals for the Salmon Creek (R.M. 08.96) Sub-watershed basin include applying current stormwater treatment and flow control BMPs to all new development and redevelopment within the sub-watershed. Less than 5% of the basin lies within the City's UGA. Therefore, there are limited opportunities for protection and restoration beyond applying the current SWMMWW requirements. Because of this, this sub-watershed is expected to have a relatively low stormwater management influence for the City's SMAP.

Mill Creek

The Mill Creek Sub-watershed is tributary to Salmon Creek. Development has occurred from 1998 to 2017, primarily under the 1992 Stormwater Management Manual for Puget Sound requirements. Recent and future development will meet the current SWMMWW requirements. Mill Creek is part of the Salmon Creek Watershed Temperature TMDL. Additional water quality concerns include bacteria, and low dissolved oxygen. Future development is expected to be both residential and commercial as the City expands to the west along SR502. Stormwater treatment and flow control will meet the current SWMMWW requirements.

Proposed protection and restoration goals for the Mill Creek Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development within the sub-watershed. Approximately 30% of the basin lies within the City's UGA. Therefore, there are more opportunities for protection and restoration beyond applying the current SWMMWW requirements. To improve the ecological condition, including increasing shade to lower temperature, wetland protection and buffer protection will be required as the basin develops. Mill Creek may provide opportunities for restoration and protection to improve water quality conditions.

Morgan Creek

A small portion of the Morgan Creek Sub-watershed is within the City's jurisdiction. Existing rural residential development occurred from 1977 to 1997 and pre-dates stormwater requirements. Planned development will meet the current SWMMWW requirements. Morgan Creek is tributary to Salmon Creek. Water quality concerns include low dissolved oxygen, pH, turbidity, and bacteria. Future development within this basin will be residential.

Proposed protection and restoration goals for the Morgan Creek Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development and redevelopment within the sub-watershed. Less than 5% of the basin lies within the City's UGA. Therefore, there are limited opportunities for protection and restoration beyond applying the SWMMWW requirements. However, undeveloped areas along Morgan Creek will be protected as development occurs.

Salmon Creek (R.M. 14.66)

The Salmon Creek (R.M. 14.66) Sub-watershed is primarily agricultural or residential land. Recent large residential developments have been designed to current SWMMWW requirements. Existing large residential parcels pre-date stormwater requirements. Water quality concerns include low dissolved oxygen, pH, turbidity, and bacteria.

Water quality impacts within this basin are primarily caused by agricultural farming. Future development is expected to be predominantly residential and will meet the current SWMMWW requirements.

Proposed protection and restoration goals for the Salmon Creek (R.M. 14.66) Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development within the sub-watershed. Approximately 16% of the basin lies within the City's UGA. Therefore, there are more opportunities for protection and restoration beyond applying the current SWMMWW requirements. Wetland protection and buffer protection will be required as the basin develops. There may also be opportunities for restoration, especially along the existing golf course and in partnership with Clark County as the area develops. There is also the potential for a county park within the basin.

Woodin Creek

The Woodin Creek Sub-watershed encompasses the core downtown area and areas from the northern city limits to the southern city limits. Development has occurred from before stormwater requirements to the present. Development includes residential, light industrial, commercial, rural residential and agricultural. Water quality concerns include Ammonia-N, BOD (5-day), bacteria, bioassessment, E. Coli, fecal coliform, and temperature.

Water quality impacts within this basin are primarily caused by commercial and residential development before stormwater treatment and detention requirements were in place. Future development within this basin is expected to be both residential and commercial and will meet the current SWMMWW requirements.

Proposed protection and restoration goals for the Woodin Creek Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development and re-development within the sub-watershed. Approximately 50% of the basin lies within the City's UGA, providing the greatest opportunities for protection and restoration. Wetland protection and buffer protection will be required as opportunities arise and the basin develops. There may also be opportunities for restoration along Woodin Creek. The City has focused its efforts on restoration plantings and removal of invasives along Woodin Creek in recent years to increase shade and improve temperature conditions. There are opportunities to work with private property owners to continue removing invasive plants and there may be opportunities to provide residential incentives to provide additional flow control BMPs.

Because much of the basin developed without stormwater controls. Adding treatment and flow control to areas within the basin will provide the most impactful improvements over the existing condition, especially within the downtown area.

3 – CITY OF BATTLE GROUND SUB-WATERSHED MAP

An online GIS sub-watershed map was created and includes a window with the following information on each sub-watershed within the City.

- Fish within the sub-watershed
- Wildlife within the sub-watershed
- Water Quality Concerns
- Basin name
- Watershed name
- Sub-watershed name
- Area within the UGA

The map also includes city limits, Urban Growth Boundary (UGA), zoning, stream, wetland, catchment, and stormwater facility information. The City provided public access to this map via its website by March 31, 2022. The website is available at the link below:

(https://storymaps.arcgis.com/stories/1bb63a05691246dc8d64406064fb3800).

4 – SUB-WATERSHED PRIORITIZATION CRITERIA

This phase of the project developed Sub-watershed Prioritization Criteria to rank the sub-watersheds within the City's jurisdiction and to determine which sub-watershed will benefit the most from stormwater retrofits, and protection and restoration efforts. The following criteria are the most applicable for determining the water quality for each basin.

- MS4 Relative Flow Contribution to Receiving Water
- Impervious Surface
- Pollution Generating Impervious Surface
- Pollution Generating Pervious Surface
- Traffic Volume
- Population Density
- Tree Canopy
- Lack of Treatment or Flow Control Facilities
- Agricultural Areas
- Industrial Areas
- Residential Areas
- Environmental Justice
- Soil Type

Environmental Justice maps obtained from the Environmental Protection Agency's (EPA) website https://www.epa.gov/ejscreen included demographics, less than a high school education, linguistic isolation, low income, and age over 65 years. These demographics indicate that the Woodin Creek and Mill Creek sub-watershed basins are the most overburdened.

Environmental Justice maps are included in Appendix B. The maps indicate how areas score on a National Percentile Rank. The Sub-watershed Receiving Water Assessment is including in Appendix C.

The Sub-watershed Basin Prioritization Criteria is included in Appendix D.

5 – PRIORITIZATION CRITERIA

This phase of the SMAP development included prioritizing all receiving waters within the City for improvements consistent with the 2019 Western Washington Phase II Municipal Stormwater Permit, Section S5.C.1.d.ii. Thirteen criteria were evaluated for each of the seven sub-watersheds within the city's UGA. Catchments within the highest priority basin were evaluated using the same prioritization criteria to rank the catchments and determine the catchment that will benefit the most from Stormwater Management Action Planning. The City solicited input from the public on the prioritized catchment through the City's stormwater webpage. For each of the thirteen criteria, a low rating corresponds to less stormwater impacts to water quality and an extreme rating corresponds to more stormwater impacts to water quality.

5.1 - MS4 Relative Flow Contribution to Receiving Water

The area of each sub-watershed within the UGA was compared to the sub-watershed area to determine how much runoff the MS4 contributes to the receiving water relative to the entire sub-watershed basin. Basins contributing a larger percentage of runoff from within the UGA scored higher because stormwater management action planning within the UGA will have a greater impact on the water quality of the receiving water.

Basin ratings were scored as follows:

- Low (0 points) <5% of basin within UGA
- Medium (1 point) 5 – 10% of basin within UGA
- High (2 points) 10-25% of basin within UGA
- Extreme (3 points) >25% of basin within UGA

5.2 - Impervious Surface Area

Impervious surface area within the UGA was calculated based on zoning. Percent impervious area was calculated for each zoning classification based on Table III-1.3 of the Stormwater Management Manual for the Puget Sound Basin (Ecology 1992) and applied to the developed condition of the current zoning classification.

Basin ratings were scored as follows:

- Low (0 points) <10% Impervious Area
- Medium (1 point) 10-15% Impervious Area
- High (2 points) 15-25% Impervious Area

- Extreme (3 points) >25% Impervious Area

5.3 - Pollution Generating Impervious Surface Area (PGIS)

Pollution generating impervious surface area within the UGA was calculated based on zoning. Percent impervious area was calculated for each zoning classification based on Table III-1.3 of the Stormwater Management Manual for the Puget Sound Basin (Ecology 1992) and applied to the developed condition of the current zoning classification. PGIS is assumed to be the same as impervious surface area because clean roof runoff is typically comingled with street runoff within the City of Battle Ground.

Basin ratings were scored as follows:

- Low (0 points) <20% Impervious Area
- Medium (1 point) 20-35% Impervious Area
- High (2 points) 35-50% Impervious Area
- Extreme (3 points) >50% Impervious Area

5.4 - Pollution Generating Pervious Surface Area (PGPS)

Pollution generating pervious surface area within the UGA was calculated based on zoning. Percent pervious area was calculated for each zoning classification based on Table III-1.3 of the Stormwater Management Manual for the Puget Sound Basin (Ecology 1992) and applied to the developed condition of the current zoning classification. Pervious areas within developed areas are considered pollution generating because fertilizers and pesticides are generally applied to developed pervious areas (yards, landscape strips, parks, etc.) and runoff typically comingles with street runoff.

Pervious surfaces are generally better than impervious surfaces because they help reduce the amount of runoff and peak flows to local streams. Pervious surfaces are assumed to be pollution generating based on the developed zoning conditions for each basin or catchment area.

Basin ratings were scored as follows:

- Low (0 points) <10% PGPS Area
- Medium (1 point) 10-20% PGPS Area
- High (2 points) 20-30% PGPS Area
- Extreme (3 points) >30% PGPS Area

5.5 - Traffic Volume

Traffic volume was calculated for each basin in vehicle miles per day per square mile by measuring the length of the roadways within each basin and multiplying by the Average Daily Trips (ADT) for

each roadway functional classification divided by the tributary basin area. ADTs for each functional classification are shown in Table 1.

Table 1 – Average Daily Trips

Functional Classification	ADT
Local Streets	500
Neighborhood Collectors	1,000
Major Collectors	5,000
Minor Arterials	8,000
Principal Arterials	10,000
State Highway	Measured

Basin ratings were scored as follows:

- Low (0 points) <10,000 Vehicle Miles/Day/Sq. Mi.
- Medium (1 point) 10,000 - 20,000 Vehicle Miles/Day/Sq. Mi.
- High (2 points) 20,000 – 30,000 Vehicle Miles/Day/Sq. Mil
- Extreme (3 points) >30,000 Vehicle Miles/Day/Sq. Mi.

5.6 - Population Density

Population density was determined from the EPA's EJScreen: Environmental Justice Screening and Mapping Tool website at https://www.epa.gov/ejscreen.

Basin ratings were scored as follows:

- Low (0 points) 0 – 2,000/Sq. Mi.
- Medium (1 point) 2,000 – 4,000/Sq. Mi.
- High (2 points) 4,000 – 5,000/Sq. Mi.
- Extreme (3 points) >5,000/Sq. Mi.

5.7 - Tree Canopy

Tree canopy was visually estimated from current aerial photographs.

For ranking purposes, the focus was on retrofitting. However, protection of existing tree canopy and opportunities to create additional canopy were a priority in the highest rated catchment during the land management and code review phase.

Basin ratings were scored as follows:

- Low (0 points) >80% Tree Canopy Coverage
- Medium (1 point) 50 – 80% Tree Canopy Coverage
- High (2 points) 20 - 50% Tree Canopy Coverage
- Extreme (3 points) <20% Tree Canopy Coverage

5.8 - Lack of Stormwater Facilities

Lack of stormwater facilities was determined by estimating the areas within each basin that are:

1. Undeveloped,
2. Developed under the Stormwater Management Manual for Western Washington requirements,
3. Developed under the Stormwater Management Manual for the Puget Sound Basin requirements, or
4. Developed before stormwater requirements.

Stormwater requirements were first implemented in the 1990s with the 1992 Stormwater Management Manual for the Puget Sound Basin. Much of the City of Battle Ground developed before this time. Therefore, much of the downtown area does not have stormwater treatment or detention controls. The Stormwater Management Manual for Western Washington became required in the mid-2000's. Slow development and vesting of stormwater requirements allowed most development to occur under the Puget Sound Manual until approximately 2013. Most development after 2013 was designed to meet the SWMMWW requirements. The SWMMWW requirements are stricter than the Puget Sound Manual requirements. Basin ratings will consider the Puget Sound requirements to be more beneficial than no requirements and less beneficial than the SWMMWW.

Stormwater requirements are used as a guide to how much impervious and pollution generating pervious surface receives treatment and detention.

Undeveloped areas were considered 'Low' impact because they will develop under current or future stormwater requirements. Areas already developed under the SWMMWW were considered 'Low' impact. Areas developed under the Stormwater Management Manual for the Puget Sound Basin were considered 'Medium' to 'High' because they developed under less stringent stormwater requirements. Basins were rated 'Medium' or 'High' depending on the relative percentage of the basin developed with no stormwater controls, Puget Sound Manual requirements or SWMMWW requirements. Areas developed before stormwater regulations were required were considered 'Extreme.' See Appendix E for percentages of each basin as developed under each standard for stormwater requirements.

Areas that lack treatment and flow control devices are considered good candidates for retrofit projects or regional stormwater treatment and flow control facilities.

Areas for each set of stormwater standards were measured within each basin and a weighted average was used to score each basin. (See Appendix E – Basin Prioritization Scoring). Basin ratings were scored as follows:

- Low (0 points) Undeveloped or developed under current stormwater requirements
- Medium (1 point) Undeveloped and developed under the Puget Sound Manual requirements
- High (2 points) Developed under the Puget Sound Manual or developed before stormwater requirements
- Extreme (3 points) Developed prior to stormwater requirements

5.9 - Agricultural Area

Increased agricultural areas were scored higher due to the increased risk of pollution from fertilizers, pesticides, and livestock.

Agricultural area was calculated by reviewing zoning classifications and aerial photographs.

Basin ratings were scored as follows:

- Low (0 points) 0 – 20% Agricultural area
- Medium (1 point) 20 - 40% Agricultural area
- High (2 points) 40 - 50% Agricultural area
- Extreme (3 points) >50% Agricultural area

5.10 - Industrial Area

Increased industrial areas were scored higher due to the increased risk of pollution from industrial activities, vehicle and truck traffic and the risk of spills or contaminated runoff from industrial activities and storage areas.

Industrial area was calculated by reviewing zoning classifications.

Basin ratings were scored as follows:

- Low (0 points) 0 – 10% Industrial area
- Medium (1 point) 10 - 20% Industrial area
- High (2 points) 20 - 30% Industrial area
- Extreme (3 points) >30% Industrial area

5.11 - Residential Area

Residential area was calculated by reviewing zoning classifications. Residential areas in Battle Ground are primarily single-family residences. Older areas developed on larger lots without

stormwater treatment and detention, while newer areas developed on smaller lots with stormwater treatment and detention. For the purposes of basin prioritization, all residential areas were treated equally.

Increased residential areas were scored higher due to increased risk of pollution from vehicles, fertilizers, and pesticides.

Basin ratings were scored as follows:

- Low (0 points) 0 – 20% Residential area
- Medium (1 point) 20 - 40% Residential area
- High (2 points) 40 - 60% Residential area
- Extreme (3 points) >60% Residential area

5.12 - Environmental Justice

Environmental Justice was evaluated by reviewing the United State Environmental Protection Agency's EJScreen: Environmental Justice Screening and Mapping Tool online. Environmental Justice maps for socio-economic indicators including Demographics, Education, Linguistics, Income and Age are online with the City of Battle Ground Watershed Maps and at https://www.epa.gov/ejscreen. The maps indicate how areas score on a National Percentile Rank, and result in data indicating degree of 'overburdened for one or more socio-economic indicators.'

The EPA and the Washington State Department of Commerce encourage consideration of environmental justice and social equity issues in economically disadvantaged neighborhoods (Building Cities in the Rain, (2016)).

Overburdened socio-economic areas are used as a tiebreaker in the event that all other prioritization criteria are equal.

Basin ratings were scored as follows:

- Low (0 points) 0 – 50% Overburdened for one or more socio-economic indicators
- Medium (1 point) 50 - 70% Overburdened for one or more socio-economic indicators
- High (2 points) 70 - 80% Overburdened for one or more socio-economic indicators
- Extreme (3 points) >80% Overburdened for one or more socio-economic indicators

5.13 - Soil Type

Soil type was measured for each basin using Western Washington Hydrologic Model (WWHM) Classifications from Clark County GIS data. WWHM Classifications, Hydrologic Soil Group, Infiltration Qualities and Ratings are shown in Table 2.

Poorly drained soils scored higher because they result in higher runoff rates, causing more erosion and transport of pollutants.

Table 2 – Soil Types

Rating	WWHM Classification	Hydrologic Soil Group	Infiltration Qualities
Low (0 points)	SG1	A and B	Excessively drained
Medium (1 point)	SG1/SG2	B	Well drained
High (2 points)	SG3/SG4	C	Moderately drained to poorly drained
Extreme (3 points)	SG5	D	Wetland soils

6 – SUB-WATERSHED EVALUATIONS AND RANKING

Sub-watershed basins were evaluated according to the criteria in Section 5 and ranked accordingly. A map of the sub-watersheds is shown below in Figure 1. Basin prioritization scoring is provided in Appendix E.

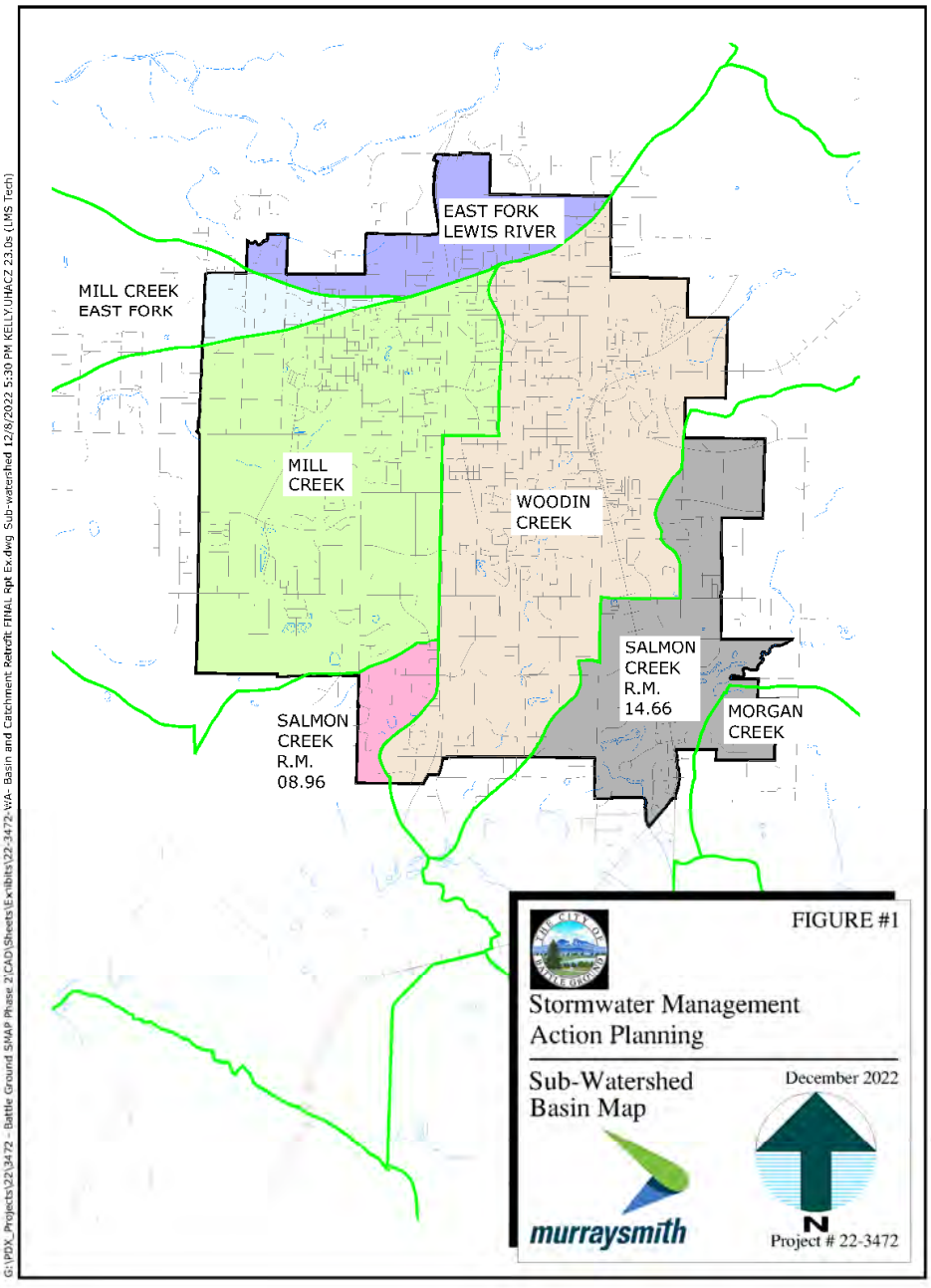


Figure 1: Sub-watershed Basin Map

6.1 - East Fork Lewis (R.M. 07.25)

Basin Delineation and Receiving Water Identification

A relatively small area of the East Fork Lewis River (R.M. 07.25) Sub-watershed is within the City's jurisdiction and tributary to the East Fork Lewis River. The basin delineation is from Clark County GIS.

Receiving Water Conditions Assessment

Agricultural farming is the dominant land use in the East Fork Lewis River Sub-watershed and has caused water quality impacts. The East Fork Lewis River Watershed Bacteria and Temperature Source Assessment Report (Ecology, May 2018) identifies the designated beneficial uses for the East Fork Lewis River as Recreational Use (Primary Contact) from the mouth upstream to Moulton Falls (R.M. 26.6). Desired Water Quality conditions to meet this use is a Bacteria Criteria with a geometric mean of 100cfu/100mL and 10% of samples not to exceed 200cfu/100mL. The East Fork Lewis River also has an aquatic life use as core summer habitat and a desired Water Quality temperature condition of 16.0°C (60.8°F). Water quality concerns include bacteria, temperature, and low dissolved oxygen.

Stormwater Management Influence Assessment

Most of the existing stormwater facilities within this basin were designed under the 1992 Stormwater Management Manual for the Puget Sound Basin. Most of the basin includes rural properties in Clark County. Several recent and proposed developments were and will be developed to meet the current Stormwater Management Manual for Western Washington (SWMMWW). Zoning within the City is primarily residential.

Relative Conditions and Contributions Assessment

Proposed protection and restoration goals for the East Fork Lewis (R.M. 07.25) Sub-watershed include applying current stormwater treatment and flow control Best Management Practices (BMPs) to all new development and redevelopment within the sub-watershed. Less than 10% of the basin lies within the City's UGA and the river is outside of the UGA. Therefore, there are limited opportunities for protection and restoration beyond applying the current SWMMWW requirements. At this time and for these reasons, the East Fork Lewis Sub-watershed is expected to have a relatively low stormwater management influence for the City's SMAP.

Future growth is expected to be primarily residential and stormwater treatment and flow control will meet the current SWMMWW requirements.

Table 3: East Fork Lewis River (R.M. 7.25) Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	7.4%	<5%	**5-10%**	10-25%	>25%	1
Impervious Surface	50%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	50%	<20%	20-35%	**35-50%**	>50%	2
Pollution Generating Pervious Surface	50%	<10%	10-20%	20-40%	**>40%**	3
Traffic Volume	30,153	<10,000	10,000-20,000	20,000-30,000	**>30,000**	3
Population Density	4,800	<2,000	2,000 - 4,000	**4,000 - 5,000**	>5,000	2
Tree Canopy	20%	>80%	50-80%	**20-49%**	<20%	2
Lack of Treatment or Flow Control Facilities	Undev.	[1]**SWMMWW**	[2]PSM	[2]PSM	No Ctrl	0
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	0%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	100%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	80%+	<50%	50-70%	70-80%	**>80%**	3
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**24**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

6.2 - Mill Creek (East Fork)

Basin Delineation and Receiving Water Identification

A small portion of the Mill Creek East Fork Sub-watershed lies within the City's jurisdiction and is tributary to the East Fork Lewis River. The basin delineation is from Clark County GIS.

Receiving Water Conditions Assessment

The Mill Creek (East Fork) Sub-watershed is tributary to the East Fork Lewis River and has the same water quality goals as the East Fork Lewis R.M. 07.25 Sub-watershed. Agricultural farming in this sub-watershed has created water quality concerns that include bacteria and temperature.

Stormwater Management Influence Assessment

Existing development was designed to the 1992 Stormwater Management Manual for the Puget Sound Basin and the SWMMWW.

Most of the current and future zoning within the City is residential. Water quality concerns associated with future residential development are likely to be mitigated by stormwater treatment and flow control meeting applicable SWMMWW requirements.

Relative Conditions and Contributions Assessment

Proposed protection and restoration goals for the Mill Creek (East Fork) Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development and redevelopment within the sub-watershed. Less than 10% of the basin lies within the City's UGA. Therefore, there are limited opportunities for protection and restoration beyond applying the current SWMMWW requirements.

Table 4: Mill Creek (East Fork) Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	7.8%	<5%	**5-10%**	10-25%	>25%	1
Impervious Surface	69%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	69%	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	31%	<10%	10-20%	**20-40%**	>40%	2
Traffic Volume	10,762	<10,000	**10,000-20,000**	20,000-30,000	>30,000	1
Population Density	2,494	<2,000	**2,000 - 4,000**	4,000 - 5,000	>5,000	1
Tree Canopy	10%	>80%	50-80%	20-49%	**<20%**	3
Lack of Treatment or Flow Control Facilities	Undev.	[1]**SWMMWW**	[2]PSM	[2]PSM	No Ctrl	0
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	0%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	94%	0-20%	20-40%	40-60%	>60%	3
Environmental Justice	80%+	<50%	50-70%	70-80%	**>80%**	3
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**22**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

6.3 - Salmon Creek (R.M. 08.96)

Basin Delineation and Receiving Water Identification

A very small portion of the Salmon Creek (R.M. 08.96) Sub-watershed lies within the City's jurisdiction and is tributary to Salmon Creek. The basin delineation is from Clark County GIS.

Receiving Water Conditions Assessment

Water quality concerns include low dissolved oxygen, pH, turbidity, and bacteria. Future development is expected to be residential and will meet the current SWMMWW requirements.

The Salmon Creek Temperature Total Daily Maximum Load – Water Quality Improvement Report and Implementation Plan (October 2011) identifies Washington State water quality standards based on the designated beneficial uses of a water body and the criteria to achieve those uses. For the Salmon Creek watershed, the designated beneficial uses are the aquatic life uses of core summer salmonid habitat and salmonid spawning, rearing, and migration. Other non-aquatic life uses include water supply (domestic; industrial; and agricultural); stock watering; fish and shellfish harvesting; wildlife habitat; recreation (primary contact recreation; sport fishing; boating; and esthetic enjoyment); and commerce and navigation.

In the Washington State Water Quality Standards, aquatic life use categories are described using key species (salmon versus warm-water species) and life-stage conditions (spawning versus rearing) [WAC 173-201A-200; 2003 edition].

1. To protect the designated aquatic life uses of core summer salmonid habitat, the highest 7-DADMax temperature must not exceed 16°C (60.8°F) more than once every ten years on average.
2. To protect the designated aquatic life uses of salmonid spawning, rearing, and migration, and salmonid rearing and migration only, the highest 7-DADMax temperature must not exceed 17.5°C (63.5°F) more than once every ten years on average.

The Mill Creek, Morgan Creek, Salmon Creek (R.M. 14.66), and Woodin Creek Sub-watersheds are included in the Salmon Creek Watershed and include the same designated uses and desired Water Quality conditions as above.

Stormwater Management Influence Assessment

Development has occurred from approximately 1940 to present. There have recently been several single-family residential units constructed. However, there has been no development within the City that met stormwater requirement thresholds.

Relative Conditions and Contributions Assessment

Proposed protection and restoration goals for the Salmon Creek (R.M. 08.96) Sub-watershed basin include applying current stormwater treatment and flow control BMPs to all new development and redevelopment within the sub-watershed. Less than 5% of the basin lies within the City's UGA.

Therefore, there are limited opportunities for protection and restoration beyond applying the current SWMMWW requirements. Because of this, this sub-watershed is expected to have a relatively low stormwater management influence for the City's SMAP.

Table 5: Salmon Creek (R.M. 08.96) Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	3.6%	**<5%**	5-10%	10-25%	>25%	0
Impervious Surface	43%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	43%	<20%	20-35%	**35-50%**	>50%	2
Pollution Generating Pervious Surface	57%	<10%	10-20%	20-40%	**>40%**	3
Traffic Volume	32,355	<10,000	10,000-20,000	20,000-30,000	**>30,000**	3
Population Density	520	**<2,000**	2,000 - 4,000	4,000 - 5,000	>5,000	0
Tree Canopy	50%	>80%	**50-80%**	20-49%	<20%	1
Lack of Treatment or Flow Control Facilities	No Ctrl	[1]SWMMWW	[2]PSM	[3]PSM	**No Ctrl**	3
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	0%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	100%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	80%+	<50%	50-70%	70-80%	**>80%**	3
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**23**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

6.4 - Mill Creek

Basin Delineation and Receiving Water Identification

The Mill Creek Sub-watershed is tributary to Salmon Creek. The basin delineation is from Clark County GIS.

Receiving Water Conditions Assessment

Mill Creek is part of the Salmon Creek Watershed Temperature TMDL. Additional water quality concerns include bacteria, and low dissolved oxygen. Future development is expected to be both

residential and commercial as the City expands to the west along SR502. Stormwater treatment and flow control will meet the current SWMMWW requirements.

Stormwater Management Influence Assessment

Development has occurred from 1998 to 2017, primarily under the 1992 Stormwater Management Manual for the Puget Sound Basin requirements. Recent and future development will meet the current SWMMWW requirements.

Relative Conditions and Contributions Assessment

Proposed protection and restoration goals for the Mill Creek Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development and redevelopment within the sub-watershed. Approximately 30% of the basin lies within the City's UGA. Therefore, there are more opportunities for protection and restoration beyond applying the current SWMMWW requirements. Wetland protection and buffer protection will be required as the basin develops. As the area develops, Mill Creek may provide opportunities for restoration and protection.

Table 6: Mill Creek Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	30.9%	<5%	5-10%	10-25%	**>25%**	3
Impervious Surface	64	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	64	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	36	<10%	10-20%	**20-40%**	>40%	2
Traffic Volume	34,680	<10,000	10,000-20,000	20,000-30,000	**>30,000**	3
Population Density	1,000-5,000	<2,000	**2,000 - 4,000**	4,000 - 5,000	>5,000	1
Tree Canopy	<20%	>80%	50-80%	20-49%	**<20%**	3
Lack of Treatment or Flow Control Facilities	Varies	[1]SWMMWW	**[2]PSM**	[2]PSM	No Ctrl	1
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	25%	0-10%	**10-20%**	**20-30%**	>30%	2
Residential Areas	70%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	80%+	<50%	50-70%	70-80%	**>80%**	3
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**29**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

6.5 - Morgan Creek

Basin Delineation and Receiving Water Identification

A small portion of the Morgan Creek Sub-watershed is within the City's jurisdiction. Morgan Creek is tributary to Salmon Creek. The basin delineation is from Clark County GIS.

Receiving Water Conditions Assessment

Water quality concerns include low dissolved oxygen, pH, turbidity, and bacteria. Future development within this basin will be residential.

Stormwater Management Influence Assessment

Existing development occurred from 1977 to 1997 and pre-dates stormwater requirements. Planned development will meet the current SWMMWW requirements.

Relative Conditions and Contributions Assessment

Proposed protection and restoration goals for the Morgan Creek Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development and redevelopment within the sub-watershed. Less than 5% of the basin lies within the City's UGA. Therefore, there are limited opportunities for protection and restoration beyond applying the current SWMMWW requirements. However, areas along Morgan Creek will be protected as development occurs.

Table 7: Morgan Creek Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	2.5%	**<5%**	5-10%	10-25%	>25%	0
Impervious Surface	35%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	35%	<20%	**20-35%**	35-50%	>50%	1
Pollution Generating Pervious Surface	65%	<10%	10-20%	20-40%	**>40%**	3
Traffic Volume	620	**<10,000**	10,000-20,000	20,000-30,000	>30,000	0
Population Density	396	**<2,000**	2,000 - 4,000	4,000 - 5,000	>5,000	0
Tree Canopy	90%	**>80%**	50-80%	20-49%	<20%	0
Lack of Treatment or Flow Control Facilities	Undev.	[1]**SWMMWW**	[2]PSM	[2]PSM	No Ctrl	0
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	0%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	100%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	70-80%	<50%	50-70%	**70-80%**	>80%	2
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**14**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

6.6 - Salmon Creek (R.M. 14.66)

Basin Delineation and Receiving Water Identification

The Salmon Creek (R.M. 14.66) Sub-watershed is tributary to Salmon Creek and is primarily agricultural or residential land. The basin delineation is from Clark County GIS.

Receiving Water Conditions Assessment

Water quality concerns include low dissolved oxygen, pH, turbidity, and bacteria. Water quality impacts within this basin are primarily caused by agricultural farming. Future development is expected to be predominantly residential and will meet the current SWMMWW requirements.

Stormwater Management Influence Assessment

Recent large residential developments have been designed to current SWMMWW requirements. Existing large residential parcels pre-date stormwater requirements.

Relative Conditions and Contributions Assessment

Proposed protection and restoration goals for the Salmon Creek (R.M. 14.66) Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development within the sub-watershed. Approximately 16% of the basin lies within the City's UGA. Therefore, there are relatively more opportunities for protection and restoration beyond applying the current SWMMWW requirements. Wetland protection and buffer protection will be required as the basin develops. There may also be opportunities for restoration, especially along the existing golf course and in partnership with Clark County as the area develops. There is also the potential for a county park within the basin which will preserve existing tree canopy and provide a buffer along Salmon Creek.

Table 8: Salmon Creek (R.M. 14.66) Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	16.1%	<5%	5-10%	**10-25%**	>25%	2
Impervious Surface	52%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	52%	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	48%	<10%	10-20%	20-40%	**>40%**	3
Traffic Volume	18,011	<10,000	**10,000-20,000**	20,000-30,000	>30,000	1
Population Density	4,500	<2,000	2,000 - 4,000	**4,000 - 5,000**	>5,000	2
Tree Canopy	40%	>80%	50-80%	**20-49%**	<20%	2
Lack of Treatment or Flow Control Facilities	Varies	[1]SWMMWW	**[2]PSM**	[2]PSM	No Ctrl	1
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	10.1%	0-10%	**10-20%**	20-30%	>30%	1
Residential Areas	79%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	80%+	<50%	50-70%	70-80%	**>80%**	3
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**26**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

6.7 - Woodin Creek

Basin Delineation and Receiving Water Identification

The Woodin Creek Sub-watershed encompasses the core downtown area and areas from the northern city limits to the southern city limits. The basin delineation is from Clark County GIS.

Receiving Water Conditions Assessment

Water quality concerns include Ammonia-N, BOD (5-day), bacteria, bioassessment, E. Coli, fecal coliform, and temperature.

Water quality impacts within this basin are primarily caused by commercial and residential development before stormwater treatment and detention requirements were in place. Future development within this basin is expected to be both residential and commercial and will meet the current SWMMWW requirements. Development has occurred since before stormwater

requirements to the present. Development includes residential, light industrial, commercial, rural residential and agricultural.

Stormwater Management Influence Assessment

Because much of the basin developed without stormwater controls, there is also an opportunity to focus on adding treatment and flow control to areas within the basin that have limited or no treatment and flow control, especially within the downtown area.

Relative Conditions and Contributions Assessment

Water quality impacts within this basin are primarily caused by commercial and residential development before stormwater treatment and detention requirements were in place. Future development within this basin is expected to be both residential and commercial and will meet the current SWMMWW requirements.

Proposed protection and restoration goals for the Woodin Creek Sub-watershed include applying current stormwater treatment and flow control BMPs to all new development and re-development within the sub-watershed. Approximately 50% of the basin lies within the City's UGA, providing the greatest opportunities for protection and restoration. Wetland protection and buffer protection will be required as the basin develops. There may also be opportunities for restoration along Woodin Creek. The City has focused its efforts on restoration plantings and removal of invasives along Woodin Creek in recent years. There are opportunities to work with private property owners to continue removing invasive plants and there may be opportunities to provide residential incentives to provide additional flow control BMPs.

Table 9: Woodin Creek Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	50.1%	<5%	5-10%	10-25%	**>25%**	3
Impervious Surface	67%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	67%	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	33%	<10%	10-20%	**20-40%**	>40%	2
Traffic Volume	44,766	<10,000	10,000-20,000	20,000-30,000	**>30,000**	3
Population Density	5,500	<2,000	2,000 - 4,000	4,000 - 5,000	**>5,000**	3
Tree Canopy	10%	>80%	50-80%	20-49%	**<20%**	3
Lack of Treatment or Flow Control Facilities	Varies	[1]SWMMWW	[2]PSM	[2]PSM	**No Ctrl**	3
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	9.2%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	74.3%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	80%+	<50%	50-70%	70-80%	**>80%**	3
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**31**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

6.8 - Sub-watershed Prioritization Summary

Results of the sub-watershed prioritization are summarized in **Table 10**. The Woodin Creek Sub-watershed ranked as the highest priority basin within the City of Battle Ground. Catchments within the Woodin Creek Sub-watershed were ranked using the same criteria as the sub-watersheds.

Table 10: Sub-Watershed Ranking Summary

Sub-Watershed	Score	Rank
Woodin Creek	31	1
Mill Creek	29	2
Salmon Creek (R.M. 14.66)	26	3
East Fork Lewis River (R.M. 7.25)	24	4
Salmon Creek (R.M. 08.96)	23	5
Mill Creek East Fork	22	6
Morgan Creek	14	7

7 – CATCHMENT EVALUATIONS AND RANKING

Catchments within the Woodin Creek Sub-watershed, the highest priority sub-watershed, were evaluated using the same prioritization criteria developed to rank the sub-watershed basins. The highest priority catchment was used to develop the SMAP. The Woodin Creek Sub-watershed contains 23 catchments within the City of Battle Ground's UGA as mapped in Clark County's GIS. The catchments were combined to create 4 catchments approximately 0.6 to 1.3 square miles in area. The grouped catchments are generally of similar land use. These catchments are summarized and ranked below. These catchments were ranked using the same prioritization criteria used to rank the sub-watersheds. The Woodin Creek Catchments are shown in Figure 2.

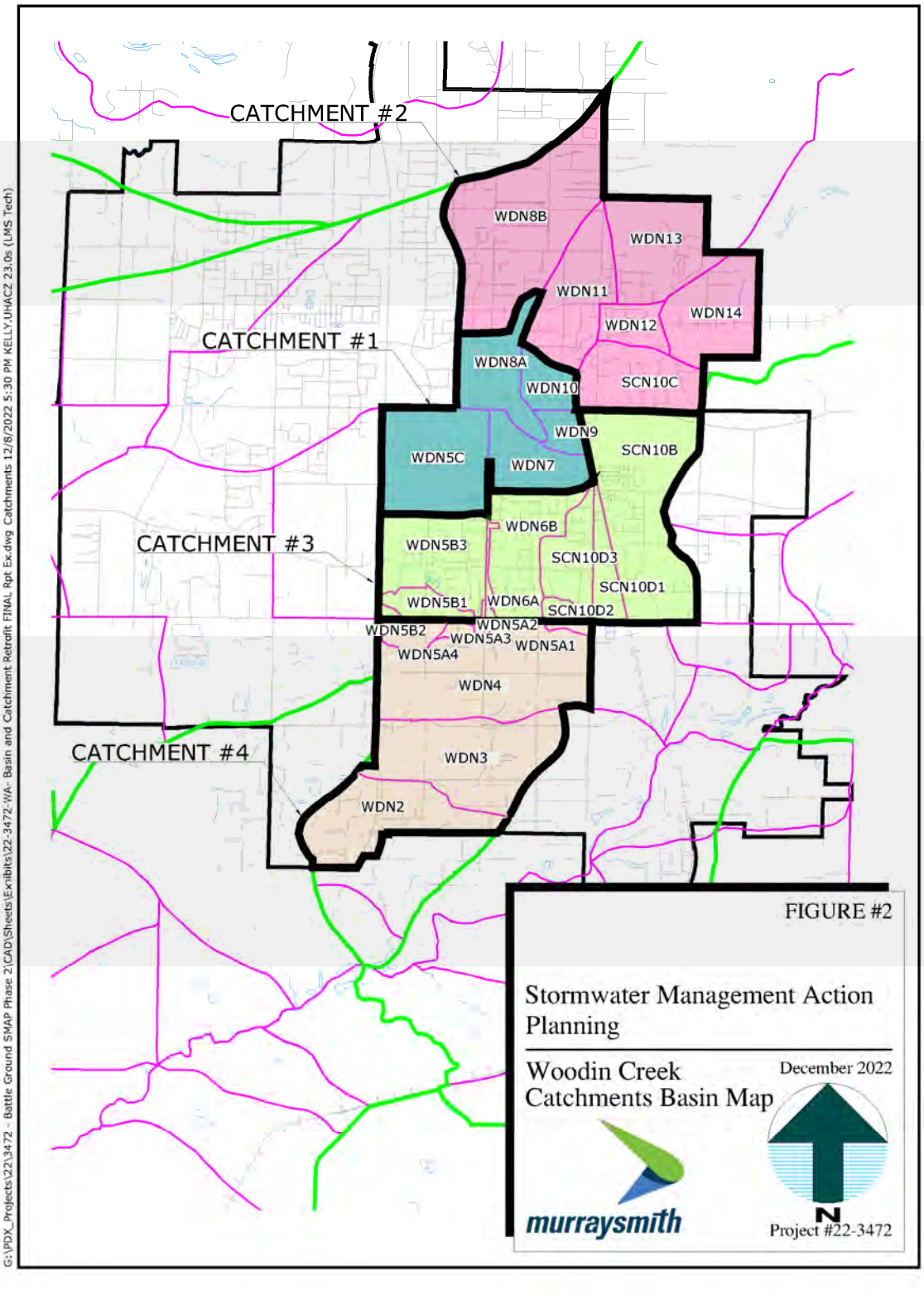


Figure 2: Woodin Creek Basin – Catchment Map

Catchment #1

Catchment #1 combines 5 catchments (WDN5C, WDN7, WDN8A, WDN9, and WND10) for a total area of 395 acres (0.6 square miles). This area encompasses the core downtown area between SR503 and the railroad tracks, north and south of Main Street. Most of this area developed before stormwater requirements. Prioritization scores are shown in **Table 11**.

Table 11: Woodin Creek Catchment #1 Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	100%	<5%	5-10%	10-25%	**>25%**	3
Impervious Surface	80%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	80%	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	20%	<10%	10-20%	**20-40%**	>40%	2
Traffic Volume	46,331	<10,000	10,000-20,000	20,000-30,000	**>30,000**	3
Population Density	5,000	<2,000	2,000 - 4,000	4,000 - 5,000	**>5,000**	3
Tree Canopy	5%	>80%	50-80%	20-49%	**<20%**	3
Lack of Treatment or Flow Control Facilities	PSM	[1]SWMMWW	[2]PSM	**[2]PSM**	No Ctrl	2
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	0%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	53%	0-20%	20-40%	**40-60%**	>60%	2
Environmental Justice	80%+	<50%	50-70%	70-80%	**>80%**	3
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**29**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

Catchment #2

Catchment #2 combines six catchments (WDN8B, WDN11, WDN12, WDN13, WDN14 and SCN10C) for a total area of 817 acres (1.3 square miles). This area is north and east of the downtown area. Much of this area developed before stormwater requirements. However, there has also been significant development under current stormwater regulations. Prioritization scores are shown in **Table 12**.

Table 12: Woodin Creek Catchment #2 Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	100%	<5%	5-10%	10-25%	**>25%**	3
Impervious Surface	56%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	56%	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	44%	<10%	10-20%	20-40%	**>40%**	3
Traffic Volume	27,881	<10,000	10,000-20,000	**20,000-30,000**	>30,000	2
Population Density	2,000-4,800	<2,000	2,000 - 4,000	**4,000 - 5,000**	>5,000	2
Tree Canopy	20%	>80%	50-80%	**20-49%**	<20%	2
Lack of Treatment or Flow Control Facilities	Varies	[1]SWMMWW	**[2]PSM**	[2]PSM	No Ctrl	1
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	0%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	97%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	70-80%	<50%	50-70%	**70-80%**	>80%	2
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**26**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

Catchment #3

Catchment #3 combines 8 catchments (WDN5B1, WDN5B3, WDN6A, SCN10B, SCN10D1, SCN10D2, and SCN10D3) for a total of 651 acres (1.0 square miles). This area is south of downtown. Much of the area developed under the Stormwater Management Manual for the Puget Sound Basin requirements. Prioritization scores are shown below in **Table 13**.

Table 13: Woodin Creek Catchment #3 Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	100%	<5%	5-10%	10-25%	**>25%**	3
Impervious Surface	74%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	74%	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	26%	<10%	10-20%	**20-40%**	>40%	2
Traffic Volume	41,895	<10,000	10,000-20,000	20,000-30,000	**>30,000**	3
Population Density	1,500	**<2,000**	2,000 - 4,000	4,000 - 5,000	>5,000	1
Tree Canopy	10%	>80%	50-80%	20-49%	**<20%**	3
Lack of Treatment or Flow Control Facilities	PSM	[1]SWMMWW	[2]PSM	**[2]PSM**	No Ctrl	2
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	30%	0-10%	10-20%	**20-30%**	>30%	2
Residential Areas	48%	0-20%	20-40%	**40-60%**	>60%	2
Environmental Justice	70-80%	<50%	50-70%	**70-80%**	>80%	2
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**28**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

Catchment #4

Catchment #4 combines 8 catchments (WDN2, WDN3, WDN4, WDN5A1, WDN5A2, WDN5A3, WDN5A4 and WDN5B2) for a total of 639 acres (1.0 square miles). This area is south of Eaton Blvd. Approximately half of the basin developed under the Stormwater Management Manual for the Puget Sound Basin and approximately half is undeveloped or developed as rural properties before stormwater requirements. Prioritization scores are shown below in **Table 14**.

Table 14: Woodin Creek Catchment #4 Prioritization Scores

Criteria	Rating					Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	100%	<5%	5-10%	10-25%	**>25%**	3
Impervious Surface	65%	<10%	10-15%	15-25%	**>25%**	3
Pollution Generating Impervious Surface	65%	<20%	20-35%	35-50%	**>50%**	3
Pollution Generating Pervious Surface	35%	<10%	10-20%	**20-40%**	>40%	2
Traffic Volume	51,179	<10,000	10,000-20,000	20,000-30,000	**>30,000**	3
Population Density	436	**<2,000**	2,000 - 4,000	4,000 - 5,000	>5,000	0
Tree Canopy	50%	>80%	**50-80%**	20-49%	<20%	1
Lack of Treatment or Flow Control Facilities	Undev.	[1]SWMMWW	**[2]PSM**	[2]PSM	No Ctrl	1
Agricultural Areas	0%	**0-20%**	20-40%	40-50%	>50%	0
Industrial Areas	6.5%	**0-10%**	10-20%	20-30%	>30%	0
Residential Areas	79.5%	0-20%	20-40%	40-60%	**>60%**	3
Environmental Justice	70-80%	<50%	50-70%	**70-80%**	>80%	2
WWHM Soil Type	SG3/SG4	SG1	SG1/SG2	**SG3/SG4**	SG5	2
Total						**23**

[1]Stormwater Management Manual for Western Washington
[2]Stormwater Management Manual for the Puget Sound Basin

Woodin Creek Catchment Ranking Summary

The catchments were prioritized according to the prioritization criteria presented in **Section 5**. Catchment #1 (the core downtown area) ranked as the highest priority catchment area. A summary of catchment scores and rankings are included in **Table 15**. This catchment will be used to develop the Stormwater Management Action Plan (SMAP) for the City of Battle Ground. Priority Catchment #1 is shown in **Figure 3.**

Table 15: Woodin Creek Catchment Ranking Summary

Catchment	Score	Rank
Catchment #1	29	1
Catchment #3	28	2
Catchment #2	26	3
Catchment #4	23	4

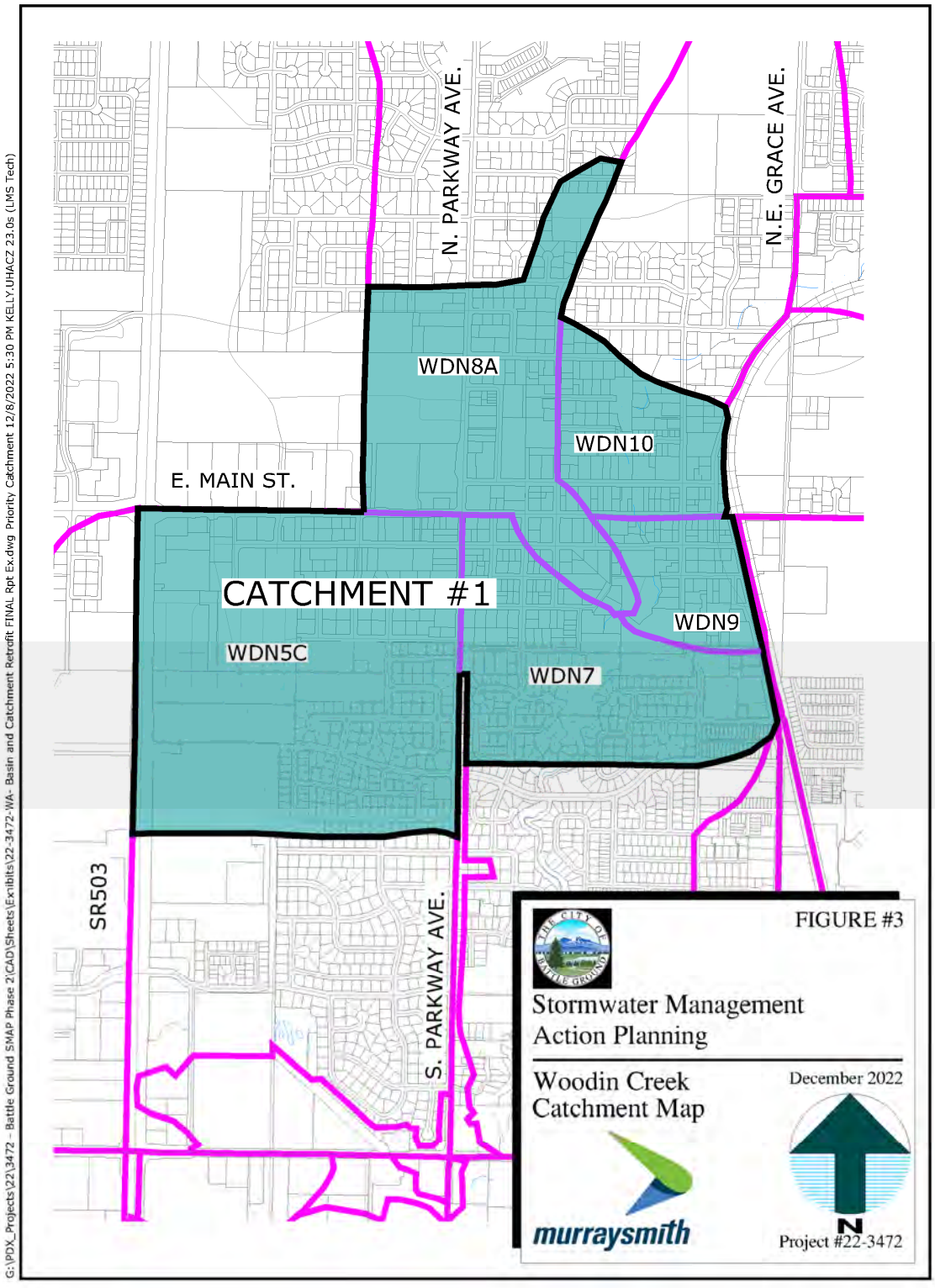


Figure 3: Priority Catchment #1 Map

The City of Battle Ground created outreach materials to provide the public and stakeholders an opportunity to comment for the prioritized catchment. Draft outreach materials are included in this document and will be provided to the Department of Ecology for review. The City created an online "StoryMap" to explain the process of creating the SMAP. The City collected and documented comments and feedback received from the public and stakeholders and responded to comments or addressed them during the SMAP development. The SMAP development schedule is shown in Figure 4.



Figure 4: City of Battle Ground SMAP Development Schedule

The SMAP development included investigation of retrofit opportunities and opportunities for regional facilities or expanded facilities in conjunction with capital projects. The City will review its Municipal Code and Zoning for opportunities to protect and conserve critical land areas and waterbodies.

The City inventoried business types within the priority catchment area, reviewed its Illicit Discharge, Detection and Elimination (IDDE) plan, Source Control Inspection Program, Operations and Maintenance Inspection Program, and summarized stormwater maintenance projects within the catchment. The City proposed an education and outreach behavior change program for a priority audience and subject within the catchment area.

The final phase of the SMAP developed an implementation schedule and potential funding sources for short-term (6-year) goals and long-term (20-year) goals and a plan to adaptively manage the SMAP.

Summary

The 2019 Stormwater Management Manual for Western Washington states the following:

> *"The engineered stormwater conveyance, treatment, and detention systems advocated by this and other stormwater manuals can reduce the impacts from development to water quality and hydrology. However, they cannot replicate the natural hydrologic functions of the natural watershed that existed before development, nor can they remove enough pollutants to replicate the water quality of pre-development conditions. Ecology understands that despite the application of appropriate practices and technologies identified in this manual, some degradation of urban and suburban receiving waters will continue, and some beneficial uses will continue to be impaired or lost due to new development. This is because land development, as practiced today, is incompatible with the achievement of sustainable ecosystems. Unless development methods are adopted that cause significantly less disruption of the hydrologic cycle, the cycle of new development followed by beneficial use impairments will continue."*

The City of Battle Ground will continue to follow the current SWMMWW. New and re-development will meet the requirements of the SWMMWW by implementing BMPs for stormwater treatment and detention. The City will also continue to meet the requirements of the Western Washington Phase II Municipal Stormwater Permit and the Clean Water Act. Therefore, water quality in local waterways will be protected and improved.

8- STORMWATER FACILITY RETROFITS

This investigation reviewed opportunities to retrofit existing stormwater infrastructure to identify projects and programs for implementation of the SMAP. Stormwater retrofits in areas that were developed prior to current stormwater standards often provide the greatest benefit, however they are also costly because of the established constraints, and difficult to implement because funding sources are often limited to utility rates that are established for maintenance. These constraints make it very challenging to bring older areas up to current standards. This is most challenging for flow control requirements that require more area for implementation and more hydraulic drop in the system than is typically available. Therefore, the focus of this investigation is on water quality improvements with additional detention provided where there is an opportunity to redesign or maintain existing detention facilities, or where pipes can be over-sized to provide storage.

In general, projects are prioritized in the following order:

- Maintenance or redesign of existing ponds.
- Replacement of traditional catch basins with water quality catch basins.
- New water quality bioretention facilities in the right-of-way or on city owner property.
- Retrofit of the existing conveyance system with over-sized pipes to provide additional flow control capacity.

Reviewing the city-wide system was beyond the scope of this effort. Therefore, projects were developed in a priority catchment within the priority sub-watershed. Projects further combined individual elements together (e.g. multiple catch basins within a street to streamline construction requirements and right-size the effort for implementation with available resources).

At the time of adoption of the Stormwater Management Action Plan (SMAP), a non-project SEPA review will be required as part of the legislative process. The stormwater retrofit projects and regional facilities identified in the SMAP will be assessed for SEPA exemption or whether a review is required at the time a project is selected for construction.

8.1 - Stormwater Facility Retrofit Summary

Existing public and private stormwater facilities in Woodin Creek Catchment #1 are summarized in Table 16.

Table 16 - Stormwater Facilities within Woodin Creek Priority Catchment Area #1

Public SW Facilities	Name	Notes
FV-168	N. Parkway Filter Vault	
DP-33	Quail Hollow Ph 4	Regrade/Remove sediment
DP-41	Battle Ground HS	Regrade/Remove sediment
DP-128	Copper Leaf	Regrade/Remove sediment
DP-194 (E and W)	City Hall	Regrade/Remove sediment
BS-UD 192	Quail Hollow Ph 1 (SW 6th Circle)	Underground detention, filled bioswale?
FV-173	SE 4th Street Filter CB	Maintain every two years
BS-186	SE 4th Street bioswale	Needs to be reconstructed or incorporated into new development
DP-195	BG Police Station	Regrade/Remove sediment
Private SW Facilities		
P-24	South Parkway Office Swale	
P-26	Opdahl Pond	
P-32	Jackson's Contech Filter Vault and OWS	
P-33	Community Travel Swale	
P-34	Park Place Bldg. Swale	
P-47	Clark Ave Apartments (SW)	
P-48	Clark Ave Apartments (NE)	
P-55	Katie's Walk Pond	
P-87	The Cottages Pond	
P-89	Wilco Pond	
P-91	Daybreak Gardens Apartments	
P-96	Mobile Home Park Pond	
P-104	Grace Townhomes	
P-108	Schuck's/O'Reilly Auto Parts	
P-109	12 S. Parkway Swale (Comm. Travel West)	

There are limited or no opportunities for expansion of existing public stormwater facilities in Catchment #1. Some facilities need maintenance to restore treatment and detention capacities to their design capacities. The City of Battle Ground has an ongoing stormwater facility maintenance and reconstruction program for major maintenance and reconstruction of older stormwater facilities. The City's ongoing private facility inspection program focuses on helping private facility owners maintain and restore their stormwater facilities.



DP-128 (Copper Leaf) pond needs to be rebuilt to remove trees and sediment to restore its detention capacity.

8.2 - Treatment Retrofit Summary

Much of Catchment #1 developed before stormwater requirements were in place. Several roadways in Catchment #1 are candidates for treatment retrofits including replacement of existing catch basins with filter catch basins or bioretention cells. Vacated right-of-way from the Grace Avenue re-alignment may be an opportunity for a regional stormwater treatment facility. Several parcels along Woodin Creek and Jewell Creek are also good candidates for regional facilities. However, implementation will require a willing seller and the project costs will increase due to the acquisition costs. Retrofit treatment options are summarized in **Table 17** and shown in **Figure 5**.

Table 17 - Treatment Retrofit Options

Keynote	Location	Options	Notes	Filter CB Est.	Bioretention Est.
1	W. Main Street (SR503 to Parkway)	Replace ex. CBs with filter CBs or bioretention	Approximately 20 CBs	$1,059,000	$3,311,000
2	E. Main Street (Parkway to Grace)	Replace ex. CBs with filter CBs or bioretention	Approximately 19 CBs	$1,070,000	$2,723,000
3	NE Grace Avenue (Main to NE 2nd St.)		5 CBs Will be reconstructed with Grace Avenue Ph II Project	$270,000	$756,000
4	NE Clark Ave (Main to NE 3rd Wy)	Replace ex. CBs with filter CBs or bioretention	3 CBs	$159,000	$490,000
5	SE Clark Ave (Main to SE 3rd Ave)	Replace ex. CBs with filter CBs or bioretention	5 CBs	$224,000	$474,000
6	NE 3rd Ave. (Main to NE 7th)	Replace ex. CBs with filter CBs or bioretention	13 CBs	$721,000	$1,767,000
7	SE 3rd Ave. (Main to SE 3rd St.)	Replace ex. CBs with filter CBs or bioretention	8 CBs	$552,000	$569,000
8	SW 6th Street (Parkway to SW 3rd Ave)	Replace ex. CBs with filter CBs or bioretention	11 CBs	$620,000	$937,000

Engineer's estimates are provided in **Appendix F**.

Some catch basins along E. Main Street are undersized or lack sumps and discharge directly into Woodin Creek.



Undersized catch basin at E. Main Street and NE Grace Avenue

Catch basins in other areas were placed in low lying gravel areas without curb and gutter.



SE Clark Avenue

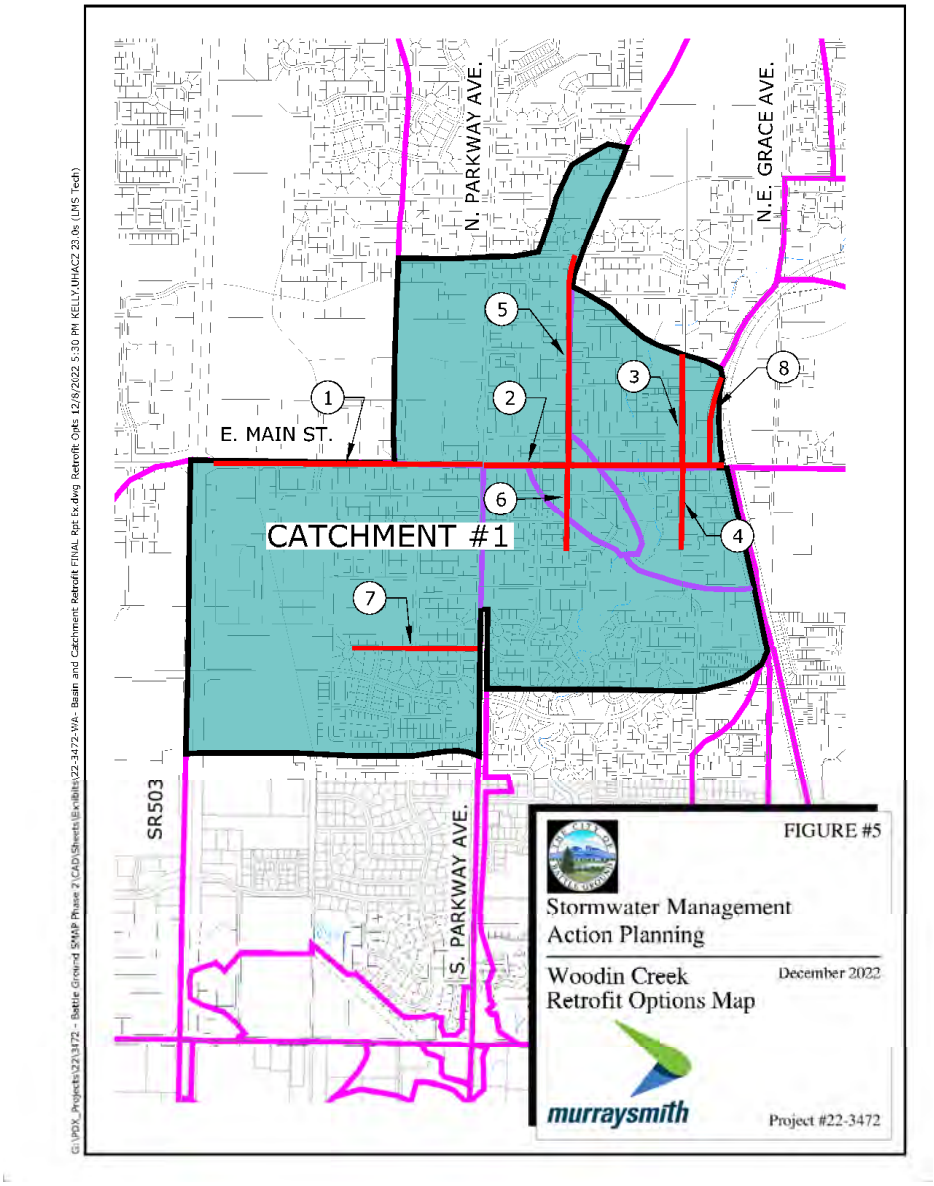


Figure 5 - Retrofit Options Map

8.3 - Detention Retrofit and Regional Facility Summary

Several vacant parcels in Catchment #1 may be candidates for regional detention facilities. These parcels are located near Woodin Creek and Jewell Creek in areas without stormwater treatment and detention facilities. These may be opportunities for regional facilities to provide treatment and/or detention to areas without stormwater controls. Locations are summarized in **Table 18** and shown in **Figure 6**.

Table 18 - Detention Retrofit Options

Keynote	Location	Options	Notes	Estimate
9	Grace/Main Intersection	Create regional facility in vacated ROW with Grace Ave Ph II re-alignment project		$1,299,000
10	403 SE 1st Street	Possible location for regional facility	0.5 acres at Jewell Creek pipe outlet	$1,369,000
11	503 SE 1st Street	Possible location for regional facility	1.33 acres near Woodin Creek and Jewell Creek pipe outlet	$2,961,000
12	101 NE 1st Street	Possible location for regional facility	Near Jewell Creek by-pass pipe	$1,887,000

Engineer's estimates are provided in **Appendix F**.

Regional facilities may be located near or along Woodin Creek to provide treatment and detention to areas lacking stormwater controls. As parcels become available, the City will evaluate the feasibility of providing a regional facility.



SE Grace Avenue south of E. Main Street. SE Grace Avenue will be realigned.



Vacant parcel near the confluence of Jewell Creek and Woodin Creek.

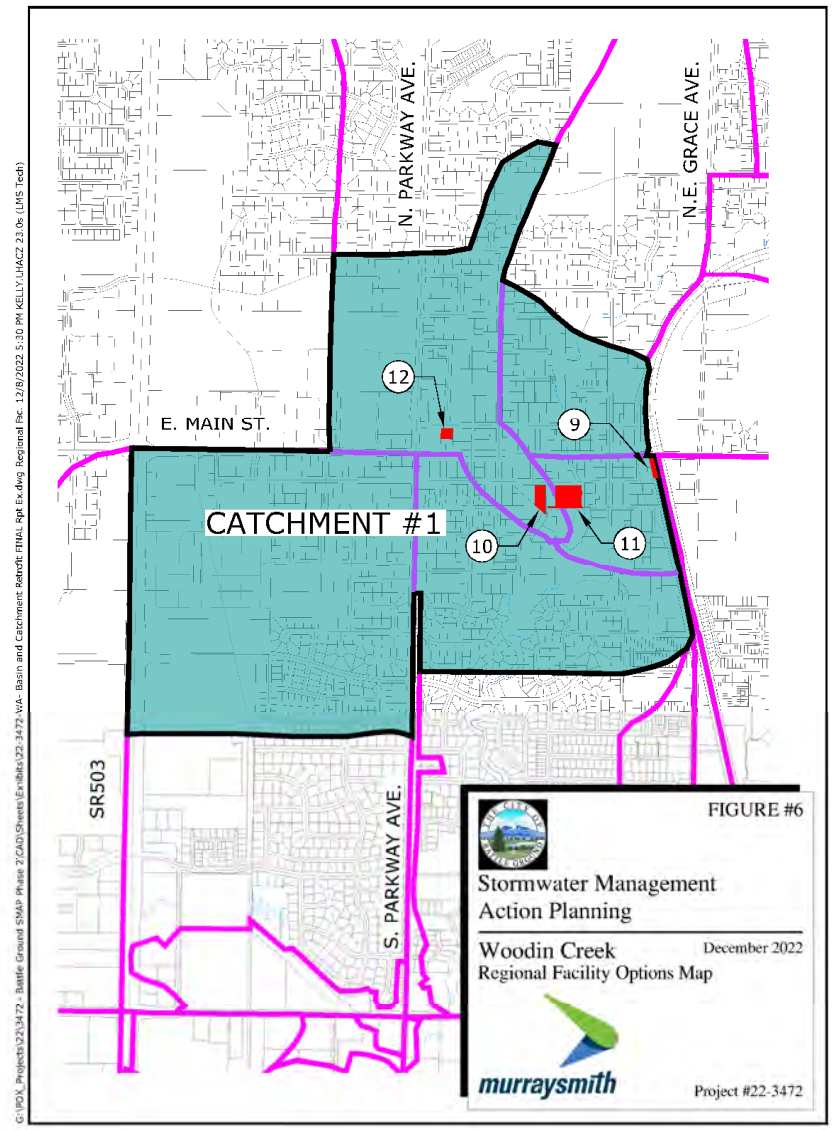


Figure 6 – Regional Facility Options Map

8.4 - Other Facility Options Summary

Additional opportunities to restore or enhance stormwater treatment and detention are summarized in **Table 19**.

Table 19 – Additional Opportunities

Location	Options	Notes
Hidden Glen Park	Detention Reconstruct Ex. Swale.	Currently undergoing restoration work and cannot be taken out of plan for 10 years.
Private parcels along Woodin Creek	Tree planting/canopy.	Possible incentives from City to enhance tree planting along Woodin Creek.
NW 5th Street (Parkway to SR503)	Detention, biofiltration, filter CBs beyond Minimum Requirements.	Opportunity to provide additional treatment or detention for surrounding areas lacking treatment and detention. Construction in 2023.
Parkway Estates Storm (SW-1) (SW 6th Street west of S. Parkway Ave.)	Provide oversized pipes for additional detention storage and filter CBs for treatment.	City of Battle Ground Stormwater Management Plan 2015-2035 (August 2015) Construction 2024
View Meadows Storm (CS-E) (NE 7th Street)	Provide oversized pipes for additional detention storage and filter CBs for treatment.	City of Battle Ground Stormwater Management Plan 2015-2035 (August 2015) Construction 2029
Nowak Addition Drainage (DA-141) (SE 1st Avenue, SE 2nd Avenue and SE 1st Street)	Provide filter CBs or biofiltration for treatment.	City of Battle Ground Stormwater Management Plan 2015-2035 (August 2015) Construction 2036

Summary

Catchment #1 of the Woodin Creek Sub-watershed is the highest priority catchment within the highest priority sub-watershed in the City of Battle Ground. This area includes the core downtown area from SR503 to Grace Avenue, north and south of Main Street. Much of this area developed before stormwater requirements were in place. Therefore, there are many opportunities for stormwater treatment retrofits and regional treatment and detention stormwater facilities.

9 - CRITICAL AREAS

The City has been responsive to evolving stormwater management requirements with code and guidance updates, such as design standards, design section, environmental protection area definitions, and buffer requirements. Therefore, existing development standards meet statewide goals. The City will continue to look for ways to protect and conserve lands from impervious surface conversions and native vegetation removal and to increase tree canopy.

Title 18 of the Battle Ground Municipal Code (BGMC) contains the requirements for Environmental Protection. *Section 18.270.080 Standards – Wetland activities* contains the requirements for activities within wetlands. *Section 18.270.090 Buffer requirements* contains the buffer widths for wetland categories and land use intensities.

Section 18.280.050 Buffer designations and widths includes minimum buffer widths for federal and state protected habitats in Battle Ground as shown in Table 20 below.

Table 20 – Buffer Widths

Critical Area	Buffer Width
Locally Significant Waterfowl or Shorebird Areas	Minimum 100 feet
Priority Habitats—Salmon Creek, East Fork of the Lewis River	250 feet
Locally Important Habitat	Buffers to be designated as habitat area during nomination process based on the needs of the habitat and species present.
Riparian Corridors along Woodin Creek	100-foot buffer, 50-foot undisturbed closest to creek, with 50-foot allowable uses such as trails
Other riparian corridors for waterways not listed above	50 feet
Critical Habitat for Federally Threatened and Endangered Fish and Wildlife Species	Subject to regulations established under Section 4(d) of the Endangered Species Act of 1973.
Oregon White Oak	None

Riparian corridors along Woodin Creek are 100-feet with the 50-feet closest to the creek undisturbed. Woodin Creek runs through the priority catchment.

The City of Battle Ground's Land Use Master Plan (June 2021) states that wetland buffer widths range from 300 feet to 50 feet depending on the wetland category and land use intensity. The East Fork Lewis River, Woodin Creek, Salmon Creek, and Morgan Creek are designated critical habitat for listed salmonid species. Stream Buffer Widths are 250' for Salmon Creek, 100' for Woodin Creek and 50' for other streams.

Chapter 6 – Environment of the City of Battle Ground's Comprehensive Plan 2015-2035 discusses the Endangered Species Act, Section 404 of the Clean Water Act, the Wellhead Protection Plan, the Critical Areas Ordinance and the Shorelines Master Program. The Critical Areas Ordinance has been updated in BGMC Sections 18.260 to 18.320.

Environmental Goals related to water quality and critical areas protection include the following:

Environment Goal 3:

The City will advance environmental education and stewardship.

Objectives

EO3.1 The City will explore a variety of environmental education opportunities.

EO3.2 The City will explore a variety of environmental stewardship opportunities.

Environment Goal 4:

The City will encourage protection, preservation and enhancement of Critical Areas within the city and its UGA.

Objectives

EO4.1 The City will identify Critical Areas as practical and necessary to assist with the development of a Critical Areas ordinance.

EO4.2 The City will strive to protect Critical Areas from further loss or degradation and to protect human safety and infrastructure investments.

EO4.3 The City will encourage the enhancement and protection of Critical Areas through appropriate development actions and the work of non-profits and community groups.

EO4.4 The City will explore ways to maximize permanent protection of Critical Areas.

EO4.5 The City will coordinate with other local jurisdictions, including Clark County and special districts to protect critical areas.

Environment Goal 6:

The City will enhance and protect water quality.

Objectives

EO6.1 The City will strive to reduce the quantity of stormwater runoff through improved development practices.

EO6.2 The City will work to treat stormwater on site if possible and in all cases treat to meet, at minimum, state requirements.

EO6.3 The City will work to reduce the impacts of construction on water quality and quantity, particularly related to erosion and sedimentation.

Environment Goal 7:

The City will work for the protection of endangered and threatened species.

Objectives

EO7.1 The City will work with NOAA Fisheries, U.S. Fish and Wildlife (USFWS) and other public agencies and non-profit organizations to identify how federal threatened and endangered species, and state species of concern and sensitive species can be protected.

EO7.2 The City will work to restore the habitat of endangered and threatened species to aid the recovery of the species.

Environmental goals of the Comprehensive Plan 2015-2035 include the following:

"Battle Ground is growing rapidly and will experience increasing pressure on its sensitive natural resources. The City will reduce impacts to sensitive natural resources by requiring land use and land division developments to be compatible with the environment."

"New code language will be required that balances avoidance, minimization, and/or mitigation of impacts caused by new development to sensitive natural resources with the need for continued economic development. The Critical Areas Ordinance (CAO) is the primary tool in preserving sensitive environmental areas, while balancing the rights of landowners to develop their property. These regulations are essential to preserving critical areas for current and future residents of Battle Ground. Other potential protection measures include conservation easements, public purchase or protection as part of an open space purchase."

The Environmental chapter of the Comprehensive Plan 2015-2035 is summarized as follows:

"Protection of critical areas must be balanced with the need for economic development. Critical area buffers and other limitations were established with the intent of minimizing the adverse effects that such protections would cause to Battle Ground's economic vitality. Although some potential types of development are limited in critical areas, other types may still be allowed that provide alternative investment opportunities. Protection can provide the quality of life and environment that promotes further development and investment in the Battle Ground community."

"The City has analyzed the degree to which new development will create pressure on sensitive natural resources during the coming years. The locations of critical wetlands, floodplains, and riparian corridor habitat were compared to the location of vacant and buildable land. It was found that approximately 13 percent of vacant land contains these critical areas, which must be developed in such a way that environmental impacts are avoided, minimized, and/or mitigated. These calculations do not include land that may be required for buffers to protect critical areas resources, nor do they include critical areas that have not been mapped. It is projected that critical

areas protections will have a minimal effect on economic development within the City, while preserving some of its finest resources."

Findings:

"Battle Ground has a wide variety of critical areas that require protection according to state and federal requirements. The City has mapped its critical areas as required by the state and has analyzed the needed protections for each. Implementations of these requirements will not only help the City preserve its natural heritage; it will also help to protect threatened and endangered species. The protection of critical areas within the City and its UGA has been balanced against the need for continued economic development and growth. An appropriate balance has been found between these two competing goals. In addition, the City will strive to protect its natural heritage through the implementation of goals found in other elements found within this Plan, including the Transportation, Parks and Recreation and Capital Facilities elements."

Chapter 8 of the Comprehensive Plan 2015-2035 (Park, Recreation & Open Space) lists four priority Conservation and Greenway Systems as follows:

- Woodin Creek and its associated flood plain
- Salmon Creek and its associated flood plain
- Tukes Mountain covering 120 acres of forested uplands and open fields
- DNR's Heisson Road ownership covering 120 acres of forest lands and open fields

Chapter 9 of the Comprehensive Plan 2015-2035 (Transportation) includes the following water quality related goals:

Transportation Goal 8:

A sustainable transportation system to minimize adverse environmental impacts and encourage environmentally appropriate design and practices.

Objectives

TO8.1 The City will strive to reduce the impacts of the transportation system on water quality and quantity.

TO8.2 The City will strive to reduce the impacts of the transportation system on wildlife and aquatic habitat.

9.1 - Protection

BGMC Section 18.280.050 Buffer designations and widths, requires a 100-foot riparian corridor along Woodin Creek with the 50 feet closest to the creek undisturbed. Woodin Creek crosses private properties from Hidden Glen Park at SE 5th Circle to the northwestern city limits. From SE 5th Circle to SE Eaton Blvd., the creek flows primarily on City property. South of SE Eaton Blvd., it flows on private property. The City owned parcels offer the greatest level of protection. Restoration plantings are in progress in the areas with minimal tree canopy coverage.

Zoning changes and restoration projects on parcels directly adjacent to Woodin Creek in the priority catchment area will have the most impact on water quality in Woodin Creek.

9.2 - Code Review and Updates

The City will continue to review its municipal code annually. As part of the Stormwater Management Action Planning process, the code sections in Table 21 will be reviewed relative to protection of the Woodin Creek corridor.

Table 21 – City of Battle Ground Municipal Code Sections

Code Section	Section Name	Subject to review
18.250	Stormwater Control and Drainage	Maintenance, Location of stormwater facilities
18.255	Erosion Control	Additional protection when working adjacent to Woodin Creek or its buffer.
18.257	Clearing and Grading	Setbacks and buffers
18.260	General Provisions	General approval criteria, Mitigation, Determination
18.270	Wetlands	Buffer widths, allowable uses inside buffer, buffer modifications
18.280	Fish and Wildlife Habitat Conservation Areas	Buffer designations and widths, reduction of habitat buffer widths

9.3 - Tree Canopy

The City currently has two restoration sites along Woodin Creek south of the downtown area. One at Hidden Glen Park and the other north of SE Rasmussen Blvd. The City is considering incentivizing tree planting on private properties along Woodin Creek to restore any gaps in the tree canopy. The City is investigating ways to ensure mature trees are protected during development via incentives and code updates.

9.4 - Coordination with Long-Range Planning

In accordance with Section S5.C1.b.i.(a) of the 2019 Western Washington Phase II Municipal Stormwater Permit, the City summarized its efforts to meet the requirements of the 2013-2019 NPDES Phase II Permit and coordinate with long-range plan updates (City of Battle Ground, S5.C1.b.i.(a) Coordination with long-range plan updates under the 2013-2019 NPDES Phase II Permit (March 2021)).

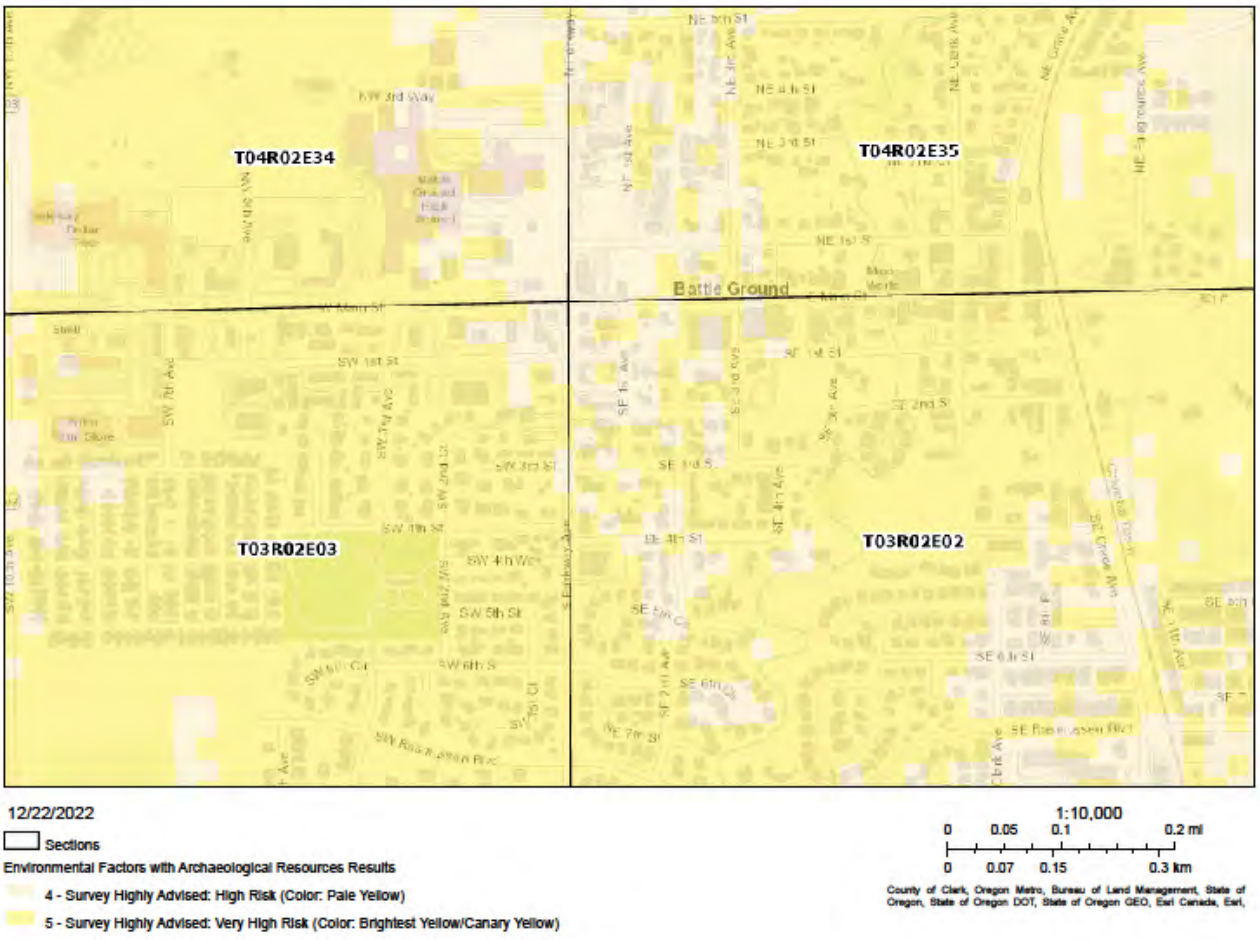
The City reviewed and updated its municipal code to make Low Impact Development (LID) Best Management Practices (BMPs) the preferred method of development. The City created LID checklists, and updated its standard details.

The City updated its Comprehensive Plan in 2016 and included protections for critical areas, and sensitive environmental resources; Open Space goals and Transportation goals to reduce environmental impacts from the transportation system.

The City will update its Comprehensive Plan again in 2023. The City is currently developing a Parks and Open Space Plan and a Greenways Plan to protect high quality wetlands. These plans will be coordinated with the goals of the City of Battle Ground Comprehensive Plan and the SMAP.

9.5 - Cultural Resources

Cultural resources will be protected by following the requirements from the Department of Archaeology and Historic Preservation (DAHP). The DAHP website classifies the project areas as High Risk or Very High Risk of survey factors with archaeological results as shown in **Figure 7** below.



Summary

Land management and development strategies to improve water quality include reducing or limiting impervious area, slowing runoff, and reducing pollutants. These can be accomplished by establishing development standards that preserve and protect critical resources and through watershed planning to restore critical resources by implementing stormwater retrofit projects or critical resources restoration projects. The City of Battle Ground reviewed and updated its Municipal Code and standard details in 2016 as part of the 2013 Western Washington Phase II Municipal Stormwater Permit requirement S5.C.4.f.i "to make Low Impact Development (LID) the preferred and commonly-used approach to site development."

Standard road sections were reviewed for narrow street sections to minimize new impervious area in new development.

10 – TARGETED, ENHANCED AND CUSTOMIZED IMPLEMENTATION

Targeted, enhanced, or customized implementation identifies where existing efforts can be focused to achieve greater system-wide benefits. For example, this provides the City with a program that will focus efforts on locations that are high-risk for illicit discharges that can be mitigated with simple Best Management Practices (BMPs) and minimal effort. It also ensures that the City's efforts in operations and maintenance of stormwater management facilities and implementation of source control measures, such as street sweeping, are applied effectively.

10.1 - Business Inventory

An inventory of businesses in Catchment #1 found the business types and quantities shown in Table 22 below.

Table 22 – Business Types

Business Type	Quantity
Commercial (Schools)	7
Commercial (Care Facilities)	1
Commercial (Restaurants/Food Establishments)	18
Commercial (Medical Offices)	10
Commercial (Auto Parts and Auto Repair Shops)	3
Commercial (General)	39
Commercial (Stores)	3
Commercial (Offices)	11
Commercial (Salon)	4
Commercial (Fueling)	2
Residential (Apartment Complexes)	Multiple
Light Industrial	4

The business type with the greatest potential for spills, illicit discharges or pollution generating activities are restaurants/food establishments due to the high number of them and frequent disposal of food and cleaning wastes. This business sector is a good candidate for Education and Outreach and a Behavior Change program. The City has investigated several incidents related to restaurants and illicit discharges within Catchment #1 in the past 5 to 10 years. Restaurants and food establishments will be a priority for source control inspections.

The Source Control Inspection Program begins in January 2023. All restaurants will be inspected within the City of Battle Ground. The priority audience for this behavior change program will be restaurant owners and staff and focused on Best Management Practices related to handling of Fats, Oils and Grease (FOG), dumpsters and compactors, and cleaning practices. This allows the City to extend the effort required to develop outreach materials to the entire City and not just Catchment #1. The initial inspection will establish current practices and note any deficiencies. During follow-up visits, City staff will provide education and outreach materials for BMPs related to FOG, dumpsters and compactors, and cleaning practices. Follow-up inspections will note corrections and behavior changes related to the initial deficiencies.

10.2 - IDDE Plan Update

In accordance with Section S5.C.5.d.i.(a) of the 2019 Western Washington Phase II Municipal Stormwater Permit, the City annually completes field screening on a minimum of 12% of the MS4, meaning that field screening in a given area is completed once every eight years. Because of the higher frequency of Illicit Discharges in Catchment #1 and the lack of stormwater controls, IDDE screening will be increased to once every two years within the priority catchment area. Source control tracing will be used to determine the source of any illicit discharges.

10.3 - Prioritized Source Control Inspection Plan

In accordance with Section S5.C.8 of the 2019 Western Washington Phase II Municipal Stormwater Permit, the City is currently developing a Source Control Inspection program and will begin inspections in January 2023. Due to the higher frequency of Illicit Discharges related to restaurants in Catchment #1, source control inspections of restaurants will be prioritized. Follow-up inspections will be conducted to verify that needed corrections are completed. The City will provide Education and Outreach materials related to Best Management Practices for handling and storing grease, hood and vent cleaning, dumpsters and trash compactors. Educational materials are included in Appendix G.



Wash water draining to catch basin.



Dumpster and trash on ground.



Dumpster with lid left open.

10.4 - Operations and Maintenance Inspection Program Plan

In accordance with Section S5.C.7.b.(b) of the 2019 Western Washington Phase II Municipal Stormwater Permit, the City annually inspects all private stormwater treatment and flow control BMPs that discharge to the MS4. The City conducts follow-up inspections to verify that required corrections are completed in a timely manner.

The City has a fully developed inspection and maintenance program and inspects City owned treatment and flow control BMPs annually. Ponds and swales are maintained 2 to 3 times per year. Stormwater filter BMPs are maintained every other year. Fifty percent of catch basins are inspected annually and cleaned when the sump is 60% full.

The City will implement a pipe cleaning program to video inspect 2,000 LF of pipe per year, and clean any pipes with accumulated sediment or debris, beginning with the priority catchment.

The City will maintain street sweeping frequency within priority catchment and other priority areas in accordance with the City's Enhanced Maintenance Plan.

Table 23 below is a list of public stormwater treatment and detention BMPs within Catchment #1 and maintenance needs. The City has an ongoing citywide maintenance program for major maintenance.

Table 23 – Public Stormwater Facilities

Public SW Facilities	Name	Notes	Estimate
FV-168	N. Parkway Filter Vault		N/A
DP-33	Quail Hollow Ph 4	Regrade/Remove sediment	$25,000
DP-41	Battle Ground HS	Regrade/Remove sediment	$10,000
DP-128	Copper Leaf	Regrade/Remove sediment, remove trees	$40,000
DP-194 (E and W)	City Hall	Regrade/Remove sediment	$10,000
FV-173	SE 4th Street Filter CB		N/A
BS-186	SE 4th Street bioswale	Needs to be reconstructed or incorporated into new development	N/A
DP-195	BG Police Station	Regrade/Remove sediment	$25,000

Summary

The City will implement enhanced or customized stormwater actions that improve water quality within the priority catchment area. These include increased street sweeping, prioritized source control inspections of restaurants, providing education and outreach materials to restaurants, pipe cleaning and stormwater facility inspections and maintenance in Catchment #1.

11 - IMPLEMENTATION SCHEDULE

The goal of the SMAP is to protect and improve water quality in Woodin Creek by focusing efforts on the highest priority catchment in the Woodin Creek Sub-watershed. If funding becomes available for a project that meets the needs of the SMAP, the funding and project will be considered. Stakeholders will be engaged, and risks and consequences will be evaluated before proceeding to the next phase. Implementation of the SMAP included short-term (less than six years) and long-term goals (six to twenty years).

The City of Battle Ground's Stormwater Management Action Plan Implementation Schedule is shown below in Table 24. The schedule covers short-term (<6 years) and long-term (6-20 years) goals. Tasks include but are not limited to inspections, education and outreach, street sweeping, storm pipe cleaning, code updates, comprehensive plan updates, maintenance and short- and long-term stormwater projects to improve water quality.

Table 24 - Stormwater Management Action Plan Implementation Schedule

Task	2023				2024				2025				2026				2027				2028				2029-2042			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Begin Source Control Inspections	■																											
Prioritize Restaurants for Source Control Inspections	■																											
Develop Education and Outreach Materials for Restaurants	■																											
Begin Education and Outreach to Restaurants					■																							
Conduct follow-up of Behavior Change									■				■															
Increased IDDE/Outfall Inspections			■				■				■				■				■				■				■	
Storm Line Cleaning							■				■				■				■				■				■	
Maintain Increase Street Sweeping per Enhanced Maintenance Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Conduct Stormwater Rate Study					■	■	■	■																				
Comprehensive Plan Update			■	■	■																							
Master Plan Update			■	■	■																							
Zoning Update			■	■	■																							
Parks Plan Update			■	■	■																							
Municipal Code Update		■				■				■				■				■				■				■		
Municipal Code Update to allow deferred treatment and detention in priority catchment						■																						
Bioretention or Filter CB Design												■	■								■	■	■	■				
W. Main Street (SR503 to Parkway) Replace ex. CBs with filter CBs or bioretention Approximately 20 CBs																										■	■	
E. Main Street (Parkway to Grace) Replace ex. CBs with filter CBs or bioretention Approximately 19 CBs														■	■													
NE Grace Avenue (Main to NE 2nd St.) 5 CBs will be reconstructed with Grace Avenue Ph II Project																										■	■	
NE Clark Ave (Main to NE 3rd Wy) Replace ex. CBs with filter CBs or bioretention 3 CBs																										■	■	
SE Clark Ave (Main to SE 3rd Ave) Replace ex. CBs with filter CBs or bioretention 5 CBs																										■	■	
NE 3rd Ave. (Main to NE 7th) Replace ex. CBs with filter CBs or bioretention 13 CBs																										■	■	

Task	2023				2024				2025				2026				2027				2028				2029-2042			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SE 3rd Ave. (Main to SE 3rd St.) Replace ex. CBs with filter CBs or bioretention 8 CBs																												
SW 6th Street (Parkway to SW 3rd Ave) Replace ex. CBs with filter CBs or bioretention 11 CBs																												
Apply for Grant Funding																												
Bioretention or Filter CB Construction																												
Site Investigation for Regional Facility																												
Purchase Property for Regional Facility																												
Construct Regional Facility																												
Stormwater Facility Rebuilds																												

11.1 - Short-term (6-year) Goals

Short-term goals include the following:

- Catch basin retrofits (Filter catch basins)
- Rebuild DP-128 (Copper Leaf Pond)
- Storm line cleaning
- Maintain street sweeping in accordance with the City's Enhanced Maintenance Plan
- Regional Facility
    - SE Eaton Blvd/Railroad Tracks Regional Facility

11.2 - Long-term (20-year) Goals

Long-term goals include the following:

- Regional Facility(ies)
    - Others if parcels become available
- Catch basin retrofits (Filter catch basins or bioretention)

11.3 - Budget/Estimates

Budget estimates include the following:

- Facility Design
- Land Acquisition
- Permit Fees
- Installation
- O&M
- Staff Time
- Monitoring and Analysis
- Administrative Support

12 - FUNDING SOURCES

Grants and rate increases will likely be the best options for funding the new projects. Projects can also be incorporated into Capital Improvement Projects (funded from debt financing, grant funds, impact fees and dedicated operating revenues). Information regarding Washington State Department of Ecology grants and loan programs is included below.

12.1 - Grants and Loans

Grant and loan opportunities are summarized at the link below:

https://ecology.wa.gov/About-us/Payments-contracts-grants/Grants-loans/Find-a-grant-or-loan/Water-Quality-grants-and-loans

12.2 - Water Quality Combined Funding program

The Water Quality Combined Funding program is the annual single-application process to apply for funding from multiple sources all at once, for eligible projects that benefit water quality.

The current funding cycle (**State Fiscal Year 2024**) was open Aug. 9, 2022 - Oct. 12, 2022. Information is available on the Water Quality Combined funding cycles page.

12.3 - Funding sources of the Water Quality Combined Funding Program

Clean Water Act Section 319 federal grants

The U.S. Environmental Protection Agency (EPA) provides grants to Washington under Section 319 of the federal Clean Water Act. The state is required to provide a 40 percent match in funding. The Section 319 grant program offers funding to eligible nonpoint source pollution control projects, similar to the state Centennial Clean Water Program.

Centennial Clean Water Program grants

To improve and protect water quality, the state Centennial Clean Water Program provides grants for water quality infrastructure and nonpoint source pollution projects. Eligible infrastructure projects are limited to wastewater treatment construction projects for financially distressed communities. Eligible nonpoint projects include stream restoration and buffers, on-site septic repair and replacement, education and outreach, and other eligible nonpoint activities.

Clean Water State Revolving Fund loans

Provided by the federal Clean Water Act (CWA), the Clean Water State Revolving Fund (CWSRF) program is funded through an annual EPA capitalization grant, state matching funds, and principal and interest repayments on past program loans. The CWSRF program provides low-interest and forgivable principal loan funding for wastewater treatment construction projects, eligible nonpoint source pollution control projects, and eligible "green" projects.

The CWSRF includes limited funding for some emergencies. Emergency funding is only available to public bodies serving a population of 10,000 or fewer people and projects where a local emergency has been declared. Information on the program is available in the CWSRF Emergency Funding Program Guidelines or by contacting Daniel Thompson.

Stormwater Financial Assistance Program grants

The Stormwater Financial Assistance Program (SFAP) is designed to fund stormwater projects and activities that have proven effective at reducing impacts from existing infrastructure and

development and enhance existing stormwater programs. Stormwater facility projects and a limited set of stormwater activities project types are eligible for SFAP funding.

Stormwater Capacity Grants are another funding source when the Department of Ecology can provide funding.

Re-development may provide opportunities to incorporate additional treatment and/or detention into new projects.

13 - ADAPTIVE MANAGEMENT

Adaptive Management is a continual and systematic process of improving and adapting management policies and practices based on the outcomes of previous policies and practices. As seen in Figure 8 below, the process continually evolves based on the results of the previous element. The process identifies the problem, specifies objectives, identifies alternatives, specifies assumptions, evaluates consequences, uncertainties, and risk tolerance. The process evaluates future impacts and constraints and engages stakeholders. Then, the process starts over based on the outcome of the previous phase.

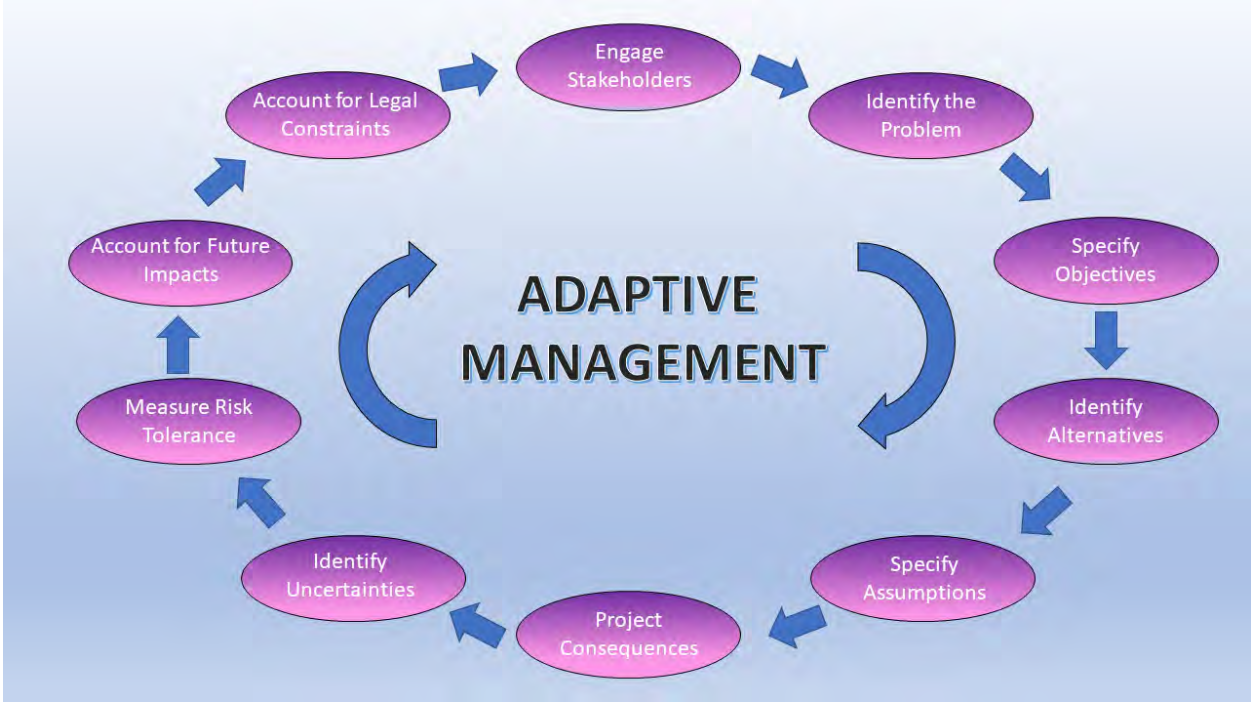


Figure 8: Adaptive Management

Adaptive Management will be applied to the City of Battle Ground's SMAP by evaluating projects and available funding. The goal of the SMAP is to protect and improve water quality in Woodin Creek by focusing efforts on the highest priority catchment in the Woodin Creek Sub-watershed. If funding becomes available for a project that meets the needs of the SMAP, the funding and

project will be considered. Stakeholders will be engaged, and risks and consequences will be evaluated before proceeding to the next phase. By continuously evaluating the results of each phase and how they impact the next phase, the SMAP can be adaptively managed to produce the most efficient ways to protect and improve water quality.

Table 25, Adaptive Management Criteria and Feedback, below, lists tasks, evaluation criteria, goals and feedback loop questions to consider throughout the implementation of the SMAP. This will provide flexibility to evaluate and adapt to meet the goals of the SMAP.

Table 25, Adaptive Management Criteria and Feedback

Stakeholders			
City of Battle Ground			
Downtown business owners			
Citizens			
Objective - Improve Water Quality	**Evaluation Criteria**	**Goal**	**Feedback Loop**
Add Treatment			
Filter Catch Basins	Number of Filter CBs installed	Replace 10 CBs/year	Were Filter CBs installed? How many? If not, why? What can make them more feasible? Should project priority be revised?
Bioretention alternative	Number of Bioretention Facilities installed		Is bioretention the preferred alternative? Were Bioretention Cells installed? How many? If not, why? What can make them more feasible?
Maintenance			
Maintain Street Sweeping in accordance with the City's Enhanced Maintenance Plan	Number of miles swept	Sweep priority areas 1 and 2 bi-weekly and priority areas 3 and 4 monthly (COBG Enhanced Maintenance Plan, April 2021)	What streets should be prioritized for increased sweeping? Did swept miles increase? How many miles? If not, why? What can be done to increase swept miles?

Objective - Improve Water Quality			Evaluation Criteria	Goal	Feedback Loop
		Pipe Cleaning	Linear feet of pipe cleaned	Clean 2,000 LF of storm pipe/year	Were storm pipes cleaned? How many feet? If not, why? What can make pipe cleaning more feasible?
		Rebuild Stormwater Facilities	Number of facilities rebuilt	Rebuild one facility/year	How many facilities were rebuilt? If none, why? What can be done to make rebuilds more feasible? Should the priority list be revised?
	Detention				
		Regional Facility	Number of new regional facilities	Construct one facility within 10 years	Was a regional facility constructed? If not, why? What can be done to make a regional facility feasible? Is property available? Where? How will it be funded?
	Source Control				
		Focused business inspections	Number of businesses inspected	Inspect all restaurants in 1st quarter and follow up as needed	What is the highest priority business type? Restaurants?
	Erosion and Sediment Control				
			2019 Stormwater Management Manual for Western Washington, Vol. II	Meets requirements of Construction General Permit	Weekly erosion control inspection results.

Objective - Improve Water Quality			Evaluation Criteria	Goal	Feedback Loop
Invasive Species Management					
				Remove invasive plant species on public property and in cooperation with private property owners on private property.	Field observations

Objective - Improve Water Quality	Evaluation Criteria	Goal	Feedback Loop
Dissolved Oxygen			
Woodin Creek Dissolved Oxygen	Salmon Creek TMDL	Meets criteria for salmon survival	Quarterly monitoring results.
Temperature			
Woodin Creek Temperature	Salmon Creek TMDL	Meets criteria for salmonid survival	Quarterly monitoring results.
Education and Outreach (Restaurants)			
Grease Storage	Number of restaurants provided educational materials	Provide educational materials to all restaurants by June 30, 2023	Source control inspection results.
Grease Traps	Number of restaurants provided educational materials	Provide educational materials to all restaurants by June 30, 2023	Source control inspection results.
Grease Interceptors	Number of restaurants provided educational materials	Provide educational materials to all restaurants by June 30, 2023	Source control inspection results.
Hood Vent Cleaning	Number of restaurants provided educational materials	Provide educational materials to all restaurants by June 30, 2023	Source control inspection results.

Objective - Improve Water Quality			Evaluation Criteria	Goal	Feedback Loop
		Dumpsters	Number of restaurants provided educational materials	Provide educational materials to all restaurants by June 30, 2023	Source control inspection results.
		Trash Compactors	Number of restaurants provided educational materials	Provide educational materials to all restaurants by June 30, 2023	Source control inspection results.
		Behavior Change Program	Follow up - How many improved behaviors?	Reduction in Illicit Discharges. Increase in implementation of BMPs.	Source control inspection results.

Summary

The City of Battle Ground SMAP will be implemented over 20 years, with short- and long-term goals. Funding will primarily come from grants and stormwater fees. Rate adjustments may be necessary to fund the projects with a rate study occurring in 2024. Others will be addressed with normal maintenance or planned capital improvement projects.

The SMAP will be adaptively managed to address changing conditions and available funding, with the goal of improving water quality in Woodin Creek.

References

City of Battle Ground, Land Use Master Plan (June 2021)

City of Battle Ground, Shoreline Master Program Periodic Review (February 2021)

City of Battle Ground, Comprehensive Plan 2015-2035 (June 27, 2016)

City of Battle Ground, NPDES Annual Report (March 2017)

City of Battle Ground, Stormwater Management Action Plan – Phase 1, Watershed Assessment Memorandum (Murraysmith, April 2022)

Southwest Washington Regional Transportation Council (RTC) (2022) NE 219th St. / SR-503 Traffic Counts https://www.rtc.wa.gov/data/traffic/intersection.asp?id=320

State of Washington, Department of Ecology, Stormwater Management Manual for the Puget Sound Basin (1992)

State of Washington, Department of Ecology, Stormwater Management Action Planning Guidance – Phase I and Western Washington Phase II Municipal Stormwater Permits (2019)

State of Washington, Department of Ecology, Fact Sheet for the Phase I, Western Washington Phase II, and Eastern Washington Phase II Municipal Stormwater Permits (2018)

Washington State Department of Ecology, East Fork Lewis River Watershed, Bacteria and Temperature Source Assessment Report (May 2018)

Washington State Department of Ecology, Salmon Creek Temperature Total Maximum Daily Load, Water Quality Improvement Report and Implementation Plan (October 2011)

State of Washington, Department of Ecology, Stormwater Management Action Planning Guidance – Phase I and Western Washington Phase II Municipal Stormwater Permits (2019)

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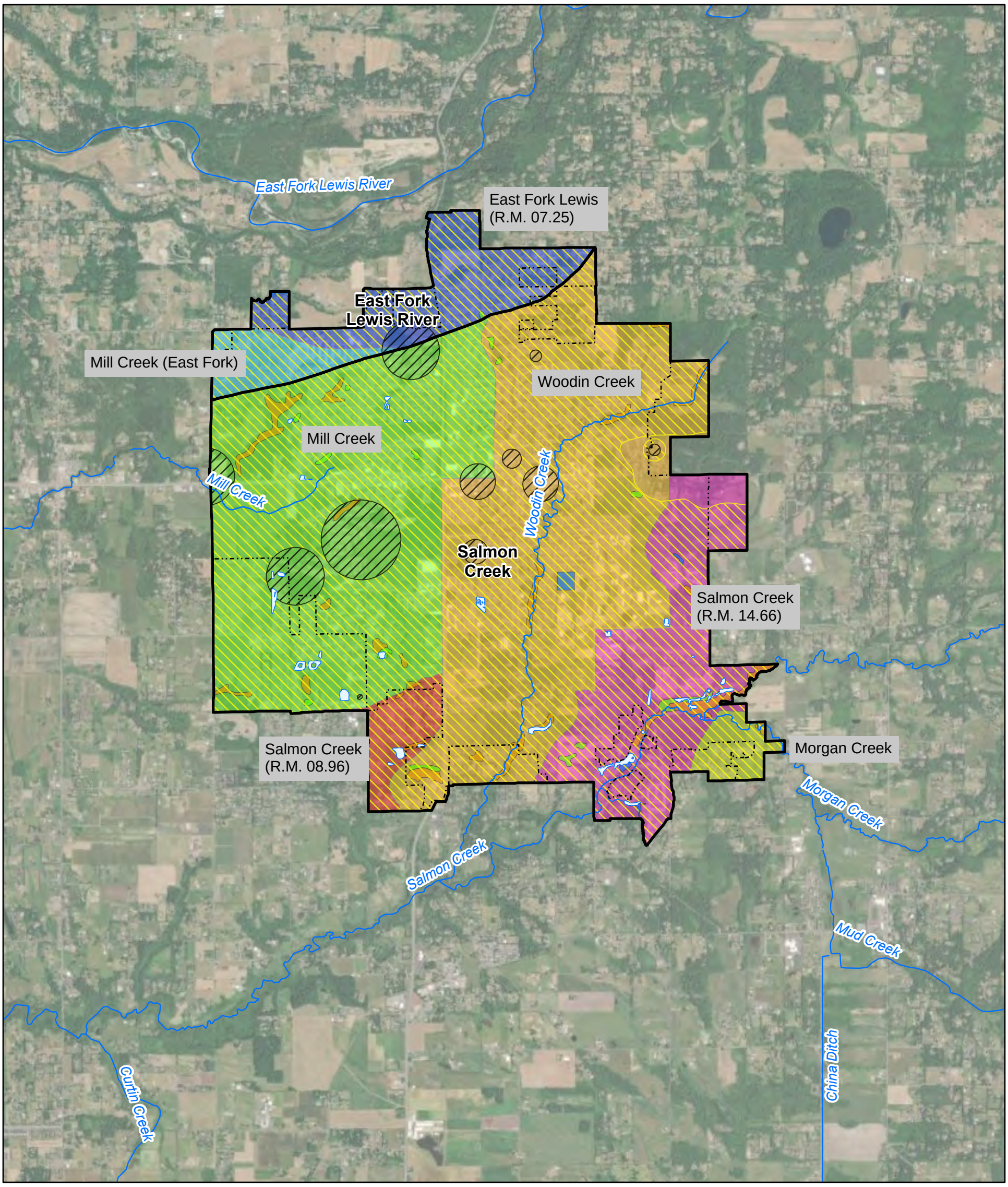
State of Washington, Department of Ecology, Western Washington Phase II Municipal Stormwater Permit (2019)

Washington State Department of Commerce, Building Cities in the Rain – Watershed Prioritization for Stormwater Retrofits (2016)

APPENDIX A

BASIN AND CITY LIMITS MAPS

Battle Ground Sub-watersheds



2/16/2022

- Watershed Boundary
- Battle Ground City Limits
- Battle Ground Urban Growth Area (UGA)
- Waterbody
- Major Stream

Aquifer

- Category 1 Recharge Areas
- Category 2 Recharge Areas

Wetland (NWI)

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

Subwatershed

- East Fork Lewis (r.m. 07.25)
- Mill Creek
- Mill Creek (East Fork)
- Morgan Creek
- Salmon Creek (r.m. 08.96)
- Salmon Creek (r.m. 14.66)
- Woodin Creek

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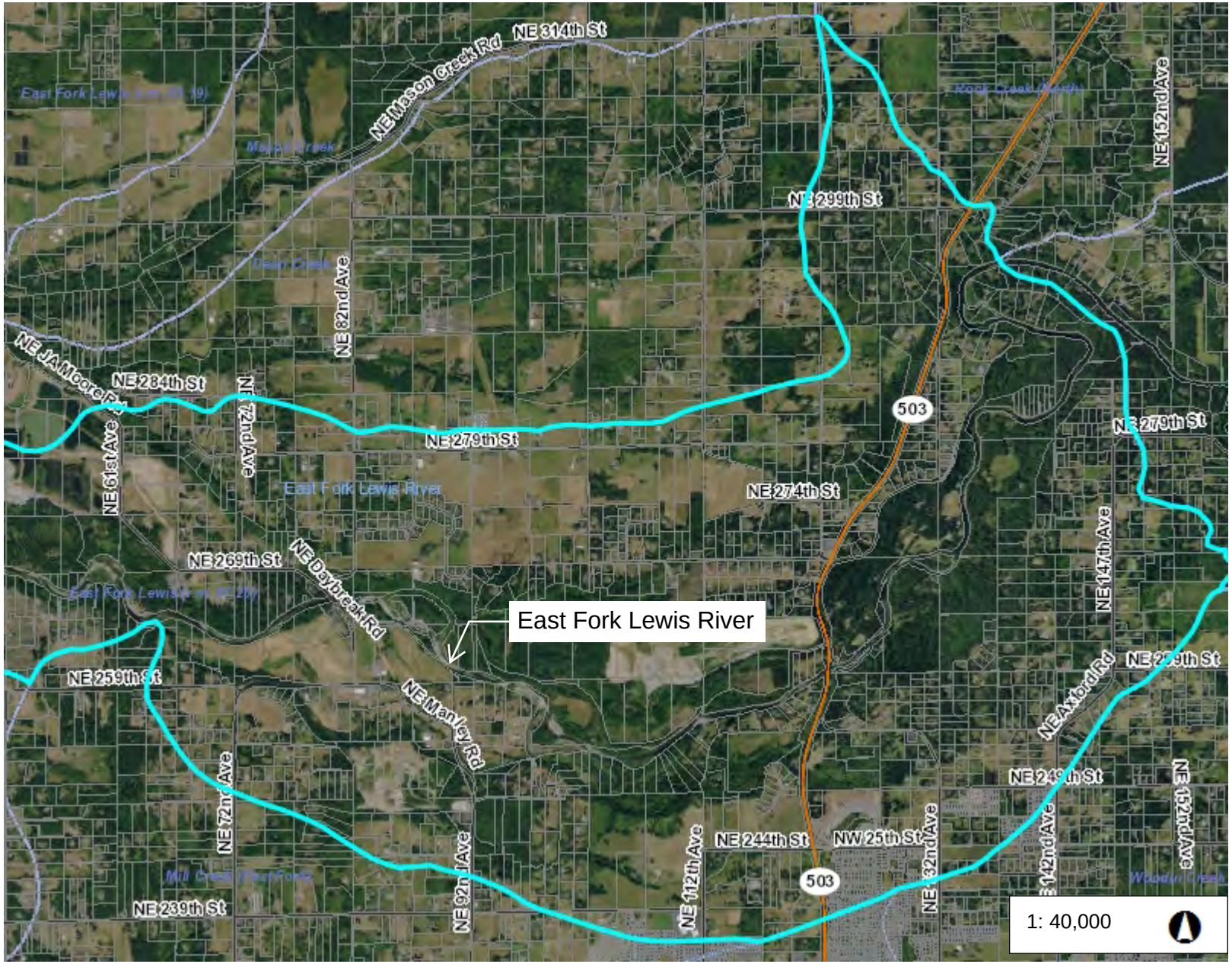
0 0.47 0.95 1.9 mi

0 0.75 1.5 3 km

Earthstar Geographics

Exhibit A-1

East Fork Lewis River Sub-watershed Basin Map





Legend

- Taxlots
- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

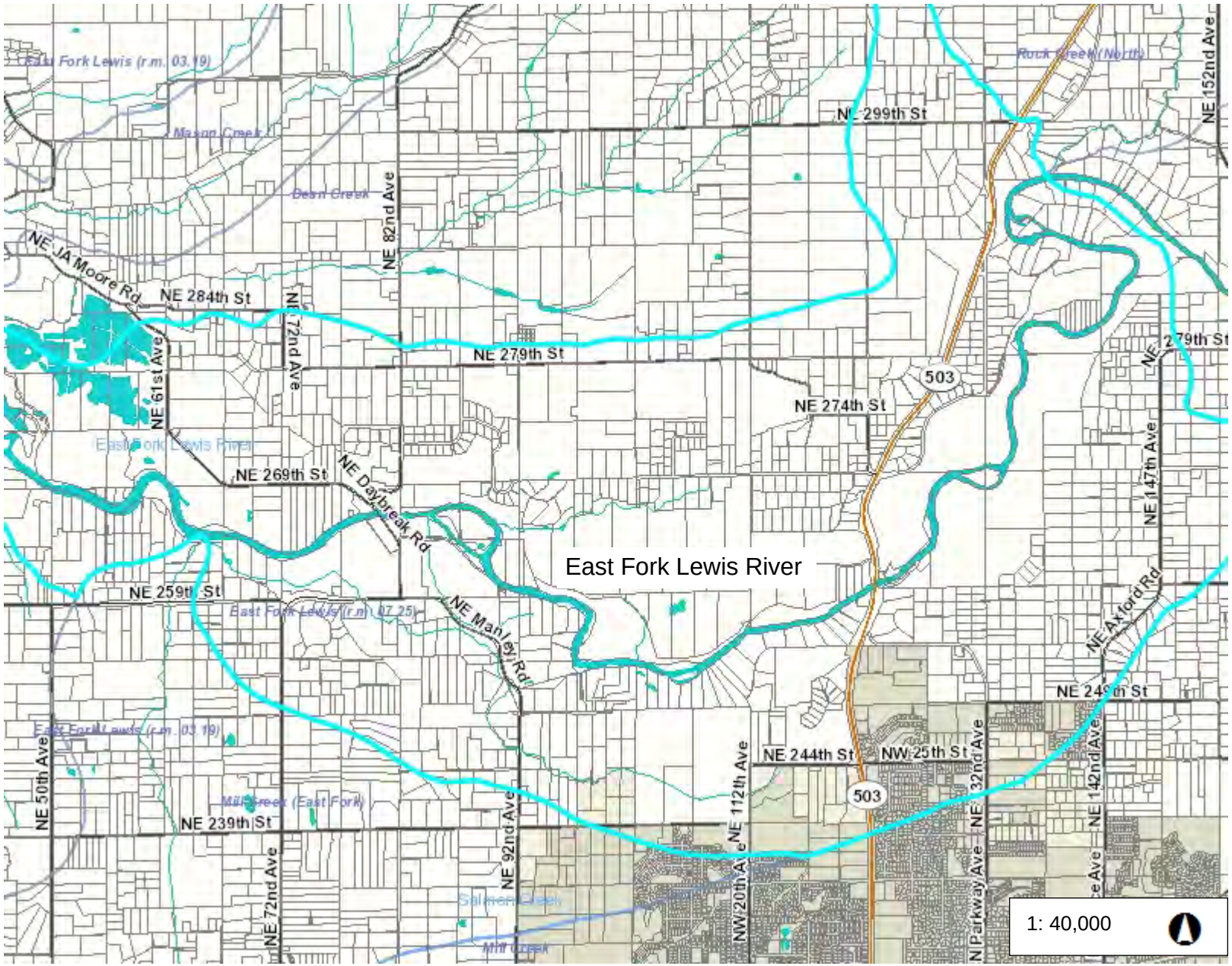
Exhibit A-2

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Clark County, WA. GIS - http://gis.clark.wa.gov

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East Fork Lewis River Sub-watershed Basin Map





Legend

- Taxlots
- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

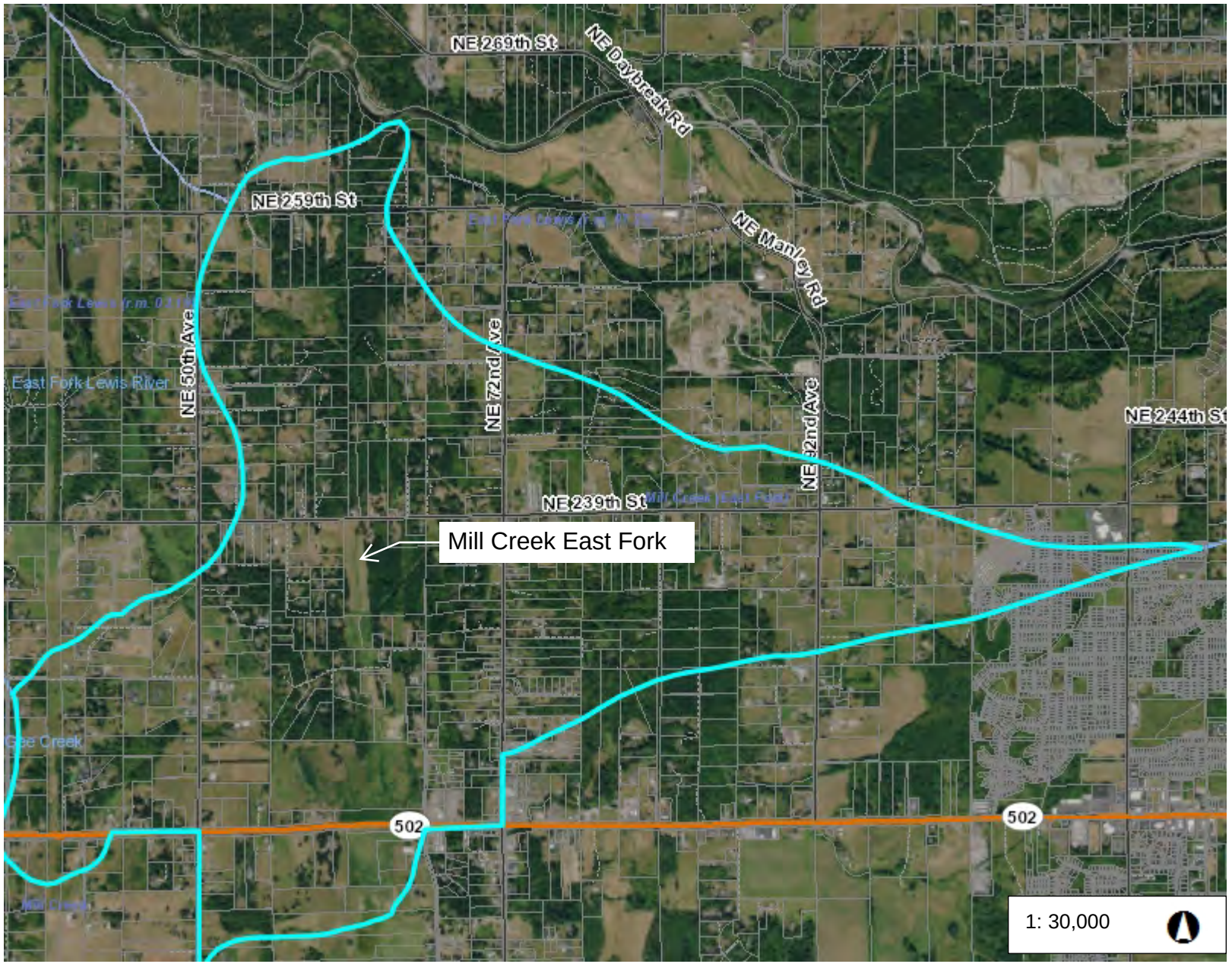
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Mill Creek East Fork Sub-watershed Basin Map





Legend

- Taxlots
- Watershed
- Sub-Watershed
- All Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
  - Minor Collector
  - Forest Collector
  - Private or Other
- Cities Boundaries
- Urban Growth Boundaries

Notes:

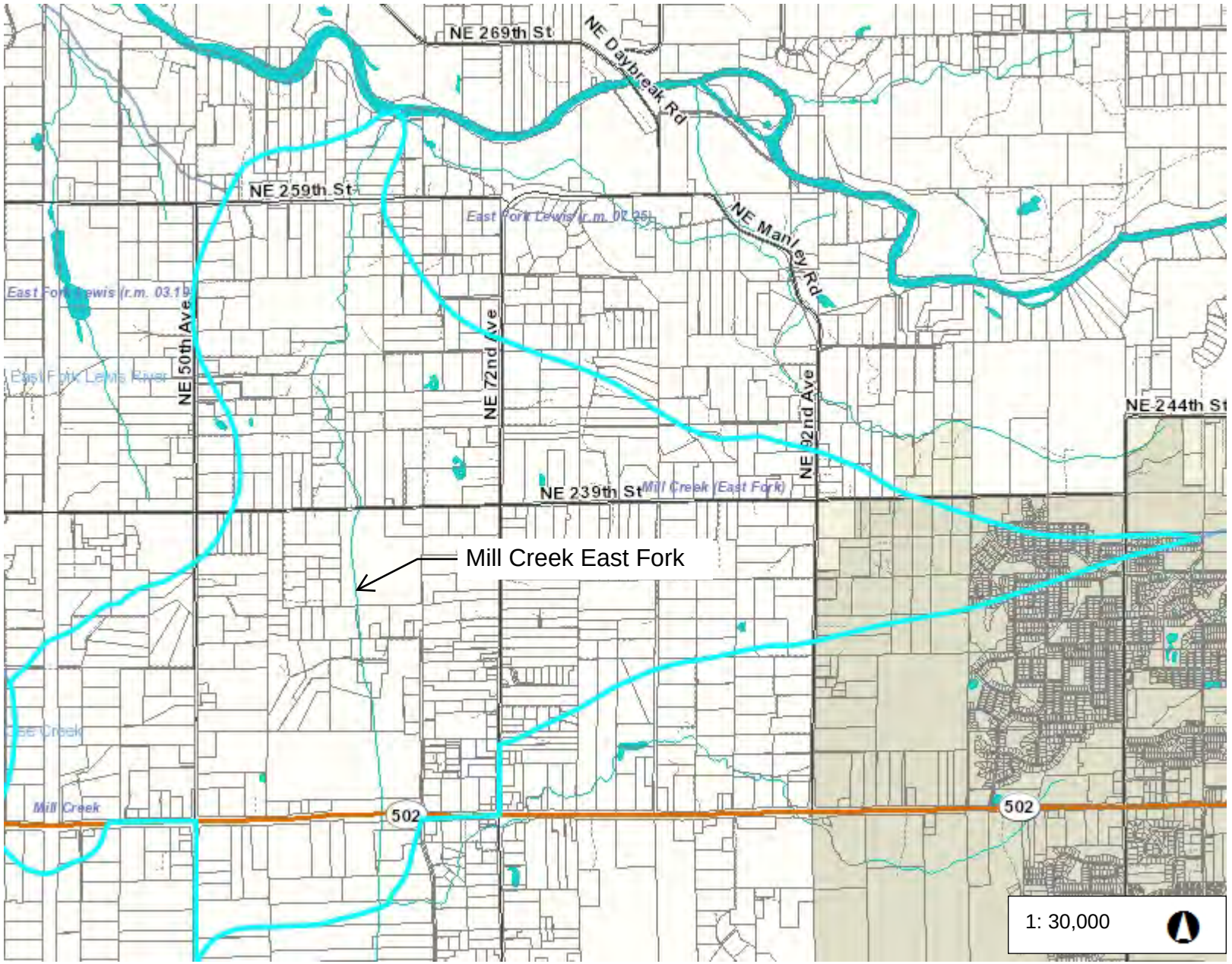
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Mill Creek East Fork Sub-watershed Basin Map





Legend

- Taxlots
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- All Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
  - Minor Collector
  - Forest Collector
  - Private or Other
- Cities Boundaries
- Urban Growth Boundaries

Notes:

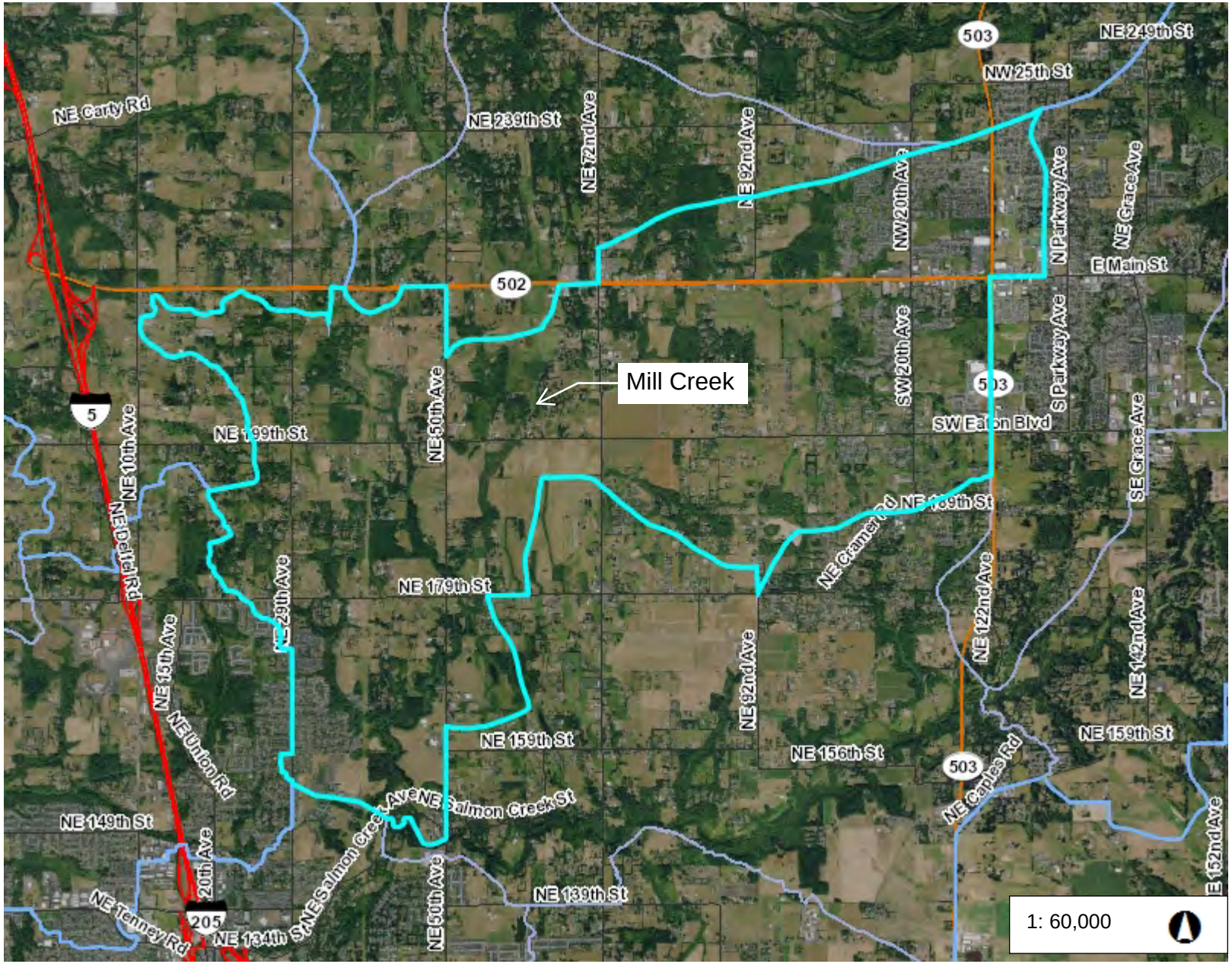
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Mill Creek Sub-watershed Basin Map





Legend

- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

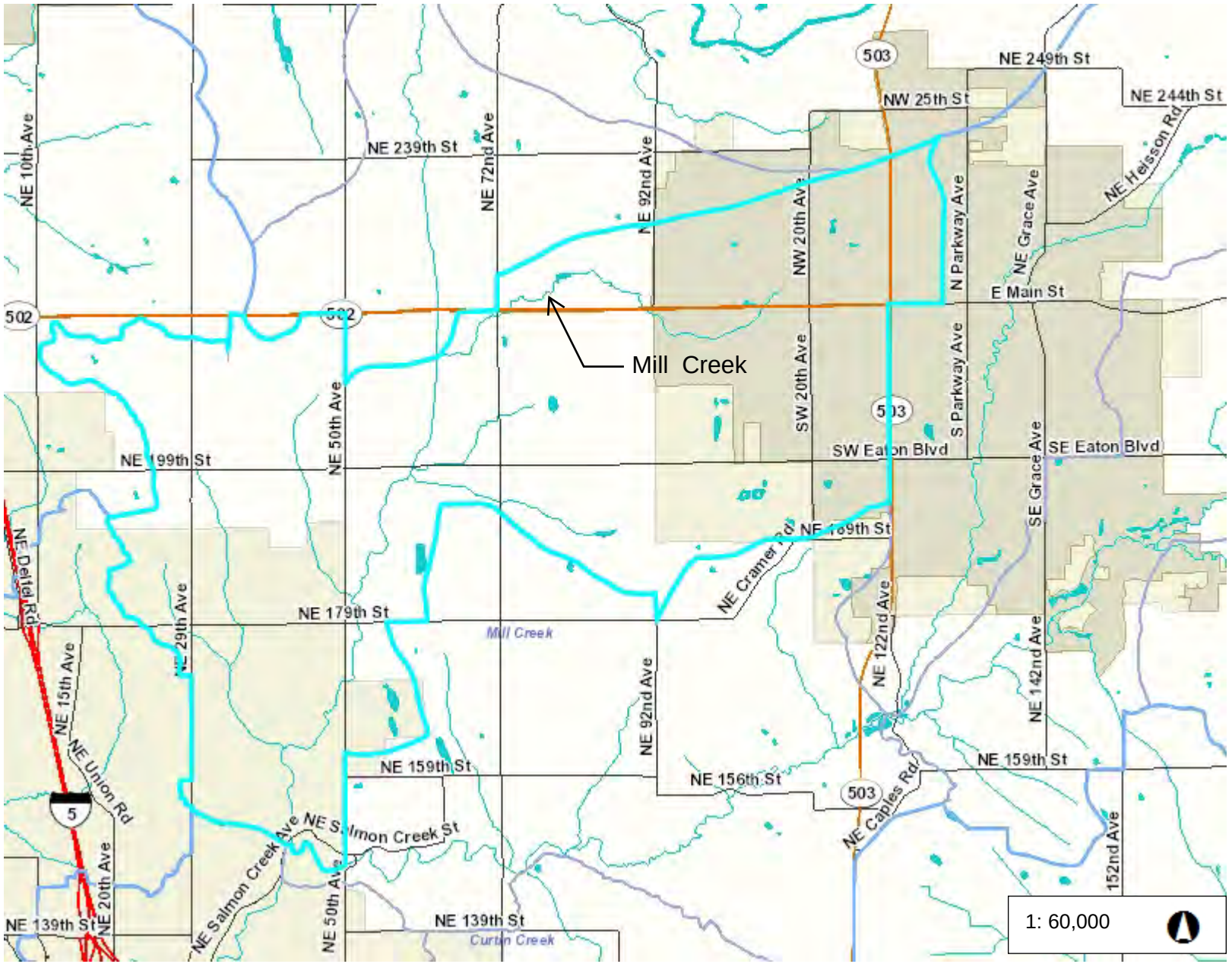
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Mill Creek Sub-watershed Basin Map





Legend

- Watershed
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- Major Roads
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  - State Route
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- Urban Growth Boundaries

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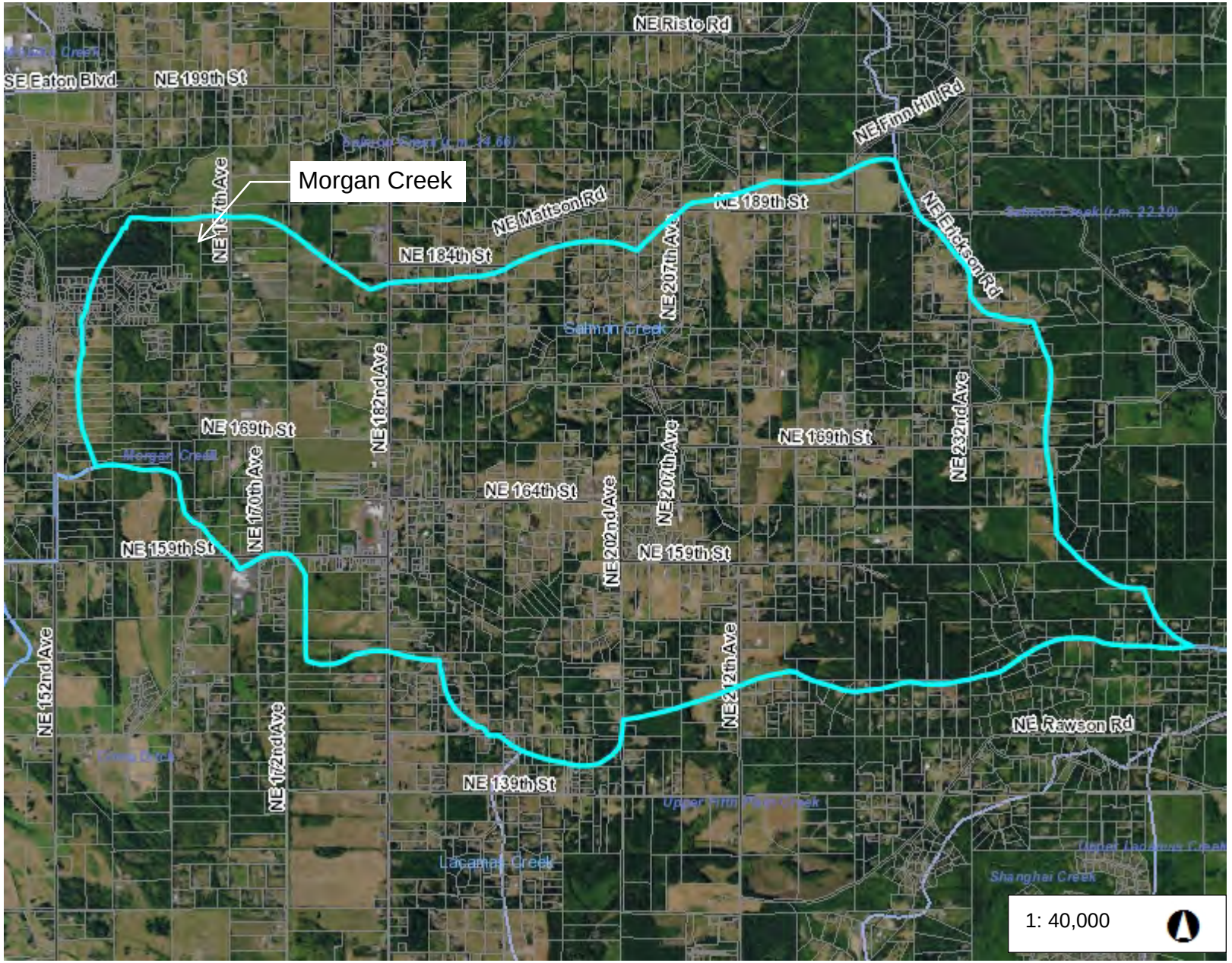
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Morgan Creek Sub-watershed Basin Map





Legend

- Taxlots
- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

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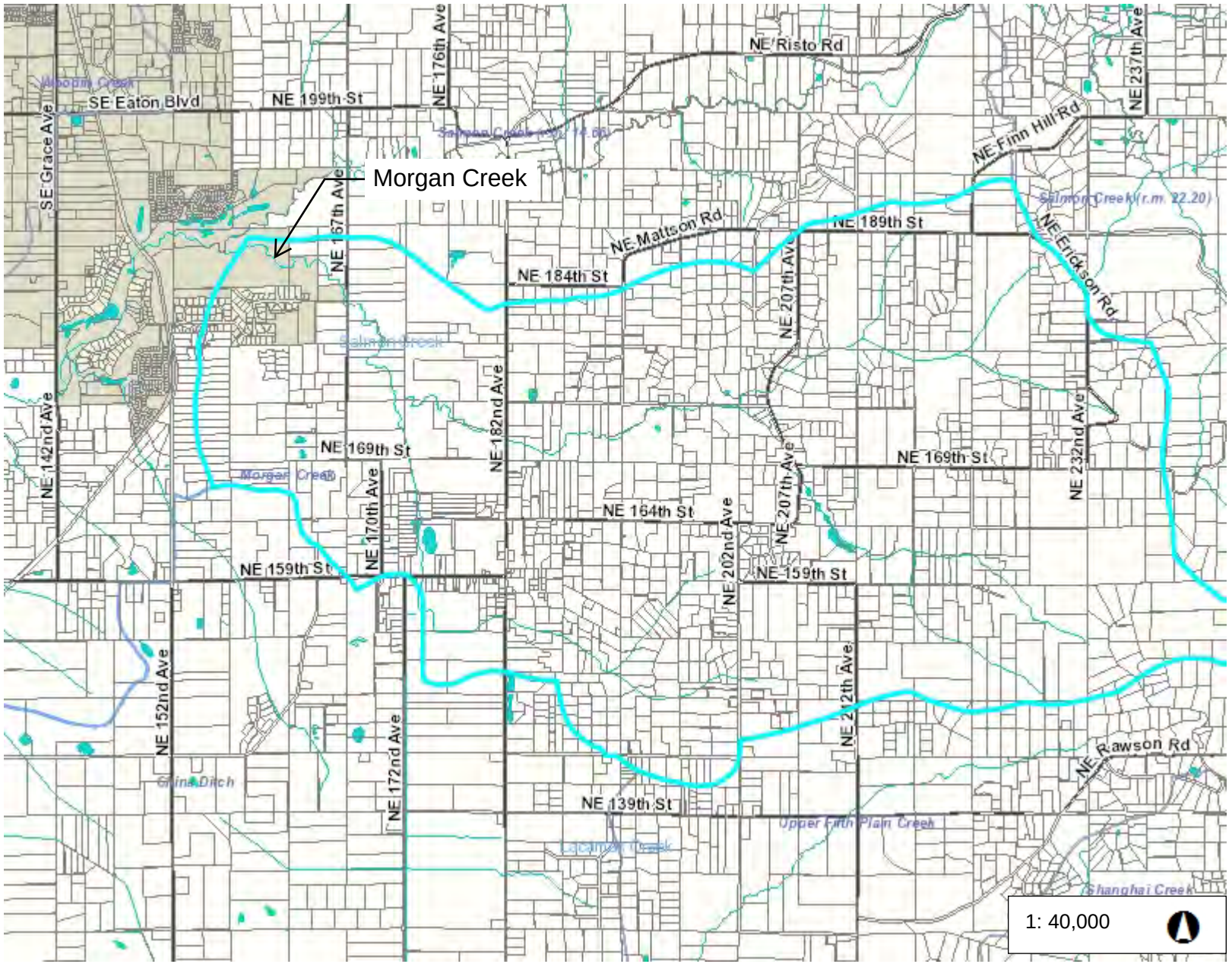
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Morgan Creek Sub-watershed Basin Map





Legend

- Taxlots
- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

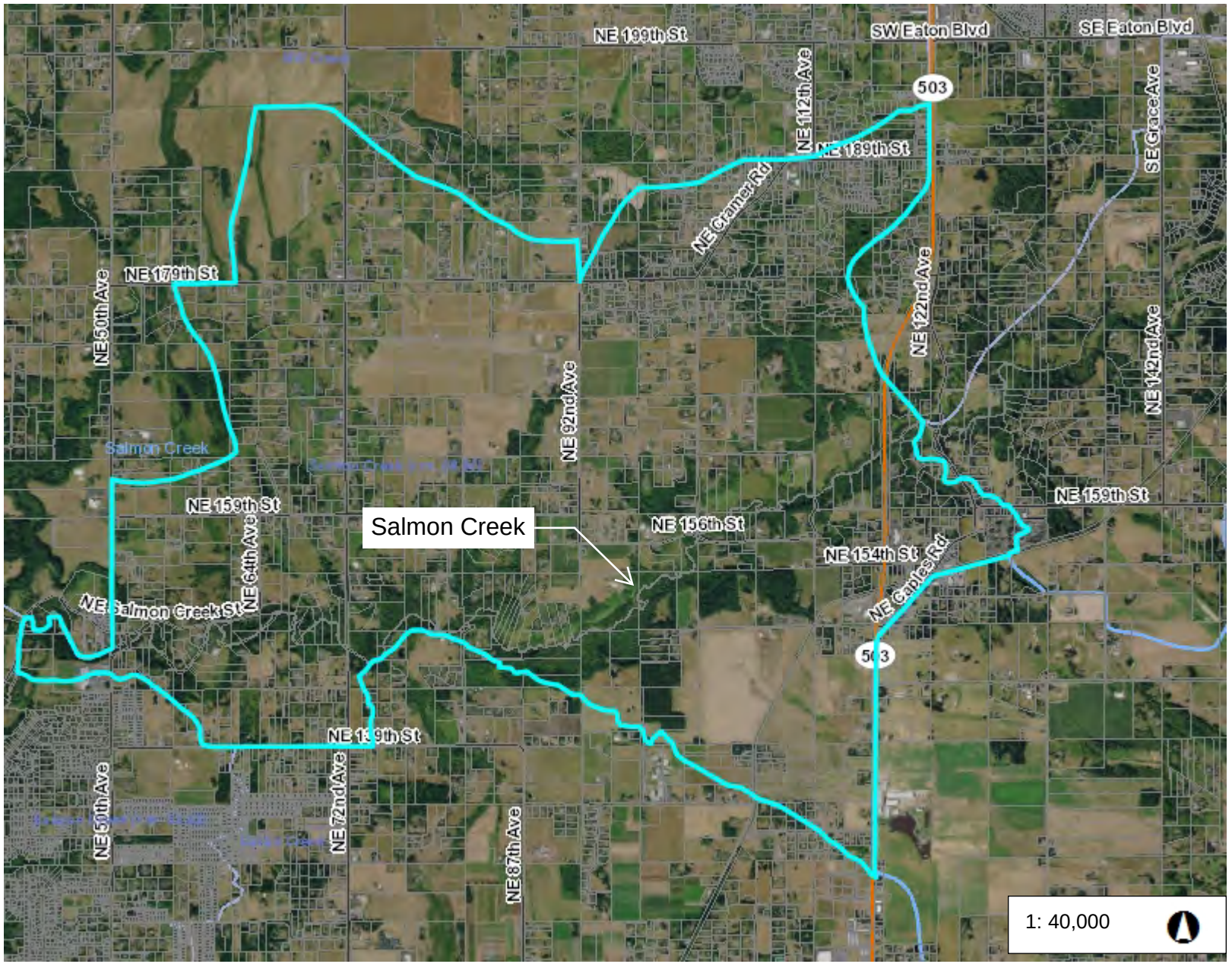
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Salmon Creek (R. M. 08.96) Sub-watershed Basin Map





Legend

- Taxlots
- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

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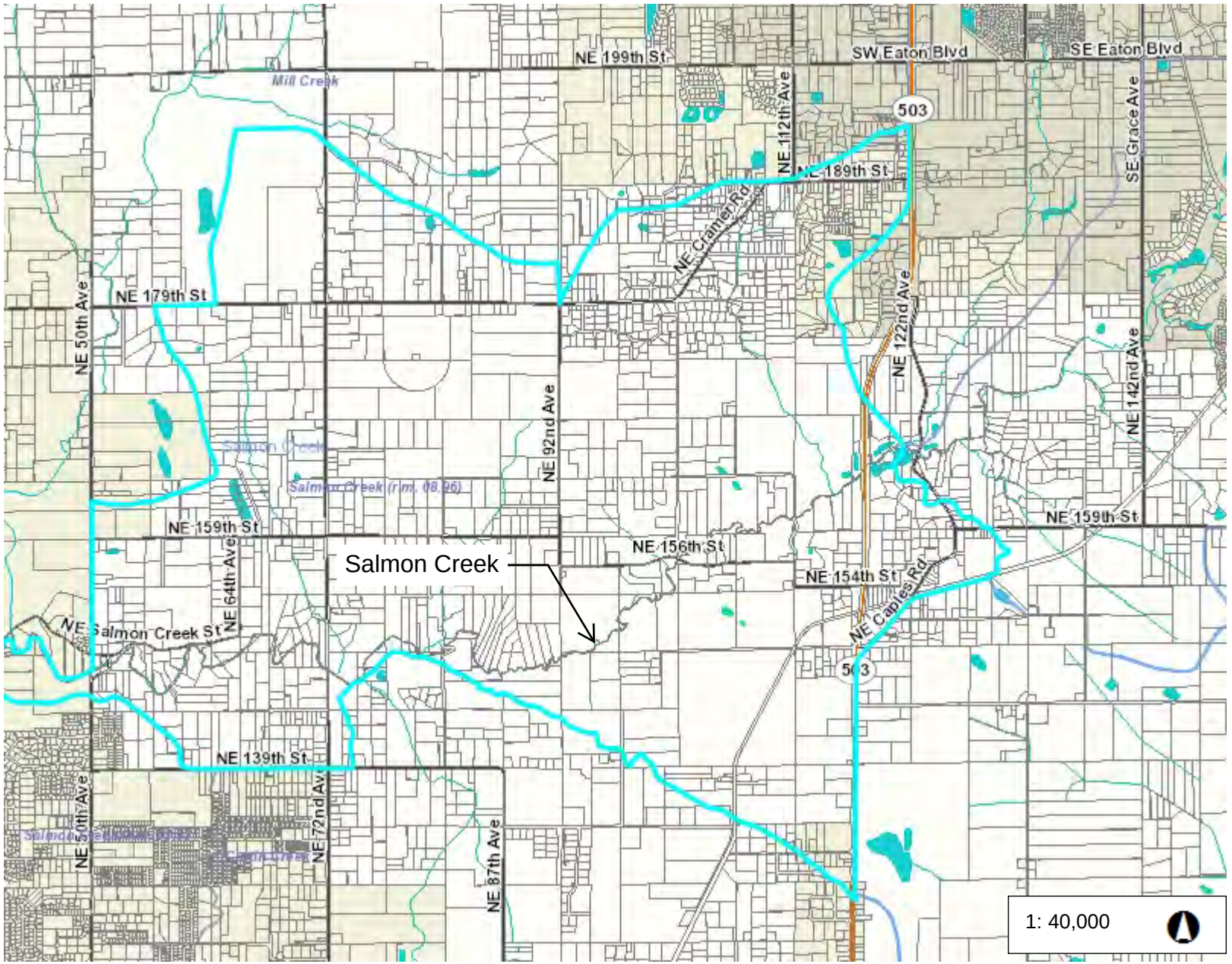
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Salmon Creek (R.M. 08.96) Sub-watershed Basin Map





Legend

- Taxlots
- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

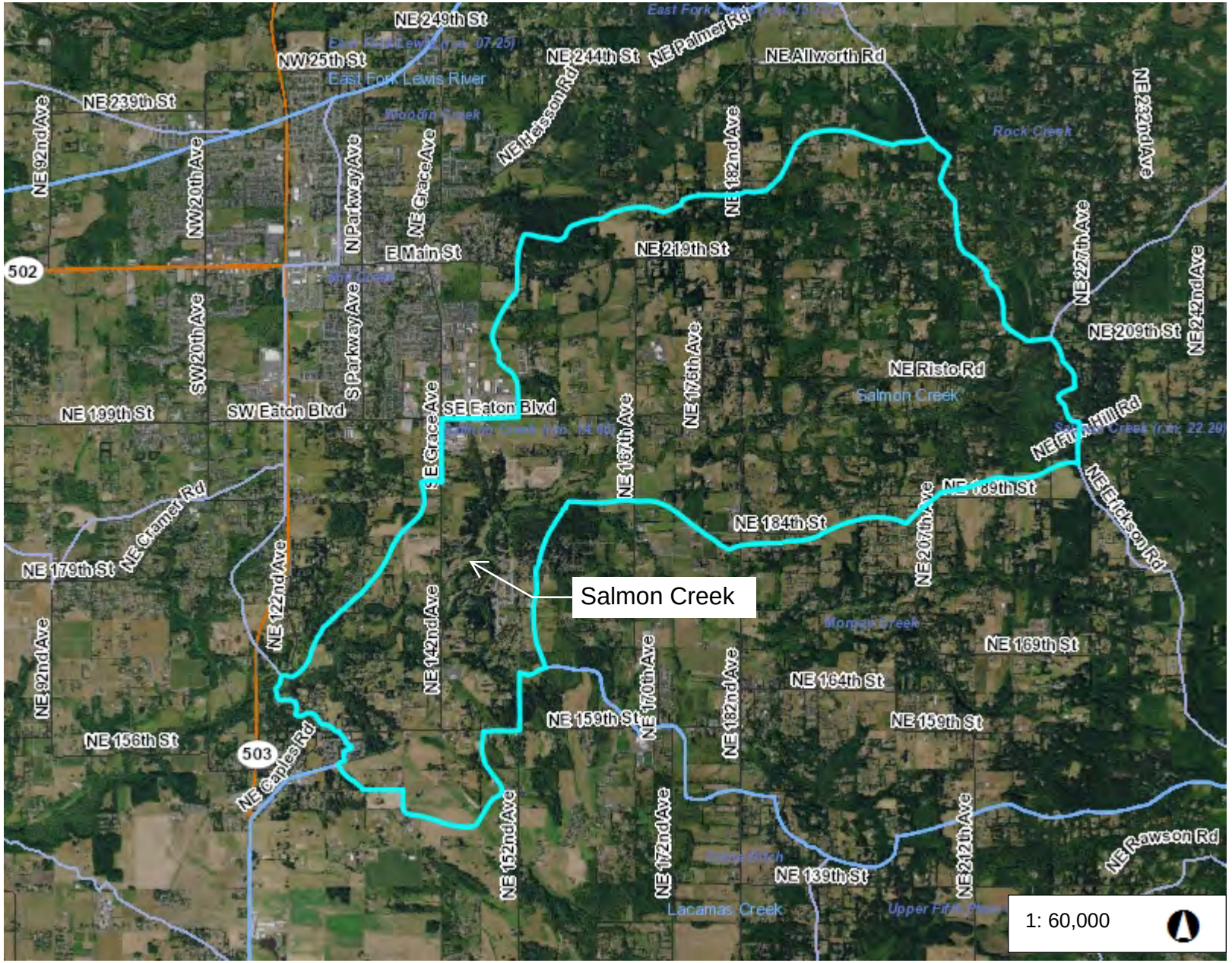
Exhibit A-11

6,666.7 0 3,333.33 6,666.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

Salmon Creek (R.M. 14.66) Sub-watershed Basin Map





Legend

- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

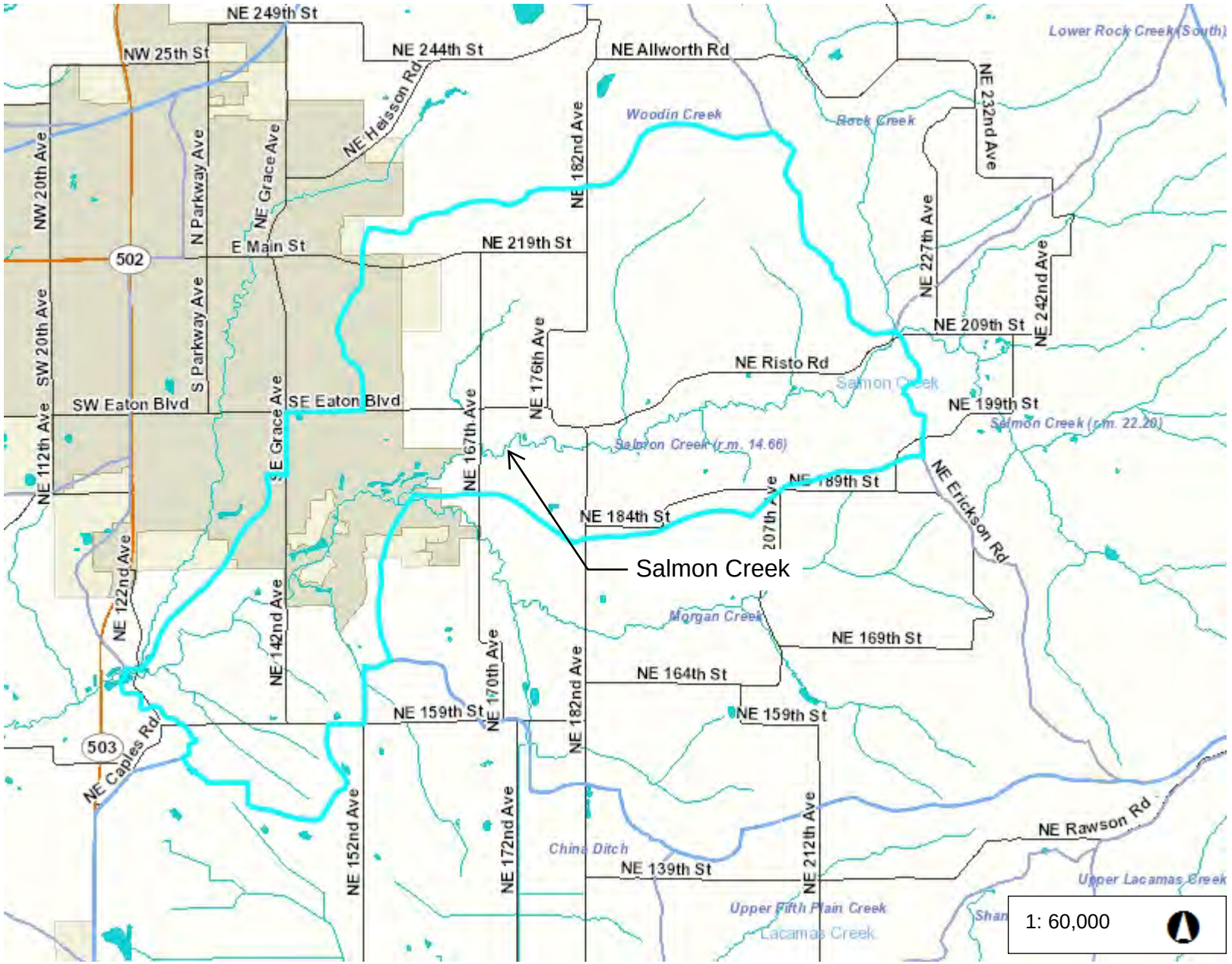
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Clark County, WA. GIS - http://gis.clark.wa.gov

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

Salmon Creek (R.M. 14.66) Sub-watershed Basin Map





Legend

- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

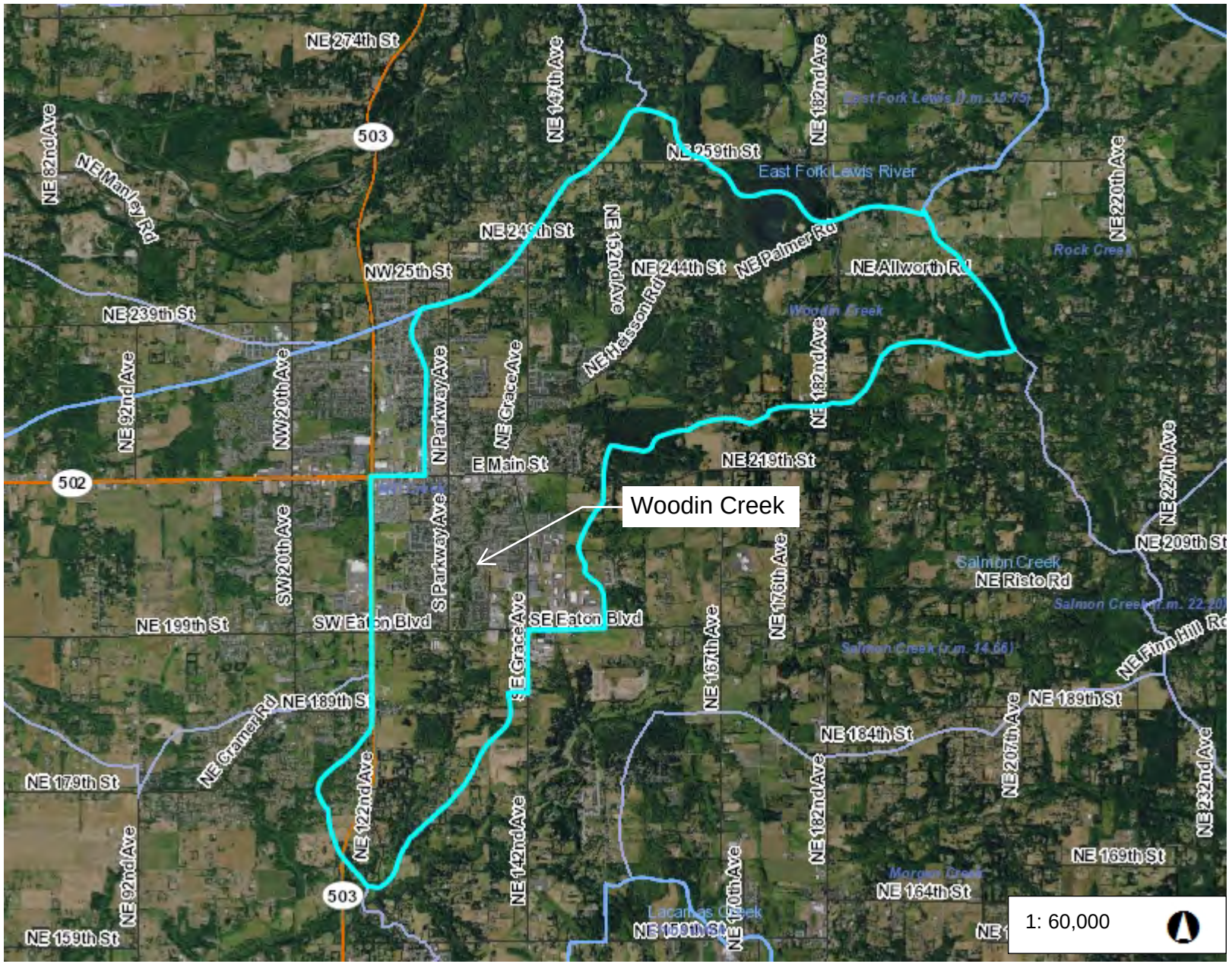
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Clark County, WA. GIS - http://gis.clark.wa.gov

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

Woodin Creek Sub-watershed Basin Map





Legend

- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

Notes:

Exhibit A-14

10,000.0 0 5,000.00 10,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

Woodin Creek Sub-watershed Basin Map





Legend

- Watershed
- Sub-Watershed
- Major Roads
  - Interstate
  - State Route
  - Arterial
  - Forest Arterial
- Cities Boundaries
- Urban Growth Boundaries

1: 60,000

10,000.0 0 5,000.00 10,000.0 Feet

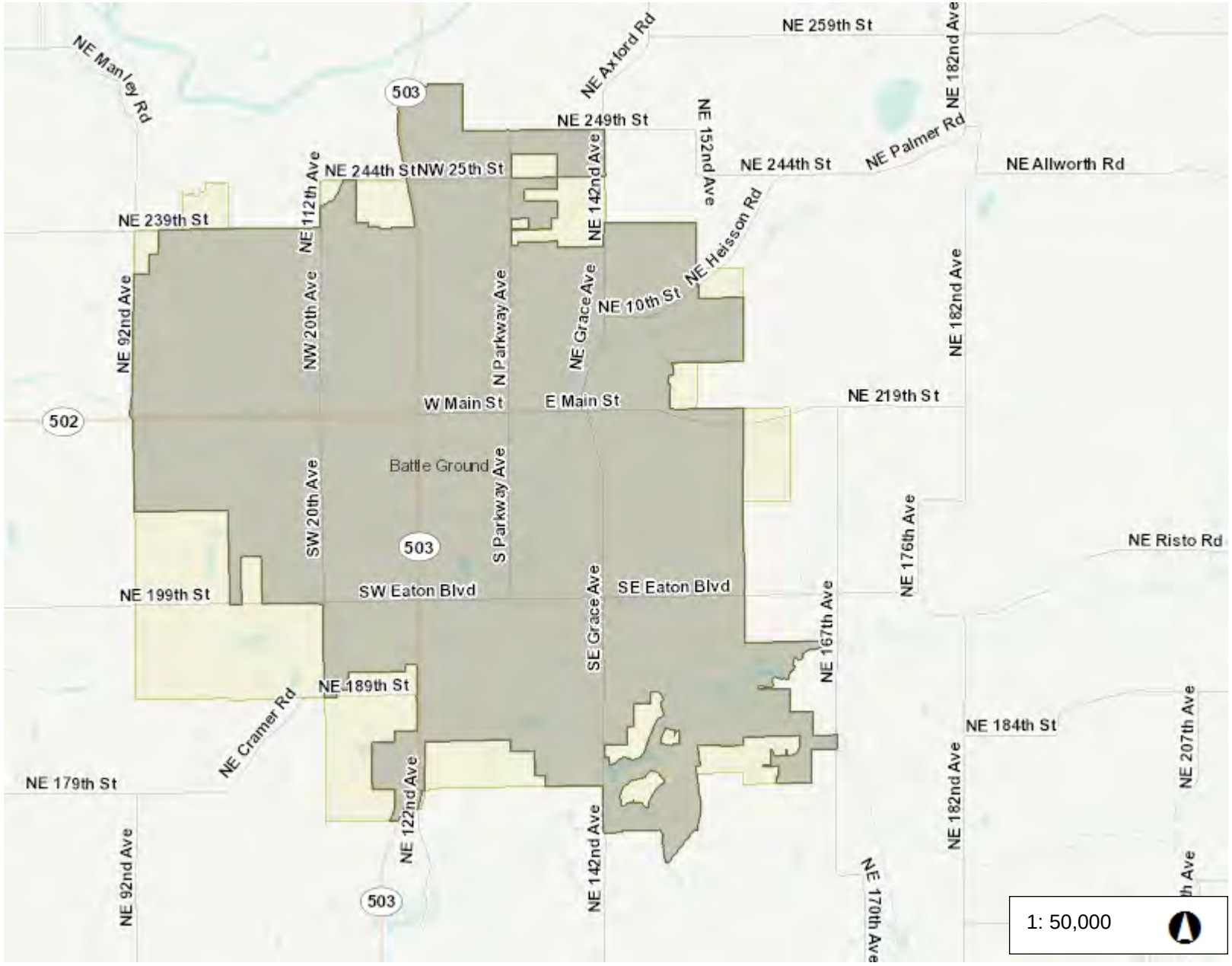
WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

Notes:

Exhibit A-15

City Boundary and UGA





Legend

Cities and Urban Growth Areas
- Incorporated
- Urban Growth Area
- Unincorporated

City Boundary

Major Roads
- Interstate
- State Route
- Arterial
- Forest Arterial

Cities Boundaries

Urban Growth Boundaries

Notes:

Exhibit A-16

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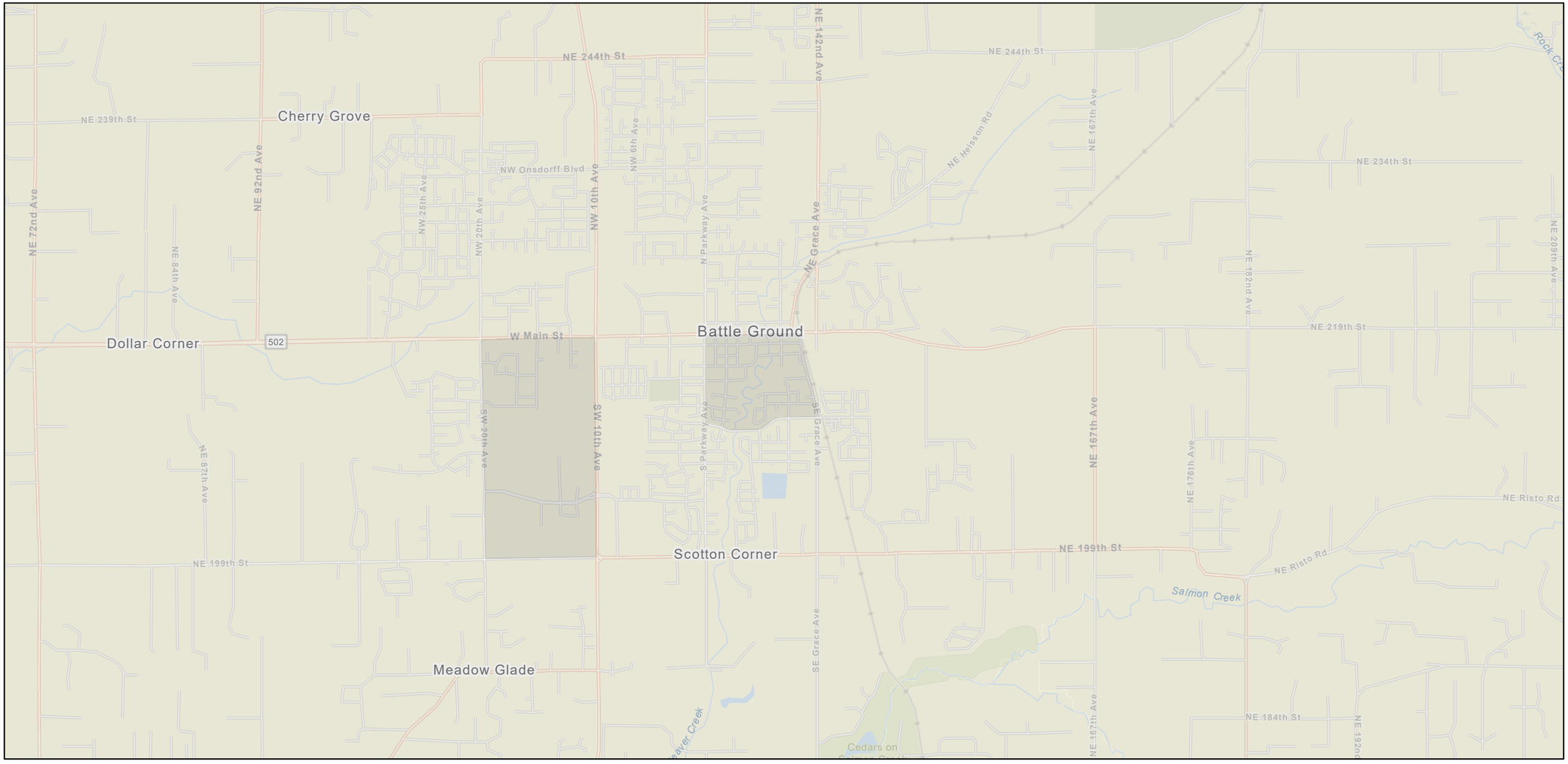
WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

APPENDIX B

ENVIRONMENTAL JUSTICE MAPS

Demographic Index Map



3/2/2022

EJSCREEN_Indexes

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Source: EPA's Environmental Justice Screening and Mapping Tool (Version 2.0)
https://ejscreen.epa.gov/mapper/
Color coding represents National Percentiles.

Percentiles

Percentiles are a way to see how local residents compare to everyone else in the United States. Instead of just showing numbers out of context, EJScreen lets you compare a community to the rest of the state, EPA region and nation, by using percentiles. The national percentile tells you what percent of the US population has an equal or lower value, meaning less potential for exposure/ risk/ proximity to certain facilities, or a lower percent minority.

1:40,000

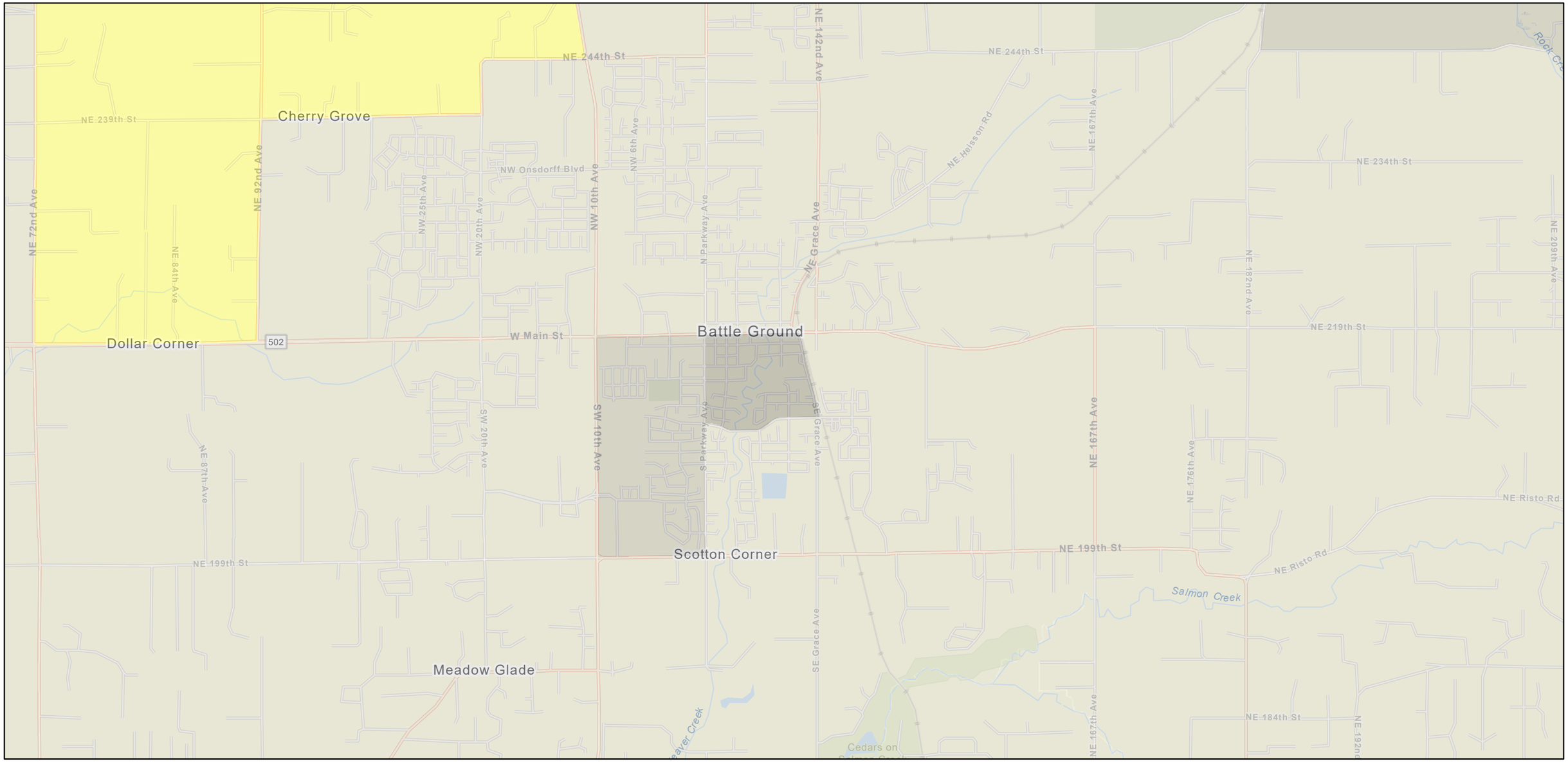
0 0.33 0.65 1.3 mi

0 0.5 1 2 km

County of Clark, WA, Oregon Metro, State of Oregon GEO, WA State Parks GIS, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Exhibit B-1

Less Than HS Education Map



3/2/2022

EJSCREEN_Indexes

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Source: EPA's Environmental Justice Screening and Mapping Tool (Version 2.0)
https://ejscreen.epa.gov/mapper/
Color coding represents National Percentiles.

Percentiles

Percentiles are a way to see how local residents compare to everyone else in the United States. Instead of just showing numbers out of context, EJScreen lets you compare a community to the rest of the state, EPA region and nation, by using percentiles. The national percentile tells you what percent of the US population has an equal or lower value, meaning less potential for exposure/ risk/ proximity to certain facilities, or a lower percent minority.

1:40,000

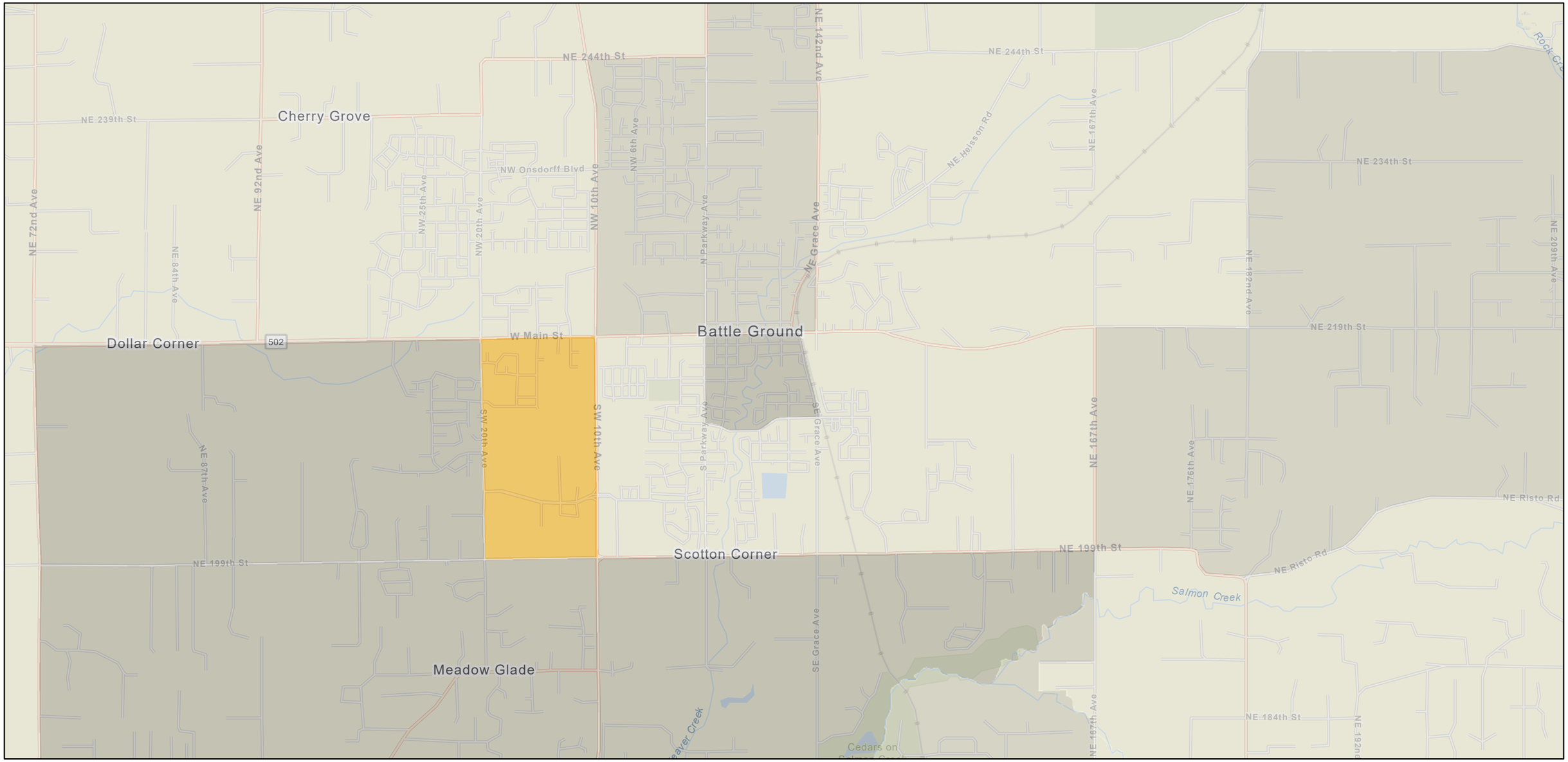
0 0.33 0.65 1.3 mi

0 0.5 1 2 km

County of Clark, WA, Oregon Metro, State of Oregon GEO, WA State Parks GIS, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Exhibit B-2

Linguistically Isolated Map



3/2/2022

EJSCREEN_Indexes

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Source: EPA's Environmental Justice Screening and Mapping Tool (Version 2.0)
https://ejscreen.epa.gov/mapper/
Color coding represents National Percentiles.

Percentiles

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1:40,000

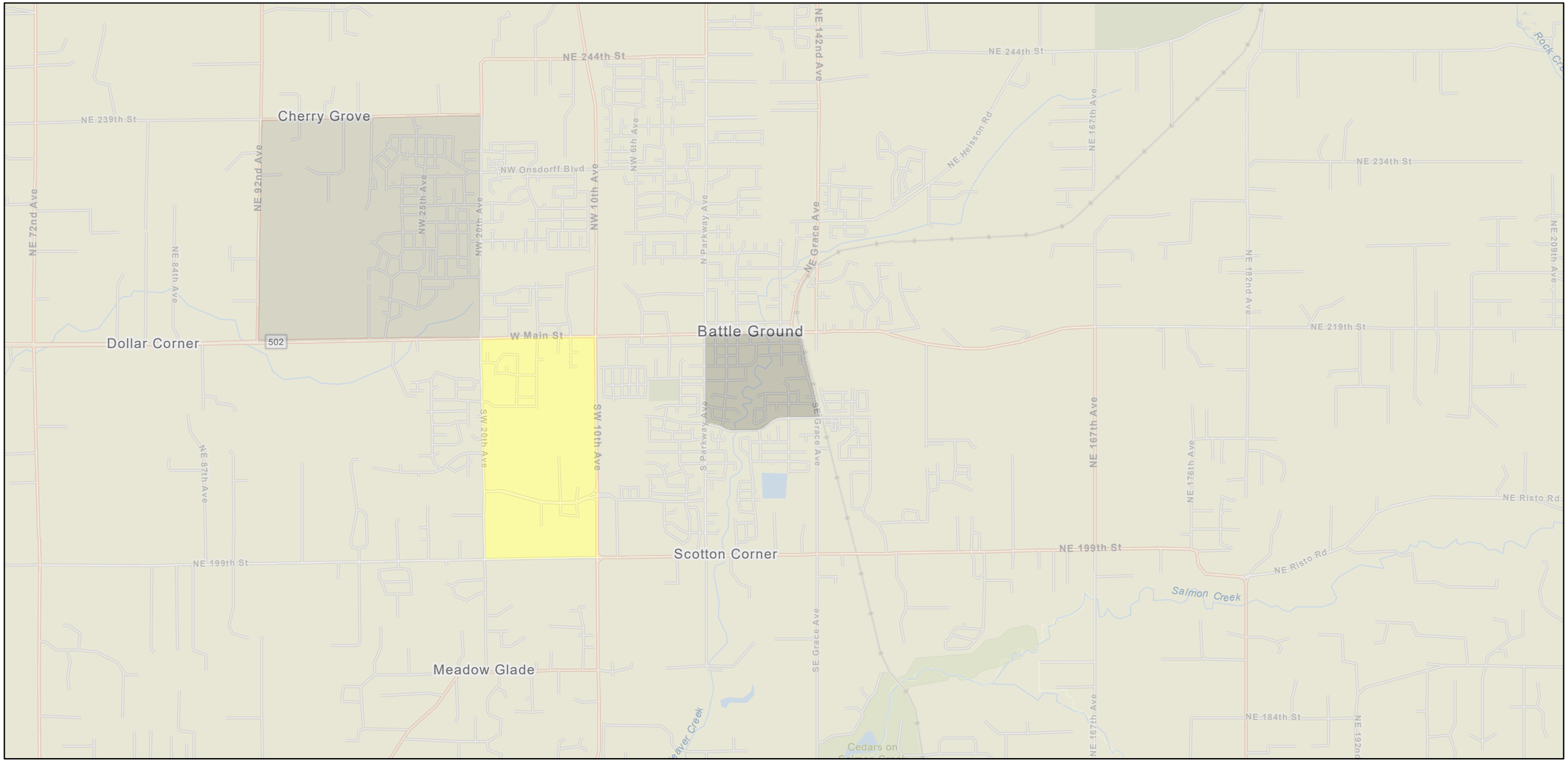
0 0.33 0.65 1.3 mi

0 0.5 1 2 km

County of Clark, WA, Oregon Metro, State of Oregon GEO, WA State Parks GIS, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Exhibit B-3

Low Income Map



3/2/2022

EJSCREEN_Indexes

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Source: EPA's Environmental Justice Screening and Mapping Tool (Version 2.0)
https://ejscreen.epa.gov/mapper/
Color coding represents National Percentiles.

Percentiles

Percentiles are a way to see how local residents compare to everyone else in the United States. Instead of just showing numbers out of context, EJScreen lets you compare a community to the rest of the state, EPA region and nation, by using percentiles. The national percentile tells you what percent of the US population has an equal or lower value, meaning less potential for exposure/ risk/ proximity to certain facilities, or a lower percent minority.

1:40,000

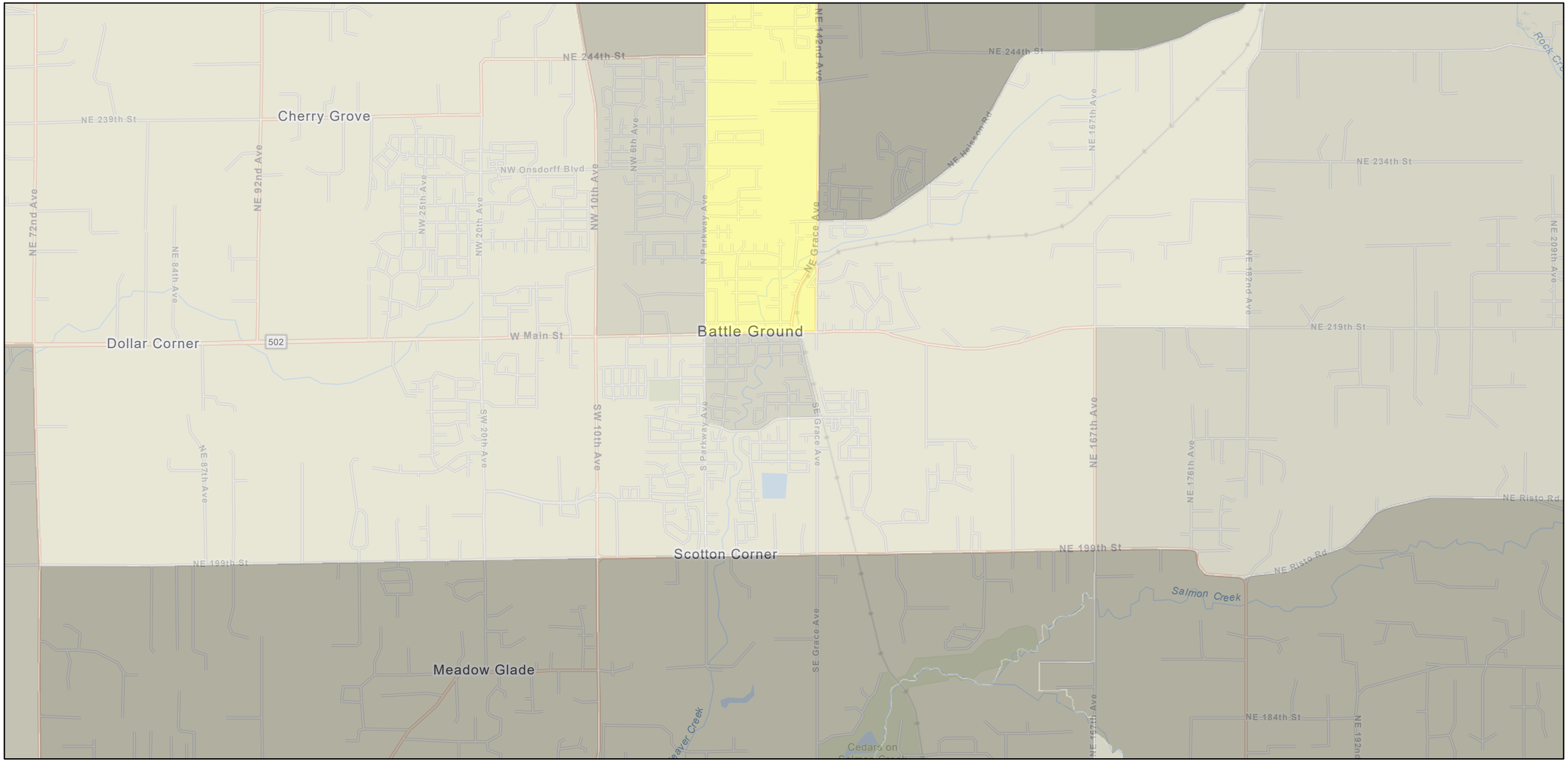
0 0.33 0.65 1.3 mi

0 0.5 1 2 km

County of Clark, WA, Oregon Metro, State of Oregon GEO, WA State Parks GIS, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Exhibit B-4

Over age 64 Map



3/2/2022

EJSCREEN_Indexes

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Source: EPA's Environmental Justice Screening and Mapping Tool (Version 2.0)
https://ejscreen.epa.gov/mapper/
Color coding represents National Percentiles.

Percentiles

Percentiles are a way to see how local residents compare to everyone else in the United States. Instead of just showing numbers out of context, EJScreen lets you compare a community to the rest of the state, EPA region and nation, by using percentiles. The national percentile tells you what percent of the US population has an equal or lower value, meaning less potential for exposure/ risk/ proximity to certain facilities, or a lower percent minority.

1:40,000

0 0.33 0.65 1.3 mi

0 0.5 1 2 km

County of Clark, WA, Oregon Metro, State of Oregon GEO, WA State Parks GIS, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Exhibit B-5

APPENDIX C

SUB-WATERSHED RECEIVING WATER ASSESSMENT

City of Battle Ground
Sub-watershed Receiving Water Assessment

March 2022

Western Washington Phase II Municipal Stormwater Permit (2019-2024)
Fulfills Permit Requirement S5.C1.d.i

Sub-watershed	Receiving Water	Fish	Wildlife	WQ Concerns [11]	Basin	Watershed	Sub-watershed	Sub-watershed Area (Acres)	Area in City Limits (Acres)	Area in UGA (Acres)	Percent in City Limits	Percent in UGA	
East Fork Lewis River (r.m. 07.25)	East Fork Lewis River	Fall Chinook, Spring Chinook, Fall Chum, Coho, Summer Steelhead, Winter Steelhead	Beavers, Bats, Deer, Coyote, Squirrel, Rabbits, Nutria, River Otters, Opossum, Raccoons, Peregrine Falcons, Bald Eagles, Osprey, Great Blue Heron, Canada Geese, Mallard Ducks	Bacteria Temperature Low Dissolved Oxygen	Columbia River	East Fork Lewis River	East Fork Lewis River (r.m. 07.25)	6,772	387	499	5.7	7.4	
Mill Creek (East Fork)	Mill Creek (East Fork)	Coho, Winter Steelhead	Beavers, Bats, Deer, Coyote, Squirrel, Rabbits, Nutria, River Otters, Opossum, Raccoons, Peregrine Falcons, Bald Eagles, Osprey, Great Blue Heron, Canada Geese, Mallard Ducks	Bacteria Temperature	Columbia River	East Fork Lewis River	Mill Creek (East Fork)	2,417	172	188	7.1	7.8	
Mill Creek	Mill Creek	Coho, Winter Steelhead	Beavers, Bats, Deer, Coyote, Squirrel, Rabbits, Nutria, River Otters, Opossum, Raccoons, Peregrine Falcons, Bald Eagles, Osprey, Great Blue Heron, Canada Geese, Mallard Ducks	Bacteria Low Dissolved Oxygen	Columbia River	Salmon Creek	Mill Creek	7,601	1,837	2,345	24.2	30.9	Matchline - Page 3 of 5
Morgan Creek	Morgan Creek	Fall Chinook, Coho, Winter Steelhead	Beavers, Bats, Deer, Coyote, Squirrel, Rabbits, Nutria, River Otters, Opossum, Raccoons, Peregrine Falcons, Bald Eagles, Osprey, Great Blue Heron, Canada Geese, Mallard Ducks	Low Dissolved Oxygen pH Turbidity Bacteria	Columbia River	Salmon Creek	Morgan Creek	4,850	75	120	1.5	2.5	
Salmon Creek (R.M. 08.96)	Salmon Creek	Fall Chinook , Coho, Winter Steelhead	Beavers, Bats, Deer, Coyote, Squirrel, Rabbits, Nutria, River Otters, Opossum, Raccoons, Peregrine Falcons, Bald Eagles, Osprey, Great Blue Heron, Canada Geese, Mallard Ducks	Low Dissolved Oxygen pH Turbidity Bacteria	Columbia River	Salmon Creek	Salmon Creek (R.M. 08.96)	4,954	17	176	0.3	3.6	

	Protection and Restoration Goals	Receiving Water Conditions	Stormwater Treatment and Detention	Stormwater Mgmt. Influence Assessment (2013-2019)	303(d) Category	Land Use/Development in City Limits/UGA	Development Period	Zoning	Basin Boundaries	Select Stormwater Facilities
	Small area Growth will be under new reqs for flow ctrl and detention	Manley Creek and the East Fork of the Lewis River downstream of Battle Ground are listed as Category 5 on Ecology's 303(d) list. Bacteria impairments in East Fork of Lewis River and tributaries. Exceedances for fecal coliform and temperature. Draft EF Lewis River Water Cleanup Plan (August 2020) prioritizes addressing WQ impacts from septic systems, stormwater, and agriculture.	A relatively small area of the basin is in the City of Battle Ground along the southern portion of the sub-watershed. Most stormwater facilities were designed under the 1992 Puget Sound Manual. Recent subdivisions are being built to the 2019 Stormwater Management Manual for Western Washington (SWMMWW). Most of the sub-watershed is rural property in Clark County.	Two large subdivisions were constructed to 2014 SWMMWW Standards. Additional large subdivisions designed to the 2019 SWMMWW are under construction.	5	Residential Subdivisions Daybreak School Agricultural	Golden Hills 1998 Whispering Pines 2020	R-5 R1-6 R-7 AG-20 MX	North of approximately NE 239th Street	Riverbend Subdivision St. George Estates Meadows at 249th Parkway Hts. Whispering Pines
	Small area New growth under new reqs for flow ctrl and detention	Tributary to East Fork Lewis	A small portion of the sub-watershed lies within the City of Battle Ground. Existing residential development was designed under the 1992 Stormwater Management Manual for Puget Sound and the 2014 SWMMWW. The remaining area is large rural residential property planned for development under the 2019 SWMMWW requirements.	Two large subdivision constructed during permit term.	5	Residential Subdivisions Rural Residential	2015-2021	NC R-5 R-7 R-10 R-12 R-16	NE corner of city NE 92nd Ave to NW 20th Ave. NW 12th Street to NE 239th Street	Lone Oak Estates Wingate Crossing
	Wetland protection Buffer protection Opportunity for restoration when areas along Mill Creek develop	Part of the Salmon Creek Watershed Temperature TMDL.	Most residential and commercial development within this basin was developed under the 1992 Stormwater Management Manual for Puget Sound. New planned developments are being designed to the 2019 SWMMWW requirements.	Several small subdivisions and infill projects were constructed during the permit term. The basin was generally developed under the 1992 Puget Sound Manual.	5	Residential Subdivisions Commercial/Retail	1998-2017	R1-10 R5 R7 R1-20 R10 R12 R16 R-18 MU-R MU-E MX RC	Generally south of Onsdorff Blvd and west of 3rd Avenue	Winchester Ranch Horsethief Canyon Pearl's Garden Scotton Landing Mill Creek Meadows Cascade Meadows
	Very small area New development will follow current SWMMWW Opportunities for protection along creek as development occurs.		Existing residential development within the Morgan Creek Sub-watershed were constructed before stormwater requirements, therefore, there are no stormwater facilities. New planned development will meet the 2019 SWMMWW requirements.	No new development during the permit term. Planned development will be under the 2019 SWMMWW requirements.	5	Residential Subdivision Clark Co. Legacy Lands (Forested)	1977-1997	R3 R1-20	Extreme southeast corner of city near NE 183th Street and NE 159th Avenue	None
	Very small area New development will follow current SWMMWW	Temperature and Dissolved Oxygen Exceedances. (2011-2012)	A very small area is within the City of Battle Ground. These properties do not have any stormwater facilities. A larger section of properties lie within the UGA in Clark County.	No new development during the permit term.	5	Rural Residential/ Large Lot Residential Residential	1940-2021	R3 R1-20 R1-5 R1-12 R10 RC	Southwest corner of city near NE 189th Street west of SR 503	Camellia Subdivision

Matchline - Page 2 of 5

Sub-watershed	Receiving Water	Fish	Wildlife	WQ Concerns [11]	Basin	Watershed	Sub-watershed	Sub-watershed Area (Acres)	Area in City Limits (Acres)	Area in UGA (Acres)	Percent in City Limits	Percent in UGA	
Salmon Creek (R.M. 14.66)	Salmon Creek	Fall Chinook, Coho, Winter Steelhead	Beavers, Bats, Deer, Coyote, Squirrel, Rabbits, Nutria, River Otters, Opossum, Raccoons, Peregrine Falcons, Bald Eagles, Osprey, Great Blue Heron, Canada Geese, Mallard Ducks	Low Dissolved Oxygen pH Turbidity Bacteria	Columbia River	Salmon Creek	Salmon Creek (R.M. 14.66)	6,099	833	984	13.7	16.1	
Woodin Creek	Woodin Creek	Coho, Winter Steelhead	Beavers, Bats, Deer, Coyote, Squirrel, Rabbits, Nutria, River Otters, Opossum, Raccoons, Peregrine Falcons, Bald Eagles, Osprey, Great Blue Heron, Canada Geese, Mallard Ducks	Ammonia-N BOD (5-day) Bacteria Bioassessment Temperature	Columbia River	Salmon Creek	Woodin Creek	4,999	2,155	2,506	43.1	50.1	Matchline - Page 5 of 5

References

[1] Washington State Department of Ecology, East Fork Lewis, Fecal Coliform Bacteria and Temperature Source Assessment (March 2017)

[2] Washington State Department of Ecology, East Fork Lewis River Watershed, Bacteria and Temperature Source Assessment Report (May 2018)

[3] Washington State Department of Ecology, East Fork Lewis River Watershed, Bacteria Monitoring and Nonpoint Source Identification (February 2021)

[4] Washington State Department of Ecology, East Fork Lewis River Alternative Restoration Plan (October 2021)

[5] Washington State Department of Ecology, Salmon Creek Nonpoint Source Pollution TMDL, (October 1995)

[6] Washington State Department of Ecology, Salmon Creek Watershed, Bacteria and Turbidity Total Maximum Daily Load, Submittal Report (January 2001)

[7] Washington State Department of Ecology, Salmon Creek Watershed, Bacteria and Turbidity Total Maximum Daily Load (Water Cleanup Plan) Detailed Implementation Plan (March 2005)

[8] Washington State Department of Ecology, Quality Assurance Project Plan, Salmon Creek Watershed Low Dissolved Oxygen and pH Characterization Study (September 2011)

[9] Washington State Department of Ecology, Salmon Creek Temperature Total Maximum Daily Load, Water Quality Improvement Report and Implementation Plan (October 2011)

[10] Washington State Department of Ecology, Salmon Creek Watershed, Low Dissolved Oxygen and pH Characterization Study (March 2013)

[11] Washington State Department of Ecology, Water Quality Assessment -303(d) List. Website: https://www.arcgis.com/apps/mapviewer/index.html?layers=d955e6b00c924bb69072b4674a0d89ac

The above references were reviewed, however Water Quality Concern information generally came from the Washington State Department of Ecology's Water Quality Assessment - 303(d) list.

	Protection and Restoration Goals	Receiving Water Conditions	Stormwater Treatment and Detention	Stormwater Mgmt. Influence Assessment (2013-2019)	303(d) Category	Land Use/Development in City Limits/UGA	Development Period	Zoning	Basin Boundaries	Select Stormwater Facilities
Matchline - Page 4 of 5	Opportunities for protection and restoration along Salmon Creek, especially along golf course. Potential restoration work with Clark County. Possible County park Development under new SWMMWW	Temperature and Dissolved Oxygen Exceedances. (2011-2012)	Existing large rural residential parcel and large lot residential parcels were developed before stormwater requirements. Several new, large residential projects are under construction or have recently been completed to current SWMMWW requirements.	Several subdivisions were developed under the 2014 SWMMWW requirements. Several planned subdivisions will be developed under the 2019 SWMMWW requirements.	5	Residential Subdivisions Rural Residential Light Industrial Agricultural	2000-2020	A R3 R5 R7 R1-20 MU-R MX ML	Generally east of NE 20th Avenue north of SE Eaton Blvd and east of SE Grace Avenue south of SE Eaton Blvd.	Quail Reserve Cedar's Landing
	Opportunities for protection, especially along southern street south of SE Eaton Blvd. Need for treatment and flow control in downtown area. Removal of invasives along creek. Focus on private properties. (Incentives? Non-profits?)	Part of the Salmon Creek Temperature TMDL. Exceedances for E. Coli, a subset of Fecal Coliform and temperature.	This basin encompasses the core downtown area and runs from the north to the south city limits boundaries. Much of the downtown area pre-dates stormwater requirements. Therefore, there are areas with no stormwater treatment or detention facilities. Other areas were developed under the 1992 Puget Sound Stormwater Manual requirements. More recent development has been developed under the current SWMMWW requirements.	Much of the older areas pre-date stormwater requirements. Several new subdivisions were developed under the 1992 Stormwater Management Manual for Puget Sound requirements and the 2012/2014 SWMMWW requirements.	4A and 5	Residential Light Industrial Commercial Rural Residential Agricultural	Pre-dates stormwater controls to current (2022)	R3 R5 R7 R10 R20 R1-10 R1-20 R1-5 R1-6 R16 MU-R MU-E MX NC CC RC ML	Generally east of SR 503 and west of NE/SE 20th Avenue and south of NE 249th Street to Salmon Creek	Creekside Heights Hummingbird Lane Fawn Meadows Copper Leaf Battle Ground Meadows

LEGEND

Information included in online Battle Ground Sub-watershed Map
Information required by the Washington State Department of Ecology
Additional supporting information

APPENDIX D

SUB-WATERSHED BASIN PRIORITIZATION CRITERIA

City of Battle Ground
Sub-watershed Basin Prioritization Criteria

Criteria	Description	Rating				Score
		Low (0)	Medium (1)	High (2)	Extreme (3)	
MS4 Relative Flow Contribution to Receiving Water	Based on tributary area	<5%	5-10%	10-25%	>25%	
Impervious Surface	Percent impervious area	<10%	10-14%	15-25%	>25%	
Pollution Generating Impervious Surface	Percent Pollution Generating Impervious Surface area	<20%	20-35%	35-50%	>50%	
Pollution Generating Pervious Surface	Percent Pollution Generating Pervious Surface area	<10%	10-20%	20-30%	>40%	
[1]Traffic Volume	Vehicle Miles per Square Mile	<2,000	2,000-5,000	5,000-10,000	>10,000	
Population Density	Persons/square mile or Zoning	R3-R6	R7-R18	R20 +	MU, RC, etc	
Tree Canopy	Percent of basin area	>80%	50-80%	20-49%	<20%	
Lack of Treatment or Flow Control Facilities	Percent of developed area without SW controls	0-10%	10-20%	20-30%	>40%	
Agricultural Areas	Percent agricultural area	0-20%	20-40%	40-50%	>50%	
Industrial Areas	Percent industrial area	0-10%	10-20%	20-30%	>30%	
Residential Areas	Percent residential area	0-20%	20-40%	40-60%	>60%	
Environmental Justice	Overburden communities	<50%	50-70%	70-80%	>80%	
Soil Type	Hydrologic Soil Group	A	B	C	D	
Total						

[1]Traffic Volume - Use available data from the City of Battle Ground Transportation System Plan (TSP), the Southwest Washington Regional Transportation Council (RTC), other sources, or assumed Average Daily Trips (ADT) based on roadway classifications, multiplied by the roadway length to calculate the number of vehicle miles traveled within each basin. Divide the total by the number of square miles within the basin inside the Urban Growth Boundary (UGB) to estimate the number of vehicle miles traveled per square mile within the basin. Score the basin based on the ranges provided.

For each sub-watershed, score each criterion on a scale of 0 (Low) to 3 (Extreme), and sum the scores. Rank the basins based on the total score for each basin. The basin with the highest score is the most at risk for poor water quality.

Future phases of this project will narrow the most at risk basin down to the most at risk catchments within the basin. At least one high priority catchment will be identified and the following information will be developed:

a. A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations.
b. Land management/development strategies and/or actions identified for water quality management.
c. Targeted, enhanced, or customized implementation of stormwater management actions related to the 2019 Western Washington Phase II Municipal Stormwater Permit sections within S5, including:
   - IDDE field screening,
   - Prioritization and Source Control inspections,
   - O&M inspection or enhanced maintenance, or
   - Public Education and Outreach behavior change programs.
d. If necessary, identification of changes needed to local long-range plans, to address SMAP priorities.
e. A proposed implementation schedule and budget sources for:
   - Short term actions (within six years)
   - Long-term actions (seven to 20 years)
f. A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects.

APPENDIX E

BASIN AND CATCHMENT PRIORITIZATION SCORING

Sub-watershed Area	6,772	Acres
Area within UGA	499	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	2,655,519	61.0	12.2	4.3	4.3	7.9
R5	5 units/gross acre	50	48	48	52	12,119,659	278.2	55.8	26.8	26.8	29.0
R7	7 units/gross acre	50	56	56	44	5,138,241	118.0	23.6	13.2	13.2	10.4
R10	10 units/gross acre	60	70	70	30	1,822,091	41.8	8.4	5.9	5.9	2.5
R12	12 units/gross acre	60	70	70	30	0	0.0	0.0	0.0	0.0	0.0
R16	16 units/gross acre	70	80	80	20	0	0.0	0.0	0.0	0.0	0.0
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
R1-20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Rural		N/A	15	15	15	0	0.0	0.0	0.0	0.0	0.0
Total							**499.0**	**100.0**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	0	0.0	0.0	0.0	0.0	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Light Industrial											
ML	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80		0.0	0.0	0.0	0.0	0.0
								499	100	50	50	50

Criteria	Score	
MS4 Contribution	1	
Impervious Surface	3	
Pollution Generating Impervious Surface	2	
Pollution Generating Pervious Surface	3	
Traffic Volume	3	
Population Density	2	~4,800/Sq. Mi.
Tree Canopy	2	~20%
Lack of SW Facilities	0	
Agricultural Areas	0	
Industrial Areas	0	
Residential Areas	3	
Enviromental Justice	3	
WWHM Soil Type	2	
Total	**24**	

East Fork Lewis River WWHM Soil Groups

Basin	Sub-watershed Area	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
East Fork Lewis River	6,772	499			17,497,045	4,108,952		0	0	402	94	0			80.5	18.9		7.4	2
Mill Creek East Fork	2,417	188						0	0	0	0	0			0.0	0.0		7.8	
Mill Creek	7,601	2,345						0	0	0	0	0			0.0	0.0		30.9	
Morgan Creek	4,850	120						0	0	0	0	0			0.0	0.0		2.5	
Salmon Creek RM 08.96	4,954	176						0	0	0	0	0			0.0	0.0		3.6	
Salmon Creek RM 14.66	6,099	984						0	0	0	0	0			0.0	0.0		16.1	
Woodin Creek	4,999	2,506			Calc.			0	0	0	0	0			0.0	0.0		50.1	

MS4 Contributions

Basin	Sub-watershed Area	Area within UGA	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499	7.4	1
Mill Creek East Fork	2417	188	7.8	1
Mill Creek	7601	2345	30.9	3
Morgan Creek	4850	120	2.5	0
Salmon Creek RM 08.96	4954	176	3.6	0
Salmon Creek RM 14.66	6099	984	16.1	2
Woodin Creek	4999	2506	50.1	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Basin Area (Acres)	Score	Area within UGA	Weighted Score
East Fork Lewis River	0	20	20	60	6772	0.6	499	0
Mill Creek East Fork	0	30	0	70	2417	0.6	188	0
Mill Creek	10	40	10	40	7601	1.2	2345	3
Morgan Creek	50	0	0	50	4850	1.5	120	0
Salmon Creek RM 08.96	100	0	0	0	4954	3	176	1
Salmon Creek RM 14.66	30	10	30	30	6099	1.4	984	1
Woodin Creek	15	30	25	30	4999	1.3	2506	3

Area within UGA 499 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
East Fork Lewis River	500	43,548	8.2	1,000	7,264	1.4	5,000	7,639	1.4	8,000	2,035	0.4	10,000	0	0.0	10,000	4,062	0.8	23,510	30,153
Mill Creek East Fork	500			1,000			5,000			8,000			10,000						0	
Mill Creek	500			1,000			5,000			8,000			10,000						0	
Morgan Creek	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 08.96	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 14.66	500			1,000			5,000			8,000			10,000						0	
Woodin Creek	500		0	1,000		0	5,000		0	8,000		0.0	10,000		0			0	5	

Total Length 43,548
Local Only 43,548

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

Sub-watershed Area	7601	Acres
Area within UGA	2351	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	24,142,947	554.2	23.6	8.3	8.3	15.3
R5	5 units/gross acre	50	48	48	52	4,243,578	97.4	4.1	2.0	2.0	2.2
R7	7 units/gross acre	50	56	56	44	24,941,952	572.6	24.4	13.6	13.6	10.7
R10	10 units/gross acre	60	70	70	30	7,113,111	163.3	6.9	4.9	4.9	2.1
R12	12 units/gross acre	60	70	70	30	7,982,292	183.2	7.8	5.5	5.5	2.3
R16	16 units/gross acre	70	80	80	20	2,434,461	55.9	2.4	1.9	1.9	0.5
R18	18 units/gross acre	75	75	82.5	17.5	2,802	0.1	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	479,853	11.0	0.5	0.4	0.4	0.1
R1-20	20 units/gross acre	80	85	85	15	768,996	17.7	0.8	0.6	0.6	0.1
Rural		N/A	15	15	15	4,807	0.1	0.0	0.0	0.0	0.0
Total							**1655.5**	**70.4**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	23,004,851	528.1	22.5	20.2	20.2	2.2
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	2,645,511	60.7	2.6	2.6	2.6	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	119,049	2.7	0.1	0.1	0.1	0.0
Total							**591.6**	**25.2**			
Light Industrial											
ML	Unk.		85	85	15	4,527,102	103.9	4.4	3.8	3.8	0.7
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**103.9**	**4.4**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25		0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
							2,351	100	64	64	36

Criteria	Score	
MS4 Contribution	3	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	3	
Traffic Volume	3	
Population Density	1	Varies <1,000 to 5,000/Sq. Mi.
Tree Canopy	3	20%
Lack of SW Facilities	3	
Agricultural Areas	3	
Industrial Areas	0	
Residential Areas	0	
Enviromental Justice	3	
WWHM Soil Type	2	
Total	**30**	

Mill Creek WWHM Soil Groups

Basin	Sub-watershed Area	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499									0				0.2	0.0		7.4	
Mill Creek East Fork	2417	188									0				0.5	0.0		7.8	
Mill Creek	7601	2345			52,610,795	49,352,588	184,847			1208	1,133	4.244			51.5	48.3	0.2	30.9	2
Morgan Creek	4850	120									0				0.8	0.0		2.5	
Salmon Creek RM 08.96	4954	176									0				0.6	0.0		3.6	
Salmon Creek RM 14.66	6099	984									0				0.1	0.0		16.1	
Woodin Creek	4999	2506			Calc.	44,664,182				1,481	1,025				59.1	40.9		50.1	2

MS4 Contributions

Basin	Sub-watershed Area	Area within UGA	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499	7.4	1
Mill Creek East Fork	2417	188	7.8	1
Mill Creek	7601	2345	30.9	3
Morgan Creek	4850	120	2.5	0
Salmon Creek RM 08.96	4954	176	3.6	0
Salmon Creek RM 14.66	6099	984	16.1	2
Woodin Creek	4999	2506	50.1	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Basin Area (Acres)	Score	Area within UGA	Weighted Score
East Fork Lewis River	0	20	20	60	6772	0.6	499	0
Mill Creek East Fork	0	30	0	70	2417	0.6	188	0
Mill Creek	10	40	10	40	7601	1.2	2345	3
Morgan Creek	50	0	0	50	4850	1.5	120	0
Salmon Creek RM 08.96	100	0	0	0	4954	3	176	1
Salmon Creek RM 14.66	30	10	30	30	6099	1.4	984	1
Woodin Creek	15	30	25	30	4999	1.3	2506	3

Mill Creek Basin Traffic Summary

Area within UGA 2,345 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/ Sq. Mi.
East Fork Lewis River	500			1,000			5,000			8,000			10,000						0	
Mill Creek East Fork	500			1,000			5,000			8,000			10,000						0	
Mill Creek	500	146,718	28	1,000	31,752	6	5,000	11,997	2	8,000	17,160	3.3	10,000		0	1		69,801	127,071	34,680
Morgan Creek	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 08.96	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 14.66	500			1,000			5,000			8,000			10,000						0	
Woodin Creek	500			1,000			5,000			8,000			10,000						0	

Total Length 257,307
Local Only 146,718

RTC Data																			
NE 219th St/SR 503																			
North Leg																22,540	5,035	1.0	21,494
South Leg																27,697			
East Leg													25,471	2,610	0.5				12,591
West Leg																27,140	9,398	1.8	48,307

Sub-watershed Area	7601	Acres
Area within UGA	2351	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	24,142,947	554.2	23.6	8.3	8.3	15.3
R5	5 units/gross acre	50	48	48	52	4,243,578	97.4	4.1	2.0	2.0	2.2
R7	7 units/gross acre	50	56	56	44	24,941,952	572.6	24.4	13.6	13.6	10.7
R10	10 units/gross acre	60	70	70	30	7,113,111	163.3	6.9	4.9	4.9	2.1
R12	12 units/gross acre	60	70	70	30	7,982,292	183.2	7.8	5.5	5.5	2.3
R16	16 units/gross acre	70	80	80	20	2,434,461	55.9	2.4	1.9	1.9	0.5
R18	18 units/gross acre	75	75	82.5	17.5	2,802	0.1	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	479,853	11.0	0.5	0.4	0.4	0.1
R1-20	20 units/gross acre	80	85	85	15	768,996	17.7	0.8	0.6	0.6	0.1
Rural		N/A	15	15	15	4,807	0.1	0.0	0.0	0.0	0.0
Total							**1655.5**	**70.4**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	23,004,851	528.1	22.5	20.2	20.2	2.2
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	2,645,511	60.7	2.6	2.6	2.6	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	119,049	2.7	0.1	0.1	0.1	0.0
Total							**591.6**	**25.2**			
Light Industrial											
ML	Unk.		85	85	15	4,527,102	103.9	4.4	3.8	3.8	0.7
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**103.9**	**4.4**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25		0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
							2,351	100	64	64	36

Criteria	Score	
MS4 Contribution	3	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	3	
Traffic Volume	3	
Population Density	1	Varies <1,00 to 5,000/Sq. Mi.
Tree Canopy	3	
Lack of SW Facilities	3	
Agricultural Areas	3	
Industrial Areas	0	
Residential Areas	0	
Enviromental Justice	3	
WWHM Soil Type	2	
Total	**30**	

Mill Creek WWHM Soil Groups

Basin	Sub-watershed Area	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499									0				0.2	0.0		7.4	
Mill Creek East Fork	2417	188									0				0.5	0.0		7.8	
Mill Creek	7601	2345			52,610,795	49,352,588	184,847			1208	1,133	4.244			51.5	48.3	0.2	30.9	2
Morgan Creek	4850	120									0				0.8	0.0		2.5	
Salmon Creek RM 08.96	4954	176									0				0.6	0.0		3.6	
Salmon Creek RM 14.66	6099	984									0				0.1	0.0		16.1	
Woodin Creek	4999	2506			Calc.	44,664,182				1,481	1,025				59.1	40.9		50.1	2

MS4 Contributions

Basin	Sub-watershed Area	Area within UGA	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499	7.4	1
Mill Creek East Fork	2417	188	7.8	1
Mill Creek	7601	2345	30.9	3
Morgan Creek	4850	120	2.5	0
Salmon Creek RM 08.96	4954	176	3.6	0
Salmon Creek RM 14.66	6099	984	16.1	2
Woodin Creek	4999	2506	50.1	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Basin Area (Acres)	Score	Area within UGA	Weighted Score
East Fork Lewis River	0	20	20	60	6772	0.6	499	0
Mill Creek East Fork	0	30	0	70	2417	0.6	188	0
Mill Creek	10	40	10	40	7601	1.2	2345	3
Morgan Creek	50	0	0	50	4850	1.5	120	0
Salmon Creek RM 08.96	100	0	0	0	4954	3	176	1
Salmon Creek RM 14.66	30	10	30	30	6099	1.4	984	1
Woodin Creek	15	30	25	30	4999	1.3	2506	3

Mill Creek Basin Traffic Summary

Area within UGA 2,345 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/ Sq. Mi.
East Fork Lewis River	500			1,000			5,000			8,000			10,000						0	
Mill Creek East Fork	500			1,000			5,000			8,000			10,000						0	
Mill Creek	500	146,718	28	1,000	31,752	6	5,000	11,997	2	8,000	17,160	3.3	10,000		0	1		69,801	127,071	34,680
Morgan Creek	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 08.96	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 14.66	500			1,000			5,000			8,000			10,000						0	
Woodin Creek	500			1,000			5,000			8,000			10,000						0	

Total Length 257,307
Local Only 146,718

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540	5,035	1.0	21,494	
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140	9,398	1.8	48,307	

Morgan Creek Basin Summary

Sub-watershed Area	4,850	Acres
Area within UGA	119	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	5,193,434	119.2	100.2	35.1	35.1	65.1
R5	5 units/gross acre	50	48	48	52	0	0.0	0.0	0.0	0.0	0.0
R7	7 units/gross acre	50	56	56	44	0	0.0	0.0	0.0	0.0	0.0
R10	10 units/gross acre	60	70	70	30	0	0.0	0.0	0.0	0.0	0.0
R12	12 units/gross acre	60	70	70	30	0	0.0	0.0	0.0	0.0	0.0
R16	16 units/gross acre	70	80	80	20	0	0.0	0.0	0.0	0.0	0.0
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
R1-20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Rural		N/A	15	15	15	0	0.0	0.0	0.0	0.0	0.0
Total							**119.2**	**100.2**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	0	0.0	0.0	0.0	0.0	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Light Industrial											
ML	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80		0.0	0.0	0.0	0.0	0.0
							119	100	35	35	65

Criteria	Score	
MS4 Contribution	0	
Impervious Surface	3	
Pollution Generating Impervious Surface	1	
Pollution Generating Pervious Surface	2	
Traffic Volume	0	
Population Density	0	396/Sq. Mi.
Tree Canopy	0	~90%
Lack of SW Facilities	0	
Agricultural Areas	0	
Industrial Areas	0	
Residential Areas	3	
Enviromental Justice	2	
WWHM Soil Type	2	
Total	**13**	

Morgan Creek Basin WWHM Soil Groups

Basin	Sub-watershed Area	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499						0	0	0	0	0			0.0	0.0		7.4	
Mill Creek East Fork	2417	188						0	0	0	0	0			0.0	0.0		7.8	
Mill Creek	7601	2345						0	0	0	0	0			0.0	0.0		30.9	
Morgan Creek	4850	120			2,636,713	2,537,881		0	0	61	58	0			50.4	48.6		2.5	
Salmon Creek RM 08.96	4954	176						0	0	0	0	0			0.0	0.0		3.6	
Salmon Creek RM 14.66	6099	984						0	0	0	0	0			0.0	0.0		16.1	
Woodin Creek	4999	2506			Calc.			0	0	0	0	0			0.0	0.0		50.1	

MS4 Contributions

Basin	Sub-watershed Area	Area within UGA	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499	7.4	1
Mill Creek East Fork	2417	188	7.8	1
Mill Creek	7601	2345	30.9	3
Morgan Creek	4850	120	2.5	0
Salmon Creek RM 08.96	4954	176	3.6	0
Salmon Creek RM 14.66	6099	984	16.1	2
Woodin Creek	4999	2506	50.1	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Basin Area (Acres)	Score	Area within UGA	Weighted Score
East Fork Lewis River	0	20	20	60	6772	0.6	499	0
Mill Creek East Fork	0	30	0	70	2417	0.6	188	0
Mill Creek	10	40	10	40	7601	1.2	2345	3
Morgan Creek	50	0	0	50	4850	1.5	120	0
Salmon Creek RM 08.96	100	0	0	0	4954	3	176	1
Salmon Creek RM 14.66	30	10	30	30	6099	1.4	984	1
Woodin Creek	15	30	25	30	4999	1.3	2506	3

Morgan Creek Basin Traffic Summary

Area within UGA 120 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
East Fork Lewis River	500			1,000			5,000			8,000			10,000						0	
Mill Creek East Fork	500			1,000			5,000			8,000			10,000						0	
Mill Creek	500			1,000			5,000			8,000			10,000						0	
Morgan Creek	500	6,494	1.2	1,000		0	5,000		0	8,000		0.0	10,000		0			0	620	
Salmon Creek RM 08.96	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 14.66	500			1,000			5,000			8,000			10,000						0	
Woodin Creek	500			1,000			5,000			8,000			10,000						0	

Total Length 6,494
Local Only 6,494

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

Sub-watershed Area	4,954	Acres
Area within UGA	176	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	5,820,201	133.6	75.9	26.6	26.6	49.3
R5	5 units/gross acre	50	48	48	52	0	0.0	0.0	0.0	0.0	0.0
R7	7 units/gross acre	50	56	56	44	0	0.0	0.0	0.0	0.0	0.0
R10	10 units/gross acre	60	70	70	30	1,358,306	31.2	17.7	12.4	12.4	5.3
R12	12 units/gross acre	60	70	70	30	487,953	11.2	6.4	4.5	4.5	1.9
R16	16 units/gross acre	70	80	80	20	0	0.0	0.0	0.0	0.0	0.0
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
R1-20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Rural		N/A	15	15	15	0	0.0	0.0	0.0	0.0	0.0
Total							**176.0**	**100.0**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	0	0.0	0.0	0.0	0.0	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Light Industrial											
ML	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
							176	100	43	43	57

Criteria	Score	
MS4 Contribution	0	
Impervious Surface	3	
Pollution Generating Impervious Surface	2	
Pollution Generating Pervious Surface	3	
Traffic Volume	3	
Population Density	0	520/Sq. Mi.
Tree Canopy	1	~50%
Lack of SW Facilities	1	
Agricultural Areas	0	
Industrial Areas	0	
Residential Areas	3	
Enviromental Justice	3	
WWHM Soil Type	2	
Total	**21**	

Salmon Creek R.M. 08.96 WWHM Soil Groups

Basin	Sub-watershed Area	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499						0	0	0	0	0			0.0	0.0		7.4	
Mill Creek East Fork	2417	188						0	0	0	0	0			0.0	0.0		7.8	
Mill Creek	7601	2345						0	0	0	0	0			0.0	0.0		30.9	
Morgan Creek	4850	120						0	0	0	0	0			0.0	0.0		2.5	
Salmon Creek RM 08.96	4954	176			4,521,102	3,145,458		0	0	104	72	0			59.0	41.0		3.6	
Salmon Creek RM 14.66	6099	984						0	0	0	0	0			0.0	0.0		16.1	
Woodin Creek	4999	2506			Calc.			0	0	0	0	0			0.0	0.0		50.1	

MS4 Contributions

Basin	Sub-watershed Area	Area within UGA	Percent of Basin within UGA	Score
East Fork Lewis River	6,772	499	7.4	1
Mill Creek East Fork	2,417	188	7.8	1
Mill Creek	7,601	2,345	30.9	3
Morgan Creek	4,850	120	2.5	0
Salmon Creek RM 08.96	4,954	176	3.6	0
Salmon Creek RM 14.66	6,099	984	16.1	2
Woodin Creek	4,999	2,506	50.1	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Basin Area (Acres)	Score	Area within UGA	Weighted Score
East Fork Lewis River	0	20	20	60	6772	0.6	499	0
Mill Creek East Fork	0	30	0	70	2417	0.6	188	0
Mill Creek	10	40	10	40	7601	1.2	2345	3
Morgan Creek	50	0	0	50	4850	1.5	120	0
Salmon Creek RM 08.96	100	0	0	0	4954	3	176	1
Salmon Creek RM 14.66	30	10	30	30	6099	1.4	984	1
Woodin Creek	15	30	25	30	4999	1.3	2506	3

Area within UGA 176 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
East Fork Lewis River	500			1,000			5,000			8,000			10,000						0	
Mill Creek East Fork	500			1,000			5,000			8,000			10,000						0	
Mill Creek	500			1,000			5,000			8,000			10,000						0	
Morgan Creek	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 08.96	500	6,356	1.2	1,000	0		5,000	1,132	0.2	8,000	4,764	0.9	10,000	0	0	0	0	0	8,892	32,335
Salmon Creek RM 14.66	500			1,000			5,000			8,000			10,000						0	
Woodin Creek	500			1,000			5,000			8,000			10,000						0	

Total Length 6,356
Local Only 6,356

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

Sub-watershed Area	6,099	Acres
Area within UGA	983	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	18,081,788	415.1	42.2	14.8	14.8	27.4
R5	5 units/gross acre	50	48	48	52	5,408,644	124.2	12.6	6.1	6.1	6.6
R7	7 units/gross acre	50	56	56	44	10,512,778	241.3	24.6	13.7	13.7	10.8
R10	10 units/gross acre	60	70	70	30		0.0	0.0	0.0	0.0	0.0
R12	12 units/gross acre	60	70	70	30		0.0	0.0	0.0	0.0	0.0
R16	16 units/gross acre	70	80	80	20		0.0	0.0	0.0	0.0	0.0
R18	18 units/gross acre	75	75	82.5	17.5		0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15		0.0	0.0	0.0	0.0	0.0
R1-20	20 units/gross acre	80	85	85	15		0.0	0.0	0.0	0.0	0.0
Rural		N/A	15	15	15		0.0	0.0	0.0	0.0	0.0
Total							780.6	**79.4**			
AG-20	20 acres agricultural	N/A	5	5	95		0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10		0.0	0.0	0.0	0.0	0.0
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	861,683	19.8	2.0	2.0	2.0	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10		0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10		0.0	0.0	0.0	0.0	0.0
Total							**19.8**	**2.0**			
Light Industrial											
ML	Unk.		85	85	15	4,337,980	99.6	10.1	8.6	8.6	1.5
EC	50% Bldg max.	Assume 85% Gross	85	85	15		0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15		0.0	0.0	0.0	0.0	0.0
Total							**99.6**	**10.1**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	134,330	3.1	0.3	0.3	0.3	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15		0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	3,501,173	80.4	8.2	6.1	6.1	2.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0		0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80		0.0	0.0	0.0	0.0	0.0
							983	100	52	52	48

Criteria	Score	
MS4 Contribution	2	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	3	
Traffic Volume	1	
Population Density	2	~4,500 - 5,000/Sq. Mi. Avg.
Tree Canopy	2	~40%
Lack of SW Facilities	1	
Agricultural Areas	0	
Industrial Areas	1	
Residential Areas	3	
Enviromental Justice	3	
WWHM Soil Type	2	
Total	**26**	

Salmon Creek R.M. 14.66 WWHM Soil Groups

Basin	Sub-watershed Area	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499						0	0	0	0	0		0.0	0.0	0.0		7.4	
Mill Creek East Fork	2417	188						0	0	0	0	0		0.0	0.0	0.0		7.8	
Mill Creek	7601	2345						0	0	0	0	0		0.0	0.0	0.0		30.9	
Morgan Creek	4850	120						0	0	0	0	0		0.0	0.0	0.0		2.5	
Salmon Creek RM 08.96	4954	176						0	0	0	0	0		0.0	0.0	0.0		3.6	
Salmon Creek RM 14.66	6099	984		12,408,509	16,212,857	13,811,094		0	285	372	317	0		28.9	37.8	32.2		16.1	2
Woodin Creek	4999	2506			Calc.			0	0	0	0	0		0.0	0.0	0.0		50.1	

MS4 Contributions

Basin	Sub-watershed Area	Area within UGA	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499	7.4	1
Mill Creek East Fork	2417	188	7.8	1
Mill Creek	7601	2345	30.9	3
Morgan Creek	4850	120	2.5	0
Salmon Creek RM 08.96	4954	176	3.6	0
Salmon Creek RM 14.66	6099	984	16.1	2
Woodin Creek	4999	2506	50.1	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Basin Area (Acres)	Score	Area within UGA	Weighted Score
East Fork Lewis River	0	20	20	60	6772	0.6	499	0
Mill Creek East Fork	0	30	0	70	2417	0.6	188	0
Mill Creek	10	40	10	40	7601	1.2	2345	3
Morgan Creek	50	0	0	50	4850	1.5	120	0
Salmon Creek RM 08.96	100	0	0	0	4954	3	176	1
Salmon Creek RM 14.66	30	10	30	30	6099	1.4	984	1
Woodin Creek	15	30	25	30	4999	1.3	2506	3

Salmon Creek R.M. 14.66 Basin Traffic Summary

Area within UGA 984 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
East Fork Lewis River	500			1,000			5,000			8,000			10,000						0	
Mill Creek East Fork	500			1,000			5,000			8,000			10,000						0	
Mill Creek	500			1,000			5,000			8,000			10,000						0	
Morgan Creek	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 08.96	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 14.66	500	71,493	13.5	1,000	1,543	0.3	5,000	10,987	2.1	8,000	6,749	1.3	10,000	0	0.0		0	0.0	27,693	18,011
Woodin Creek	500		0	1,000		0	5,000		0	8,000		0.0	10,000		0			0	5	

Total Length 90,772
Local Only 71,493

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

di

Sub-watershed Area	4,999	Acres
Area within UGA	2,637	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	8,054,890	184.9	7.0	2.5	2.5	4.6
R5	5 units/gross acre	50	48	48	52	15,070,748	346.0	13.1	6.3	6.3	6.8
R7	7 units/gross acre	50	56	56	44	30,001,612	688.7	26.1	14.6	14.6	11.5
R10	10 units/gross acre	60	70	70	30	7,544,893	173.2	6.6	4.6	4.6	2.0
R12	12 units/gross acre	60	70	70	30	18,092,740	415.4	15.8	11.0	11.0	4.7
R16	16 units/gross acre	70	80	80	20	3,305,712	75.9	2.9	2.3	2.3	0.6
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	3,015,320	69.2	2.6	2.2	2.2	0.4
R1-20	20 units/gross acre	80	85	85	15	244,818	5.6	0.2	0.2	0.2	0.0
Rural		N/A	15	15	15	42,436	1.0	0.0	0.0	0.0	0.0
Total							**1959.9**	**74.3**			
AG-20	20 acres agricultural	N/A	5	5	95	2,349	0.1	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	7,946,842	182.4	6.9	6.2	6.2	0.7
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	9,466,231	217.3	8.2	8.2	8.2	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10		0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	126,741	2.9	0.1	0.1	0.1	0.0
Total							**402.7**	**15.3**			
Light Industrial											
ML	Unk.		85	85	15	10,541,867	242.0	9.2	7.8	7.8	1.4
EC	50% Bldg max.	Assume 85% Gross	85	85	15		0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15		0.0	0.0	0.0	0.0	0.0
Total							**242.0**	**9.2**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	1,417,053	32.5	1.2	1.0	1.0	0.2
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
							2,637	100	67	67	33

Criteria	Score	
MS4 Contribution	3	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	2	
Traffic Volume	3	4,600-6,500/Sq. Mi.
Population Density	3	
Tree Canopy	3	
Lack of SW Facilities	3	
Agricultural Areas	3	
Industrial Areas	0	
Residential Areas	0	
Enviromental Justice	3	
WWHM Soil Type	2	
Total	**31**	

Woodin Creek WWHM Soil Groups

Basin	Sub-watershed Area	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
East Fork Lewis River	6772	499									0				0.2	0.0		7.4	
Mill Creek East Fork	2417	188									0				0.5	0.0		7.8	
Mill Creek	7601	2345									0				0.0	0.0		30.9	
Morgan Creek	4850	120									0				0.8	0.0		2.5	
Salmon Creek RM 08.96	4954	176									0				0.6	0.0		3.6	
Salmon Creek RM 14.66	6099	984									0				0.1	0.0		16.1	
Woodin Creek	4999	2506			Calc.	44,664,182				1,481	1,025				59.1	40.9		50.1	2

MS4 Contributions

Basin	Sub-watershed Area	Area within UGA	Percent of Basin within UGA	Score
East Fork Lewis River	6,772	499	7.4	1
Mill Creek East Fork	2,417	188	7.8	1
Mill Creek	7,601	2,345	30.9	3
Morgan Creek	4,850	120	2.5	0
Salmon Creek RM 08.96	4,954	176	3.6	0
Salmon Creek RM 14.66	6,099	984	16.1	2
Woodin Creek	4,999	2,506	50.1	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Basin Area (Acres)	Score	Area within UGA	Weighted Score
East Fork Lewis River	0	20	20	60	6772	0.6	499	0
Mill Creek East Fork	0	30	0	70	2417	0.6	188	0
Mill Creek	10	40	10	40	7601	1.2	2345	3
Morgan Creek	50	0	0	50	4850	1.5	120	0
Salmon Creek RM 08.96	100	0	0	0	4954	3	176	1
Salmon Creek RM 14.66	30	10	30	30	6099	1.4	984	1
Woodin Creek	15	30	25	30	4999	1.3	2506	3

Woodin Creek Basin Traffic Summary

Area within UGA 2,560 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
East Fork Lewis River	500			1,000			5,000			8,000			10,000						0	
Mill Creek East Fork	500			1,000			5,000			8,000			10,000						0	
Mill Creek	500			1,000			5,000			8,000			10,000						0	
Morgan Creek	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 08.96	500			1,000			5,000			8,000			10,000						0	
Salmon Creek RM 14.66	500			1,000			5,000			8,000			10,000						0	
Woodin Creek	500	266,921	51	1,000	19,891	4	5,000	17,594	3	8,000	39,120	7.4	25,471	2,610	0	27,697	11,731	2	179,105	44,776

Total Length 346,136
Local Only 266,921

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

Woodin Creek Catchment #1 Summary
(WDN10, WDN9, WDN8A, WDN7, WDN5C)

Catchment Area	395	Acres
Area within UGA	395	Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	0	0.0	0.0	0.0	0.0	0.0
R5	5 units/gross acre	50	48	48	52	0	0.0	0.0	0.0	0.0	0.0
R7	7 units/gross acre	50	56	56	44	4,724,785	108.5	27.5	15.4	15.4	12.1
R10	10 units/gross acre	60	70	70	30	800,083	18.4	4.6	3.3	3.3	1.4
R12	12 units/gross acre	60	70	70	30	2,040,943	46.9	11.9	8.3	8.3	3.6
R16	16 units/gross acre	70	80	80	20	276,563	6.3	1.6	1.3	1.3	0.3
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	1,347,787	30.9	7.8	6.7	6.7	1.2
R1-20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Rural		N/A	15	15	15	0	0.0	0.0	0.0	0.0	0.0
Total							**211.0**	**53.4**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	3,365,657	77.3	19.6	17.6	17.6	2.0
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	4,649,357	106.7	27.0	27.0	27.0	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
Total							**184.0**	**46.6**			
Light Industrial											
ML	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
								395	100	80	80	20

Woodin Creek Catchment #1 Summary
(WDN10, WDN9, WDN8A, WDN7, WDN5C)

Criteria	Score	
MS4 Contribution	3	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	2	
Traffic Volume	3	
Population Density	3	~5,000/Sq. Mi.
Tree Canopy	3	~5%
Lack of SW Facilities	2	
Agricultural Areas	0	
Industrial Areas	0	
Residential Areas	2	
Enviromental Justice	3	
WWHM Soil Type	2	
Total	**29**	

Woodin Creek Catchment #1 WWHM Soil Groups

Basin	Catchment Arera	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
Woodin Creek Catchment #1	395	395		533,022	6,438,758	10,251,513		0	12	148	235	0		3.1	37.4	59.6		100.0	

MS4 Contributions

Basin	Catchment Area	Area within UGA	Percent of Basin within UGA	Score
Woodin Creek Catchment #1	395	395	100.0	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Catchment Area (Acres)	Score	Area within UGA
Woodin Creek (Catchment #1)	60	20	5	15	395	2.25	395

Woodin Creek Catchment #1 Basin Traffic Summary

Area within UGA 395 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
Woodin Creek (Catchment #1)	500	61,596	12	1,000	3,946	1	5,000	8,220	2	8,000	9,392	1.8	10,000	0	0		0	0	28,595	46,331

Total Length 83,154
Local Only 61,596

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

Woodin Creek Catchment #2 Summary
(WDN8B, WDN11, WDN12, WDN13, WDN14, SCN10C)

Catchment Area within UGA 817.3 Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	4,263,772	97.9	12.0	4.2	4.2	7.8
R5	5 units/gross acre	50	48	48	52	14,571,066	334.5	40.9	19.6	19.6	21.3
R7	7 units/gross acre	50	56	56	44	5,553,584	127.5	15.6	8.7	8.7	6.9
R10	10 units/gross acre	60	70	70	30	0	0.0	0.0	0.0	0.0	0.0
R12	12 units/gross acre	60	70	70	30	8,851,798	203.2	24.9	17.4	17.4	7.5
R16	16 units/gross acre	70	80	80	20	0	0.0	0.0	0.0	0.0	0.0
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	1,077,826	24.7	3.0	2.6	2.6	0.5
R1-20	20 units/gross acre	80	85	85	15	244,818	5.6	0.7	0.6	0.6	0.1
Rural		N/A	15	15	15	0	0.0	0.0	0.0	0.0	0.0
Total							**793.5**	**97.1**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	1,053,863	24.2	3.0	3.0	3.0	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
Total							**24.2**	**3.0**			
Light Industrial											
ML	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**0.0**	**0.0**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
							818	100	56	56	44

Woodin Creek Catchment #2 Summary
(WDN8B, WDN11, WDN12, WDN13, WDN14, SCN10C)

Criteria	Score	
MS4 Contribution	3	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	3	
Traffic Volume	2	
Population Density	2	2,000-4,800/Sq. Mi.
Tree Canopy	2	~20%
Lack of SW Facilities	1	
Agricultural Areas	0	
Industrial Areas	0	
Residential Areas	3	
Enviromental Justice	2	
WWHM Soil Type	2	
Total	**26**	

Woodin Creek Catchment #2 WWHM Soil Groups

Basin	Catchment Arera	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
Woodin Creek Catchment #2	817.3	817.3			24,950,207	10,652,484		0	0	573	245	0		0.0	70.1	29.9		100.0	

MS4 Contributions

Basin	Catchment Area	Area within UGA	Percent of Basin within UGA	Score
Catchment #2	817.3	817.3	100.0	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Catchment Area (Acres)	Score	Area within UGA
Woodin Creek Catchment #2	20	25	10	45	817.3	1.2	817.3

Woodin Creek Catchment #2 Basin Traffic Summary

Area within UGA 817.3 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
Woodin Creek Catchment #2	500	84,302	16.0	1,000	4,513	0.9	5,000	928	0.2	8,000	17,086	3.2	10,000	0	0.0		0	0.0	35,605	27,881

Total Length 106,829
Local Only 84,302

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

Woodin Creek Catchment #3 Summary
(WDN5B1, WDN5B3, WDN6A, WDN6B, SCN10B, .SCN10D1, SCN10D2, SCN10D3)

Catchment Area within UGA 650 Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	0	0.0	0.0	0.0	0.0	0.0
R5	5 units/gross acre	50	48	48	52	0	0.0	0.0	0.0	0.0	0.0
R7	7 units/gross acre	50	56	56	44	12,402,586	284.7	43.8	24.5	24.5	19.3
R10	10 units/gross acre	60	70	70	30	657,556	15.1	2.3	1.6	1.6	0.7
R12	12 units/gross acre	60	70	70	30	0	0.0	0.0	0.0	0.0	0.0
R16	16 units/gross acre	70	80	80	20	0	0.0	0.0	0.0	0.0	0.0
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	548,695	12.6	1.9	1.6	1.6	0.3
R1-20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Rural		N/A	15	15	15	0	0.0	0.0	0.0	0.0	0.0
Total							**312.4**	**48.1**			
AG-20	20 acres agricultural	N/A	5	5	95		0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	2,099,401	48.2	7.4	6.7	6.7	0.7
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	3,729,880	85.6	13.2	13.2	13.2	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10	126,741	2.9	0.4	0.4	0.4	0.0
Total							**136.7**	**21.0**			
Light Industrial											
ML	Unk.		85	85	15	8,745,470	200.8	30.9	26.3	26.3	4.6
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**200.8**	**30.9**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
							650	100	74	74	26

Woodin Creek Catchment #3 Summary
(WDN5B1, WDN5B3, WDN6A, WDN6B, SCN10B, .SCN10D1, SCN10D2, SCN10D3)

Criteria	Score	
MS4 Contribution	3	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	2	
Traffic Volume	3	
Population Density	1	1,000 - 2,700 (Avg. 2,000/Sq. Mi.)
Tree Canopy	3	~10%
Lack of SW Facilities	2	
Agricultural Areas	0	
Industrial Areas	2	
Residential Areas	2	
Enviromental Justice	2	
WWHM Soil Type	2	
Total	**28**	

Woodin Creek Catchment #3 WWHM Soil Groups

Basin	Catchment Arera	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
Woodin Creek Catchment #1	651	651		912,465	8,612,182	18,843,711		0	21	198	433	0		3.2	30.4	66.5		100.0	

MS4 Contributions

Basin	Catchment Area	Area within UGA	Percent of Basin within UGA	Score
Catchment #3	651	651	100.0	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Catchment Area (Acres)	Score	Area within UGA
Woodin Creek(Catchment #3)	25	60	5	10	651	2	651

Woodin Creek Catchment #3 Basin Traffic Summary

Area within UGA 651 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
Woodin Creek (Catchment #1)	500	62,355	12	1,000	11,637	2	5,000	3,547	1	8,000	20,557	3.9	10,000	0	0		0	0	42,615	41,895

Total Length 98,096
Local Only 62,355

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5					12,591
West Leg																27,140				

Woodin Creek Catchment #4 Summary
(WDN2, WDN3, WDN4, WDN5A1, WDN5A2, WDN5A3, WDN5A4, WDN5B2)

Catchment Area within UGA 638.9 Acres

Zoning	Definition	Max. Lot Coverage	Impervious Area Assumption per GA	PGIS Assumption per GA	PGPS Assumption per GA	Area SF	Area Ac.	Percent in UGA	Percent Impervious Area within UGA	Percent PGIS within UGA	Percent PGPS within UGA
Residential Districts											
R3	3 units/gross acre	50	35	35	65	3,754,436	86.2	13.5	4.7	4.7	8.8
R5	5 units/gross acre	50	48	48	52	1,890,012	43.4	6.8	3.3	3.3	3.5
R7	7 units/gross acre	50	56	56	44	7,316,893	168.0	26.3	14.7	14.7	11.6
R10	10 units/gross acre	60	70	70	30	6,081,266	139.6	21.9	15.3	15.3	6.6
R12	12 units/gross acre	60	70	70	30	46,404	1.1	0.2	0.1	0.1	0.1
R16	16 units/gross acre	70	80	80	20	3,029,149	69.5	10.9	8.7	8.7	2.2
R18	18 units/gross acre	75	75	82.5	17.5	0	0.0	0.0	0.0	0.0	0.0
R20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
R1-20	20 units/gross acre	80	85	85	15	0	0.0	0.0	0.0	0.0	0.0
Rural		N/A	15	15	15	0	0.0	0.0	0.0	0.0	0.0
Total							**507.8**	**79.5**			
AG-20	20 acres agricultural	N/A	5	5	95	0	0.0	0.0	0.0	0.0	0.0
Commercial Districts											
RC (Regional Center)	20% min. LS	Assume 90% Gross	90	90	10	2,486,280	57.1	8.9	8.0	8.0	0.9
D (Downtown)	0% min. LS	Assume 100% Gross	100	100	0	0	0.0	0.0	0.0	0.0	0.0
CC (Community Center)	20% min. LS	Assume 90% Gross	90	90	10	0	0.0	0.0	0.0	0.0	0.0
NC (Neighborhood Center)	20% min. LS	Assume 90% Gross	90	90	10		0.0	0.0	0.0	0.0	0.0
Total							**57.1**	**8.9**			
Light Industrial											
ML	Unk.		85	85	15	1,795,410	41.2	6.5	5.5	5.5	1.0
EC	50% Bldg max.	Assume 85% Gross	85	85	15	0	0.0	0.0	0.0	0.0	0.0
WE	Unk.		85	85	15	0	0.0	0.0	0.0	0.0	0.0
Total							**41.2**	**6.5**			
Mixed Use											
MU-R	70% or other max. coverage	Assume 85% Gross	85	85	15	1,417,053	32.5	5.1	4.3	4.3	0.8
MU-E	70% or other max. coverage	Assume 85% Gross	85	85	15		0.0	0.0	0.0	0.0	0.0
Total							**32.5**	**5.1**			
Air Park District											
A	Unk.	Assume 75% Gross	75	75	25	0	0.0	0.0	0.0	0.0	0.0
Greenway Conservation Overlay Area											
GC	Unk.	Assume 10% Gross	20	20	0	0	0.0	0.0	0.0	0.0	0.0
Parks, Recreation and Open Spaces											
N/A	Unk.	Assume 10% Gross	20	20	80	0	0.0	0.0	0.0	0.0	0.0
							639	100	65	65	35

Woodin Creek Catchment #4 Summary
(WDN2, WDN3, WDN4, WDN5A1, WDN5A2, WDN5A3, WDN5A4, WDN5B2)

Criteria	Score	
MS4 Contribution	3	
Impervious Surface	3	
Pollution Generating Impervious Surface	3	
Pollution Generating Pervious Surface	2	
Traffic Volume	3	
Population Density	0	436/Sq. Mi.
Tree Canopy	1	~50%
Lack of SW Facilities	1	
Agricultural Areas	0	
Industrial Areas	2	
Residential Areas	3	
Enviromental Justice	2	
WWHM Soil Type	2	
Total	**25**	

Woodin Creek Catchment #4 WWHM Soil Groups

Basin	Catchment Arera	Area within UGA	SG1 SF	SG2 SF	SG3 SF	SG4 SF	SG5 SF	SG1 Ac.	SG2 Ac.	SG3 Ac.	SG4 Ac.	SG5 Ac.	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %	Percent of Basin within UGA	Score
Woodin Creek Catchment #4	638.9	638.9		3,807,799	19,828,792	4,193,909		0	87	455	96	0		13.7	71.2	15.1		100.0	

MS4 Contributions

Basin	Catchment Area	Area within UGA	Percent of Basin within UGA	Score
Catchment #4	638.9	638.9	100.0	3

Stormwater Development Requirements

Basin	No SW Controls (%)	Puget Sound Manual (%)	Stormwater Management Manual for Western Washington (%)	Undeveloped (%)	Catchment Area (Acres)	Score	Area within UGA
Woodin Creek Catchment #4	0	10	45	45	638.9	0.65	638.9

Woodin Creek Catchment #4 Basin Traffic Summary

Area within UGA 638.9 Acres

Basin	ADT Local	Feet	Local Miles	ADT Neighborhood Collector	Neighborhood Collector Feet	Neighborhood Collector Miles	ADT Major Collector	Major Collector Feet	Major Collector Miles	ADT Minor Arterial	Minor Arterial Feet	Minor Arterial Miles	ADT Principal Arterial	Principal Arterial Feet	Principal Arterial Miles	ADT State Highway	State Highway Feet	State Highway Miles	Vehicle Miles/Day	Vehicle Miles/Day/Sq. Mi.
Woodin Creek (Catchment #1)	500	52,484	9.9	1,000	0	0.0	5,000	4,775	0.9	8,000	5,398	1.0	10,000	0	0.0	27,697	6,371	1.2	51,091	51,179

Total Length 69,028
Local Only 52,484

RTC Data																				
NE 219th St/SR 503																				
North Leg																22,540				
South Leg																27,697				
East Leg													25,471	2,610	0.5				12,591	
West Leg																27,140				

APPENDIX F

ENGINEER'S ESTIMATES

W. Main Street (SR503 to Parkway Avenue)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$43,180.00	$43,180.00	8% of Construction Costs
Construction Surveying (1%)	1	LS	$5,397.50	$5,397.50	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 2 days/CB, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$5,000.00	$5,000.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	20	EA	$18,000.00	$360,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	100	CY	$50.00	$5,000.00	Assume 5 CY/Filter CB
Crushed Surfacing Base Course	20	CY	$75.00	$1,500.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	10	CY	$75.00	$750.00	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$5,000.00	$5,000.00	
Asphalt (1/2" PG64-22)	20	TN	$300.00	$6,000.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	200	LF	$200.00	$40,000.00	Assume 10 LF/CB
Connect to Drainage Structure	20	EA	$2,500.00	$50,000.00	Assume 1/CB
Adjust Manhole	20	EA	$1,200.00	$24,000.00	Assume 1/CB

Sub-total	**$588,327.50**
Contingency (50%)	$294,163.75
Engineering (30%)	$176,498.25
Total	**$1,058,989.50**

W. Main Street (SR503 to Parkway Avenue)
Filter Catch Basins Conceptual Engineer's Estimate

CONSOR's construction cost estimate ("estimate") is in dollars valued as of the date of this estimate. This estimate is an opinion of probable cost based on information available at the time of its development. Final costs will depend on
- actual field conditions.
- actual material and labor costs.
- market conditions for construction.
- regulatory factors.
- final project scope.
- method of implementation.
- schedule (time to completion? time of commencement? Speed of execution?), and
- other variables.

This estimate is based on our perception, which is based on experience and research, yet nevertheless, an assessment, of current conditions at the project location. This estimate reflects our professional opinion of current costs and is subject to change as the project design evolves. CONSOR has no control over, nor can it forecast variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means, and methods of executing the work, or of determining prices, of the impact of competitive bidding or market conditions, practices, or bidding strategies. CONSOR neither warrants nor guarantees that proposals, bids, or actual construction costs will reflect the costs presented, which are for illustrative purposes only.

Existing Catch Basins	20

W. Main Street (SR503 to Parkway Avenue)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$136,236.07	$136,236.07	8% of Construction Costs
Construction Surveying (1%)	1	LS	$16,860.90	$16,860.90	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$100,300.00	$100,300.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	3,009	CY	$50.00	$150,450.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	1,003	CY	$75.00	$75,225.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	401	CY	$75.00	$30,075.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	201	CY	$75.00	$15,075.00	6" under asphalt. Assume 1 CY/10 LF o bioretention cell length
Erosion Control	1	LS	$10,000.00	$10,000.00	
Bioretention Soil Mix	667	CY	$70.00	$46,690.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	2,006	LF	$20.00	$40,120.00	Assume average combined approx. $20/LF
Asphalt (1/2" PG64-22)	301	TN	$300.00	$90,300.00	Assume 1.5 TN/10 LF of bioretention cell
48" Manhole	18	EA	$15,000.00	$270,000.00	Assume 1/bioretention cell
Overflow Structure	18	EA	$5,000.00	$90,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	2,006	LF	$45.00	$90,270.00	Length of bioretention cell
10" Storm Sewer Pipe	360	LF	$200.00	$72,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	18	EA	$2,500.00	$45,000.00	1 per bioretention cell
Adjust Manhole	18	EA	$1,200.00	$21,600.00	1 per bioretention cell
Concrete Curb and Gutter	2,006	LF	$80.00	$160,480.00	Length of bioretention cell
Concrete Curb	2,006	LF	$80.00	$160,480.00	Length of bioretention cell
Cement Concrete Sidewalk	1,003	SY	$175.00	$175,525.00	0.5 SY per LF of bioretention cell

Sub-total	**$1,839,186.97**
Contingency (50%)	$919,593.49
Engineering (30%)	$551,756.09
Total	**$3,310,536.55**

W. Main Street (SR503 to Parkway Avenue)
Bioretention Conceptual Engineer's Estimate

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- final project scope.
- method of implementation.
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Project Length	2,500
ROW	76
Number of Bioretention Cells	18
Bioretention Cell Length	1,900
Bioretention Width	5
Bioretention Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

E. Main Street (Parkway Avenue to Grace Avenue)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$44,015.80	$44,015.80	8% of Construction Costs
Construction Surveying (1%)	1	LS	$5,447.50	$5,447.50	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$5,000.00	$5,000.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	20	EA	$18,000.00	$360,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	100	CY	$50.00	$5,000.00	Assume 5 CY/Filter CB
Gravel backfill	0	CY	$75.00	$0.00	
Crushed Surfacing Base Course	20	CY	$75.00	$1,500.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	10	CY	$75.00	$750.00	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$10,000.00	$10,000.00	
Asphalt (1/2" PG64-22)	20	TN	$300.00	$6,000.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	200	LF	$200.00	$40,000.00	Assume 10 LF/CB
Connect to Drainage Structure	20	EA	$2,500.00	$50,000.00	Assume 1/CB
Adjust Manhole	20	EA	$1,200.00	$24,000.00	Assume 1/CB

Sub-total	**$594,213.30**
Contingency (50%)	$297,106.65
Engineering (30%)	$178,263.99
Total	**$1,069,583.94**

E. Main Street (Parkway Avenue to Grace Avenue)
Filter Catch Basins Conceptual Engineer's Estimate

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- actual field conditions.
- actual material and labor costs.
- market conditions for construction.
- regulatory factors.
- final project scope.
- method of implementation.
- schedule (time to completion? time of commencement? Speed of execution?), and
- other variables.

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Existing Catch Basins	20

E. Main Street (Parkway Avenue to Grace Avenue)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$112,056.27	$112,056.27	8% of Construction Costs
Construction Surveying (1%)	1	LS	$13,868.35	$13,868.35	1% of Construction Costs
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$76,250.00	$76,250.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	2,288	CY	$50.00	$114,400.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	763	CY	$75.00	$57,225.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	305	CY	$75.00	$22,875.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	153	CY	$75.00	$11,475.00	6" under asphalt. Assume 1 CY/10 LF of bioretention cell length
Bioretention Soil Mix	508	CY	$70.00	$35,560.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	1,525	LF	$20.00	$30,500.00	Assume average combined approx. $20/LF
Erosion Control	1	LS	$10,000.00	$10,000.00	
Asphalt (1/2" PG64-22)	230	TN	$300.00	$69,000.00	Assume 1.5 TN/10 LF of bioretention cell length
48" Manhole	17	EA	$15,000.00	$255,000.00	Assume 1/bioretention cell
Overflow Structure	17	EA	$5,000.00	$85,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	1,525	LF	$45.00	$68,625.00	Length of bioretention cell
10" Storm Sewer Pipe	340	LF	$200.00	$68,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	17	EA	$2,500.00	$42,500.00	1 per bioretention cell
Adjust Manhole	17	EA	$1,200.00	$20,400.00	1 per bioretention cell
Concrete Curb and Gutter	1,525	LF	$80.00	$122,000.00	Length of bioretention cell
Concrete Curb	1,525	LF	$80.00	$122,000.00	Length of bioretention cell
Cement Concrete Sidewalk	763	SY	$175.00	$133,525.00	0.5 SY per LF of bioretention cell

Sub-total	**$1,512,759.62**
Contingency (50%)	$756,379.81
Engineering (30%)	$453,827.89
Total	**$2,722,967.31**

E. Main Street (Parkway Avenue to Grace Avenue)
Bioretention Conceptual Engineer's Estimate

Project Length	2,100
Right-of-way	60
Number of Bioretention Cells	17
Bioretention Cell Length	1,525
Bioretention Cell Width	5
Bioretention Cell Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

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- actual field conditions.
- actual material and labor costs.
- market conditions for construction.
- regulatory factors.
- final project scope.
- method of implementation.
- schedule (time to completion? time of commencement? Speed of execution?), and
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NE Grace Avenue (Main to NE 2nd Street)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$11,093.84	$11,093.84	8% of Construction Costs
Construction Surveying (1%)	1	LS	$1,373.00	$1,373.00	
Traffic Control	1	LS	$5,000.00	$5,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 5 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$1,250.00	$1,250.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	5	EA	$18,000.00	$90,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	25	CY	$50.00	$1,250.00	Assume 5 CY/Filter CB
Crushed Surfacing Base Course	5	CY	$75.00	$375.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	3	CY	$75.00	$225.00	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$3,000.00	$3,000.00	
Asphalt (1/2" PG64-22)	5	TN	$300.00	$1,500.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	50	LF	$200.00	$10,000.00	Assume 10 LF/CB
12" Storm Sewer Pipe	0	LF	$200.00	$0.00	
Connect to Drainage Structure	6	EA	$2,500.00	$15,000.00	Assume 1/CB
Adjust Manhole	6	EA	$1,200.00	$7,200.00	Assume 1/CB

Sub-total	**$149,766.84**
Contingency (50%)	$74,883.42
Engineering (30%)	$44,930.05
Total	**$269,580.31**

NE Grace Avenue (Main to NE 2nd Street)
Filter Catch Basins Conceptual Engineer's Estimate

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- actual field conditions.
- actual material and labor costs.
- market conditions for construction.
- regulatory factors.
- final project scope.
- method of implementation.
- schedule (time to completion? time of commencement? Speed of execution?), and
- other variables.

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Existing Catch Basins	5

NE Grace Avenue (Main to NE 2nd Street)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$31,116.08	$31,116.08	8% of Construction Costs
Construction Surveying (1%)	1	LS	$3,851.00	$3,851.00	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$17,300.00	$17,300.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	519	CY	$50.00	$25,950.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	173	CY	$75.00	$12,975.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	69	CY	$75.00	$5,175.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	35	CY	$75.00	$2,625.00	6" under asphalt. Assume 1 CY/10 LF of bioretention cell length
Bioretention Soil Mix	115	CY	$70.00	$8,050.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	346	LF	$20.00	$6,920.00	Assume average combined approx. $20/LF
Erosion Control	1	LS	$8,000.00	$8,000.00	
Asphalt (1/2" PG64-22)	53	TN	$300.00	$15,900.00	Assume 1.5 TN/10 LF of bioretention cell length
48" Manhole	5	EA	$15,000.00	$75,000.00	Assume 1/bioretention cell
Overflow Structure	5	EA	$5,000.00	$25,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	346	LF	$45.00	$15,570.00	Length of bioretention cell
10" Storm Sewer Pipe	100	LF	$200.00	$20,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	5	EA	$2,500.00	$12,500.00	1 per bioretention cell
Adjust Manhole	5	EA	$1,200.00	$6,000.00	1 per bioretention cell
Concrete Curb and Gutter	346	LF	$80.00	$27,680.00	Length of bioretention cell
Concrete Curb	346	LF	$80.00	$27,680.00	Length of bioretention cell
Cement Concrete Sidewalk	173	SY	$175.00	$30,275.00	0.5 SY per LF of bioretention cell

Sub-total	**$420,067.08**
Contingency (50%)	$210,033.54
Engineering (30%)	$126,020.12
Total	**$756,120.74**

NE Grace Avenue (Main to NE 2nd Street)
Bioretention Conceptual Engineer's Estimate

CONSOR's construction cost estimate ("estimate") is in dollars valued as of the date of this estimate. This estimate is an opinion of probable cost based on information available at the time of its development. Final costs will depend on

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- regulatory factors.
- final project scope.
- method of implementation.
- schedule (time to completion? time of commencement? Speed of execution?), and
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Project Length	658
Right-of-way	60
Number of Bioretention Cells	5
Bioretention Cell Length	346
Bioretention Cell Width	5
Bioretention Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

NE Clark Avenue (Main to NE 3rd Way)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$6,531.67	$6,531.67	8% of Construction Costs
Construction Surveying (1%)	1	LS	$808.38	$808.38	
Traffic Control	1	LS	$6,000.00	$6,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 6 days
SPCC Plan	1	LS	$500.00	$500.00	
Removal of Structures and Obstructions	1	LS	$750.00	$750.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	3	EA	$18,000.00	$54,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	15	CY	$50.00	$750.00	Assume 5 CY/Filter CB
Crushed Surfacing Base Course	3	CY	$75.00	$225.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	1.5	CY	$75.00	$112.50	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$500.00	$500.00	
Asphalt (1/2" PG64-22)	3	TN	$300.00	$900.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	30	LF	$200.00	$6,000.00	Assume 10 LF/CB
Connect to Drainage Structure	3	EA	$2,500.00	$7,500.00	Assume 1/CB
Adjust Manhole	3	EA	$1,200.00	$3,600.00	Assume 1/CB

Sub-total	**$88,177.55**
Contingency (50%)	$44,088.77
Engineering (30%)	$26,453.26
Total	**$158,719.58**

NE Clark Avenue (Main to NE 3rd Way)
Filter Catch Basins Conceptual Engineer's Estimate

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- final project scope.
- method of implementation.
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Existing Catch Basins	3

NE Clark Avenue (Main to NE 3rd Way)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$20,158.39	$20,158.39	8% of Construction Costs
Construction Surveying (1%)	1	LS	$2,494.85	$2,494.85	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SSPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$12,500.00	$12,500.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	375	CY	$50.00	$18,750.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	125	CY	$75.00	$9,375.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	50	CY	$75.00	$3,750.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	25	CY	$75.00	$1,875.00	6" under asphalt. Assume 1 CY/10 LF of bioretention cell length
Bioretention Soil Mix	83	CY	$70.00	$5,810.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	250	LF	$20.00	$5,000.00	Assume average combined approx. $20/LF
Erosion Control	1	LS	$10,000.00	$10,000.00	
Asphalt (1/2" PG64-22)	38	TN	$300.00	$11,400.00	Assume 1.5 TN/10 LF of bioretention cell length
48" Manhole	2	EA	$15,000.00	$30,000.00	Assume 1/bioretention cell
Overflow Structure	2	EA	$5,000.00	$10,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	250	LF	$45.00	$11,250.00	Length of bioretention cell
10" Storm Sewer Pipe	40	LF	$200.00	$8,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	2	EA	$2,500.00	$5,000.00	1 per bioretention cell
Adjust Manhole	2	EA	$1,200.00	$2,400.00	1 per bioretention cell
Concrete Curb and Gutter	250	LF	$80.00	$20,000.00	Length of bioretention cell
Concrete Curb	250	LF	$80.00	$20,000.00	Length of bioretention cell
Cement Concrete Sidewalk	125	SY	$175.00	$21,875.00	0.5 SY per LF of bioretention cell

Sub-total	**$272,138.24**
Contingency (50%)	$136,069.12
Engineering (30%)	$81,641.47
Total	**$489,848.83**

NE Clark Avenue (Main to NE 3rd Way)
Bioretention Conceptual Engineer's Estimate

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Project Length	800
Right-of-way	60
Number of Bioretention Cells	2
Bioretention Cell Length	250
Bioretention Cell Width	5
Bioretention Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

SE Clark Avenue (Main to SE 3rd Avenue)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$9,207.16	$9,207.16	8% of Construction Costs
Construction Surveying (1%)	1	LS	$1,139.50	$1,139.50	
Traffic Control	1	LS	$10,000.00	$10,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 10 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$1,000.00	$1,000.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	4	EA	$18,000.00	$72,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	20	CY	$50.00	$1,000.00	Assume 5 CY/Filter CB
Crushed Surfacing Base Course	4	CY	$75.00	$300.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	2	CY	$75.00	$150.00	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$3,000.00	$3,000.00	
Asphalt (1/2" PG64-22)	4	TN	$300.00	$1,200.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	40	LF	$200.00	$8,000.00	Assume 10 LF/CB
Connect to Drainage Structure	4	EA	$2,500.00	$10,000.00	Assume 1/CB
Adjust Manhole	4	EA	$1,200.00	$4,800.00	Assume 1/CB

Sub-total	**$124,296.66**
Contingency (50%)	$62,148.33
Engineering (30%)	$37,289.00
Total	**$223,733.99**

SE Clark Avenue (Main to SE 3rd Avenue)
Filter Catch Basins Conceptual Engineer's Estimate

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Existing Catch Basins	4

SE Clark Avenue (Main to SE 3rd Avenue)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$19,507.54	$19,507.54	8% of Construction Costs
Construction Surveying (1%)	1	LS	$2,414.30	$2,414.30	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$9,550.00	$9,550.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	287	CY	$50.00	$14,350.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	96	CY	$75.00	$7,200.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	38	CY	$75.00	$2,850.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	19	CY	$75.00	$1,425.00	6" under asphalt. Assume 1 CY/10 LF of bioretention cell length
Bioretention Soil Mix	64	CY	$70.00	$4,480.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	191	LF	$20.00	$3,820.00	Assume average combined approx. $20/LF
Erosion Control	1	LS	$7,500.00	$7,500.00	
Asphalt (1/2" PG64-22)	29	TN	$300.00	$8,700.00	Assume 1.5 TN/10 LF of bioretention cell length
48" Manhole	3	EA	$15,000.00	$45,000.00	Assume 1/bioretention cell
Overflow Structure	3	EA	$5,000.00	$15,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	191	LF	$45.00	$8,595.00	Length of bioretention cell
10" Storm Sewer Pipe	60	LF	$200.00	$12,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	3	EA	$2,500.00	$7,500.00	1 per bioretention cell
Adjust Manhole	3	EA	$1,200.00	$3,600.00	1 per bioretention cell
Concrete Curb and Gutter	191	LF	$80.00	$15,280.00	Length of bioretention cell
Concrete Curb	191	LF	$80.00	$15,280.00	Length of bioretention cell
Cement Concrete Sidewalk	96	SY	$175.00	$16,800.00	0.5 SY per LF of bioretention cell

Sub-total	**$263,351.84**
Contingency (50%)	$131,675.92
Engineering (30%)	$79,005.55
Total	**$474,033.32**

SE Clark Avenue (Main to SE 3rd Avenue)
Bioretention Conceptual Engineer's Estimate

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Project Length	775
Right-of-way	60
Number of Bioretention Cells	3
Bioretention Cell Length	191
Bioretention Cell Width	5
Bioretention Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

NE 3rd Avenue (Main to NE 7th Street)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$29,690.97	$29,690.97	8% of Construction Costs
Construction Surveying (1%)	1	LS	$3,674.63	$3,674.63	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$3,250.00	$3,250.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	13	EA	$18,000.00	$234,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	65	CY	$50.00	$3,250.00	Assume 5 CY/Filter CB
Crushed Surfacing Base Course	13	CY	$75.00	$975.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	6.5	CY	$75.00	$487.50	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$5,000.00	$5,000.00	
Asphalt (1/2" PG64-22)	13	TN	$300.00	$3,900.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	130	LF	$200.00	$26,000.00	Assume 10 LF/CB
Connect to Drainage Structure	13	EA	$2,500.00	$32,500.00	Assume 1/CB
Adjust Manhole	13	EA	$1,200.00	$15,600.00	Assume 1/CB

Sub-total	**$400,828.10**
Contingency (50%)	$200,414.05
Engineering (30%)	$120,248.43
Total	**$721,490.57**

NE 3rd Avenue (Main to NE 7th Street)
Filter Catch Basins Conceptual Engineer's Estimate

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Existing Catch Basins	13

NE 3rd Avenue (Main to NE 7th Street)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$72,715.15	$72,715.15	8% of Construction Costs
Construction Surveying (1%)	1	LS	$8,999.40	$8,999.40	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SSPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$43,050.00	$43,050.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	1,292	CY	$50.00	$64,600.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	431	CY	$75.00	$32,325.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	173	CY	$75.00	$12,975.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	86	CY	$75.00	$6,450.00	6" under asphalt. Assume 1 CY/10 LF of bioretention cell length
Bioretention Soil Mix	287	CY	$70.00	$20,090.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	861	LF	$20.00	$17,220.00	Assume average combined approx. $20/LF
Erosion Control	1	LS	$10,000.00	$10,000.00	
Asphalt (1/2" PG64-22)	129	TN	$300.00	$38,700.00	Assume 1.5 TN/10 LF of bioretention cell length
48" Manhole	13	EA	$15,000.00	$195,000.00	Assume 1/bioretention cell
Overflow Structure	13	EA	$5,000.00	$65,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	861	LF	$45.00	$38,745.00	Length of bioretention cell
10" Storm Sewer Pipe	260	LF	$200.00	$52,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	13	EA	$2,500.00	$32,500.00	1 per bioretention cell
Adjust Manhole	13	EA	$1,200.00	$15,600.00	1 per bioretention cell
Concrete Curb and Gutter	861	LF	$80.00	$68,880.00	Length of bioretention cell
Concrete Curb	861	LF	$80.00	$68,880.00	Length of bioretention cell
Cement Concrete Sidewalk	431	SY	$175.00	$75,425.00	0.5 SY per LF of bioretention cell

Sub-total	**$981,654.55**
Contingency (50%)	$490,827.28
Engineering (30%)	$294,496.37
Total	**$1,766,978.19**

NE 3rd Avenue (Main to NE 7th Street)
Bioretention Conceptual Engineer's Estimate

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- market conditions for construction.
- regulatory factors.
- final project scope.
- method of implementation.
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Project Length	1,950
ROW	60
Number of Bioretention Cells	13
Bioretention Cell Length	861
Bioretention Cell Width	5
Bioretention Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

SE 3rd Avenue (Main to SE 3rd Street)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$22,727.02	$22,727.02	8% of Construction Costs
Construction Surveying (1%)	1	LS	$2,812.75	$2,812.75	
Traffic Control	1	LS	$5,000.00	$5,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 5 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$2,750.00	$2,750.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	11	EA	$18,000.00	$198,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	55	CY	$50.00	$2,750.00	Assume 5 CY/Filter CB
Crushed Surfacing Base Course	11	CY	$75.00	$825.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	6	CY	$75.00	$450.00	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$3,000.00	$3,000.00	
Asphalt (1/2" PG64-22)	11	TN	$300.00	$3,300.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	110	LF	$200.00	$22,000.00	Assume 10 LF/CB
Connect to Drainage Structure	11	EA	$2,500.00	$27,500.00	Assume 1/CB
Adjust Manhole	11	EA	$1,200.00	$13,200.00	Assume 1/CB

Sub-total	**$306,814.77**
Contingency (50%)	$153,407.39
Engineering (30%)	$92,044.43
Total	**$552,266.59**

SE 3rd Avenue (Main to SE 3rd Street)
Filter Catch Basins Conceptual Engineer's Estimate

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- market conditions for construction.
- regulatory factors.
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Existing Catch Basins	11

SE 3rd Avenue (Main to SE 3rd Street)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$23,402.91	$23,402.91	8% of Construction Costs
Construction Surveying (1%)	1	LS	$2,896.40	$2,896.40	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$13,750.00	$13,750.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	413	CY	$50.00	$20,650.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	138	CY	$75.00	$10,350.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	55	CY	$75.00	$4,125.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	28	CY	$75.00	$2,100.00	6" under asphalt. Assume 1 CY/10 LF of bioretention cell length
Bioretention Soil Mix	92	CY	$70.00	$6,440.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	275	LF	$20.00	$5,500.00	Assume average combined approx. $20/LF
Erosion Control	1	LS	$8,000.00	$8,000.00	
Asphalt (1/2" PG64-22)	42	TN	$300.00	$12,600.00	Assume 1.5 TN/10 LF of bioretention cell length
48" Manhole	3	EA	$15,000.00	$45,000.00	Assume 1/bioretention cell
Overflow Structure	3	EA	$5,000.00	$15,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	275	LF	$45.00	$12,375.00	Length of bioretention cell
10" Storm Sewer Pipe	60	LF	$200.00	$12,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	3	EA	$2,500.00	$7,500.00	1 per bioretention cell
Adjust Manhole	3	EA	$1,200.00	$3,600.00	1 per bioretention cell
Concrete Curb and Gutter	275	LF	$80.00	$22,000.00	Length of bioretention cell
Concrete Curb	275	LF	$80.00	$22,000.00	Length of bioretention cell
Cement Concrete Sidewalk	138	SY	$175.00	$24,150.00	0.5 SY per LF of bioretention cell

Sub-total	**$315,939.31**
Contingency (50%)	$157,969.66
Engineering (30%)	$94,781.79
Total	**$568,690.76**

SE 3rd Avenue (Main to SE 3rd Street)
Bioretention Conceptual Engineer's Estimate

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- actual material and labor costs.
- market conditions for construction.
- regulatory factors.
- final project scope.
- method of implementation.
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Project Length	760
Right-of-way	60
Number of Bioretention Cells	3
Bioretention Cell Length	275
Bioretention Cell Width	5
Bioretention Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

SW 6th Street (S. Parkway to SW 3rd Ave)
Filter Catch Basins Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$25,514.62	$25,514.62	8% of Construction Costs
Construction Surveying (1%)	1	LS	$3,157.75	$3,157.75	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$2,750.00	$2,750.00	Asphalt, curb and sidewalk removal. Assume $250/CB
Filter Catch Basin (1-27" cartridge)	11	EA	$18,000.00	$198,000.00	Assume 1-27" Filter CB replaces 1 existing CB
Excavation Incl. Haul	55	CY	$50.00	$2,750.00	Assume 5 CY/Filter CB
Crushed Surfacing Base Course	11	CY	$75.00	$825.00	12" under asphalt - Assume 1 CY/CB
Crushed Surfacing Top Course	6	CY	$75.00	$450.00	6" under asphalt - Assume 0.5 CY/CB
Erosion Control	1	LS	$2,500.00	$2,500.00	
Asphalt (1/2" PG64-22)	11	TN	$300.00	$3,300.00	Assume 1.0 TN/CB
10" Storm Sewer Pipe	110	LF	$200.00	$22,000.00	Assume 10 LF/CB
Connect to Drainage Structure	11	EA	$2,500.00	$27,500.00	Assume 1/CB
Adjust Manhole	11	EA	$1,200.00	$13,200.00	Assume 1/CB

Sub-total	**$344,447.37**
Contingency (50%)	$172,223.69
Engineering (30%)	$103,334.21
Total	**$620,005.27**

SW 6th Street (S. Parkway to SW 3rd Ave)
Filter Catch Basins Conceptual Engineer's Estimate

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Existing Catch Basins	11

SW 6th Street (S. Parkway to SW 3rd Ave)
Bioretention Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$38,547.66	$38,547.66	8% of Construction Costs
Construction Surveying (1%)	1	LS	$4,770.75	$4,770.75	
Traffic Control	1	LS	$40,000.00	$40,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 40 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$23,250.00	$23,250.00	Asphalt, curb and sidewalk removal. Assume $50/LF of bioretention cell
Excavation incl. Haul	698	CY	$50.00	$34,900.00	Assume 1.5 CY/LF of bioretention cell length
Gravel backfill	233	CY	$75.00	$17,475.00	Assume 1 CY/2 LF of bioretention cell length
Crushed Surfacing Base Course	93	CY	$75.00	$6,975.00	12" under asphalt. Assume 1 CY/5 LF of bioretention cell length
Crushed Surfacing Top Course	47	CY	$75.00	$3,525.00	6" under asphalt. Assume 1 CY/10 LF of bioretention cell length
Bioretention Soil Mix	155	CY	$70.00	$10,850.00	Assume 1 CY/3 LF of bioretention cell length
Planting/Seeding/Mulch	465	LF	$20.00	$9,300.00	Assume average combined approx. $20/LF
Erosion Control	1	LS	$5,000.00	$5,000.00	
Asphalt (1/2" PG64-22)	70	TN	$300.00	$21,000.00	Assume 1.5 TN/10 LF of bioretention cell length
48" Manhole	6	EA	$15,000.00	$90,000.00	Assume 1/bioretention cell
Overflow Structure	6	EA	$5,000.00	$30,000.00	Assume 1/bioretention cell
6" Underdrain Storm Sewer Pipe	465	LF	$45.00	$20,925.00	Length of bioretention cell
10" Storm Sewer Pipe	120	LF	$200.00	$24,000.00	Assume 20 LF/bioretention cell
Connect to Drainage Structure	6	EA	$2,500.00	$15,000.00	1 per bioretention cell
Adjust Manhole	6	EA	$1,200.00	$7,200.00	1 per bioretention cell
Concrete Curb and Gutter	465	LF	$80.00	$37,200.00	Length of bioretention cell
Concrete Curb	465	LF	$80.00	$37,200.00	Length of bioretention cell
Cement Concrete Sidewalk	233	SY	$175.00	$40,775.00	0.5 SY per LF of bioretention cell

Sub-total	**$520,393.41**
Contingency (50%)	$260,196.71
Engineering (30%)	$156,118.02
Total	**$936,708.14**

SW 6th Street (S. Parkway to SW 3rd Ave)
Bioretention Conceptual Engineer's Estimate

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Project Length	925
Right-of-way	50
Number of Bioretention Cells	6
Bioretention Cell Length	980
Bioretention Cell Width	5
Bioretention Area	5%

Assume 5% of ROW area. (2019 SWMMWW Vol 1 - Ch 3 - Page 120. Per List approach, minimum bioretention area = 5% of area draining to it.)

403 SE 1st Street
Regional Stormwater Facility Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$44,722.80	$44,722.80	8% of Construction Costs
Property acquisition	1	EA	$156,750.00	$156,750.00	
Construction Surveying (1%)	1	LS	$5,535.00	$5,535.00	
Traffic Control	1	LS	$20,000.00	$20,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 20 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$2,600.00	$2,600.00	Asphalt, curb and sidewalk removal. Assume $20/LF of frontage
60" Control Manhole	1	EA	$18,000.00	$18,000.00	Assume 1/pond
Filter Catch Basin (1-27" cartridge)	10	EA	$18,000.00	$180,000.00	Assume 10-27" Filter CBs for treatment
6' Black Vinyl Fence	540	LF	$50.00	$27,000.00	Perimeter of site
20' Black Vinyl Double Swing Gate	1	EA	$3,000.00	$3,000.00	1 per pond
Excavation Incl. Haul	1,065	CY	$50.00	$53,250.00	Volume of pond. Assume 4 feet deep, 75% of lot area.
Crushed Surfacing Base Course	100	CY	$75.00	$7,500.00	12" under asphalt
Crushed Surfacing Top Course	50	CY	$75.00	$3,750.00	6" under asphalt
Erosion Control	1	LS	$7,500.00	$7,500.00	
Asphalt (1/2" PG64-22)	89	TN	$300.00	$26,700.00	Assume 0.45' thickness (20' width)
48" Flat-top manhole	5	EA	$15,000.00	$75,000.00	
12" Storm Sewer Pipe	500	LF	$200.00	$100,000.00	Assume 500 LF per pond and filter CB system
Concrete Curb and Gutter	130	LF	$80.00	$10,400.00	Length of frontage
Cement Concrete Sidewalk	72	SY	$175.00	$12,600.00	5 SF per length of frontage
Connect to Drainage Structure	1	EA	$2,500.00	$2,500.00	Assume 1/pond
Adjust Manhole	1	EA	$1,200.00	$1,200.00	Assume 1/pond

Sub-total	**$760,507.80**
Contingency (50%)	$380,253.90
Engineering (30%)	$228,152.34
Total	**$1,368,914.04**

403 SE 1st Street
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Lot area	9,583 SF
Frontage	130 LF
Perimeter	560 LF

503 SE 1st Street
Regional Stormwater Facility Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$87,373.08	$87,373.08	8% of Construction Costs
Property acquisition	1	EA	$465,300.00	$465,300.00	
Construction Surveying (1%)	1	LS	$10,813.50	$10,813.50	
Traffic Control	1	LS	$20,000.00	$20,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 20 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$5,300.00	$5,300.00	Asphalt, curb and sidewalk removal. Assume $20/LF of frontage on east portion of south side.
60" Control Manhole	1	EA	$18,000.00	$18,000.00	Assume 1/pond
Filter Catch Basin (1-27" cartridge)	10	EA	$18,000.00	$180,000.00	Assume 10-27" Filter CBs for treatment
6' Black Vinyl Fence	1,100	LF	$50.00	$55,000.00	Perimeter of site
20' Black Vinyl Double Swing Gate	1	EA	$3,000.00	$3,000.00	1 per pond
Excavation Incl. Haul	6,500	CY	$50.00	$325,000.00	Volume of pond. Assume 4 feet deep, 75% of lot area.
Crushed Surfacing Base Course	450	CY	$75.00	$33,750.00	12" under asphalt
Crushed Surfacing Top Course	225	CY	$75.00	$16,875.00	6" under asphalt
Erosion Control	1	LS	$10,000.00	$10,000.00	
Asphalt (1/2" PG64-22)	417	TN	$300.00	$125,100.00	Assume 0.45' thickness (20' width)
48" Flat-top manhole	5	EA	$15,000.00	$75,000.00	
12" Storm Sewer Pipe	500	LF	$200.00	$100,000.00	Assume 500 LF per pond and filter CB system
Concrete Curb and Gutter	610	LF	$80.00	$48,800.00	Length of frontage
Cement Concrete Sidewalk	339	SY	$175.00	$59,325.00	5 SF per length of frontage
Connect to Drainage Structure	1	EA	$2,500.00	$2,500.00	Assume 1/pond
Adjust Manhole	1	EA	$1,200.00	$1,200.00	Assume 1/pond

Sub-total	**$1,644,836.58**
Contingency (50%)	$822,418.29
Engineering (30%)	$493,450.97
Total	**$2,960,705.84**

503 SE 1st Street
Regional Stormwater Facility Conceptual Engineer's Estimate

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Lot area	57,935 SF
Frontage	675 LF
Perimeter	1,100 LF

SE Grace Avenue
Regional Stormwater Facility Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$53,441.12	$53,441.12	8% of Construction Costs
Property acquisition	1	EA	$0.00	$0.00	City owned ROW
Construction Surveying (1%)	1	LS	$6,614.00	$6,614.00	
Traffic Control	1	LS	$10,000.00	$10,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 10 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$5,200.00	$5,200.00	Asphalt, curb and sidewalk removal. Assume $20/LF of frontage
60" Control Manhole	1	EA	$18,000.00	$18,000.00	Assume 1/pond
Filter Catch Basin (1-27" cartridge)	10	EA	$18,000.00	$180,000.00	Assume 10-27" Filter CBs for treatment
6' Black Vinyl Fence	560	LF	$50.00	$28,000.00	Perimeter of site
20' Black Vinyl Double Swing Gate	1	EA	$3,000.00	$3,000.00	1 per pond
Excavation Incl. Haul	2,100	CY	$50.00	$105,000.00	Volume of pond. Assume 4 feet deep, 75% of lot area.
Crushed Surfacing Base Course	192	CY	$75.00	$14,400.00	12" under asphalt
Crushed Surfacing Top Course	96	CY	$75.00	$7,200.00	6" under asphalt
Erosion Control	1	LS	$10,000.00	$10,000.00	
Asphalt (1/2" PG64-22)	178	TN	$300.00	$53,400.00	Assume 0.45' thickness (20' width)
48" Flat-top manhole	5	EA	$15,000.00	$75,000.00	
12" Storm Sewer Pipe	500	LF	$200.00	$100,000.00	Assume 500 LF per pond and filter CB system
Concrete Curb and Gutter	260	LF	$80.00	$20,800.00	Length of frontage
Cement Concrete Sidewalk	144	SY	$175.00	$25,200.00	5 SF per length of frontage
Connect to Drainage Structure	1	EA	$2,500.00	$2,500.00	Assume 1/pond
Adjust Manhole	1	EA	$1,200.00	$1,200.00	Assume 1/pond

Sub-total	**$721,455.12**
Contingency (50%)	$360,727.56
Engineering (30%)	$216,436.54
Total	**$1,298,619.22**

SE Grace Avenue
Regional Stormwater Facility Conceptual Engineer's Estimate

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Lot area	19,000 SF	
Frontage	260 LF	Unknown?
Perimeter	580 LF	

101 NE 1st Street
Regional Stormwater Facility Conceptual Engineer's Estimate

Item	Quantity	Unit	Unit Price	Price	Assumptions
Mobilization (8%)	1	LS	$65,673.03	$65,673.03	8% of Construction Costs
Property acquisition	1	EA	$161,920.00	$161,920.00	
Construction Surveying (1%)	1	LS	$8,127.85	$8,127.85	
Traffic Control	1	LS	$20,000.00	$20,000.00	2 Flaggers, $60/Hr, 8 Hrs/Day, 20 days
SPCC Plan	1	LS	$2,500.00	$2,500.00	
Removal of Structures and Obstructions	1	LS	$2,300.00	$2,300.00	Asphalt, curb and sidewalk removal. Assume $20/LF of frontage on east portion of south side.
60" Control Manhole	1	EA	$18,000.00	$18,000.00	Assume 1/pond
Filter Catch Basin (1-27" cartridge)	10	EA	$18,000.00	$180,000.00	Assume 10-27" Filter CBs for treatment
6' Black Vinyl Fence	420	LF	$50.00	$21,000.00	Perimeter of site
20' Black Vinyl Double Swing Gate	1	EA	$3,000.00	$3,000.00	1 per pond
Excavation Incl. Haul	6,500	CY	$50.00	$325,000.00	Volume of pond. Assume 4 feet deep, 75% of lot area.
Crushed Surfacing Base Course	83	CY	$75.00	$6,225.00	12" under asphalt
Crushed Surfacing Top Course	42	CY	$75.00	$3,150.00	6" under asphalt
Erosion Control	1	LS	$10,000.00	$10,000.00	
Asphalt (1/2" PG64-22)	77	TN	$300.00	$23,100.00	Assume 0.45' thickness (20' width)
48" Flat-top manhole	5	EA	$15,000.00	$75,000.00	
12" Storm Sewer Pipe	500	LF	$200.00	$100,000.00	Assume 500 LF per pond and filter CB system
Concrete Curb and Gutter	112	LF	$80.00	$8,960.00	Length of frontage
Cement Concrete Sidewalk	62	SY	$175.00	$10,850.00	5 SF per length of frontage
Connect to Drainage Structure	1	EA	$2,500.00	$2,500.00	Assume 1/pond
Adjust Manhole	1	EA	$1,200.00	$1,200.00	Assume 1/pond

Sub-total	**$1,048,505.88**
Contingency (50%)	$524,252.94
Engineering (30%)	$314,551.76
Total	**$1,887,310.58**

101 NE 1st Street
Regional Stormwater Facility Conceptual Engineer's Estimate

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Lot area	14,375 SF
Frontage	112 LF
Perimeter	430 LF

APPENDIX G

EDUCATION AND OUTREACH MATERIALS

THE CITY OF Battle Ground WASHINGTON

Stormwater Best Management Practices for Food Establishments



Cleaning

Dispose of Wash Water Properly

Catch basins drain to our rivers and streams. Dispose of wash water down a sanitary floor drain or sink.

Mop Water

Dispose of mop water down a sanitary floor drain or sink.

Never dump it outside on the ground.

Pressure Washing

Do not wash oils and grease to a catch basin.

Only use water when pressure washing. (No soap).

CITY OF BATTLE GROUND

109 SW 1st Street, Battle Ground, WA 98604
(360) 342-5070 | Stormwater@cityofbg.org| Https://www.cityofbg.org

THE CITY OF Battle Ground WASHINGTON

Stormwater Best Management Practices for Food Establishments



Trash Compactors

Location

Covered area.

Away from storm drains.

Direct spills and leaks to sanitary drain.

Maintenance

Check for hydraulic leaks regularly.

Repair leaks immediately.

Sweep around compactor regularly.

Training

Provide training to properly operate compactor.

Provide compactor inspection training.

CITY OF BATTLE GROUND

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THE CITY OF Battle Ground WASHINGTON

Stormwater Best Management Practices for Food Establishments



Dumpsters

Close Lids and Store Undercover

Closing dumpster lids and storing under cover keeps trash inside and rainwater out.

Slope Floor to Sanitary Floor Drain

Store dumpsters in and area where the floor slopes to an area drain connected to the sanitary system to keep pollutants out of the environment.

Replace Damaged Dumpsters

Call your service provider to replace damaged or leaking dumpsters.

CITY OF BATTLE GROUND

109 SW 1st Street, Battle Ground, WA 98604
(360) 342-5070 | Stormwater@cityofbg.org| Https://cityofbg.org

Stormwater Best Management Practices for Food Establishments



Grease Barrels/Storage

PLACEMENT

On a flat, impervious surface.

Away from stormwater catch basins.

Fenced

Away from vehicles.

MAINTENANCE

Inspect weekly for leaks.

Keep lids securely fastened.

Clean up spills immediately.

TRAINING

Spill cleanup.

Proper disposal procedure.

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THE CITY OF Battle Ground WASHINGTON

Stormwater Best Management Practices for Food Establishments



Grease Traps/Oil-Water Separators

Training

Provide proper training.

Maintain when more than 1 inch oil layer.

Maintain when more than 6 inches of accumulated sediment.

Inspections

Inspect monthly.

Keep records of maintenance and inspections.

Maintenance

Remove trash regularly.

Remove oil and sediment.

Contain spills and leaks.

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Stormwater Best Management Practices for Food Establishments



Hood Vent Cleaning

Pressure Washing

Contain all wash water.

Do not wash to downspout, catch basin or onto the ground.

Spills and Leaks

Keep a Spill Kit nearby.

Contain all spills and leaks and clean up immediately.

Material Handling

Store materials under cover.

Provide secondary containment.

Protect storm drain inlets.

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Behavior Change Questions for Restaurants/Food Establishments

Question	Answer
Cleaning	
How is cleaning water (mop water) disposed?	
How are grease and oils disposed?	
Trash Compactors	
Have employees been properly trained?	
How often is the compactor inspected for leaks?	
How often is the compactor maintained?	
Dumpsters	
Does the area around the dumpster drain to a sanitary drain?	
Is the dumpster stored under cover?	
Are dumpster lids kept closed?	
Grease Barrels/Storage	
Are barrels stored on a flat, impervious surface?	
Are lids securely fastened?	
Are barrels stored behind a fence and away from vehicles?	
Are barrels inspected for leaks at least once a week?	
Are spills immediately cleaned up?	
How is grease disposed?	
Grease Traps/Oil Water Separators	
Is maintenance conducted when 1 inch of oil accumulates?	
Is maintenance conducted when 6 inches of sediment accumulates?	
Is the Grease Trap or Oil Water Separator inspected monthly?	
Are inspection records kept?	
Is trash and debris removed regularly?	
Are spills and leaks contained and cleaned up immediately?	
Hood Vent Cleaning	
Is all wash water and pressure washing water contained?	
Is a spill kit kept nearby?	
Are storm drains protected?	