Following is

2013 Surface Water Comprehensive Plan

Adopted by Res 1807

CITY OF TUKWILA

2013 SURFACE WATER COMPREHENSIVE PLAN

Prepared by

CH2MHILL®

February 2013

Final

City of Tukwila 2013 Surface Water Comprehensive Plan

Prepared for

Tukwila, WA

February 2013

Prepared by

CH2MHILL

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Acronyms and Abbreviations

CBD	Southeast Central Business District
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
GIS	Geographic Information System
LF	linear feet
LID	Low Impact Development
mg/L	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
ROW	right-of-way
SEPA	State Environmental Policy Act
TMDL	total maximum daily load
TSS	total suspended solids
TUC	Tukwila Urban Center
WDFW	Washington Department of Fish and Wildlife
WSDOT	State of Washington Department of Transportation

1.0 Introduction

1.1 Background

The purpose of this Comprehensive Surface Water Management Plan is to provide a strategic framework for the management of surface water within the City of Tukwila. This Surface Water Plan is intended to be a flexible document that may be revised should priorities or regulatory requirements change. This Surface Water Plan can also serve as a reference for City departments whose activities may impact surface water drainage, water quality, or aquatic habitat concerns.

This 2013 Surface Water Plan is an update to the Surface Water Plan prepared in 2003 (CH2MHILL 2003). The previous surface water plan was prepared in 1993. This 2013 Surface Water Plan addresses changes that have taken place since 2003, including the annexation of 259 acres into the City of Tukwila in 2009, expansion of regulatory requirements, and changing surface water management techniques and strategies. This 2013 Plan also reflects the surface water capital and non-structural investments that the City of Tukwila has made since the 2003 Surface Water Plan, including addressing priority drainage, water quality, and aquatic habitat issues identified in that plan.

1.2 Plan Objective

The objective of this 2013 Surface Water Plan is to provide a surface water management framework that will protect the public's health and safety, protect both public and private property, conserve and enhance the natural aquatic systems within the City, and maintain compliance with local, state, and federal regulations related to surface water.

1.3 Report Organization

The main body of this Surface Water Plan consists of a series of sections that summarize the general topics of this plan. Technical conclusions as well as detailed information are included in the appendices. The Plan includes the following sections:

- **Section 1** - Introduction
- **Section 2** - Drainage Basin and Watershed Characteristics (supporting information in **Appendix A** and in **Appendix B**)
- **Section 3 –** Regulations and Policies (supporting information in **Appendix C**)
- **Section 4 –** Surface Water Issues (supporting information in **Appendix D**)
- **Section 5 –** Capital Improvement Projects (supporting information in **Appendix E**)
- **Section 6 –** Operations and Maintenance
- **Section 7** - Recommendations

2.0 Drainage Basin and Watershed Characteristics

This section contains a description of the physical characteristics of the City of Tukwila. Drainage, water quality, and aquatic habitat conditions are also presented. Appendix B contains the detailed information in support of this Section 2.

2.1 General Description

The City of Tukwila encompasses approximately 9.7 square miles straddling the Green and Duwamish Rivers (Figure 1). The climate is strongly influenced by the Pacific Ocean with wet and mild winters with temperatures varying from 30°F to 50°F and dry and cool summers with temperatures typically less than 80°F. The average annual precipitation is between 32 and 38 inches.

The Green and Duwamish Rivers and associated floodplains dominate the geography and topography of Tukwila. Relatively flat and poorly drained floodplains exist adjacent to the rivers and steep valley walls dominate the areas on the west side of Tukwila along the I-5 corridor. Soils in the valley floor tend to be fine sandy loam and silty clay loam (Newberg and Woodinville Series, respectively). The valley walls typically are comprised of soils from the Alderwood Series (interbedded silts and clays) and are characterized by numerous hillside springs and the accompanying potential for instability.

2.2 Drainage Basins

The City has been divided into nine drainage basins (Figure 2):

- Green/Duwamish River Mainstem
- Gilliam Creek
- Nelson Place - Long Acres
- P17
- Riverton Creek
- Southeast Central Business District (CBD)
- Southgate Creek
- Johnson Creek
- Mill Creek

Portions of these basins are located outside City limits as shown in Table 1. The basin boundary delineation was based on information from field visits, the City Geographic Information System (GIS), and previously developed basin plans. The City of Tukwila has finished an inventory and mapping of the drainage network. Basin boundaries should be periodically re-visited to ensure the inventory is up to date. Appendix A to this Plan includes a Surface Water map book, a summary of this inventory and mapping to date.

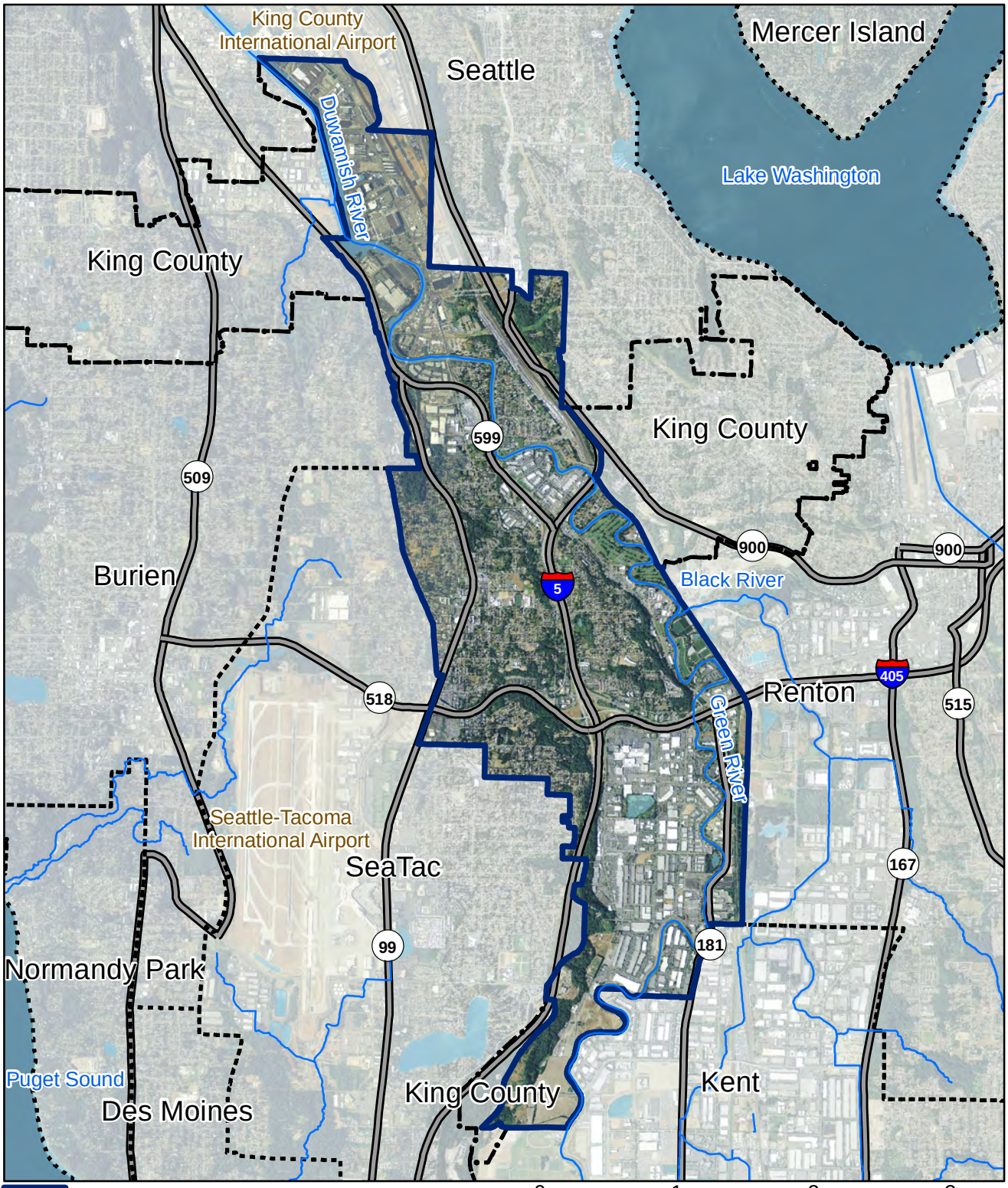


FIGURE 1
City of Tukwila Vicinity Map
City of Tukwila 2012 Surface Water Comprehensive Plan

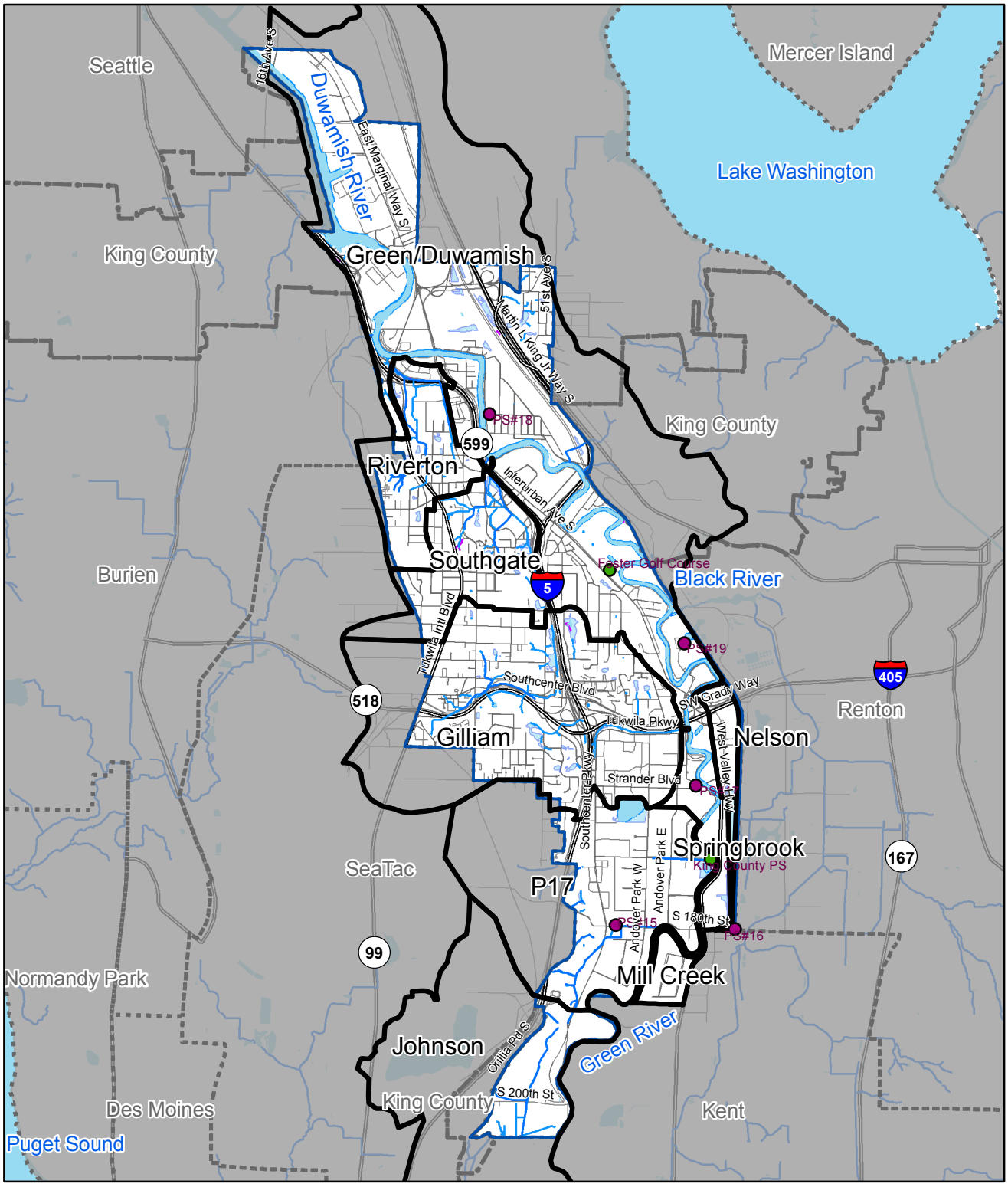


FIGURE 2
City of Tukwila Drainage Basins
City of Tukwila 2012 Surface Water Comprehensive Plan

TABLE 1
Drainage Basin Areas Summary

Basin Name	Total Basin Area (acres)	Area of Basin in City of Tukwila (acres)	Percent of Basin in City of Tukwila
Green/Duwamish River Mainstem	4,250	2,613	61%
Gilliam Creek	1,774	1,314	74%
Nelson Place / Long Acres	93	94	101%
P17	1,348	777	58%
Riverton Creek	452	393	87%
Springbrook Creek	23	23	100%
Southgate Creek	546	484	89%
Johnson Creek	1,833	309	17%
Mill Creek	87	87	100%
Total	10,406	6,094	

2.3 Population, Existing Land Use and Future Development

The City of Tukwila's population is approximately 19,000 residents with an estimated 42,000 people employed at businesses located within the City of Tukwila. The resident population of Tukwila is not expected to change dramatically over the 7-year planning period covered by this Plan. Any increase in residents would be due to redevelopment that may increase residential densities. The number of those employed within the City of Tukwila may increase with additional commercial development throughout the city, most notably the Tukwila South project described later in this section. The 2030 targets for additional residents and employees are 4,800 and 15,000, respectively.

Land use within the City of Tukwila varies from undeveloped natural land to highly developed industrial areas. The City is almost fully developed with those undeveloped acres in sensitive areas and in locations that are difficult to build such as steep slopes. Figure 3 shows the zoning within the City of Tukwila and Table 2 lists the distribution of land uses by drainage basin.

The City of Tukwila annexed 259 acres on the south end of the city on December 31, 2009, referred to as the Tukwila South Annexation. In the future, the boundaries of the City of Tukwila may change due to boundary adjustments or additional annexations. Other possible annexations include areas to the north of the city limits though no plan has been formalized.

The Tukwila South development consists of 512 acres of land with boundaries of approximately S 180th Street to the north, the Green River to the east, S 204th Street to the south, and Orillia Road/I-5 to the west. This development includes the 259 acres annexed to the City of Tukwila as part of the Tukwila South Annexation. Stormwater management

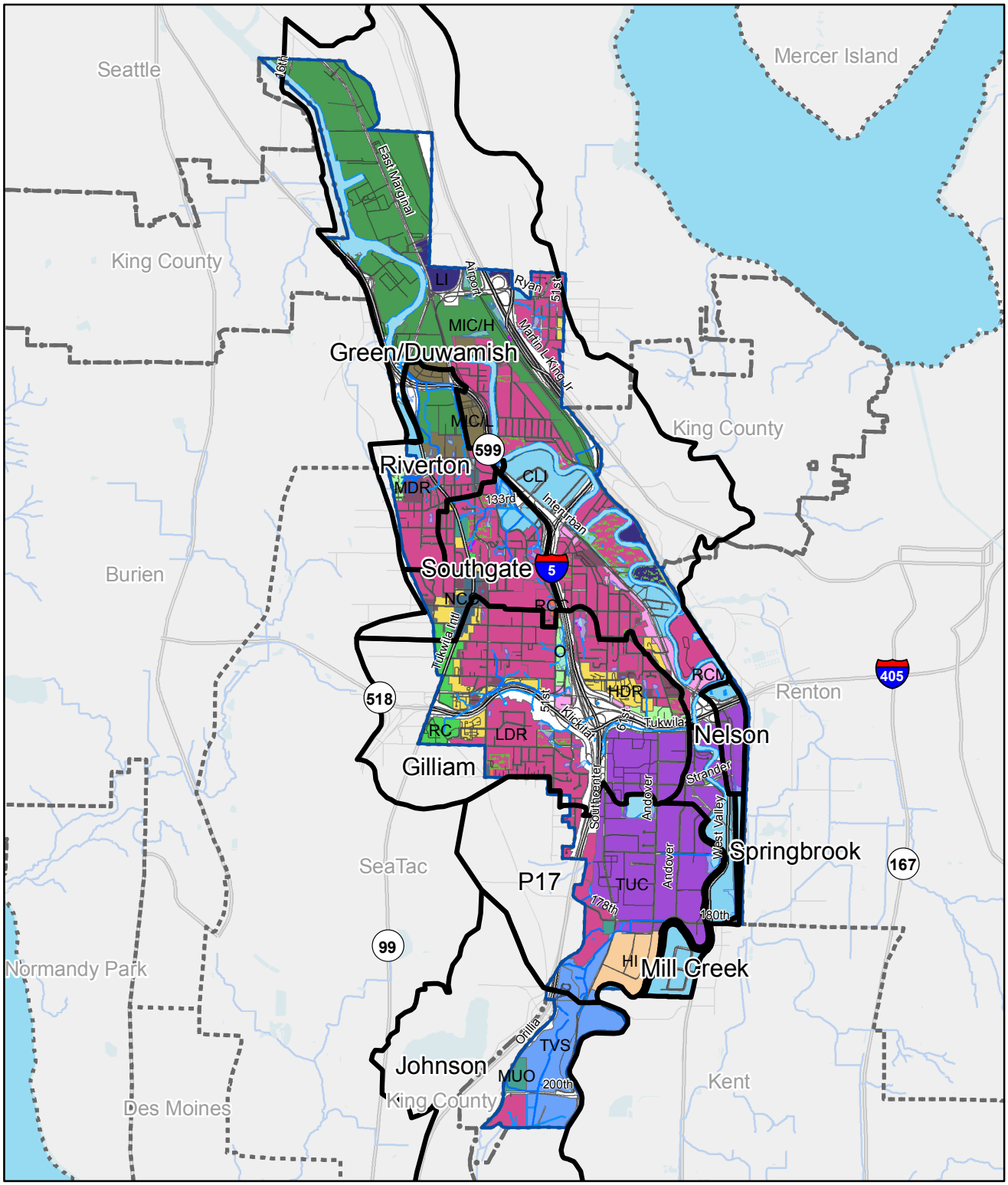


FIGURE 3
City of Tukwila Zoning
City of Tukwila 2012 Surface Water Comprehensive Plan

TABLE 2
Tukwila Land Use Zoning and Undeveloped Land

Basin Name	Residential[1]		Commercial[1]		Industrial[1]		State Right-of-Way[1, 4]		Other Un-Zoned Areas[1]		Undeveloped Land		Existing and Planned Parks	
	Acres	% of Basin[2]	Acres	% of Basin[2]	Acres	% of Basin[2]	Acres	% of Basin[2]	Acres	% of Basin[2]	Acres	% of Basin[2]	Acres	% of Basin
Green/ Duwamish River Mainstem	607	23%	129	5%	1209	46%	263	10%	406	16%	94	4%	116	4%
Gilliam Creek	646	49%	286	22%	0	0%	236	18%	145	11%	31	2%	29	2%
Nelson Place / Long Acres	0	0%	64	68%	15	16%	14	15%	0	0%	19	21%	0	0%
P17	80	10%	506	65%	99	13%	23	3%	69	9%	60	8%	26	3%
Riverton Creek	168	43%	16	4%	125	32%	39	10%	44	11%	34	9%	0	0%
Springbrook Creek	0	0%	1	3%	22	96%	0	0%	0	2%	11	48%	0	0%
Southgate Creek	297	61%	47	10%	34	7%	37	8%	69	14%	18	4%	18	4%
Johnson Creek	31	10%	230	75%	0	0%	0	0%	47	15%	0	0%	0	0%
Mill Creek	0	0%	0	0%	74	85%	4	4%	9	11%	0	0%	0	0%
Total	1829	30%	1280	21%	1578	26%	612	10%	782	13%	267	4%	189	3%

[1] These five categories (Residential, Commercial, Industrial, State Right-of-Way [ROW], and Other Un-zoned areas) add up to 100% of the basin; Undeveloped Land totals and Parks totals are shown as stand-alone totals in table and also included in residential, commercial, and industrial totals

[2] All percentages are of the portion of the basin within Tukwila City Limits

[3] Nearly 100% of Johnson Creek was undeveloped in the 2009 aerial imagery, but much of the basin is slated for development in the near future.

[4] State ROW boundaries used for this analysis are imprecise; these values are approximate.

approaches and techniques are described in the developers' agreement with the City of Tukwila.

One other redevelopment initiative is the Tukwila Urban Center (TUC). The TUC covers the area known as Southcenter. The TUC is bounded by I-5 to the west, I-405 to the north, the City limits to the east, and South 180th Street to the south. The TUC also includes the station at Long Acres that serves Amtrak and the Sounder commuter rail. The City issued a public review draft of the TUC Sub-Area Plan in February 2009. That Plan will serve as a guide to continuing growth and redevelopment of the TUC over the next 20 years, focusing on a transition from the current pattern of sub-urban development to an urban environment. The plan includes high-density, pedestrian oriented development served by high-capacity transit.

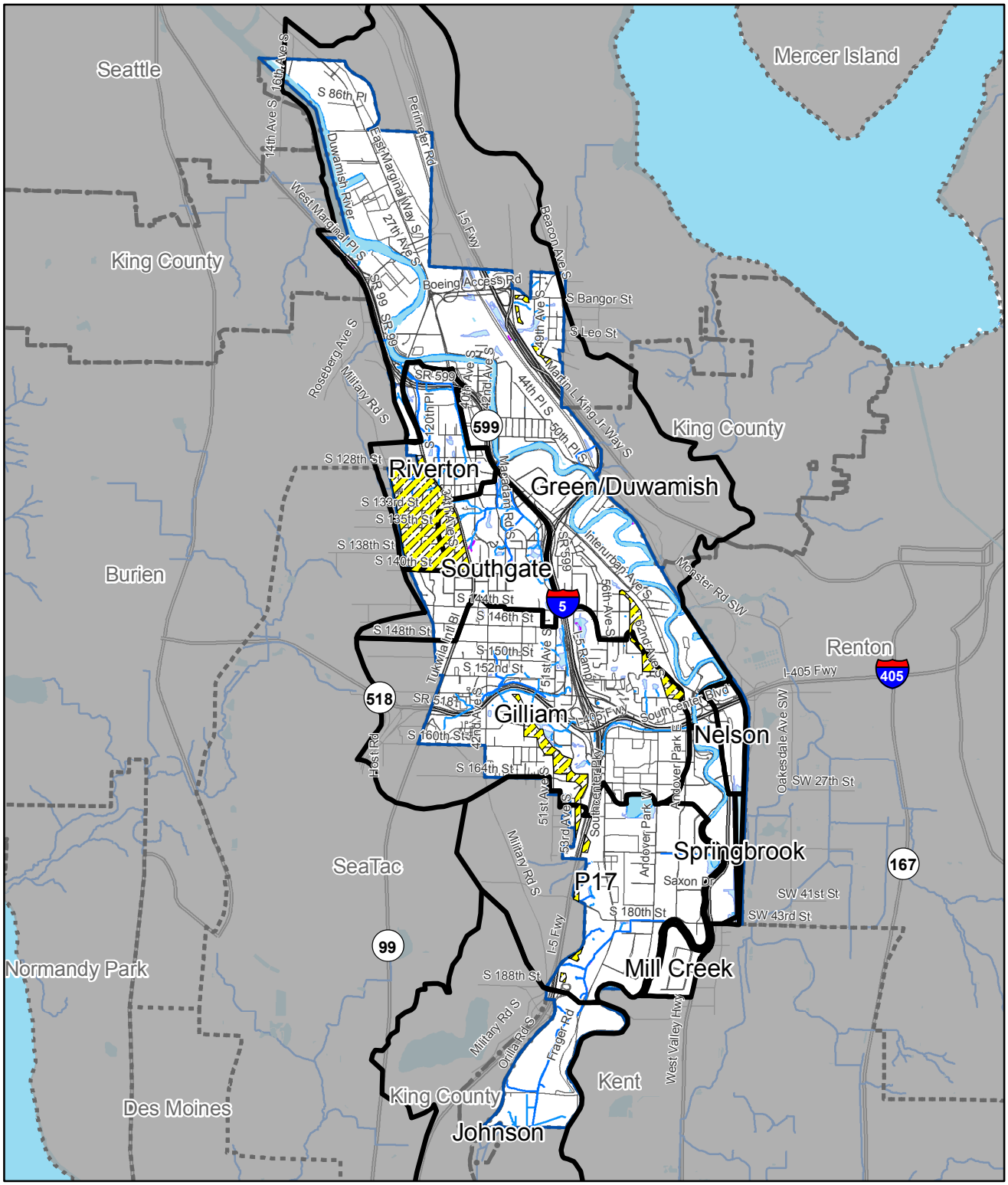
Future development and re-development is undertaken in accordance with the City's storm drainage manual (at the time of this Report, 2009 King County Surface Water Design Manual). The City has identified areas where infiltration is not allowed as a surface water management approach due to steep slopes and/or high groundwater table (Figure 4).

Flow control standards within the City of Tukwila depend on location within the City (Figure 5). In addition to the flow control standards within the 2009 King County Surface Water Design Manual, Tukwila has added two additional flow control standards referred to as 'Level 2 – Conservation to Existing Conditions' and as 'Basic - Peak Rate to Existing'. Table 5.1 in Chapter 5 of the City's Development Guidelines and Design and Construction Standards (City of Tukwila, 2010) includes descriptions of each of the flow control levels applicable within the City of Tukwila.

The flow control standard that applies to most of the City, 'Level 2 – Conservation to Existing Conditions', means that runoff from the developed site will be controlled and released at a rate that matches the flow duration for the existing site conditions before the development (pre-project). The flow control duration standard requires runoff to be detained and released at a rate that matches the flow duration over the range of flows extending from ½ of the 2-year up to the 50-year flow and to also match developed peak discharge rates to existing (pre-project) peak discharge rates for the 2-year and 10-year return periods. Much of the City of Tukwila area east of I-5 falls under this category. The 'Basic – Peak Rate to Existing' flow control standard matches existing site conditions for areas that drain to constructed (man-made) drainage systems that drain directly to either a direct discharge exempt water body or to a receiving water body such that there is not a possibility of creating an erosion problem. The standard calls for matching the 2-, 10- and 100-year peak runoff rate for existing conditions. This standard only applies to those portions of the Nelson Place/Long Acres Basin that drain to Springbrook Creek in the City of Renton.

2.4 Drainage System Characterization

Supporting information for the drainage system, water quality, and aquatic habitat characterizations located in Sections 2.4, 2.5, and 2.6 of this Plan, respectively, and is contained in Appendix B.



Areas where infiltration not allowed

Drainage Basins

N

0 1 2 Miles

FIGURE 4
Infiltration Not Allowed
City of Tukwila 2012 Surface Water Comprehensive Plan

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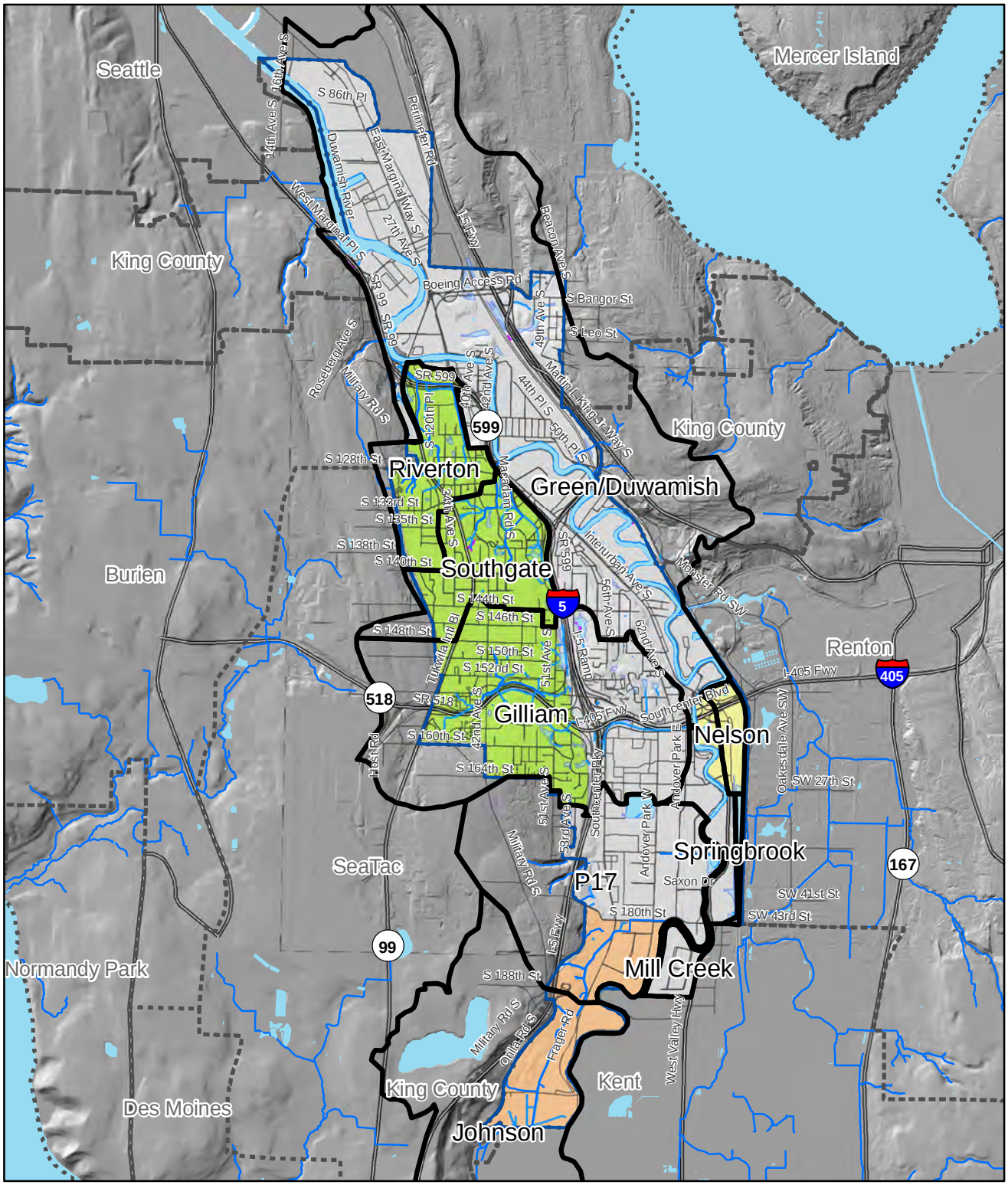


Level 2- Conservation to Existing

Level 2- Conservation to Forested

Basic- Peak Rate to Existing

Per Tukwila South Development Agreement

Drainage Basins

N

0 1 2 Miles

FIGURE 5
Level 2 Stormwater Detention
City of Tukwila 2012 Surface Water Comprehensive Plan

All of the surface water in the City of Tukwila eventually discharges to the Green and Duwamish Rivers. The Green/Duwamish River meanders from the southeast to northwest through the City of Tukwila. The Green/Duwamish River is tidally influenced along most of length of the river within the City of Tukwila. The Green/Duwamish River is called the Duwamish below the confluence with the Black River and is called the Green River upstream of that point.

Tukwila's drainage network consists of both closed-pipe and open channel conveyance. Numerous outfalls discharge to the Green and Duwamish Rivers with several tide gates preventing river and tidal flows from flowing up into the drainage basins. The outfalls with the largest discharge are typically associated with the creek systems located entirely or partially within the City, including Riverton Creek, Gilliam Creek, Southgate Creek, and Johnson Creek.

Tukwila's drainage assets include pipes, manholes, ditches, ponds, culverts, and surface water pump stations. Table 3 lists each of the city-owned surface water pump stations (also shown in Figure 2). Outfalls, tide gates, pump stations, and other drainage assets are shown in the map book in Appendix A. Note that King County owns and operates a pump station (P17) within the City of Tukwila's P17 drainage basin.

TABLE 3
Surface Water Pump Stations

Station Name	Physical Location	Drainage Basin	Ownership
Sta #15	5880 S 180th Street – near Claim Jumper Restaurant	P17	City of Tukwila Stormwater Utility
Sta #16	7420 S. 180th Street – underpass	Springbrook Creek, Green/ Duwamish River	City of Tukwila Stormwater Utility
Sta #17	530 Strander Boulevard – Bicentennial Park	Green/ Duwamish River	City of Tukwila Stormwater Utility
Sta #18	4225 S. 122nd Street – Allentown	Green/ Duwamish River	City of Tukwila Stormwater Utility
Sta #19	Fort Dent Park	Green/ Duwamish River	City of Tukwila Parks Department

It is possible that the City may acquire additional surface water assets after development of the south annexation area. The City should update this surface water asset inventory both in this comprehensive surface water plan and in the City's GIS when these surface water assets are put into service.

2.5 Water Quality Characterization

Supporting information for the water quality characterization located in this Section 2.5 is contained in Appendix B.

In 2003, Ecology adopted a water use-based classification for state surface waters (RCW 173-201A, Table 602) that determines the surface water quality standards applicable

for that water body (RCW 173-201A-600(1)). The Duwamish River (below the confluence with the Black River) is classified as Salmonid Rearing/Migration Only and Secondary Contact Recreation. The Green River (above the confluence with the Black River) is classified as Salmonid Spawning/Rearing Only and Primary Contact Recreation.

None of the tributaries to these rivers within Tukwila is called out in Table 602. Therefore, the uses defined for tributaries are the same as the river to which they discharge. Riverton Creek and Southgate Creek discharge to the Duwamish River so they have a use-based classification of Salmonid Rearing/Migration and Secondary Contact Recreation. Gilliam Creek, Johnson Creek, and the Nelson Place / Long Acres, Southeast CBD, and P17 drainage basins have a use-based classification of Salmonid Rearing/Migration and Primary Contact Recreation.

Ecology maintains a list of water bodies that do not meet water quality standards, known as the 303(d) list. The 2008 update is the current water quality assessment and 303(d) list for the state of Washington (at the time of preparation of this plan). Four sections of the Green/Duwamish River within the City of Tukwila do not meet water quality standards according to the 2008 303(d) list. Both the Green River and Duwamish River are listed as Category 5 (at least one designated use is impaired) for dissolved oxygen, temperature, pH, and fecal coliform, based on water sampling and analysis (Ecology 2010; Ecology 2006).

Gilliam Creek is the only creek system in the City of Tukwila for which additional water quality data is available for this water quality characterization. Water quality sampling was performed during storm runoff events in the fall of 1999 as part of the Gilliam Creek Stormwater Management Plan (Herrera Environmental Consultants 2001). Temperature, dissolved oxygen and pH (the latter with the exception of one sample) all met current state water quality standards during this sampling. Turbidity was somewhat elevated, generally ranging from 25 to 50 NTUs. Similarly suspended solids were also only modestly elevated, generally ranging from 20 to 60 milligrams per liter (mg/L). Dissolved lead met applicable water quality criteria, as did nearly 90 percent of the dissolved zinc samples. About half of the samples failed to meet the dissolved copper criteria. Finally, nearly all of the fecal coliform samples exceeded the state water quality standards.

In a study that had been conducted several years prior, two creek samples were collected during summer baseflow conditions (June and September of 1997). Several samples taken during these months did not meet the state dissolved oxygen standard, with one sample recorded at 3.2 mg/L, well below the state standard of 6 mg/L. These samples also fell slightly below the pH standard. In September the measured stream temperature of 17.5 degrees Celsius barely fell below the state standard of 18 degrees.

The northern-most portion of the City of Tukwila lies within the Lower Duwamish Waterway Superfund Site, designated by the U.S. Environmental Protection Agency (EPA) in 2001. King County, the Port of Seattle, and the cities of Seattle and Tukwila are working with Ecology and the EPA to control sources of pollution in the Lower Duwamish Waterway. Ecology is the lead agency for implementing source controls in the Lower Duwamish Waterway. In 2002 the entities listed above formed the Lower Duwamish Waterway Source Control Work Group to coordinate source control activities.

2.6 Aquatic Habitat Characterization

Supporting information for the aquatic habitat characterization located in this Section 2.6 is contained in Appendix B. A detailed fish-blocking culvert inventory is included in Attachment A to Appendix B.

2.6.1 Green/Duwamish River

The Green/Duwamish River channel is significantly altered from its natural condition along most reaches in the City of Tukwila. Non-native and other less desirable trees and shrubs such as blackberry have replaced native riparian vegetation. Riprap also borders the river along many reaches. Urban development in and near the City has greatly reduced the vegetated buffer of the river and has encroached upon the banks. Flooding and drainage problems associated with this urban development throughout the basin (including the levees constructed to address flooding) have degraded fish and other wildlife habitat in and along the river.

Productive, good quality fish habitat, both in the main channel and in off-channel refuge, is generally lacking along the Green and Duwamish Rivers. Spawning gravel recruitment to the Green/Duwamish River in this area has been diminished due to the comprehensive effects of urban development, in particular the diversion of the White River and the Cedar/Black River away from the Duwamish River. Little, if any, spawning habitat occurs in the river reaches within the City. The Puget Sound Salmon Recovery Plan calls for increased opportunities for levee set-backs to restore habitat within 200 feet of the Green/Duwamish River, particularly side-channel refuge habitat.

In addition to the mainstem Green and Duwamish River channels, aquatic habitat is provided in the City of Tukwila's four major creek systems: Gilliam Creek, Riverton Creek, Southgate Creek, and Johnson Creek. The remainder of this section includes a description of the aquatic habitat available to fish in these four creek systems.

2.6.2 Gilliam Creek

The lower reach of Gilliam Creek provides mostly rearing and possibly some scattered spawning habitat. Spawning gravels are covered by sediments deposited by upstream erosion and by historical construction activities. Habitat in the lower reach of Gilliam Creek is available to fish through the flap gate at the outlet of Gilliam Creek only under certain high-flow conditions, when the Green River water level is elevated but remains lower than the water level in Gilliam Creek. Several species of anadromous fish, including coho salmon, chinook salmon, and sea-run cutthroat trout, are reported to make use of the lower reach of Gilliam Creek, along the south shoulder of I-405 between the Green River and the I-5/I-405 interchange (Washington Department of Fish and Wildlife [WDFW], 2010; Herrera, 2001).

Two more partial fish passage barriers exist in the lower reach of Gilliam Creek. A State of Washington Department of Transportation (WSDOT) -owned culvert that conveys at least 1,000 feet of the creek under the south shoulder of I-405 is identified as a partial fish barrier (WDFW, 2010). Farther upstream, a log at the inlet of the WSDOT-owned culvert at the I-405 on-ramp observed in spring of 2011 appears capable of blocking fish passage.

WDFW determined that several of the tributaries to upper Gilliam Creek provide some rearing habitat (WSDOT, 2007). Since the culvert underneath the I-5/I-405 interchange is a total barrier to anadromous fish, it is likely that only resident fish such as cutthroat trout and sculpin are utilizing the available habitat in the upper reaches of Gilliam Creek at this time. Fish barriers do exist in the upper reaches of Gilliam Creek, including a WSDOT-owned culvert beneath SR 518 that conveys one of these tributaries that is identified as a total fish passage barrier.

2.6.3 Riverton Creek

Both west and east forks of Riverton Creek are characterized by narrow, straight channels and long sections of culvert in their lower reaches. Both forks are considered fish-bearing. Coho salmon, Chinook salmon, and resident cutthroat trout are potentially present in Riverton Creek (WDFW, 2010; Entranco, 1997). Overall, Riverton Creek provides some limited rearing habitat for salmon, but no longer provides substantial spawning habitat.

The flap gates at the outlet of Riverton Creek to the Duwamish River are impassable to fish during low flows plus somewhat impassable all other times. One of the flap gates is currently propped open as an interim solution.

The East Fork of Riverton Creek just upstream of the SR 599 culvert is characterized by a wide, exposed, sandy, and silty streambed which provides fish passage but no spawning or rearing habitat. Upstream of that reach, a more than 2,000 linear feet (LF) culvert likely prevents at least some anadromous fish from accessing suitable habitat located in the upper reach between S 126th Street and S 128th Street, where good overhead cover from riparian plants, sufficient flows, and streambed gravel appear suitable for coho salmon spawning. Anecdotal evidence from a local resident during a February 2011 site visit suggests that anadromous salmon can and do access the east fork up to S 128th Street. The gradient upstream of S 128th Street is likely too steep for anadromous fish.

Approximately 2,000 LF of restored channel in the West Fork of Riverton Creek just upstream of SR 599 has provided some spawning and rearing habitat. The culverts within this restored reach could fill with sediment from upper watershed erosion and surface water runoff, which could potentially block fish passage. A log jam in the upper portion of the restoration area may also be a partial fish passage barrier. Just upstream of the restored reach, a 20-foot-tall manmade waterfall prevents fish from passing upstream to S 126th Street. A private property owner owns and operates a fish hatchery and releases juvenile salmon at the base of the waterfall into the west fork at the upper end of the restored reach.

Upstream of the waterfall up to S 126th Street, there is about 500 feet of potential fish habitat, though that reach also includes two total fish passage barriers. Fish would likely not be able pass upstream of S 126th Street because of a steep gradient, even if the waterfall and other nearby barriers were removed. However, this upper reach beyond S 126th Street has a cobble streambed that is likely supporting macroinvertebrates, a food source for fish downstream of the barriers.

2.6.4 Southgate Creek

The East Fork of Southgate Creek begins as a relatively small channel just south of S 137th Street and flows north through a steep ravine, several culverts, and an asphalt-lined ditch

before it merges with the west fork. The West Fork begins as three smaller tributaries that collect flow from the hillside just west of 40th Avenue S and merge just upstream of S 133th Street. The West Fork then passes underneath S 133rd Street and 42nd Avenue S through more than 500 feet of culvert and merges with the east fork coming from a ditch along S 132nd Street. From there, the main stem of Southgate Creek extends under SR 599 through about 320 feet of culvert, a fish ladder, and large arch culvert into the Duwamish River downstream of the Black River confluence.

Bank erosion from the combination of steep gradients and surface water runoff from urban development have deposited sediments in the lower reach, which have reduced effective culvert conveyance capacities and covered up salmon spawning gravels. The section of the main stem just downstream of the confluence of the West and East Forks is often completely blocked by sediment and debris.

As in other urbanized streams, development has altered Southgate Creek's riparian buffer and natural channel alignment, resulting in increased channel incision, stream bank erosion, and degraded water quality. Rearing habitat is available in the main stem between SR 599 and S 132nd Street culvert. Rearing habitat is available in some small sections of the east fork along S 131st Place and S 134th Place. Rearing and some spawning habitat is available in the recently restored section of the west fork just upstream of S 133rd Street.

Coho salmon are potentially present in Southgate Creek, according to WDFW, and resident trout or and other types of non-anadromous fish are likely present. The fish ladder at the SR 599 culvert likely is a fish barrier to anadromous fish during low stream flows. During a February 2011 site visit, juvenile salmon were observed in the section of the east fork along S 131st Place, which are regularly released into the stream by a nearby homeowner, according to local residents and City of Tukwila staff. Fish are unlikely to be present in the West Fork of Southgate Creek upstream of Macadam Way S due to the steep gradient. Some resident fish may use the upper reaches of the east fork within Southgate Park.

2.6.5 Johnson Creek

The Johnson Creek flap gate and outfall to the Green River, once partial blockages to fish passage, were replaced in 2011 with a fish-passable structure as part of the mitigation for the proximate commercial development. No other barriers to fish passage were identified in Johnson Creek. Also as part of the commercial development, the lower reach of Johnson Creek was reconstructed and now provides aquatic habitat opportunities. A revised aquatic habitat assessment should be performed once the commercial development in the Johnson Creek Basin is completed.

2.6.6 Mill Creek

The Mill Creek drainage basin is the area east of the Green River north of S 190th Street and west of 72nd Ave South. This area flows into the Duwamish River and/or south and east into the Mill Creek basin within the City of Kent. All drainage conveyance is piped. No natural channels exist in this basin within the City of Tukwila.

Mill Creek flows north from the City of Kent into the City of Renton, then discharges into the Green/Duwamish River within the City of Renton. Habitat opportunities and problems within the Mill Creek drainage within the City of Kent are identified in the Kent Surface Water Comprehensive Plan, likewise for those opportunities and problems within the City of Renton.

3.0 Regulations and City Policies

This section contains a description of the current and anticipated future surface water regulations applicable to the City of Tukwila's surface water management program. In addition, potential City of Tukwila surface water management program improvements are identified that contribute to regulatory compliance. Appendix C contains the detailed information in support of this Section 3.

3.1 Applicable Surface Water Regulations

Regulatory changes have occurred since preparation of the 2003 City of Tukwila Comprehensive Surface Water Management Plan. The changes most significant for Tukwila are with National Pollutant Discharge Elimination System (NPDES) Phase II permit. Regulations currently applicable to the City of Tukwila's surface water management program are described in detail in Appendix C. (Note that Green and Duwamish River flooding and flood protection are outside the scope of this Plan.)

As was done in 2003 as part of that comprehensive planning effort, this 2013 Plan contains an evaluation, or gap analysis, of Tukwila's surface water management program against all relevant surface water management regulations. As a result of the gap analysis, this Plan contains recommendations for program improvements that need to be implemented to achieve compliance. In general, the City's surface water management activities support its regulatory compliance requirements and obligations, but there are some additional steps that must be taken to ensure regulatory compliance and to better coordinate environmental compliance activities across various City departments. Specific actions recommended to improve upon regulatory compliance are presented in Section 7 of this Plan.

3.2 Potential Regulatory Changes

A number of changes in regulations relevant to surface water management are expected to occur in the next surface water planning cycle. Appendix C contains a detailed description of these anticipated changes. Changes to the NPDES Phase II Municipal stormwater permit and associated Total Maximum Daily Load (TMDL) program are anticipated, as well as the possibility of additional listings (or downgrading of existing listed species) under the Endangered Species Act (ESA). In general, these changes are expected to increase the City's obligations for surface water management, water quality, and aquatic habitat protection and restoration. Tukwila will need to accommodate such changes in its surface water management program, possibly with additional financial resources and/or additional staff time. Section 7 includes a section on recommendations to address these regulatory requirements anticipated in this next surface water planning cycle.

4.0 Surface Water Issues and Solutions

This section summarizes existing surface water issues. These issues are organized by type of surface water issue: drainage, water quality, or aquatic habitat. Appendix D contains the detailed information in support of this Section 4.

4.1 Available Data and Information

The following sources of information were used to identify drainage, water quality, and aquatic habitat issues:

- Anecdotal and recorded information provided by City staff
- Observations made during field visits by CH2M HILL and City staff
- 2003 City of Tukwila Comprehensive Surface Water Management Plan
- The following drainage studies:
  - 1993 Surface Water Management Comprehensive Plan
  - 1994 Gilliam Creek Detention and Water Quality Enhancements
  - 1996 Fostoria Basin Stormwater Quality Management Plan
  - 1997 Southgate Creek By-Pass Study
  - 2001 Gilliam Creek Basin Storm Water Management Plan.

4.2 Identified Surface Water Issues

Localized drainage problems are the primary surface water concern for the residents of the City of Tukwila. Drainage issues arise on both public and private property because there are no storm drainage systems, the existing conveyance systems are damaged or in need of maintenance, or the existing conveyance systems have inadequate hydraulic capacity. Much of the development in Tukwila occurred previous to current stormwater flow control standards. In addition, as impervious surfaces are added, more stormwater runs off during storms, exacerbating existing problems.

Water quality problems are evident in the Green and Duwamish River system and in each of the major creek systems within the City of Tukwila. The Green River and Duwamish River are listed as impaired on the 2008 Ecology 303(d) list for dissolved oxygen, temperature, pH, and fecal coliform. Untreated runoff from arterial streets with intensive traffic usage, areas of dense commercial development, parking lots in the Tukwila International Boulevard corridor and Westfield Mall area, and I-5 and I-405 contributes to these problems. All of Tukwila's creek systems are affected, including Gilliam, Riverton, Southgate, and Johnson Creeks. Runoff conveyed to the river via these creeks is contributing to the impaired water quality of the Green and Duwamish Rivers.

Available aquatic habitat has been significantly reduced in the creeks that drain Tukwila due to the effects of development and the loss of riparian buffer areas. Uncontrolled runoff

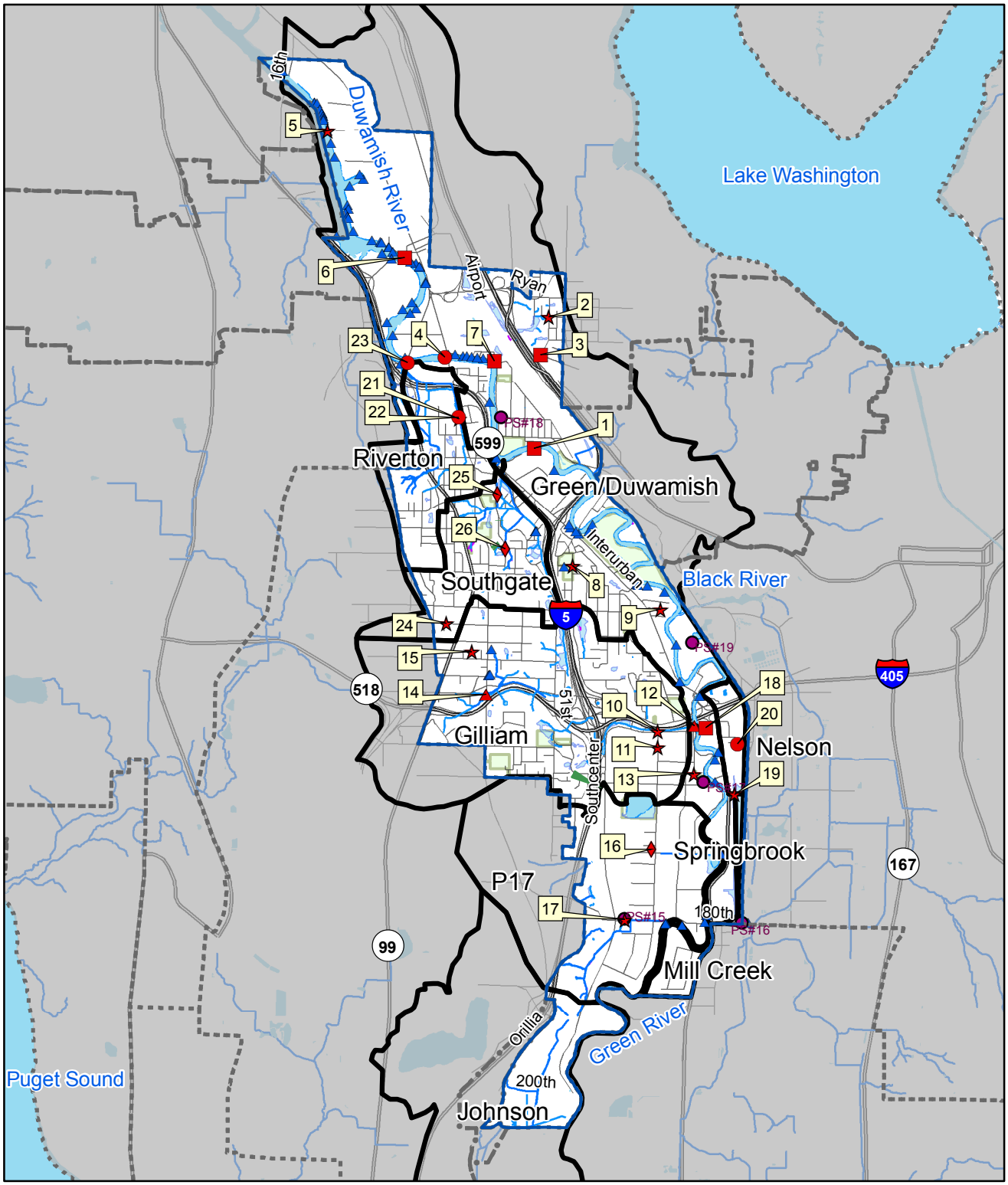
flows coupled with steep slopes in the upper reaches of Gilliam, Southgate, Riverton, and Johnson Creeks cause channel erosion that in turn delivers sediments to the lower-gradient downstream reaches of these streams. Sediment deposition significantly reduces the conveyance capacity of these channels, restricts fish passage, and hinders the potential for salmonid spawning in these lower reaches. Better quality aquatic habitat in the lower reaches of all four streams in Tukwila would provide refuge to salmonids from high flows and predators in the Green and Duwamish Rivers. Several culverts are blockages to fish passage from the lower reaches to the upper reaches of each of the creek systems. Addressing these blockages to fish passage would provide salmonids access to aquatic habitat in the upper reaches of these systems. In addition, restoration of riparian buffer areas both in the upper and lower reaches of these creeks would reduce water temperatures, which is better for salmonids at all life cycles. Opportunities for salmon habitat restoration (and protection) are outlined in the WRIA 9 Salmon Habitat Plan (WRIA 9 2005).

Table 4 presents a summary of the number of identified drainage, water quality, and aquatic habitat issues. Individual surface water issues are shown on Figure 6 and discussed in detail in Appendix D.

TABLE 4
Surface Water Issue Summary

		Type of Surface Water Issue		
Drainage Basin	**Number of Issues**	**Drainage**	**Water Quality**	**Aquatic Habitat**
Green/ Duwamish	9	X	X	X
Gilliam Creek	5	X		X
Nelson Place / Long Acres	3	X	X	X
P17	1	X		
Riverton Creek	3	X		X
Springbrook Creek	0			
Southgate Creek	3	X	X	
Johnson Creek	0			
Mill Creek	0			
City-wide	2	X	X	
Totals	26	X	X	X

This Comprehensive Surface Water Management Plan for Tukwila has outlined 26 specific surface water problems within the City of Tukwila. In addition to these specific 26, several smaller drainage issues have been identified by the City of Tukwila and have been included on the Small Drainage Project List maintained and frequently updated by City of Tukwila staff. The drainage issues on the Small Drainage Project List are addressed as a small drainage program.



Surface Water Issues

- Drainage
- Drainage/Habitat
- Habitat
- Water Quality
- Water Quality/Drainage

- City of Tukwila
- King County Unincorporated
- Other Municipalities
- Stormwater Pipe
- Drainage Basins
- Outfall

N

0 1 2 Miles

FIGURE 6
Surface Water Issues
City of Tukwila 2012 Surface Water Comprehensive Plan

4.3 Menu of Solutions to Address Surface Water Issues

This section outlines the menu of solutions that could be used to address the surface water issues identified in the City of Tukwila. No single type of action, activity, or project is a "one size fits all" fix to all of these identified problems. Some surface water problems have structural solutions, while others have programmatic (non-structural) solutions, and many have both programmatic and structural solutions. Implementing a diverse portfolio of solutions allows for different aspects of the issues to be addressed by different solutions.

Potential solutions are divided into actions that would not involve construction or land acquisition, collectively referred to as programmatic approaches, and actions that would require capital projects and would be listed in the City of Tukwila Capital Improvement Program. The programmatic activities have the benefit of often being strategic rather than reactionary. Instead of fixing a single problem with a structural solution, programmatic alternatives often address a series of existing problems and are effective at preventing future problems.

Often, capital (structural) solutions are most effective for single-location surface water problems and programmatic solutions are most effective for watershed-wide or other large-scale problems. Regulatory requirements (such as the NPDES Phase II permit) emphasize programmatic approaches to problems. Also, water quality problems can be targeted successfully using programmatic means such as source control measures. Sub-basin- or watershed-wide water quantity problems, such as increase in impervious surface runoff, can be addressed with programmatic solutions. Location-specific habitat, water quality, and water quantity issues can be addressed with capital projects. Using capital projects and programmatic solutions in tandem is the most effective method of addressing drainage, water quality, and aquatic habitat problems comprehensively.

Because multiple sources contribute to the problems, multiple solutions targeting different sources and different aspects of sources are appropriate. Programmatic actions can provide overlapping benefits, thus addressing several pollution sources at once. However, capital projects can yield immediate, measurable results in a specific location, such as reduction of sediment load to the Green River from a specific parking lot. An additional benefit of capital projects is that the City can implement any number of individual capital projects in any given year depending upon funding availability.

Both capital and programmatic solutions are discussed in the next sub-sections.

4.3.1 Programmatic Solutions

The driving factor behind the comprehensive stormwater management plan is to comprehensively address drainage, water quality, and aquatic habitat issues identified in the City of Tukwila. The type(s) of surface water issues that could be addressed by individual programmatic solutions are summarized in Table 5. Note that many of these activities are required in whole or in part by the City's NPDES Phase II permit. The remainder of this sub-section discusses each of seven programmatic solutions in further detail. These seven types of programmatic solutions are education, incentives, changes to City policies or regulations, inspections and enforcement, illicit discharge detection and elimination, public involvement and compliant response, and operations and maintenance.

TABLE 5
Surface Water Issue Types Addressed by Programmatic Solutions

Program Element	Surface Water Issue Type			Required *(in whole or in part)* by NPDES Phase II Permit
	Drainage	Water Quality	Aquatic Habitat	
Education	x	x	x	x
Incentives	x	x	x	
Changes to City Policies or Regulations	x	x	x	
Inspections and Enforcement	x	x		x
Illicit Discharge Detection and Elimination		x		x
Public Involvement (including complaint response)	x	x	x	x
Operations and Maintenance	x	x	x	x

4.3.1.1 Education

Many surface water issues in Tukwila are caused by the everyday actions of people that live in or visit the City. While difficult, changing behavior patterns is a cost-effective programmatic solution to surface water problems. Establishing public knowledge of the link between activities within the watershed and ecosystem health is imperative for the success of these education programs.

The educational topics listed below would supplement the current City of Tukwila education program:

- Surface water runoff from existing residential lots
- Surface water runoff from new developments
- Improperly maintained surface water detention or treatment facilities
- Proper maintenance of septic systems (where applicable)
- Wastewater conveyance systems inspection and maintenance
- Dog and cat pet waste disposal
- Erosion management
- Wildlife
- Waterfowl (ducks and geese)
- General awareness of receiving water health and fostering 'ownership'
- Stream reach needs – get to know your backyard, Adopt-a-Stream programs

Education has drainage, water quality, and aquatic habitat benefits.

4.3.1.2 Incentives

Incentives could be considered as a way to more quickly and more effectively obtain the targeted benefits of education. Incentives are one step over on the education-incentives-regulations-enforcement spectrum.

Incentives are most often financial. Possible incentives include:

- Free "mutt mitts" for pet owners
- Reduced surface water fee with on-site surface water management implemented on private property (with drain cleaning certification)
- Free technical assistance for private property owners wishing to implement on-site surface water management (such as rain gardens or rain barrels)

Incentives would have drainage, water quality, and aquatic habitat benefits.

4.3.1.3 Regulatory and Policy Changes

Most existing drainage problems are best addressed with a capital project. However, programmatic solutions can be used to prevent future drainage problems by managing how new and re-development is conducted.

Most of the water quality problems in Tukwila are caused by the activities of residents and visitors, including the way that people use the land. These pollutants cannot be removed practically by stormwater treatment facilities that are typically more effective at removal of point-source pollution. Therefore, protection of water quality is dependent on improved regulations to address the source of the pollutants.

Possible changes to City policies or regulations include the following:

- Require maximum potential infiltration on development and re-development sites
- Require zero stormwater discharge from all new development
- Establish a policy of no net increase in Effective Impervious Area in the City
- Establish a policy of no net loss of forest cover in the City
- Require annual inspections and corrections for septic systems (where applicable)
- Require that all new roads, driveways, parking areas and walkways be constructed of pervious materials such as pervious asphalt, concrete, or pavers

Changes to policies or to regulations at the state or national level are outside the scope of this Plan.

Changes to City policies and regulations would have drainage, water quality, and aquatic habitat benefits.

4.3.1.4 Inspection and Enforcement

Inspections are conducted during construction activities to ensure compliance with existing requirements. In Tukwila, these inspections might occur at less-than-ideal frequency due to

lack of available personnel. In addition, enforcement is difficult. The inspection program would be enhanced and a more reliable and detailed recording system should be utilized. This recording system should be used to determine "hot spots" or "repeat offenders." Programmatic decisions affecting inspection and enforcement would incorporate input from the City's Planning and Development Services department.

In addition to inspections of construction activities, Tukwila will need to develop an approach for inspections of privately-owned stormwater facilities such as detention ponds and vaults.

Inspection and enforcement activities have drainage and water quality benefits.

4.3.1.5 Illicit Discharge Detection and Elimination

Illicit discharge detection and elimination is an NPDES Phase II permit requirement. The permit requires the City to have an ongoing program to detect, remove, and prevent illicit connections, discharges, and improper disposal, including spills, into the surface water system. The permit requires full implementation of an illicit discharge and elimination program.

Disconnecting homes from septic systems and connecting them to piped sewers is a structural solution aimed at reducing the risk of malfunctioning septic systems affecting receiving water quality.

Illicit discharge detention and elimination would benefit water quality.

4.3.1.6 Public Involvement

Public involvement can promote awareness of and foster a sense of responsibility for the health of the watersheds of Tukwila and of the greater Puget Sound, and help identify problems and solutions. Engaging citizens in the reporting and documenting of surface water problems through phone hotlines increases detection of problems.

Environmental stewardship activities should be increased. Individually targeted groups should include children, students, adults, and visitors. Public involvement activities can be coordinated with the educational activities mentioned previously. Volunteers can perform stream buffer planting, become stream watchers, and plant trees both on their own property and in public spaces.

Public Involvement would benefit drainage, water quality, and aquatic habitat.

4.3.1.7 Surface Water System Maintenance

Currently, Tukwila City maintenance staff perform maintenance of the surface water system, including pipes, manholes, inlets and catch basins, ditches, open streams, and pump stations. Because of demands on limited resources, maintenance is too often done in response to a drainage complaint or issue rather than proactively. Proactive maintenance may also benefit water quality and aquatic habitat by reducing total sediment load to creeks. An example of this is cleaning out catch basins more often than required by the NPDES Phase II permit in sensitive areas such as near salmon-bearing creeks.

Tukwila is required to ensure maintenance of private stormwater facilities in NPDES Phase II areas according to their NPDES Phase II permit. According to the permit, the City must

have a regular inspection plan for both public and private facilities. In addition to the inspection program, the City must have a program to work with private property owners to ensure that maintenance of the private facilities is occurring.

Maintenance benefits drainage, water quality, and aquatic habitat.

4.3.2 Capital Project Solutions

Capital projects implemented as part of a comprehensive capital improvement program can together address many of the surface water problems identified in the City of Tukwila. Capital projects have the potential to reduce and/or store stormwater volumes, reduce peak flows, improve water quality, and restore aquatic habitat. This section includes descriptions of the methods that can be utilized to address these surface water issues using capital projects. The type(s) of surface water issues that could be addressed by capital projects are summarized in Table 6. The remainder of this sub-section discusses each of the types of capital projects in further detail. Capital project types are organized by surface water issue type (drainage, water quality, and aquatic habitat).

TABLE 6
Surface Water Issue Types Addressed by Capital Projects

	Surface Water Issue Type		
Capital Project Type	**Drainage**	**Water Quality**	**Aquatic Habitat**
Increase conveyance capacity	x		
Provide drainage system (or re-route existing)	x		
Infiltration	x	x	
On-site detention/retention	x	x	
Regional detention/retention	x	x	
Velocity Reduction (check dams, etc.)	x	x	
High flow bypass	x	x	
Impervious surface reduction	x	x	
Point source control		x	
Water quality treatment		x	
Conveyance system cleaning and inspection	x	x	
Land acquisition	x	x	x
Riparian buffer restoration / protection	x	x	x
Channel stabilization		x	
Channel physical habitat restoration			x
Replacement of culvert or other infrastructure to be fish passable			x

4.3.2.1 Drainage

Capital projects meant to address altered hydrology (that is, water quantity) include infiltration, regional detention/retention, onsite detention/retention, reductions in impervious surface, velocity reduction, high-flow bypass facilities, dispersion, stream buffer restoration, and land purchase. The effectiveness of any of these alternatives can be limited by physical space constraints. The feasibility of any of these alternatives is also often limited by topography, soil conditions, and the presence of sensitive areas.

Increasing Conveyance Capacity of a drainage network is often performed to alleviate localized drainage issues. Pipes are removed and replaced with a larger diameter pipe. Hydraulic and hydrologic analysis should be performed in order to assess downstream impacts of proposed conveyance capacity changes.

Providing a drainage network where there is currently a formal system will provide conveyance of stormwater away from a location. Lack of a formal (that is engineered or planned) drainage network is common in areas developed before current stormwater standards.

Infiltration is an extremely effective method to reduce stormwater runoff volumes and peak flows. Under pre-development conditions, a significant portion of the annual precipitation infiltrates into the ground. After development and the corresponding increase in impervious surfaces that prevent infiltration, much more of the annual precipitation runs off as stormwater. Promoting infiltration is a method to reduce the impacts of development by mimicking natural hydrologic processes.

Infiltration effectiveness is a function of soil infiltration capacity. Many areas of Tukwila have top soils conducive to infiltration. When local soils are not conducive to infiltration, soils amended with organic material can be brought in and placed over native soils. Even if the native underlying soils have low infiltration capacity, the infiltrated water will use the storage available in the soil column of the amended soil layer until infiltration into the underlying layer is possible. Moisture retained in the amended soil layer is available for plant uptake, including lawns.

During construction activities, it is common for the native top layer of soil to be stripped away. In this case, amended soils should be introduced rather than relying on the remaining native soils. Planting, then maintaining, a lawn on the remaining native soil will require watering and fertilizing that would not be necessary if the native top layer were still in place or if amended soils were brought in.

Regional detention/retention is a plausible structural solution. Regional detention could be used to detain erosive peak flows. Total volumes of stormwater runoff can be reduced through retention via evaporation, plant uptake, and infiltration. In addition to implementation of new facilities, existing regional detention facilities can be retrofitted to promote capacity and capability.

Onsite detention/retention and other site-specific measures are also effective at detaining peak flows and decreasing total volumes of stormwater runoff. Onsite detention and other site-specific measures on public, City-owned property are considered capital project and are therefore discussed in this section. Onsite detention and other site-specific measures on

private property are discussed in the programmatic solutions section under education, incentives, and regulations. That said, it may be feasible to use public funds to fund on-site detention on private property if the benefit is shared by a larger group than just the private property owner. Dispersion, for purposes of this discussion, is considered a type of on-site stormwater management

Reductions in impervious surface can reduce runoff volumes and velocities. Low Impact Development (LID) regulations can promote reduced widths of newly constructed roadways and is covered in the regulations section (programmatic), but retrofitting existing infrastructure is a structural solution. Pilot projects for reducing road widths and using permeable pavements can be implemented within the City to address water quantity concerns.

Conveyance system cleaning and inspection provides information as to the condition of the stormwater conveyance system that allows for prioritization of rehabilitation, repair, or replacement efforts. In addition, cleaning of the conveyance system can increase the effective conveyance capacity by removing accumulated sediment and other material. Water quality benefits may also be obtained by removing that sediment from the stormwater system.

Stormwater runoff **velocities can be reduced using check dams and vegetation in existing ditches**. In addition, **high-flow bypass facilities** can be installed in areas that are prone to erosion under high flow regimes. **Stream buffer restoration** can reduce stormwater volumes via plant uptake and reduce stormwater velocities by adding roughness to the flow path. **Land acquisition** can be an effective method to reduce developed land surface and therefore reduce impervious surface, promote infiltration, and retain the natural tree canopy.

4.3.2.2 Water Quality

The most effective methods to reduce pollutant loading to the City of Tukwila's receiving waters are controlling pollutants at the source and controlling stormwater flows (that is, peak flows and volumes). Water quality treatment can also be an effective method but effectiveness is often limited by available technology. Channel stabilization also has water quality benefits.

Source control measures tend to be programmatic in nature rather than structural and are therefore addressed in the programmatic solution section. However, **control of point source** water quality problems is covered in this section.

Alternatives geared towards reducing volumes and peaks of stormwater runoff discussed in the drainage section also have positive impacts on pollutant inputs by reducing erosion and erosive capabilities of stormwater and by reducing total stormwater inputs to receiving water bodies. These solutions include infiltration, regional or on-site detention or retention, impervious surface reduction, velocity reduction, stream buffer restoration, and land purchase.

The effectiveness of **water quality treatment** as an alternative is limited by available technology. Total suspended solids (TSS) is relatively easy to remove but other pollutants such as nutrients and heavy metals are not. Particulate-bound copper can be removed via

treatment, but dissolved copper is difficult to remove. Though particulate-bound copper can be removed using sedimentation and filtration, dissolved copper requires adsorption, precipitation, or separation.

The pollutant removal capabilities of stormwater treatment is dependent upon the concentrations of pollutants entering the treatment facility. The lower the influent concentration, the harder it is to remove. The term "irreducible limits" refers to the concentration at which no more of a constituent can be removed. The irreducible limit depends on available technology. The higher the influent concentration, the easier the constituent is to remove.

Channel stabilization can be used to reduce channel erosion propagated by increasing stormwater peak flows and volumes. This structural solution can prevent significant erosion and minimize the risk of increasing channel incision (that is, down-cutting).

The selection of a preferred water quality solution is dependent upon pollutants of concern in the receiving water body.

4.3.2.3 Aquatic Habitat

Structural solutions aimed at aquatic habitat restoration include **replacing culverts, flap gates, or other structures that block fish passage**, **restoration of physical features of creek and river channels**, and **riparian buffer restoration and protection**. Any of these solutions can aid in aquatic habitat restoration. This Plan contains an inventory of blockages to fish passage in the Gilliam, Riverton, Southgate, and Johnson Creeks. Restoring physical features of creek channels and protecting and restoring stream buffers also have water quantity and water quality benefits, in addition to aquatic habitat benefits. Note that habitat restoration or protection projects on the Green or Duwamish Rivers will require significant partnerships with regulatory agencies and with other municipalities such as King County.

Land acquisition can be an effective method to reduce developed land surface and therefore promote infiltration, retain the natural tree canopy, and restore stream buffers. Retention of the natural tree canopy and restoration of stream buffers promote improvement of aquatic habitat.

4.4 Solutions to Tukwila's Surface Water Issues

The purpose of this sub-section is to specify individual solutions to the surface water issues outlined earlier in this section. Table 7 outlines all major surface water issues identified during this planning effort. All of the surface water issues identified have been assigned one or more possible solutions. Each issue can be wholly or partially addressed by that, or those, solutions. Note that City-wide problems will need to be addressed by either a programmatic activity (such as a regulatory change) or else as a series (or program) of capital projects. Problems identified at specific locations may be addressed by a capital project, a programmatic action, or a combination of both programmatic and capital investment. A recommended solution is also shown in Table 7.

In addition to the specific surface water issues shown in Table 7, several smaller drainage issues have been identified by the City of Tukwila and have been included on the Small

Drainage Project List. The drainage issues on the Small Drainage Project List are addressed as a small drainage program.

Note that both the programmatic activities and capital projects recommended as part of this Plan are described in Section 7 (Recommendations). Section 5 provides specific details of the operations and maintenance programmatic activities and Section 6 provides a listing of the capital projects.

TABLE 7
Surface Water Issues and Solutions

ID	Problem Description	Location	Issue Type	Drainage Basin	Possible Solutions[1]	Recommended Solution
1	Outfalls discharge directly to receiving water, no treatment	All outfalls are potential candidates; 48th Ave S and S 122nd are two top candidates	Water quality	All (City-wide)	Programmatic (inspections/enforcement, illicit discharge detection and elimination, maintenance) or capital (point source control, water quality treatment)	Water Quality Retrofit Program (capital project)
2	Ponding in low spot, possible ponding on the east side of road	49th Ave S and S Hazel Street	Drainage	Green/ Duwamish	Capital (increase conveyance capacity, retention/detention)	Move onto 2012 Small Drainage Project List
3	Dumping	S 114th St and 49th Ave S	Water quality	Green/ Duwamish	Cleanup of dumped material	To be addressed by others[2] and City Code Enforcement
4	Lack of off-channel salmon habitat along lower Duwamish	Duwamish River near light rail crossing	Habitat	Green/ Duwamish	Capital (channel physical habitat restoration)	Physical habitat restoration (capital project - Duwamish Gardens)
5	E Marginal Way S Stormwater Outfall	North end of Tukwila, along east shore of Duwamish River; 4 outfalls proximate to S 87th Place	Drainage	Green/ Duwamish	Programmatic (inspections/enforcement, illicit discharge detection and elimination, maintenance) or capital (retrofit system, abandon existing outfalls)	Retrofit system / outfall(s) (capital project)
6	Duwamish River riverbank at S 104th St is eroding, causing failure of road shoulder and habitat degradation	Duwamish River right (east) bank at S. 104th St	Water quality	Green/ Duwamish	Capital (channel stabilization) or close the road	To be addressed by others[2] ; had been CIP project #99441205
7	Duwamish River riverbank at S 115th St is eroding, causing failure of road shoulder and habitat	Duwamish River right (east) bank adjacent to S 115th St between 42nd Ave S and E Marginal Way S and adjacent to 42nd Ave S from	Water quality	Green/ Duwamish	Capital (physical habitat restoration; channel stabilization)	To be addressed by others[2]

TABLE 7
Surface Water Issues and Solutions

ID	Problem Description	Location	Issue Type	Drainage Basin	Possible Solutions[1]	Recommended Solution
	degradation	S 115 St to Interurban Ave S.				
8	53rd Ave S storm drain system has inadequate capacity	53rd Ave S near S 139th	Drainage	Green/ Duwamish	Capital (increase conveyance capacity, provide drainage system, detention/retention)	Increase conveyance capacity (capital project)
9	S 143rd St has no drainage system	S 143rd St, east of Interurban Ave; S 144th St, S 143rd Place, S 143rd S, east of Interurban Ave S between Interurban and Duwamish River, W. Of Duwamish, near Black River convergence	Drainage	Green/ Duwamish	Capital (provide drainage system)	Provide drainage system (capital project)
10	Tukwila stormwater line discharges to WSDOT pipe, no access due to I-405 widening	Andover Park W at Gilliam Creek	Drainage	Green/ Duwamish	Capital (re-route drainage system)	Re-route drainage system (capital project)
11	Andover Park 48 inch stormwater pipe in poor condition, possibly damaged	Andover Park W	Drainage	Gilliam Creek	Capital (increase effective conveyance capacity)	No capital project at this time; address once collection system has been clean and inspected; had been CIP project #98641217
12	Gilliam Creek flapgates as fish barrier	Outlet of Gilliam Creek to Green River - partial fish blockage	Drainage/ habitat	Gilliam Creek	Capital (modify/remove to allow fish passage)	retrofit for fish passage; provide flood protection (capital project)
13	Christensen Rd 12" pipe is undersized (replace with 18")	Christensen Rd	Drainage	Gilliam Creek	Capital (increase capacity)	Increase capacity (capital project)
14	Gilliam Creek culvert at 42nd Ave SE is undersized	Gilliam Creek crossing at 42nd Ave SE (between S 154th and Hwy 518)	Drainage/ habitat	Gilliam Creek	Capital (increase conveyance capacity, replacement of culvert to be fish-passable)	Replace culvert (capital project)

TABLE 7
Surface Water Issues and Solutions

ID	Problem Description	Location	Issue Type	Drainage Basin	Possible Solutions[1]	Recommended Solution
15	Northwest Gilliam Storm Drainage System has inadequate capacity - S 152nd and S 148th	From 42nd Ave S to Tukwila International Blvd S 146th St, S 148th St, S 150th St, S 152nd St	Drainage	Gilliam Creek	Capital (conveyance capacity, re-route existing drainage system, detention/retention, high flow bypass)	Increase capacity (capital project)
16	Cleaning/Inspection of Stormwater Conveyance	Various - commercial area at Mall and surrounding	Water quality / drainage	All (City-wide)	Capital (conveyance system cleaning and inspection)	Conveyance system cleaning and inspection (capital project)
17	Storm Lift Station No. 15 improvements	Near Claim Jumper - 5880 S 180th	Drainage	P17	Capital (needed upgrades, updating)	Upgrade pump station (capital project)
18	Permanent home for soils reclamation facility	Vactor waste dump site / decanter facility, currently using an area near Nelson Place	Water quality	Nelson/ Longacres	Capital (land acquisition for soils reclamation facility)	Land acquisition (capital project)
19	No functional outlet to drainage network at Nelson/Longacres	Area bounded by SR 181, Green River, Burlington Northern RR, and Strander Blvd	Drainage	Nelson/ Longacres	Capital (provide drainage system, on-site detention/retention)	Provide outlet to drainage system (capital project)
20	Former river oxbow has bren blocked off from River	Nelson farm property between Green River and W. Valley Highway	Habitat	Nelson/ Longacres	Capital (channel physical habitat restoration)	Restore Nelson Salmon Habitat Side Channel (capital project)
21	Storm system along E Marginal Way is bad setup, causes ponding	E Marginal Way between SR599 ramp and S 124th St	Drainage	Riverton Creek	Capital (increase conveyance capacity, re-route drainage, detention, high flow bypass)	Proximate to Riverton Creek culvert (below), so addressed together
22	Fish habitat accessibility issues in Riverton Creek culvert	E Marginal Way south of SR599	Habitat	Riverton Creek	Capital (removal/replacement of fish-blocking culvert)	Conveyance system cleaning and inspection (capital project)
23	Riverton Creek Flap Gate	Riverton outfall into Duwamish	Habitat	Riverton	Capital (modify/remove to	Remove flapgate (capital

TABLE 7
Surface Water Issues and Solutions

ID	Problem Description	Location	Issue Type	Drainage Basin	Possible Solutions[1]	Recommended Solution
	is partial fish passage barrier	River		Creek	allow fish passage)	project)
24	S 146th St pipe and 35th ave s drainage - needs additional capacity	S 146th St between Military Rd S and Pac Hwy S	Drainage	Southgate Creek	Capital (increase conveyance capacity, detention/retention, high flow bypass)	Increase conveyance capacity (capital project)
25	Sediment/clogging issues proximate to Southgate Creek	S 131st St near 44th Ave S	Drainage, water quality	Southgate Creek	Regrading of wetlands on private property by private property owner	To be addressed by others[2]
26	Historical landslide - road closed	S 137th St at 44th Ave S	Drainage, water quality	Southgate Creek	Capital (complete channel stabilization and riparian buffer restoration)	No capital project at this time; monitor status and review during next planning period

Notes:

[1] Possible solutions address the surface water problem in whole or in part

[2] Problem to be addressed by others because responsibility/opportunity lies in other City department or with other jurisdiction

5.0 Capital Improvement Projects

This section summarizes the eighteen capital improvement projects recommended for inclusion into the City of Tukwila's capital improvement program. These capital projects are organized by fund (412 Fund for drainage and water quality shown in Table 8 and 301 Fund for fish habitat shown in Table 9). Figure 7 shows the locations of each of these capital projects. Appendix E contains the details for each capital project, including cost estimates.

5.1 412 Fund (Drainage and Water Quality)

TABLE 8
Drainage and Water Quality Capital Projects – 412 Fund

ID	Project Name	Basin	Estimated Total Project Cost (March 2012 Dollars)
98641222	S 143rd St storm drain system	Green/ Duwamish River	$1,096,000
98741202	Nelson/Longacres – Phase II	Nelson/Longacres	$678,000
98941202	Christensen Rd. pipe replacement	Gilliam Creek	$327,000
99341208	Gilliam Creek 42nd Ave S culvert	Gilliam Creek	$702,000
99441202	Soil Reclamation Facility	Nelson/Longacres	$3,504,000
90341206	Northwest Gilliam Storm Drainage System	Gilliam Creek	$1,978,000
90341213	53rd Ave S storm drain system	Green/ Duwamish River	$1,557,000
90341214	S 146th St pipe and 35th Ave S drainage	Southgate Creek	$882,000
91041203	Storm Lift Station No. 15 Improvements	P17	$698,000
91041204	E. Marginal Way S Stormwater Outfall	Green/ Duwamish River	$772,000
91241201	Water Quality Retrofit Program	Green/ Duwamish River	$287,000
91241202	Tukwila Pkwy/Gilliam Cr Outfalls	Gilliam Creek	$278,000
91241203	Tukwila Urban Center Conveyance Inspections	Gilliam Cr./P17	$541,000
91041204	E. Marginal Way Conveyance Inspection	Riverton Creek	$85,000

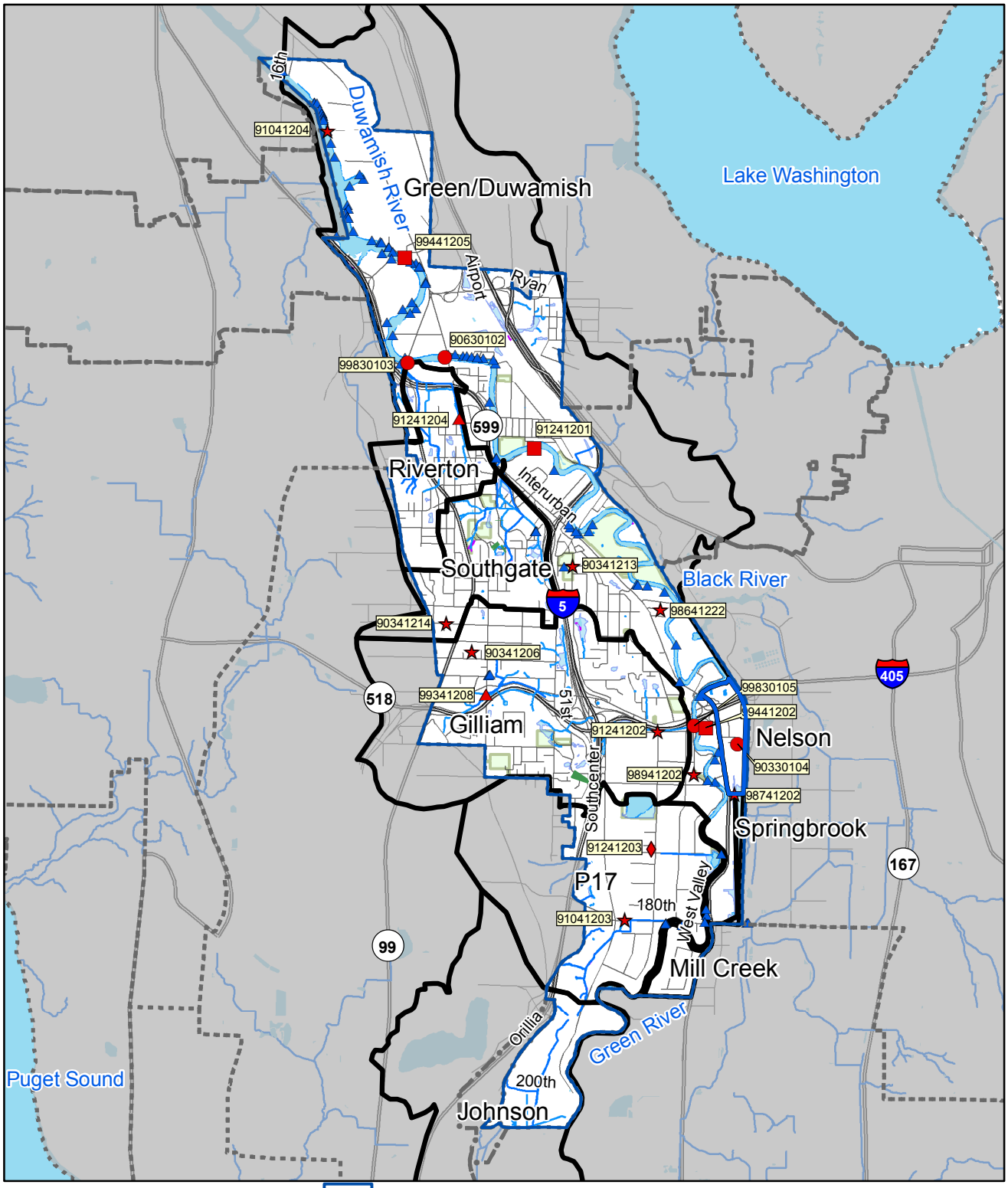


FIGURE 7
Capital Improvement Projects
City of Tukwila 2012 Surface Water Comprehensive Plan

5.2 301 Fund (Fish Habitat)

TABLE 9
Fish Habitat Capital Projects – 301 Fund

ID	Project Name	Basin	Estimated Total Project Cost (March 2012 Dollars)
90330104	Nelson Side Channel	Nelson/Longacres	$1,497,000
90630102	Duwamish Gardens	Green/ Duwamish	$3,000,000
99830103	Riverton Creek Flap Gate Removal	Riverton Creek	$946,000
99830105	Gilliam Creek Fish Barrier Removal	Gilliam Creek	$816,000

6.0 Operations and Maintenance

This section contains a description of the operations and maintenance activities applicable to the City of Tukwila's surface water management program.

6.1 Surface Water Maintenance Activities

The operations and maintenance of existing surface water assets is an important part of the City's surface water management program. Surface water Operations and Maintenance (O&M) staff perform the following:

- Respond to citizen complaints regarding surface water problems
- Observe and document new and existing surface water issues
- Maintain and operate surface water assets (facilities, features, etc.)

Tukwila's surface water O&M program has well-established guidelines for its various activities. These activities are based on previous experience and institutional knowledge and are optimized for the available maintenance crew and equipment resources.

6.2 Regulatory Compliance

The City, businesses and residents of Tukwila are involved in activities that could potentially affect surface water. Water quality impacts from these activities can be offset by best management practices (BMPs). Many water quality BMPs are currently being implemented by the City in its O&M work in accordance with the City's NPDES stormwater permit. The City should consider enhancements to its surface water O&M program related to NPDES compliance:

- Expand and enhance documentation program for compliant/complaint response, location of surface water 'hot spots' (for drainage and water quality), and maintenance performed; consider implementing a GIS-based tracking tool
- Develop a vactor decant policy and locate and secure a permanent site to decant solids from vactor and street sweepings; perform a 'benchmarking' study of proximate surface water utilities to characterize what other utilities are doing with decant solids

6.3 Surface Water Maintenance Policies

Within the boundaries of the City of Tukwila, numerous privately-owned residential surface facilities exist. Many if not most of these privately-owned residential surface water facilities are not maintained as they should be to maintain designed performance. The City of Tukwila needs make a policy decision regarding maintenance of these surface water facilities. In making this decision, the City should consider currently available surface water O&M staff and equipment resources and the cost of adding additional resources to maintain these privately-owned surface water facilities. The City needs to answer the following questions to inform their decision:

- Existing residential Stormwater facility built by developers (or redevelopers), is it public or private?
- When a new residential development installs a stormwater facility, is it public or private?

Once these questions are answered, the City can then decide between the following options:

- All residential stormwater facilities publically owned and publically maintained
- All residential stormwater facilities privately owned, publically maintained (private owner charged a fee for the City to maintain)
- All residential stormwater facilities privately owned, privately maintained (with corresponding enforcement program)

A possible option would be to increase the stormwater fee dramatically for owners served by a private residential stormwater facility, then have the private stormwater facility owner prove it is being maintained adequately, and in turn have a reduced stormwater fee (back to the original rate).

Whatever the City chooses, it must consider the impacts to required number of maintenance staff FTEs that would be required.

7.0 Recommendations

This section contains a summary of the recommendations made in this Plan for the City of Tukwila's surface water management program.

7.1 Recommended Activities

7.1.1 Capital Projects

Section 5 of this Plan outlines the eighteen (18) individual capital projects recommended in this Plan. Of the 18, there are fourteen (14) recommended for implementation using the 412 fund and four (4) recommended for implementation using the 301 fund (Tables 8 and 9, respectively).

Not all capital projects are recommended for implementation in this surface water planning window, due to funding availability. These remaining capital projects represent the continuing need for capital improvements in the City of Tukwila in order to achieve surface water goals. The City of Tukwila should consider this list of unfunded capital projects when making investments in other arenas (such as transportation) or when identified possible outside funding sources (such as grants or loans). This list will likely be a starting point for the next round of comprehensive surface water planning.

7.1.2 Programmatic Solutions and Policies

This sub-section contains a summary of the recommended improvements to Tukwila's Surface Water Management Program needed in order to more fully comply with applicable regulations. These recommendations are also shown in Section 7 of the Plan.

7.1.2.1 Education

Increase opportunities for public involvement in environmental stewardship activities; reach out to children, students, adults, and visitors. Develop and disseminate information to the public.

7.1.2.2 Incentives

No recommendations at this time.

7.1.2.3 Regulatory and Policy Changes

The City of Tukwila should update its SEPA ESA screening checklist to include Coastal-Puget Sound bull trout and Puget Sound steelhead

The City of Tukwila has implemented capital improvement projects that restore fish habitat for ESA-listed species but should identify, plan, and implement more habitat restoration projects, in accordance with the State Salmon Recovery Planning Act.

The City should respond to any new and additional requirements in the next NPDES Phase II permit cycle, which will likely include requirements for water quality monitoring and implementation of low impact development where feasible. In addition, the City should

keep track of possible modifications to its NPDES stormwater permit over future cycles to include TMDL requirements on the Green and Duwamish Rivers.

The City should make a policy decision regarding responsibility for maintenance of private residential stormwater facilities. The City needs to answer the following questions to inform their decision:

- Existing residential Stormwater facility built by developers (or redevelopers), is it public or private?
- When a new development installs a residential stormwater facility, is it public or private?

Once these questions are answered, the City can then decide between the following options:

- All residential stormwater facilities publically owned and publically maintained
- All residential stormwater facilities privately owned, publically maintained (private owner charged a fee for the City to maintain)
- All residential stormwater facilities privately owned, privately maintained (with corresponding enforcement program)

A possible option would be to increase the stormwater fee on privately maintained residential stormwater facilities dramatically, then have the private stormwater facility owner prove it is being maintained adequately, and in turn have a reduced stormwater fee (back to the original rate).

Whatever the City chooses, it must consider the impacts to required number of maintenance staff FTEs that would be required.

7.1.2.4 Inspection and Enforcement

The City should plan for periodic updating of City's surface water system inventory. This inventory should include new infrastructure brought on-line since previous update (such as for new and re-development).

The City should complete inspections of the City's stormwater system. As needed, complete cleaning of stormwater lines in order to allow inspections to occur.

The City should perform an inventory (and plan for periodic updates) of private stormwater facilities within City boundaries.

The City should enhance its inspection program to reduce noncompliance with BMP requirements and water quality violations.

The City should identify, document, and implement procedures for characterizing, tracing, and removing illicit discharges. The City should develop and carry out systematic inspections of construction sites then document inspections and any enforcement actions.

7.1.2.5 Public Involvement

Hold public meeting and public comment period on this Surface Water Comprehensive Plan. See related activities under 'education' within this Recommendations Section 7.

7.1.2.6 Surface Water System Maintenance

Develop a permanent vactor waste treatment facility or reach an agreement with another municipality to use an existing facility.

Perform more robust documentation of inspections, maintenance activities, compliant response, etc. Enhance tracking and reporting to ensure maintenance, inspections, and enforcements are conducted and documented adequately.

7.1.2.7 Habitat Manager

Hire a 'habitat manager' to focus on habitat protection and restoration within the City of Tukwila, assisting in implementation of the WRIA 9 Salmon Recovery Plan (WRIA 9 2005).

The benefit would be that the City would have a qualified person dedicated to this effort and available for grant funding applications and permitting. The cost of this additional FTE could come from a combination of parks and from the surface water fee. With a dedicated person, the City would be more likely to obtain outside grant and loan funding for habitat projects. It's also possible that this position could pay for itself through outside funding.

7.2 Schedule for Implementation

The City will determine a schedule for implementing the recommendations in this Plan. The City should consider implementing all of the programmatic recommendations in the next few years. While the City is budget-limited in implementing capital projects, it is recommended that the City implement at least one capital project per year to address the backlog of capital projects and to keep up with the rate of new capital projects being developed. Funding the capital projects and the programmatic recommendations in this plan will meet regulatory requirements and maintain current level of service.

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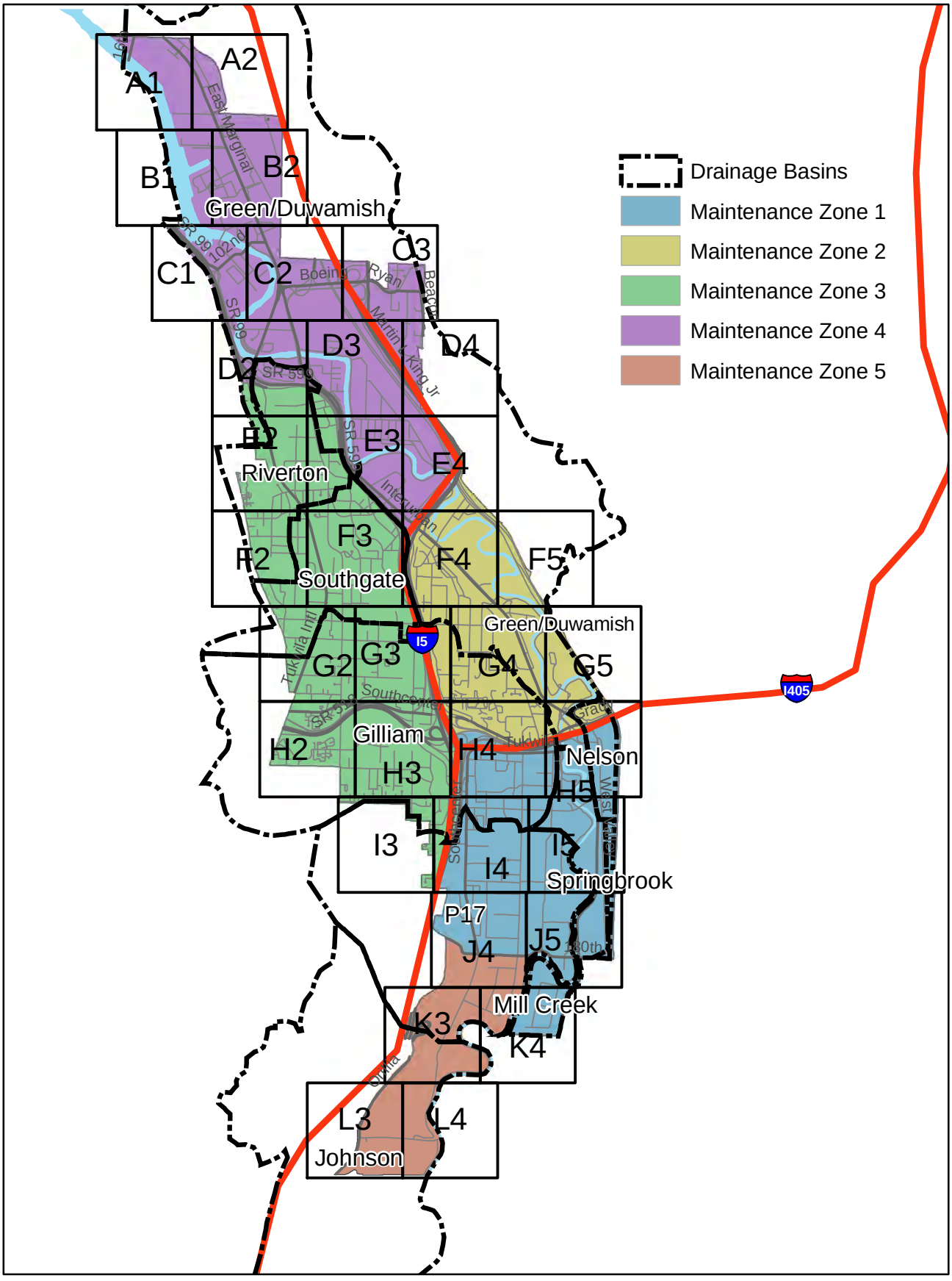
APPENDIX A

Map Book



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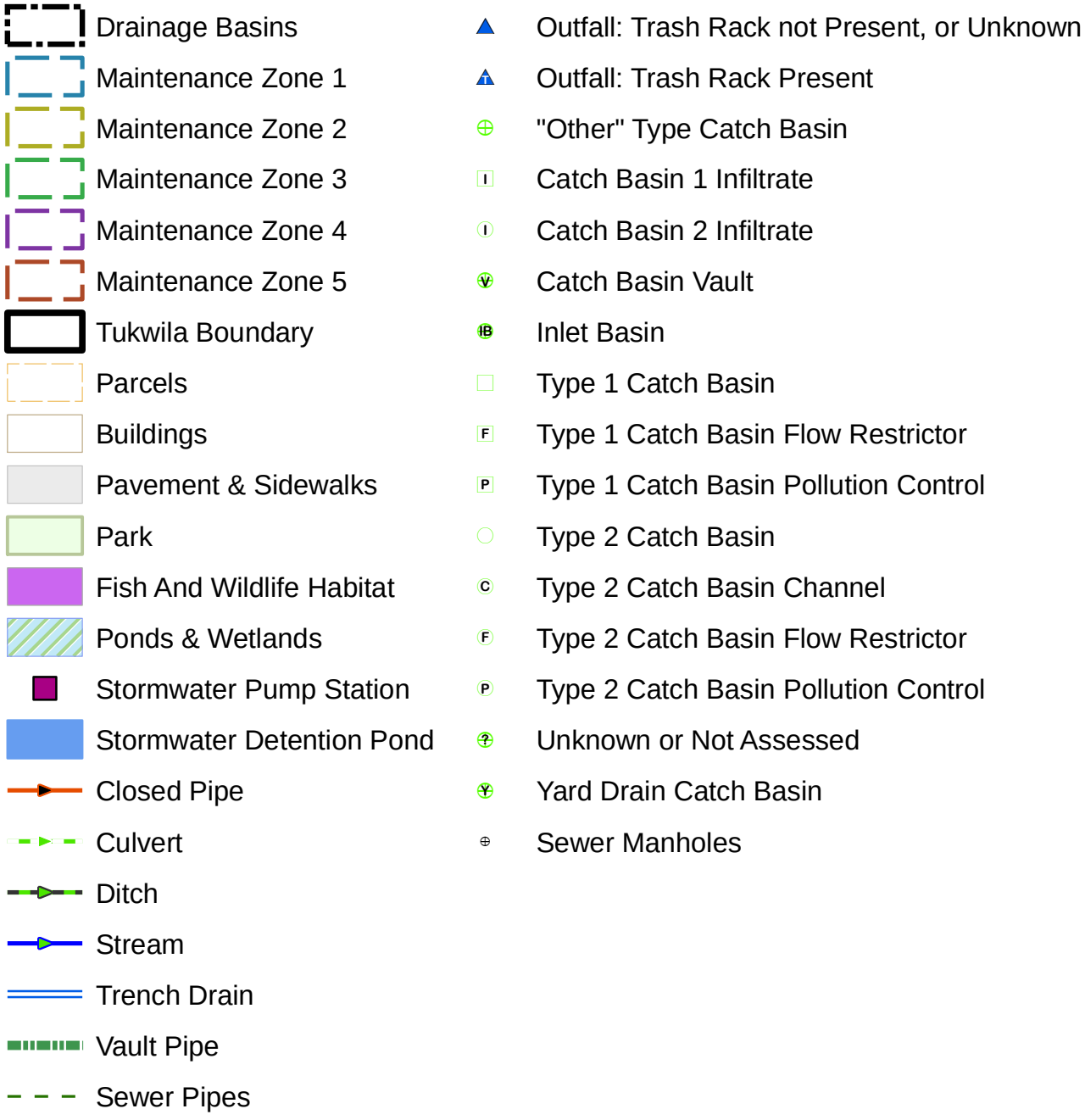

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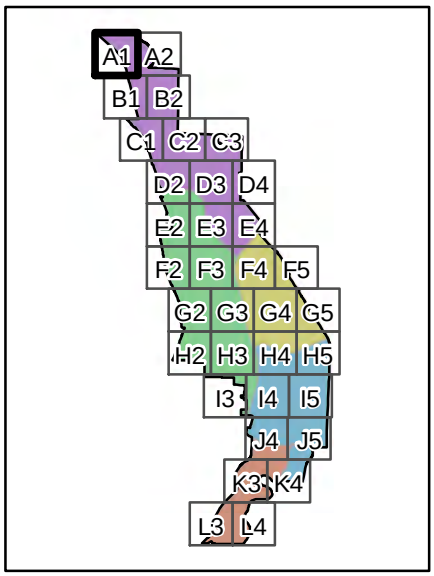

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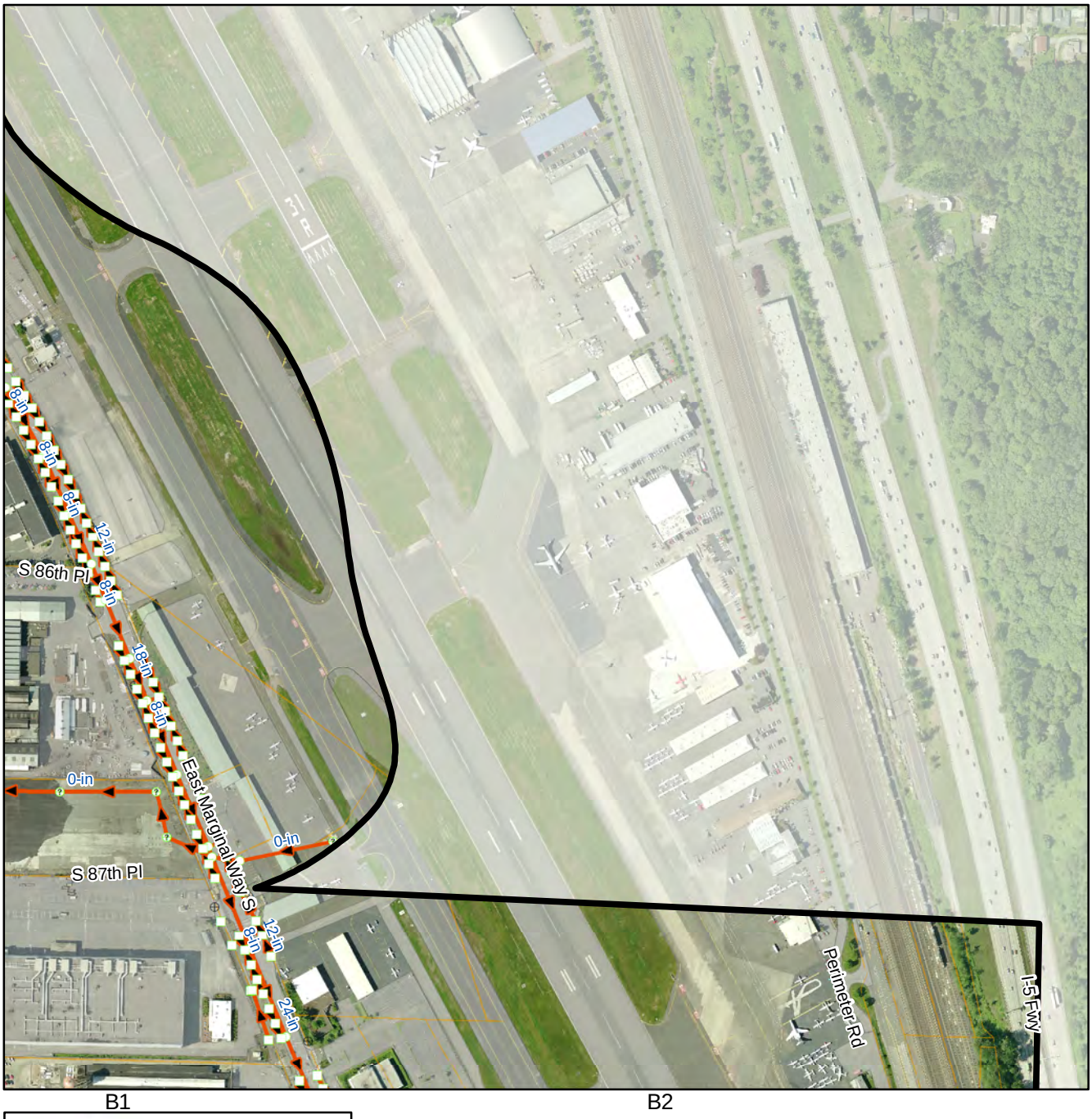

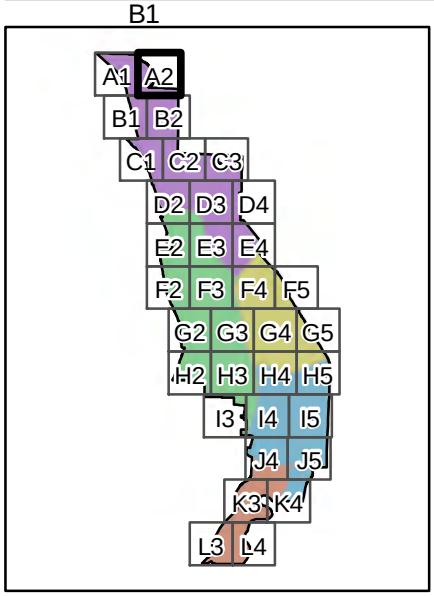

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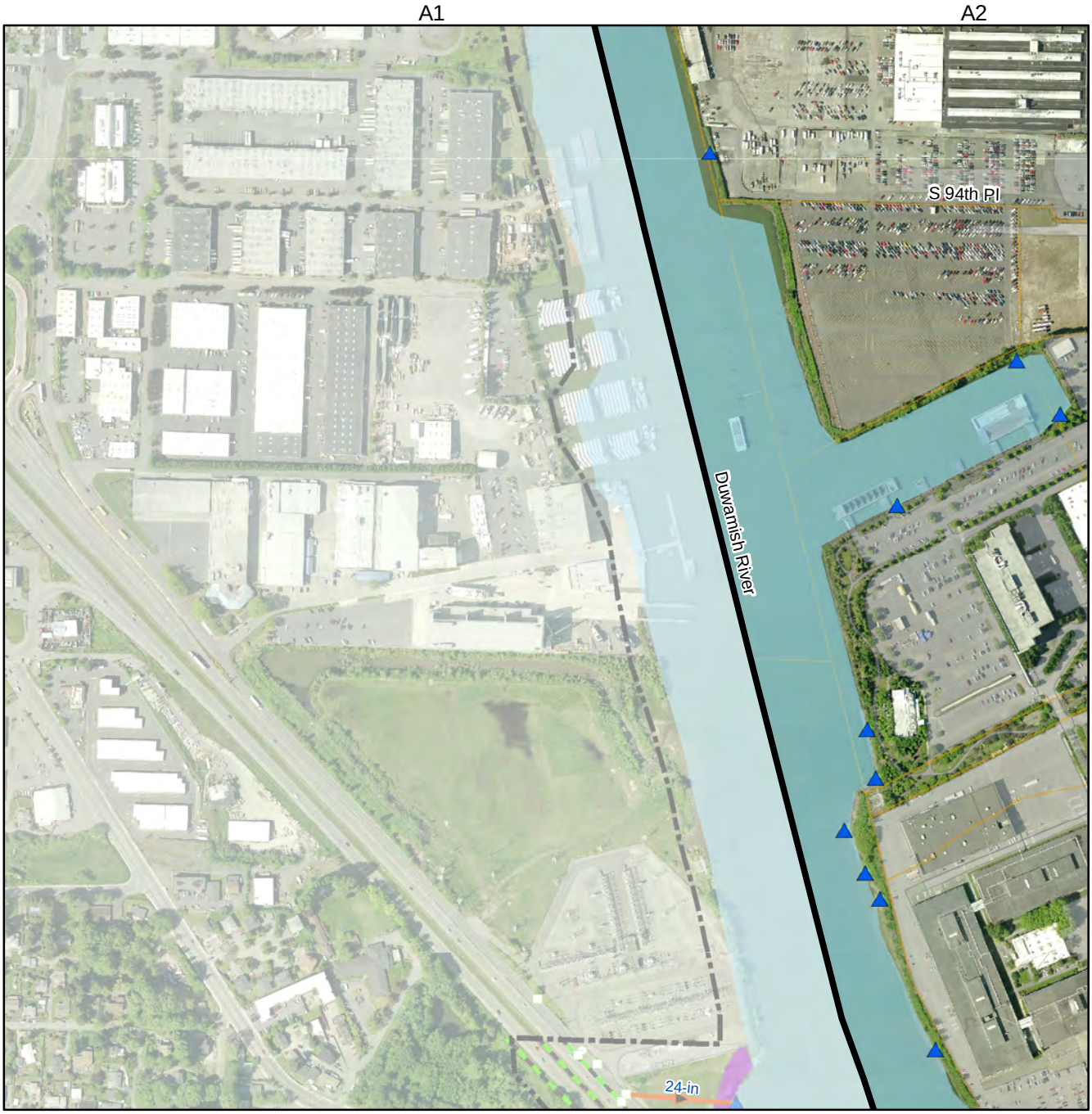

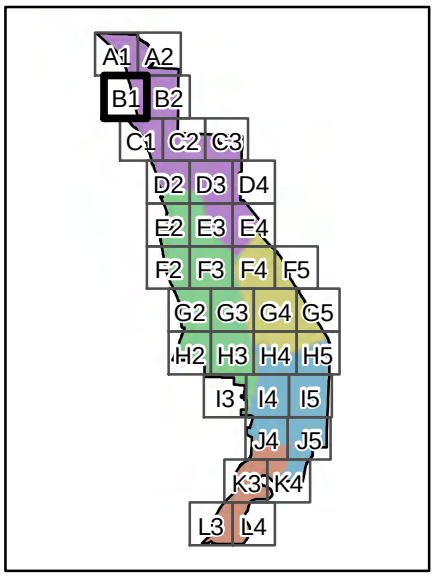

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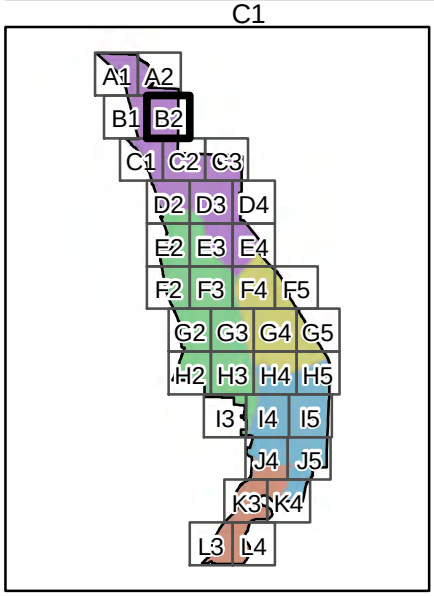

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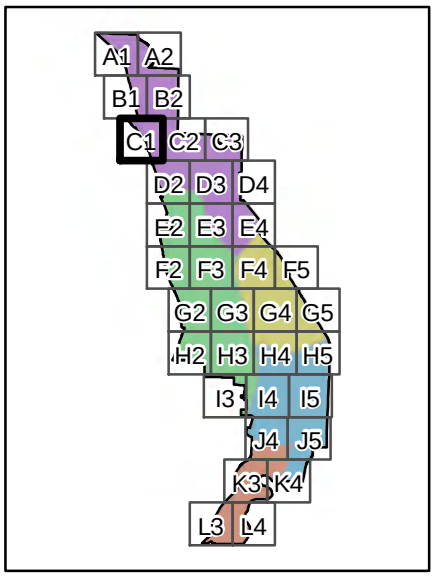

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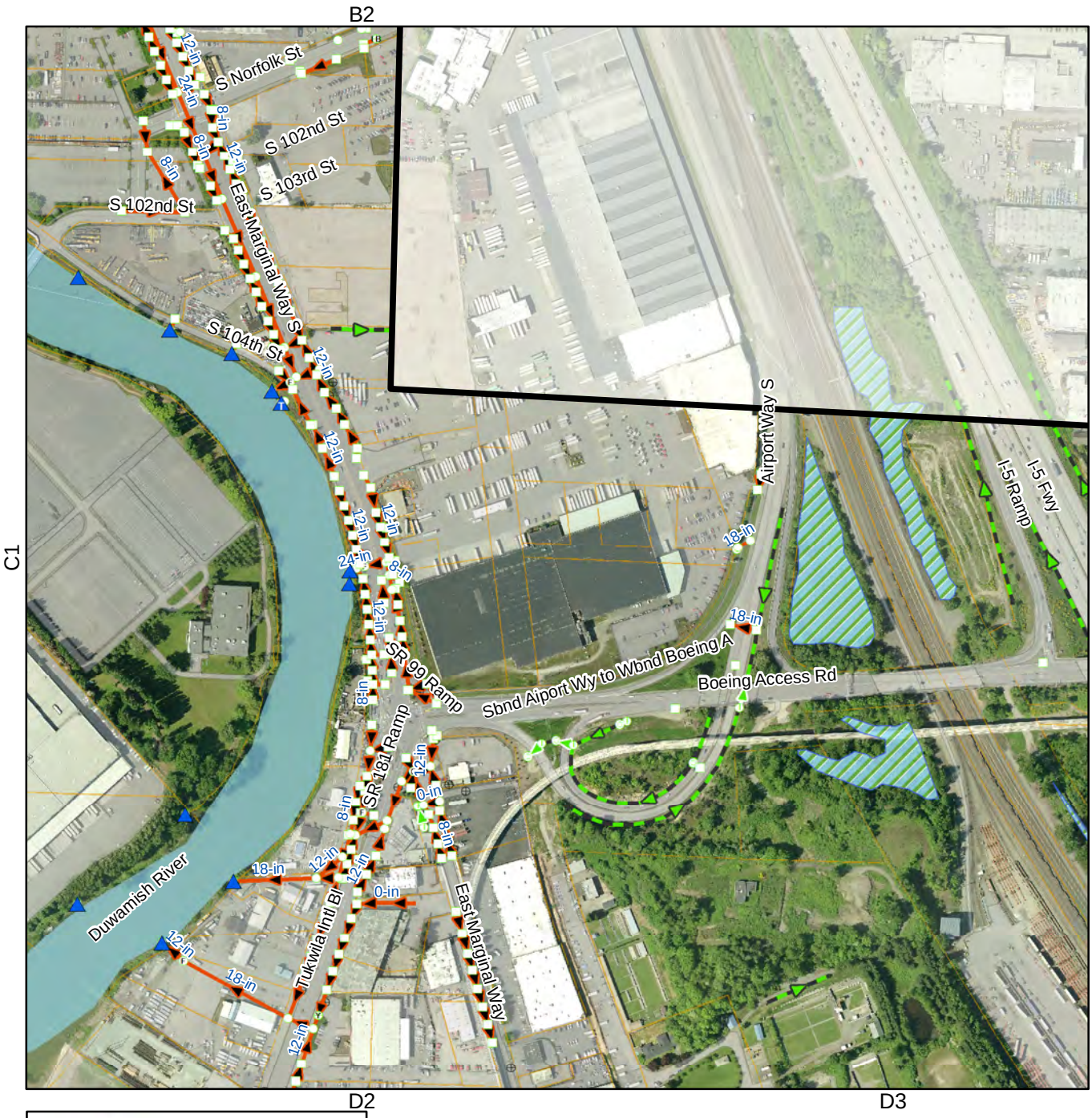

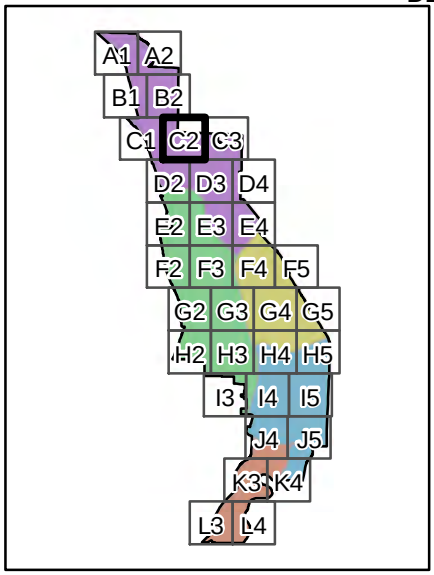

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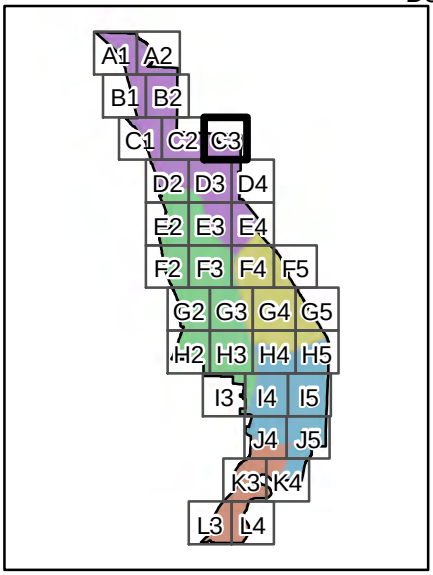

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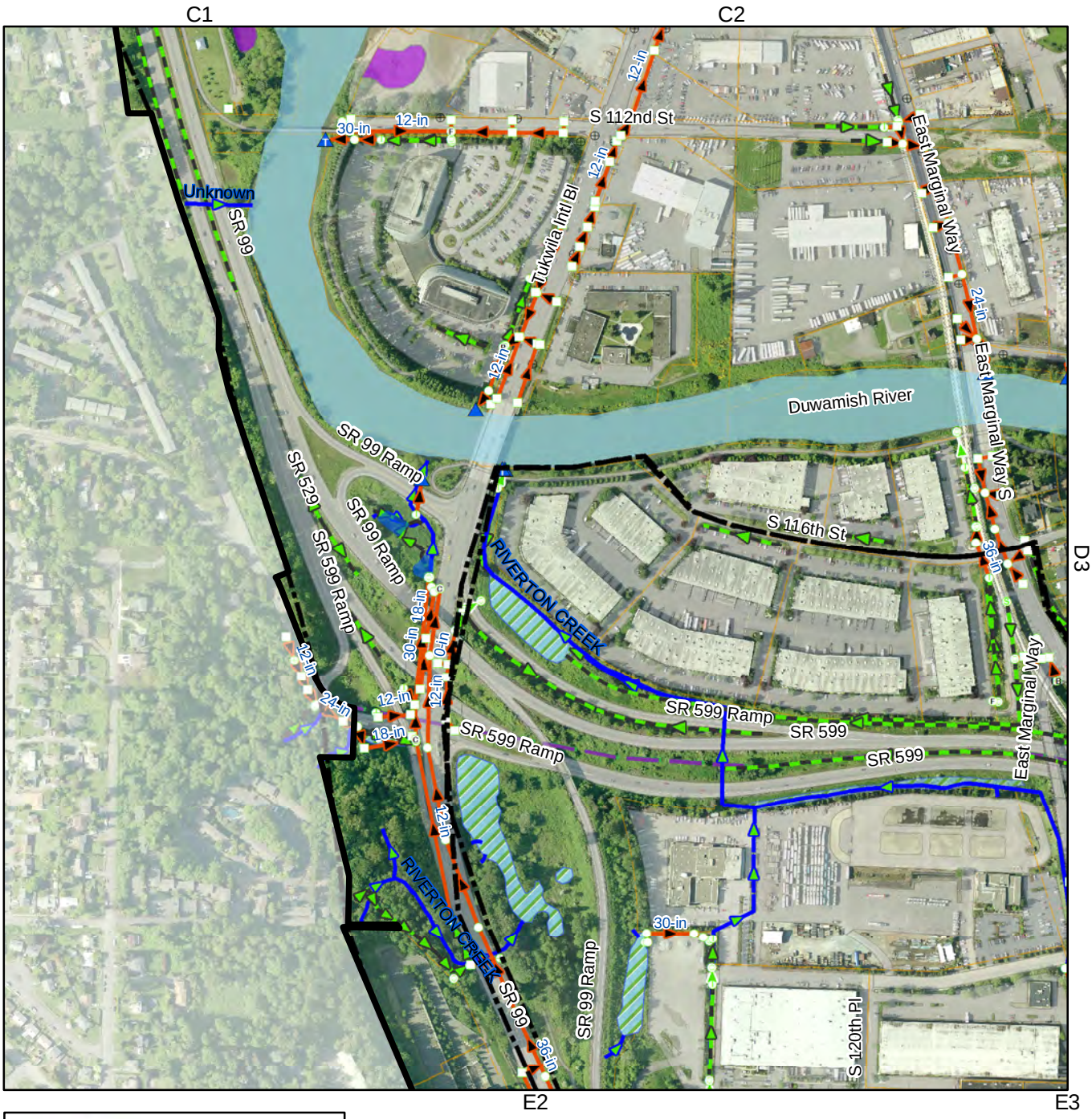

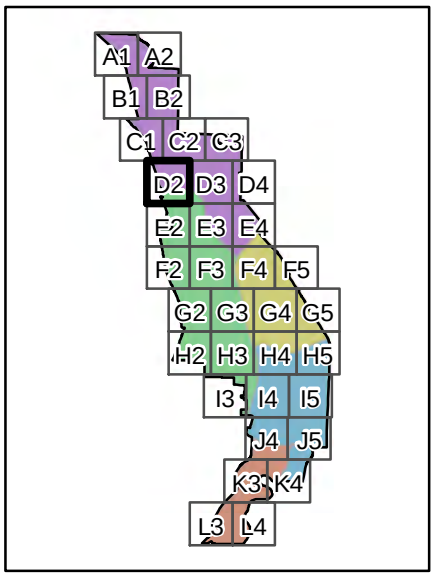

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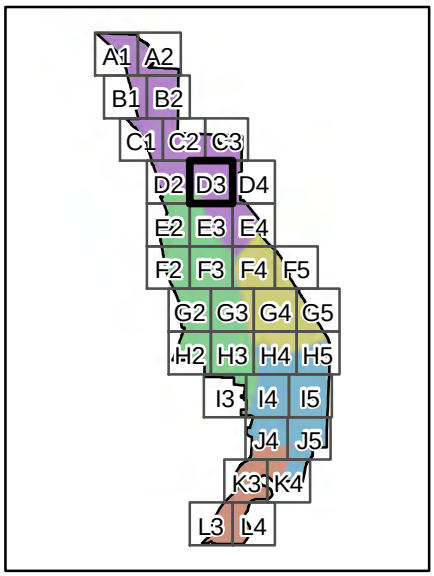

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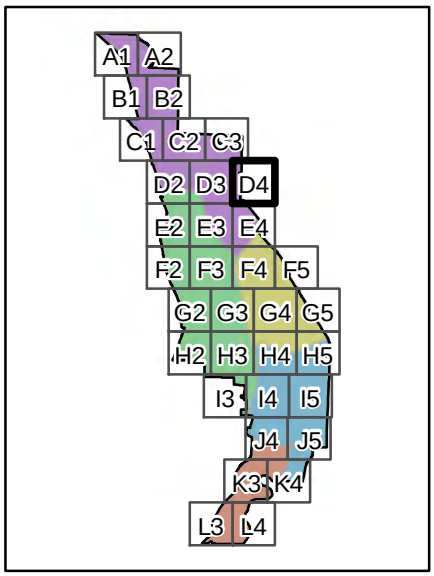

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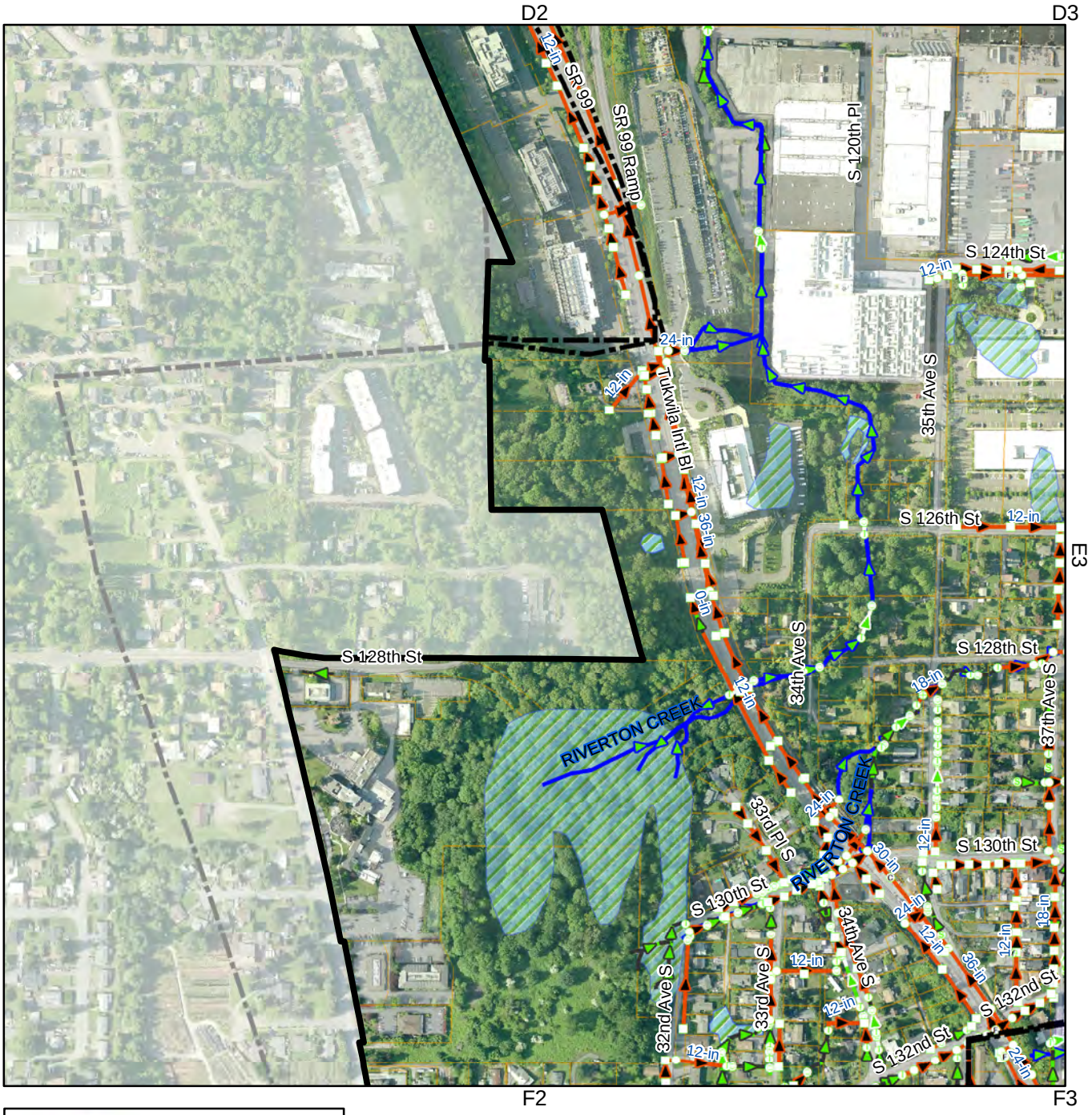

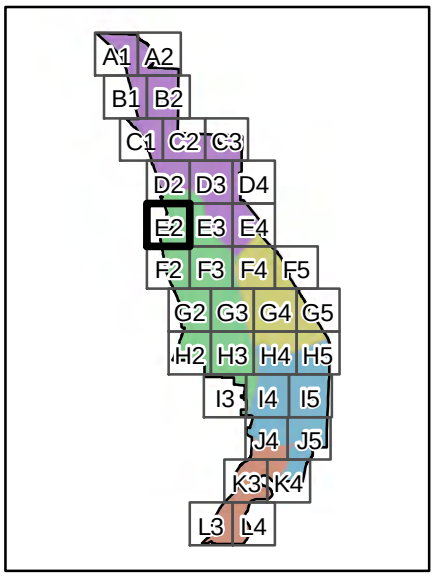

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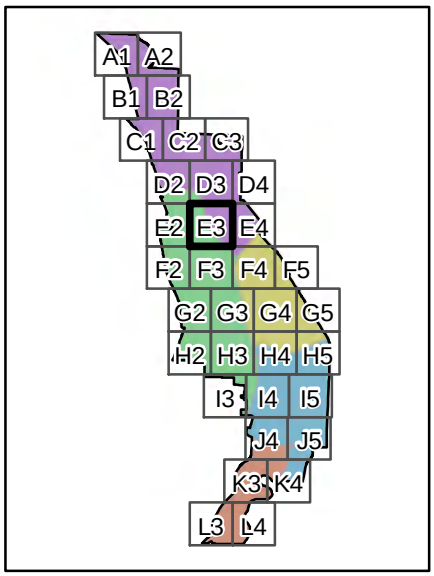

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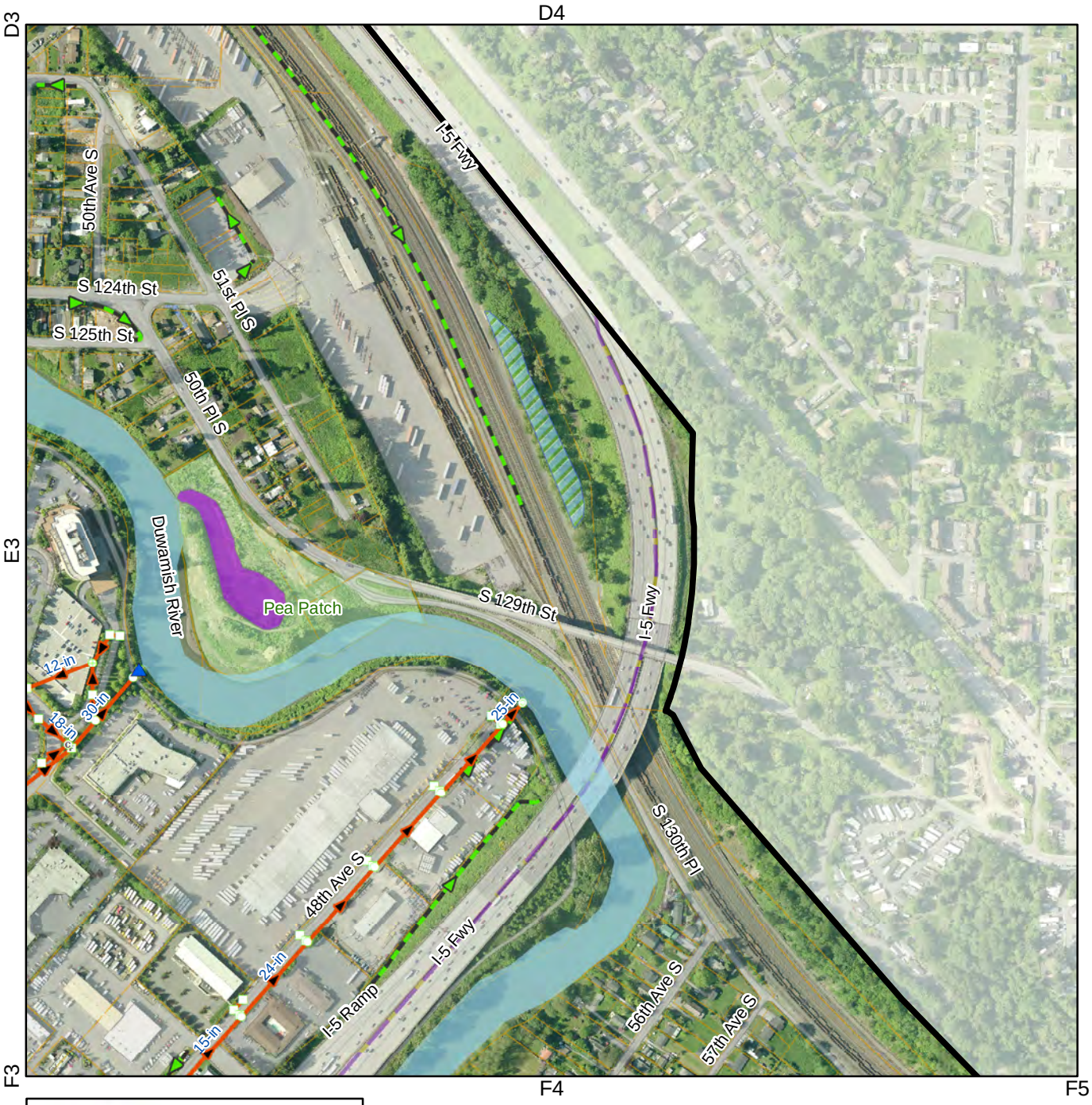

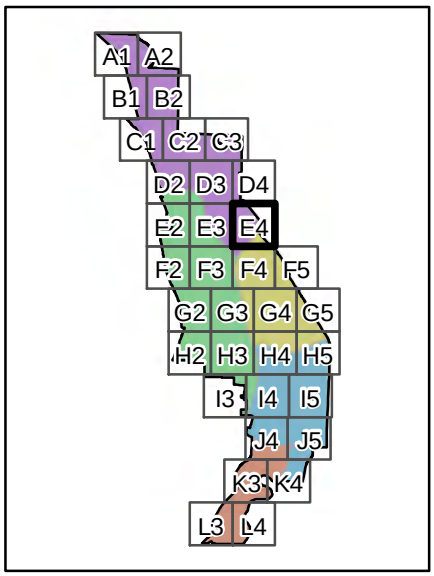

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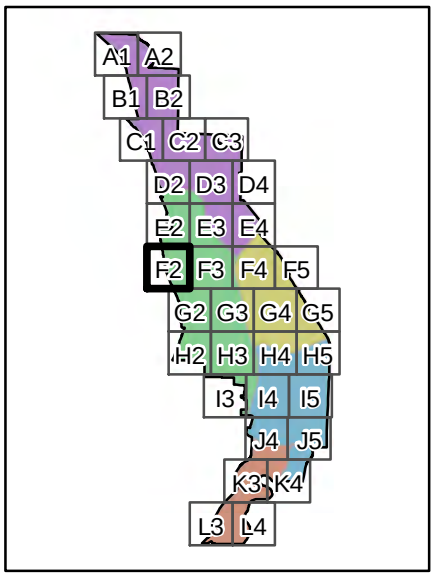

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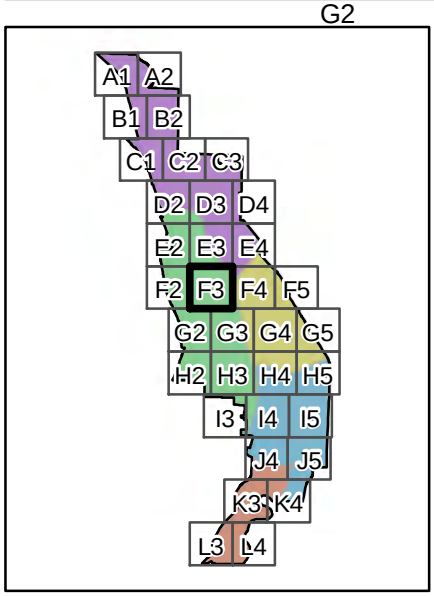

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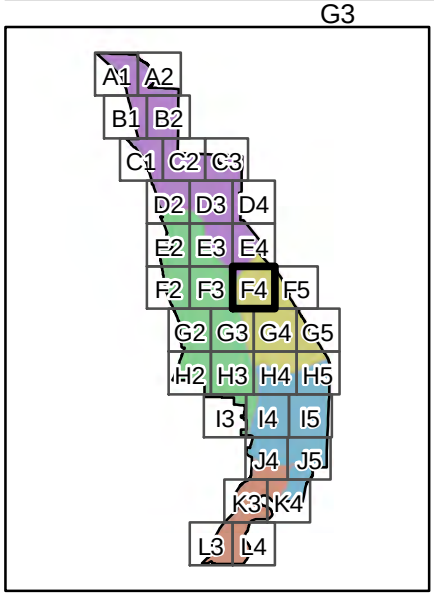

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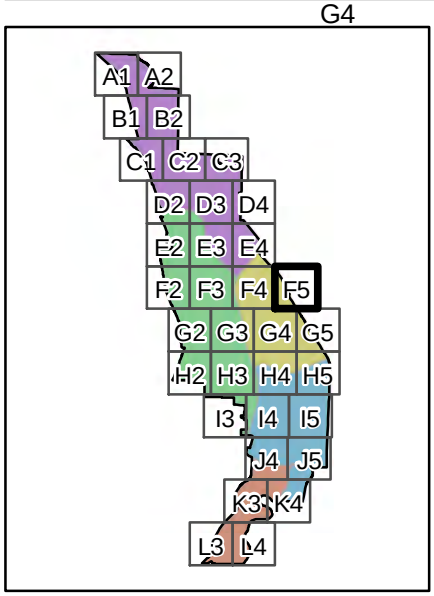

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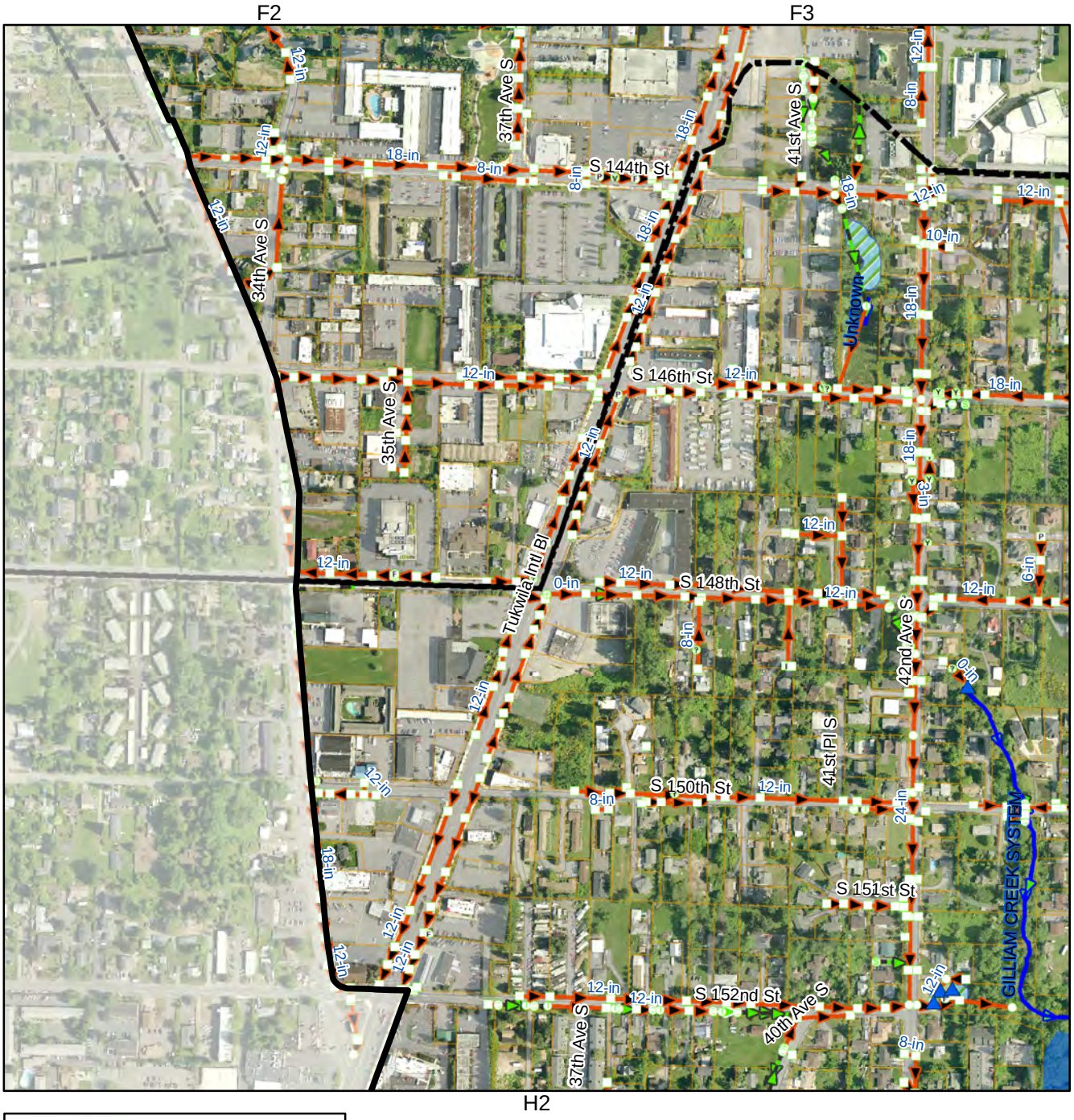

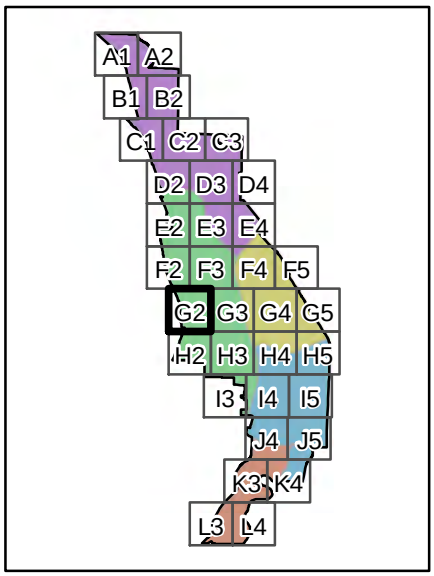

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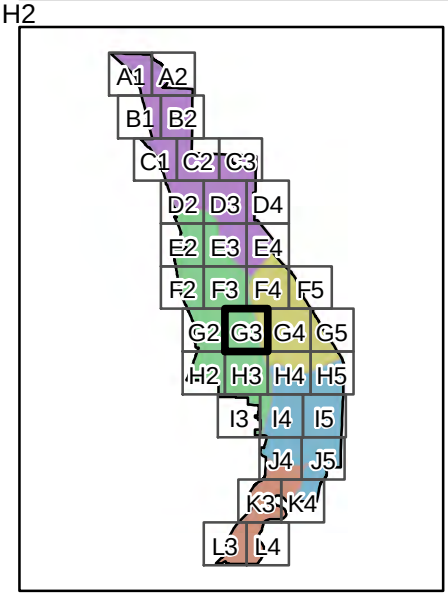

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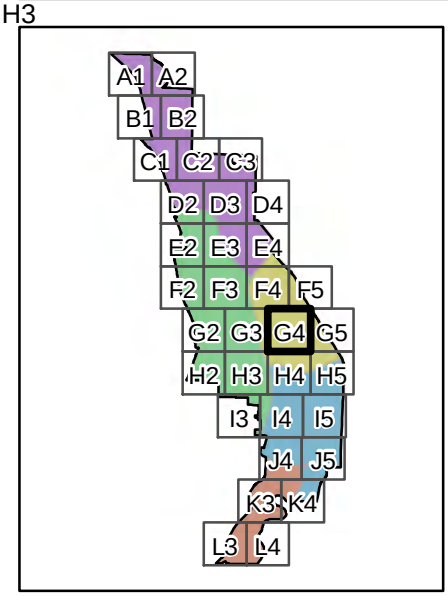

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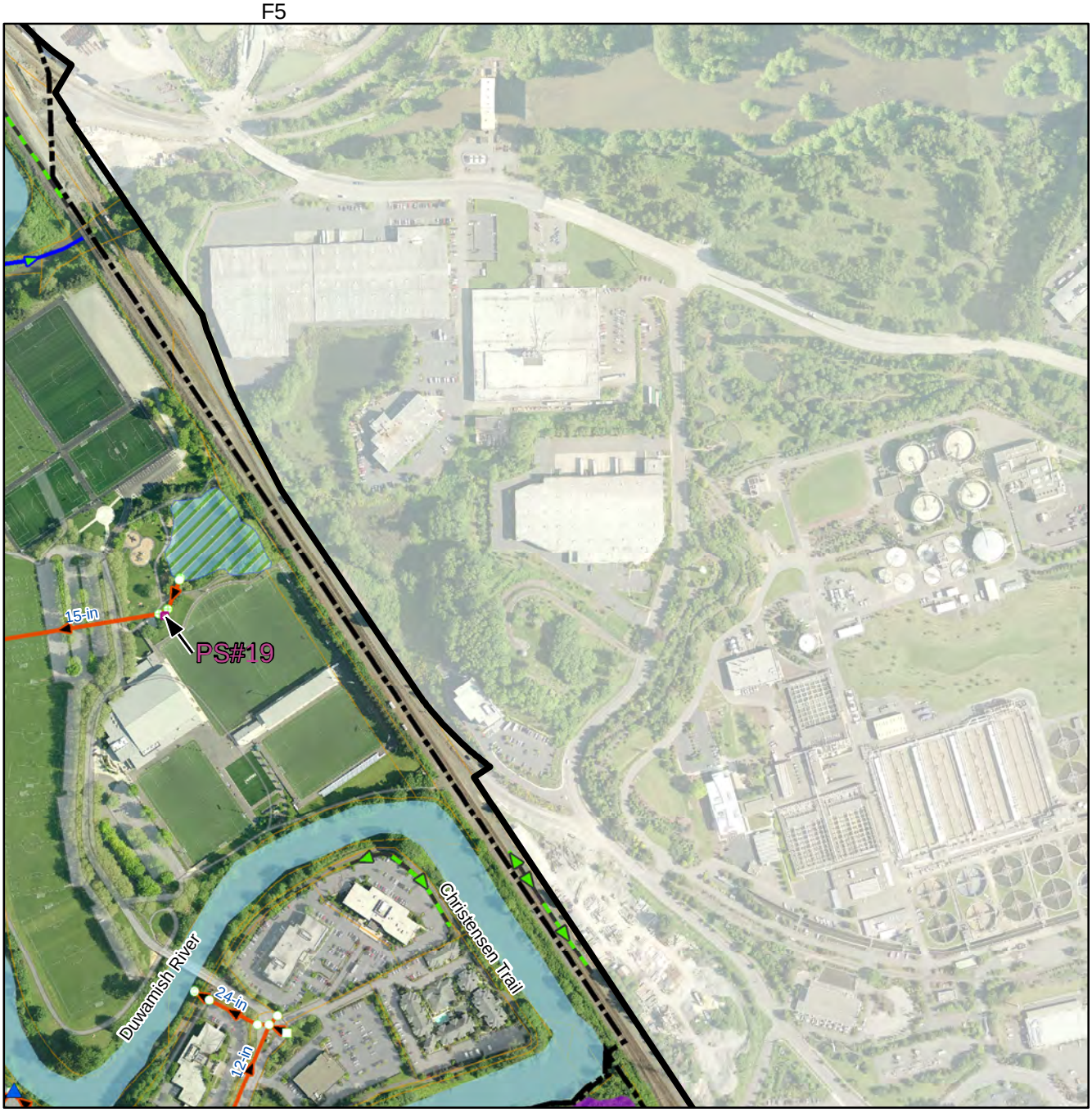

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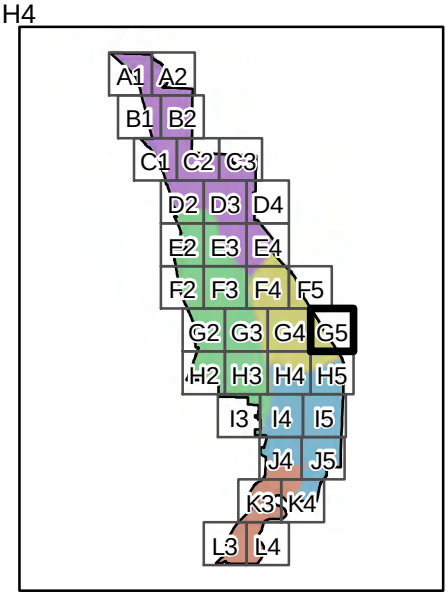

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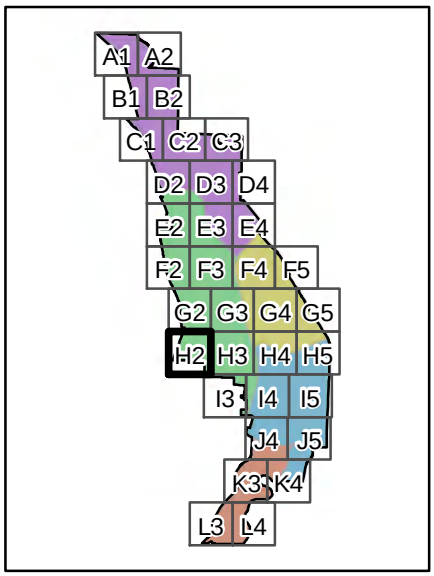

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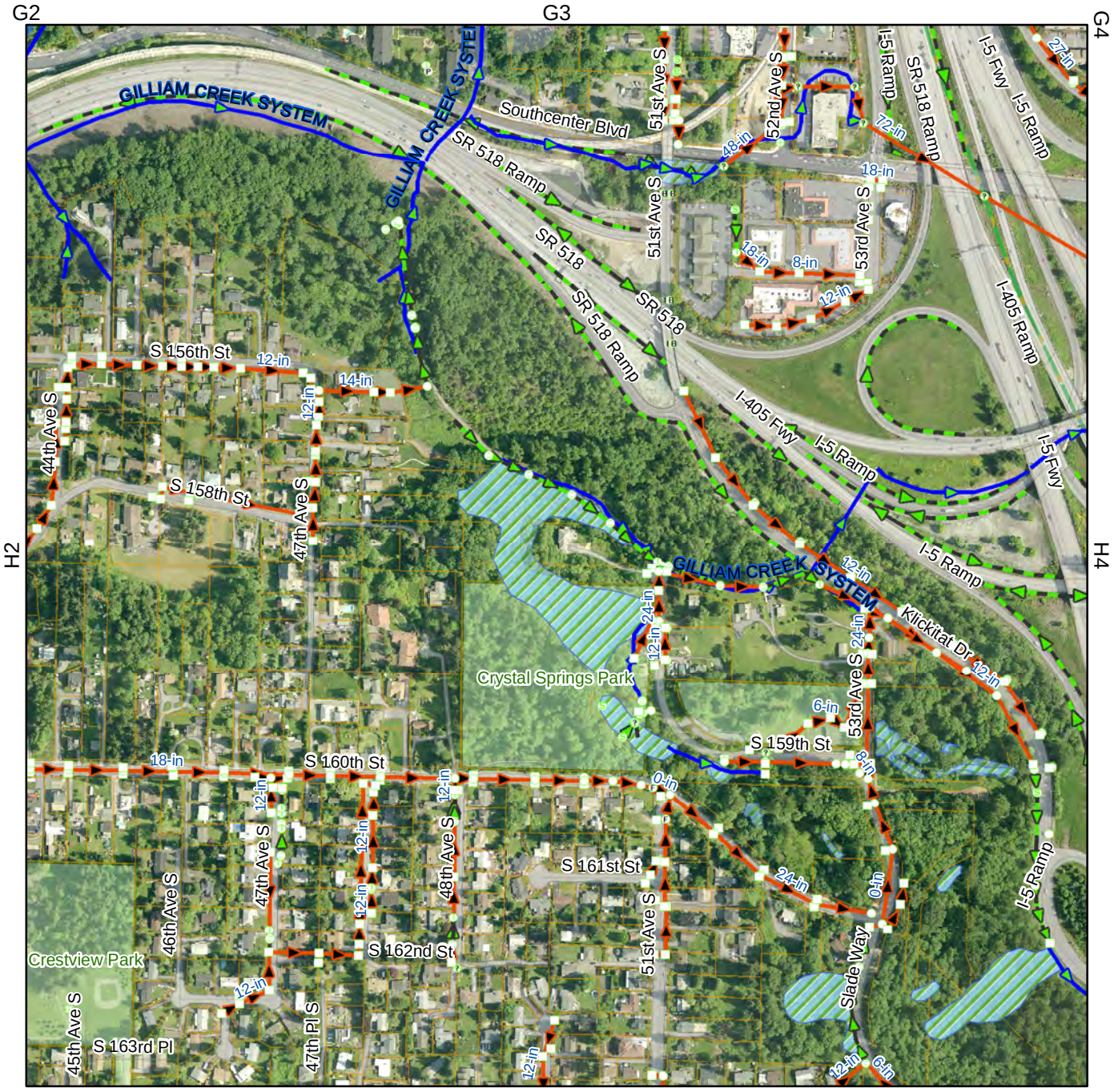

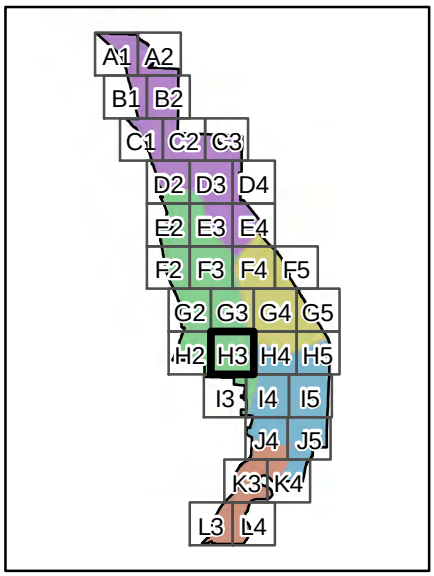

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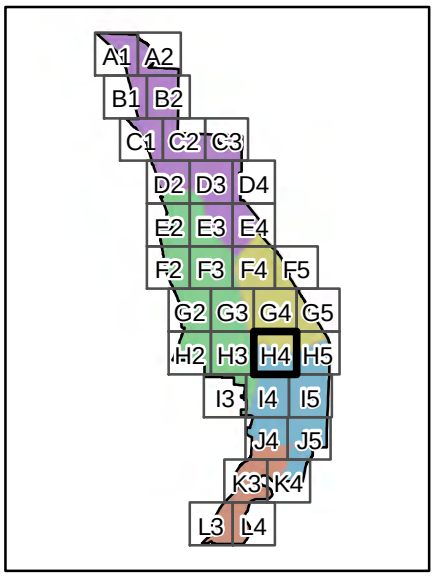

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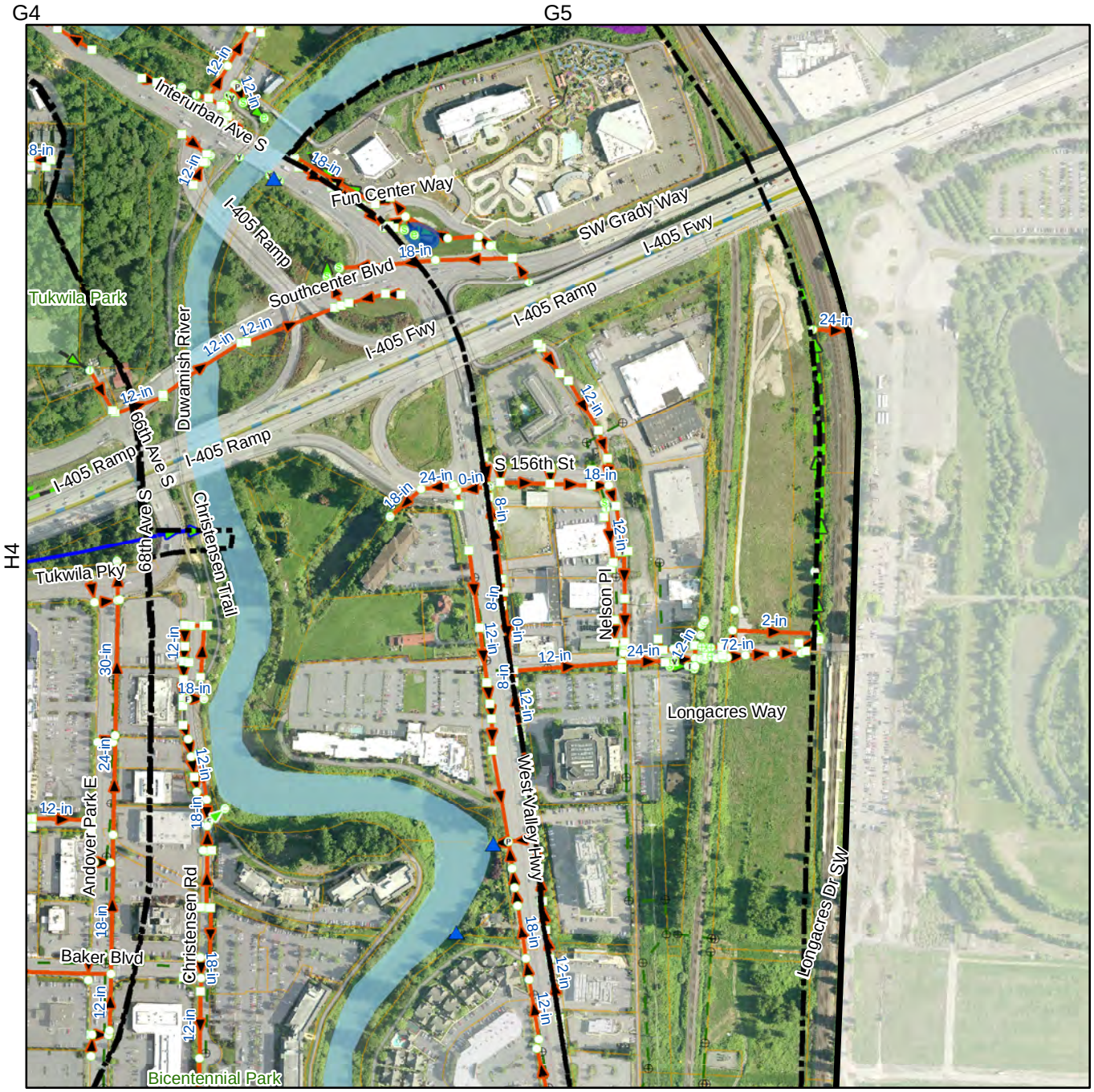

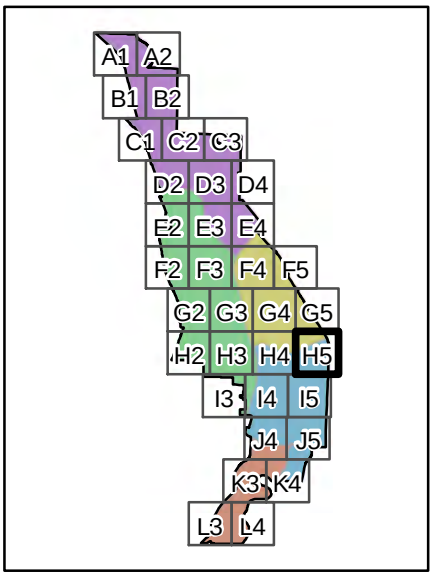

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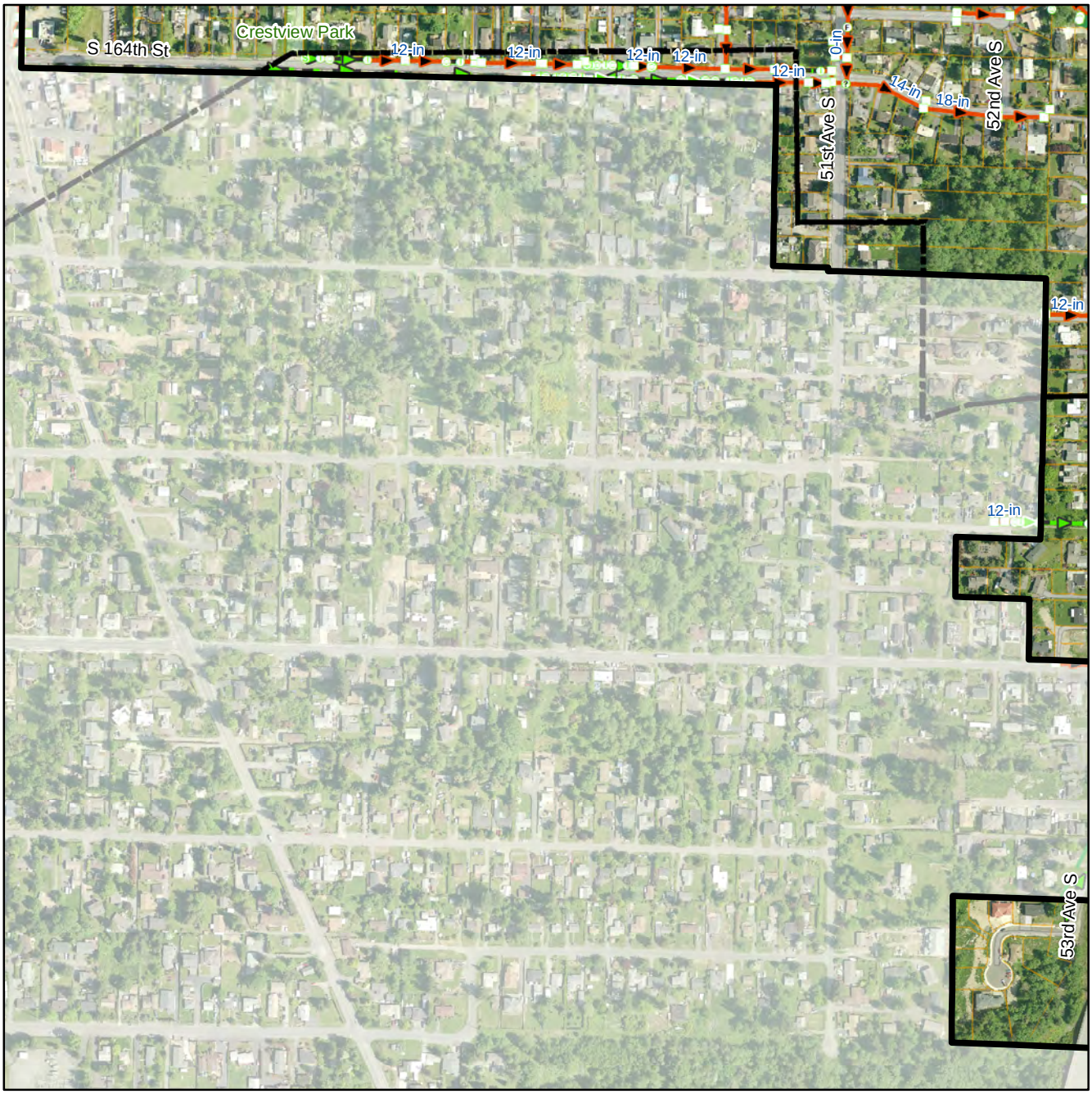

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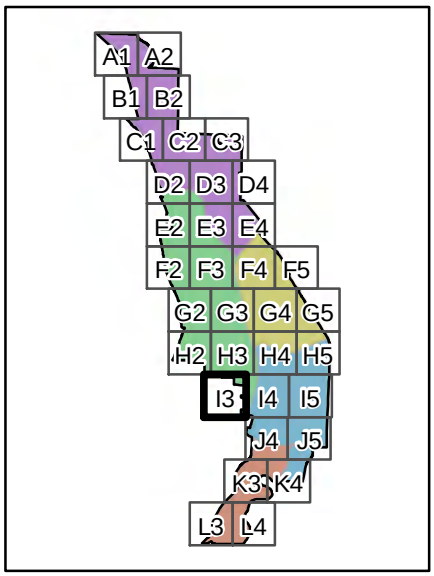

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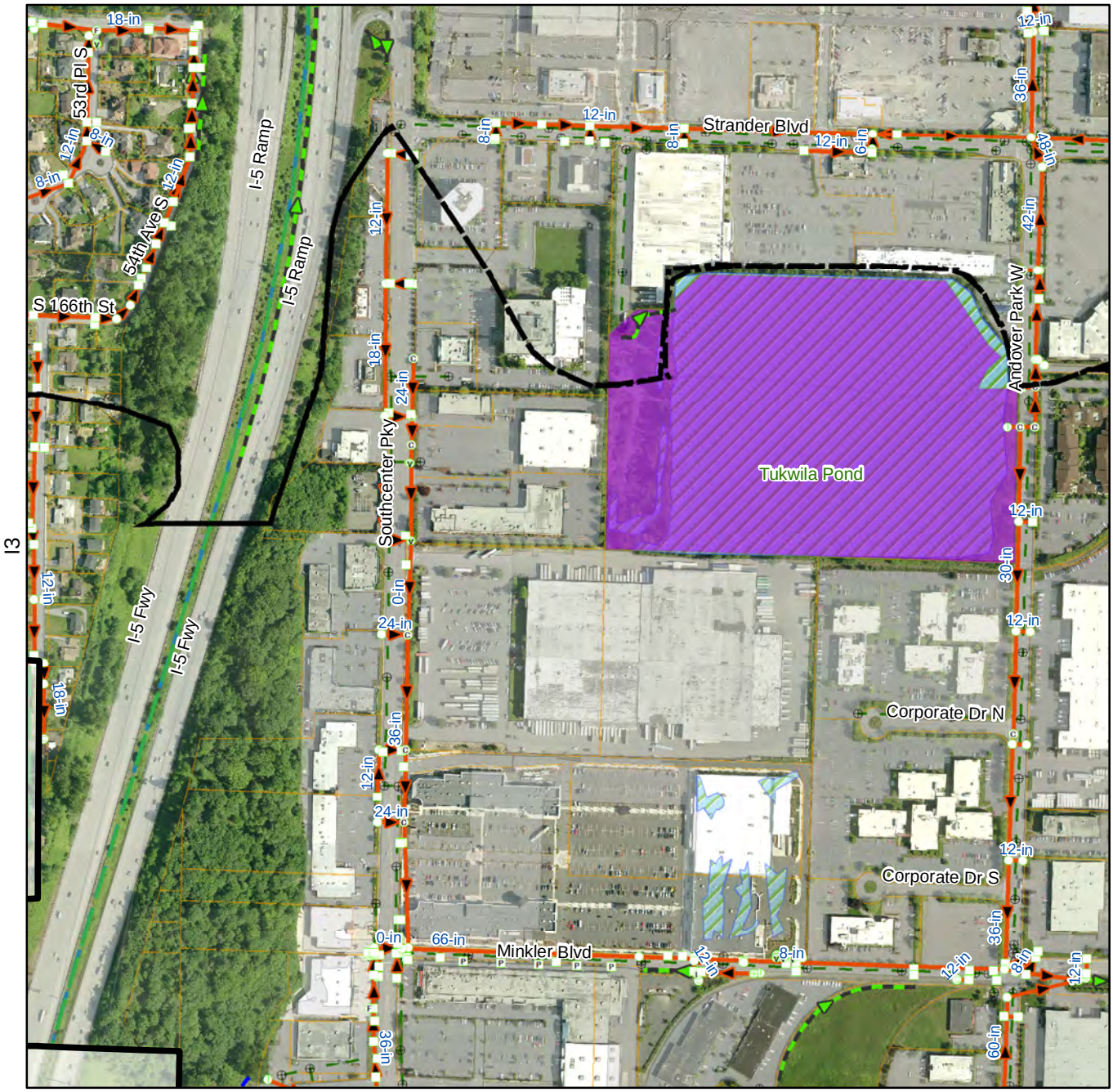

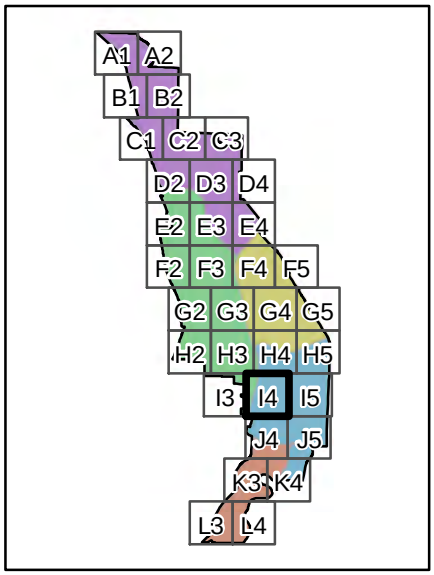

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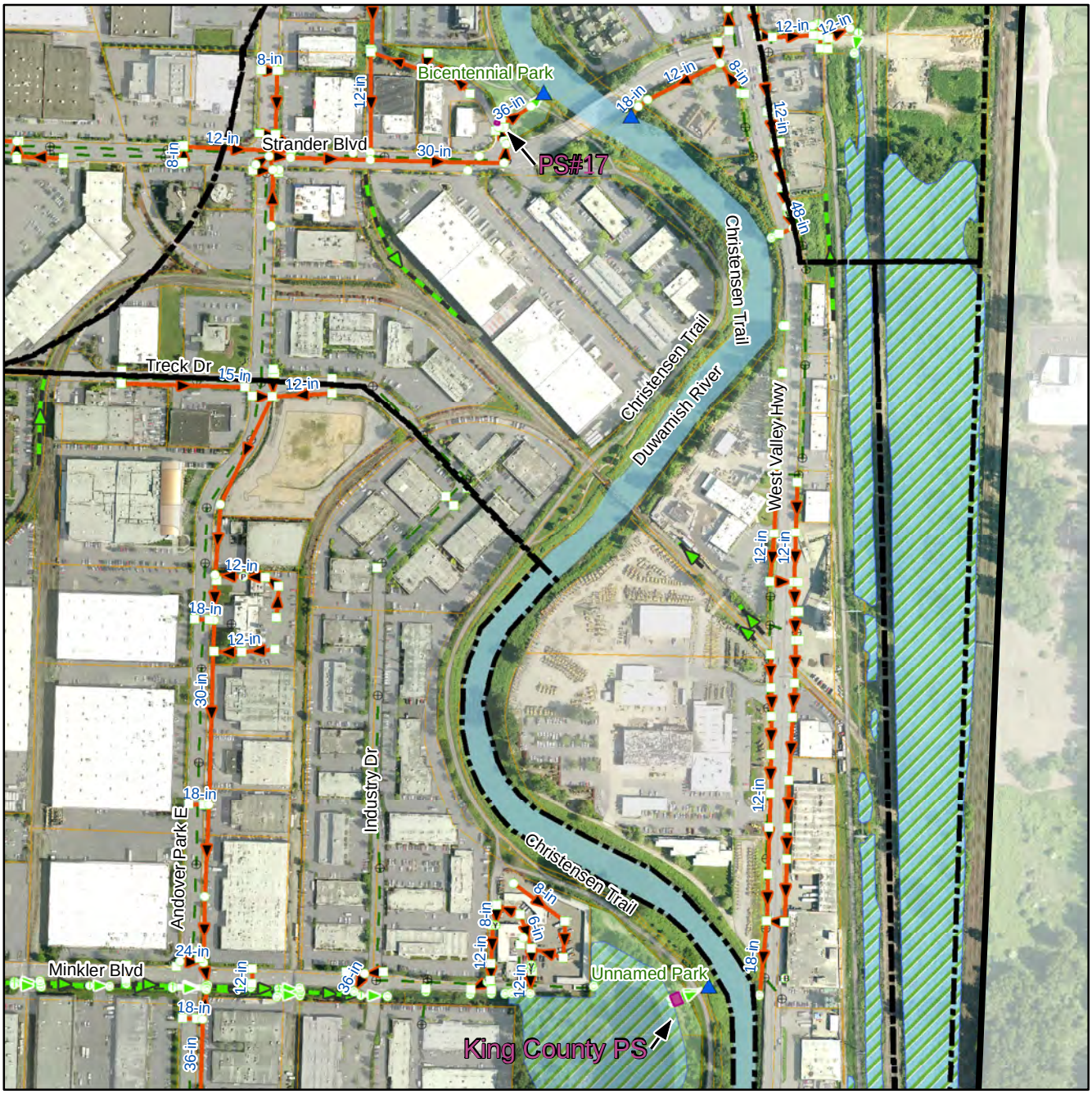

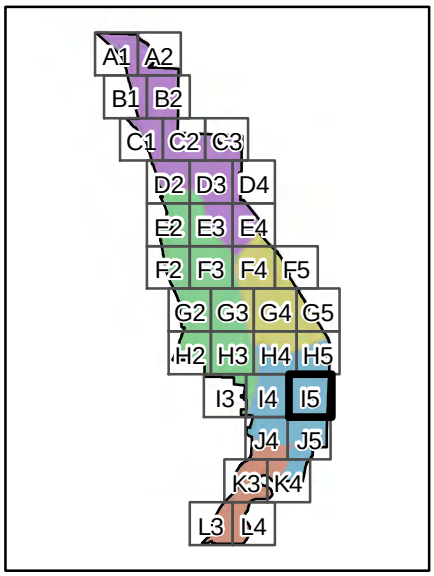

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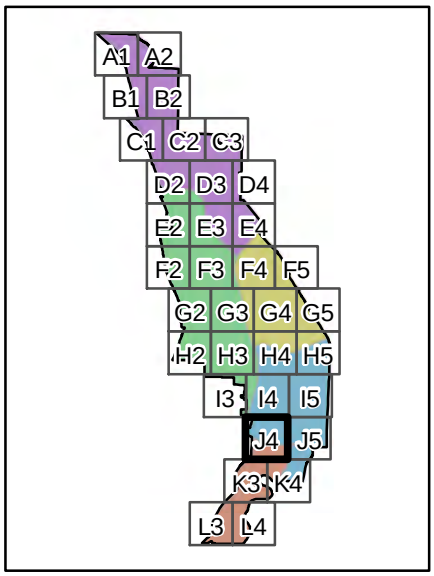

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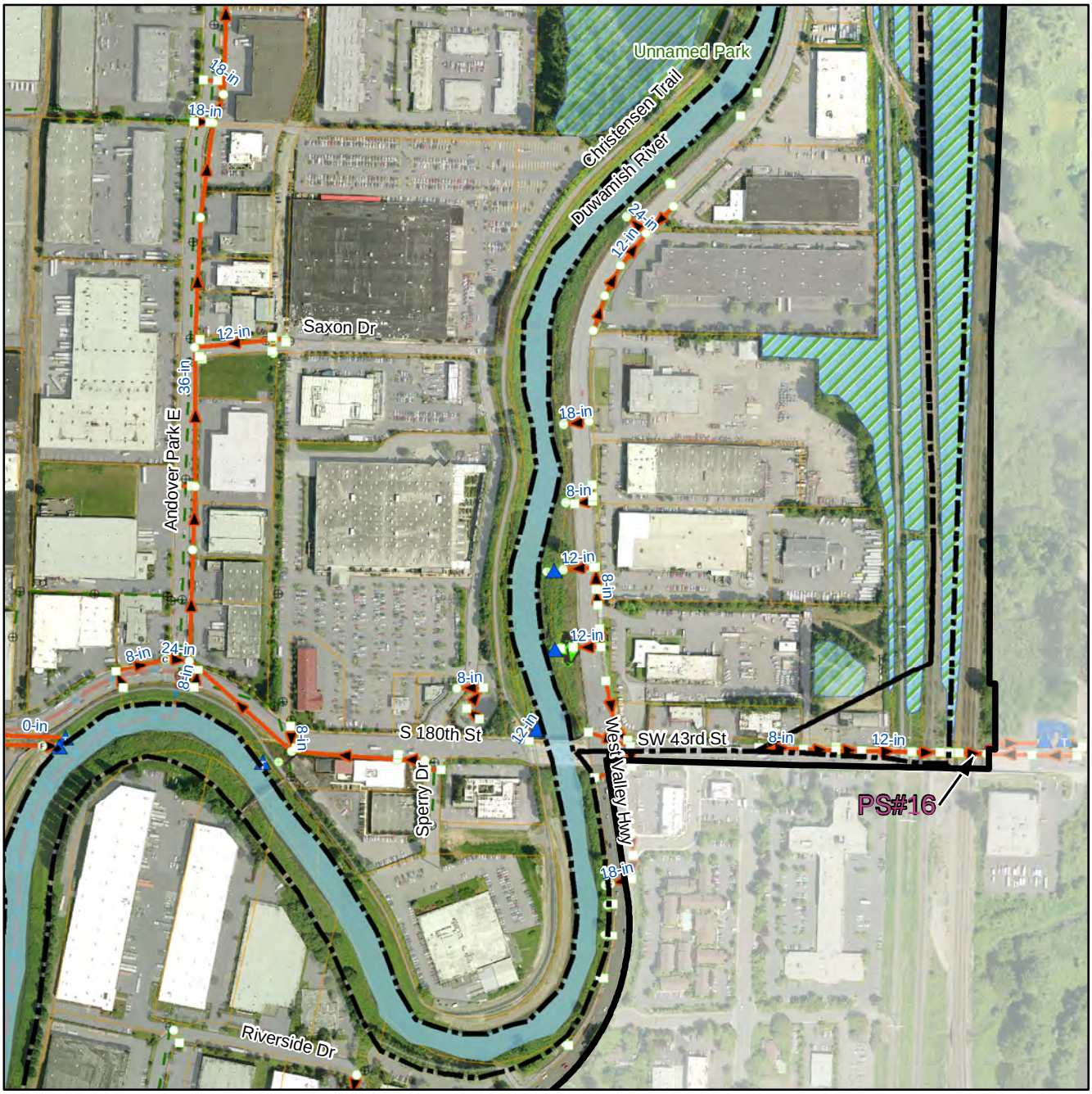

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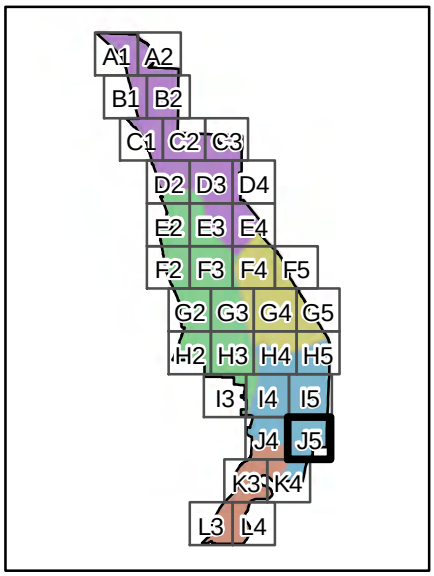

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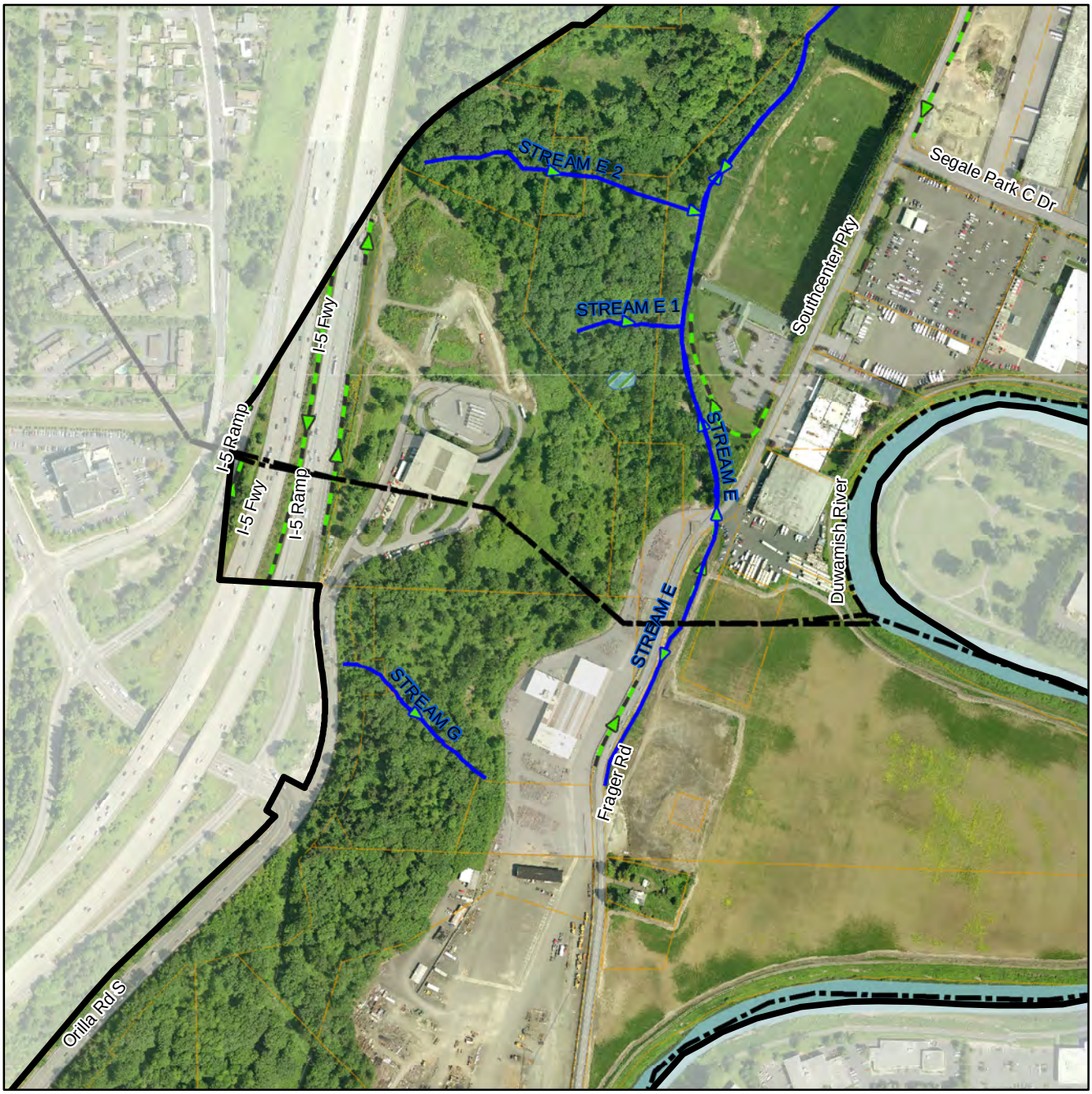

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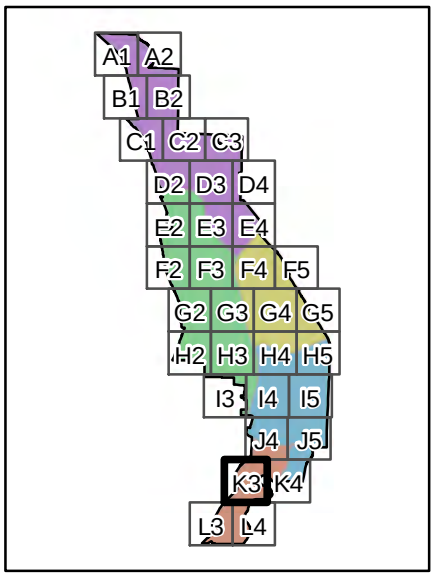

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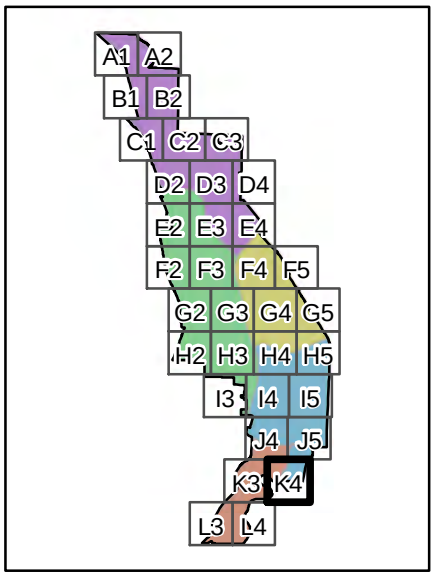

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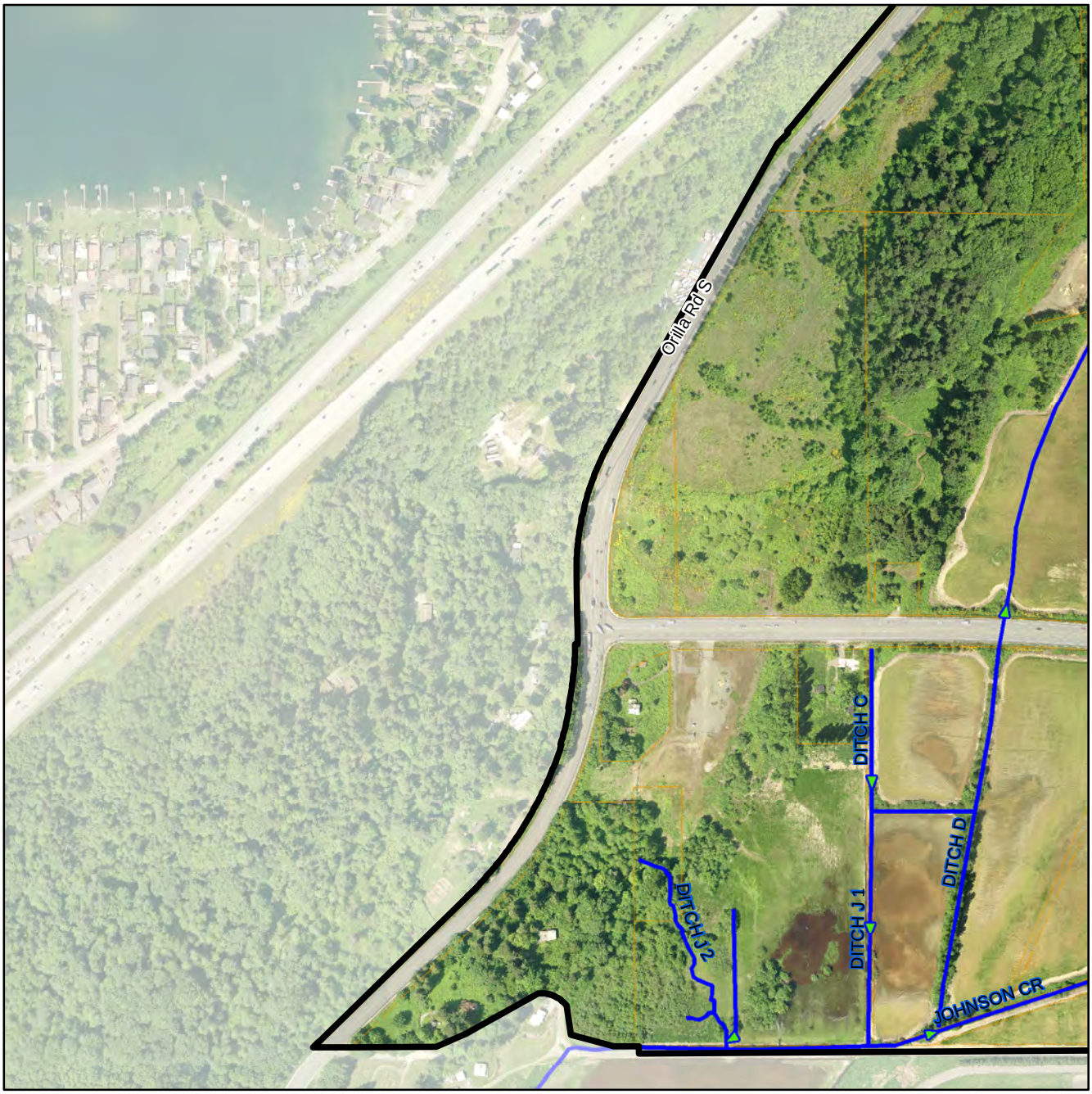

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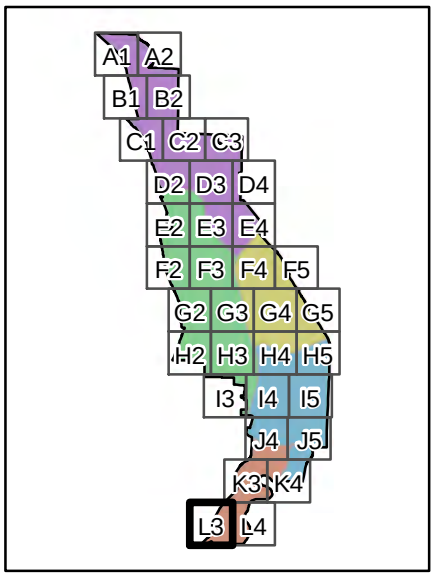

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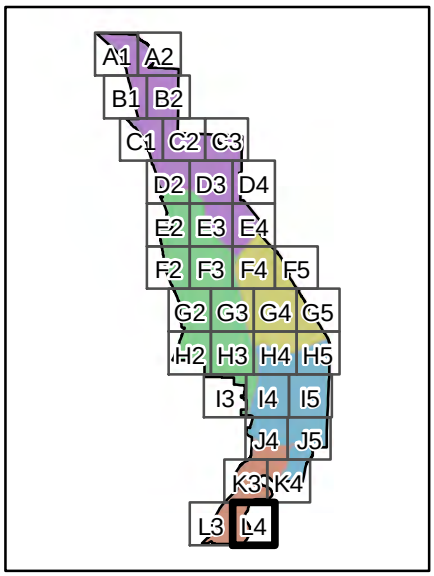

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APPENDIX B

Drainage, Water Quality, and Fish Habitat Characterization

(Supporting Information for Plan Section 2)

APPENDIX B

Drainage, Water Quality, and Fish Habitat Characterization

This Appendix B contains the drainage, water quality, and fish habitat characterization for the City of Tukwila. The information presented here is summarized in Section 2 of this Surface Water Comprehensive Plan.

This Appendix is organized by drainage basin, with the following eight drainage basins located wholly or partially in the City of Tukwila:

- Green/Duwamish River Mainstem
- Gilliam Creek
- Nelson Place - Long Acres
- P17
- Riverton Creek
- Southeast Central Business District (CBD)
- Southgate Creek
- Johnson Creek

Basin boundary delineation was based on information from field visits, the City Geographic Information System (GIS), and previously developed basin plans. The City of Tukwila is nearly finished with an inventory and mapping of the drainage network. Basin boundaries should be re-visited once this inventory and mapping is complete.

Green/Duwamish River Mainstem Basin

Drainage Characterization

The Green/Duwamish River meanders from the southeast to northwest through the City of Tukwila. The Green/Duwamish River is tidally influenced along most of length of the river within the City of Tukwila. The Green/Duwamish River is called the Duwamish below the confluence with the Black River and is called the Green River upstream of that point. The flood and floodplain management of the Green/Duwamish River is outside of the scope of this surface water comprehensive plan. The Green/Duwamish River drainage basin shown in Figure B-1 has multiple outlets, or outfalls, into both the Green and Duwamish Rivers.

This basin is almost entirely developed. Industrial areas, including portions of the Boeing Airfield, make up the development in the area north of the Riverton Creek Basin. The areas east of the Riverton and Southgate Creek basins and north of the Gilliam Creek basin are mostly residential. Foster Golf Course and Fort Dent Park are within this basin. The area east of the P17 basin is mostly commercial.

City of Tukwila surface water pump stations #17, #18, and #19 are located within the Green Duwamish River Mainstem drainage basin (Figure B-1).

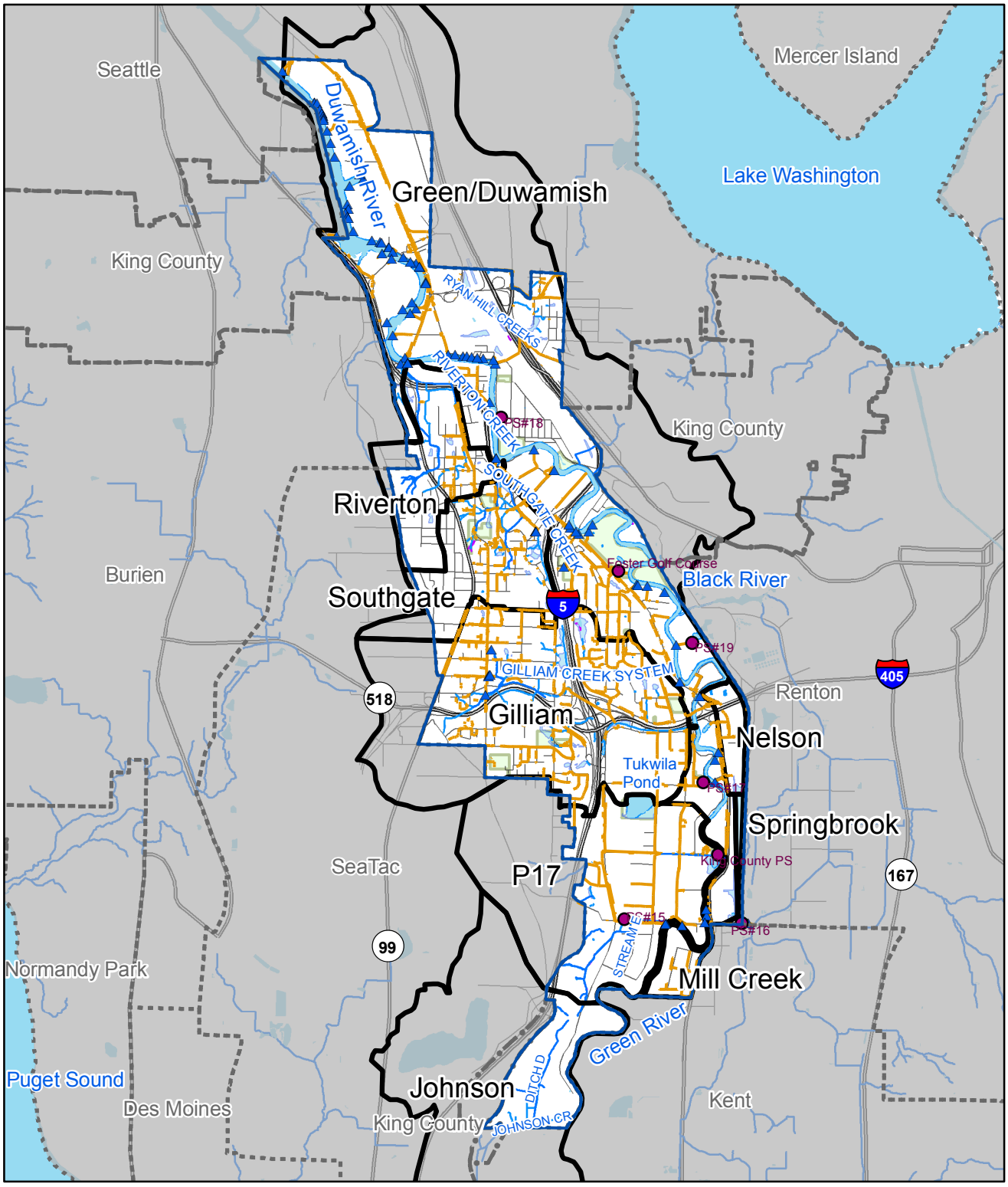


FIGURE B-1
City of Tukwila Drainage System
City of Tukwila 2012 Surface Water Comprehensive Plan

Water Quality Characterization

In 2003, Ecology adopted a water use-based classification for state surface waters (RCW 173-201A, Table 602) that determines the surface water quality standards applicable for that water body (RCW 173-201A-600(1)). The Duwamish River (below the confluence with the Black River) is classified as Salmonid Rearing/Migration Only and Secondary Contact Recreation. The Green River (above the confluence with the Black River) is classified as Salmonid Spawning/Rearing Only and Primary Contact Recreation. None of the tributaries to these rivers within Tukwila is listed in Table 602. Therefore the uses defined for these tributaries are the same as the Green River to which they discharge. Table B-1 shows the classifications for surface waters in the City of Tukwila.

TABLE B-1
Use-based Classification for Surface Waters in City of Tukwila

	Use-based Classification (Source: RCW 173-201A-600(1))	
Water Body	**Aquatic Life Uses**	**Recreational Uses**
Duwamish River (Green/Duwamish River, downstream of confluence with Black River)	Salmonid Rearing/Migration Only	Secondary Contact Recreation
Riverton Creek (to Duwamish River)	Salmonid Rearing/Migration Only	Secondary Contact Recreation
Southgate Creek (to Duwamish River)	Salmonid Rearing/Migration Only	Secondary Contact Recreation
Green River (Green/Duwamish River, upstream of confluence with Black River)	Salmonid Rearing/Migration Only	Primary Contact Recreation
Gilliam Creek (to Green River)	Salmonid Rearing/Migration Only	Primary Contact Recreation
Johnson Creek (to Green River)	Salmonid Rearing/Migration Only	Primary Contact Recreation
Other Tukwila drainage basins (to Green River): Nelson Place / Long Acres Southeast CBD P17	Salmonid Rearing/Migration Only	Primary Contact Recreation

Ecology maintains a list of water bodies that do not meet water quality standards, known as the 303(d) List. The United States Environmental Protection Agency (EPA) approved the 2008 Water Quality Assessment 305(b) report and 303(d) list on January 29, 2009. This is the current water quality assessment and 303(d) list for the state of Washington. Four sections of the Green/Duwamish River within the City of Tukwila do not meet water quality standards according to the 2008 303(d) list. Both the Green River and Duwamish River are listed as Category 5 (at least one designated use is impaired) for dissolved oxygen, temperature, pH, and fecal coliform, based on water sampling and analysis. Figure B-2 shows the 303(d) listings for water bodies within the City of Tukwila and Table B-2 shows the 303(d) listings relevant for the City of Tukwila.

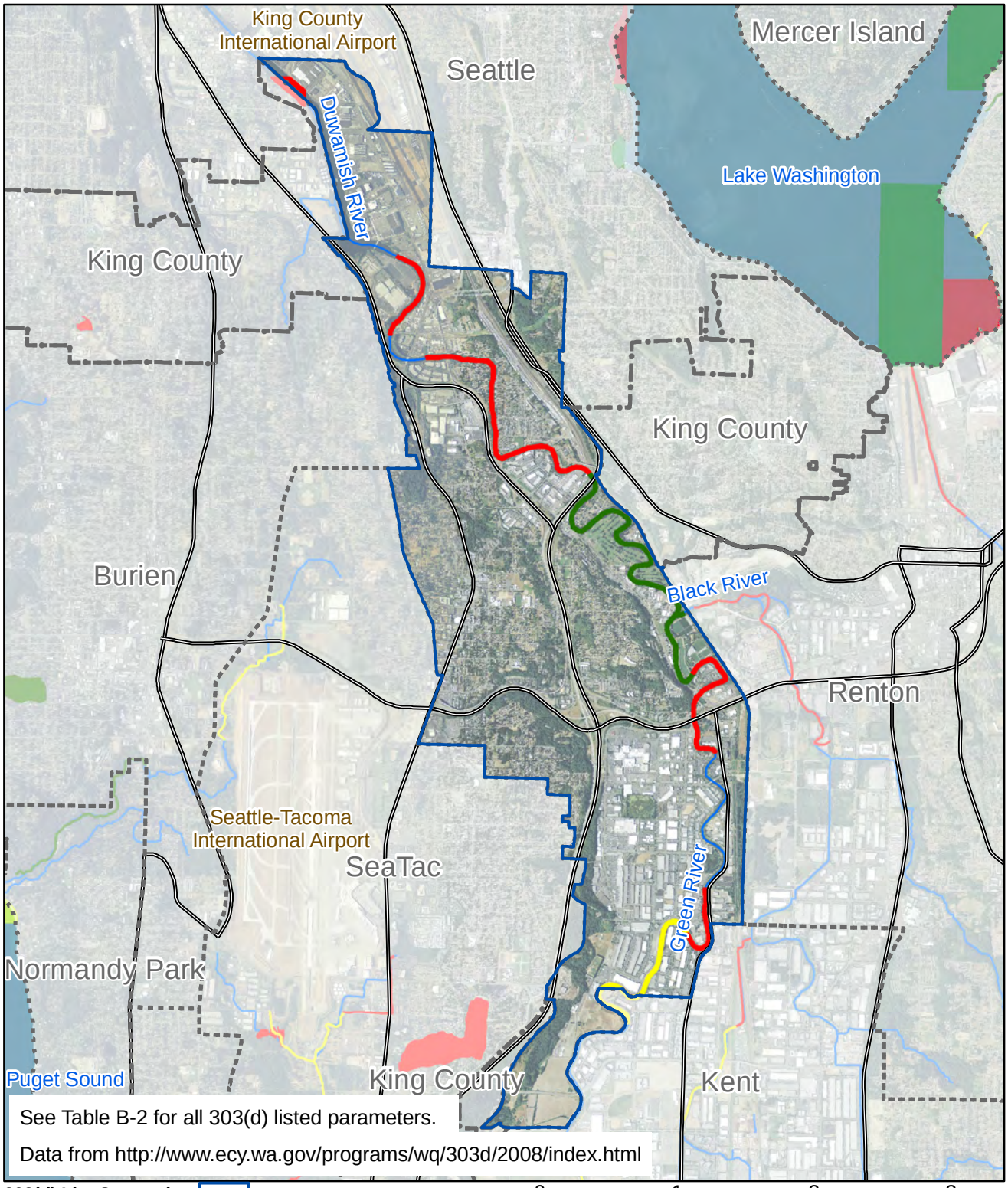


FIGURE B-2
Ecology 303(d) Listed Water Bodies
City of Tukwila 2012 Surface Water Comprehensive Plan

TABLE B-2
303(d) Water Quality Listings for Surface Waters within City of Tukwila Boundaries

	Listing		
Water Body	**Category**	**Parameter**	**Medium**
Duwamish River	1	Ammonia-N	Water
Duwamish River	1	Fecal Coliform	Water
Duwamish River	2	Bis(2-Ethylhexyl) Phthalate	Water
Duwamish River	2	Dissolved Oxygen	Water
Duwamish River	2	Temperature	Water
Duwamish Waterway	4A	Ammonia-N	Water
Duwamish River	5	pH	Water
Duwamish Waterway	5	Dissolved Oxygen	Water
Duwamish Waterway	5	Fecal Coliform	Water
Green River	1	Ammonia-N	Water
Green River	1	pH	Water
Green River	2	Bis(2-Ethylhexyl) Phthalate	Water
Green River	4A	Ammonia-N	Water
Green River	5	Dissolved Oxygen	Water
Green River	5	Fecal Coliform	Water
Green River	5	Temperature	Water
Springbrook (Mill) Creek	1	Ammonia-N	Water

In addition to Ecology's 303(d) listings, King County has collected monthly water quality data along the Green/Duwamish River for many years (King County, 2011). Two monitoring stations fall within the City of Tukwila: Duwamish River at E Marginal Way Bridge and Green River at West Valley Road. These data were reviewed for the period of 2003 through 2008. They reflect around 70 samplings and are the latest data available. The Duwamish station meets water quality standards for dissolved oxygen, pH, and fecal coliform. Temperature is exceeded in 11 percent of the total samples, during the months of July and August. For the Green River station, temperature is exceeded in 15 percent of the total samples, also during the same summer period. In addition, 15 percent of the dissolved oxygen samples from the Green River station fail to meet standards, mostly during the summer period. The lowest dissolved oxygen measurement at the Green River station was 7.0 milligrams per liter (mg/L). Fecal coliform and pH surface water quality standards were met at this station.

Turbidity standards are expressed as an allowable increase over background conditions and the water quality data do not allow for a direct assessment. The maximum recorded turbidity at either station during this six-year period is around 70 Nephelometric Turbidity

Units (NTUs) and that only four values at each station exceeded 10 NTUs, indicating relatively clear water conditions nearly all of the time.

The northern-most portion of the City of Tukwila lies within the Lower Duwamish Waterway Superfund Site, designated by the EPA in 2001. King County, the Port of Seattle, and the cities of Seattle and Tukwila are working with the Washington Department of Ecology (Ecology) and the EPA to control sources of pollution in the Lower Duwamish Waterway. Decades of heavy industrial activity along both sides of the waterway have resulted in the accumulation of high levels of PCBs, polyaromatic hydrocarbons (PAHs), arsenic and other pollutants in the upland soils and within the waterway sediments (Windward Environmental, 2010). Dredging and capping projects in limited areas of the waterway have removed some of these pollutants and more removal actions are planned. Upland sources of these pollutants are also being addressed. Ecology is the lead agency for implementing source controls in the Lower Duwamish Waterway. In 2002 the entities listed above formed the Lower Duwamish Waterway Source Control Work Group to coordinate source control activities.

The Norfolk Basin, located in the southern portion of the superfund site, lies partially within the jurisdiction of the City of Tukwila. This area is included in the Duwamish River Basin shown on Figure B-1. The Norfolk Basin discharges to the Lower Duwamish Waterway and includes both stormwater runoff and occasional combined sewer overflows. In 2007, the City of Tukwila signed a memorandum of agreement with the City of Seattle allowing the latter to inspect suspected contaminated sites in the Norfolk Basin that lie within the jurisdiction of the City of Tukwila. The City of Seattle has carried out sediment sampling and cleaning of storm sewers in the Norfolk Basin. Of the numerous chemical parameters analyzed in the storm sewers, phthalates and zinc consistently exceeded the cleanup screening level (CSL), above which adverse impacts on marine organisms would be likely. Total petroleum hydrocarbons were also consistently high. The City of Seattle removed sediment from the storm sewer serving Martin Luther King Way South prior to a recent sewer upgrade.

In 2007, Ecology produced a Source Control Action Plan (SCAP) for Early Action Area 7 (the Norfolk Basin) (Ecology and Environment, 2007). The plan lists a number of potential upland sources of contaminants to the surface water system. Through the memorandum of agreement mentioned earlier, the City of Seattle is conducting inspections to determine whether cleanup measures should be carried out. The SCAP states that there is an incomplete mapping of the surface water system serving the Norfolk Basin. It identifies the need for a cooperative effort between the City of Seattle and the City of Tukwila to use available GIS and as-built storm sewer drawings to better delineate the surface water system.

The EPA is sponsoring another round of storm drain sampling in 2011. The City has recently signed another agreement allowing continued inspection and sampling with the Norfolk Basin (Larson, 2011).

Fish Habitat Characterization

The Green/Duwamish River channel is significantly altered from its natural condition along most reaches in the City of Tukwila. Non-native and other less desirable trees and shrubs such as blackberry have replaced native riparian vegetation. Riprap also borders the river

along many reaches. Urban development in and near the City has greatly reduced the vegetated buffer of the river and has encroached upon the banks. Flooding and drainage problems associated with this urban development throughout the basin (including the levees constructed to address flooding) have degraded fish and other wildlife habitat in and along the river.

Productive, good quality fish habitat, both in the main channel and in off-channel refuge, is generally lacking (King County, 2000). Spawning gravel recruitment to the Green/Duwamish River in this area has been diminished due to the comprehensive effects of urban development, in particular the diversion of the White River and the Cedar/Black River away from the Duwamish River. Little, if any, spawning habitat occurs in the river reaches within the City.

Gilliam Creek Basin

Drainage Characterization

The Gilliam Creek basin has a single outlet to the Green River through an outfall and flap gate located to the south of I-405. Most of the Gilliam Creek basin is located within the central region of the City of Tukwila, with the remainder (27 percent) located in the City of SeaTac. The basin has been almost fully developed except for the steep slopes above the I-5 corridor. The portion of the basin located north of I-405 and east of I-5 is mostly residential, with some commercial areas located along Southcenter Boulevard. Residential developments make up most of the basin west of I-5, with the exception of the Tukwila International Boulevard corridor which contains commercial development. Southcenter Mall and other commercial areas dominate the portion of the basin east of I-5 and south of I-405.

Tukwila Pond is within the 25 acre Tukwila Pond Park located to the south of Southcenter Mall. Historically, this area drained north into Gilliam Creek via both subsurface and surface flow. As this area was developed, Tukwila Pond was formed. Currently, under normal flow conditions, Tukwila Pond drains to the south into the P17 basin then on to the Green River. A conveyance system built along Andover Park West in the mid-1980s provides overflow conveyance north towards Gilliam Creek. A gate valve installed at the discharge point to Gilliam Creek is usually closed. When open, the City of Tukwila has the capability to either allow Tukwila Pond to flow into Gilliam Creek when the pond is at high levels or to provide storage when the Green River is at high levels and backs water into the storm drain systems in the lower portion of the Gilliam Creek Basin. Figure B-1 shows the location of Tukwila Pond.

Water Quality Characterization

Gilliam Creek's use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because Gilliam Creek enters the Green River upstream of the confluence with the Black River. The water quality characterization for Gilliam Creek in this section is drawn from the stormwater management plan prepared for Gilliam Creek in 2001 (Herrera, 2001). Water quality data for the creek was collected in support of that study. No additional water quality data for the creek has been found subsequent to this study. Thus, the discussion in this section is drawn from that study.

The creek water samples were taken at eight locations during three different storm runoff events in the fall of 1999. The data therefore reflect the effects of active stormwater runoff and cooler temperature conditions. In summary, temperature, dissolved oxygen, and pH (the latter with the exception of one sample) all met current state water quality standards. Turbidity was somewhat elevated, generally ranging from 25 to 50 NTUs. Similarly suspended solids were also only modestly elevated, generally ranging from 20 to 60 mg/L. Dissolved lead met applicable water quality criteria, as did nearly 90 percent of the dissolved zinc samples. About half of the samples failed to meet the dissolved copper criteria. Finally, nearly all of the fecal coliform samples were above the state water quality standards. The study noted that the two sites most frequently exceeding the criteria for zinc and copper both directly drained Highway 99 and appear to be heavily influenced by the high level of traffic and parking lots in the upper basin. Similar conditions exist in the lower reaches of Gilliam Creek near Southcenter Mall, but the dilution effects occurring in the lower portion of the basin may mitigate against higher metals concentrations in the creek.

In a study that had been conducted several years prior, two creek samples were collected during summer baseflow conditions (June and September of 1997). Several samples taken during these months did not meet the state dissolved oxygen standard, with one sample recorded at 3.2 mg/L, well below the state standard of 6 mg/L. These samples also fell slightly below the pH standard. In September the measured stream temperature of 17.5 degrees Celsius barely fell below the state standard of 18 degrees. This suggests the likelihood that portions of the stream may exceed the state temperature standard during the warmer summer months. Gilliam Creek flows into a section of the Green River that is on Ecology's 303(d) list for temperature, dissolved oxygen and fecal coliform. Thus the degraded water quality conditions in Gilliam Creek may be contributing to water quality problems in the Green River.

Given both the age and the limited amount of water quality data available for Gilliam Creek, additional water quality data should be collected to determine if similar water quality conditions continue to persist in this creek.

Fish Habitat Characterization

Several species of anadromous fish, including coho salmon, chinook salmon, and sea-run cutthroat trout are reported to make use of the lower reach of Gilliam Creek, along the south shoulder of I-405 between the Green River and the I-5/I-405 interchange (Washington Department of Fish and Wildlife [WDFW], 2010; Herrera, 2001). This lower reach provides mostly rearing and possibly some scattered spawning habitat. Spawning gravels are covered by sediments deposited by upstream erosion and by historical construction activities.

Habitat in the lower reach of Gilliam Creek is available to fish through the flap gate at the outlet of Gilliam Creek only under certain high flow conditions, when the Green River water level is elevated but remaining lower than the water level in Gilliam Creek. WDFW has characterized this flap gate a partial fish passage barrier (WDFW, 2010). Two more partial fish passage barriers exist in the lower reach of Gilliam Creek. A State of Washington Department of Transportation (WSDOT) -owned culvert that conveys at least 1,000 feet of the creek under the south shoulder of I-405 is identified as a partial fish barrier (WDFW,

2010). Farther upstream, a log at the inlet of the WSDOT-owned culvert at the I-405 on-ramp observed in spring of 2011 appears capable of blocking fish passage.

WDFW determined that several of the tributaries to upper Gilliam Creek provide some rearing habitat (WSDOT, 2007). Since the culvert underneath the I-5/I-405 interchange is a total barrier to anadromous fish, it is likely that only resident fish such as cutthroat trout and sculpin are utilizing the available habitat in the upper reaches of Gilliam Creek at this time. Fish barriers do exist in the upper reaches of Gilliam Creek, including a WSDOT-owned culvert beneath SR 518 that conveys one of these tributaries that is identified as a total fish passage barrier.

Figure B-3 shows the inventory of fish-blockages in the creek systems of Tukwila, including Gilliam Creek. Attachment A to this Appendix B contains a detailed inventory of barriers to fish passage within the City of Tukwila.

Nelson Place – Long Acres Basin

Drainage Characterization

The Nelson Place – Long Acres basin is located east of the Green River on the eastern edge of the City of Tukwila (Figure B-1). The Renton city limits form the east boundary of the basin. Commercial developments line the West Valley Highway corridor. The areas east and west of the West Valley Highway corridor are mostly undeveloped.

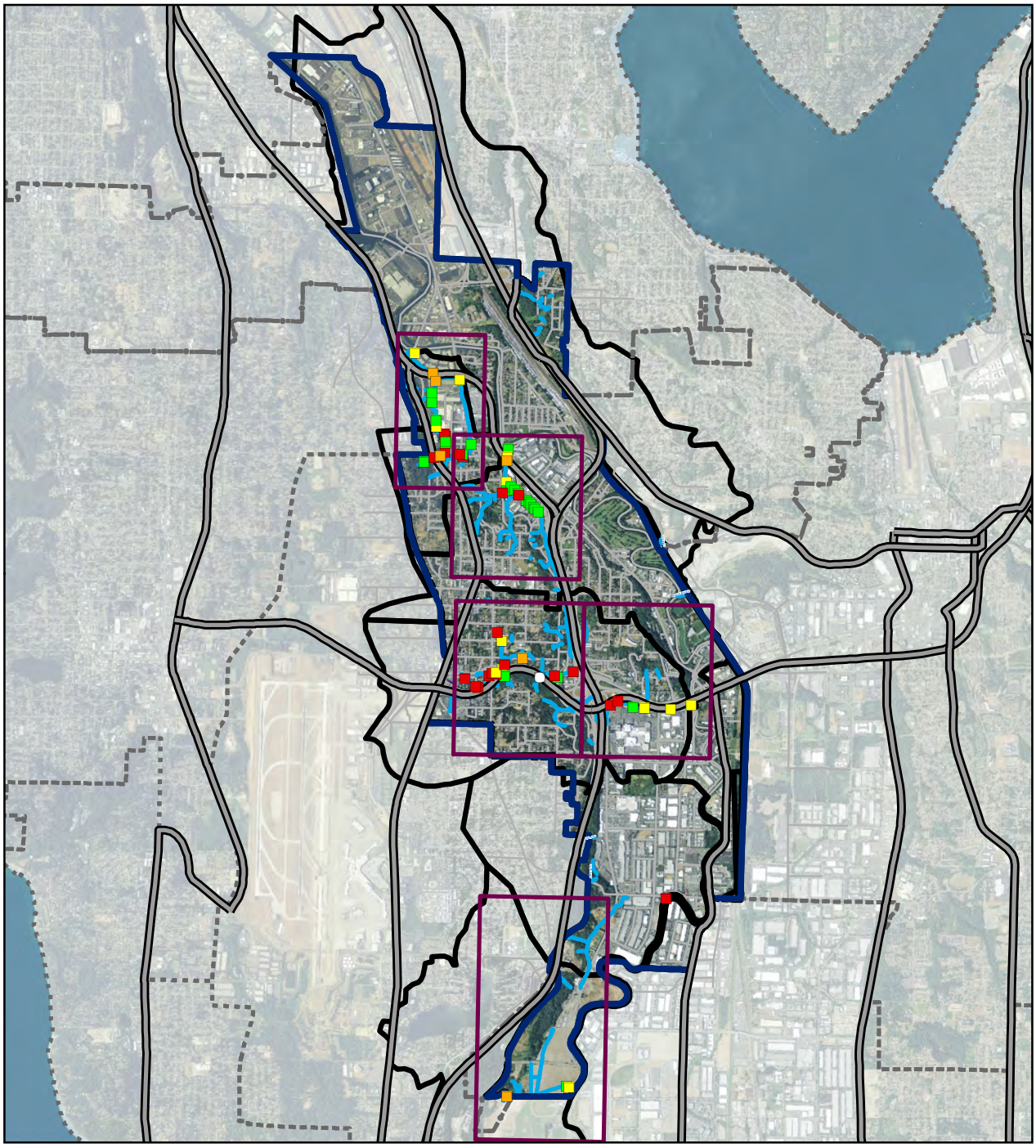
Runoff from the West Valley Highway and the area in the western part of the drainage basin drains directly into the Green River through numerous storm drainage outfalls. Runoff from the area east of the West Valley Highway drains to the open ditch and culvert system located on the east side of the basin adjacent to the Burlington Northern Santa Fe (BNSF) Railroad track. A 24-inch-diameter pipe located under the BNSF tracks directs drainage from this series of open ditches and culverts east to drainage systems in the City of Renton. Figure B-1 shows the Nelson Place – Long Acres Basin in relation to the city boundaries and to the other drainage basins in Tukwila.

Water Quality Characterization

The Nelson Place – Long Acres drainage basin use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River. No water quality data is available for this drainage basin.

Fish Habitat Characterization

The former alignment of the Green River, prior to construction of I-405 in 1962, extended through the Nelson farm property and into the property currently occupied by Homestead Studio Suites. Part of that former alignment has been filled, isolating a pond area and reducing off-channel habitat and floodplain connectivity in this reach of the river. Apart from along the mainstem Green River, which is described in an earlier section of this Appendix, no fish habitat was identified in this basin.



Fish Passage Features

Barrier Status

- N/A
- None
- Partial
- Potential
- Total
- Attachment A Figures

- City of Tukwila
- King County Unincorporated
- Stream
- Drainage Basins

0 1 2 3 Miles

FIGURE B-3
Inventory of Fish Blocking Culverts
City of Tukwila 2012 Surface Water Comprehensive Plan

P17 Basin

Drainage Characterization

The P17 drainage basin is located south of the Gilliam Creek basin (Figure B-1). Approximately 60 percent of this basin is located within the City of Tukwila, with the remaining portion in the City of SeaTac. The basin is almost fully developed for the exception of the steep slopes adjacent to the I-5 corridor. The P17 basin includes a portion of the Tukwila South development site.

Typically, flows from Tukwila Pond are routed through drainage basin P17. A drainage pipe adjacent to Andover Park West conveys pond outflow into the basin. As discussed earlier, drainage is routed north to Gilliam Creek when the gate valve at the overflow pipe to Gilliam Creek is open and the pond water level is elevated.

The P17 drainage basin has multiple outlets, or outfalls, into the Green River. Runoff from the northern portion of the basin is routed to the P17 stormwater pump station located at the east end of Minkler Boulevard. This P17 pump station, owned and operated by King County, discharges to the Green River. The southern portion of the basin drains to the P17 pump station or directly into the Green River through a WSDOT outfall. City of Tukwila's surface water pump station #15 is located within this P17 drainage basin (Figure B-1).

Water Quality Characterization

The P17 drainage basin use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River. No water quality data is available for this drainage basin.

Fish Habitat Characterization

Apart from along the mainstem of the Green River, which is described in an earlier section of this Appendix, no fish habitat was identified in this basin.

Riverton Creek Basin

Drainage Characterization

The Riverton Creek basin is located in the northwest region of Tukwila. Nearly the entire basin is located within the City of Tukwila boundaries with the remaining portion of the basin in unincorporated King County and in the City of Sea-Tac. The basin is almost entirely developed except for about 50 acres of forested land west of Tukwila International Boulevard. Residential and commercial developments are located on the steep slopes in the southern and western portions of the basin. Light industrial developments are located in the valley floor in the northern portion of the basin.

There are two major forks to Riverton Creek, named the East Fork and West Fork. The East Fork and West Fork of Riverton Creek merge just upstream of SR 599, and then pass underneath SR599 through approximately 300 feet of culvert, through about 1,000 feet of open channel and finally through two 48-inch culverts (each with a flap gate) into the Duwamish River downstream of the confluence with the Black River (Figure B-1).

Water Quality Characterization

The Riverton Creek use-based classification is Salmonid Spawning/Rearing and Secondary Contact Recreation, because the drainage discharges to the Duwamish River downstream of the confluence with the Black River. No water quality data is available for this drainage basin.

Fish Habitat Characterization

The flap gates at the Duwamish River are impassable to fish during low flows plus somewhat impassable all other times. Both west and east forks of Riverton Creek are characterized by narrow, straight channels and long sections of culvert in their lower reaches. Both forks are considered fish-bearing. Coho salmon, Chinook salmon, and resident cutthroat trout are potentially present in Riverton Creek (WDFW, 2010; Entranco, 1997). Overall, Riverton Creek provides some limited rearing habitat for salmon, but no longer provides substantial spawning habitat.

The East Fork of Riverton Creek just upstream of the SR 599 culvert is characterized by a wide, exposed, sandy and silty streambed that provides fish passage but no spawning or rearing habitat. Upstream of that reach, a more than 2,000 linear foot (LF) culvert likely prevents at least some anadromous fish from accessing suitable habitat located in the upper reach between S 126th Street and S 128th Street, where good overhead cover from riparian plants, sufficient flows, and streambed gravel appear suitable for coho salmon spawning. Anecdotal evidence from a local resident during a February 2011 site visit suggests that anadromous salmon can and do access the east fork up to S 128th Street. The gradient upstream of S 128th Street is likely too steep for anadromous fish.

Approximately 2,000 LF of restored channel in the West Fork of Riverton Creek just upstream of SR 599 has provided some spawning and rearing habitat. The culverts within this restored reach could fill with sediment from upper watershed erosion and stormwater runoff, which could potentially block fish passage. A log jam in the upper portion of the restoration area may also be a partial fish passage barrier. Just upstream of the restored reach, a 20-foot-tall manmade waterfall prevents fish from passing upstream to S 126th Street. Juvenile salmon are released from a city-operated fish hatchery at the base of the waterfall into the west fork at the upper end of the restored reach.

Upstream of the waterfall up to S 126th Street, there is about 500 feet of potential fish habitat, though that reach also includes two total fish passage barriers. Fish would likely not be able pass upstream of S 126th Street because of a steep gradient, even if the waterfall and other nearby barriers were removed. However, this upper reach beyond S 126th Street has a cobble streambed that is likely supporting macroinvertebrates, a food source for fish downstream of the barriers.

Figure B-3 shows the inventory of fish-blockages in the creek systems of Tukwila, including Riverton Creek. Attachment A to this Appendix B contains a detailed inventory of barriers to fish passage within the City of Tukwila.

Southeast Central Business District (CBD) Basin

Drainage Characterization

The Southeast CBD drainage basin shown in Figure B-1 is formed by the Green River on the west and the BNSF railroad track to the east. Most of the basin contains developed commercial areas along the West Valley Highway corridor with some wetland areas located along the east side of the basin adjacent to the BNSF railroad track.

The Southeast CBD basin has multiple outlets. Drainage from the West Valley Highway and the area in the west side of the drainage basin drain directly into the Green River through numerous storm drainage outfalls. The area east of the West Valley Highway drains into the wetlands on the east side of the basin. Overflow from these wetlands drains east into the City of Renton through culverts under the BNSF railroad tracks. City of Tukwila surface water pump station #16 is located within this CBD drainage basin (Figure B-1).

Water Quality Characterization

The use-based classification for the Southeast CBD basin is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River. No water quality data is available for this drainage basin.

Fish Habitat Characterization

Apart from along the mainstem Green River, which is described in an earlier section of this Appendix, no fish habitat was identified in this basin.

Southgate Creek Basin

Drainage Characterization

The Southgate Creek basin is located in the northwest region of Tukwila, south of Riverton Creek (Figure B-1). Most of the basin is located in the City of Tukwila with the remaining portion (approximately 11 percent) located in the City of SeaTac. Commercial and residential developments are located on the steep-sided slopes in the west portion of the basin (west of Tukwila International Boulevard) and lowlands in the central portion of the basin (between Tukwila International Boulevard and 42nd and 43rd Avenue S). The east portion of the basin, also located in the lowlands, is the least-developed portion of the basin. Private residences are the primary type of development in this area, covering nearly 80 percent of the basin.

Water Quality Characterization

The Southgate Creek use-based classification is Salmonid Spawning/Rearing and Secondary Contact Recreation, because the drainage discharges to the Duwamish River downstream of the confluence with the Black River. No water quality data is available for this drainage basin.

Fish Habitat Characterization

The East Fork of Southgate Creek begins as a relatively small channel just south of S 137th Street and flows north through a steep ravine, several culverts, and an asphalt-lined ditch before it merges with the west fork. The West Fork begins as three smaller tributaries that collect flow from the hillside just west of 40th Avenue S and merge just upstream of S 133th Street. The West Fork then passes underneath S 133rd Street and 42nd Avenue S through more than 500 feet of culvert and merges with the east fork coming from a ditch along S 132nd Street. From there, the main stem of Southgate Creek extends under SR 599 through about 320 feet of culvert, a fish ladder, and large arch culvert into the Duwamish River downstream of the Black River confluence.

Coho salmon are potentially present in Southgate Creek, according to WDFW, and resident trout or and other types of non-anadromous fish are likely present. The fish ladder at the SR 599 culvert likely is a fish barrier to anadromous fish during low stream flows.

As in other urbanized streams, development has altered Southgate Creek's riparian buffer and natural channel alignment, resulting in increased channel incision, stream bank erosion, and degraded water quality. Suitable fish habitat is limited to the following:

- Rearing habitat in the main stem between SR 599 and S 132nd Street culvert
- Rearing habitat in some small sections of the east fork along S 131st Place and S 134th Place
- Rearing and some spawning habitat in the recently-restored section of the west fork just upstream of S 133rd Street

Bank erosion from the combination of steep gradients and stormwater runoff from urban development have deposited sediments in the lower reach, which have reduced effective culvert conveyance capacities and covered up salmon spawning gravels. The section of the main stem just downstream of the confluence of the West and East Forks is often completely blocked by sediment and debris.

During a February 2011 site visit, juvenile salmonids were observed in the section of the east fork along S 131st Place, which are reportedly released into the stream by a nearby homeowner.

Fish are unlikely to be present in the West Fork of Southgate Creek upstream of Macadam Way S due to the steep gradient. Some resident fish may use the upper reaches of the east fork within Southgate Park.

Figure B-3 shows the inventory of fish-blockages in the creek systems of Tukwila, including Southgate Creek. Attachment A to this Appendix B contains a detailed inventory of barriers to fish passage within the City of Tukwila.

Johnson Creek Basin

Drainage Characterization

The Johnson Creek basin is located to the south of the P17 basin and extends southward to the City of Tukwila boundary with the City of Kent and westward to I-5. Much of the

Johnson Creek basin was recently annexed into the City of Tukwila (Figure B-1). The approximately 850-acre basin includes about half of the Tukwila South commercial development site.

The basin includes steep hillsides leading up to I-5 as well as Green River floodplain lowlands. In times of high Green River water levels, runoff ponds behind the Green River levees until the river stage drops, allowing discharge by gravity through the flap gate and outfall at the Johnson Creek outlet to the Green River.

Water Quality Characterization

The Johnson Creek use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River. No water quality data is available for this drainage basin.

Fish Habitat Characterization

The Johnson Creek flap gate and outfall to the Green River, partial blockages to fish passage, were replaced with a fish-passable structure as part of the mitigation for the proximate commercial development. No other barriers to fish passage were identified in Johnson Creek. Figure B-3 shows the inventory of fish-blockages in the creek systems of Tukwila, including Johnson Creek. Attachment A to this Appendix B contains a detailed inventory of barriers to fish passage within the City of Tukwila.

The lower reach of Johnson Creek was reconstructed in 2011 as part of mitigation for the commercial development in the area. As the commercial development is completed, an aquatic habitat assessment should be conducted in order to assess conditions post-development and to assess the effectiveness of the mitigation.

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ATTACHMENT A

Fish-blocking Culvert Inventory

City of Tukwila Fish Passage Barrier Inventory

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DATE: November 22, 2011

PROJECT NUMBER: 412954.TT.02

Introduction

This memo documents the fish passage barrier inventory developed for the City of Tukwila (the City). The purpose of the inventory is to provide a baseline of information that will inform future planning efforts and prioritization of capital and programmatic improvements related to fish-bearing streams within the City's jurisdiction. The inventory includes information gathered from the Washington Department of Fish and Wildlife (WDFW) and a windshield survey completed for the City's 2010 Surface Water Comprehensive Plan.

The inventory encompasses the four main fish-bearing streams in the City's jurisdiction: Riverton Creek, Southgate Creek, Gilliam Creek, and Johnson Creek. Each of these streams is identified by WDFW as having the potential to support anadromous fish such as coho salmon (*Oncorhynchus kisutch*). The WDFW fish passage barrier inventory does not currently identify any barriers on the Duwamish River, and the inventory in this memo does not include the Duwamish River.

Determining a culvert's (or other structure's) fish passability according to accepted standards involves a detailed engineering analysis (developed by WDFW) beyond the scope of this effort. For the areas that were not covered by WDFW's existing inventory, a best professional judgment of fish passability was made based on information gathered during the windshield survey. The windshield survey was conducted by a CH2M HILL professional fish biologist and an assistant scientist on February 3 and 4, 2011.

Method

The steps outlined below summarize the method used to develop the fish passage barrier inventory.

1. Gathered existing information and data from WDFW and other sources (listed below)
2. Created a basemap from the existing data, which included roads, stream channels, WDFW-mapped fish presence, WDFW fish barrier inventory, and City-mapped culverts

3. Identified information gaps from the basemap and existing information (e.g., road crossings without a corresponding WDFW fish passage feature)
4. Completed a windshield survey to fill information gaps, determine fish passability of areas uncovered by WDFW's inventory, and assess general aquatic habitat conditions for the 2010 Surface Water Comprehensive Plan
5. Created a new GIS database file of fish passage barriers incorporating WDFW's existing inventory and new information from the windshield survey

Sources of existing information on fish passage and habitat that were evaluated during development of the inventory include:

- WDFW Fish Passage Barrier Inventory GIS data (WDFW, 2010)
- WSDOT Fish Passage Inventory (WSDOT and WDFW, 2010)
- WRIA 9 Limiting Factors Analysis (King County and Washington State Conservation Commission, 2000)
- Existing knowledge of City of Tukwila staff (Personal communications)
- Tukwila's 2003 Comprehensive Surface Water Management Plan (CH2M HILL, 2003)
- Gilliam Creek Basin Plan (Herrera, 2001)
- Riverton Creek Basin Plan (Entranc, 1997)
- Fostoria (Southgate) Creek Basin Plan (Herrera, 1996)
- Johnson Creek Restoration Plan (Cedarock Consultants, 2010)
- Tukwila South Project Final Environmental Impact Statement
- King County's WRIA 9 Salmon Habitat Plan
- Wild Fish Conservancy (formerly Washington Trout) website: http://wildfishconservancy.org/

Of these, the primary sources of information used to create the inventory are the WDFW fish passage barrier inventory and the February 2011 windshield survey. The WDFW fish passage barrier data are collected under the auspices of the Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual (WDFW, 2009). The data do not represent a complete and comprehensive inventory of all waters. Numerous fish passage inventories are being conducted across the state and the data set is updated when new information becomes available.

Table 1 summarizes key information from the fish passage inventory GIS database. Road crossings and other fish passage features were not always covered by the WDFW inventory or accessible in the field during the windshield survey. Remaining information gaps are noted by the entry "Unknown" both in the GIS database and in Table 1.

Figures 1, 2, 3, 4, and 5 on the following pages show the fish passage barrier inventory for Riverton Creek, Southgate Creek, Lower Gilliam Creek, Upper Gilliam Creek, and Johnson Creek, respectively. Attachment A to this memo provides photographs of the fish passage features observed during the February 2011 windshield survey; not all fish passage features were accessible for photographs.

TABLE 1
Tukwila Fish Barrier Inventory

Fish Passage ID[a]	Location[b]	Feature Type	Barrier Status	Survey Date[c]	Owner Type	Data Source	Problem[d] (CH2M HILL Added)	Culvert ID[e]
Riverton Creek								
14673	W (upstream) of SR 99	Culvert	None	10/2/2003	City	WDFW	None	
14674	SR 99	Culvert	Total	10/2/2003	State	WDFW	Unknown	
14675	126th St	Culvert	Partial	10/2/2003	City	WDFW	Unknown	1077
14676	S 126th St	Culvert	Partial	10/2/2003	Private	WDFW	Unknown	
14677	S 126th St	Culvert	None	10/2/2003	Private	WDFW	None	
19812	N of S 128th St	Dam	Total	10/2/2003	Private	WDFW	Unknown	885
21065	34th Ave S	Culvert	Potential	10/2/2003	City	WDFW	Unknown	1460
20534	W of 35th Ave S	Artificial waterfall	Total	7/8/2003	Private	WDFW	Gradient	n/a
20533	W of 35th Ave S	Artificial waterfall	Total	7/8/2003	Private	WDFW	Gradient	n/a
50002	Unnamed road (Outfall to Duwamish River)	Culvert	Partial	n/a	City	CH2M HILL	Flap gate	
50003	SR 599	Culvert	Potential	n/a	State	CH2M HILL	Unknown	
50005	Unnamed road (Adjacent to E Marginal Way just S of SR 599)	Culvert	Partial	2/4/2011	City	CH2M HILL	Length; others possible	
50006	S 126th St	Culvert	None	2/4/2011	City	CH2M HILL	None	994
50007	S 128th St	Culvert	None	2/4/2011	City	CH2M HILL	None	1803
50008	S 128th St	Culvert	Total	2/4/2011	City	CH2M HILL	Gradient; length, others possible	1606
50004	Unnamed road (Just upstream of SR 599)	Culvert	Potential	n/a	Unknown	CH2M HILL	Unknown	
50009	S 120th Pl (Restored stream length in industrial park)	Culvert	None	2/4/2011	City	CH2M HILL	None	872
50010	Unnamed road (Restored stream length in industrial park)	Culvert	None	2/4/2011	City	CH2M HILL	None	920
50011	Unnamed (Restored stream length in industrial park)	Culvert	None	2/4/2011	City	CH2M HILL	None	925
50022	W of Group Health building (main stream reach)	Log jam	Partial	2/4/2011	Unknown	CH2M HILL	Insufficient pool downstream of log jam obstacle	n/a
50023	S 128th St	Artificial waterfall	Total	2/4/2011	Private	CH2M HILL	Gradient	n/a
Southgate Creek								
50012	Unnamed road (Outfall to Duwamish River)	Culvert	None	2/3/2011	City	CH2M HILL	None	1487
50013	Interurban Ave S	Culvert	Partial	2/3/2011	City	CH2M HILL	Fish ladder at low flows	1932
50014	SR 599	Culvert	Potential	n/a	State	CH2M HILL	Unknown	1932
50015	S 132nd St	Culvert	Partial	2/3/2011	City	CH2M HILL	Sediment blockage	1420
50016	44th Pl S	Culvert	None	2/3/2011	City	CH2M HILL	None	1035
50017	S 132nd St	Culvert	None	2/3/2011	City	CH2M HILL	None	1591
50018	S 133rd St	Culvert	None	2/3/2011	City	CH2M HILL	None	2086
50019	Commercial lot just S of S 133rd St	Culvert	Total	2/3/2011	Unknown	CH2M HILL	Perched; no flow	2225

TABLE 1
Tukwila Fish Barrier Inventory

Fish Passage ID[a]	Location[b]	Feature Type	Barrier Status	Survey Date[c]	Owner Type	Data Source	Problem[d] (CH2M HILL Added)	Culvert ID[e]
50020	Unnamed road (driveway in restored stream length just N of S 133rd St)	Culvert	None	2/3/2011	Unknown	CH2M HILL	None	
50021	S 133rd St/E Marginal Way	Culvert	Total	2/3/2011	City	CH2M HILL	Gradient; others possible	1877
50025	S 134th Pl	Culvert	None	2/3/2011	City	CH2M HILL	None	953
50026	S 134th Pl	Culvert	None	2/3/2011	City	CH2M HILL	None	988
50027	S 134th Pl	Culvert	None	2/3/2011	City	CH2M HILL	None	2068
50028	S 134th Pl	Culvert	None	2/3/2011	City	CH2M HILL	None	1285
50029	S 134th Pl	Culvert	None	2/3/2011	City	CH2M HILL	None	1370
50030	S 134th Pl	Culvert	None	2/3/2011	City	CH2M HILL	None	1203
Gilliam Creek								
14611	I-405; NB on-ramp	Culvert	Partial	12/11/2007	State	WDFW	Unknown	
14737	I-5; NB to I-405	Culvert	Total	9/9/2009	State	WDFW	Unknown	
40359	SR 518	Culvert	Total	9/15/2009	State	WDFW	Unknown	
40863	61st Ave SE	Culvert	None	3/1/2007	City	WDFW	Unknown	
40864	I-405 NB shoulder	Culvert	Partial	9/8/2009	State	WDFW	High discharge during high flows; length	
44984	Southcenter Blvd	Culvert	Total	9/9/2009	City	WDFW	Unknown	
44985	51st Ave S	Bridge	None	9/9/2009	City	WDFW	Unknown	n/a
44986	Southcenter Blvd	Culvert	Total	9/9/2009	City	WDFW	Unknown	
44989	Southcenter Blvd	Culvert	Total	9/9/2009	City	WDFW	Unknown	
44990	42nd Ave S	Culvert	Total	9/10/2009	City	WDFW	Unknown	3086
44994	Tukwila Pkwy	Culvert	Partial	9/8/2009	City	WDFW	Flap gate	
17539	SR 518	Culvert	N/A	9/13/2005	State	WDFW	Unknown	
40532	SR 518	Culvert	Total	9/16/2009	State	WDFW	Unknown	
40861	I-5; NB off-ramp	Culvert	Total	2/27/2007	State	WDFW	Unknown	
44979	39th Ln S (Upper Gilliam)	Culvert	Total	9/15/2009	Unknown	WDFW	Unknown	
44981	S 154th St (Upper Gilliam)	Culvert	Total	9/15/2009	Private	WDFW	Unknown	
44983	SR 518 (Upper Gilliam)	Culvert	Partial	9/16/2009	Unknown	WDFW	Unknown	
44991	W of 42nd Ave S (Upper Gilliam)	Dam	Total	9/10/2009	Private	WDFW	Gradient	n/a
44992	S 150th St (Upper Gilliam)	Culvert	Partial	9/16/2009	City	WDFW	Unknown	
44993	N of S 150th St (Upper Gilliam)	Culvert	Total	9/17/2009	Unknown	WDFW	Unknown	
45078	Gilliam Regional Detention Facility at SR 518/Southcenter Blvd (Upper Gilliam)	Dam	Partial	9/10/2009	City	WDFW	Unknown	n/a
45118	SR 518 (Upper Gilliam)	Abandoned	None	9/16/2009	Unknown	WDFW	Unknown	
50031	S 152nd St (Upper Gilliam)	Culvert	Potential	n/a	City	CH2M HILL	Unknown	

TABLE 1
Tukwila Fish Barrier Inventory

Fish Passage ID[a]	Location[b]	Feature Type	Barrier Status	Survey Date[c]	Owner Type	Data Source	Problem[d] (CH2M HILL Added)	Culvert ID[e]
Johnson Creek								
50000	Outfall to Green River	Flood gate	Partial	n/a	City	CH2M HILL	Assumes newly installed flood gate is fish-passable at most flows.	
50001	S 204th St	Culvert	Potential	2/3/2011	Unknown	CH2M HILL	Unknown	
50024	Outfall to Green River	Culvert	None	n/a	City	CH2M HILL	Assumes newly installed culvert is fish-passable.	

NOTES:
[a] The Fish Passage ID number is a unique identifier number that corresponds to the "Fish_Passage_ID" attribute within the GIS database and figures. The number was either assigned by WDFW (where WDFW is the data source for the fish passage feature) or by CH2M HILL (where CH2M HILL was the data source for the fish passage feature).
[b] The Location indicates the road crossing or other location description based on the nearest road or major landmark.
[c] The Survey Date indicates either 1) the date that WDFW surveyed the fish passage feature or 2) CH2M HILL visited the feature during windshield survey. If no date is listed, the feature has not yet been assessed in the field.
[d] The Problem listed here corresponds to the "CH_Problem" attribute within the GIS database, and indicates the specific cause of fish impassability. Some information was not available from the WDFW inventory or windshield survey.
[e] The Culvert ID corresponds to the culvert feature ID number in the City's GIS database.

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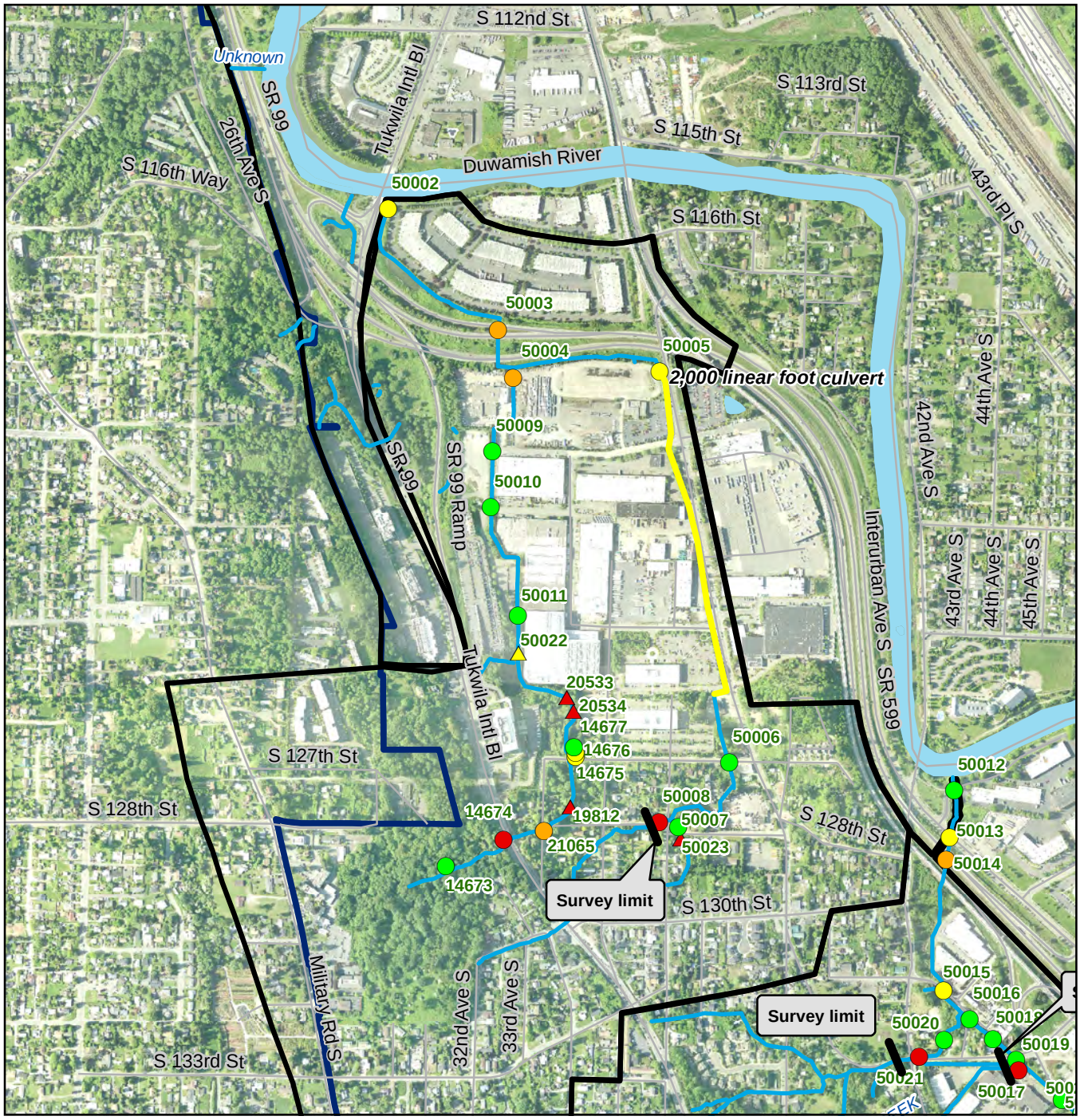
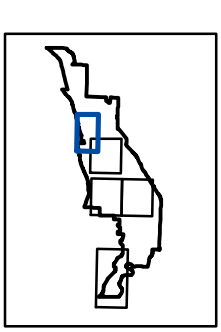
Attachment A
Photographs



This information is intended for planning purposes only. Additional information would be required to support design and construction.

Figure 1. Riverton Creek Fish Passage Barrier Inventory



N

0 250 500 1,000 1,500 Feet

Legend

Fish Passage Features - Culverts

Barrier Status

- N/A
- None
- Partial
- Potential
- Total

Fish Passage Features - Other

Barrier Status

- Partial
- Total
- Stream
- Drainage Basins
- Tukwila Boundary

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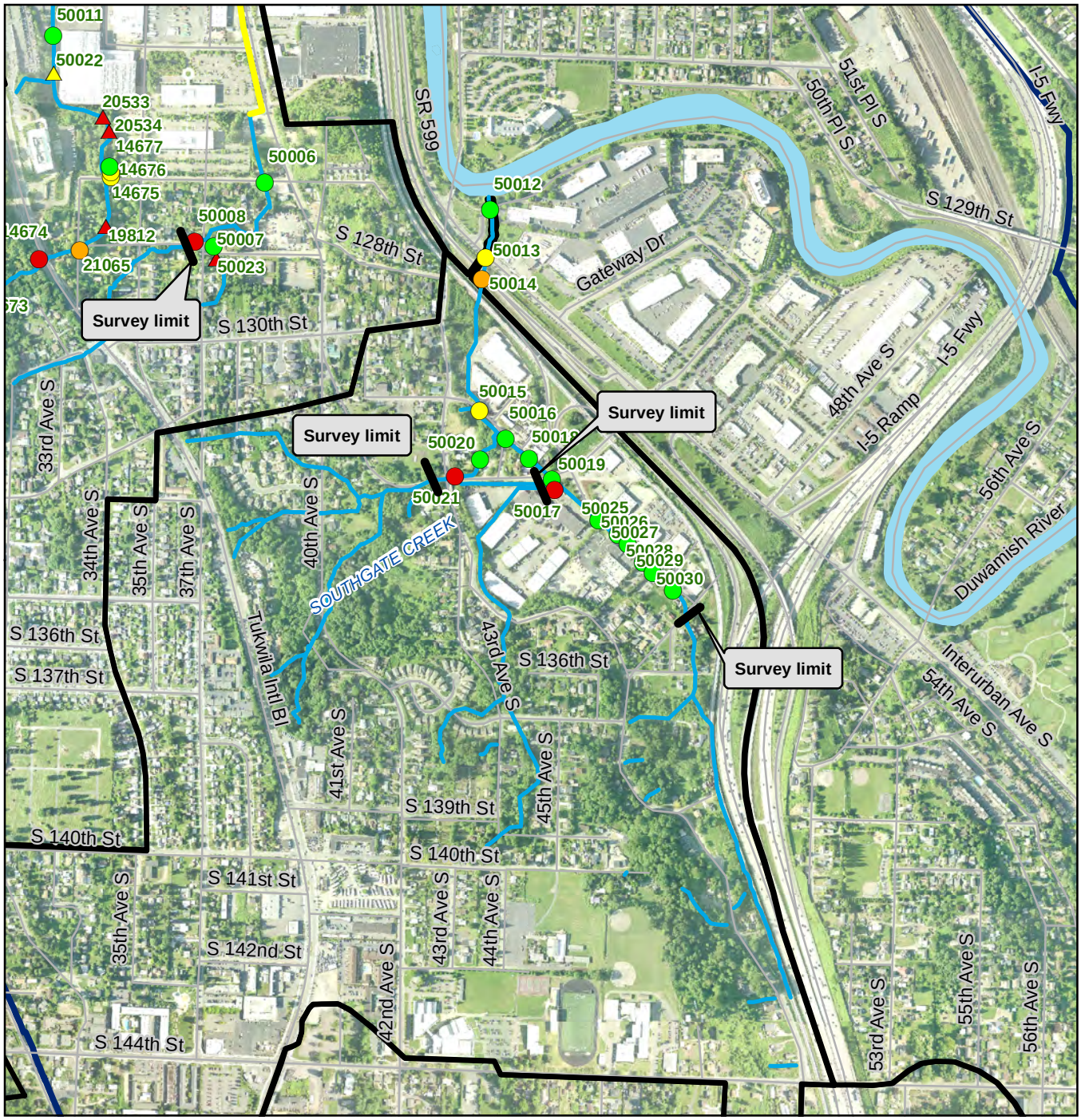
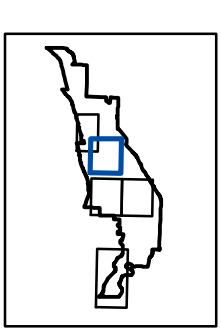


This information is intended for planning purposes only. Additional information would be required to support design and construction.

Figure 2. Southgate Creek Fish Passage Barrier Inventory



N

0 250 500 1,000 1,500 Feet

Legend

Fish Passage Features - Culverts

Barrier Status

- N/A
- None
- Partial
- Potential
- Total

Fish Passage Features - Other

Barrier Status

- Partial
- Total
- Stream
- Drainage Basins
- Tukwila Boundary

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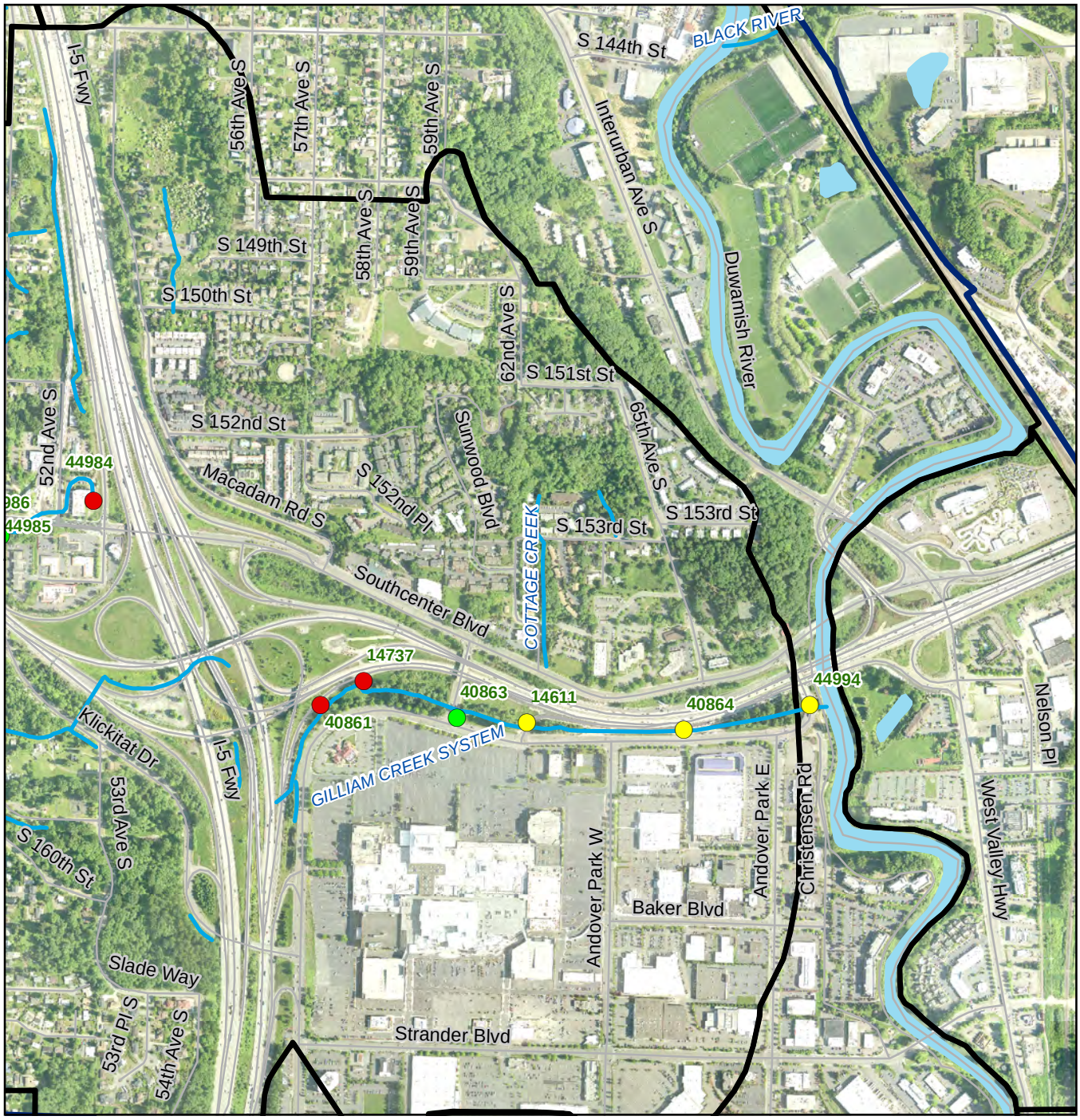
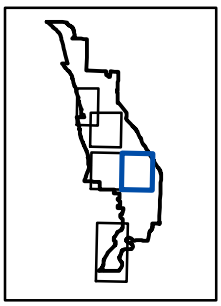


This information is intended for planning purposes only. Additional information would be required to support design and construction.

Figure 3. Lower Gilliam Creek Fish Passage Barrier Inventory



N

0 250 500 1,000 1,500 Feet

Legend

Fish Passage Features - Culverts

Barrier Status

- N/A
- None
- Partial
- Potential
- Total

Fish Passage Features - Other

Barrier Status

- Partial
- Total
- Stream
- Drainage Basins
- Tukwila Boundary

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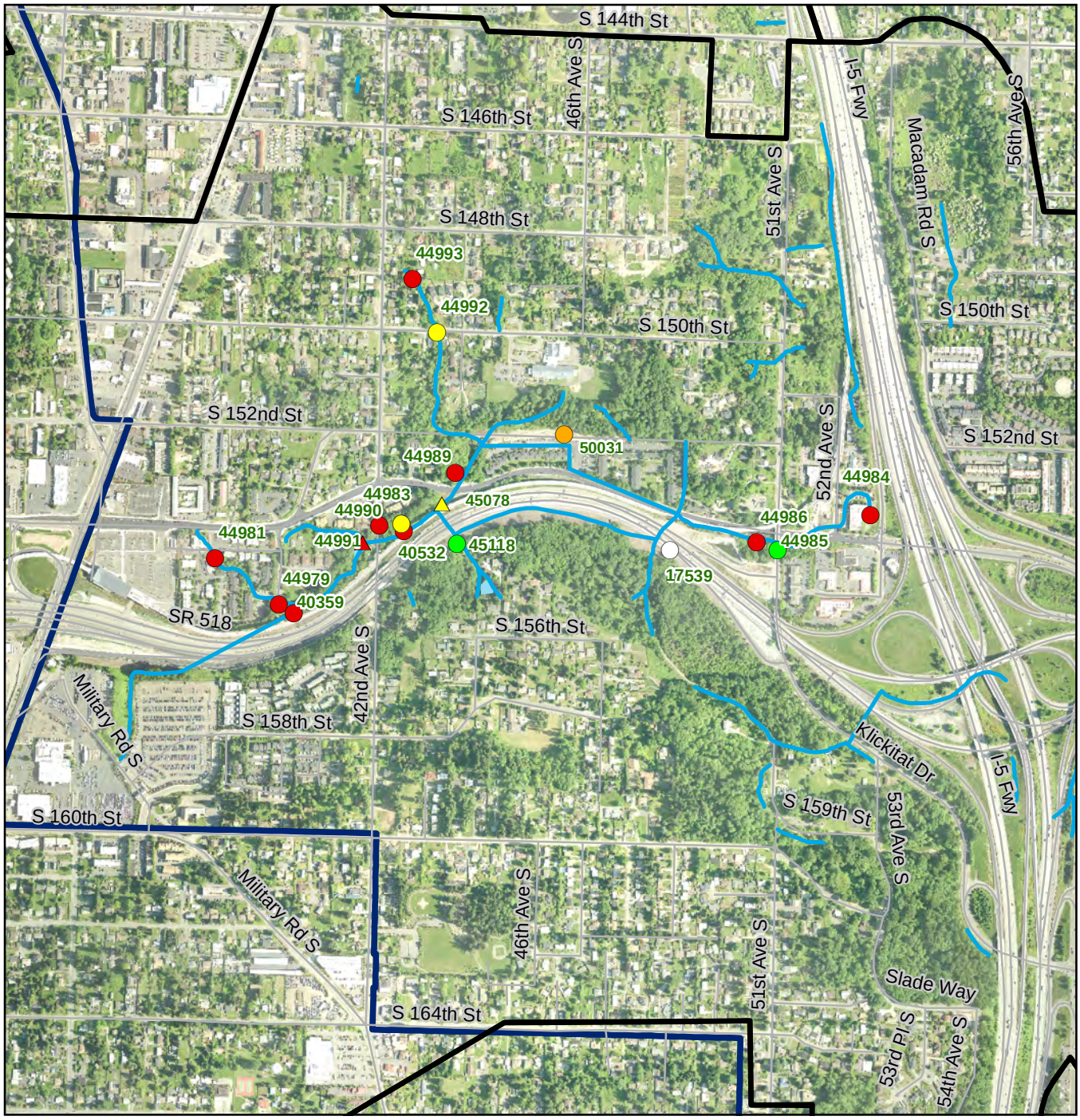

This information is intended for planning purposes only. Additional information would be required to support design and construction.

Figure 4. Upper Gilliam Creek Fish Passage Barrier Inventory

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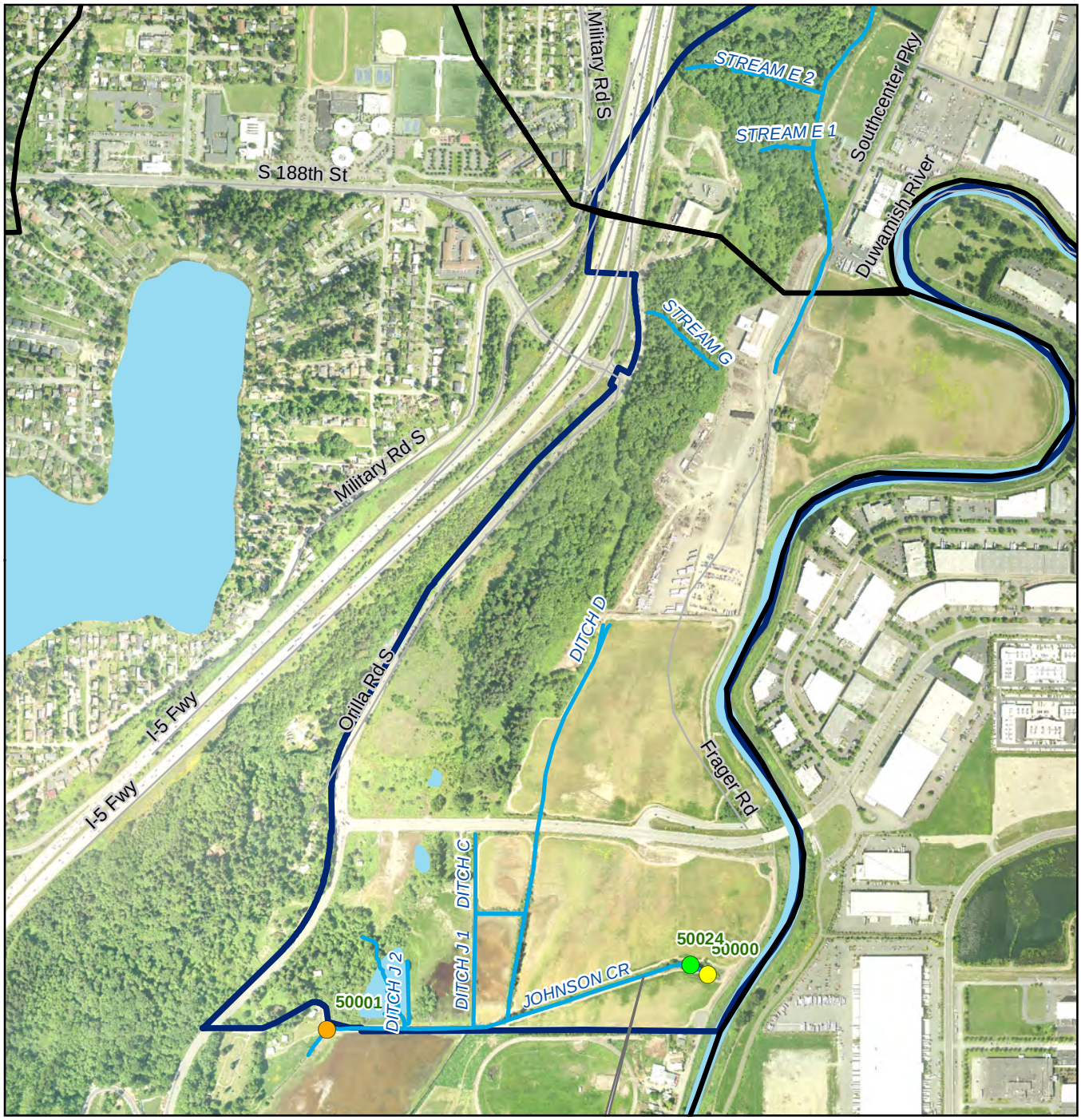
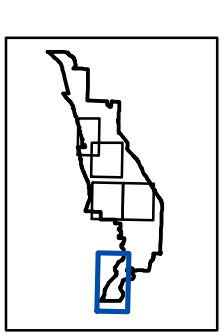


This information is intended for planning purposes only. Additional information would be required to support design and construction.

Figure 5. Johnson Creek Fish Passage Barrier Inventory



N

0 250 500 1,000 1,500 Feet

Legend

Fish Passage Features - Culverts

Barrier Status

- N/A
- None
- Partial
- Potential
- Total

Fish Passage Features - Other

Barrier Status

- Partial
- Total
- Stream
- Drainage Basins
- Tukwila Boundary

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Photo 1. East Fork Riverton Creek: view downstream from the outlet of the 2,000-foot long pipe along East Marginal Way S (fish passage ID 50005, partial barrier). (Date: 2/4/2011)

Photo 3. East Fork Riverton Creek: view of the privately-owned waterfall (fish passage ID 50007, total barrier) just upstream of the S 128th Street culvert (fish passage ID 50023, non-barrier). (Date: 2/4/2011)

Photo 2. East Fork Riverton Creek: view upstream from the culvert under S 126th Street (fish passage ID 50006, non-barrier). (Date: 2/4/2011)

Photo 4. West Fork Riverton Creek: view of log jam (fish passage ID 50022, partial barrier) in restored channel area. (Date: 2/4/2011)

Photo 5. West Fork Riverton Creek: view of the waterfall just upstream of the restored channel area (fish passage ID 20533, total barrier). (Date: 2/4/2011)

Photo 6. West Fork Riverton Creek: view upstream from the top of the large waterfall in Photo 5, toward fish passage ID 20534 (total barrier).(Date: 2/4/2011)

Photo 7. Southgate Creek: view of the outlet of the culvert under Interurban Avenue S (fish passage ID 50013, partial barrier). The fish ladder just inside the culvert is considered a partial fish passage barrier because low flows did not appear sufficient to allow fish to jump over the weirs. (Date: 2/3/2011)

Photo 8. Southgate Creek: view of inlet to City-owned culvert under S 132nd Street (fish passage ID 50015, partial barrier). There was no flow through the culvert due to sediment blockage at the time this photo was taken. (Date: 2/3/2011)

Photo 9. Southgate Creek: view of pipe outlet into the wetland that conveys the main branch (fish passage ID 50015, partial barrier) just upstream of SR 599. (Date: 2/3/2011)

Photo 10. East Fork Southgate Creek: view of the east end of the culvert under 44th Place S (fish passage ID 50016, non-barrier). Flow from the west fork was diverting into a pipe at S 133rd Street, instead of passing into the main channel, due to channel gradient and sediment blockage. (Date: 2/3/2011)

Photo 11. West Fork Southgate Creek: view of the inlet to the long culvert under S 133rd Street (fish passage ID 50021, total barrier). The steep gradient as well as the structures shown here and in Photo 12 combine to act as a total fish passage barrier. (Date: 2/3/2011)

Photo 12. West Fork Southgate Creek: view of weir at the inlet to the long culvert under S 133rd Street (fish passage ID 50021, total barrier). The weir's height exceeds the fish jumping criteria by 0.10 foot, and the culvert just downstream was considered too steep for fish. Habitat just upstream provides some suitable spawning gravel, possibly for resident trout. (Date: 2/3/2011)

Photo 13. Gilliam Creek: view of the log at the inlet to WSDOT-owned culvert at the northbound I-405 on-ramp (fish passage ID 14611, partial barrier). (Date: 2/3/2011)

Photo 14. Gilliam Creek: view of the outlet of the WSDOT-owned culvert under the south shoulder of I-405 (fish passage ID 40864, partial barrier). This 1,100-foot long culvert is identified as a partial fish passage barrier likely because of high discharge during high stream flows due to its length. (Date: 2/3/2011)

Photo 15. Upper Gilliam Creek: view downstream from the 42nd Avenue S culvert (fish passage ID 44990, total barrier). A view of the actual culvert was not possible due to physical constraints.
(Date: 2/4/2011)

Photo 16. Gilliam Creek: view of the presumed outlet of the culvert under the I-5/I-405 interchange (fish passage ID 14737, total barrier). It was not clear from the available mapping whether this culvert conveys flow from upper Gilliam Creek, or from stormwater detention managed by WSDOT.
(Date: 2/3/2011).

Photo 17. Upper Gilliam Creek: view upstream from the City-owned culvert under 42nd Ave S, toward the dam feature located on privately-owned property (fish passage ID 44991, total barrier). (Date: 2/4/2011)

Photo 18. Upper Gilliam Creek: view of the Gilliam Creek RDF structure (fish passage ID 45078, partial barrier). This feature was identified as a partial barrier by WDFW, but appeared to be a total barrier during the windshield survey. (Date: 2/4/11)

Photo 19. Upper Gilliam Creek: view downstream from outlet of the culvert underneath Southcenter Boulevard (fish passage ID 44989, total barrier). In addition to the culvert identified by WDFW as a total barrier, the flow appeared too low for adult fish through this length. (Date: 2/4/11)

Photo 20. Johnson Creek: view upstream of the old inlet to the outfall to the Green River (fish passage ID 50000, partial barrier). The flap gate and outfall were replaced with a fish-passable structure (see Photo 21). (Date: 2/3/2011)

Photo 21. Newly restored section of the main Johnson Creek: reach, looking upstream of the inlet to the outfall to the Green River (fish passage ID 50000, partial barrier). The culvert and flood gate were replaced with a fish-passable structure (passable under most flow conditions) under the mitigation for the adjacent Tukwila South project. (Date: Fall 2011)

APPENDIX C

Surface Water Regulations and Policies

(SUPPORTING INFORMATION FOR PLAN SECTION 3)

APPENDIX C

Surface Water Regulations and Policies

This Appendix C contains the detailed assessment of regulations applicable to the City of Tukwila's surface water program. The information presented here is summarized in Section 3 of this Surface Water Comprehensive Plan.

Applicable Surface Water Regulations

Regulatory changes have occurred since preparation of the 2003 City of Tukwila Comprehensive Surface Water Management Plan. The changes most significant for Tukwila are with National Pollutant Discharge Elimination System (NPDES) Phase II permit. Regulations currently applicable to the City of Tukwila's surface water management program are shown in Table C-1. (Note that flood protection and flooding as a result of Green or Duwamish River flooding are outside the scope of this Plan.)

TABLE C-1
Summary of Applicable Surface Water Regulations

Regulation or Program (organized by category)		Tukwila Surface Water Management Program Areas		
		Surface Water	**Water Quality**	**Aquatic Habitat**
Surface Water Management	Surface Water Management Ordinance, Tukwila Municipal Code 14.30, and resultant surface water planning	Capital projects to address drainage problems; many needed projects await funding	Capital projects to address water quality concerns; projects await funding	Capital projects to address aquatic habitat concerns or opportunistically protect/restore habitat; projects await funding
	Surface Water Design Manual	Adoption of the 2009 King County Surface Water Design Manual	Adoption of the 2009 King County Surface Water Design Manual	Not Applicable.
Water Quality	State surface water quality standards	Not Applicable	Several water bodies do not meet standards. Anti-degradation standard difficult to achieve. Need to identify pollution sources and implement prevention programs.	Degraded water quality impacts aquatic habitat, lessening benefits of habitat protection or restoration efforts
	Section 303(d) list	Not Applicable.	303(d) impaired listings will require development of TMDLs; Tukwila would be one of several jurisdictions involved	Not Applicable.

TABLE C-1
Summary of Applicable Surface Water Regulations

Regulation or Program (organized by category)		Tukwila Surface Water Management Program Areas		
		Surface Water	**Water Quality**	**Aquatic Habitat**
	Total Maximum Daily Loads (TMDLs)	Not Applicable.	Not yet applicable to Tukwila (see above); however, studies and implementation may be initiated as a part of TMDL development	Not Applicable.
	NPDES Phase II permit	See Table C-2	See Table C-2	Not Applicable.
Habitat Protection	Endangered Species Act	City regulations and policies generally support compliance with the ESA and encourage salmon recovery.	City demonstrates understanding of environmental baseline conditions (see basin pans and other documents).	Update the SEPA ESA screening checklist to include Coastal-Puget Sound bull trout and Puget Sound Steelhead.
	State Salmon Recovery Planning Act	Not Applicable.	Not Applicable.	City has implemented capital improvement projects that restore fish habitat for ESA-listed species but should implement more projects.
	Growth Management Act	Adopted Stormwater Management Manual for Western Washington	Adopted Stormwater Management Manual for Western Washington	Not Applicable.

As was done in 2003 as part of that comprehensive planning effort, this 2010 Plan contains an evaluation, or gap analysis, of Tukwila's surface water management program against all relevant surface water management regulations. While Table C-1 contains a high-level assessment of all applicable surface water regulations, Table C-2 contains a more detailed gap analysis of Tukwila's surface water management program against the requirements of the NPDES Phase II permit. Improvements to Tukwila's surface water management program recommended as a result of the gap analyses are outlined later in this Appendix.

NPDES Municipal Stormwater Phase II Permit

Table C-2 contains a detailed gap analysis of Tukwila's surface water management program against the NPDES Phase II permit. Since preparation of Tukwila's 2003 Surface Water Management Plan, the Phase II NPDES permits have changed and Tukwila has responded by expanding their surface water management program to meet those requirements. The gap analysis included in this Plan is intended to enhance and document Tukwila's previous investments in NPDES Phase II compliance, including an extensive Surface Water Management Program development as well as preparation and submittal of annual reports.

As a result of the gap analysis, this Plan contains recommendations for program improvements that need to be implemented to achieve compliance. The outlined recommended program improvements listed later in this Appendix reflect Tukwila's significant investment in NPDES Phase II compliance activities since preparation of the 2003 Surface Water Comprehensive Plan.

Environmental Species Act (ESA)

The Environmental Species Act (ESA) of 1973 provided broad protection for listed threatened and endangered species and their designated critical habitat. As of June of 2011, the salmon and trout listings applicable for Puget Sound are

- Chinook salmon (Threatened)
- Coho Salmon (Species of Concern)
- Steelhead (Threatened; Critical Habitat Designation)
- Bull trout (Threatened)

The listings for bull trout and coho salmon have occurred since development of the 2003 Surface Water Comprehensive Plan. The listing for Puget Sound cutthroat trout was determined to be not warranted, though listings are in effect for other geographic areas.

The ESA prohibits a "take" of a listed species by any person subject to the jurisdiction of the United States, which applies to both public and private lands and activities. Both a person whose actions harm or harass a protected species and a government entity that authorizes that person's actions can violate the ESA prohibitions. Thus, the City of Tukwila is responsible for implementation of plans and policies that support the ESA prohibitions.

Coho salmon are thought to be present in Gilliam Creek, Southgate Creek, and Riverton Creek within the boundaries of the City of Tukwila. Chinook are thought to be present in both Riverton Creek and Gilliam Creek. These streams historically did not provide extensive habitat for Chinook salmon because Chinook tend to use larger streams for spawning and rearing.

Generally, City regulations and policies support compliance with ESA and encourage salmon recovery. With this recent listing of coho as a species of concern, areas within these creeks used by coho for rearing, foraging, and migration should be protected and/or enhanced. In addition, there may be opportunities for improvements to road maintenance practices, stormwater treatment, and watershed management that would improve conditions for coho in Gilliam, Southgate, and Riverton Creeks. The City should update the State Environmental Policy Act (SEPA) ESA screening checklist to include Coastal-Puget Sound bull trout (listed as threatened) as Puget Sound steelhead (listed as threatened with a critical habitat designation).

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TABLE C-2
NPDES Phase II Requirements and Corresponding City of Tukwila Regulations, Plans, and Programs

NPDES Phase II Requirements (per Western Washington Phase II Municipal Stormwater Permit, effective through July 31, 2013)	Minimum Performance Measures Associated with NPDES Phase II Requirements	Required Date	Applicable City Regulation or Program	Additional Activities Recommended to Address Requirement	2013 Surface Water Comprehensive Plan Recommendation(s)
S5.A2 Implement a Stormwater Management Program Each Permittee must prepare a Stormwater Management Program (SWMP) that describes the activities being carried out to fulfill the requirements of Section S5.C5.	The SWMP shall be organized according to the five elements listed in Section S5.C5. An updated SWMP is to be submitted to the Washington Department of Ecology (Ecology) on an annual basis.	8/15/2011; Updates due March 31 annually	The City prepares annual SWMP updates.	None	N/A
S5.C1. Public Education and Outreach Education programs aimed at residents, businesses, industries, engineer, developers, elected officials and city staff to increase knowledge of Best Management Practices (BMPs) and reduce or eliminate practices that cause or contribute to adverse stormwater impacts.	a) Implement or participate in an education and outreach program targeting the following audiences: i. General Public General impacts of stormwater flows into surface waters Impacts from impervious surfaces Source control BMPs and environmental stewardship actions and opportunities in the areas of pet waste, vehicle maintenance, landscaping, and buffer ii. General public, businesses, including home-based and mobile businesses BMPs for use and storage of automotive chemicals, hazardous cleaning supplies, carwash soaps, and other hazardous materials Impacts of illicit discharges and how to report them iii. Homeowners, landscapers and property managers Yard care techniques protective of water quality BMPs for use and storage of pesticides and fertilizers BMPs for carpet cleaning and auto repair and maintenance Low impact development (LID) techniques, including site design, pervious paving, retention of forests and mature trees Stormwater pond maintenance iv. Engineers, contractors, developers, review staff, and land use planners Technical standards for stormwater site and erosion control plans LID techniques, including site design, pervious paving, retention of forests, and mature trees Stormwater treatment and flow control BMPs	2/16/2009	Educational materials provided to the public include: i. General Public water course signs catch basin labeling City newsletter articles published several times per year hazardous waste directory Ecology pamphlet on 5 Steps To Natural Yard Care ii. General public, businesses, including home-based and mobile businesses spill kit program disposing of hazardous waste information card Ecology pamphlet on reporting spills Sudsafe carwash program iii. Homeowners, landscapers and property managers Puget Sound Shoreline Guidebook Pet Waste brochure iv. Engineers, contractors, developers, review staff, and land use planners Environmental Protection Agency (EPA) information sheet on oil/water separators City Infrastructure Design and Construction Standards	Increase opportunities for public involvement in environmental stewardship activities; reach out to children, students, adults, and visitors.	Education (see Section 7)
	b) Implement or participate in an effort to measure understanding and adoption of the targeted behaviors among the targeted audiences. The resulting measurements shall be used to direct education and outreach resources most effectively, as well as to evaluate changes in adoption of the targeted behaviors.	2/16/2009	In January 2010, a survey was mailed to 1,000 Tukwila residents for the purpose of measuring the understanding of practices that impact the stormwater system. Such a survey will be performed annually in the future. Results to be posted on website.	None	Education (see Section 7)
	c) Track and maintain records of public education and outreach activities.	2/16/2009	Public education activities have been tracked since 2008.	None	N/A

TABLE C-2
NPDES Phase II Requirements and Corresponding City of Tukwila Regulations, Plans, and Programs

NPDES Phase II Requirements (per Western Washington Phase II Municipal Stormwater Permit, effective through July 31, 2013)	Minimum Performance Measures Associated with NPDES Phase II Requirements	Required Date	Applicable City Regulation or Program	Additional Activities Recommended to Address Requirement	2013 Surface Water Comprehensive Plan Recommendation(s)
S5.C2. Public Involvement and Participation Ongoing opportunities for public involvement through advisory councils, watershed committees, etc.	a) Create opportunities for the public to participate in the decision-making process involving the development, implementation, and update of the Permittee's entire SWMP. Each Permittee must develop and implement a process for consideration of public comments on their SWMP.	2/16/2008	Public involvement is encouraged via the City website, City Council, and Utilities Committee meetings, and City news articles.	Hold public meeting and public comment period on the SWMP.	Public Involvement (see Section 7)
	b) Each Permittee must make their SWMP, the annual report required under S9.A, and all other submittals required by this Permit, available to the public, preferably by posting the materials on the Permittee's website.	2/16/2008	The SWMP, latest annual report, and an email address for public comment are posted on the City's website: www.ci.tukwila.wa.us/pubwks/npdes.html	None	N/A
S5.C3. Illicit Discharge Detection and Elimination Ongoing program to detect, remove, and prevent illicit connections, discharges, and improper disposal, including spills, into the municipal separate storm sewer system (MS4). Full implementation of an illicit discharge detection and elimination program must be achieved by 8/15/2011.	a) A storm sewer system map shall be developed to show storm sewer outfalls and all stormwater BMPs owned by the Permittee. The map shall show tributary conveyances, connections to the storm sewers, drainage areas, and land use. These maps should be periodically updated.	2/16/2011	A consultant has been hired to update the City's GIS maps and develop a program to ensure the storm sewer map is kept current. Areas 1 through 5 have been previously mapped. Area 6 (of a total of seven areas) is currently being mapped. Mapping is expected to be completed in the spring of 2011.	Complete the mapping of the City's stormwater system, including newly annexed area (scheduled completion in Summer 2013). Perform inventory of private stormwater facilities. Plan for periodic updating of stormwater system inventory; inventory should include new infrastructure brought on-line since previous update (such as for new and re-development).	Inspections and Enforcement and Illicit Detection and Elimination (see Section 7)
	b) Develop and implement an ordinance or other regulatory mechanism to effectively prohibit non-stormwater, illegal discharges, and/or dumping into the Permittee's municipal separate storm sewer system. Prohibited discharges include runoff from irrigation, sidewalk washing and dust control, municipal water releases for system testing purposes and swimming pool discharges unless dechlorinated to 0.1 ppm or less. This section also lists 13 categories of allowed non-stormwater discharges. An enforcement strategy must be identified along with escalating enforcement procedures.	9/15/2009	A new City ordinance, TMC 14.31 Illicit Discharge Detection and Elimination, was adopted in March 2010.	None	N/A
	c) Develop and implement an ongoing program to detect and address non-stormwater discharges, spills, illicit connections and illegal dumping into the Permittee's municipal separate storm sewer system.	8/15/2011	c) City maintenance staff respond to hazardous material spills and perform basic containment and cleanup functions. Tracking of illicit discharges began in June 2009. Much of the stormwater piping was videotaped in 2009 and questionable connections were investigated. Approximately 25% of the system has been done (as of December 2011).	c) Complete inspections of the remaining City stormwater system. As needed, complete cleaning of stormwater lines in order to allow inspections to occur.	Inspections and Enforcement and Illicit Detection and Elimination (see Section 7)
	i. and ii. Locate priority areas likely to have illicit discharges; Conduct field assessment activities, including visual inspection of priority outfalls (prioritize receiving waters for visual inspection; screen for illicit connections).	8/15/2011	i and ii. Three outfalls, one to the Green River and two to the Duwamish River, have been identified for visual field assessment.	i and ii. Carry out inspections of the individual tributary areas and outfalls.	Inspections and Enforcement and Illicit Detection and Elimination (see Section 7)
	iii, iv, and v. Identify procedures for characterizing, tracing and removing illicit discharges.	8/15/2011	iii, iv, and v. Not completed.	Iii, iv, and v. Identify procedures for characterizing, tracing, and removing illicit discharges	Inspections and Enforcement and Illicit Detection and Elimination (see Section 7)
	d) Permittees shall inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste. i. Distribute information to target audiences. ii. Establish hotline for reporting spills and illicit discharges.	i. 8/15/2011 ii. 2/16/2009	A hotline phone number (206-433-1860) has been added to the City website: www.ci.tukwila.wa.us/pubwks/npdes.html	Develop and disseminate information to the public.	Education (see Section 7)

TABLE C-2
NPDES Phase II Requirements and Corresponding City of Tukwila Regulations, Plans, and Programs

NPDES Phase II Requirements (per Western Washington Phase II Municipal Stormwater Permit, effective through July 31, 2013)	Minimum Performance Measures Associated with NPDES Phase II Requirements	Required Date	Applicable City Regulation or Program	Additional Activities Recommended to Address Requirement	2013 Surface Water Comprehensive Plan Recommendation(s)
	e) Adopt and implement procedures for program evaluation and assessment, including the tracking number and type of spills or illicit discharges identified; inspections made; and any feedback received from public education efforts.	8/15/2011		Develop and implement.	Record-Keeping and Annual Reporting (see Section 7)
	f) Provide appropriate training for municipal field staff on the identification and reporting of illicit discharges into MS4s.	i. 9/15/09	Field staff dealing with illicit discharges were trained in August 2009 and a staff review was conducted in 2010.	None	N/A
	i. Ensure that all municipal field staff responsible for identification and reporting of illicit discharges are trained to conduct these activities. ii. Implement ongoing training of staff.	ii. 2/16/2010	Ongoing training is provided for street storm/sewer and water department staff.		
S5.C4. Controlling Runoff from New Development, Redevelopment and Construction Sites Develop, implement, and enforce a program to reduce pollutants in stormwater runoff to MS4s from new development, redevelopment, and construction site activities. This applies to all sites 1 acre in size or greater, including those projects less than 1 acre that are part of a larger project.	a) The program shall include an ordinance or other enforceable mechanism that addresses the runoff from new development, redevelopment, and construction site projects. The program must meet the requirements of Ecology's 2005 Stormwater Management Manual for Western Washington or an equivalent manual approved by Ecology. The program should allow the use of LID measures.	2/16/2010	TMC 14.30 – Surface Water Management defines City responsibilities for stormwater management. TMC 14.30.060.2 adopts the 2009 King County Surface Water Design Manual (KCSWDM) as the City's surface water manual. Per Appendix 10 of the NPDES Permit, the KCSWDM is recognized an equivalent manual approved by Ecology. The City's Infrastructure Design and Construction Standards are also implemented. TMC 14.30.080.A4 provides for unlimited City access to stormwater facilities for inspection and enforcement activities. TMC 14.30.130.B allows for LID measures in projects by exception.	Develop a proactive approach to LID that encourages innovative design to reduce onsite runoff. Consider developing a map that identifies locations in the City with soils that are conducive to LID measures.(see LID requirements anticipated for next permit cycle)	Regulations (see Section 7)
	b) The program shall include a permitting process with plan review, inspection and enforcement capability to meet the standards listed for both private and public projects, using qualified personnel. Elements of the permitting process must include: i. Review of all stormwater site plans for development ii, iii, iv. Site inspection prior, during and at the conclusion of construction v. Attain minimum 80% inspection rate and retain inspection records vi. Enforce non-compliance	2/16/2010	TMC 14.30.070 specifies a project review process and issuance of a storm drainage permit. TMC 14.30.10 describes enforcement actions available to the City while TMC 14.130 describes penalties the City may assign a violator for each day of non-compliance. TMC 8.45 provides a system of escalating enforcement procedures. i. The City reviews all development stormwater plans ii, iii, iv, v. The City inspects some construction sites for proper stormwater BMPs but inspections are sporadic. vi. The City carries out enforcement measures for sites that are not in compliance.	Enhance the City inspection program with adequate staffing to reduce noncompliance with BMP requirements and water quality violations. Develop and carry out systematic inspections of construction sites.	Regulations (see Section 7)
	c) The program shall include provisions to ensure adequate long-term operation and maintenance (O&M) of post-construction stormwater facilities and BMPs that are permitted and constructed pursuant to (b) above. Elements include: ii. Establishment of maintenance standards ii, iii, iv. Prescribed schedule for inspections and maintenance: catch basins: by 2/15/2012 treatment and flow control facilities: annually	2/16/2010	TMC 14.30.080 describes maintenance requirements and responsibilities for stormwater facilities. TMC 14.30.080.6 places responsibility for maintenance of privately owned facilities on the owner. TMC 14.30.080.A2 and B5 identify a schedule for frequency of inspection and elapsed time for required maintenance. Maintenance standards are those found in the KCSWDM.	Expand the City inspection program to ensure maintenance. Increase inspections and expand enforcement efforts. Keep robust database of inspections and enforcement actions.	Maintenance and Operations and Record-keeping (see Section 7)
	d) The program shall include a procedure for keeping records of inspections and enforcement actions by staff, including inspection reports, warning letters, notices of violations, and other enforcement records.	2/16/2010	Develop and carry out systematic inspections of construction sites.	Enhance tracking and reporting function to ensure maintenance is conducted and documented adequately.	Record-Keeping and Annual Reporting (see Section 7)
	e) The program shall make available copies of the "Notice of Intent for Construction Activity" and/or copies of the "Notice of Intent for Industrial Activity" to representatives of proposed new development and	2/16/2010	These documents are readily available and the City inserts them into the Pre-Application Packet for new projects.	None	N/A

TABLE C-2
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NPDES Phase II Requirements (per Western Washington Phase II Municipal Stormwater Permit, effective through July 31, 2013)	Minimum Performance Measures Associated with NPDES Phase II Requirements	Required Date	Applicable City Regulation or Program	Additional Activities Recommended to Address Requirement	2013 Surface Water Comprehensive Plan Recommendation(s)
	redevelopment. Permittees will continue to enforce local ordinances controlling runoff form sites that are also covered by stormwater permits issued by Ecology.				
	f) The Permittee shall ensure that all staff responsible for implementing the stormwater program are trained to conduct these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques, or staffing. Permittees shall document and maintain records of the training provided and the staff trained.	2/16/2010	The City has conducted staff training in the application of the revised stormwater procedures.	None	N/A
S5.C5. Pollution Prevention and Operation and Maintenance for Municipal Operations	a) Adopt maintenance standards that are at least as protective as those specified in Ecology's 2005 Stormwater Management Manual for Western Washington, Volume V, Chapter 4.	2/16/2010	Maintenance standards are those found in the KCSWDM, which is equivalent to the Ecology manual.	Develop maintenance practices that are applicable to the City.	Maintenance and Operations (see Section 7)
Develop and implement an O&M program for stormwater facilities for municipal operations.	b) Annual inspection of all municipally owned or operated permanent stormwater treatment and flow control facilities with maintenance, as required. Reduced frequency of inspection is allowed if justified by maintenance records.	2/16/2010	TMC 14.30.050.D states that the surface water compliance requirements of TMC 14.30 apply to all City departments except for O&M activities of the Department of Parks and Recreation. TMC 14.30.080 identifies the required frequency of inspection and maintenance. The City is carrying out annual inspections of its stormwater facilities and is documenting all maintenance that is carried out. The City maintains a list of problem areas and complaints, using these to target maintenance.	None	N/A
	c) Spot checks of permanent treatment and flow control facilities (other than catch basins) after major storm events, defined as greater than the 10-year, 24-hour rain event.	2/16/2010	The City has committed to carry out spot checks of its stormwater system following major storm events.	None	N/A
	d) Inspection of all catch basins and inlets owned or operated by the Permittee at least once before the end of the permit term (February 15, 2012). Clean catch basins if the inspection indicates cleaning is needed. Decant water shall be disposed of in accordance with Permit Appendix 6. Street Waste Disposal. There are provisions for the inspection of a representative subset of catch basins.	2/16/2010	The City is committed to inspecting all catch basins. The storm conveyance system is inspected and maintained on a 3-5 year cycle. Vactor waste is currently disposed of in an open field, with the water allowed to percolate and evaporate.	Continue inspections. Develop a permanent vactor waste treatment facility or reach an agreement to use an existing facility.	Maintenance and Operations (see Section 7)
	e) Inspect at least 95 percent of all catch basins.	8/19/2011		Complete inspection of all catch basins by 7/16/2011.	Maintenance and Operations (see Section 7)
	f, g) Establish and implement practices to reduce stormwater impacts associated with runoff from streets, parking lots, roads, or highways owned or maintained by the Permittee, and road maintenance activities conducted by the Permittee. Covered activities include: pipe and culvert cleaning ditch maintenance road repair and resurfacing snow and ice control utility installation road shoulder maintenance dust control fertilizer/pesticide application landscape management trash management	2/16/2010		Develop a program to reduce pollutants in runoff from City property.	Maintenance and Operations (see Section 7)

TABLE C-2
NPDES Phase II Requirements and Corresponding City of Tukwila Regulations, Plans, and Programs

NPDES Phase II Requirements (per Western Washington Phase II Municipal Stormwater Permit, effective through July 31, 2013)	Minimum Performance Measures Associated with NPDES Phase II Requirements	Required Date	Applicable City Regulation or Program	Additional Activities Recommended to Address Requirement	2013 Surface Water Comprehensive Plan Recommendation(s)
	building exterior maintenance				
	h) Implement an on-going training program for appropriate employees of the Permittee whose construction, operations, or maintenance job functions may impact stormwater quality. Provide follow-up training as necessary.	2/16/2010	City's O&M training program	None.	Maintenance and Operations (see Section 7)
	i) Develop and implement a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards, and material-storage facilities owned or operated by the Permittee that are not required to have coverage under the Industrial Stormwater General Permit.	2/16/2010	The City is preparing a SWPPP for the Tukwila Golf Links maintenance center (SWPPP needed for each building).	Complete SWPPP for Tukwila Golf Links Maintenance Center	Maintenance and Operations (see Section 7)
	j) Keep records of inspections and maintenance/repair activities.	2/16/2010	City performs record-keeping.	Perform more robust, computer-based record-keeping system.	Record-Keeping and Annual Reporting (see Section 7)
S7. Total Maximum Daily Load (TMDL) Requirements For Permittees whose jurisdictions fall within an area covered by TMDL requirements, specific additional stormwater requirements must be met.	Compliance with TMDL requirements B. Applicable only to water bodies listed in Appendix 2 of the Phase 2 NPDES Permit.	n/a	None of the water bodies within the City's jurisdiction currently has a TMDL. The City therefore has no obligations under this section of the NPDES permit.	None at this time under current permit cycle; (see requirements anticipated for next permit cycle, Plan Section 3)	Regulations (see Section 7)
S8. Monitoring A. Permittees must conduct water sampling only for TMDL compliance and illicit discharges pursuant to S5.C.3. C. Permittees must prepare for future long-term monitoring.	C.1.a.iv. Tukwila's population is between 10,000 and 75,000 persons. Therefore the City is required to identify two outfalls where stormwater sampling can be conducted. C.1.b. Select two suitable monitoring objectives that relate to the effectiveness of BMPs or the achievement of an environmental outcome such as a water quality goal. C.2. Permittees within a single Water Resource Inventory Area (WRIA) may choose to collaborate on a single basin-level monitoring plan.	12/31/2010	None.	Consider joining the regional stormwater monitoring network of Puget Sound entities proposed to Ecology. (see stormwater monitoring requirements anticipated for next permit cycle, Plan Section 3)	Regulations (see Section 7)
S9. Reporting Requirements	S9.A through E. Submit an annual report that discusses the status of each component of the SWMP. The Permittee is to use the *Annual Report Form for Cities, Towns and Counties*. The annual report is to include: E.4. a. A summary of barriers to the use of LID measures within the jurisdiction. E.4.b.A report that identifies: LID practices currently available or reasonably implemented in the jurisdiction Potential LID techniques Metrics to promote and measure LID use Schedule for requirements/implementation of LID on a broader scale within the jurisdiction	3/31/2011 and annually on March 31	The City produces the required annual report and posts it on the City website.	None at this time	N/A

N/A = not applicable

Sources of information include the following:

- NPDES Phase 2 Permit (Western Washington Phase II Municipal Stormwater Permit (modified June 17, 2009; Ecology reissued it unmodified on August 1, 2012 at legislative direction to be effective through July 31, 2013. This document has an effective date of September 1, 2012. The updated 2013-2018 permit will become effective on August 1, 2013)
- Tukwila's 2010 Stormwater Management Program (March 2010) and Tukwila's 2011 Stormwater Management Program (March 2011)
- Tukwila's annual Ecology Report Form for Cities, Towns and Counties (2009)

Potential Changes to Surface Water Regulations

This plan includes a discussion of potential changes to the following regulations:

- Endangered Species Act listings
- NPDES Phase II, including LID, monitoring, and potential TMDL pollution reduction requirements

Endangered Species Act

The listing of coho salmon as a species of concern highlights the need to protect and restore salmon rearing, foraging, and migration areas in Gilliam, Riverton, and Southgate creeks within the City of Tukwila's boundaries.

If additional species are listed or current listings are downgraded, the City's surface water program will need to be re-prioritized to place greater emphasis on habitat protection and restoration measures for these additional species.

NPDES Phase II Permit

The City of Tukwila is covered under the Washington State Department of Ecology's NPDES program for municipalities as a 'small MS4' with a Phase II municipal stormwater Permit. The current Western Washington Phase II Municipal Stormwater Permit was issued on January 17, 2007 (with an effective date of February 16, 2007), was modified on June 17, 2009, with an expiration date of February 15, 2012. The Washington State Department of Ecology reissued the Phase II permit unmodified on August 1, 2012 at legislative direction to be effective starting September 1, 2012 through July 31, 2013. Ecology will finalize the current draft of the updated 2013-2018 permit, which will become effective August 1, 2013.

While a draft of the new permit has not been finalized, preliminary draft language regarding stormwater monitoring and low impact development (LID) requirements has been distributed for comment. Based on this draft language, it is anticipated that the new Phase II permit will include requirements for both stormwater monitoring and LID implementation. However, specific requirements are not yet known. It is anticipated that the new permit will contain other changes in addition to stormwater monitoring and LID implementation. However, the extent and impact of these are not yet known. Therefore, this section focuses on potential requirements for stormwater monitoring and LID implementation.

Stormwater Monitoring

The rationale behind the anticipated stormwater monitoring requirements is that monitoring is necessary to characterize the effectiveness of stormwater management investments. Monitoring results are intended to steer future policy and future capital investments.

The preliminary draft language in the Phase II permits proposes collaborative implementation of a new regional stormwater monitoring program. Costs of this program would be shared among all permittees and Ecology administers the contracts. Individual permittees would not have specific monitoring requirements according to this preliminary draft language. All permittees are still required to sample outfalls and receiving waters as necessary to identify illicit discharges and implement water quality improvement plans.

The impact of these anticipated stormwater monitoring requirements on Tukwila's stormwater program will be mainly financial. Since Ecology will administer the program, significant staff time is not anticipated to be required.

Low Impact Development

The preliminary draft language calls for three levels for local government implementation:

- Adopt site and subdivision requirements that require list of LID BMPs or compliance with performance standard using methods of choice. The LID techniques are mandatory unless infeasible for the site as determined using proposed feasibility criteria.
- Update development codes, roles, and standards to require LID principles, such as ways to conserve native vegetation and minimize impervious surfaces, in site design.
- Perform watershed-scale stormwater planning in areas where urban areas are expanding or impervious surface is increasing, in order to identify and prevent urban stormwater pollution and further habitat damage.

The intent of this last bullet is to address the stormwater problem through land use, referring to watershed-scale LID rather than a traditional capital project in one location. A May 2011 publication from Ecology (publication number 11-10-034) acknowledges that there is considerable experience with the first two bullets above and much less with the third bullet, watershed-scale LID. That same publication states that it is not possible to maintain water quality and habitat in Puget Sound lowland streams without considering land-use and how the landscape is developed.

All three of the anticipated LID requirements require political and/or planning action rather than implementation of capital projects. The first two items involve modification of Tukwila code. The third involves watershed planning. A possible approach for the watershed planning is to use this 2013 Surface Water Comprehensive Plan to identify the highest priority watersheds to take to the next level of planning as required by this last bullet. The priority watersheds may be those identified as containing the most growth or re-development in earlier sections of this Plan.

The impact of these anticipated LID requirements on Tukwila's stormwater program is difficult to quantify at this stage. However, significant staff time may be required for the first two bullets, as they involve changes to city code and standards. The third bullet would be more of a financial impact, as the technical work could be done by an outside consultant, saving limited staff time.

Establishment of a TMDL for the Green and Duwamish River System

Ecology is required to establish a TMDL for each pollutant identified in each impaired water body on the Section 303(d) list. The Green/Duwamish River system is listed as Category 5 (impaired) for pH, dissolved oxygen, fecal coliform, and temperature. (A complete list of 303(d) listings is included in Table B-2 of Appendix B of this Plan).

While a TMDL is not yet established, it is anticipated that a TMDL will be established in the future. Ecology can use mechanisms such as the municipal NPDES permit program to establish water quality control requirements for individual drainage basins. If TMDL requirements were to be incorporated into the NPDES permit mechanism, the earliest this would occur is with the

next permit cycle (beginning approximately July 2017, five years after the effective date of this next permit). Before this can occur, Ecology would spearhead establishment of the TMDL using data collection and modeling.

The impact of the anticipated TMDL on Tukwila's surface water program during this surface water planning cycle is likely in the form of staff time or financial resources during the technical portion of establishment of the TMDL.

Recommended Improvements to Tukwila's Surface Water Management Program

This sub-section contains a summary of the recommended improvements to Tukwila's Surface Water Management Program needed in order to more fully comply with applicable regulations. These recommendations are also shown in Section 7 of the Plan.

Environmental Species Act

- Update the SEPA ESA screening checklist to include Coastal-Puget Sound bull trout and Puget Sound steelhead

State Salmon Recovery Planning Act

- City has implemented capital improvement projects that restore fish habitat for ESA-listed species but should identify, plan, and implement more habitat restoration projects.

NPDES Permit

Education

- Increase opportunities for public involvement in environmental stewardship activities; reach out to children, students, adults, and visitors.
- Develop and disseminate information to the public.

Public Involvement

- Hold public meeting and public comment period on the SWMP.

Inspections and Enforcement and Illicit Detection and Elimination

- Plan for periodic updating of City's surface water system inventory; inventory should include new infrastructure brought on-line since previous update (such as for new and re-development).
- Complete inspections of the City's stormwater system. As needed, complete cleaning of stormwater lines in order to allow inspections to occur.
- Perform inventory of private stormwater facilities. City to make policy decision regarding responsibility for maintenance of private stormwater facilities.
- Enhance the City inspection program to reduce noncompliance with BMP requirements and water quality violations.
- Identify procedures for characterizing, tracing, and removing illicit discharges

- Develop and carry out systematic inspections of construction sites. Document inspections and any enforcement actions.

Maintenance and Operations

- Develop a permanent vactor waste treatment facility or reach an agreement with another municipality to use an existing facility.
- Perform more robust documentation of inspections, maintenance activities, compliant response, etc.

Record-keeping

- Enhance tracking and reporting to ensure maintenance, inspections, and enforcements are conducted and documented adequately.

Future NPDES Phase II requirements

- *City should respond to any new and additional requirements in the next NPDES Phase II permit cycle, which may include requirements for water quality monitoring and implementation of low impact development where feasible.*

APPENDIX D

Surface Water Issues and Solutions

(SUPPORTING INFORMATION FOR PLAN SECTION 4)

APPENDIX D

Surface Water Issues and Solutions

This Appendix D contains an inventory of the drainage, water quality, and aquatic habitat issues identified in the City of Tukwila. The information presented here is summarized in Section 4 of this Surface Water Comprehensive Plan.

Note that the City of Tukwila maintains a Small Drainage Project list to address the minor drainage issues that existing throughout the City. Some, but not all, of these minor drainage problems are identified in this Appendix. This Appendix (and this Plan) focuses on the major surface water problems and therefore should not be considered a complete list of surface water issues.

Table D-1 contains an inventory of the surface water issues identified in this planning effort. This surface water issue inventory is organized by drainage basin, with the following eight drainage basins located wholly or partially in the City of Tukwila:

- Green/Duwamish River Mainstem
- Gilliam Creek
- Nelson Place - Long Acres
- P17
- Riverton Creek
- Southeast Central Business District (CBD)
- Southgate Creek
- Johnson Creek

Green/Duwamish River Mainstem Basin

Drainage Issues

Right-of-way and private property drainage issues occur along S 143rd Street, east of Interurban Avenue. No formal drainage system exists along South 143rd Street, and flooding occurs about every 2 to 5 years.

Drainage issues occur on 53rd Avenue South, east of I-5 near S 139th. A damaged and/or undersized drainage system causes flooding along 53rd Avenue S, which occurs about once every 5 years.

Historically, there has been a localized drainage issue at S 112th Street and Tukwila International Boulevard west of E Marginal Way. Localized ponding has occurred on private property due to sheet flows from International Boulevard. This problem has not been experienced over the last several years even through significant storm events. It is probable that the issue has been addressed because of improvements made on private property.

A localized drainage issue exists at 49th Avenue S and S Hazel Street in Tukwila. This is a general low spot with no observed outlet.

A series of four stormwater outfalls exist along E. Marginal Way S within the City of Tukwila. Two of the outfalls are owned by King County, a third has been decommissioned (Jorgenson Forge), and the fourth outfall is currently owned by Boeing.

The major storm pipe flowing north along Andover Park West currently discharges to a State of Washington Department of Transportation (WSDOT) -owned pipe that flows east to the Duwamish River. With the widening of I-405, the connection was covered leaving no access to this junction. This stormwater line serves much of the central retail area in Tukwila.

Water Quality Issues

Four sections of the Green/Duwamish River within the City of Tukwila do not meet water quality standards according to the 2008 303(d) list. Both the Green River and Duwamish River are listed as Category 5 (at least one designated use is impaired) for dissolved oxygen, temperature, pH, and fecal coliform, based on water sampling and analysis. While stormwater originating in the City of Tukwila does contribute to water quality in the Green/Duwamish River system, other contributions from upstream sources outside of the City's management and control have a significant contribution to the impairment.

Most of the City of Tukwila's stormwater outfalls to the Green and Duwamish River have no water quality treatment.

Riverbank erosion is currently occurring along the length of the Green and Duwamish Rivers within the City of Tukwila. Two example locations are the East bank of the Duwamish River at S 104th and on the East bank adjacent to S 115th St between 42nd Avenue S and E Marginal Way S. Riverbank erosion is a water quality concern. Also, places that are currently experiencing riverbank erosion may be candidates for restoration projects and are therefore an aquatic habitat opportunity.

The Norfolk Basin, partially within the City of Tukwila, discharges to the Lower Duwamish Waterway and includes both stormwater runoff and occasional combined sewer overflows. Of the numerous chemical parameters analyzed in the storm sewers, phthalates and zinc consistently exceeded the cleanup screening level (CSL), above which adverse impacts on marine organisms would be likely. Total petroleum hydrocarbons were also consistently high. In 2007, Ecology produced a Source Control Action Plan for Early Action Area 7 (the Norfolk Basin) (Ecology and Environment 2007). The plan lists a number of potential upland sources of contaminants to the stormwater system. Through a memorandum of agreement, the City of Seattle is conducting inspections to determine the sources of contaminants. The Action Plan also calls for better as-built storm sewer drawings and the use of Geographic Information System (GIS) to better delineate the stormwater system in this area.

Aquatic Habitat Issues

The riparian corridor of the river is significantly degraded from its natural condition in many areas of the city, such as along Foster Golf Course, north of SR 599, and east of Southcenter Mall. Productive, good quality fish habitat, both in the main channel and in off-channel refuge, is generally lacking. Little, if any, spawning habitat exists in the river reaches within the City.

The City of Tukwila is moving forward with the Duwamish Gardens project located on the Duwamish River near the E Marginal Way South crossing. This project will provide off-channel refuge habitat for salmonids. In addition to the Duwamish Gardens project, there are

opportunities to enhance and/or restore aquatic habitat up and down the length of the Green and Duwamish Rivers in the City of Tukwila. A possible opportunity is on the east bank of the Duwamish River at S 104th Street, an area currently experiencing riverbank erosion.

Gilliam Creek Basin

Drainage Issues

The 12-inch drainage pipe serving Christensen Road is undersized and possibly collapsing and is therefore in need of replacement with a larger-sized pipe. Localized drainage issues have occurred along S 146th Street, S 148th Street, S 150th Street, and S 152nd Street between 42nd Avenue S to Tukwila International Boulevard. The problems along S 146th Street have been addressed previous to this Plan and the problems along 150th will be addressed in 2014. The problems at S 148th Street and S 152nd Street remain. The existing Gilliam Creek culvert under 42nd Avenue S is lacking adequate conveyance capacity during large storms. The 48-inch storm pipe located underneath Andover Park West is reported to be in poor condition.

Water Quality Issues

Gilliam Creek's use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because Gilliam Creek enters the Green River upstream of the confluence with the Black River. Water quality in Gilliam Creek is thought to be consistent with other urbanized creeks in the Puget Sound Area showing elevated levels of fecal coliform, elevated temperatures, and low dissolved oxygen levels. Temperature, dissolved oxygen, pH, and fecal coliform are the constituents of concern in Gilliam Creek based on the Category 5 (impaired) listings of the Duwamish River and the Green River. In addition to these parameters, total suspended solids and turbidity are also of concern.

No site-specific water quality problems were identified in the Gilliam Creek basin. While some water quality data is available for Gilliam Creek, additional water quality data should be collected to characterize water quality conditions in Gilliam Creek. This data will help in determining an approach for addressing any water quality concerns.

Aquatic Habitat Issues

Habitat in the lower reach of Gilliam Creek is available to fish through the flap gate at the outlet of Gilliam Creek only under certain high flow conditions, when the Green River water level is elevated but remaining lower than the water level in Gilliam Creek.

A WSDOT-owned culvert that conveys at least 1,000 feet of the creek under the south shoulder of I-405 is identified as a partial fish barrier (Washington Department of Fish and Wildlife [WDFW], 2010). Farther upstream, a log at the inlet of the WSDOT-owned culvert at the I-405 on-ramp observed in spring of 2011 appears capable of blocking fish passage. Removal of the log would allow anadromous fish greater access to the rest of the lower reach, up to the culvert at the I-5/I-405 interchange, which is currently impassable to fish (WDFW, 2010).

WDFW determined that several of the tributaries to upper Gilliam Creek provide some rearing habitat (WSDOT, 2007). Coho salmon and other anadromous fish are not expected to be able to reach the habitat in these upper reaches until fish passability is improved at the I-5/I-405 interchange and immediately upstream of the interchange, where there are several other WSDOT- and City-owned culverts identified as fish passage barriers (WDFW, 2010).

Fish barriers do exist in the upper reaches of Gilliam Creek, including a WSDOT-owned culvert beneath SR 518 that conveys one of these tributaries that is identified as a total fish passage barrier. The Gilliam Creek culvert under 42nd Avenue S currently is a total blockage to fish passage. Tukwila plans to replace the deteriorating culvert at 42nd Avenue S with a fish-passable structure. Just upstream of this culvert is a dam-like structure that is a total fish passage barrier, and appears to be privately-owned Removing both of these barriers would immediately improve resident fish access to the limited rearing habitat in this reach.

Nelson Place – Long Acres Basin

Drainage Issues

The area bounded by SR-181, the Green River, the Burlington Northern Railroad, and Strander Boulevard experiences localized drainage issues. There is no functional outlet to the drainage network in this area.

Water Quality Issues

The Nelson Place – Long Acres drainage basin use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River.

The City of Tukwila is currently using a site within the Nelson Place – Long Acres basin to dispose of solids collected in vactor trucks. The material sits at the site and gradually decants. The site is located near Nelson Place.

Aquatic Habitat Issues

The former alignment of the Green River, prior to construction of I-405 in 1962, extended through the Nelson farm property and into the property currently occupied by Homestead Studio Suites. An oxbow of that former river alignment has been filled, isolating a pond area and reducing off-channel habitat and floodplain connectivity in this reach of the river. This is a habitat restoration opportunity for the City of Tukwila. Partnerships with other jurisdictions and regulatory agencies would be necessary, acknowledging that flood protection is necessary for proximate land owners.

P17 Basin

Drainage Issues

Sediment is thought to have accumulated in significant quantities in the stormwater conveyance system within the P17 basin. While not a drainage issue currently, this significant buildup of sediment could potentially cause a severe localized drainage issue. In addition, because of the sediment buildup, City crews have not been able to inspect the conveyance system and therefore do not know its condition. Portions of the conveyance system that require cleaning and inspection include the following:

- Andover Park E from 180th to Minkler
- 36-inch pipe from Minkler to Azteca
- Andover Park W from Tukwila Pkwy to 180th

- Minkler from Southcenter to ditch at Andover West
- From Minkler to industry drive

It is possible that, after cleaning and inspection, individual improvement projects will be identified. The 48-inch pipe along Andover Park (in the Gilliam Basin) is one location that City staff have identified as a potential problem. Cleaning and inspection will provide more information.

City of Tukwila's stormwater pump station #15 is located within this P17 drainage basin. Improvements to pump station #15 are planned for 2013 as part of a capital improvement project.

Water Quality Issues

The P17 drainage basin use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River. No site-specific water quality issues were identified in this basin other than the potential water quality impact of sediment load currently contained within the stormwater pipes in the basin (mentioned above).

Aquatic Habitat Issues

Apart from along the mainstem of the Green River, which is described in an earlier section of this Appendix, no fish habitat opportunities were identified in this basin.

Riverton Creek Basin

Drainage Issues

Localized drainage issues occur in the stormwater system along E Marginal Way between the SR-599 ramp and S 124th Street. The setup of the drainage network in this area is likely not optimal.

Water Quality Issues

The Riverton Creek use-based classification is Salmonid Spawning/Rearing and Secondary Contact Recreation, because the drainage discharges to the Duwamish River downstream of the confluence with the Black River. Water quality in Riverton Creek is thought to be consistent with other urbanized creeks in the Puget Sound Area showing elevated levels of fecal coliform, elevated temperatures, and low dissolved oxygen levels. Temperature, dissolved oxygen, pH and fecal coliform are the constituents of concern in Riverton Creek based on the Category 5 (impaired) listings of the Duwamish River and the Green River. In addition to these parameters, total suspended solids and turbidity are also of concern.

No site-specific water quality problems were identified in the Riverton Creek basin.

Water quality data should be collected to characterize water quality conditions that will help in determining an approach for addressing any water quality concerns.

Aquatic Habitat Issues

The flap gate at the Duwamish River is impassable to fish during high tides and high river flows. This flap gate should be modified and/or replaced to allow fish access to mainstem

Riverton Creek. One of the gates failed in 2000, and now, during high flow events, river water backs up through that culvert into the lower reach of the creek.

The East Fork of Riverton Creek just upstream of the SR 599 culvert is characterized by a wide, exposed, sandy and silty streambed that provides fish passage but no spawning or rearing habitat. Upstream of that reach, a more than 2,000-linear-foot (LF) culvert likely prevents at least some anadromous fish from accessing suitable habitat located in the upper reach between S 126th Street and S 128th Street, where good overhead cover from riparian plants, sufficient flows, and streambed gravel appear suitable for coho salmon spawning. This 2000 LF culvert is considered a partial fish blockage. Little is known about the condition and characteristics of this culvert. Inspection of this culvert would provide more information to help in deciding if replacement or channel day-lighting is feasible and beneficial.

Southeast CBD Basin

Drainage Issues

No site-specific drainage issues were identified in this basin.

Water Quality Issues

The use-based classification for the Southeast CBD Basin is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River. No site-specific water quality issues were identified in this basin.

Aquatic Habitat Issues

Apart from along the mainstem of the Green River, which is described in an earlier section of this Appendix, no fish habitat opportunities were identified in this basin.

Southgate Creek Basin

Drainage Issues

The drainage network near S 146th Street and 35th Avenue South is under capacity to serve the area. A landslide occurred several years ago on S 131st Street near 44th Avenue South. This landslide is both a drainage and a water quality issue.

Water Quality Issues

The Southgate Creek use-based classification is Salmonid Spawning/Rearing and Secondary Contact Recreation, because the drainage discharges to the Duwamish River downstream of the confluence with the Black River. Water quality in Southgate Creek is thought to be consistent with other urbanized creeks in the Puget Sound Area showing elevated levels of fecal coliform, elevated temperatures, and low dissolved oxygen levels. Temperature, dissolved oxygen, pH, and fecal coliform are the constituents of concern in Southgate Creek based on the Category 5 (impaired) listings of the Duwamish River and the Green River. In addition to these parameters, total suspended solids and turbidity are also of concern. This is especially true in Southgate Creek given the sediment load observed in the lower reaches of the creek.

Water quality data should be collected to characterize water quality conditions in Southgate Creek. This data will help in determining an approach for addressing any water quality concerns.

Aquatic Habitat Issues

The fish ladder at the Southgate culvert under SR 599 likely is a fish barrier to anadromous fish during low stream flows. Bank erosion from the combination of steep gradients and stormwater runoff from urban development have deposited sediments in the lower reach, which have reduced effective culvert conveyance capacities and covered up salmon spawning gravels. The section of the main stem just downstream of the confluence of the West and East Forks is often completely blocked by sediment and debris. Improving this section of the main stem Southgate Creek along S 132nd Street would allow anadromous fish greater access to the spawning and rearing habitat in the recently-restored lower west fork and rearing habitat in the east fork.

Johnson Creek Basin

Drainage Issues

No site-specific drainage issues were identified in this basin.

Water Quality Issues

The Johnson Creek use-based classification is Salmonid Spawning/Rearing and Primary Contact Recreation, because the drainage discharges to the Green River upstream of the confluence with the Black River. Water quality in Johnson Creek is thought to be consistent with other urbanized creeks in the Puget Sound Area showing elevated levels of fecal coliform, elevated temperatures, and low dissolved oxygen levels. Temperature, dissolved oxygen, pH, and fecal coliform are the constituents of concern in Johnson Creek based on the Category 5 (impaired) listings of the Duwamish River and the Green River. In addition to these parameters, total suspended solids and turbidity are also of concern. However, no site-specific water quality problems were identified in the Johnson Creek basin.

Water quality data should be collected to characterize water quality conditions in Johnson Creek. This data will help in determining an approach for addressing any water quality concerns.

Aquatic Habitat Issues

The Johnson Creek flap gate and outfall to the Green River were replaced as part of mitigation for the proximate commercial development. No other barriers to fish passage were identified in Johnson Creek. No other aquatic habitat opportunities were identified in this basin.

Mill Creek Basin

Drainage Issues

No site-specific drainage issues were identified in this basin.

Water Quality Issues

No site-specific water quality issues were identified in this basin.

Aquatic Habitat Issues

No site-specific habitat issues were identified in this basin.

TABLE D-1
Surface Water Issues and Solutions

ID	Problem Description	Location	Issue Type	Drainage Basin	Possible Solutions[1]	Recommended Solution
1	Outfalls discharge directly to receiving water, no treatment	All outfalls are potential candidates; 48th Ave S and S 122nd are two top candidates	Water quality	All	Programmatic (inspections/enforcement, illicit discharge detection and elimination, maintenance) or capital (point source control, water quality treatment)	Water Quality Retrofit Program (capital project)
2	Ponding in low spot, possible ponding on the east side of road	49th Ave S and S Hazel Street	Drainage	Duwamish	Capital (increase conveyance capacity, retention/detention)	Move onto 2013 Small Drainage Project List
3	Dumping	S 114th St and 49th Ave S	Water quality	Duwamish	Cleanup of dumped material	To be addressed by others[2]
4	Lack of off-channel salmon habitat along lower Duwamish	Duwamish River near light rail crossing	Habitat	Duwamish	Capital (channel physical habitat restoration)	Physical habitat restoration (capital project - Duwamish Gardens)
5	E Marginal Way S Stormwater Outfall	North end of Tukwila, along east shore of Duwamish River; 4 outfalls proximate to S 87th Place	Drainage	Duwamish	Programmatic (inspections/enforcement, illicit discharge detection and elimination, maintenance) or capital (retrofit system, abandon existing outfalls)	Retrofit system / outfall(s) (capital project)
6	Duwamish River riverbank at S 104th St is eroding, causing failure of road shoulder and habitat degradation	Duwamish River right (east) bank at S. 104th St	Water quality	Duwamish	Capital (channel stabilization) or close the road	To be addressed by others[2]
7	Duwamish River riverbank at S 115th St is eroding, causing failure of road shoulder and habitat degradation	Duwamish River right (east) bank adjacent to S 115th St between 42nd Ave S and E Marginal Way S and adjacent to 42nd Ave S from S 115 St to Interurban Ave S.	Water quality	Duwamish	Capital (physical habitat restoration; channel stabilization)	To be addressed by others[2]
8	53rd Ave S storm drain system has inadequate capacity	53rd Ave S near S 139th	Drainage	Duwamish	Capital (increase conveyance capacity, provide drainage system, detention/retention)	Increase conveyance capacity (capital project)

TABLE D-1
Surface Water Issues and Solutions

ID	Problem Description	Location	Issue Type	Drainage Basin	Possible Solutions[1]	Recommended Solution
9	S 143rd St has no drainage system	S 143rd St, east of Interurban Ave; S 144th St, S 143rd Place, S 143rd S, east of Interurban Ave S between Interurban and Duwamish River, W. Of Duwamish, near Black River convergence	Drainage	Duwamish	Capital (provide drainage system)	Provide drainage system (capital project)
10	Tukwila stormwater line discharges to WSDOT pipe, no access due to I-405 widening	Andover Park W at Gilliam Creek	Drainage	Duwamish	Capital (re-route drainage system)	Re-route drainage system (capital project)
11	Andover Park 48 inch stormwater pipe in poor condition, possibly damaged	Andover Park W	Drainage	Gilliam Creek	Capital (increase effective conveyance capacity)	No capital project at this time; address once collection system has been clean and inspected
12	Gilliam Creek flapgates as fish barrier	Outlet of Gilliam Creek to Green River - partial fish blockage	Drainage/ habitat	Gilliam Creek	Capital (modify/remove to allow fish passage)	retrofit for fish passage; provide flood protection (capital project)
13	Christensen Rd 12" pipe is undersized (replace with 18")	Christensen Rd	Drainage	Gilliam Creek	Capital (increase capacity)	Increase capacity (capital project)
14	Gilliam Creek culvert at 42nd Ave SE is undersized	Gilliam Creek crossing at 42nd Ave SE (between S 154th and Hwy 518)	Drainage/ habitat	Gilliam Creek	Capital (increase conveyance capacity, replacement of culvert to be fish-passable)	Replace culvert (capital project)
15	Northwest Gilliam Storm Drainage System has inadequate capacity - S 152nd and S 148th	From 42nd Ave S to Tukwila International Blvd S 146th St, S 148th St, S 150th St, S 152nd St	Drainage	Gilliam Creek	Capital (increase conveyance capacity, re-route existing drainage system, detention/retention, high flow bypass)	Increase capacity (capital project)
16	Cleaning/Inspection of Stormwater Conveyance	Various - commercial area at Mall and surrounding	Water quality / drainage	All	Capital (conveyance system cleaning and inspection)	Conveyance system cleaning and inspection (capital project)
17	Storm Lift Station No. 15 improvements	Near Claim Jumper - 5880 S 180th	Drainage	P17	Capital (needed upgrades, updating)	Upgrade pump station (capital project)

TABLE D-1
Surface Water Issues and Solutions

ID	Problem Description	Location	Issue Type	Drainage Basin	Possible Solutions[1]	Recommended Solution
18	Permanent home for soils reclamation facility	Vactor waste dump site / decanter facility, currently using an area near Nelson Place	Water quality	Nelson/ Longacres	Capital (land acquisition for soils reclamation facility)	Land acquisition (capital project)
19	No functional outlet to drainage network at Nelson/Longacres	Area bounded by SR 181, Green River, Burlington Northern RR, and Strander Blvd	Drainage	Nelson/ Longacres	Capital (provide drainage system, on-site detention/retention)	Provide outlet to drainage system (capital project)
20	Former river oxbow has bren blocked off from River	Nelson farm property between Green River and W. Valley Highway	Habitat	Nelson/ Longacres	Capital (channel physical habitat restoration)	Restore Nelson Salmon Habitat Side Channel (capital project)
21	Storm system along E Marginal Way is bad setup, causes ponding	E Marginal Way between SR599 ramp and S 124th St	Drainage	Riverton Creek	Capital (increase conveyance capacity, re-route drainage, detention, high flow bypass)	Proximate to Riverton Creek culvert (below), so addressed together
22	Fish habitat accessibility issues in Riverton Creek culvert	E Marginal Way south of SR599	Habitat	Riverton Creek	Capital (removal/replacement of fish-blocking culvert)	Conveyance system cleaning and inspection (capital project)
23	Riverton Creek Flap Gate is partial fish passage barrier	Riverton outfall into Duwamish River	Habitat	Riverton Creek	Capital (modify/remove to allow fish passage)	Remove flapgate (capital project)
24	S 146th St pipe and 35th ave s drainage - needs additional capacity	S 146th St between Military Rd S and Pac Hwy S	Drainage	Southgate Creek	Capital (increase conveyance capacity, detention/retention, high flow bypass)	Increase conveyance capacity (capital project)
25	Sediment/clogging issues proximate to Southgate Creek	S 131st St near 44th Ave S	Drainage, water quality	Southgate Creek	Regrading of wetlands on private property	To be addressed by others[2]
26	Historical landslide - road closed	S 137th St at 44th Ave S	Drainage, water quality	Southgate Creek	Capital (complete channel stabilization and riparian buffer restoration)	No capital project at this time; monitor status and review during next planning period

Notes:

[1] Possible solutions address the surface water problem in whole or in part

[2] Problem to be addressed by others because responsibility/opportunity lies in other City department or with other jurisdiction

APPENDIX E

Surface Water Capital Projects

(SUPPORTING INFORMATION FOR PLAN SECTION 5)

APPENDIX E

Surface Water Capital Projects

This Appendix E contains a summary of the recommended surface water capital projects. The information presented here is summarized in Section 5 of this Surface Water Comprehensive Plan.

The City of Tukwila has requested that CH2M HILL update the City's Comprehensive Surface Water Management Plan to provide a "living" document that will guide the City's surface water management activities for the next planning period. A major component of the Plan is identified surface water management issues and corresponding solutions to those issues. The Plan identifies both programmatic (non-structure) and capital project (structural) solutions to those issues. The purpose of this appendix is to outline the capital projects recommended for implementation in the Plan.

Attachment A to this Appendix contains the basis for the cost estimates for each of the capital projects recommended for inclusion in Tukwila's CIP. Attachment B to this Appendix contains the summary sheets for each of the capital projects that can be utilized as part of the budget planning process and CIP development.

Capital Projects

Capital Project Development

The surface water needs, or issues, were identified as part of Comprehensive Surface Water Management Plan development. Needs were categories as drainage, water quality, or aquatic habitat needs. Once these needs were identified, one or more potential solutions were identified. These solutions were either programmatic or structural (capital) in nature.

CH2MHILL and City of Tukwila staff collaborated on the preferred solution for each surface water need identified. CH2MHILL developed preliminary design concepts and planning-level cost estimates for each capital project.

Most of the capital projects presented in this memorandum are focused on rectifying discrete drainage or aquatic habitat problems. Some of the surface water management problems identified are not readily solved using discrete capital projects. For example, widespread water quality problems in urban runoff entering Riverton, Southgate, and Gilliam Creeks are difficult to address with capital improvements. Very few water quality projects have been developed because individual, small-scale runoff treatment system retrofits would make only an incremental difference in receiving water quality. It is more appropriate to address most of the water quality problems with land use or storm water management regulations (for example, requiring water quality treatment for redevelopment projects).

The water quality projects that have been developed and are described in this section either are targeting a drainage or habitat issue and have water quality benefits, or else are the recommended first projects as part of a larger program to address water quality.

Capital Projects Recommended for Inclusion into the CIP

Table E-1 presents the capital projects recommended for inclusion into Tukwila's Surface Water CIP. Attachment A to this memorandum contains the basis for the cost estimates. Attachment B contains project summary sheets with project scopes, benefits, schematic sketches, and cost estimates for each project.

TABLE E-1
Recommended Capital Projects

ID	Project Name	Drainage Basin	Estimated Total Project Cost (March 2012 dollars)
98641222	S 143rd St storm drain system	Duwamish River	$1,096,000
98741202	Nelson/Longacres – Phase II	Nelson/Longacres	$678,000
98941202	Christensen Rd. pipe replacement	Gilliam Creek	$327,000
99341208	Gilliam Creek 42nd Ave S culvert	Gilliam Creek	$702,000
99441202	Soil Reclamation Facility	Nelson/Longacres	$3,504,000
90341206	Northwest Gilliam Storm Drainage System	Gilliam Creek	$1,978,000
90341213	53rd Ave S storm drain system	Duwamish River	$1,557,000
90341214	S 146th St pipe and 35th Ave S drainage	Southgate Creek	$882,000
91041203	Storm Lift Station No. 15 Improvements	P17	$698,000
91041204	E. Marginal Way S Stormwater Outfall	Duwamish River	$772,000
91241201	Water Quality Retrofit Program	Duwamish River	$287,000
91241202	Tukwila Pkwy/Gilliam Cr Outfalls	Gilliam Creek	$278,000
91241203	Tukwila Urban Center Conveyance Inspections	Gilliam Cr./P17	$541,000
91041204	E. Marginal Way Conveyance Inspection	Riverton Creek	$85,000
90330104	Nelson Side Channel	Nelson/Longacres	$1,497,000
90630102	Duwamish Gardens	Duwamish	$3,000,000
99830103	Riverton Creek Flap Gate Removal	Riverton Creek	$946,000
99830105	Gilliam Creek Fish Barrier Removal	Gilliam Creek	$816,000

Capital Projects Recommended for Removal from the CIP

Several capital projects developed in previous Comprehensive Stormwater Plans and appearing in previous CIPs are recommended for removal from the CIP for one or more of the following reasons:

- Surface water issue is located on private property.

- Alternative solutions are already under further development (that is, design and construction).
- Alternative solutions were developed under a different capital project included in the CIP.
- Issue will be monitored over time and considered for inclusion in the CIP during the next planning period
- Issue will be further characterized with information gathered in this next planning cycle and will be considered for inclusion in the CIP during the next planning period
- Issue will be addressed by other parties besides the City of Tukwila or by other departments within the City of Tukwila

These projects are listed in Table E-2.

TABLE E-2
Capital Projects Removed from the CIP

ID	Fund	Capital Project Name
99441205	412	Duwamish Riverbank Stabilization at S 104th St.
99441209	412	Duwamish Riverbank Stabilization near S 115th St.
98641217	412	Andover Park West 48" rehabilitation
90341205	412	Tukwila Parkway Drainage
90341207	412	Treatment Pond for Gilliam Creek
90341208	412	Minkler Boulevard Culvert Replacement
90341210	412	Retrofit Stormwater Treatment at 51st Avenue S
0341211	412	Property for Riverton Creek Sediment Trap
90330106	301	Foster Golf Course Riverbank
90330116	301	Lower Gilliam Creek Channel Improvements

Capital Project Descriptions

98641222: S 143rd Street Storm Drain System

Project Description

Because of development and increased surface water runoff, drainage issues are occurring in the right-of-way along S. 143rd Place and S. 143th Street. The design objectives are reduction of stormwater ponding and peak flow rate. A secondary design objective is to provide water quality treatment prior to discharge to the Duwamish River.

Proposed Solution

The proposed solution is to install an asphalt overlay, curb and a closed-pipe conveyance system along S. 143rd Street and S. 143rd Place to collect and convey the stormwater runoff to a water quality treatment device then discharge the stormwater into the Duwamish River. A flap gate will be installed in the outfall to prevent flooding when the river is at high levels. Also, the

project will convert an existing drainage ditch into a bioswale to provide some water quality treatment.

98741202: Nelsen Pl/Longacres – Phase II

Project Description
Because of development and increased surface water runoff, flooding is occurring in the right-of-way and on private property. The design objectives are reduction of stormwater ponding and peak flow rate. The project is located within the Burlington Northern Santa Fe (BNSF) corridor.

Proposed Solution
The proposed solution is to install a 48-inch stormwater pipe crossing underneath the Burlington Northern railroad tracks connecting to a previously installed interceptor east of the tracks. This 48-inch stormwater pipe will be constructed using trenchless techniques to minimize the impact to the operation of the railroad. This new pipe will provide drainage from the existing drainage ditch west of the tracks to the P-1 interceptor. Ownership, easement, and maintenance responsibility will be determined and/or verified prior to moving forward with this project.

98941202: Christensen Road Pipe Replacement

Project Description
The existing 12-inch storm drain pipe between the end of Christensen Road to Strander Boulevard is collapsed and causing flooding at Christensen Road. This pipe is currently located between two buildings. Temporary pumps have been used to convey water from the area when flooding occurs.

Proposed Solution
The proposed solution is to replace the existing collapsed pipe with an 18-inch pipe. Because of the close proximity of the pipe trench to the adjacent buildings, shoring will be needed to provide support for the building foundations.

99341208: Gilliam Creek 42nd Avenue S Culvert

Project Description
The existing concrete culvert along Gilliam Creek underneath 42nd Avenue S. is in poor condition and is undersized for larger storm events. The pipe is cracked and pipe sections are separating. The failure of the culvert could result in erosion or catastrophic failure of the 42nd Avenue South roadway.

Proposed Solution
The proposed solution is to replace this culvert with a 16’ wide open-bottom arch culvert and to rehabilitate the upstream and downstream segments of the stream channel. The project will be included in the 42nd Avenue S. Roadway Improvement project.

99441202: Soil Reclamation Facility

Project Description
The City maintenance crews collect sediments during typical stormwater system maintenance work tasks such as street sweeping and cleaning out stormwater inlets and pipes. The City is lacking a formal facility to efficiently dewater, treat and dispose of the waste materials.

Proposed Solution

The proposed solution is to build a soil reclamation facility within the City. This capital project consists of property acquisition for this facility.

90341206: Northwest Gilliam Basin Storm Drainage System

Project Description

Because of urban development and increased surface water runoff, flooding is occurring in the right-of-way and private property along S. 148th Street and S. 152nd Street between International Boulevard and S. 42nd Avenue South. (A similar issue has been addressed on S 146th Street. The issue will be addressed in 2014 on S 150th Street. S. 148th Street and S 152nd Street still need to be addressed and are therefore included here in this capital project.) The design objectives are reduction of stormwater surface runoff volume and reduction of peak flow rate. The project may also provide water quality treatment prior discharge to the Gilliam Creek.

Proposed Solution

The proposed solution includes installing new storm drain pipes along S. 148th Street and S. 152nd Street to replace the old storm drain and increase the conveyance capacity of the system. Other project elements include installation of an asphalt overlay and curbs to route water to new catch basins to reduce surface ponding. In addition, the installation of water quality treatment devices at the end of each of the blocks is also planned. Stormwater would be discharged to the existing storm drain on 42nd Avenue South.

90341213: 53rd Avenue S Storm Drainage System

Project Description

Because of urban development and increased surface water runoff, flooding is occurring in the right-of-way and private property along 53rd Avenue South between S. 137th Street to S. 144th Street. The existing storm drain is in poor condition and street runoff flows onto private property. The design objectives are reduction of stormwater ponding and peak flow rate and providing water quality treatment.

Proposed Solution

The proposed solution includes providing an asphalt overlay to the existing roadway, installing a curb to keep the stormwater runoff remain on the road, and replacing the existing storm drain system along 53rd Avenue S. to improve conveyance capacity. The project also includes the installation of bioretention swales along 53rd Avenue South or near the Lee Philip Field and Foster Memorial Park to provide water quality treatment. The upgraded storm drains will connect to an existing storm drain at S. 137th Street.

90341214: S 146th St Pipe and 35th Ave S Drainage System

Project Description

Because of urban development and increased surface water runoff, flooding is occurring in the right-of-way and private property along S. 146th Street immediately west of Tukwila International Boulevard. The design objectives are reduction of stormwater ponding and peak flow rate.

Proposed Solution

The proposed solution includes applying an asphalt overlay to the existing roadway, installing a curb to keep the stormwater runoff on the road, and replacing the existing storm drain system

along S. 146th Street and a segment of 35th Avenue South to improve conveyance capacity. The upgraded storm drains will connect to an existing storm drain on International Boulevard.

91041203: Storm Lift Station No.15 Improvement

Project Description

The study completed in 2010 recommended upgrading of this lift station to provide a higher level of reliability and protection against damage due to power failure.

Proposed Solution

The proposed solution includes the installation of an on-site power generator with enclosure. The power generator will provide power automatically to the lift station allowing the lift station to continue conveying stormwater runoff during power failure.

91041204: East Marginal Way South Stormwater Outfall

Project Description

A series of four stormwater outfalls located on private property discharge directly into the Duwamish River. Two of the outfalls (Z-line and Jorgensen Forge) are located within the Boeing property and the other two outfalls (KC Airport Lift Station and Slip-6) are owned and operated by King County. The Jorgensen Forge outfall was closed in January 2011. The stormwater runoff previously discharging from the Jorgensen Forge outfall overflowed to the King County Airport Lift Station outfall. No flooding was reported. A study completed in September 2009 by GHD (GHD 2009) evaluated 4 alternatives to this problem.

Proposed Solution

The proposed solution is based on the Alternative 1 from the GHD study to reuse the Z-line outfall. This alternative includes installing a new storm drain to direct the stormwater runoff from East Marginal Way South to an existing storm drain connecting to the outfall. This existing storm drain would be slip-lined to reduce the risk of cross contamination. This alternative is proposed for inclusion into the City's CIP because this alternative provides a long-term fix of the problem without the long-term maintenance cost associated with the use a stormwater lift station or paying a fee for using a third-party stormwater lift station. Ownership, easement, and maintenance responsibility will be negotiated between the City and the property owner prior the implementation of the project.

91241201: Water Quality Retrofit Program

Project Description

Because of existing development and the increase in surface water runoff from pollutant generating impervious surfaces, the water quality of the receiving water bodies in the City of Tukwila continues to deteriorate. The water quality retrofit program is intended to address this need as an overall water quality program with individual project(s) implemented each year.

Three of the possible locations for implementation of water quality retrofits under this program are Z-line (see CIP 91041204), 48th Avenue South, and S. 122nd Street, all discharging to the Duwamish River.

Proposed Solution

For each location identified as part of this water quality retrofit program, several options for water quality retrofits will be evaluated. These include low impact development techniques and water quality proprietary devices. The proposed solution is based on installing a structure

treatment device to provide pre-treatment. The treatment device needs to works with the existing storm drain system. The actual location and the treatment approach will be determined for each project that is implemented as part of this program.

91241202: Tukwila Parkway / Gilliam Creek Outfalls

Project Description

The existing 48-inch storm drain along Andover Park West crosses Tukwila Parkway, crosses underneath a 60-inch Seattle Public Utility water supply pipe line, and then discharges into a 108-inch culvert owned by WSDOT installed as part of the initial construction of I-405 to convey Gilliam Creek adjacent to the freeway. This WSDOT-owned pipe discharges to Gilliam Creek. With subsequent freeway improvements and widening, the discharge point of the 48-inch storm drain to the culvert is now underneath the freeway travel lanes. Also, the connection to the 108-inch culvert is higher than the invert elevation of the 48-inch pipe which can create backwater conditions in the 48-inch pipe at Andover pipe W. This system is extremely difficult, if not impossible, for the City to inspect and maintain. In addition, a backwater condition within City pipes for several hundred feet prevents inspection and cleaning.

Proposed Solution

The proposed solution is to install a new 84-inch manhole structure on the existing 48-inch pipe and a new 72-inch structure on the 30-inch pipe west of Lowe's. A slide guide with a discharge port would be installed in each of the new structures.

91241203: Tukwila Urban Center Conveyance Inspections

Project Description

The network of storm pipes in the core retail area of Tukwila has not been inspected in the last several decades. Because there have been no inspections, pipe condition is unknown and rehabilitation, repair, and replacement needs are therefore unknown. It is likely that a significant amount of sediment exists within the storm network in that area. Several stormwater pipes have been selected as higher priority because of the large pipe sizes and more significant impact should a pipe fail. The selected area includes 1)Andover Park E from S. 180th Street to Minkler Boulevard, 2) 36" pipe from Minkler Boulevard to Azteca Restaurant, 3) Andover Park West from Tukwila Parkway to S 180th Street, 4) Minkler Boulevard from Southcenter Parkway to ditches at Andover Park West, and 5) Minkler Boulevard to Industry Drive.

Proposed Solution

In order to assess the pipe conditions, the storm drain pipes will be cleaned and the sediment will be disposed of. Then the pipe interior will be inspected using a remote-control camera. The inspection will be recorded. Rehabilitation, repair, and replacement needs will then be known and prioritized.

91241204: East Marginal Way Conveyance Inspection

Project Description

The storm drainage system along East Marginal Way near S 124th is problematic. Localize drainage issues occur. Proximate to this drainage issue, Riverton Creek flows through a long culvert that is a blockage to fish passage under certain flow conditions.

Proposed Solution

These separate problems of drainage issues and fish blockages could be addressed by a joint solution. However, until more information is known, this solution cannot be fully developed. Therefore, for this planning period, Tukwila should proceed with cleaning and inspecting the Riverton Creek culvert and proximate drainage infrastructure. After the City performs the inspection, the City can determine the pipe conditions, address any issues, and proceed with development of the larger project.

90330104: Nelson Salmon Habitat Side Channel

Project Description

Many years ago, a natural oxbow on the Duwamish River was disconnected from the main channel as the Duwamish/Green River was engineered for flood control. Currently, this oxbow is a pond.

Proposed Solution

The proposed solution is to re-connect the oxbow with the main channel. The hydraulic connectivity will increase habitat for juvenile salmonids in order to increase rearing productivity. The existing embankment between the Duwamish River and the existing pond will be removed to create a backwater side channel. Boulders and large woody debris will be placed along the toe of embankment for erosion protection and creating habitat. A flood control levee will be installed along the south side of the existing pond to provide flood protection to the adjacent private property. Currently a hotel is located next to the pond.

90630102: Duwamish Gardens

Project Description and Solution

This on-going 2.25-acre habitat restoration project is located within the Lower Duwamish River. The goal of this project is to provide salmon habitat and a passive park. This project is currently in the design process.

99830103: Riverton Creek Flap Gate Removal

Project Description

The flap gates at the outlet of Riverton Creek are impassible to fish during low flows and are somewhat impassible all other times. The flap gates have been partially propped-open as an interim solution.

Proposed Solution

The proposed solution is to remove the flap gates and to perform channel restoration in the lower reaches of Riverton Creek. The existing channel upstream of the existing flap gates will be enhanced and restored to provide salmonid rearing and resting habitat.

99830105: Gilliam Creek Fish Barrier Removal

Project Description

The flap gate at Gilliam Creek only allow fish passage at certain of high flow conditions, when the Green River water level is elevated but remaining lower than the water level in Gilliam Creek.

Proposed Solution

The proposed solution is to remove the fish barrier and restore the natural channel in the lower reaches of Gilliam Creek. The existing flap gate will be replaced with a self-regulating tide gate

to allow fish access of upstream habitats. A fish ladder will be installed upstream of the tide gate to provide access to further upstream creek reaches. The Army Corps of Engineer had plans to improve this segment of Gilliam Creek. This project should be coordinated with the Army Corps of Engineers and another City of Tukwila capital project, "91241202: Andover Park W Outfall to Gilliam Creek".

Surface Water Capital Project Funding

The City of Tukwila's Capital Improvement Program includes projects and program elements that are recommended for implementation in the Surface Water Management Comprehensive Plan. Projects implemented primarily for surface water management purposes are funded with Fund 412 (drainage, water quality) or Fund 301 (aquatic habitat). Projects financed under the commercial streets, water, and sewer programs may have a stormwater element. Projects with surface water components are funded under the following City Programs, in addition to Fund 412 and Fund 301:

- Commercial Streets Program (Fund 104)
- Water Program (Fund 403/01)
- Sewer Program (Fund 403/02)

References

CH2M HILL. 2003. City of Tukwila Comprehensive Surface Water Management Plan. Prepared for the City of Tukwila. November.

City of Tukwila. Adopted 2010-2015 Financial Planning Model and Capital Improvement Program. December 7, 2009.

GHD 2009. City of Tukwila East Marginal Way South Outfall Analysis Report, report to City of Tukwila. September.

ATTACHMENT A

Capital Project Cost Opinions

City of Tukwila
CAPITAL IMPROVEMENT PROGRAM
for
2012 - 2017

Enter Year: **SUMMARY OF FUND #** 412
2012 NOTE: All sheets are linked to the Summary Printed: 8/31/2012

SURFACE WATER
412 Fund

PROJ.#	PROJECT TITLE	Construction Subtotal	Project Subtotal	Land Acquisition	Project Total	Notes
98641222	S 143rd Street/Place Storm Drain System	687,000	1,096,000	0	1,096,000	Updated unit costs from 2003
98741202	Nelson Pl/Longacres Ph2 - Interceptor Pipe	425,000	678,000	0	678,000	Updated unit costs from 2003
98941202	Christensen Rd Pipe Replacement	205,000	327,000	0	327,000	New estimate
99341208	Gilliam Creek Crossing at 42nd Ave S. (93-DR08)	489,000	702,000	0	702,000	Updated unit costs from 2003; revised for 16' width
99441202	Soil Reclaimation Facility	1,507,000	2,404,000	1,100,000	3,504,000	New estimate
90341206	Northwest Gilliam Storm Drainage System	1,240,000	1,978,000	0	1,978,000	S148th, S150th, and S152th Street. Revised from 2003
90341213	53rd Ave S Storm Drainage System	976,000	1,557,000	0	1,557,000	Updated unit costs from 2003
90341214	S. 146th Street Pipe and 35th Avenue S. Drainage System	553,000	882,000	0	882,000	Updated unit costs from 2003
91041203	Storm Lift Station No. 15 Improvement	467,000	698,000	0	698,000	New estimate
91041204	East Marginal Wy S Stormwater Outfall	469,000	772,000	0	772,000	New estimate
91241201	Water Quality Retrofit Program	n/a	n/a	n/a	286,500	New Project.
91241202	Tukwila Pkwy/Gilliam Creek Outfalls	180,000	278,000	0	278,000	New Project.
91241203	Tukwila Urban Center Conveyance Inspections	396,000	541,000	0	541,000	New Project.
91241204	E. Marginal Way Conveyance Inspection	57,000	85,000	0	85,000	New Project.
	Grand Total	**7,651,000**	**11,998,000**	**1,100,000**	**13,384,500**	

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	S 143rd Street/Place Storm Drain System	CHECKED BY:	Amy Carlson
BY:	Raymond Chung	DATE:	3/2/2012
		CIP#	98641222

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	REMOVE/ABANDON PIPE	85	LF	$ 23.00	$ 1,955
2	PAVEMENT OVERLAY, ASPHALT CONCRETE CL B (S 143RD ST AND S 143RD PL)	1,305	TN	$ 63.00	$ 82,215
3	WASHED DRAIN ROCK/STRUCTURAL FILL/PIPE BEDDING	420	TN	$ 26.00	$ 10,920
4	CURB AND GUTTER, CEMENT AND CONC. (S 143RD ST)	2,300	LF	$ 22.00	$ 50,600
5	CEMENT CONCRETE SIDEWALK OR DRIVEWAY (S 143RD ST)	1,533	SY	$ 40.00	$ 61,320
6	CURB RAMP, CEMENT CONCRETE (S 143RD ST)	12	EA	$ 489.00	$ 5,868
7	CATCH BASIN TYPE 1	8	EA	$ 1,532.00	$ 12,256
8	CATCH BASIN TYPE 2 48"-54"	2	EA	$ 4,353.00	$ 8,706
9	STORMCEPTOR WQ MANHOLE (STC 4800)	1	EA	$ 53,000.00	$ 53,000
12	18"-24" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	500	LF	$ 141.00	$ 70,500
13	8"-12" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	1,100	LF	$ 81.00	$ 89,100
14	TRENCH SAFETY SYSTEMS	16,000	SF	$ 0.92	$ 14,741
15	REGRADE EXISTING DITCH	500	LF	$ 5.76	$ 2,879
16	BIOSWALE SEEDING	4,000	SF	$ 1.73	$ 6,910
17	18" - 24" DIAMETER FLAP GATE	1	EA	$ 3,455.00	$ 3,455
18	UTILITY RELOCATIONS	1	LS	$ 11,516.00	$ 11,516
19	TEMPORARY BYPASS	1	LS	$ 5,758.00	$ 5,758
				Subtotal	$ 491,699
	DEWATERING	5%			$ 24,585
	EROSION & SEDIMENTATION CONTROL	2%	(See Note 3)		$ 9,834
	TRAFFIC CONTROL	5%	(See Note 4)		$ 24,585
	CONTINGENCY	15%			$ 73,755
				Subtotal	$ 624,458
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 62,446
				Construction Subtotal (Rounded)	$ 687,000
	STATE SALES TAX	9.5%			$ 65,265
	ENGINEERING/LEGAL/ADMIN	25%			$ 171,750
	CONSTRUCTION MANAGEMENT	20%			$ 137,400
	PERMITTING	5%			$ 34,350
				Project Subtotal (Rounded)	$ 1,096,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 1,096,000**

Notes:

1. The above cost opinion is based on 2003 quantities, with unit prices escalated to 2012 dollars. It does not include future escalation beyond 2011, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope and schedule, and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs for individual projects must be scrutinized prior to establishing the final project budgets.
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Nelson Pl/Longacres Ph2 - Interceptor Pipe	CHECKED BY:	Amy Carlson
BY:	Raymond Chung	DATE:	3/2/2012
		CIP#	98741202

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	JACKING AND RECEIVING PIT	1	EA	$ 40,883.00	$ 40,883
2	42" DIA. SMOOTH WALL INTERIOR CORROGATED POLYETHENE, JACK & BORE CONSTRUCTION	225	LF	$ 1,025.00	$ 230,625
3	RAILROAD INSPECTOR	24	HR	$ 58.00	$ 1,392
4	CATCH BASIN TYPE 2 72"-96"	1	EA	$ 14,108.00	$ 14,108
5	UTILITY RELOCATIONS	1	LS	$ 11,516.00	$ 11,516
6	TEMPORARY BYPASS	1	LS	$ 5,758.00	$ 5,758
				Subtotal	$ 304,282
	DEWATERING	5%			$ 15,214
	EROSION & SEDIMENTATION CONTROL	2%	(See Note 3)		$ 6,086
	TRAFFIC CONTROL	5%	(See Note 4)		$ 15,214
	CONTINGENCY	15%			$ 45,642
				Subtotal	$ 386,438
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 38,644
				Construction Subtotal (Rounded)	$ 425,000
	STATE SALES TAX	9.5%			$ 40,375
	ENGINEERING/LEGAL/ADMIN	25%			$ 106,250
	CONSTRUCTION MANAGEMENT	20%			$ 85,000
	PERMITTING	5%			$ 21,250
				Project Subtotal (Rounded)	$ 678,000
		2%			
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 678,000**

Notes:

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3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Christensen Rd Pipe Replacement	CHECKED BY:	Amy Carlson		
BY:	Raymond Chung	DATE:	3/2/2012	CIP#	98941202

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	18" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	320	LF	$ 110.00	$ 35,200
2	REMOVE/ABANDON PIPE	320	LF	$ 20.00	$ 6,400
3	TRENCHBOX SHORING	2,720	SF	$ 2.00	$ 5,440
4	SPECIAL BUILDING SHORING	1,020	SF	$ 75.00	$ 76,500
5	SETTLEMENT MONITORING	1	LS	$ 10,000.00	$ 10,000
6	CONNECTION TO EXISTING STRUCTURE	2	EA	$ 500.00	$ 1,000
7	REMOVE PAVEMENT	178	SY	$ 20.00	$ 3,556
8	PATCH PAVEMENT	178	SY	$ 50.00	$ 8,889
				Subtotal	$ 146,984
	DEWATERING	5%			$ 7,349
	EROSION & SEDIMENTATION CONTROL	2%	(See Note 3)		$ 2,940
	TRAFFIC CONTROL	5%	(See Note 4)		$ 7,349
	CONTINGENCY	15%			$ 22,048
				Subtotal	$ 186,670
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 18,667
				Construction Subtotal (Rounded)	$ 205,000
	STATE SALES TAX	9.5%			$ 19,475
	ENGINEERING/LEGAL/ADMIN	25%			$ 51,250
	CONSTRUCTION MANAGEMENT	20%			$ 41,000
	PERMITTING	5%			$ 10,250
				Project Subtotal (Rounded)	$ 327,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 327,000**

Notes:

1. The above cost opinion is in 2012 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope and schedule, and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs for individual projects must be scrutinized prior to establishing the final project budgets.
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Gilliam Creek Crossing at 42nd Ave S. (93-DR08)	CHECKED BY:	Amy Carlson (revised 8/30/12)
BY:	Raymond Chung	DATE:	3/2/2012 CIP# 99341208

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	REMOVE/ABANDON EXISITNG 36" DIAM. PIPE	94	LF	$ 37.00	$ 3,478
2	16' SPAN MULTI-PLATE OPEN BTM ARCH (5'-3" RISE)	116	LF	$ 424.00	$ 49,184
3	CIP PIPE ARCH FOUNDATION / FTGS	19	CY	$ 457.50	$ 8,648
4	ROCKERY HEADWALL	2	LS	$ 15,000.00	$ 30,000
5	TRENCH SAFETY SYSTEMS	2,640	SF	$ 3.00	$ 7,920
6	SHORING (SHEET PILE)	0	SF	$ 60.00	$ -
7	RESTORE ROADWAY ASPHALT PAVEMENT	123	TONS	$ 91.50	$ 11,285
8	UTILITY RELOCATIONS AND TEMPORARY SUPPORT	1	LS	$ 50,000.00	$ 50,000
9	TEMPORARY BYPASS	1	LS	$ 15,000.00	$ 15,000
10	STREAMBED COBBLES WITHIN CULVERT	224	CY	$ 90.00	$ 20,160
11	STREAMBED CHANNEL RECONSTRUCTION (OUTSIDE CULVERT)	80	LF	$ 300.00	$ 24,000
12	ROADWAY EXCAVATION INCL. HAUL	2,712	CY	$ 27.00	$ 73,211
13	IMPORTED GRAVEL BACKFILL	1,156	CY	$ 40.00	$ 46,230
14	CLEARING AND GRUBBING	1	LS	$ 6,000.00	$ 6,000
15	LANDSCAPE RESTORATION	1	LS	$ 20,000.00	$ 20,000
				Subtotal	$ 365,116
	DEWATERING				$ 10,000
	EROSION & SEDIMENTATION CONTROL	5%	(See Note 3)		$ 18,256
	TRAFFIC CONTROL	4%	(See Note 4)		$ 14,605
	CONTINGENCY	10%			$ 36,512
				Subtotal	$ 444,488
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 44,449
				Construction Subtotal (Rounded)	$ 489,000
	STATE SALES TAX	9.5%			$ 46,455
	ENGINEERING/LEGAL/ADMIN	18%			$ 88,020
	CONSTRUCTION MANAGEMENT	10%			$ 48,900
	PERMITTING	6%			$ 29,340
				Project Subtotal (Rounded)	$ 702,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 702,000**

Notes:

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2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope and schedule, and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs for individual projects must be scrutinized prior to establishing the final project budgets.
3. Increased percentage markup because work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increased percentage markup because will require temporary partial, or entire, closure of 42nd.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	**Soil Reclaimation Facility**	**CHECKED BY:**	**Amy Carlson**		
BY:	**Raymond Chung**	**DATE:**	**3/2/2012**	**CIP#**	**99441202**

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	RECLAIMATION FACILITY (bid item provided by City)	1	LS	$ 760,000.00	$ 1,104,000
2			LF		$ -
3			HR		$ -
4			EA		$ -
5			LS		$ -
6			LS		$ -
				Subtotal	$ 1,104,000
	DEWATERING	5%			$ 55,200
	EROSION & SEDIMENTATION CONTROL	5%	(See Note 3)		$ 55,200
	TRAFFIC CONTROL	5%	(See Note 4)		$ 55,200
	CONTINGENCY	15%			$ 165,600
				Subtotal	$ 1,435,200
	MOBILIZATION (GENERAL REQUIREMENT)	5%			$ 71,760
				Construction Subtotal (Rounded)	$ 1,507,000
	STATE SALES TAX	9.5%			$ 143,165
	ENGINEERING/LEGAL/ADMIN	25%			$ 376,750
	CONSTRUCTION MANAGEMENT	20%			$ 301,400
	PERMITTING	5%			$ 75,350
				Project Subtotal (Rounded)	$ 2,404,000
	LAND ACQUISITION	2	AC	$ 500,000.00	$ 1,000,000
	CONTINGENCY	10%			$ 100,000
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 3,504,000**

Notes:

1. The above cost opinion is in 2012 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope and schedule, and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs for individual projects must be scrutinized prior to establishing the final project budgets.
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Northwest Gilliam Storm Drainage System	**CHECKED BY:**	Amy Carlson		
BY:	Raymond Chung	**DATE:**	3/2/2012	**CIP#**	90341206

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	REMOVE/ABANDON PIPE	2096	LF	$ 23.00	$ 48,208
2	REMOVE/ABANDON CATCH BASIN	20	EA	$ 345.00	$ 6,900
3	PAVEMENT OVERLAY, ASPHALT CONCRETE CL B {QTY > 500}	1446	TN	$ 63.00	$ 91,098
4	CURB, EXTRUDED (ASPHALT OR CEMENT CONCRETE)	7,584	LF	$ 9.00	$ 68,256
5	CATCH BASIN TYPE 1	36	EA	$ 1,532.00	$ 55,152
6	8"-12" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	4,340	LF	$ 81.00	$ 351,540
7	TRENCH SAFETY SYSTEMS	26,040	SF	$ 1.00	$ 26,040
8	STORMCEPTOR WQ MANHOLE (STC 2400)	0	EA	$ 37,000.00	$ -
9	STORMCEPTOR WQ MANHOLE (STC 4800)	2	EA	$ 53,000.00	$ 106,000
10	STORMCEPTOR WQ MANHOLE (STC 7200)	1	EA	$ 71,072.00	$ 71,072
11	UTILITY RELOCATIONS	1	LS	$ 57,582.00	$ 57,582
12	TEMPORARY BYPASS	1	LS	$ 5,758.00	$ 5,758
				Subtotal	$ 887,606
	DEWATERING	5%			$ 44,380
	EROSION & SEDIMENTATION CONTROL	2%	(See Note 3)		$ 17,752
	TRAFFIC CONTROL	5%	(See Note 4)		$ 44,380
	CONTINGENCY	15%			$ 133,141
				Subtotal	$ 1,127,260
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 112,726
				Construction Subtotal (Rounded)	$ 1,240,000
	STATE SALES TAX	9.5%			$ 117,800
	ENGINEERING/LEGAL/ADMIN	25%			$ 310,000
	CONSTRUCTION MANAGEMENT	20%			$ 248,000
	PERMITTING	5%			$ 62,000
				Project Subtotal (Rounded)	$ 1,978,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 1,978,000**

Notes:

1. The above cost opinion is based on 2003 quantities, with unit prices escalated to 2012 dollars. It does not include future escalation beyond 2011, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope and schedule, and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs for individual projects must be scrutinized prior to establishing the final project budgets.
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	53rd Avenue S. Storm Drain System	CHECKED BY:	Amy Carlson		
BY:	Raymond Chung	DATE:	3/2/2012	CIP#	90341213

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	CATCH BASIN TYPE 1	18	EA	$ 1,532.00	$ 27,576
2	CATCH BASIN TYPE 2 48"-54"	6	EA	$ 4,353.00	$ 26,118
3	CURB, EXTRUDED (ASPHALT OR CEMENT CONCRETE)	4400	LF	$ 9.00	$ 39,600
4	TRENCH SAFETY SYSTEMS	15,360	SF	$ 1.00	$ 15,360
5	STORMCEPTOR WQ MANHOLE (STC 2400)	1	EA	$ 37,000.00	$ 37,000
6	BIOSWALE CONSTRUCTION (INCLUDES EXCAVATION GRADING AND SEEDING)	8,184	SF	$ 6.00	$ 49,104
7	PAVEMENT OVERLAY, ASPHALT CONCRETE CL B {QTY > 500}	1,933	TN	$ 63.00	$ 121,779
8	8"-12" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	1,460	LF	$ 93.00	$ 135,780
9	18"-24" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	1,100	LF	$ 162.00	$ 178,200
10	REMOVE/ABANDON PIPE	2,200	LF	$ 23.00	$ 50,600
11	UTILITY RELOCATIONS	1	LS	$ 17,275.00	$ 17,275
				Subtotal	$ 698,392
	DEWATERING	5%			$ 34,920
	EROSION & SEDIMENTATION CONTROL	2%	(See Note 3)		$ 13,968
	TRAFFIC CONTROL	5%	(See Note 4)		$ 34,920
	CONTINGENCY	15%			$ 104,759
				Subtotal	$ 886,958
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 88,696
			2%	**Construction Subtotal (Rounded)**	$ 976,000
	STATE SALES TAX	9.5%			$ 92,720
	ENGINEERING/LEGAL/ADMIN	25%			$ 244,000
	CONSTRUCTION MANAGEMENT	20%			$ 195,200
	PERMITTING	5%			$ 48,800
				Project Subtotal (Rounded)	$ 1,557,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 1,557,000**

Notes:

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3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
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PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	S. 146th Street Pipe and 35th Avenue S. Drainage System	**CHECKED BY:**	Amy Carlson
BY:	Raymond Chung	**DATE:**	3/2/2012

CIP# 90341214

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	REMOVE/ABANDON PIPE	1,000	LF	$ 23.00	$ 23,000
2	REMOVE/ABANDON CATCH BASIN	5	EA	$ 345.00	$ 1,725
3	PAVEMENT OVERLAY, ASPHALT CONCRETE CL B {QTY > 500}	1,062	TN	$ 63.00	$ 66,906
4	CURB, EXTRUDED (ASPHALT OR CEMENT CONCRETE)	2,700	LF	$ 9.00	$ 24,300
5	8" - 12" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREAS	560	LF	$ 93.00	$ 52,080
6	18"-24" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	1,050	LF	$ 162.00	$ 170,100
7	TRENCH SAFETY SYSTEMS	9,660	SF	$ 1.00	$ 9,660
8	CATCH BASIN TYPE 2 48"-54"	5	EA	$ 4,353.00	$ 21,765
9	UTILITY RELOCATIONS	1	LS	$ 11,516.00	$ 11,516
10	TEMPORARY BYPASS	1	LS	$ 5,758.00	$ 5,758
				Subtotal	$ 386,810
	DEWATERING	5%			$ 19,341
	EROSION & SEDIMENTATION CONTROL	5%	(See Note 3)		$ 19,341
	TRAFFIC CONTROL	5%	(See Note 4)		$ 19,341
	CONTINGENCY	15%			$ 58,022
				Subtotal	$ 502,853
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 50,285
				Construction Subtotal (Rounded)	$ 553,000
	STATE SALES TAX	9.5%			$ 52,535
	ENGINEERING/LEGAL/ADMIN	25%			$ 138,250
	CONSTRUCTION MANAGEMENT	20%			$ 110,600
	PERMITTING	5%			$ 27,650
				Project Subtotal (Rounded)	$ 882,000
	LAND ACQUISITION	0			$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 882,000**

Notes:

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5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Storm Lift Station No. 15 Improvement	CHECKED BY:	Amy Carlson
BY:	Raymond Chung	DATE:	3/2/2012
		CIP#	91041203

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Generator with Turning Vane	1	LS	$ 220,000.00	$ 220,000
2	Generator Enclosure	1	LS	$ 75,000.00	$ 75,000
3	Electrical/Communication	1	LS	$ 75,000.00	$ 90,000
4	Concrete Pad	1	LS	$ 3,000.00	$ 3,000
5	Asphalt Patch, 2"	30	SY	$ 45.00	$ 1,350
6	Crushed Surfacing Top Course	35	TN	$ 30.00	$ 1,050
7	Trench Shoring and Protection	1	LS	$ 500.00	$ 500
8	Landscape Restoration	1	LS	$ 1,250.00	$ 1,250
				Subtotal	$ 392,150
	DEWATERING				$ -
	EROSION & SEDIMENTATION CONTROL				$ 2,000
	TRAFFIC CONTROL				$ -
	CONTINGENCY				$ 48,000
				Subtotal	$ 442,150
	MOBILIZATION (GENERAL REQUIREMENT)				$ 25,000
				Construction Subtotal (Rounded)	$ 467,000
	STATE SALES TAX	9.5%			$ 44,365
	ENGINEERING/LEGAL/ADMIN	15%			$ 70,050
	CONSTRUCTION MANAGEMENT	20%			$ 93,400
	PERMITTING	5%			$ 23,350
				Project Subtotal (Rounded)	$ 698,000
	LAND ACQUISITION	0			$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 698,000**

Notes:

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4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	East Marginal Wy S Stormwater Outfall	CHECKED BY:	Amy Carlson		
BY:	Raymond Chung	DATE:	3/2/2012	CIP#	91041204

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Cost estimate from GHD report for the 'Z-line' outfall					
1	REMOVE MANHOLE	4	EA	$ 650.00	$ 2,600
2	REMOVE/ABANDON PIPE	980	LF	$ 20.00	$ 19,600
3	MANHOLE TYPE 204A	4	EA	$ 3,400.00	$ 13,600
4	PIPE, PS, CONC REINF C76 CL III, 18 IN (TRUNK)	980	LF	$ 85.00	$ 83,300
5	SHORING	9,506	SF	$ 1.42	$ 13,499
6	BEDDING, CL B, 18" PIPE	980	LF	$ 18.00	$ 17,640
7	CONSTRUCTION GEOTEXTILE	1,206	SY	$ 2.00	$ 2,412
8	REPAIR CB PIPE CONNECTIONS	6	EA	$ 600.00	$ 3,600
9	PIPE, PS, CONC REINF C76 CL III, 18 IN (OUTFALL)	230	LF	$ 85.00	$ 19,550
10	8X11 MANHOLE FILTER SYSEM (24 CARTRIDGES)	1	EA	$ 50,200.00	$ 50,200
11	VORTECHS	1	EA	$ 14,500.00	$ 14,500
12	SAW CUT CEMENT CONCRETE, FULL DEPTH	1,960	LF	$ 8.00	$ 15,680
13	REMOVE PAVEMENT	436	SY	$ 24.00	$ 10,464
14	CONCRETE PAVEMENT CL6.5, (1-1/2), 9IN	436	SY	$ 80.00	$ 34,880
				Subtotal	$ 301,525
	DEWATERING				$ -
	EROSION & SEDIMENTATION CONTROL				$ 29,720
	TRAFFIC CONTROL				$ 14,860
	CONTINGENCY				$ 92,875
				Subtotal	$ 438,979
	MOBILIZATION (GENERAL REQUIREMENT)				$ 29,720
				Construction Subtotal (Rounded)	$ 469,000
	STATE SALES TAX	9.5%			$ 44,555
	ENGINEERING/LEGAL/ADMIN	30%			$ 140,700
	CONSTRUCTION MANAGEMENT	20%			$ 93,800
	PERMITTING	5%			$ 23,450
				Project Subtotal (Rounded)	$ 772,000
	LAND ACQUISITION	0			$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 772,000**

Notes:

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PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Water Quality Retrofit Program	CHECKED BY:	Amy Carlson
BY:	Raymond Chung	DATE:	3/2/2012
		CIP:	91241201

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	S 122th Street				
1	STORMCEPTOR STC 2400	1	EA	$ 37,000.00	$ 37,000
2	STORMCEPTOR STC 4800	1	EA	$ 53,000.00	$ 53,000
3	CATCH BASIN TYPE 1	2	EA	$ 1,530.00	$ 3,060
4	CATCH BASIN TYPE 2 48"-54"	2	EA	$ 4,350.00	$ 8,700
5	18"-24" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	200	LF	$ 141.00	$ 28,200
6	PAVEMENT, HMA CLASS	36	TN	$ 150.00	$ 5,396
7	TRENCH SAFETY SYSTEM	1,465	SF	$ 1.00	$ 1,465
8	BIOFILTRATION SWALE	200	LF	$ -	$ -
	48th Avenue S				
7	STORMCEPTOR STC 11000	1	EA	$ 89,000.00	$ 89,000
8	CATCH BASIN TYPE 2 48"-54"	2	EA	$ 4,350.00	$ 8,700
9	18"-24" DIA. SMOOTH INTERIOR WALL CORROGATED POLYETHENE IN PAVED AREA	100	LF	$ 141.00	$ 14,100
10	PAVEMENT, HMA CLASS	13	TN	$ 100.00	$ 1,326
11	TRENCH SAFETY SYSTEM	900	SF	$ 1.00	$ 900
					$ 250,847
	DEWATERING	5%			$ 12,542
	EROSION & SEDIMENTATION CONTROL	5%	(See Note 3)		$ 12,542
	TRAFFIC CONTROL	5%	(See Note 4)		$ 12,542
	CONTINGENCY	15%			$ 37,627
					$ 326,101
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 32,610
					$ 359,000
	STATE SALES TAX	9.5%			$ 34,105
	ENGINEERING/LEGAL/ADMIN	25%			$ 89,750
	CONSTRUCTION MANAGEMENT	20%			$ 71,800
	PERMITTING	5%			$ 17,950
					$ 573,000
	LAND ACQUISITION	0			$ -
	CONTINGENCY	30%			$ -
2012 Dollars		**Total Estimated Project Cost (Rounded)**			**$ 573,000**

Notes:

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5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Tukwila Pkwy/Gilliam Creek Outfalls	**CHECKED BY:**	Amy Carlson (revised 8/30/12)
BY:	Raymond Chung	**DATE:**	3/2/2012 **CIP#** 91241202

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	SHEETPIPE SHORING, WALERS, BRACING	1,600	SF	$ 10.00	$ 16,000
2	MANHOLE TYPE 2, 84-INCHES DIAM.	1	EA	$ 14,108.00	$ 14,108
3	MANHOLE TYPE 2, 72-INCHES DIAM.	1	EA	$ 10,000.00	$ 10,000
4	REMOVE PAVEMENT	197	SY	$ 15.00	$ 2,958
5	PATCH PAVEMENT	197	SY	$ 45.00	$ 8,875
6	OVERLAY PAVEMENT & STRIPING	300	SY	$ 20.00	$ 6,000
6	SELF-REGULATING TIDE GATE WITH DISCHARGE PORT FOR 84-INCH DIAM MANHOLE	1	LS	$ 30,000.00	$ 30,000
7	SELF-REGULATING TIDE GATE WITH DISCHARGE PORT FOR 72-INCH DIAM MANHOLE	1	LS	$ 20,000.00	$ 20,000
8	UTILITY COORDINATION	1	LS	$ 5,000.00	$ 5,000
				Subtotal	$ 112,941
	DEWATERING	10%			$ 11,294
	EROSION & SEDIMENTATION CONTROL	10%	(See Note 3)		$ 11,294
	TRAFFIC CONTROL	15%	(See Note 4)		$ 16,941
	CONTINGENCY	10%			$ 11,294
				Subtotal	$ 163,765
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 16,376
				Construction Subtotal (Rounded)	$ 180,000
	STATE SALES TAX	9.5%			$ 17,100
	ENGINEERING/LEGAL/ADMIN	20%			$ 36,000
	CONSTRUCTION MANAGEMENT	15%			$ 27,000
	PERMITTING	10%			$ 18,000
				Project Subtotal (Rounded)	$ 278,000
	LAND ACQUISITION	0			$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 278,000**

Notes:

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PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Tukwila Urban Center Conveyance Inspections	CHECKED BY:	Amy Carlson
BY:	Raymond Chung	DATE:	3/2/2012
		CIP#	91241203

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	PIIPE CLEANING AND CCTV	14,300	LF	$ 9.50	$ 135,850
2	DISPOSAL OF SEDIMENT	2,000	TON	$ 85.00	$ 170,000
				Subtotal	$ 305,850
	DEWATERING	5%			$ 15,293
	EROSION & SEDIMENTATION CONTROL	2%	(See Note 3)		$ 6,117
	TRAFFIC CONTROL	5%	(See Note 4)		$ 15,293
	CONTINGENCY	15%			$ 45,878
				Subtotal	$ 388,430
	MOBILIZATION (GENERAL REQUIREMENT)	2%			$ 7,769
				Construction Subtotal (Rounded)	$ 396,000
	STATE SALES TAX	9.5%			$ 37,620
	ENGINEERING/LEGAL/ADMIN	2%			$ 7,920
	CONSTRUCTION MANAGEMENT	20%			$ 79,200
	PERMITTING	5%			$ 19,800
				Project Subtotal (Rounded)	$ 541,000
	LAND ACQUISITION	0			$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 541,000**

Notes:

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PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	E. Marginal Way Conveyance Inspection	CHECKED BY:	Amy Carlson
BY:	Raymond Chung	DATE:	3/2/2012
		CIP#	91241204

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	PIIPE CLEANING AND CCTV	3,500	LF	$ 9.50	$ 33,250
2	DISPOSAL OF SEDIMENT	94	TON	$ 85.00	$ 7,969
3					$ -
4					$ -
5					$ -
6					$ -
7					$ -
8					$ -
9					$ -
10					$ -
				Subtotal	$ 41,219
	DEWATERING	10%			$ 4,122
	EROSION & SEDIMENTATION CONTROL	2%	(See Note 3)		$ 824
	TRAFFIC CONTROL	5%	(See Note 4)		$ 2,061
	CONTINGENCY	15%			$ 6,183
				Subtotal	$ 54,409
	MOBILIZATION (GENERAL REQUIREMENT)	5%			$ 2,720
				Construction Subtotal (Rounded)	$ 57,000
	STATE SALES TAX	9.5%			$ 5,415
	ENGINEERING/LEGAL/ADMIN	15%			$ 8,550
	CONSTRUCTION MANAGEMENT	20%			$ 11,400
	PERMITTING	5%			$ 2,850
				Project Subtotal (Rounded)	$ 85,000
	LAND ACQUISITION	0			$ -
	CONTINGENCY	30%			$ -
2012 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 85,000**

Notes:

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City of Tukwila
CAPITAL IMPROVEMENT PROGRAM
for
2012 - 2017

Enter Year: **SUMMARY OF FUND #** 301
2012 NOTE: All sheets are linked to the Summary Printed: 8/31/2012

SURFACE WATER
301 Fund

PROJ.#	PROJECT TITLE	Construction Subtotal	Project Subtotal	Land Acquisition	Project Total	Note
90330104	Nelson Salmon Habitat Side Channel	883,000	1,497,000	0	1,497,000	New Estimate
90630102	Duwamish Gardens	3,000,000	3,000,000	0	3,000,000	City Input
99830103	Riverton Creek Flap Gate Removal	575,000	946,000	0	946,000	Under design (75% completion). Cost provided by the City
99830105	Gilliam Creek Fish Barrier Removal	496,000	816,000	0	816,000	Updated from 2003
	Grand Total	**4,954,000**	**6,259,000**	**0**	**6,259,000**	

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Nelson Salmon Habitat Side Channel	CHECKED BY:			
BY:	Raymond Chung	DATE:	3/1/2012	CIP#	90330104

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	COMMON EXCAVATION (INCL HAUL)	13600	CY	$ 10.00	$ 136,000
2	VINYL SHEET PILES (EXPOSED FACE AREA)	3,120	SF	$ 40.00	$ 124,800
3	PILING CONTRACTOR MOB/DEMOB	1	LS	$ 10,000.00	$ 10,000
4	EMBANKMENT COMPACTION	900	CY	$ 5.00	$ 4,500
5	BOULDERS/RIPRAP, SLOPE PROTECTION	200	CY	$ 50.00	$ 10,000
6	GEOTEX TILE UNDER RIPRAP	274	SY	$ 2.00	$ 548
7	PLANTING	0.7	AC	$ 20,000.00	$ 14,000
8	COMMON BORROW INSIDE SHEETS	415	CY	$ 15.00	$ 6,225
9	CLEARING AND GRUBBING	0.5	AC	$ 8,000.00	$ 4,000
10	SET & REMOVE COFFERDAM	250	LF	$ 500.00	$ 125,000
11	TREE SCREEN ON SOUTH SIDE OF WALLS	430	LF	$ 50.00	$ 21,500
12	SLAB TOP ON WALL STRUCTURE	42	CY	$ 300.00	$ 12,613
13	SAFETY RAILINGS	860	LF	$ 40.00	$ 34,400
14	LARGE WOODY DEBRIS	1	LS	$ 50,000.00	$ 50,000
				Subtotal	$ 553,586
	DEWATERING	5%			$ 27,679
	EROSION & SEDIMENTATION CONTROL	20%	(See Note 3)		$ 110,717
	TRAFFIC CONTROL	5%	(See Note 4)		$ 27,679
	CONTINGENCY	15%			$ 83,038
				Subtotal	$ 802,700
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 80,270
			Construction Subtotal (Rounded)		$ 883,000
	STATE SALES TAX	9.5%			$ 83,885
	ENGINEERING/LEGAL/ADMIN	30%			$ 264,900
	CONSTRUCTION MANAGEMENT	20%			$ 176,600
	PERMITTING	10%			$ 88,300
			Project Subtotal (Rounded)		$ 1,497,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	15%			$ -
2011 Dollars			**Total Estimated Project Cost (Rounded)**		**$ 1,497,000**

Notes:

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PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	**Duwamish Gardens**	**CHECKED BY:**			
BY:	**Raymond Chung**	**DATE:**	**3/2/2012**	**CIP#**	**90630102**

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Restoration	1	LS	$ 3,000,000.00	$ 3,000,000
2				$ -	
3				$ -	
4					
5					
6					
				Subtotal	$ 3,000,000
	DEWATERING				$ -
	EROSION & SEDIMENTATION CONTROL		(See Note 3)		$ -
	TRAFFIC CONTROL		(See Note 4)		$ -
	CONTINGENCY				$ -
				Subtotal	$ 3,000,000
	MOBILIZATION (GENERAL REQUIREMENT)				$ -
				Construction Subtotal (Rounded)	$ 3,000,000
	STATE SALES TAX				$ -
	ENGINEERING/LEGAL/ADMIN				$ -
	CONSTRUCTION MANAGEMENT				$ -
	PERMITTING				$ -
				Project Subtotal (Rounded)	$ 3,000,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	15%			$ -
2011 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 3,000,000**

Notes:

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5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT:	Riverton Creek Flap Gate Removal	CHECKED BY:	
BY:	Raymond Chung	DATE:	3/2/2012
		CIP#	99830103

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	CLEAR AND GRUBBING, REMOVAL AND DEMOINATION	1	LS	$ 17,925	$ 17,925
2	DITCH EXCAVATION INCLUDING HAUL	1,125	CY	$ 50	$ 56,250
3	TIE-BACK ANCHORS, 20 FT, THROUGH SHEET PILE WALL	10	EA	$ 8,500	$ 85,000
4	CLEANING AND 5/16" FILLET WIELD OF SHEET PILES TO WALL CAP	10	EA	$ 200	$ 2,000
5	EPOXY DOWELLS AT WALL CAP	50	LS	$ 35	$ 1,750
6	CONCRETE WALL CAP	16	CY	$ 150	$ 2,400
7	8-INCH DIAM. STANDARD PIPE MICROPILE	280	LF	$ 50	$ 14,000
8	BRIDGE ABUTMENT CONCRETE	20	CY	$ 500	$ 10,000
9	MODULAR BLOCK RETAINING WALL	1	LS	$ 5,000	$ 5,000
10	PREFABRICATED BRIDGE	1	LS	$ 50,000	$ 50,000
11	HOT MIX ASPHALT WITH CSBC	1	TON	$ 160	$ 160
12	LARGE WOODY DEBRIS	11	EA	$ 11,000	$ 121,000
13	OVERLAPPED LARGE WOODY DEBRIS	2	EA	$ 4,000	$ 8,000
14	PLANTING	1	LS	$ 6,000	$ 6,000
15	SURVEY	1	LS	$ 7,500	$ 7,500
				Subtotal	$ 386,985
	DEWATERING	5%			$ 19,349
	EROSION & SEDIMENTATION CONTROL	10%	(See Note 3)		$ 38,699
	TRAFFIC CONTROL	5%	(See Note 4)		$ 19,349
	CONTINGENCY	15%			$ 58,048
				Subtotal	$ 522,430
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 52,243
			Construction Subtotal (Rounded)		$ 575,000
	STATE SALES TAX	9.5%			$ 54,625
	ENGINEERING/LEGAL/ADMIN	25%			$ 143,750
	CONSTRUCTION MANAGEMENT	20%			$ 115,000
	PERMITTING	10%			$ 57,500
			Project Subtotal (Rounded)		$ 946,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	15%			$ -
2011 Dollars			**Total Estimated Project Cost (Rounded)**		**$ 946,000**

Notes:

1. The above cost opinion is in 2011 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope and schedule, and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs for individual projects must be scrutinized prior to establishing the final project budgets.
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.

PLANNING LEVEL CONSTRUCTION COST OPINION

PROJECT: Gilliam Creek Fish Barrier Removal — **CHECKED BY:**
BY: Raymond Chung — **DATE:** 3/2/2012 — **CIP#** 99830105

ITEM NO.	BID ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	CLEARING AND GRUBBING, AND ROADSIDE CLEANUP	1	AC	$ 9,213	$ 9,213
2	COMMON EXCAVATION	30	CY	$ 31	$ 933
3	TOP SOIL	130	CY	$ 32	$ 4,192
4	PLANTING (WETLAND ENHANCEMENT)	1	LS	$ 23,033	$ 23,033
5	EMBANKMENT COMPACTION	20	CY	$ 25	$ 507
6	GRAVEL CLASS B	75	TN	$ 25	$ 1,900
7	STREAMBED GRAVEL	35	TN	$ 35	$ 1,209
8	RIPRAP	3,200	TN	$ 52	$ 165,837
9	CONCRETE CLASS A (INCL. FORMS AND REBAR)	110	CY	$ 633	$ 69,675
10	108" SELF-REGULATING TIDE GATE	1	EA	$ 57,582	$ 57,582
				Subtotal	$ 334,081
	DEWATERING	5%			$ 16,704
	EROSION & SEDIMENTATION CONTROL	10%	(See Note 3)		$ 33,408
	TRAFFIC CONTROL	5%	(See Note 4)		$ 16,704
	CONTINGENCY	15%			$ 50,112
				Subtotal	$ 451,009
	MOBILIZATION (GENERAL REQUIREMENT)	10%			$ 45,101
			Construction Subtotal (Rounded)		$ 496,000
	STATE SALES TAX	9.5%			$ 47,120
	ENGINEERING/LEGAL/ADMIN	25%			$ 124,000
	CONSTRUCTION MANAGEMENT	20%			$ 99,200
	PERMITTING	10%			$ 49,600
			Project Subtotal (Rounded)		$ 816,000
	LAND ACQUISITION	0	AC		$ -
	CONTINGENCY	15%			$ -
2011 Dollars			**Total Estimated Project Cost (Rounded)**		**$ 816,000**

Notes:
1. The above cost opinion is based on 2003 quantities, with unit prices escalated to 2011 dollars. It does not include future escalation beyond 2011, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope and schedule, and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs for individual projects
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.
5. Land Acquisition unit costs include Administrative Costs and Condemnation.