



City of Burien, Washington  
Storm Drainage Master Plan Update  
2020

Approved by City of Burien Council on October 19, 2020

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# ACKNOWLEDGEMENTS

## **City of Burien, Washington Storm Drainage Master Plan Update 2020**

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## ABBREVIATIONS AND ACRONYMS

SWMMWW	2014 Department of Ecology Stormwater Management Manual for Western Washington
BMC	Burien Municipal Code
BMP	Best Management Practice
CB	Catch Basin
CIP	Capital Improvement Projects
CITY	City of Burien
ESA	Endangered Species Act
ECOLOGY	Washington State Department of Ecology
FTE	Full Time Equivalent
GIS	Geographic Information System
IDDE	Illicit Discharge Detection and Elimination
IDDE Manual	2013 Ecology Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual
KCSWDM	2016 King County Surface Water Design Manual
KCSPPM	2016 King County Stormwater Pollution Prevention Manual
LID	Low Impact Development
NERA	Northeast Redevelopment Area
NPDES	National Pollution Discharge Elimination System
PARTNERSHIP	Puget Sound Partnership
PHASE II PERMIT	2013 National Pollutant Discharge Elimination System Phase II Municipal Stormwater Permit
SDMP	Storm Drainage Master Plan
SWMP	Stormwater Management Plan
SWP	Small Works Project
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
UIC	Underground Injection Control
UTILITY	Surface Water Utility
WAC	Washington Administrative Code
WRIA	Water Resource Inventory Area

## Background

The City of Burien is a young city located just south of Seattle, Washington. The City faces numerous demands on both the staff and financial resources. Over the last several years, the City has worked to establish a Stormwater Program to meet regulatory requirements, protect water quality, maintain the City's drainage infrastructure, and construct capital improvement projects. The goals of the City's Stormwater Program are to:

- Protect public health and welfare
- Protect wetlands, shorelines, streams, and creeks as natural surface water resources
- Achieve compliance with stormwater-related regulatory requirements, specifically the NPDES Phase II Permit
- Expand public support for the Stormwater Program and actions to protect water resources
- Actively maintain the capacity of the City's drainage infrastructure.
- Identify and solve storm drainage problems
- Provide for the comprehensive, integrated management and administration of the City's stormwater facilities and operations
- Design and construct capital projects to reduce flooding, provide protection from erosion, enhance conveyance capacity and protect habitat

At incorporation in 1993, the City inherited an extensive storm drainage infrastructure that was constructed and previously maintained by King County. In 1996, the City completed a Draft Storm Drainage Master Plan in conjunction with the City's first Comprehensive Plan. In 2005, the City published its first Storm Drainage Master Plan (CH2MHill, May 2005) that provided guidance for surface water management, including policy development and setting, along with identifying the Stormwater Capital Improvement Program (CIP) project needs. The Storm Drainage Master Plan also provided the City Public Works staff with a guide for stormwater infrastructure operation and maintenance activities. In 2012, the City updated the Storm Drainage Master Plan (Otak, July 2012) to revise the CIP and to address requirements of the Phase II Permit re-issuance, which was expected in 2013.

See Figure ES-1 for a map of City of Burien vicinity.



## Purpose of the Study

The purpose of this study is to identify the future needs of the City's stormwater program including documenting areas where drainage and water quality can be improved, updating the CIP project list and identifying the actions and staff demands for both the current and future regulatory requirements. This Storm Drainage Master Plan (SDMP) outlines programmatic, operational, and capital construction activities to guide the City's Stormwater Program over the next five to ten years.

## Stormwater Program Considerations

The City's Stormwater Program service area is approximately ten square miles, encompassing the full City limits. The City limits include three major drainage basins – Salmon Creek, Miller Creek (including Lake Burien and Walker Creek), and Puget Sound as well as several smaller basins – as shown in Figure 2-1. The SDMP has been developed with consideration to the local and regional issues described below.

### NPDES Phase II Permit

In January of 2007, the City was first issued the National Pollutant Discharge Elimination System (NPDES) Western Washington Phase II Municipal Stormwater Permit (Phase II Permit), that prompted the City to add new stormwater program elements to their SWM Program, including an Illicit Discharge Detection and Elimination (IDDE) program, stormwater system inspections, increased operation and maintenance activities, and planning for future stormwater monitoring. The City is now approaching the end of its second permit term, as the current permit is set to expire on July 31, 2019. The Washington State Department of Ecology (Ecology) intends to issue a new Phase II Permit that will impact City operations starting in August 2019 through July 2024.

### Aging Stormwater Infrastructure

At incorporation and during subsequent annexations, the City acquired an aging stormwater infrastructure system from King County. Stormwater system infrastructure typically has a 50-100 year design life, which the majority of the existing infrastructure has met. The City has an ongoing program to replace existing pipes when roadways are under construction.

### Lake Water Quality

Lake Burien and Arbor Lake are small lakes that serve important local functions for recreation and as ecological amenities within the Miller Creek watershed. Local residents are concerned about lake water quality and interested in supporting City programs to maintain long term watershed health. The City's efforts focus on public outreach and education to improve practices (animal waste, fertilizer use, etc.) of the surrounding and upstream properties. The City also considers including water quality treatment facilities when developing capital projects in the surrounding area

### Miller-Walker Creek Watershed

Miller Creek flows approximately six miles through urban areas of Burien and adjacent communities. Walker Creek also runs through a similar urban area of Burien and adjacent communities for two miles. In 2006, Burien, Normandy Park, SeaTac, King County, the Port of Seattle, and the Washington State Department of Transportation worked together to develop the *Miller and Walker Creeks Basin Plan*, addressing surface water quality, flooding, stormwater infrastructure capacity, and fish habitat issues. As part of stewardship of Miller and Walker Creeks, volunteers participate in the Community Salmon Investigation to monitor adult salmon returning to the creeks. The City works closely with King County and the Miller-Walker Basin Steward to evaluate opportunities and projects to support and restore watershed health in the Miller-Walker Creek basin.



# Executive Summary

(continued)

## Closed Depressions

Burien is home to numerous closed depressions where stormwater collects without a defined outlet. Major closed depressions with localized flooding issues include Hermes Depression, Mayfair Depression and the 142<sup>nd</sup> Street Depression.

## In-house vs. Contracted Operation and Maintenance Activities

As the City's capabilities grow, it has been taking over services previously contracted to King County. After the 2012 SDMP update, City staff began conducting all construction and stormwater facility inspections as required by the NPDES Phase II Permit.

## Implementing Low Impact Development and Green Infrastructure Design

Low Impact Development (LID) is an ever increasingly important topic in the field of stormwater management. The new Phase II permit is expected to require the City to update City Codes to promote increased use of LID in development planning and infrastructure design. The use of LID drainage infrastructure can be beneficial to Burien because of the hydrology (closed depressions) that need to infiltrate runoff at the source decreasing the need for large regional stormwater facilities and localized flooding. The implementation of LID codes and techniques will require additional training and staffing to design and review development plans and public CIPs.

## Stormwater Program Assessment

This SDMP includes an analysis of the City's Stormwater Program for compliance with regulatory obligations and other necessary administrative functions. The primary regulation driving the City's stormwater program is the NPDES Phase II Permit. The City is also subject to compliance with the State Underground Injection Control Rule, the Federal Endangered Species Act (ESA), and the Puget Sound Action Agenda. The City's Stormwater Program includes ordinances, programmatic activities, services, and maintenance actions required for permit compliance. Some of these program components will need to be enhanced or expanded for full compliance with future regulations.

The program assessment shows a future need for 3.35 additional Full Time Equivalent (FTE) City staff and an additional \$22,345 in budget annually to support the Stormwater Program. Section 3 outlines short term and long-term program implementation activities, a recommended staffing plan, and budget considerations Table ES-1 provides a summary of the staffing and funding recommended for future Stormwater Program implementation.

## Executive Summary (continued)

**Table ES-1—Summary of Existing and Recommended Future Stormwater Program Annual Expense and FTE**

Element	Existing Staff FTE	Existing Staff Cost (\$)*	Existing Expense Cost (\$)	Recommended Future Staff FTE	Recommended Future Staff Cost (\$)*	Recommended Future Expense Cost (\$)	Notes
1 – Comprehensive Stormwater Planning	0.00	N/A	N/A	0.05	\$5,476	\$14,400	Proposed new permit section. Expenses account for hiring a consultant to prepare comprehensive plan reports and SMAP.
2 – Public Education and Outreach	0.55	\$60,233.62	\$214,000	0.60	\$65,709	\$219,000	Increase reflects proposed new requirement for Community Based Social Marketing that will require staff training and additional program evaluation.
3 – Public Involvement and Participation	0.55	\$60,234	\$0	0.55	\$60,234	\$0	No change.
4 – MS4 Mapping and Documentation	0.10	\$10,952	\$40,000	0.12	\$13,142	\$40,000	Previously part of Illicit Discharge Detection and Elimination.
5 – Illicit Discharge Detection and Elimination	0.20	\$20,904	\$6,750	0.23	\$25,189	\$4,250	Expense decrease reflects less frequent use of King County staff as City capability improves.
6 – Controlling Runoff from New Development, Redevelopment and Construction Sites	1.50	\$164,274	\$19,475	2.00	\$219,031	\$19,475	Staff increase due to increase in drainage reviews and inspections.
7 – Operation and Maintenance	9.20	\$1,007,544	\$164,750	11.70	\$1,281,333	\$139,750	Increased staff expense reflects additional permit requirements and continuing workload increase. Expense reduction reflects continued shift in responsibility from outside contracts to City staff.
8 – Source Control for Existing Development	0.00	\$0.00	N/A	0.20	\$21,903	\$4,250	Proposed new permit requirement.
9 – Program Implementation	0.10	\$10,952	\$22,000	0.10	\$10,952	\$22,000	No change.
10 – Total Maximum Daily Load Allocations	N/A	N/A	N/A	N/A	N/A	N/A	No TMDLs apply to the stormwater program.
11 – Monitoring	0.05	\$5,476	\$32,500	0.05	\$5,476	\$24,000	City must pay in to regional monitoring program as required by NPDES.
12 – Reporting	0.10	\$10,952	\$5,000	0.10	\$10,952	\$5,000	No change.
<i>Subtotal</i>	<i>12.35</i>	<i>\$1,429,180</i>	<i>\$1,084,630</i>	<i>15.70</i>	<i>\$1,796,057</i>	<i>\$1,094,625</i>	<i>Subtotal for NPDES activities</i>

## Executive Summary (continued)

Element	Existing Staff FTE	Existing Staff Cost (\$)*	Existing Expense Cost (\$)	Recommended Future Staff FTE	Recommended Future Staff Cost (\$)*	Recommended Future Expense Cost (\$)	Notes
13 – Regional Watershed Planning	0.05	\$5,476	\$41,500	0.05	\$5,476	\$41,500	No change.
14 – Underground Injection Control Rule	N/A	N/A	N/A	N/A	N/A	N/A	No change.
15 – Capital Improvement Program	1.30	\$142,370	See Section 4	1.30	\$142,370	See Section 4	Program variable based on project development.
16 – Additional Activities	0.65	\$71,185	\$538,655	0.65	\$71,185	\$561,000	Increase accounts for shift in responsibility from King County and increase in workload over time.
<i>Subtotal (non-NPDES)</i>	<i>2.0</i>	<i>\$219,031</i>	<i>\$580,155</i>	<i>2.0</i>	<i>\$219,031</i>	<i>\$602,500</i>	<i>Subtotal for CIP, regional planning, and additional activities exclusive of CIP expenses.</i>
<b>Grand Total</b>	<b>14.35</b>	<b>\$2,656,180</b>		<b>17.70</b>		<b>\$3,031,553</b>	<b>Operating only; See Section 4 for CIP</b>

\*Staff cost is calculated based on average salary plus benefits for the Public Works Department Stormwater Management Division.



## Capital Needs

A major component of this SDMP is the development of an updated CIP. Section 4 of this report includes a list of CIP projects that will address currently existing flooding and stormwater infrastructure issues. Section 4 also identifies long term larger scale stormwater and water quality studies as part of the CIP as well as a list of small works projects that can be completed by City staff. An Infrastructure Replacement Fund to upgrade aging stormwater infrastructure is also discussed as part of the CIP.

The different portions of the CIP were determined from various sources of information. Recorded resident complaints associated with stormwater issues were used to determine locations that required action to address the associated issue(s). City staff also provided locations of known drainage deficiencies in addition to larger study areas within the city to analyze as part of the CIP that had not been reported through resident complaints. Using the provided information and frequent communication with City staff, the CIP update was created. Section 4 of this report details how the analysis was performed in determining the different CIP projects, studies, and small works projects to update the CIP.

Table ES-2 presents the updated capital program. A map of the proposed project locations is presented in Figure ES-2. Additional capital projects will be identified through the watershed-based studies and ongoing review of drainage complaints reported by residents and City staff.

**Table ES-2 —Summary of CIP Projects, Studies and Small Works Projects**

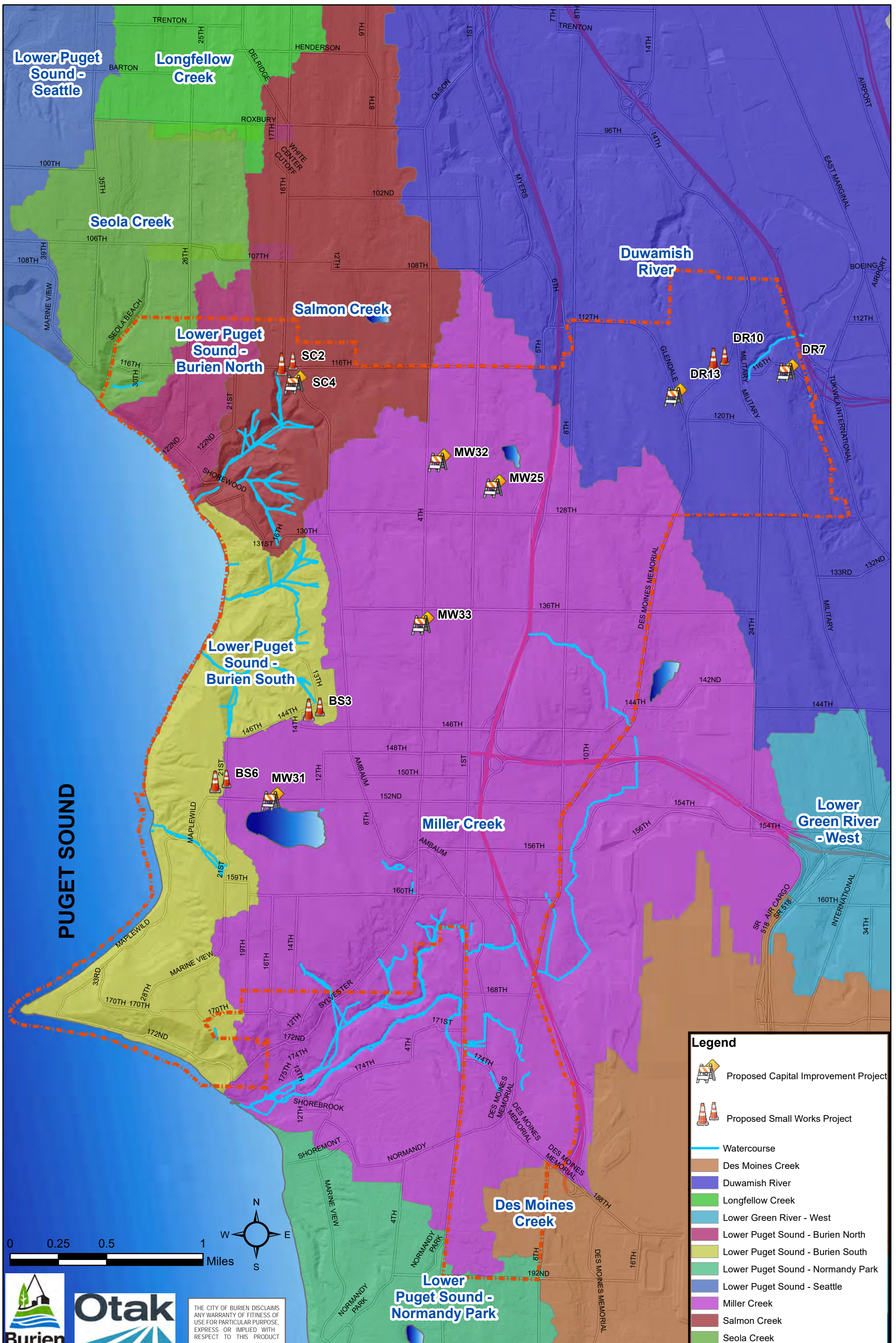
Table ES-2: Summary of CIP Projects, Studies, and Small Works Projects		
Project Problem Area	Project Title	Cost
CIP DR7	Stormwater Infrastructure Improvement at S 116 <sup>th</sup> Way	\$164,000
CIP DR13	Stormwater Infrastructure Improvement at Glendale Way S	\$38,000-\$264,000
CIP MW25	Stormwater Infrastructure Improvement at 2 <sup>nd</sup> Ave S between S 124 <sup>th</sup> St and S 128 <sup>th</sup> St	\$86,000
CIP SC4	Stormwater Infrastructure Improvement at 11704 Ambaum Blvd SW	\$49,000-\$97,000
CIP MW31	Stormwater Infrastructure Improvement on SW 152 <sup>nd</sup> St and 16 <sup>th</sup> Ave SW	\$46,000-\$279,000
CIP MW32	Stormwater Infrastructure Improvement at 2 <sup>nd</sup> Ave SW and SW 124 <sup>th</sup> St	\$380,000-382,000
CIP MW33	Stormwater Infrastructure Improvement on 4 <sup>th</sup> Ave SW and SW 137 <sup>th</sup> St and SW 139 <sup>th</sup> St	\$88,000
	<b>CIP Total</b>	<b>\$851,000 – \$1,360,000</b>
Study 1	142 <sup>nd</sup> Street Depression Improvement	\$200,000
Study 2	Chelsea Park Neighborhood Bioretention Siting (total cost assumes four facilities)	\$65,000 per facility \$260,000 total
Study 3	Large-scale ditch retrofit project (converting into bioretention, bioswales, infiltration trenches, etc.) (total cost assumes ten facilities)	\$10,000 per facility \$100,000 total
Study 4	Pretreatment or WQ retrofits on untreated outfalls City-wide (total cost assumes ten outfalls)	\$30,000 per facility \$300,000 total
Study 5	Public-Private partnership for large-scale stormwater retrofits	\$>\$500,000
	<b>Study Total</b>	<b>\$1,160,000</b>

# Executive Summary


(continued)

Table ES-2: Summary of CIP Projects, Studies, and Small Works Projects		
Project Problem Area	Project Title	Cost
Small Works Project BS3	Stormwater Infrastructure Improvement at SW 144 <sup>th</sup> Pl	<b>\$100,000 per year</b>
Small Works Project SC2	Stormwater Infrastructure Improvement at 1598 SW 116 <sup>th</sup> St	
Small Works Project BS6	Stormwater Infrastructure Improvement at 14945 21 <sup>st</sup> Ave SW	
Small Works Project DR10	Stormwater Infrastructure Improvement at 11424 20 <sup>th</sup> Ave S	
Infrastructure Replacement Fund	Upgrade/Replace Drainage infrastructure associated with Roadway Improvement Projects	<b>\$350,000 per year</b>





**Legend**

-  Proposed Capital Improvement Project
-  Proposed Small Works Project
-  Watercourse
-  Des Moines Creek
-  Duwamish River
-  Longfellow Creek
-  Lower Green River - West
-  Lower Puget Sound - Burien North
-  Lower Puget Sound - Burien South
-  Lower Puget Sound - Normandy Park
-  Lower Puget Sound - Seattle
-  Miller Creek
-  Salmon Creek
-  Seola Creek




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# Executive Summary

(continued)

## Watershed Health Considerations

The City is dedicated to protecting watershed health and enhancing water quality and natural resources. In compliance with NPDES Phase II Permit requirements, the City has developed an education and outreach program focused on educating residents and business owners about their impact on the health of the watershed. The City is conducting other voluntary actions supportive of watershed health. Section 5 describes these mandatory and voluntary actions.

## Stormwater Program Funding

Historically, the City's Stormwater Program has been funded by the City's stormwater utility and grants for specific activities and projects. The City will use the annual budgeting process to update priorities and select projects for design, construction or long-term planning. The City will continue to pursue grant opportunities to enhance operations and accelerate the rate of construction for stormwater related capital projects.



# Section 1—Introduction and Overview

## Background

Incorporated in 1993, the City of Burien is a growing city faced with the challenges of meeting a myriad of local, state and federal demands on its financial and staff resources. The City's Stormwater Program is currently providing stormwater education to residents, maintaining its drainage system, reviewing new development for compliance with stormwater design standards, controlling pollution sources, constructing Capital Improvement Program (CIP) projects, and complying with requirements of the federal Clean Water Act for managing its municipal stormwater system discharges. Figure 1-1 shows the vicinity of the City of Burien.

This Storm Drainage Master Plan (SDMP) updates and replaces the previous Plan which was prepared in May 2012. The updates address the requirements of the National Pollutant Discharge Elimination System (NPDES) Phase II Western Washington Municipal Stormwater Permit (Permit), bring the CIP up to date, and evaluate program staffing and resources. This SDMP also includes a comprehensive review of the City's existing Stormwater Program, recommendations for future programs and capital projects, and an implementation plan for the next five to ten years.

## Stormwater Program Purpose and Mission

The City's Stormwater Program is dedicated to addressing public safety, protecting properties and structures, supporting continued economic development, and protecting and preserving the natural environment and its functions. The goals of the City's Stormwater Program are to:

- Protect public health and welfare
- Protect wetlands, shorelines, streams, and creeks as natural surface water resources
- Achieve compliance with stormwater-related regulatory requirements, specifically the Permit
- Expand public support for the Stormwater Program and the public's knowledge of ways to protect water resources
- Actively maintain the capacity of the City's drainage infrastructure
- Identify and solve storm drainage problems
- Provide for the comprehensive, integrated management and administration of the City's stormwater facilities and operations
- Design and construct capital projects to reduce flooding, provide protection from erosion, enhance conveyance capacity and protect habitat

To achieve these goals, the City's Stormwater Program routinely conducts numerous activities and services, ranging from program administration to complaint response. The program includes specific elements such as education and outreach, development review, facility maintenance and capital improvement design and construction.

The City's Comprehensive Plan Storm Water Element (Appendix 1-1) provides the guiding policy for Stormwater Program activities. The goals of the Comprehensive Plan Storm Water Element are summarized as:

- Manage stormwater runoff in such a manner as to protect steep slopes, streams, wetlands and shorelines from erosion and sedimentation;
- Preserve, protect, and restore natural habitat for salmonid species;
- Protect the quality of surface water and groundwater;
- Provide recharge of groundwater where appropriate;
- Ensure natural control mechanisms where appropriate;
- Establish design standards for drainage systems that support the character of adjacent development and the environmental protection goals of the City; and
- Minimize the risk to property and residents from flooding hazards.





# Section 1—Introduction and Overview

(continued)

This SDMP outlines an implementation plan to guide the City's Stormwater Program in achieving the goals and following the policies outlined in the Comprehensive Plan Storm Water Element.

## Stormwater Program History

At incorporation, the City inherited an extensive storm drainage infrastructure that was constructed and previously maintained by King County. In 1996, the City completed a Draft Storm Drainage Master Plan in conjunction with the City's first Comprehensive Plan. In 2005, the City published its first Storm Drainage Master Plan (CH2MHill, May 2005). The Storm Drainage Master Plan provided guidance for surface water management, including policy development and setting, along with identifying the Stormwater CIP project needs. The Storm Drainage Master Plan also provided the City Public Works staff with a guide for stormwater infrastructure operation and maintenance activities.

In January of 2007, the City was issued an NPDES Permit that prompted the City to add new elements to the Stormwater Program, including an Illicit Discharge Detection and Elimination (IDDE) program, stormwater system inspections, increased operation and maintenance activities, and planning for future stormwater monitoring.

The City's Surface Water Utility (Utility) was formed in 2008 by Ordinance 489 and is currently administered by the Public Works Department. The Utility was established to pay for stormwater management activities, including but not limited to basin planning, stormwater system operations, maintenance, construction of facilities, regulatory compliance and water quality.

In 2012, the Washington Department of Ecology re-issued the NPDES Permit effective in 2013. In 2012 the City published an updated Storm Drainage Master Plan (Otak, July 2012) to revise the CIP and to address requirements of the Phase II Permit re-issuance. Throughout the permit term, the City continued the ongoing elements of the Stormwater Program, meeting several new requirements within some of the elements. Notably, the City adopted the updated King County Surface Water Design Manual and integrated low impact development principles and practices into its development codes and stormwater engineering standards.

The Stormwater Program has been successful in pursuing state grants and working with local partners to fund projects focused on water quality. These projects often go beyond the minimum activities required by regulation. For example, partnering with the cities of SeaTac, Des Moines, Normandy Park, and King County, the Stormwater Program obtained state funding in 2017 to create and implement StormFest, a two-day hands-on stormwater education event for 6<sup>th</sup> grade students in the Highline school district.

As of 2018, the Utility collects approximately \$3.5M per year. In 2018, \$1.7M was slated for program services and \$1.6M was transferred out of the operating fund to pay for stormwater-related capital projects.

## Organization and Staffing

The City's Stormwater Program is primarily run by the Surface Water Management Division of the Public Works Department. Additional activities of the Stormwater Program are conducted by Community Development and Code Compliance Division.

The Stormwater Program is funded by the Surface Water Management Fund which accounts for the maintenance and improvement of the City's storm drainage system. Revenue is derived from fees collected from residences and businesses through the King County property tax collection process. Services are provided by both in-house staff and through contracts.

The Public Works Director, Assistant Public Works Director, and Department Assistant dedicate a portion of their time to supervising and conducting administrative tasks for the Stormwater Program. The Surface Water Management Division includes two civil engineers who oversee stormwater system improvements and review

## Section 1—Introduction and Overview (continued)

drainage plans for building and land use review applications. A stormwater inspector conducts stormwater facility inspections, construction site inspections, and illicit discharge detection and elimination and drainage complaint investigations. A maintenance manager oversees both street and stormwater system maintenance and six maintenance workers maintain the storm drainage system. A Community Environmental Education Specialist conducts and coordinates public education and outreach efforts.

The Community Development Department includes the Building and Planning Divisions. Planners review building and land use permit applications and respond to public inquiries on land use and planning issues. The Planning Division is responsible for maintaining and implementing the Burien Comprehensive Plan and all land use codes. The Building Division is responsible for administration of construction-related codes and coordinates the plan review and inspection process. Permit Technicians, Planners, the Building Official, and Building Inspectors all contribute to the Stormwater Program.

The Code Compliance Division is responsible for code enforcement.

### Existing Infrastructure

In order to manage runoff from the urban area, the City owns and operates more than 100 miles of stormwater conveyance infrastructure and nearly 200 other stormwater facilities such as oil water separators, water quality vaults, and water quality filters. Private owners are responsible for additional conveyance lines facilities. The majority of the public infrastructure was installed by King County prior to the City's incorporation (1993). Based on neighborhood age, much of the storm system inventory has exceeded or is close to reaching typical design life of 50-100 years.

### Overview of the Stormwater Management Planning Process

This SDMP update was initiated by the City in July 2018, with work continuing through October 2019. The intent of the project is to update the list, priorities, and costs of the City's Stormwater Program. The SDMP includes:

- Summary of the physical drainage and drainage-related characteristics of the City (Section 2)
- Review and assessment of the City's current Stormwater Management Program in comparison to regulatory requirements, including maintenance program responsibilities. Assessment of staffing and revenue needs to comply with regulatory requirements (Section 3)
- Document existing storm drainage problem areas and development of stormwater CIP, including program costs and 5-year implementation plan (Section 4)
- Outline of the City's Watershed Enhancement Program to provide water quality related outreach and educational opportunities (Section 5)
- Estimation of future revenue needs and a financial plan to ensure adequate resources for implementation (Section 6)

The City intends to use the SDMP as a guide in implementing the Stormwater Program over the next five to ten years.

## Section 2—Characterization of the Study Area

### Service Area

The City's Stormwater Program service area (the City limits) is approximately ten square miles. The City uses an extensive Geographic Information System (GIS)-based stormwater inventory to visually track the infrastructure.

### Demographics

Burien is a medium sized, suburban City in King County with over 51,000 residents in 2019. Approximately 58% of housing in the City consists of single-family homes and 33% of apartment complexes. Most homes in the City are older. 55% of homes were built between 1940 and 1969 and another 31% between 1969 and 1999.

### Infrastructure

The City manages approximately 132 miles of conveyance infrastructure including 21 miles of swales and conveyance channels and over 6,000 publicly maintained catch basins and other stormwater structures. The City also maintains 15 public water quality/detention ponds and 157 other stormwater facilities (includes oil water separators, water quality vaults, water quality filters). An overview map of the City's drainage system is included in Section 4. The City maintains a GIS map of the drainage infrastructure throughout the City limits. The map can be viewed on the City's website.

### Drainage Basins

The City limits include three major drainage basins – Salmon Creek, Miller and Walker Creek (including Lake Burien), and Puget Sound. There are five subbasins within the Salmon Creek drainage basin; 23 subbasins within the Miller Creek basin; and eight subbasins within the Puget Sound drainage basin. Other areas of the City drain to the Duwamish River, Seola Creek, and Des Moines creek as shown on Figure 2-1 and Table 2-1.

Table 2-1—Drainage Basin Areas Within City Limits

Table 2-1: Drainage Basin Areas Within City Limits	
Drainage Basin ID	Area (Acres)
Miller and Walker Creek	3,638
Lower Puget Sound – South	1004
Duwamish River	856
Salmon Creek	473
Lower Puget Sound – North	198
Seola Creek	90
Des Moines Creek	79
Lower Puget Sound – Normandy Park	19

### Adjacent and Downstream Drainages

Figure 2-1 shows a significant number of flows that originate outside the City and drain into the City limits. Flows from the north include Seola Creek, Salmon Creek (primarily Lake Hicks and the neighboring subbasin), and Miller Creek through a tributary that drains to and is pumped from the Hermes Depression to Miller Creek. Flows from the east primarily originate from the City of SeaTac. Small portions of southern Burien flow out of the City into Normandy Park and Des Moines Creek drainage basins. Remaining flows from the City originate in the bluffs on the west side of the City and empty into Puget Sound.











## Hydrologic Characteristics

The hydrologic characteristics of the City are determined by climate, topography, geology, and land use. Streams, lakes, wetlands, steep slopes and floodplains manage and direct natural runoff flows through detention, treatment, and infiltration. As development occurs, these natural drainages are modified, often changing the performance and function of these natural drainage facilities and redirecting flows from one basin or watershed into another.

### Climate

The City is part of the Puget Sound geographic region, which experiences a marine climate characteristic of the West Coast region. Average annual precipitation in this area is approximately 38.3 inches with the rainy season beginning in October and continuing through March, often extending into June.

The 2016 King County Surface Water Design Manual includes design storms for estimating stormwater runoff during storm events. The design storms for the City of Burien are:

- 2-year, 24-hour: 2.1 inches
- 10-year, 24-hour: 3.0 inches
- 25-year, 24-hour: 3.45 inches
- 100-year, 24-hour: 4.3 inches

### Topography

Topography defines the drainage basins and has an effect on the direction and velocity of surface water flow and drainage paths. Over 1.2 million years ago the City's landform and topography was formed by repeated advancement and retreat of glaciers. The City's topography is made up of numerous depressions formed by glaciations marks. The western side of the City includes steep coastal bluffs. There are numerous streams and storm drains that drain generally from east to west to the coastal bluffs of the Puget Sound.

### Geology

Figure 2-2 shows the geology within the City limits. Mapping of surficial geology by Waldron indicates that the natural geologic landforms in the Burien area generally consist of recessional outwash, glacial till, and advance outwash.

### Critical Areas (Sensitive Areas, Steep Slopes, Wetlands, Floodplains)

The City has classified its critical areas by stream buffers, landslide area, seismic hazard area, wetlands, aquifer recharge area, wetland buffers, and flood plains. Figure 2-3 shows the mapped sensitive and critical areas in the City.

### Land Use

Most of the City of Burien has already been developed. Undeveloped land is generally in park areas and along steep coastal bluffs on the west side of the City. Developed areas in the City are primarily residential. Commercial areas are located along the Ambaum Boulevard SW Corridor, 1<sup>st</sup> Avenue South corridor, and an area centered around City Hall. A small industrial area is located in the southeast portion of the City.

The City, in partnership with the Port of Seattle, has completed its Redevelopment Plan and Implementation Strategy for the 165-acre Northeast Redevelopment Area (NERA), located between 8<sup>th</sup> Avenue South, Des Moines Memorial Drive, and South 138<sup>th</sup> Street. The goal of the plan is to transform the NERA from a mixture of vacant, residential, public and small commercial land uses to uses compatible with Sea-Tac International Airport

## Section 2—Characterization of the Study Area (continued)

operations and existing and planned surrounding land uses. Some areas previously occupied by low-density residential use have been vacated and razed, returning the areas to lawn and pasture, while retaining the roads. Two sections, along the western and northern borders of the NERA, are still occupied by low-density residential use. Two large private airport parking facilities, one in the middle of the site, the other toward the northeast corner, create large impervious areas. All buildings in the area south of SR 518 have been razed, leaving impervious concrete pads and asphalt pavement. Within the West Fork Miller Creek and its associated corridor and wetlands, forest and lawn conditions dominate. A multi-use regional trail through the Miller Creek Greenway has been built.

Four regional stormwater facilities have been built to provide stormwater management as redevelopment occurs within the NERA. Two additional regional stormwater facilities have been designed and will be built in the future. Developers have the option to connect into these facilities and provide on-site stormwater management through LID BMPs to meet water quality and flow control requirements laid out in NERA Master Drainage Plan. Further, culvert improvements have either been built or designed at the West Fork Miller Creek crossings at roadways within the NERA and a stream restoration project on West Fork Miller Creek has been fully designed.

### Study Area Considerations

The following study area considerations are primary drivers for this plan. The programs, projects, and future studies to address issues related to water quality and closed depressions are included in Sections 3, 4, and 5 of this SDMP.

#### Lake Burien Water Quality

Lake Burien is a small lake and a designated shoreline area located in central Burien that eventually drains to Miller Creek. Volunteer monitoring of Lake Burien coordinated through King County occurred in 1994, 1998, and 2000-2004. Unofficial monitoring activities coordinated by private residents have continued beyond the King County effort with data supplied to the City's Shoreline Master Plan process.

The trophic state index data collected through King County was used to classify Lake Burien as low to moderate in primary productivity (oligotrophic – mesotrophic) with very good water quality that was steady over the time period in which data was collected. However, local residents are concerned about the water quality of Lake Burien and interested in supporting City programs to maintain long term watershed health. Lake Burien does not have public access, so the City has limited direct influence on lake management or water quality. Instead, the City focuses efforts on general public outreach and education to improve practices including animal waste management, fertilizer use, and other sources of pollutants from residential properties. The City also looks to add water quality treatment facilities when developing capital projects in the surrounding area. See Sections 4 and 5 for additional information about the City's stormwater capital improvement program and Watershed Enhancement activities related to Lake Burien.

#### Arbor Lake Water Quality

Arbor Lake is a small lake located in north Burien with reported algae bloom problems. Arbor Lake is the headwaters to Miller Creek. While the lake is not accessible to anadromous fish such as salmon, the lake supports numerous other fish and bird species. The Lake is supported by neighborhood volunteers who often join together with Burien Parks, Recreational and Cultural Services to remove invasive species around the Lake, thereby boosting habitat for native species. As with Lake Burien, the City focuses efforts on general public outreach and education to improve practices including animal waste management, fertilizer use, and other sources of pollutants from residential properties .



## Section 2—Characterization of the Study Area (continued)

### Miller-Walker Creek Watershed

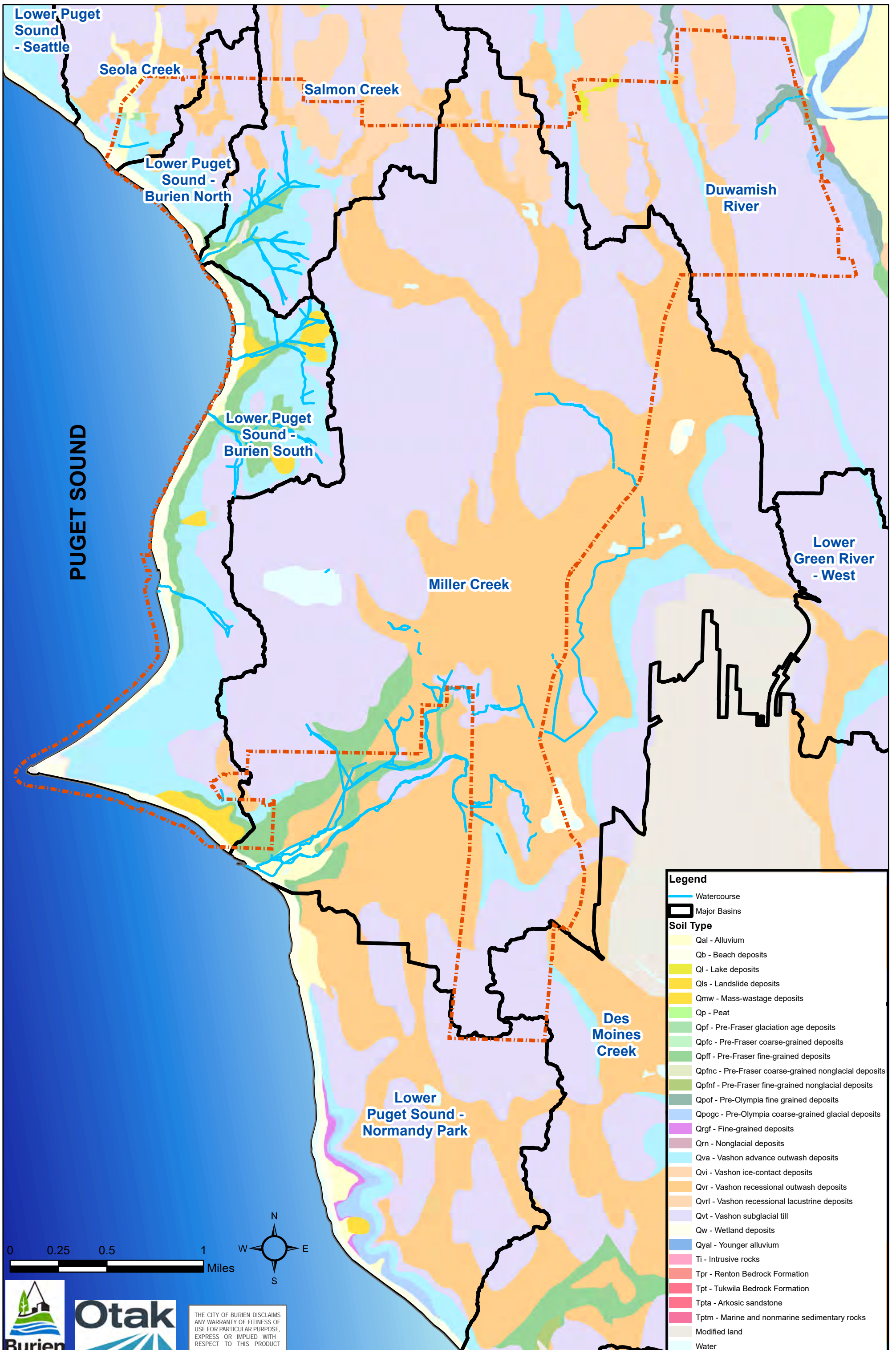
Miller Creek flows approximately six miles through urban areas of Burien and adjacent communities. Walker Creek also runs through a similar urban area of Burien and adjacent communities for two miles. There are multiple jurisdictions that drain to these two creeks including Burien, Normandy Park, SeaTac, King County, the Port of Seattle, and the Washington State Department of Transportation. In 2006, King County published the Miller and Walker Creeks Basin Plan, addressing surface water quality, flooding, stormwater infrastructure capacity, and fish habitat issues. While the plan was developed as a joint effort between the surrounding cities and King County, authorization and funding for capital projects is the responsibility of individual jurisdictions or through separate interlocal agreements.

The Miller-Walker Creek Watershed benefits from mitigation measures constructed as part of SeaTac Airport's 3<sup>rd</sup> Runway Project. The Watershed also encompasses the NERA and stormwater management and mitigation projects are a key aspect of development in the NERA. Section 4 includes projects to support and restore watershed health in the Miller-Walker Creek basin.

### Closed Depressions

Burien is home to numerous closed depressions where stormwater collects without a defined outlet. Major closed depressions include Hermes Depression, Mayfair Depression and the 142<sup>nd</sup> Street Depression. There are no stormwater outlets from these three depressions, which causes reoccurring localized flooding issues. Each of these depressions need a long-term master plan to address the connectivity between depressions and to identify facility upgrades or retrofits to improve drainage capacity and water quality. Basin studies to address challenges with the closed depressions are included in Section 4.

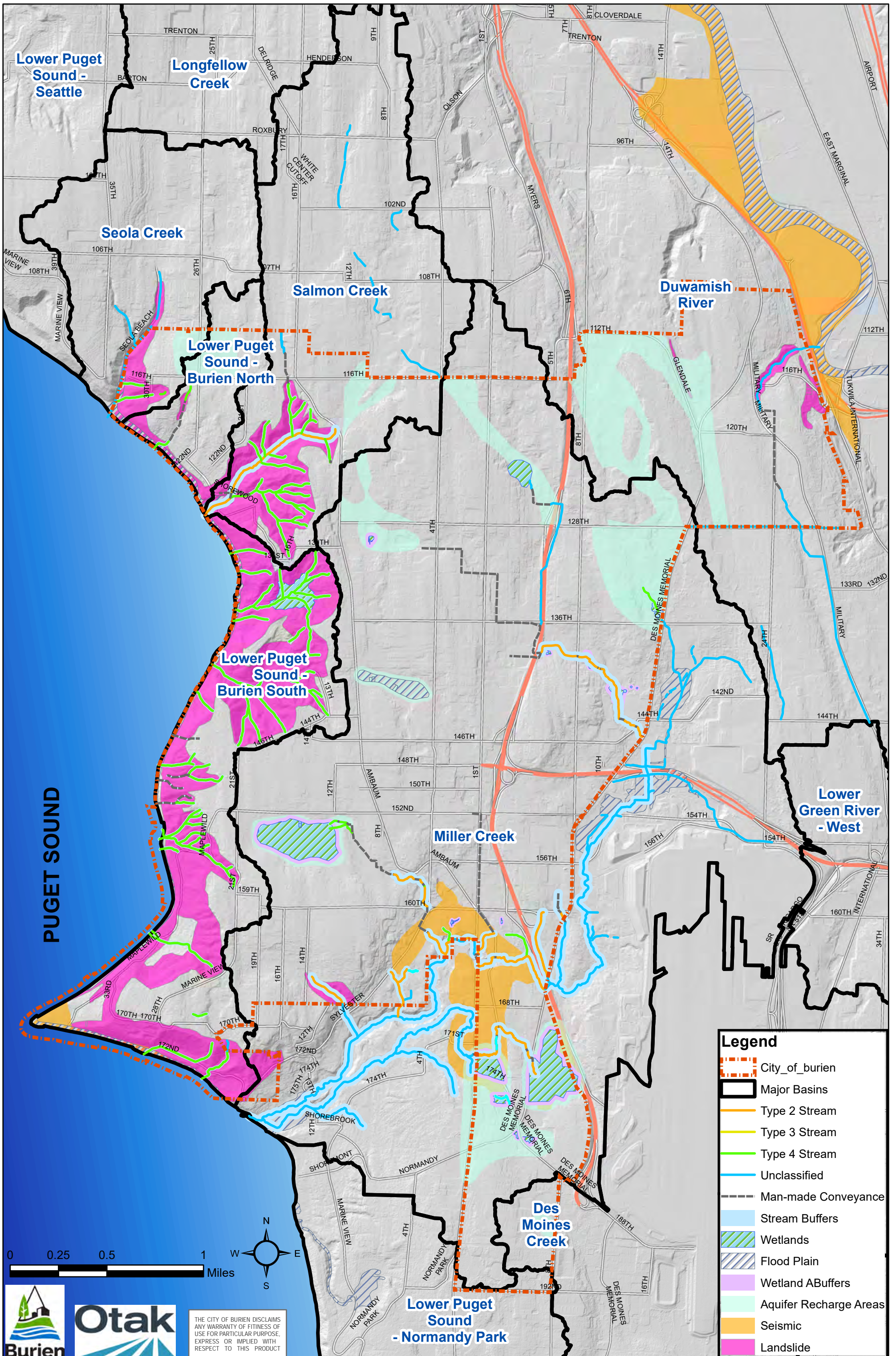




Legend	
	Watercourse
	Major Basins
Soil Type	
	Qal - Alluvium
	Qb - Beach deposits
	Ql - Lake deposits
	Qls - Landslide deposits
	Qmw - Mass-wastage deposits
	Qp - Peat
	Qpf - Pre-Fraser glaciation age deposits
	Qpfc - Pre-Fraser coarse-grained deposits
	Qpff - Pre-Fraser fine-grained deposits
	Qpfn - Pre-Fraser coarse-grained nonglacial deposits
	Qpfnf - Pre-Fraser fine-grained nonglacial deposits
	Qpof - Pre-Olympia fine grained deposits
	Qpogc - Pre-Olympia coarse-grained glacial deposits
	Qrgf - Fine-grained deposits
	Qrn - Nonglacial deposits
	Qva - Vashon advance outwash deposits
	Qvi - Vashon ice-contact deposits
	Qvr - Vashon recessional outwash deposits
	Qvri - Vashon recessional lacustrine deposits
	Qvt - Vashon subglacial till
	Qw - Wetland deposits
	Qyal - Younger alluvium
	Ti - Intrusive rocks
	Tpr - Renton Bedrock Formation
	Tpt - Tukwila Bedrock Formation
	Tpta - Arkosic sandstone
	Tptm - Marine and nonmarine sedimentary rocks
	Modified land
	Water







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## Section 3—Stormwater Program Analysis

### Introduction

This Section provides an analysis of the City's Stormwater Management Program for compliance with regulatory obligations and other necessary administrative functions. The primary regulation driving the City's stormwater program is the NPDES Phase II Permit (Permit). The City is also subject to the State Underground Injection Control Rule, the Federal Endangered Species Act, and the Puget Sound Action Agenda.

The City's stormwater program includes ordinances, programmatic activities, services, and maintenance actions. Some additional activities will be required by recent regulations.

### Analysis Structure

The analysis includes an overview of the City's regulatory obligations, including milestone dates, current activities, and future activities needed for compliance. The analysis summarizes of the current organization, staffing and the stormwater utility budget as required by the regulatory obligations. The program analysis evaluates the current program (as of 2019) against current and future activity, staffing, and resource requirements. The primary tool for the analysis is the detailed regulatory gap analysis included as Appendix 3-2.

The analysis was completed early in 2019, and it is based primarily on the draft version of the 2019-2024 NPDES Phase II Permit released by Ecology August 15, 2018. The final 2019-2024 NPDES Phase II Permit was issued July 1, 2019. The final Permit differed from the draft in minor respects. Timelines for implementing permit requirements were clarified, and deadlines for Comprehensive Stormwater Planning; Controlling Runoff from New Development, Redevelopment, and Construction Sites; and Operations and Maintenance were pushed back from three to 12 months from the draft to the final Permit. Minor other changes and clarifications were made.

A summary of existing and future required activities for each program element is presented below structured according to the following sections:

- NPDES Phase II Municipal Stormwater Permit
  - Comprehensive Stormwater Planning (Special Condition S5.C.1)
  - Public Education and Outreach (Special Condition S5.C.2)
  - Public Involvement and Participation (Special Condition S5.C.3)
  - MS4 Mapping and Documentation (Special Condition S5.C.4)
  - Illicit Discharge Detection and Elimination (Special Condition S5.C.5)
  - Controlling Runoff from New Development, Redevelopment, and Construction Sites (Special Condition S5.C.6)
  - Operations and Maintenance (Special Condition S5.C.7)
  - Source Control for Existing Development (Special Condition S5.C.8)
  - Total Maximum Daily Load Requirements (Special Condition S7)
  - Monitoring (Special Condition S8)
  - Reporting (Special Condition S9)
- Regional Stormwater Planning
  - Endangered Species Act and WRIA
  - Puget Sound Action Agenda
- Underground Injection Control Rule
- Capital Improvement Program
- Additional Activities
- Stormwater Program Implementation Plan
  - Summary of the current and anticipated staffing
  - Stormwater program budget

The results of the program analysis, including a summary of existing and future staffing and program expenses are summarized in Table 3-2 at the end of this section.

# Section 3—Stormwater Program Analysis (continued)

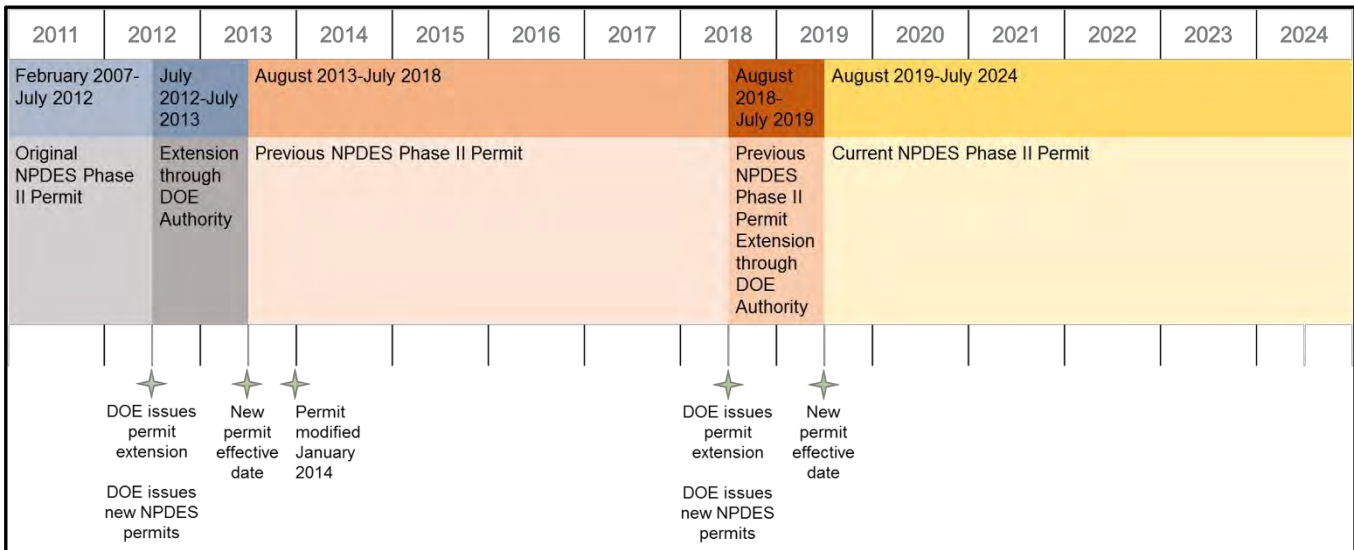
## NPDES Phase II Municipal Stormwater Permit

The City of Burien has been identified by Ecology as an NPDES Phase II community. All Phase II communities are expected to develop a stormwater program that includes the required permit activities, implement those activities within the required timeframes over the permit term, and submit annual reports to Ecology to document progress toward complete program implementation. The requirements of the Permit apply throughout the entire incorporated area of the City. The City has been implementing the requirements of its Permit over the past several years. Documentation of the City’s compliance activities is summarized in the 2007-2018 annual reports, which are available online.

### Permit Timeline

The most recent previous NPDES Phase II Permit (previous Permit) became effective August 1, 2013 and was modified on January 16, 2014. The permit originally covered a five-year period that was set to expire on July 31, 2018. Ecology extended the permit for one year through July 31, 2019. On August 15, 2018, Ecology released the Draft 2019-2024 Permit for public comment. Ecology issued the final Permit in July 2019 with an effective date of August 1, 2019 through July 31, 2024. This plan is part of the City’s process of adopting changes to the stormwater program to comply with the latest Permit (current Permit). See Figure 3-1 for the permit re-issuance schedule.

Figure 3-1—NPDES Phase II Permit Effective Dates Timeline



The stormwater management program requirements remained largely the same with the issuance of the current Permit, with some additions. The additional of program elements caused the permit sections to be renumbered. Table 3-1 compares the previous and current permit section numbers. A summary of the stormwater management program changes can be found in Appendix 3-1. Figure 3-2 summarizes the updated Permit elements and timelines.



## Section 3—Stormwater Program Analysis (continued)

Table 3-1—Comparison of Previous and Current Permit Section Numbers

NPDES Phase II Permit Requirements Comparison				
2013-2018 Permit Requirements		2019-2024 Permit Requirements		Version Notes
S5	Stormwater Management Program for Cities, Towns, and Counties	S5	Stormwater Management Program for Cities, Towns, and Counties	
		S5.C.1	Comprehensive Stormwater Planning	New permit requirement
S5.C.1	Public Education and Outreach	S5.C.2	Public Education and Outreach	
S5.C.2	Public Involvement and Participation	S5.C.3	Public Involvement and Participation	
		S5.C.4	MS4 Mapping and Documentation	Mapping the MS4 is currently organized under the IDDE section.
S5.C.3	Illicit Discharge Detection and Elimination	S5.C.5	Illicit Discharge Detection and Elimination	
S5.C.4	Controlling Runoff from New Development, Redevelopment, and Construction Sites	S5.C.6	Controlling Runoff from New Development, Redevelopment, and Construction Sites	
S5.C.5	Municipal Operations and Maintenance	S5.C.7	Operations and Maintenance	
		S5.C.8	Source Control Program for Existing Development	New permit requirement
S7	Compliance with Total Maximum Daily Load Requirements	S7	Compliance with TMDLs	
S8	Monitoring and Assessment	S8	Monitoring and Assessment	
S9	Reporting Requirements	S9	Reporting Requirements	

# Section 3—Stormwater Program Analysis (continued)

Figure 3-2—Current NPDES Phase II Permit Requirements and Milestones

Permit Element	2019	2020	2021	2022	2023	2024
<b>Comprehensive Planning</b>						
Coordinate with long range plan updates			■		■	
Low impact development code						
Receiving water basin assessment and prioritization				■		
Stormwater Management Action Plan					■	
<b>Public Education</b>						
General awareness						
Behavior change		■				
Community-Based Social Marketing			■			
Stewardship						
<b>Public Involvement</b>						
Continue current program						
<b>MS4 Mapping and Documentation</b>						
Ongoing mapping requirements						
New mapping requirements			■		■	
<b>Illicit Discharge Detection &amp; Elimination (IDDE)</b>						
Continue current program						
<b>Runoff from Development, Redevelopment, &amp; Construction Sites</b>						
Adopt stormwater manual updates				■		
Continue current program						
<b>Municipal Operations and Maintenance</b>						
Adopt stormwater manual updates				■		
Continue current program						
<b>Source Control from Existing Development</b>						
Adopt an ordinance requiring source control BMPs (Complete)				■		
Inventory commercial and industrial properties				■		
Implement an inspection program and enforcement strategy					■	
<b>TMDLs</b>						
Monitoring/TMDL plan implementation (Not applicable)						
<b>Monitoring</b>						
Using regional "Pay In" approach Status/trends, effectiveness, and source identification	■	■	■	■	■	■
<b>Reporting</b>						
Annual report	■	■	■	■	■	■

- Continuing Effort
- New Effort
- Deadline or Report

### Burien Budget

The City of Burien operates on a biennial budget cycle. The most recent budget is for the 2019-2020 biennium and was adopted by the City Council December 17, 2018. The budget is further based on the 2017-2020 Strategic Plan adopted in June 2016 and amended in June 2017. The current Permit was released by Ecology in draft form in August 2018 and the final Permit formally issued July 1, 2019.

Due to this timing offset, the additional requirements of the current Permit are not included in Burien's adopted 2019-2020 Budget. However, only two stormwater program requirements have new deadlines in 2020. Most new requirements have a delayed implementation starting in 2021. The budget recommendations presented in the Stormwater Program Implementation Plan at the end of this section represent average costs over the entire five-year permit term exclusive of increases resulting from cost of living adjustments and inflation.

### Comprehensive Stormwater Planning (S5.C.1)

The Comprehensive Stormwater Planning program element is a proposed new requirement in the current Permit. The purpose of this requirement is to integrate stormwater considerations into the City's long-term planning efforts.

#### *Long-term Plan Reports*

To comply with this sub-requirement, the City will need to answer questions on the annual report to Ecology in 2021 and 2023 about how stormwater needs were addressed in long-term plans during the previous Permit and current Permit terms. The questions will cover how stormwater management needs and protection/improvement of receiving water health inform the Comprehensive Plan and in other locally initiated or state mandated long-range land use plans, policies and implementation strategies that are used to accommodate growth or transportation. The 2021 annual report will include questions about the 2013-2018 permit cycle. The 2023 annual report will ask questions about the 2019-2024 permit cycle.

#### *Require LID Principles and BMPs*

This sub-requirement continues the effort to make LID the preferred and commonly-used approach to site development. The City will need to continue to incorporate LID Principles and LID BMPs when updating and developing new local development related codes, rules, standards, or other enforceable documents. Each year, the City will need to report on any newly identified barriers to implementation of LID and measures to address the barriers. The report should also describe mechanisms developed to encourage or require implementation of LID Principles or LID BMPs.

#### *Develop a Stormwater Management Action Plan*

The Stormwater Management Action Plan (SMAP) is designed to target stormwater retrofits to restore and protect habitat in high-priority basins and receiving waters by addressing the collective development in a watershed. The process consists of three major phases: receiving water basin assessment, receiving water basin prioritization, and Stormwater Management Action Planning.

The City will need to complete a receiving water basin assessment to document and assess existing information related to local receiving waters and contributing area conditions to identify receiving waters that will benefit from stormwater management planning. The City may choose to meet this permit requirement individually, or as part of a regional effort. Where significant gaps in the state of knowledge exist, a plan and protocol should be developed to improve the assessment.

Based on the information collected through the receiving water basin assessment the City will need to prioritize basins and select at least one basin for the SMAP.

## Section 3—Stormwater Program Analysis (continued)

The City will need to develop an SMAP for the basin selected during the receiving water basin prioritization that identifies:

- Targeted or customized implementation of stormwater management actions.
- The need for stormwater facility retrofits.
- A proposed implementation schedule and budget sources.
- Short-term actions (i.e. actions to be accomplished within six years).
- Long-term actions (i.e. actions to be accomplished within seven to 20 years).
- Process to adaptively manage the plan.

### *Recommended Program Implementation*

Questions about the existing long-range plans will be included on the annual report due to Ecology by March 31, 2021. The City should immediately begin the process to meet this deadline. The City will need to collect and review the existing Comprehensive Plan and similar long-range land use plans and describe how stormwater considerations were addressed in these plans. The City may wish to hire a consultant to review this material and write this report. The approximate cost of hiring a consultant to prepare the report is \$6,000. Answering these questions is a one-time effort that will not require an increase in FTE.

Questions about the updated long-range plans will be included on the annual report due to Ecology by March 31, 2023. The City will need to describe how stormwater management and conservation of receiving waters are informing updates to the Comprehensive Plan and similar long-range land use plans. The reporting should be included in any project planning to update long-term plans. The City's Comprehensive Plan was most recently updated in 2016, and the City is not required to conduct a mandatory update until 2024. The City may not begin the update process prior to March 2023; however, the City does conduct annual updates to the Comprehensive Plan and should discuss those updates in the report. If the City hires a consultant to write any long-term plans, the City may wish to include a summary containing this information as part of the project scope. The approximate cost of hiring a consultant to prepare the report is \$6,000. The report is a one-time effort that will be absorbed by the existing staff.

The LID assessment report is due to Ecology annually by March 31. This assessment and report should be incorporated into the annual Stormwater Management Program (SWMP) plan update (S5.A.2) and annual report process (S9.A&D). LID code update efforts were completed in 2016 and effort was shifted to implementing the Code changes. A minor additional effort required to review development code and other regulatory document updates and report on barriers and implementation of LID Principles or LID BMPs.

The watershed inventory with brief descriptions of conditions is due to Ecology March 31, 2022. The receiving water basin prioritization is due to Ecology June 30, 2022. The assessment and prioritization processes are described in the permit and in more detail in the *Stormwater Management Action Planning Guidance 2019* published by Ecology. Aspects of the assessment and prioritization have been completed during this Storm Drainage Management Plan process and this Storm Drainage Master Plan can be referenced as a source of information and rationale for prioritization. As part of the process, the City must document the priority ranking process used to identify high priority areas. The City may choose to hire a consultant to complete the assessment and prioritization process. The approximate cost of hiring a consultant to prepare this plan is \$60,000.

The City's SMAP is due to Ecology March 31, 2023. The process is described in the permit and in the *Stormwater Management Action Planning Guidance 2019* published by Ecology. The ongoing activities described in the SMAP will be incorporated into the SWMP and CIP program. An additional approximately 0.05 FTE per year to supervise the process and implement the SMAP.

The total effort required for this permit requirement is approximately 0.05 FTE. The total expense for this permit element is approximately \$14,400 per year.

## Public Education and Outreach (S5.C.2)

The Public Education and Outreach program element is a continuing requirement in the current Permit. The City has an active Public Education and Outreach program that follows the current Permit requirements which include general awareness for specific audiences, measure and report on behavior change for one target audience, and provide stewardship opportunities for residents.

Recent and ongoing education and outreach activities by the City of Burien include:

- Publishing educational information in the City magazine and on the City website
- Posting natural yard care information on the City's website
- Establishing a social media presence on Facebook and Twitter
- Conducting natural lawn yard workshops
- Publicizing and distributing car wash kits for charity groups
- Participating in and planning Puget Sound Starts Here Month
- Developing the Burien Residential Rain Garden Project to build rain gardens in low income neighborhoods
- Participating in the Don't Drip and Drive regional education campaign Steering Committee
- Developing a "De-pave" program with King County
- Steering Committee member for the STORM group (the Regional NPDES Education and Outreach Forum) and the *Puget Sound Starts Here* campaign
- Partnering with Washington Green Schools to develop and implement the Sylvester Middle School Stormwater Curriculum and Field Project
- Developing the Stormwater PSA Film Contest for high schoolers
- Providing spill kits and water quality BMP education for businesses
- Making available Erosion and Sediment Control brochures for small construction sites
- Distributing Low Impact Development (LID) information to developers during pre-application meetings with City staff.
- Developing the StormFest stormwater educational event for middle school students and testing behavior change
- Partnering with the Environmental Science Center to offer stormwater education
- Partnering with King Conservation District to teach shoreline stewardship classes
- Participating in the Miller-Walker Creek Basin Stewardship program

The current Permit requires the City to continue to conduct general awareness outreach, measure behavior change, and provide stewardship opportunities. The current Permit also requires a new evaluation of the effectiveness of the existing behavior change program and development and implementation of a strategy similar to a Community-Based Social Marketing (CBSM) program based on the new evaluation. At the end of the current Permit term, the City will also need to evaluate the CBSM program. In 2018, the City received a \$152,000 grant from the State to fund the StormFest event which meets the requirements for the CBSM program. The City plans to continue this event in cooperation with other cities during the current permit term. The Miller-Walker Creek Stewardship program costs the City approximately \$62,000 annually.



### *Recommended Program Implementation*

The City plans to continue the StormFest event to satisfy the CBSM requirement. Therefore, the new requirement will not increase the level of effort for the public education and outreach much. Some additional resources may be

## Section 3—Stormwater Program Analysis (continued)

required to document and evaluate the CBSM program to fully meet the new permit requirement. The CSBM techniques are described in a free book available at [www.cbsm.com](http://www.cbsm.com).

The CBSM program requirement and additional evaluations may require approximately 0.05 additional FTE. Training for the new program and evaluation of the program will cost approximately \$5,000 per year.

The total effort required for this permit requirement is approximately 0.60 FTE. The total annual expense for this program element in the current Permit term is estimated at \$219,000. Grants and agreements with other cities to share the cost of the StormFest program may offset a portion of that expense.

### Public Involvement and Participation (S5.C.3)

The Public Involvement and Participation program element is a continuing requirement in the current Permit. As required, the City posts the most current annual report to Ecology and the current SWMP update on its website. In the spring of 2019, as part of the development of the SDMP, the City initiated a public involvement campaign focused on using the City's existing web page and social media accounts to elicit input and feedback on the SDMP. As part of the current Permit, the City will need to continue to post the annual report and SWMP on their website by May 31 each year. The City must continue to provide opportunities for public involvement and participation in the stormwater program.

#### *Recommended Program Implementation*

No changes to staffing or funding are required for this permit element. The total effort required for public involvement and participation is approximately 0.55 FTE.

### MS4 Mapping and Documentation (S5.C.4)

The MS4 Mapping and Documentation program element is a continuing requirement in the current Permit. MS4 Mapping and Documentation was previously organized as part of the Illicit Discharge Detection and Elimination special condition (S5.C.5). During previous permit cycles, the City established a comprehensive inventory of the stormwater infrastructure. All stormwater system data is available in GIS format and is maintained by the City's GIS and IT Departments. The GIS Stormwater Map is available on the City's website and upon request. The City continues to update the GIS Stormwater Map as new infrastructure is built.

As part of the current Permit, the City will be required to expand the MS4 Map to include the size, type and material of all outfalls from the system beginning in 2020 and to map all connections the MS4 to a privately-owned stormwater system by 2023.

#### *Recommended Program Implementation*

Most of the effort required for the current requirements in this area was accounted for under the effort previously allocated for illicit discharge detection and elimination for mapping, approximately 0.1 FTE. The new requirements will require some additional staff time and funding for field work and GIS analysis beyond current levels starting in 2020. This effort will continue to be linked with the IDDE inspection efforts. Effort for MS4 Mapping is anticipated to increase by 0.02 FTE to approximately 0.12 FTE. The Surface Water Management Fund should continue to transfer approximately \$40,000 per year to the City's General Fund to pay for its share of the City's GIS and Information Technology services.



### Illicit Discharge Detection and Elimination (S5.C.5)

The Illicit Discharge Detection and Elimination program element is a continuing requirement in the current Permit. The City has adopted an ordinance to address Illicit Connections and Illicit Discharge Detection and Elimination (Burien Municipal Code (BMC) Chapter 13). The ordinance includes a list of allowable and prohibited discharges to the City's drainage system and streams. The ordinance includes escalating enforcement procedures and actions. The Code Enforcement group is responsible for all IDDE Code Enforcement activities.

The City established a general IDDE Program to implement the previous Permit requirements. Current activities include:

- Adopting Ecology's 2013 Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual (IDDE Manual)
- Performing field inspections for all reported illicit discharges and connections, with technical assistance from King County and DOE
- Performing visual inspections of priority receiving waters (Miller Creek, Walker Creek, and Salmon Creek) with technical assistance from King County and Ecology
- Adopting a surface water management ordinance which describes illicit connection and illicit discharge enforcement authority and processes
- Establishing a hotline<sup>1</sup> for residents to report spills and illicit discharges
- Maintaining an interlocal agreement with King County to respond to major spills
- Maintaining records of the IDDE program in Azteca CityWorks (public works asset management software)
- Holding IDDE training for all staff, including follow-up training as staff comes on board or new policies/procedures are put into place
- Entering an IGA with King County to allow water quality audits on commercial sites



#### *Recommended Program Implementation*

Minor additional effort for IDDE inspections is expected to account for the City's growth and the City's continued takeover of services previously provided by King County in the current Permit term. Effort for IDDE is anticipated to increase from 0.20 FTE by 0.03 FTE to approximately 0.23 FTE. Expenses for this program should be approximately \$4,250 annually primarily for staff training.

### Controlling Runoff from New Development, Redevelopment, and Construction Sites (S5.C.6)

The City conducts site plan review of new development and redevelopment projects and inspects construction sites to ensure drainage meets the minimum requirements established by the permit.

#### *Stormwater Runoff Control Ordinance*

The City's oversight of development is codified in Burien Municipal Code (BMC) Chapter 13. The City has adopted the 2016 King County Surface Water Design Manual (KCSWDM) to guide stormwater management from new development and redevelopment projects. As part of the permit approval process, Burien requires the construction of surface water and stormwater management systems to mitigate the impacts on natural and existing man-made drainage systems. Low Impact Development (LID) BMPs (called Flow Control BMPs in the KCSWDM and BMC) are required for nearly all development projects within the City. Additional code changes were adopted throughout the development code to further encourage LID techniques. Ecology will adopt a 2019

<sup>1</sup> IDDE Hotline: (206) 248-5521

## Section 3—Stormwater Program Analysis (continued)

update to the Stormwater Management Manual for Western Washington (SWMMWW) which, along with the current Phase I NPDES Permit, will require King County to update the KCSWDM to ensure compliance. The City will need to review the stormwater and development code as well as any additional documents to ensure they comply with the update.

### *Site Review, Permitting, and Inspection*

The City's Development Review Engineer works with the Community Development Department to conduct a drainage review of all proposed development and redevelopment projects and to conduct required site inspections during construction and post construction. The Stormwater Inspector and Building Inspector conduct inspections of construction sites during and after construction prior to the City accepting stormwater facilities for maintenance. The Building Inspector conducts stormwater inspections of single-family housing building sites. The City tracks all development reviews and inspections in CityView. Post-construction private facility inspections previously organized under Controlling Runoff from New Development, Redevelopment, and Construction Sites have been moved to Operations and Maintenance.

### *Recommended Program Implementation*

The City has experienced an increase in drainage reviews from an average of 141 per year from 2010 to 2014 to an average of 182 per year from 2015-2018. Continued growth in reviews is expected, and additional effort will be required to process applications and conduct inspections in a thorough and timely manner. Additional effort over the 2019 level is expected to be required over the current permit term bringing the total to approximately 2.0 FTE. Expenses for this program should be approximately \$19,475 annually primarily for staff training and software licensing.



## Operations and Maintenance (S5.C.7)

The City implements a stormwater maintenance program to ensure the proper function of all City and privately-owned stormwater facilities and conducts training for all City staff whose primary duties may impact stormwater quality.

### *Maintenance Standards*

The City adopted the 2016 King County Surface Water Design Manual (KCSWDM) in 2016. This manual includes the maintenance standard and requirements of drainage structures such as flow control, conveyance, and water quality. The City inspects City and privately-owned drainage facilities annually. The City also adopted Standard Operating Procedures for Stormwater, Streets, and Parks Operations and Maintenance (Maintenance SOP) in 2018. The City's Maintenance SOP for operations and maintenance references the maintenance standards in the KCSWDM and the SWMMWW.

### *Inspections*

City Public Works staff inspect City and existing privately-owned drainage facilities annually. The City also inspects all catch basins on a two-year rotating basis, cleaning those that exceed sediment accumulation standards. The City conducts spot checks of all City-owned detention/retention ponds after major storms. The current Permit does not require an increase in inspection frequency for facilities or catch basins.



## Section 3—Stormwater Program Analysis (continued)

### *Stormwater System Maintenance*

The City's Stormwater Program includes an annual stormwater facilities maintenance program. This program includes maintaining the proper function of stormwater facilities through cleaning, mowing, and repair/replacement activities. The Permit requires the City to take corrective maintenance action based on the state of each catch basin or stormwater facility during maintenance inspections.

### *Complaint Response*

The City's Stormwater Program is responsible for receiving and responding to public complaints. Drainage complaints are received as Citizen Action Request Forms at City Hall, online through the Burien website, or through the complaint hotline. The City performs field inspections and keeps records for all reported issues. Depending on the nature and magnitude of the problem, City staff addresses it internally or brings in assistance from outside agencies or contractors.

Response to water quality complaints and spill reports are part of the City's Illicit Discharge Detection and Elimination program.

### *Pollution Prevention*

The City adopted the 2016 King County Stormwater Pollution Prevention Manual (KCSPPM) which includes BMPs for commercial, multi-family, and residential properties. The City is implementing practices to reduce stormwater impacts associated with runoff from streets, parking lots and roads maintained by the City including pipe and culvert cleaning, ditch and roadside areas maintenance including vegetation management, street sweeping and cleaning, and street repair and resurfacing. The City also conducts snow and ice control, with priority removal focused on arterial streets and residential streets addressed on an emergency basis, and uses techniques to help prevent impacts to the local waterways.

The City implements Integrated Pest Management as one pollution prevention technique for landscape maintenance. The City also incorporates pollution prevention techniques including erosion and sediment control into landscape maintenance and vegetation disposal, street repair/resurfacing and trash management (through a franchise agreement). The City is not conducting building exterior cleaning and maintenance.

The City operates a Public Works maintenance facility and a materials storage yard. Each of these locations is described in the City's Public Works Operations Facilities Stormwater Pollution Prevention Plan (SWPPP). The SWPPP is updated as needed, most recently in February 2019.

### *Recordkeeping*

The City uses Azteca CityWorks to track operations and maintenance activities.

### *Recommended Program Implementation*

The City will need to continue all current maintenance program activities. The current Permit reorganizes some efforts from Controlling Runoff from New Development, Redevelopment, and Construction Sites (S5.C.6) to Operation and Maintenance (S5.C.7). Based on the City's anticipated increase in maintenance demand over the next five years, effort in this area is expected to increase to 11.7 FTE of which approximately 2.0 FTE is new and 0.5 is transferred for activities previously organized under S5.C.6 Controlling Runoff from New Development, Redevelopment and Construction. Expenses for this program should be approximately \$139,750 annually for staff training, contracted repairs and maintenance, and TV pipe inspections. This is a decrease over 2019 expenses as the City continues to increase capabilities and takeover maintenance responsibilities from King County.

## Section 3—Stormwater Program Analysis (continued)

### Source Control for Existing Development (S5.C.8)

Source control for existing development is a new requirement of the current Permit. Under the current Permit the City will be required to have an ordinance requiring publicly and privately-owned commercial and industrial sites to implement source control BMPs, give the City authority to inspect source control BMPs, and give the City authority to enforce compliance. The City will need to develop and implement written plans and procedures for this program element. The City will need to conduct an inventory to identify publicly and privately owned commercial and industrial properties which have the potential to generate pollutants to the MS4. The City will also need to implement an inspection program for these sites that conducts a number of inspections equaling 20% of the identified sites each year. The City will need to train staff to conduct the source control inspections. The City may choose to hire a consultant to assist with preparing the written plans and procedures.



#### *Recommended Program Implementation*

The City's SWM ordinance already requires businesses and residents to implement source control BMPs and gives the director inspection and enforcement authority. The City will need to conduct an inventory of commercial and industrial properties that pose a potential for pollutant discharge to the MS4 by August 1, 2022 and implement an inspection program by January 1, 2023. The additional effort to conduct the inventory and inspections will require 0.2 new FTE for this permit requirement. Expenses for this program should be approximately \$4,250 annually primarily for staff training. The approximate one-time cost of hiring a consultant to prepare the written plans and procedures is \$10,000.

### Total Maximum Daily Loads (S7)

There are no applicable Total Maximum Daily Load (TMDL) water bodies in Burien, in either the previous or current Permit.

#### *Recommended Program Implementation*

No change to the existing staffing or program funding.

### Monitoring (S8)

The City opted in to the Regional Status and Trends Monitoring and SWMP Effectiveness and Source Identification Studies collective funds and has submitted all monitoring documents required under the previous Permit including the required monitoring site selection documents to Ecology that identify potential locations for regional monitoring activities. The current Permit requires cities that chose to pay into the Ecology collective fund in the previous Permit term to pay into the fund in the current Permit term. The current Permit sets Burien's cost to pay into the regional monitoring program at approximately \$24,000 per year.

#### *Recommended Program Implementation*

The City currently participates in the regional monitoring program. The City should budget to continue to participate program at an annual cost of approximately \$24,000 per year. This is approximately \$8,000 lower than the cost under the previous Permit and the pay-in program continues to place liability and responsibility on Ecology for meeting the monitoring obligations of the Permit instead of the City. The administration of monitoring will continue to require approximately 0.05 FTE annually.

### Annual Reporting (S9)

The City completed their annual report and SWMP documents each year and submitted the two documents to Ecology annually in March. As part of the current Permit the City will continue to submit annual reports to Ecology.

#### *Recommended Program Implementation*

No change to the existing staffing or program funding. Preparing and submitting the SWMP and annual report will continue to require approximately 0.1 FTE annually. The expense of complying with the reporting requirements will continue to be approximately \$5,000 annually.

### Regional Watershed Planning

#### *Endangered Species Act and Water Resources Inventory Area Planning*

In 1999, the federal government listed the Puget Sound Chinook salmon and bull trout as threatened in the Puget Sound Region. Beginning in 2007, steelhead trout are also protected under the same regulations as threatened Pacific salmonids. Additional Puget Sound marine and freshwater species listed since 1999 include two rockfish species (yelloweye rockfish and bocaccio), southern resident Orca whales, and Oregon spotted frogs. In the Puget Sound region, a coalition of local governments has created a Regional Forum system to coordinate protection and restoration efforts on a watershed basis. The Regional Forum is organized by Water Resource Inventory Area (WRIA), consistent with the watershed identification system used by Ecology and other state resource agencies.

The City is part of WRIA #9 in the Green/Duwamish and Central Puget Sound Watershed. As part of WRIA #9 planning and the Miller-Walker Creek Stewardship Program, the City has conducted the following activities to work toward a healthy basin:

- Adult salmon monitoring
- A volunteer program conducting stream restoration projects including planting trees and controlling invasive weeds
- Public education presentations
- Basin planning
- IDDE program and water quality investigations
- Development standards to help improve the health of these two creeks

In May of 2006 King County published a report titled “Prioritization of Marine Shorelines of WRIA #9 for Juvenile Salmonid Habitat Protection and Restoration”. This report identified Puget Sound shoreline habitat in southern King County that should be preserved or restored to help salmon, including prioritizing nearshore habitat in Burien that provides important habitat for young salmon after they have left the freshwater streams where they hatched and reared.

The Green/Duwamish and Central Puget Sound Watershed Ecosystem Forum (WEF) is comprised of 16 cities, including Burien, and King County. These jurisdictions share interest in and responsibility for long-term watershed planning. The WEF oversees efforts on watershed protection, restoration and salmon conservation including promoting implementation of the Salmon Habitat Plan. The Salmon Habitat Plan was approved in 2005 and documents science-based projects, programs, and policies to protect and restore salmon habitat in the Green/Duwamish and Central Puget Sound Watershed for the period 2006-2015. Since 2015, additional riparian re-planting and vegetation restoration strategies have been established for WEF<sup>1</sup> to improve stream conditions for salmonids, and 22 restoration projects have been proposed, and completed, or are currently active in the same time period<sup>2</sup>. Miller and Walker Creeks located in Burien, within the WRIA 9 Green/Duwamish area, are part of the Central Puget Sound Watershed.

## Section 3—Stormwater Program Analysis (continued)

### *Puget Sound Action Agenda*

In April 2007, the Washington State Legislature passed legislation creating the Puget Sound Partnership (Partnership) to coordinate and lead the effort to restore and protect Puget Sound. (The Puget Sound Partnership replaced the former Puget Sound Action Team.) The Partnership's charge is to define a strategic action agenda that prioritizes necessary actions based on science and includes clear, measurable goals for the recovery of Puget Sound by 2020. Adopted December 1, 2008, the Puget Sound Action Agenda replaced the prior Puget Sound Water Quality Management Plan. The Leadership Council adopted an updated Action Agenda on December 5, 2018 which extends actions beyond 2020. The Action Agenda is a strategy that sets state policy for cleaning up, restoring and protecting Puget Sound. The 2008 Action Agenda included five strategic priorities:

- Protect intact ecosystem processes, structures, and functions
- Restore ecosystem processes, structures, and functions
- Reduce the sources of water pollution
- Work effectively and efficiently together on a priority basis
- Build an implementation, monitoring, and accountability management system

The 2018 Action Agenda added a sixth priority: increase funding.

The Partnership's major focus since publishing the Action Agenda in December 2008 has been to evaluate ecosystem status and develop a performance management system to manage recovery efforts. Interdisciplinary teams comprised of local governments, local organizations and academia are working towards developing strategies and actions to reduce effects from five components that negatively impact Puget Sound's ecosystems: land development, shoreline alteration, runoff from built environment, wastewater, and loss of floodplain function. Until the current work of the Puget Sound Partnership Leader Council is completed, there is no new direction regarding stormwater management priorities.

The City of Burien is part of the "Puget Sound Actions Area" which encompasses the Cedar, Duwamish and Puyallup watersheds. Currently, the City is addressing the Action Agenda priority for managing stormwater runoff in urban areas to reduce stormwater impacts by implementing its NPDES Phase II Permit requirements and requiring LID for new development and redevelopment.

### *Recommended Program Implementation*

The City currently participates in regional watershed planning by making annual contributions to fund WRIA #9 and the Miller-Walker Basin Stewardship Program. Because of the regional planning efforts already conducted for Miller-Walker Creeks, the City benefits greatly from the stewardship work in the local watershed. The City plans to continue participating in these programs and providing annual funding for projects. Regional planning and coordination will continue to require approximately 0.05 FTE annually. The City should budget approximately \$40,000 annually for this element consisting of approximately \$20,000 per year to support the WRIA #9 Regional Forum activities, additional expenses to complying with the ESA requirements are approximately \$8,000 per year, and \$10,000 per year for the City's Permit fee.

## Underground Injection Control Rule

The activities required for compliance with the State's Underground Injection Control (UIC) Rule depend on the number and type of underground injection control facilities (such as dry wells or underground infiltration galleries) that the City uses for stormwater management. With no City-owned UIC facilities, the City is not under any current UIC rule obligations. When evaluating solutions to address drainage challenges in the City's closed depressions, the City should pay careful attention to the State UIC rule. Any new or retrofitted injection facilities must comply with the requirements of WAC 173-218.

## Section 3—Stormwater Program Analysis (continued)

### *Recommended Program Implementation*

No change to the existing staffing or program funding.

## Capital Improvement Program

The stormwater capital improvement program (CIP) analysis focuses on the staffing and resources required to implement construction projects that will maintain and enhance the storm drainage infrastructure. Currently, the City contracts for engineering and construction services to design and construct one to two stormwater-related capital improvement project each year. The City also is a member of the Municipal Research and Services Center (MRSC), which maintains a roster of businesses eligible to perform small public works projects. For small works with construction costs less than \$100,000, City staff can design the project in-house and hire a contractor from the MRSC roster to construct it. The City also leverages Stormwater Program funds to upgrade stormwater infrastructure when transportation or other utility projects are scheduled on local roadways.

### *Recommended Program Implementation*

No change to the existing staffing or related program funding. See Section 4 for a detailed analysis of the City's stormwater CIP and the annual cost for construction projects. The stormwater CIP will continue to require approximately 1.3 FTE annually.

## Additional Activities

Additional activities include administrative functions of the Stormwater Program, interest payments, overhead costs, and fees not covered in the above regulatory elements. The City pays administrative fees to King County to coordinate the billing and collection of the City's Stormwater Utility fees with property tax bills. The Stormwater Fund also pays a portion of the City's general overhead costs for items such as operating rentals and leases, janitorial services, and other miscellaneous items. Additional activities also include the Stormwater Programs interest payments on past loans and engineering services to support the program. The City has established a city-wide maintenance shop, equipment shed, and material storage facility which surface water funds contribute to upkeep. The funds would also pay for long term purchases of maintenance equipment to continue to enable the City's ability to conduct most stormwater maintenance in house.

### *Recommended Program Implementation*

Existing administrative activities, interest payments, and fees are expected to remain generally constant. Additional activities that do not fit into other elements of the Stormwater Program will continue to require approximately 0.65 FTE annually. The City should budget approximately \$561,000 for overhead costs, contracted engineering and emergency repair, and other additional activities in the current Permit term. This includes a transfer of \$75,000 to the City's Equipment Replacement Fund for future equipment replacement. This is an increase of approximately \$22,000 over the previous Permit term representing the City's continued increase in takeover of activities currently conducted by King County.

## Stormwater Program Implementation Plan

The City's existing Stormwater Program already includes many of the required legal authorities, programmatic activities, services, and maintenance actions needed for compliance with stormwater regulations. Some of these activities will need to be enhanced or expanded for full compliance in the future with the current Phase II Permit. Table 3-1 provides a summary of the staffing and funding required for future Stormwater Program implementation. The detailed program analysis is included in Appendix 3-2.



## Section 3—Stormwater Program Analysis (continued)

Table 3-2—Summary of Existing and Recommended Future Stormwater Program Annual Expenses and FTE

Element	Existing Staff FTE	Existing Staff Cost (\$)*	Existing Expense Cost (\$)	Recommended Future Staff FTE	Recommended Future Staff Cost (\$)*	Recommended Future Expense Cost (\$)	Notes
1 – Comprehensive Stormwater Planning	0.00	N/A	N/A	0.05	\$5,476	\$14,400	Proposed new permit section. Expenses account for hiring a consultant to prepare comprehensive plan reports and SMAP.
2 – Public Education and Outreach	0.55	\$60,233.62	\$214,000	0.60	\$65,709	\$219,000	Increase reflects proposed new requirement for Community Based Social Marketing that will require staff training and additional program evaluation.
3 – Public Involvement and Participation	0.55	\$60,234	\$0	0.55	\$60,234	\$0	No change.
4 – MS4 Mapping and Documentation	0.10	\$10,952	\$40,000	0.12	\$13,142	\$40,000	Previously part of Illicit Discharge Detection and Elimination.
5 – Illicit Discharge Detection and Elimination	0.20	\$20,904	\$6,750	0.23	\$25,189	\$4,250	Expense decrease reflects less frequent use of King County staff as City capability improves.
6 – Controlling Runoff from New Development, Redevelopment and Construction Sites	1.50	\$164,274	\$19,475	2.00	\$219,031	\$19,475	Staff increase due to increase in drainage reviews and inspections.
7 – Operation and Maintenance	9.20	\$1,007,544	\$164,750	11.70	\$1,281,333	\$139,750	Increased staff expense reflects additional permit requirements and continuing workload increase. Expense reduction reflects continued shift in responsibility from outside contracts to City staff.
8 – Source Control for Existing Development	0.00	\$0.00	N/A	0.20	\$21,903	\$4,250	Proposed new permit requirement.
9 – Program Implementation	0.10	\$10,952	\$22,000	0.10	\$10,952	\$22,000	No change.
10 – Total Maximum Daily Load Allocations	N/A	N/A	N/A	N/A	N/A	N/A	No TMDLs apply to the stormwater program.
11 – Monitoring	0.05	\$5,476	\$32,500	0.05	\$5,476	\$24,000	City must pay in to regional monitoring program as required by NPDES.
12 – Reporting	0.10	\$10,952	\$5,000	0.10	\$10,952	\$5,000	No change.
<i>Subtotal</i>	<i>12.35</i>	<i>\$1,429,180</i>	<i>\$1,084,630</i>	<i>15.70</i>	<i>\$1,796,057</i>	<i>\$1,094,625</i>	<i>Subtotal for NPDES activities without CIP, regional planning, or additional activities staff costs.</i>

## Section 3—Stormwater Program Analysis (continued)

Element	Existing Staff FTE	Existing Staff Cost (\$)*	Existing Expense Cost (\$)	Recommended Future Staff FTE	Recommended Future Staff Cost (\$)*	Recommended Future Expense Cost (\$)	Notes
13 – Regional Watershed Planning	0.05	\$5,476	\$41,500	0.05	\$5,476	\$41,500	No change.
14 – Underground Injection Control Rule	N/A	N/A	N/A	N/A	N/A	N/A	No change.
15 – Capital Improvement Program	1.30	\$142,370	See Section 4	1.30	\$142,370	See Section 4	Program variable based on project development.
16 – Additional Activities	0.65	\$71,185	\$538,655	0.65	\$71,185	\$561,000	Increase accounts for shift in responsibility from King County and increase in workload over time.
<i>Subtotal</i>	<i>2.0</i>	<i>\$219,031</i>	<i>\$580,155</i>	<i>2.0</i>	<i>\$219,031</i>	<i>\$602,500</i>	<i>Subtotal for CIP, regional planning, and additional activities exclusive of CIP expenses.</i>
<b>Grand Total</b>	<b>14.35</b>	<b>\$2,656,180</b>		<b>17.70</b>	<b>\$3,031,553</b>		<b>Operating only; See Section 4 for CIP</b>

\*Staff cost is calculated based on average salary plus benefits for the Public Works Department Stormwater Management Division.

## Section 3—Stormwater Program Analysis (continued)

### *Recommended Short Term Implementation Activities*

Over the next year, City should continue to conduct all current activities established to comply with the current Permit including public education and outreach activities, public involvement and participation activities, development review, and regular maintenance activities. The City needs to complete the following activities in 2019 to maintain compliance with the current Permit:

- Conduct dry weather outfall inspections for illicit discharges and respond to complaints
- Review development, redevelopment, and construction applications for stormwater compliance.
- Conduct inspections to verify long term maintenance of private stormwater facilities
- Conduct inspections to assess condition of city-owned stormwater facilities
- Maintain city-owned stormwater facilities.
- Conduct planned inspections of 50% of catch basins
- Conduct quarterly Stormwater Pollution Prevention Plan (SWPPP) inspections and repairs as necessary for heavy equipment maintenance or storage yards and materials storage facilities

### *Recommended Long Term Implementation Activities*

Starting with the new permit effective date in 2019, the City will need to expand or enhance the Stormwater Program in the following ways to address increasing Permit requirements:

- Continue to evaluate contracted services and identify activities and equipment needs to expand the services that can be performed by City staff.
- Report to Ecology how stormwater needs and protection or improvement of receiving water health inform the planning update processes.
- Conduct a receiving water basin assessment and prioritization and develop a Stormwater Management Action Plan for one high priority area.
- Conduct a new evaluation of the existing behavior change program and implement and evaluate a strategy similar to Community-Based Social Marketing.
- Conduct MS4 mapping to include the size, type and material of all outfalls from the system and map all connections from the MS4 to privately-owned stormwater systems.
- Review the stormwater and development code as well as any additional documents to ensure they comply with the 2019 update to the SWMMWW or any resultant updated to the KCSWDM.
- Conduct an inventory of commercial and industrial properties that pose a potential for pollutant discharge to the MS4 and implement a source control inspection program of these properties.

### *Recommended Staffing Plan*

In the 2019 budget, the Stormwater Program funds 14.35 FTEs<sup>2</sup>. This includes:

- 0.45 FTE Public Works Director
- 0.40 FTE Assistant Public Works Director
- 0.5 FTE Department Assistant
- 1.55 FTE Civil Engineer II
- 0.80 FTE Civil Engineer II – SWM
- 0.50 FTE Street and SWM Maintenance Manager
- 1.00 FTE Community Environmental Education Specialist
- 1.00 FTE Stormwater Inspector
- 0.20 FTE Public Works Inspector
- 1.00 FTE Public Works Maintenance Worker III
- 4.00 FTE Public Works Maintenance Worker II
- 1.00 FTE Public Works Maintenance Worker I
- 2.00 FTE Maintenance Assistant – Temporary

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<sup>2</sup> The 2019 budget includes the hiring of seasonal staff to conduct additional maintenance activities. Seasonal hires are not included in the FTE calculations and are rather budgeted as an ongoing and recommended program expense.

## Section 3—Stormwater Program Analysis (continued)

The program analysis shows an overall need for 3.35 additional FTEs to support the Stormwater Program. Additional staff time is recommended in the following areas:

- Add 0.05 FTE to Civil Engineer for Comprehensive Planning
- Add 0.05 FTE to Community Environmental Education Specialist for Public Education and Outreach
- Add 0.02 FTE to GIS support for MS4 Mapping
- Add 0.03 FTE to Stormwater Inspector for IDDE inspections and enforcement
- Add 0.50 FTE to Civil Engineer for drainage review
- Add 0.50 FTE to Stormwater Inspector for Operations and Maintenance for private and city-owned facility maintenance inspections
- Add 2.00 FTE to Maintenance Worker for Operations and Maintenance storm drainage system
- Add 0.05 FTE to Civil Engineer for Source Control
- Add 0.05 FTE to Stormwater Inspector for Source Control
- Add 0.10 FTE to Maintenance Worker for Source Control

### *Recommended Stormwater Program Budget*

Table 3-1 shows that Programmatic activities presented in this section are expected to require \$3,031,553 annually starting in 2020, after the current Permit takes effect. This funding is necessary to meet minimum compliance requirements of the NPDES Phase II Permit and other regulatory obligations. The stormwater program budget could see the following significant changes in 2020, including both staffing and expenses:

- Increased costs to conduct the Comprehensive Planning reviews and planning processes at \$100,000 over the five-year permit term, approximately \$20,000 per year (Element 1)
- Increased cost for staff training and evaluation of the Public Education and Outreach program at \$10,000 per year (Element 2)
- Net increased cost for additional mapping requirements \$3000 per year (Elements 4 and 5)
- Increased cost to conduct permit review reflecting increase in workload and additional permit requirements at \$55,000 per year (Element 6)
- Increased cost to conduct additional conveyance system cleaning and keep up with increased workload at \$250,000 per year (Element 7).
- Increased cost to develop written plans and procedures for the City's Source Control inspections, conduct staff training, and perform inspections at \$10,000 to develop plans and procedures and \$14,000 per year for training and inspections (Element 8).
- Decreased cost for annual pay-in to the regional monitoring program reduced by \$8,000 per year (Element 11).
- Increased cost for additional activities and overhead created by continued decreased reliance on King County for inspections and maintenance activities at \$22,000 per year (Element 16).

The stormwater program will also fund the stormwater CIP program discussed in Section 4.

### *Additional Considerations*

This Program Analysis includes Stormwater Program costs based on the City's service area in 2019. The analysis does not evaluate the Stormwater Program requirements that would be needed to support potential future annexations. Stormwater program impacts should be thoroughly evaluated when planning for services in any future annexation areas. Adding service area to the City can affect the stormwater program by adding additional program area for NPDES Phase II Permit requirements, increasing the maintenance service area, increasing need for stormwater CIP projects to address aging infrastructure or to bring existing systems up to City standards, and bringing new liability for water quality issues in the annexation area. However, any new annexed area will also directly increase the stormwater program budget through the addition of new utility rate payers.





## Section 4—Stormwater Program Capital Needs

### Introduction

A major component of this SDMP is the development of an updated CIP projects list. The updated CIP includes projects that address flooding, infrastructure and water quality concerns, along with identifying long term stormwater and water quality studies.

Section 4 describes the CIP project development methodologies, including information sources, rating and ranking criteria for drainage concerns and the CIP project development process. This section provides a project description, sketch, and planning level cost estimate in 2019 dollars for the planning, design, permitting and construction of each CIP project. This section also provides a list of small works projects and water resource related studies to support the City's Stormwater Program.

The City's CIP projects will be funded by the City's stormwater utility (See Section 5). The City will also pursue grant funding, as appropriate, for the design and construction of the CIP projects. The City will use their annual budgeting process to update project priorities and select projects for design and construction.

### Stormwater System Inventory

Table 4-1 summarizes the stormwater and drainage-related infrastructure in the City of Burien. Information was generated from the City's stormwater inventory and is continually updated as new information comes available. See Figure 4-1 for the City's stormwater system map.

Table 4-1—Existing Inventory Summary

Table 4-1: Existing Stormwater Inventory*					
Type	Right-Of-Way	Parks	City Owned Property	Private Property	Total in City
Stormwater Ponds	0	2	13	47	62
Control Structures	71	4	12	256	343
Water Quality Structures	25	1	4	151	181
Vaults	32	1	4	187	224
Pump Stations	2	0	1	10	13
Catchments (catch basins, yard drains, manholes etc.)	6,176	155	155	4,176	10,662
Discharge Points (Outfalls, Infiltration)	41	27	30	107	205
Culvert (ft)	35,188	448	515	3,113	39,263
Ditch (ft)	115,026	2,005	2,337	21,459	140,82
Pipe (ft)	502,135	14,007	17,117	226,413	759,673
Swale (ft)	331	85	444	2,241	3,101
Other (ft)	4,469	979	1,083	10,370	17,502

\*As of September 23, 2019

### Recent Capital Improvement Projects

The City has completed capital improvement projects identified in the 2012 Storm Drainage Master Plan. Table 4-2 provides a brief summary of the recently completed projects. A master list of the current status of the CIP projects from the 2012 plan is included in Appendix 4-1.

## Section 4—Stormwater Program Capital Needs (continued)

Table 4-2—Completed Stormwater Capital Projects from the 2012 DMP

Table 4-2: Completed Stormwater Capital Projects from the 2012 Plan	
Project Title	Previously Listed Project Cost
Capacity Improvement at 4 <sup>th</sup> Ave SW	\$552,000
SW 165 <sup>th</sup> St between 16 <sup>th</sup> Ave SW and 19 <sup>th</sup> Ave SW	\$332,000
135 <sup>th</sup> St and 6 <sup>th</sup> Ave SW Drainage Improvements	\$154,000
SW 152nd and 8 <sup>th</sup> Ave SW Drainage Improvements	\$457,000

The City has also funded ongoing small works projects to address small problems that can be solved with simple solutions. These projects are generally designed by City staff and constructed by contractors on the City's Small Works Roster for under \$100,000. City maintenance staff also addresses stormwater infrastructure needs by replacing or adding catch basins, installing asphalt berms to direct stormwater runoff, and re-grading drainage swales and roadside ditches.

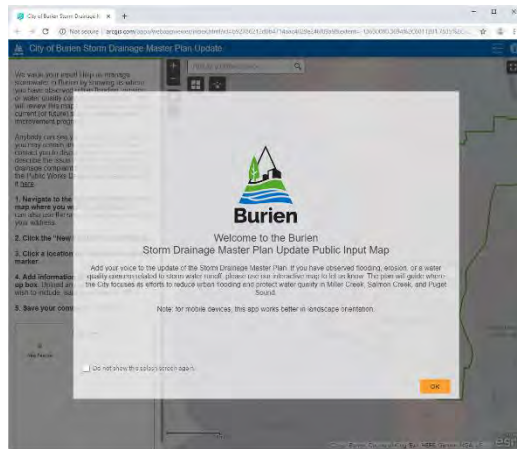
### CIP Development Process

The CIP development process includes the following four steps:

- Step 1: Problem Identification and Mapping
- Step 2: Categorize Drainage Concerns
- Step 3: Ranking of Potential CIP
- Step 4: Site Visits/Development of Capital Projects

The process of collecting, categorizing, and evaluating complaints is described below.

#### Step 1: Problem Identification and Mapping



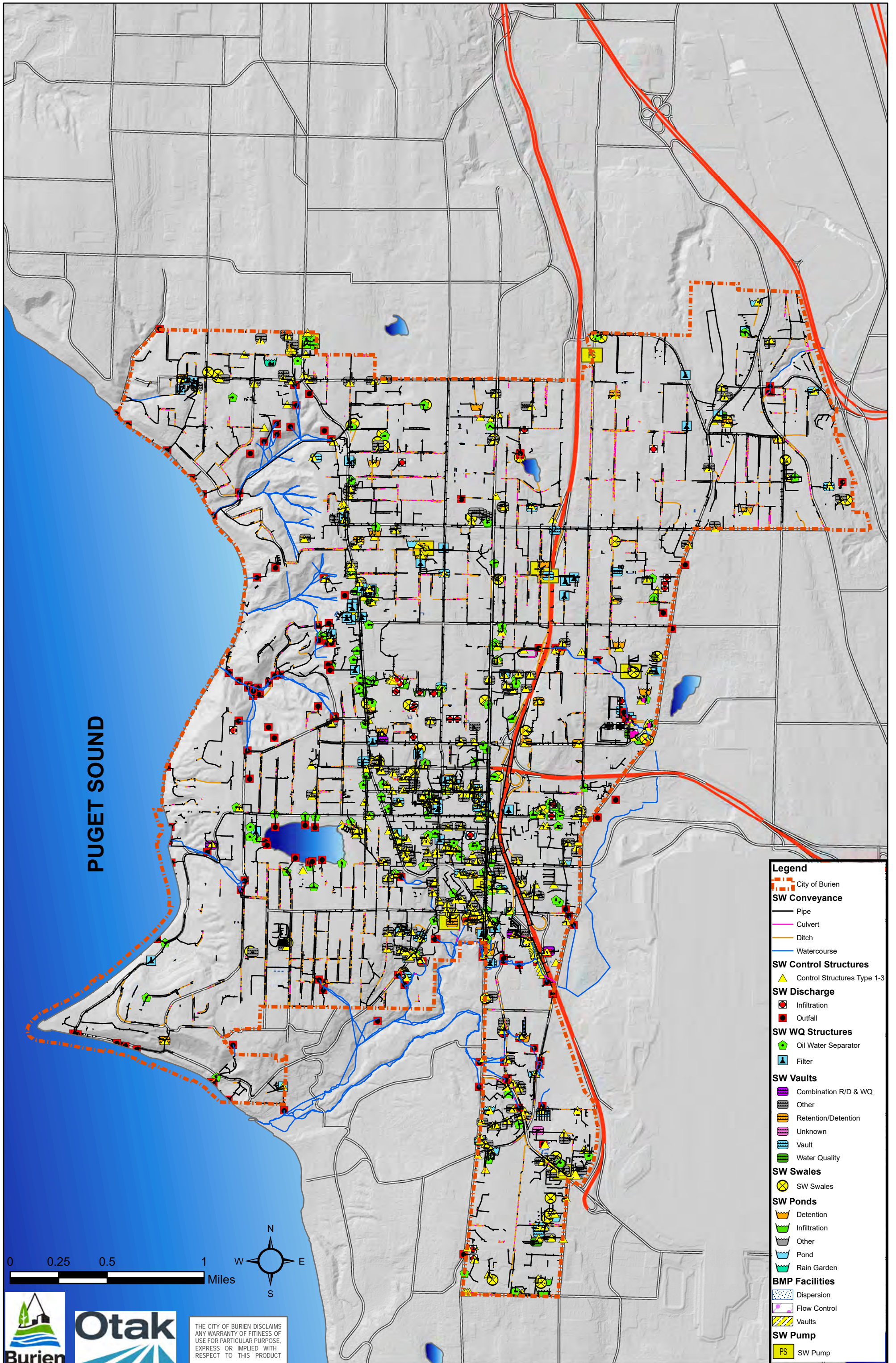
The first step in developing the CIP projects was to identify existing drainage concerns and problem areas throughout the City. To identify these areas, two different stormwater issue reporting databases were used, and the City requested public input via an online map. The first



database was a reported issue master list provided by the city. The second database was a list of issues that had been reported and categorized on the City's Azteca CityWorks application. The online public input map was advertised on the City's homepage and was available during 2019. The data collection resulted in the identification of 755 unique drainage complaints located across the City as summarized in Table 4-3. The problem report locations are shown on Figure 4-2 and described in detail in the evaluation matrix presented in Appendix 4-2<sup>1</sup>.

<sup>1</sup> The City's drainage complaint tracking database is constantly updated with new complaints received from residents and City staff. The CIP program presented in this SDMP was developed based on the drainage complaint database as of August 10, 2018. Future changes to the database may require adding or removing projects from the City's CIP program plan.





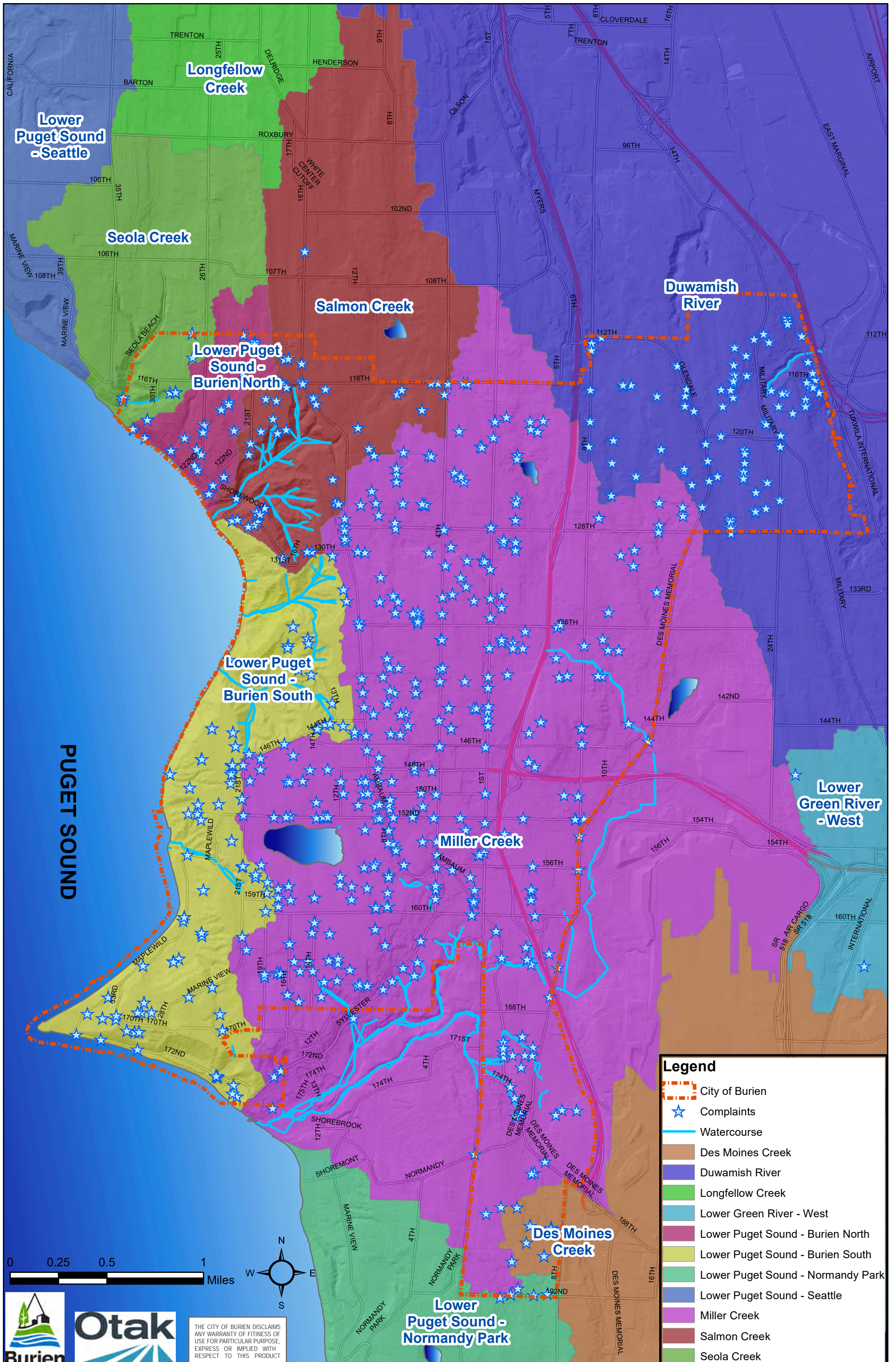
- Legend**
- City of Burien
  - SW Conveyance**
    - Pipe
    - Culvert
    - Ditch
    - Watercourse
  - SW Control Structures**
    - ▲ Control Structures Type 1-3
  - SW Discharge**
    - Infiltration
    - Outfall
  - SW WQ Structures**
    - ◆ Oil Water Separator
    - ▲ Filter
  - SW Vaults**
    - Combination R/D & WQ
    - Other
    - Retention/Detention
    - Unknown
    - Vault
    - Water Quality
  - SW Swales**
    - ⊗ SW Swales
  - SW Ponds**
    - ☰ Detention
    - ☰ Infiltration
    - ☰ Other
    - ☰ Pond
    - ☰ Rain Garden
  - BMP Facilities**
    - Dispersion
    - Flow Control
    - Vaults
  - SW Pump**
    - PS SW Pump











**Legend**

- City of Burien
- Complaints
- Watercourse
- Des Moines Creek
- Duwamish River
- Longfellow Creek
- Lower Green River - West
- Lower Puget Sound - Burien North
- Lower Puget Sound - Burien South
- Lower Puget Sound - Normandy Park
- Lower Puget Sound - Seattle
- Miller Creek
- Salmon Creek
- Seola Creek



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# Section 4—Stormwater Program Capital Needs (continued)

There were also 10 locations not identified in the drainage complaint database that were provided to Otak by City staff. These locations were observed drainage deficiencies that City staff had identified and requested be examined in greater detail. As these locations were not derived from drainage complaints, they were not categorized and rated with the issues determined from drainage complaints. However, they were ranked highly due to their high priority from the City, therefore several of these locations were investigated as potential capital improvement projects.

*Table 4-3—Number of Drainage Problem Reports by Source*

Table 4-3: Number of Drainage Problem Reports by Source (2012 – 2018)		
Source of Drainage Problem Reports	Description	Number of Complaints*
Azteca CityWorks Service Request Database	All stormwater service requests recorded through the City of Burien Azteca CityWorks database. Complaints were further broken up into categories (SW run-off issue, erosion damage, etc.)	610
City of Burien Master List Complaint Database	The City records resident drainage complaints within the City boundaries that are received by phone. All resident complaints that were received between 2012 and 2018 (after development of the last stormwater plan) were added to the complaint database.	254
City of Burien Staff Observed Drainage Deficiencies	Issues that City staff identified but had not been reported in either complaint database. These issues were not rated by the same criteria as issues from the complaints in both databases but were ranked highly and investigated due to City priority	10

\*Note that some complaints had multiple sources. There were a total of 755 unique complaints recorded.

## Step 2: Categorizing Drainage Concerns

The first step for categorizing drainage complaints was to remove any complaints that were determined to be private drainage issues. With these complaints removed, the next step in categorization was to isolate complaints that appeared to be driven by issues in the existing stormwater infrastructure as opposed to complaints driven by the volume of precipitation. Complaints removed were from particularly large storm events, which flooded many locations. For the current 5-year horizon, complaints generated from these events are not helpful in identifying problem locations.

The remaining six years of complaints were grouped by location. There were several instances of one property having multiple complaints over six years. There were also instances of multiple adjacent or nearby properties having similar types of complaints over the six-year period where complaints were grouped and evaluated as a single location. After discussion with City staff, it was determined that for locations to be considered for further analysis, a minimum of three complaints needed to have been registered at a given location over the six-year period. Using this procedure, 58 locations were analyzed further as potential capital improvement projects.



**Localized street ponding**

The next step in the desktop analysis was to categorize the 58 locations by recommended response to address the issues. Five different recommended responses were used: repair/replace existing infrastructure, perform maintenance on existing infrastructure, design and install a CIP, and further investigate the location to determine if a CIP is necessary to solve the issue. A fifth category stated that the issue at a given location had already been resolved. The 58 locations were categorized as shown in Table 4-4.

# Section 4—Stormwater Program Capital Needs (continued)

Table 4-4—Summary of Drainage Concern Categorization

Table 4-4: Summary of Drainage Concern Categorization		
Problem Category	Number of Locations	Description
Maintenance	14	Drainage concerns referred to City maintenance staff for further action.
Repair and Replace	5	These complaints require a repair or replacement of existing infrastructure that can be completed by City staff
Further Investigate Location	6	Drainage concerns that are yet to be confirmed by City staff. These areas require future tracking and observation during storm events to determine severity and complexity of the problem.
Completed	10	Drainage concerns had previously been addressed by City staff. No further action is required per desktop assessment.
Potential CIP	23	Drainage concerns that likely require more detailed study and/or a significant construction to address the problem.
<b>Total</b>	<b>58</b>	

The largest area of concern were locations that were determined to warrant investigation as potential CIP alternatives. As one of the screening criteria was a minimum of three complaints in the six-year period of complaints, it was expected that many of the locations would have issues that required a more robust improvement than could be completed through increased maintenance or by repairing and replacing existing infrastructure. It is also important to note that many of the potential CIPs were locations that had complaints from multiple properties as opposed to locations with a single property owner complaint.

## Step 3: Ranking of Potential CIP

The rating/ranking process utilized eleven criteria, grouped according to the three major concerns of the City: flood reduction hazard, environmental impacts, and strategic benefits, as shown in Table 4-5 on the next page. Each of the eleven criteria were weighted according to the City local priorities and concerns. Detailed scoring of each problem areas is provided in Appendix 4-2.



141<sup>st</sup> Street Facility

# Section 4—Stormwater Program Capital Needs (continued)

Table 4-5—Ranking Criteria for CIP Projects

Table 4-5: Ranking Criteria for CIP Projects			
General	Specific	Score Range	Weight
Flood Hazard Reduction	Flood Location Impacts	0 = No impact 3 = Impacts private property 5 = Impacts public streets (traffic, infrastructure and public safety)	4
	Flood Source	0 = No flooding 3 = Private Water 5 = Public Water	1
	Flood Frequency	1 = Flooding only during majors (10+-year event) 3 = Flooding every 2-5 years 5 = Flooding annually	3
	Flooding Extents	1 = Single property or isolated location within public right-of-way impacted 3 = Several (2-4) clustered properties or less than one city block of public right-of-way impacted 5 = Numerous (>4) clustered properties or greater than one city block of public right-of-way impacted	2
Environmental	Erosion	0 = No erosion 3 = Erosion with no public safety impact 5 = Streambank erosion or hillside erosion with public safety impact	2
	Existing Water Quality	1 = Significant (>50%) existing WQ treatment 3 = Minor (10% – 50%) existing WQ treatment 5 = Negligible (< 10%) existing WQ treatment	2
	Pollutant Source (as identified from CCAP data)	1 = Mostly low-density residential runoff 3 = Mostly medium-density residential runoff 5 = Mostly high-density residential / commercial runoff	1
	Habitat	0 = No habitat enhancement 3 = Enhance habitats of 1 to 2 species 5 = Enhance habitats of 3 or more species	1
Strategic Benefits	Certainty of Issue	0 = Issue can be solved by maintaining, repairing/replacing existing drainage infrastructure 3 = Issue warrants further investigation to determine if a CIP is warranted 5 = Issue will only be solved with a CIP	2
	Opportunistic	0 = One issue addressed that will not provide opportunity for grant funding 3 = Multiple issues addressed that will not provide opportunity for grant funding 5 = Multiple issues addressed that will provide opportunity for grant funding	1
	Public Visibility	1 = Issue and solution visible in low traffic residential areas (i.e. neighborhood cul-de-sac) 3 = Issue and solution visible in medium traffic areas (i.e. typical City streets) 5 = Issue and solution visible in high traffic areas (i.e. main arterials, parks, schools, downtown streets)	1
<b>Total Possible Score</b>			<b>100</b>



# Section 4—Stormwater Program Capital Needs (continued)

## Step 4: Development of Capital Projects

In the final step of the CIP development, the 58 locations were investigated to develop potential CIPs. A meeting was held with City staff to review the priority problem areas. Using the experience of staff and their knowledge of the City’s drainage infrastructure and recurring problem areas, the project team determined which locations warranted a field visit to analyze the existing drainage issues. Of the 58 locations, 13 were visited by Otak staff for drainage issue analysis. From these site visits, it was determined that four locations could be moved forward with CIP or small works projects. The remaining sites were determined to be lower priority CIPs to be further examined at a later date.

In addition to the issues examined from drainage complaints, seven observed drainage deficiencies locations provided by the City were investigated in the field. Six of these locations were moved forward with CIP designs.

Table 4-6 shows the seven new CIP projects, their costs and initial prioritization. Figure 4-3 shows the location of each new CIP project. CIP project sheets and cost estimates are included in Appendix 4-3.



**Catch basin installation**

**Table 4-6—Summary of CIP Projects**

Table 4-6: Summary of CIP Projects			
Project ID	Project Title	Project Description (see Appendix 4-1 for details)	Cost
CIP DR7	Stormwater Infrastructure Improvement at S 116 <sup>th</sup> Way	Improve stormwater collection and reduce erosion of the vegetated shoulder by extending the existing curb and replacing catchbasin inlets along the west side of S 166 <sup>th</sup> Way between 26 <sup>th</sup> Ave S and Tukwila International Blvd,	\$164,000
CIP DR13	Stormwater Infrastructure Improvement at Glendale Way S	Improve stormwater collection and reduce ponding on the west side of Glendale Way S between Des Moines Memorial Dr S and S 188 <sup>th</sup> St by either installing two new catch basins and connecting to existing storm drains or implementing LID infiltration.	\$38,000-\$264,000
CIP MW25	Stormwater Infrastructure Improvement at 2 <sup>nd</sup> Ave S between S 124 <sup>th</sup> St and S 128 <sup>th</sup> St	Install four new catchbasins at existing low points and connect to existing conveyance to improve stormwater collection and reduce ponding along 2 <sup>nd</sup> Ave S.	\$86,000
CIP SC4	Stormwater Infrastructure Improvement at 11704 Ambaum Blvd SW	Improve stormwater collection and reduce ponding along the ROW at 11704 Ambaum Blvd SW by installing a curb-inlet catchbasin and connecting to existing stormwater conveyances either across the roadway to the west by installing a lateral pipe, or to the north-east by installing a pipe following the ROW.	\$49,000-\$97,000

## Section 4—Stormwater Program Capital Needs (continued)

Table 4-6: Summary of CIP Projects			
CIP MW31	Stormwater Infrastructure Improvement on SW 152 <sup>nd</sup> St and 16 <sup>th</sup> Ave SW	Improve stormwater collection and reduce ponding along the south ROW of SW 152 <sup>nd</sup> St at 16 <sup>th</sup> Ave SW by either connecting to existing stormwater conveyances or installing an infiltration facility at the ponding location.	\$46,000-\$279,000
CIP MW32	Stormwater Infrastructure Improvement at 2 <sup>nd</sup> Ave SW and SW 124 <sup>th</sup> St	Improve stormwater collection and reduce ponding at the northwest corner of the intersection of 2 <sup>nd</sup> Ave SW and SW 124 <sup>th</sup> St by installing new catchbasins and pipe to connect to existing stormwater conveyances on SW 126 <sup>th</sup> St to the west and either connect to existing underperforming drywell to the proposed conveyance or abandon the existing drywell.	\$380,000-382,000
CIP MW33	Stormwater Infrastructure Improvement on 4 <sup>th</sup> Ave SW and SW 137 <sup>th</sup> St and SW 139 <sup>th</sup> St	Improve stormwater collection and reduce ponding at the intersections of 4 <sup>th</sup> Ave SW and SW 127 <sup>th</sup> St (NW and NE corner), and 4 <sup>th</sup> Ave SW and 129 <sup>th</sup> St (NW corner) by installing new catchbasins and pipe to connect to the existing stormwater conveyances on 4 <sup>th</sup> Ave SW.	\$88,000
	<b>Total</b>		<b>\$851,000 – 1,360,000</b>

Concept level projects were developed to address each of the problem areas. Project improvements include adding and upsizing inlets, replacing damaged pipes, adjusting lids, and installing new or retrofitting existing stormwater infrastructure (pipes, ditches, catch basins, berms, curb and gutter etc.). Project sketches and planning level quantity/cost estimates were developed using available GIS data and information documented during the field visit. More detailed topographic survey will be needed to develop full solutions and construction drawings for each CIP. The cost estimates were developed using average bid item costs from recent construction projects and the engineering judgment and construction experience of the consultant team.













In six additional locations the preferred solution is to conduct a more detailed study to clarify the source or extent of the problem and to develop a more extensive set of solution alternatives. Table 4-7 lists the proposed drainage studies and estimated study costs.

Table 4-7—Summary of Studies

Table 4-7: Summary of Studies			
Study Number	Project Title	Project Description	Cost*
Study 1	142 <sup>nd</sup> Street Depression Improvements	Two detention ponds are connected but have no outlet. During large rainfall events the ponds overflow and flood public ROW and adjacent private property. Further study, including geotechnical investigation to confirm infiltration capacity, is recommended to determine the preferred solution. Potential solutions include the retrofit of the existing ponds with infiltration, installation of a high flow bypass or addition of a pumped outlet.	\$200,000
Study 2 (CIP MW36)	Chelsea Park Neighborhood Bioretention Siting	Provide water quality treatment and create green spaces throughout the neighborhood by installing dispersed bioretention facilities where feasible. Further study needed to prioritize feasible locations.	\$65,000 per facility \$260,000 total (assumes four facilities)
Study 3	Large-scale ditch retrofit project (converting into bioretention, bioswales, infiltration trenches, etc.)	Provide water quality treatment by retrofitting existing ditches with bioretention, bioswales, or infiltration facilities. Further study needed to identify and prioritize feasible locations City-wide.	\$10,000 per facility \$100,000 total (assumes 10 facilities)
Study 4	Pretreatment or WQ retrofits on untreated outfalls City-wide	Provide water quality treatment at levels varying from pretreatment to enhanced treatment, at existing untreated outfalls across the City. Further study needed to identify and prioritize outfalls and determine treatment needs.	\$30,000 per facility \$300,000 total (assumes 10 facilities)
Study 5	Public-Private partnership for large-scale stormwater retrofits	Develop a program to identify and engage private property owners or developers on large-scale stormwater retrofit project, such as regional facilities.	\$>\$500,000
<b>Study Total</b>			<b>\$1,160,000</b>

\*Note: The cost opinion is in 2019 dollars and does not include future escalation, financing, or O&M costs.

Small works projects are projects that can be within the design capabilities of City Engineering staff and constructed by City Maintenance staff or contractors from the Municipal Research and Services Center (MRSC) roster of businesses eligible to perform small public works projects. Small Works projects have straightforward design solutions (no specialized analysis required) and an estimated construction cost of under \$100,000 per project. The list of current small works projects is included in Table 4-8. The City's small works project list is expected to expand as additional drainage complaints are received, categorized, and ranked according to the criteria presented in the SDMP.

## Section 4—Stormwater Program Capital Needs (continued)

Table 4-8—Summary of Small Works Projects

Table 4-8: Summary of Small Works Projects			
Small Works Project Number	Project Title	Project Summary	Cost*
Small Works Project BS3	Stormwater Infrastructure Improvement at SW 144 <sup>th</sup> PI	Replace the existing grate of CB2973, which is prone to clogging, with a vaned grate inlet, and extend the existing asphalt berm around the CB to direct runoff to the inlet.	\$4,000
Small Works Project SC2	Stormwater Infrastructure Improvement at 1598 SW 116 <sup>th</sup> St	Replace the existing grate of CB8168, which is prone to clogging, with a vaned grate inlet.	\$2,000
Small Works Project BS6	Stormwater Infrastructure Improvement at 14945 21 <sup>st</sup> Ave SW	Conveyance improvements to alleviate localized flooding along shoulder of 21 <sup>st</sup> Ave SW.	\$20,000
Small Works Project DR10	Stormwater Infrastructure Improvement at 11424 20 <sup>th</sup> Ave S	Conveyance system alignment adjustments to allow proper drainage from 20 <sup>th</sup> Ave S, to alleviate localized flooding of ditches.	\$50,000

\*Note: The cost opinion is in 2019 dollars and does not include future escalation, financing, or O&M costs.

### Miller and Walker Creek Basin Plan Projects

The CIP Development process also included a review of the 2006 Miller and Walker Creek Basin Plan to identify additional projects related to the City's Stormwater Program. The Miller-Walker Creek Basin Plan was published in collaboration with King County, WSDOT, Port of Seattle, Seatac, Burien and Normandy Park. This report outlined five major capital projects within the City of Burien, two of which have been completed and three which remain as potential future projects (Note: all costs listed are in 2006 dollars):

- Hermes Intake Line – Water Quality Project ; Cost Dependent on Type of Treatment
- Seattle City Light Property Detention and Water Quality Treatment Facility – 12 acre-feet Detention Pond; \$1.2 Million
- Ambaum Regional Detention Facility – 12.5 acre-feet Detention Pond; \$1.4 Million
- Miller Creek Concrete Weirs (COMPLETED) – Weirs were installed in Miller Creek Downstream of 1<sup>st</sup> Avenue South (City of Normandy Park)
- Walker Creek Headwaters Purchase (COMPLETED) – Property Purchase

The Ambaum Regional Detention Facility was expanded by 7.4 acre-feet in 2006 with funding from the City, WSDOT, and a State grant. The other projects in the Miller-Walker Creek Basin Plan will be evaluated as part of the City's renewed focus on basin planning and watershed studies. The City will continue to evaluate the needs within the Miller and Walker Creek Basins and has allocated funding for two studies to identify short- and long-term project needs (Study 1 and Study 2 in Table 4-7).

### Infrastructure Replacement Fund

The vast majority of the City's drainage infrastructure was constructed prior to incorporation and was previously managed and maintained by King County. Drainage system infrastructure typically has a 50-100 year design life. Based on the age of the surrounding neighborhoods, design life exceedance is a concern for large portions of the City's drainage system. The City has an ongoing program to replace existing pipes in coordination with roadway construction. However, with over 130 miles of publicly owned pipes and culverts, the cost to replace just one percent of the system is approximately \$350,000. This assumes that pipe replacement occurs concurrent with other roadway improvement projects, so that design and construction management costs can be absorbed into the larger project.

The CIP program includes establishing an Infrastructure Replacement Fund. The Stormwater Program will transfer approximately \$350,000 per year into the Infrastructure Replacement Fund, so that funding can

## Section 4—Stormwater Program Capital Needs (continued)

accumulate to upgrade existing stormwater infrastructure during future roadway improvement projects. Money from the Infrastructure Replacement Fund will then be used to construct the stormwater-related aspects of each project.

The infrastructure replacement fund may also be used to develop hydraulic models of the City's existing drainage infrastructure in order to prioritize system replacement in areas that require additional capacity.

### Capital Program Funding

Historically, the City's CIP projects have been funded by the City's stormwater utility and grants for specific projects. The amount of funding provided for stormwater-related capital projects varies from year to year, depending on the program revenue, activities, and priorities. For 2018, the City obligated \$1.5M to pay for capital projects from the stormwater utility fund.

The capital program proposed in this plan includes CIP Projects, Water Resource Related Studies, Small Works Projects, and the Infrastructure Replacement Fund. The proposed program, in conjunction with existing budgeted capital projects, is expected to require between \$1M and \$1.5M on an annual basis. The City will use the annual budgeting process to update priorities and select projects for design, construction or long-term planning. The City will continue to pursue grant opportunities to accelerate the rate of construction for stormwater related capital projects.



## Section 5—Watershed Health Considerations

### Background

The City is dedicated to protecting watershed health and enhancing water quality and natural resources. In compliance with NPDES Phase II Permit (Permit) requirements, the City has developed a Public Education and Outreach program focused on educating residents and business owners about their impact on the health of their watershed. This section describes in more detail some of the City's current and planned future activities focused on watershed health. Some of these actions are required, or will be required, by the Permit and some go above and beyond minimum permit requirements.

This is not a comprehensive list of watershed health considerations addressed by the City.

### Partnerships

#### Miller-Walker Creek Basin Steward

The City of Burien currently partners with King County, Normandy Park, SeaTac, and the Port of Seattle to fund the Miller-Walker Creek Basin Steward through King County. Funding a Basin Steward position was recommended in the Miller and Walker Creeks Basin Plan. The Basin Steward serves as a single point of contact for activities and information related to the basin. In addition, the Basin Steward provides educational materials on pet waste, native vegetation, controlling invasive weeds, and storm drain protection. The Basin Stewardship Program coordinates volunteer efforts for local stream restoration and tree planting projects, conducts monitoring programs, arranges presentations to school and community groups, and responds to reports of fish sightings, and non-emergency problems in local creeks. The Basin Steward is a StormFest Committee member.

Participation in the Miller and Walker Creek Basin Stewardship Program helps the City go above and beyond its Public Education and Outreach permit requirements (see Section 3).

#### Water Resource Inventory Area 9

Water Resource Inventory Area 9 (WRIA9) comprises the Green/Duwamish and Central Puget Sound watershed. Threatened Chinook salmon, bull trout, and steelhead rely on the watershed's rivers, streams, and the nearshore Puget Sound to spawn, hatch, rear, and live as juveniles. The City of Burien partners with the following 16 cities and counties to promote salmon recovery through watershed health initiatives in the basin:

- Algona
- Auburn
- Black Diamond
- Covington
- Des Moines
- Enumclaw
- Federal Way
- Kent
- Maple Valley
- Normandy Park
- Renton
- SeaTac
- Seattle
- Tacoma





## Section 5—Watershed Health Considerations (continued)

- Tukwila
- King County

### Northeast Redevelopment Area

In partnership with the Port of Seattle, the City has completed its Redevelopment Plan and Implementation Strategy for the 165-acre Northeast Redevelopment Area (NERA), located between 8<sup>th</sup> Avenue South, Des Moines Memorial Drive, and South 138<sup>th</sup> Street. As described in Section 2, the goal of the plan is to transform the NERA from a mixture of vacant, residential, public and small commercial land uses to uses compatible with Sea-Tac International Airport operations and existing and planned surrounding land uses.

The stormwater management plan and environmental enhancements implemented and planned for the NERA have a watershed health focus. Regional stormwater facilities rely primarily on infiltrating stormwater, while water quality and LID requirements will be provided on-site at redevelopment sites using bioretention or an equivalent BMP. Several environmental enhancements have been implemented or planned along Miller Creek. Several culverts have been replaced with fish passable versions, and a stream realignment and restoration project on West Fork Miller Creek will daylight the creek, improve water quality, add shade, and provide fish passage and habitat.

### Stormwater Management Action Planning

Stormwater Management Action Planning (SMAP) is a proposed new requirement of the upcoming Permit.

The SMAP concept developed from a disconnect identified between the goals of the Growth Management Act (GMA) and effects of NPDES requirements. One of the goals of the GMA is to densify urban areas and preserve habitat. The NPDES requirements were pushing development projects into lower-density areas where stormwater requirements were less expensive to meet. SMAP was developed to address this disconnect. SMAP focuses on addressing impacts of the collective development in a watershed rather than on the impacts from a single site or subdivision.



SMAP targets stormwater retrofits to protect and restore aquatic habitat in high-priority basins and receiving waters. Basins are prioritized based on factors likely to maximize the results of effort. Therefore, SMAP gives higher priority to the higher quality receiving waters within jurisdictions and to the basins where jurisdictions have the most influence. Once a basin is selected for planning, each jurisdiction will plan actions appropriate to the City's built environment and receiving waters.

The SMAP requirements are established in the Draft Permit and described in more detail in the Stormwater Management Action Planning Guidance published by Ecology (Guidance). The SMAP process consists of three major phases:

- Receiving Water Basin Assessment
- Receiving Water Basin Prioritization
- Stormwater Management Action Planning

Some of the project and studies recommended in Section 4 of this plan can satisfy a portion of this upcoming Permit requirement.

## Operations and Capital Program

The City's Stormwater Program and stormwater capital improvement program (CIP) are focused on promoting watershed health. The Stormwater Program activities described in Section 3 are designed to protect and improve water quality under the Federal Clean Water Act. Specific activities include:

- Public Education and Outreach efforts focused on proper car wash methodology as well as the distribution of car wash kits to protect water quality during charity car wash events
- Illicit Discharge Detection and Elimination screenings and investigations to identify sources of pollution entering the public stormwater system
- Water quality audit program to evaluate local business practices with respect to water quality impacts
- Ongoing development review to ensure that proposed development and redevelopment activities are in compliance with the stormwater management standards to reduce runoff and protect water quality
- Inspection of stormwater management facilities to identify maintenance concerns
- Ongoing maintenance program to keep stormwater management facilities in proper working order and to remove sediment and pollutants accumulated in catch basins
- Participation in regional watershed planning efforts



The City's CIP also includes specific water quality enhancement projects, as well as watershed-based studies to identify additional opportunities to upgrade or retrofit the existing public infrastructure to promote watershed health. The City is joining efforts with local organizations and residents to improve the health of the streams and natural habitats.



## Section 6—Summary and Recommendations

### Overview

The purpose of this study was to identify the future needs of the City’s Stormwater Program including documenting areas where drainage and water quality can be improved, updating the stormwater capital improvement program (CIP) project list and identifying the actions and staff demands for both the current and future regulatory requirements. This Storm Drainage Master Plan (SDMP) outlines programmatic, operational, and capital construction activities to guide the City’s stormwater program over the next five to ten years.

### Recommended Program

Table 6-1 summarizes the City’s recommended annual Stormwater Program. The recommendations are based on the analyses presented in the program analysis in Section 3 and the CIP in Section 4. Stormwater program costs assume full implementation of the NPDES Phase II Municipal Permit (Permit) that became effective in 2019.

**Table 6-1—Recommended Annual Stormwater Program**

Table 6-1: Recommended Annual Stormwater Program		
Stormwater Program Element	Annual Cost (2018 Dollars, Averaged over Five Years)	Notes
SWM Program (NPDES Compliance and Maintenance)	\$3,031,553	Adds 3.35 FTE to meet future Permit requirements and accommodate increasing inventory of drainage infrastructure and increasing number of drainage review and associated inspections. Adds Comprehensive Stormwater Planning element. Adds Source Control for Existing Development element.
Capital Program Funding		
CIP Projects	\$170,200 – 272,000	Constructs seven projects over 5-year period. Additional projects identified through watershed studies.
Studies	\$232,000	Funds more detailed studies to clarify and develop alternatives in six locations
Small Works Projects	\$100,000	Design and construction of projects with costs under \$100,000 per project in response to drainage complaints
Infrastructure Replacement Fund	\$350,000	Cost to replace one percent of the drainage system infrastructure
<b>Annual Program Total</b>	<b>\$3,883,753 – 3,985,553</b>	

The Stormwater Program is funded through the City’s Surface Water Management Fund. The City’s Stormwater Program is driven by activities required by the Permit, and required activities constitute approximately 65 percent of the total recommended Surface Water Management Fund budget. The remaining budget funds the City’s stormwater CIP.

The Surface Water Management Fund makes annual transfers to the City general fund to support the City’s GIS and Information Technology services, the Equipment Replacement Fund for future equipment replacement, and to the Surface Water Management Capital Improvement Program fund. Spending from the capital construction fund varies annually based on the City’s priorities, which are set by Council and the Public Works Director.

## Stormwater Program Funding

The City's Stormwater Program is funded by the City's storm drainage fees, stormwater facility connection fees, and grants for specific activities and projects. The 2019 Surface Water utility revenue is expected to be \$3,558,000. As program costs increase, additional funding may be needed to implement required regulatory programmatic activities, implement administrative needs of the program, maintain existing infrastructure, and construct capital projects to address drainage and water quality problem areas. The City will use this SDMP as the basis to evaluate stormwater program funding sources, update program priorities, and select projects for design, construction or additional study. The City will continue to pursue grant opportunities to enhance operations and accelerate the rate of construction for stormwater related capital projects.



## References

**2011-2012 Adopted Budget, For the biennium January 1 2011 through December 31, 2012. City of Burien.**

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## **Appendix 1-1**

Appendix 1-1: Comprehensive Plan Storm Water Element



## 2.8 STORM WATER ELEMENT

### ***Goal ST.1***

***Manage stormwater runoff in such a manner as to:***

- ***protect steep slopes, streams, wetlands and shorelines from erosion and sedimentation to avoid the degradation of environmental quality, wildlife habitat, and natural system aesthetics;***
- ***preserve, protect, and restore natural habitat critical for the conservation of salmonid species listed under the federal ESA;***
- ***protect the quality of surface water and groundwater;***
- ***provide recharge of groundwater where appropriate; and***
- ***ensure natural control mechanisms are preferred, where appropriate.***

### Managing Stormwater (General)

- Pol. ST 1.1 The City shall separately adopt a detailed Storm Drainage Master Plan to implement these stormwater policies based on this comprehensive plan. This plan shall:
- a. Provide a plan of drainage improvements and regulatory actions that will reduce or eliminate local erosion, landslide and flooding problems in Burien, thereby protecting existing and future development and property values;
  - b. Provide protection from erosion, landslides and flooding in the Puget Sound basins where perennial and seasonal streams exist, and also protect these streams from the impacts of urban runoff;
  - c. Provide for the long-term protection and restoration of Miller Creek Basin as a viable fish habitat and a natural amenity for the urban area. Require higher detention and water quality standards for development within this basin because it supports a federally listed species.
  - d. Provide long-term protection and restoration of Salmon Creek Basin, as a viable fish habitat and a natural amenity for the urban area. Require higher detention and water quality standards for development within this basin because it supports a federally listed species.
  - e. Encourage developers to incorporate into site planning various environmentally sensitive approaches to stormwater management, including low-impact development techniques, and preservation and restoration of natural landforms.

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Note: Policy numbers may not be consecutive. Through the Comprehensive Plan amendment process, some policies have been deleted from this chapter while existing policy numbers have retained their original sequence. Information on past Comprehensive Plan amendments is available at the City of Burien Community Development Department.

- Pol. ST 1.2 The City should encourage regional approaches to managing stormwater to provide improved performance, maintenance and cost efficiency. Land should be acquired that is adequate for the development of regional detention and water quality facilities.
- Pol. ST 1.3 Wherever possible, stormwater facilities should be considered as a multi-functional community resource which provides other public benefits such as recreational, habitat, cultural, educational, open space and aesthetic opportunities.
- Pol. ST 1.4 Stormwater retention/detention facilities may be allowed to be used as partial fulfillment of open space requirements, where the facility provides significant recreation and open space amenities. In determining the degree to which this is allowed, consideration shall be given to the nature of the development. Where the development is non-residential, a greater percentage may be allowed for fulfillment. Commercial development shall make retention/detention facilities part of a more extensive landscaping. These facilities should be designed as an amenity, particularly in commercial developments, and to ensure the safety of its users.
- Pol. ST 1.5 A watershed approach should be taken to surface water management, with responsibility shared among the City and other contributing jurisdictions. This approach should emphasize:
- a. Prevention of water quality degradation through implementation of Best Management Practices and educational programs to reduce pollution entering surface waters;
  - b. Reduction of volumes and duration of urban flows to prevent flooding and erosion;
  - c. Cost sharing;
  - d. Consistency with the City's risk management practices; and
  - e. Maintenance and restoration of stream habitat for habitat preservation and enhancement.
  - f. Coordinated, knowledge based management decisions.

#### Protecting Natural Drainage Systems

- Pol. ST 1.6 Development shall be designed and constructed to minimize disruption and/or degradation of natural drainage systems and the habitat they provide, both during and after construction. Development design which minimizes impervious surfaces through the use of appropriate low-impact development techniques, such as by limiting site coverage and maximizing the exposure of natural surfaces for the infiltration of water shall be required.

- Pol. ST 1.7 Stormwater shall be detained and infiltrated on-site where possible. If on-site detention and infiltration is not possible, stormwater shall be detained so that the release rate is equal to or less than predevelopment or natural conditions. Any release must be to an approved drainage system, either natural or constructed, as approved by the City.
- Pol. ST 1.8 As part of its review process, the City shall consider the impacts of stormwater runoff from new development on the City's natural drainage systems, and require any appropriate mitigating measures. When redevelopment occurs, and the amount of impervious surface increases, the City shall require existing development to be retrofitted with stormwater management facilities. Criteria for implementing this policy should also be developed using a threshold approach patterned after SEPA requirements.
- Pol. ST 1.9 The City shall require development to provide off-site improvements necessary to avoid adverse downstream impacts.

#### Protecting Water Quality

- Pol. ST 1.10 In the interest of the residents of Burien, the Puget Sound area and adjoining communities, the City will protect the quality of surface water bodies that are located within drainage basins of the City.
- Pol. ST 1.11 The City will encourage all City residents and require businesses to implement Best Management Practices to prevent erosion and sedimentation from occurring, and to prevent pollutants from entering ground or surface waters to maintain natural aquatic communities and beneficial uses.
- Pol. ST 1.12 The City shall establish enforcement mechanisms that may be used to prevent or stop contamination to surface water quality, as well as to implement all City stormwater policies. Enforcement mechanisms should address surface water contamination, including surface water flows. Through intergovernmental coordination, the city will seek similar enforcement mechanisms for all waters through or into the City from up to five miles from its corporate limit.
- Discussion:** The City currently does not have an adopted water quality ordinance.
- Pol. ST 1.13 The City shall incorporate facilities such as detention ponds, bioswales, wetlands, and other natural drainage facilities to improve the water quality of surface water runoff from existing and new roadway improvements.



## Providing Groundwater Recharge

- Pol. ST 1.14 Where infiltration will not adversely effect down gradient properties, infiltration of stormwater is preferred over surface discharge to a natural stream system. The return of precipitation to the soil at natural rates near where it falls should be encouraged through the use of infiltration mechanisms, including but not limited to well designed open drainage systems, infiltration ponds, detention ponds and grass lined swales.
- Pol. ST 1.15 The City should use Geographic Information Systems (GIS) and other analysis tools to assist in determining appropriate locations for implementation of low impact development techniques that are complementary to their respective geographic context. The resulting analysis (document/map) should be made available to the public to increase education and awareness of best storm water management practices. (Amended, Ord. 497, 2008)

### ***Goal ST.2***

***Ensure that standards used for the design and development of stormwater drainage systems reflect and support the character of adjacent development and the stormwater, land use, and environmental protection goals of the City.***

- Pol. ST 2.1 Appropriate stormwater management practices shall be employed to prevent stormwater problems from urban runoff, which may include flooding, erosion, or stream channel scouring in natural drainage systems. These practices at a minimum should include the collection, control and treatment of storm water runoff at a rate and quantity that will prevent damage to both man-made and natural drainage systems. One or a combination of the following three approaches can be used to managed excessive storm water runoff:
- a. Collect, control, and treat stormwater runoff to a level that will prevent damage to the natural drainage system and restore the ability of the natural drainage system to function as a productive biosystem; and/or
  - b. Remove excessive stormwater runoff from the natural drainage system by artificial means such as bypass systems in accordance with SEPA or other adopted plans, regulations or regional programs.
  - c. Repair/retrofit private storm drainage lines that route City stormwater to prevent damage to both man-made and natural drainage systems.
- Pol. ST 2.2 The following guidelines shall be used to develop stormwater quantity and quality standards within the City:
- a. *Multifamily and Moderate Density Single Family Neighborhoods:* The City shall require new development, as well as redevelopment projects involving external construction that may have drainage implications, to comply with full urban stormwater drainage

standards. Seek to implement stormwater management, including low-impact development standards, which require all development proposals to establish systems, preferably natural, for filtering the “first flush” (delivery of disproportionately large amounts of pollutants which occur during the early stages of the storm) of urban runoff near its source. The standards should also address maximum impervious lot coverage. Where appropriate, the Director of Public Works may modify these standards but only to the extent that runoff quantity and quality levels are maintained.

- b. *Commercial and Industrial Areas:* The City shall require new development, as well as redevelopment projects involving external construction that may have drainage implications, to comply with full urban stormwater drainage standards, as described above.
- c. *Low Density Single Family Neighborhoods:* The City shall allow low-impact development techniques that are appropriately designed to match the character of adjacent land uses, such as allowing well designed, open drainage systems which increase the amount of infiltration of rainfall as it occurs, as opposed to gutters and pipes which do not provide infiltration. (Facilities on arterials in these areas may require full urban stormwater drainage standards.)
- d. *Low and Moderate Density Single Family Neighborhoods located in landslide hazard areas, on steep slopes, or in erosion hazard areas (as defined in the City’s Environmentally Sensitive Areas Ordinance), or in areas with existing or potential drainage problems:* The City shall require new development, as well as redevelopment projects involving external construction that may have adverse impacts on the stormwater drainage system, to comply with stormwater drainage standards that include on-site drainage controls. (Facilities on arterials in these areas may require full urban stormwater drainage standards.)

Pol. ST 2.3. The City shall develop and adopt regulations to supplement the adopted King County Surface Water Design Manual to ensure that any clearing, grading or the addition of impervious area in steep slopes or landslide hazard areas (or projects that drain or discharge into such areas) be reviewed for drainage implications and regulated accordingly.

Pol. ST 2.4 Design and construction standards for development should address rate of discharge, water quality, method and point of discharge, and method of storm drainage control.

Pol. ST 2.5 Design and construction standards for development should require the use of temporary erosion and sedimentation control measures that minimize the transport of sediment to drainage facilities, water resources, and adjacent properties.

- Pol. ST 2.6 Stormwater conveyance systems for proposed projects must be analyzed, designed and constructed to accommodate stormwater runoff originating off-site that are conveyed onto the project site, as well as runoff from the project itself. Encourage the use of semi-pervious or pervious surfaces, and other low-impact development techniques to ensure that stormwater discharge from the site occurs at the natural location.
- Pol. ST 2.7 The City shall enact ordinances and review development and redevelopment proposals in a manner which controls the duration and discharge of storm water from new development. At a minimum, peak discharge shall not exceed the rate of the predevelopment or natural conditions.
- Pol. ST 2.8 Maintenance of all drainage facilities constructed or modified by a proposed project becomes the responsibility of the property owner. The City of Burien may assume maintenance of all approved drainage facilities constructed for formal plat subdivisions, planned unit developments, and short plat subdivisions two years after construction approval and upon assurance that they are in working order.
- Pol. ST 2.9 The City shall not convert any pervious residential driveways to impervious surfaces following completion of a stormwater improvement or capital improvement project, unless the residential driveway was impervious prior to the commencement of the project.
- Pol. ST 2.10 Increase the overall coverage of tree canopies and other vegetation in the City by encouraging new site development and retrofit plans to include provisions for the addition or preservation of trees and vegetation.
- Pol. ST 2.11 Implement public educational programs encouraging homeowners to use development modifications to reduce stormwater impacts. The program should distribute materials to the community or conduct outreach activities about the impacts of stormwater discharges on water bodies and the steps the public can take to reduce pollutants in stormwater runoff.
- Pol. ST 2.12 The public shall be involved in creating, implementing, and updating the storm/surface water management program. Municipalities should make efforts to reach out and engage all economic and ethnic groups.
- Pol. ST 2.13 The City shall enforce a program to detect and eliminate illicit discharges into the city's stormwater system, including illegal dumping to the system.
- Pol. ST 2.14 Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.

**Goal ST.3**

***Minimize the risk to property and residents from flooding hazards.***

Pol. ST 3.1 Flood prone properties outside of the floodway are developable provided that such development can meet the standards set forth in the federal flood insurance program.

***Discussion:*** The general location of areas within the 100-year floodplain is depicted on the City's environmentally sensitive areas map.

Pol. ST 3.2 Site plan review shall be required under SEPA for all development in the flood plain, including single family development, short plats and redevelopment. Appropriate mitigating measures shall be required whenever needed to reduce potential hazards.

Pol. ST 3.3 Any development within the floodway, which would reduce the capacity of the floodway or create risks to property, shall be prohibited.





## **Appendix 3-1**

Appendix 3-1: Upcoming Draft NPDES Phase II Permit Review Memo





## Memorandum

**To:** Dan O'Brien, City of Burien Stormwater Engineer  
**From:** Cody Kent  
**Copies:** File  
**Date:** 3/27/2019  
**Subject:** New Draft NPDES Phase II Permit Review  
**Project No.:** 32995

The purpose of this memo is to summarize the major changes between the current NPDES Phase II Permit and the draft NPDES Phase II Permit published in August of 2018.

### Summary Overview of New Activities and Changes in the Permit

- New permit condition requiring comprehensive stormwater planning.
- Report how stormwater management needs and protection/improvement of receiving water health are informing the planning update process and influencing policies and implementation strategies.
- Continue to require LID principles and BMPs in local codes, rules, and standards.
- Annually assess and report to Ecology on barriers to implementation of LID principles and BMPs.
- Conduct Receiving Water Basin Assessment and Prioritization to identify high priority areas for Stormwater Management Action Planning.
- Develop a Stormwater Management Action Plan for at least one high priority area.
- Conduct a new evaluation of effectiveness of the ongoing behavior change program.
- Use social marketing practices to develop a strategy and schedule to more effectively implement the existing program, expand the existing program to a new target audience or BMPs, or initiate a new target audience and BMP behavior change campaign.
- New permit condition separating MS4 mapping from IDDE.
- New stormwater mapping: size and material of MS4 outfalls and location of connections from the MS4 to private stormwater systems.
- New permit condition requiring a source control program for existing development.
- Adoption of local ordinance requiring application of source control BMPs and if necessary treatment BMPs to pollution generating sources associated with existing land uses and activities.
- New inspection of pollutant generating sources at publicly and privately owned commercial and industrial properties to enforce implementation of required source control and treatment BMPs.
- Implement practices to reduce polluted runoff from the application of pesticides, herbicides, and fertilizer discharging into the city's MS4.
- Pay-in option for: Status and Trends Monitoring, Effectiveness Studies, and Source Identification and Diagnosis Information Repository. Pay in costs for Burien total \$23,703 annually.
- Annual reports must be submitted electronically using Ecology's Water Quality Permitting Portal (WQWebPortal).

## Detailed Summary of New Activities and Changes in the Permit

Below is a summary of the new activities and changes in the Permit by major element.

### NEW Condition S5.C.1, Comprehensive Stormwater Planning

- New permit condition requiring comprehensive stormwater planning.
- Report how stormwater management needs and protection/improvement of receiving water health are informing the planning update process and influencing policies and implementation strategies.
- Continue to require LID principles and BMPs in local codes, rules, and standards.
- Annually assess and report to Ecology on barriers to implementation of LID principles and BMPs.
- Conduct Receiving Water Basin Assessment and Prioritization to identify high priority areas for Stormwater Management Action Planning.
- Develop a Stormwater Management Action Plan for at least one high priority area.

### Condition S5.C.2, Public Education and Outreach

- Conduct a new evaluation of effectiveness of the ongoing behavior change program.
- Use social marketing practices to develop a strategy and schedule to more effectively implement the existing program, expand the existing program to a new target audience or BMPs, or initiate a new target audience and BMP behavior change campaign.

### Condition S5.C.3, Public Involvement and Participation

No new public involvement and participation requirements.

### NEW Condition S5.C.4, MS4 Mapping and Documentation

- New permit organization separating MS4 mapping from IDDE.
- New stormwater mapping: size and material of MS4 outfalls and location of connections from the MS4 to private stormwater systems.

### Condition S5.C.5, Illicit Discharge Detection and Elimination

- Submit data in the annual report for all of the illicit discharges, including spills and illicit connections that were found by, reported to, or investigated by the Permittee during the previous calendar year.

### Condition S5.C.6, Controlling Runoff from New Development, Redevelopment, and Construction Sites

- Make available the link to the electronic *Construction Stormwater General Permit* Notice of Intent (NOI) form for construction activity and the *Industrial Stormwater General Permit* NOI form for industrial activity to representatives of proposed new development and redevelopment.

### Condition S5.C.7, Operations and Maintenance

- As necessary, update maintenance standards by December 31, 2021.
- Verify long-term maintenance of private stormwater treatment and flow control BMPs regulated by the city.
- Maintain staff training records that include dates, activities or course descriptions, and names and positions of staff in attendance.

- Implement SWPPPs for all heavy equipment maintenance and storage yards owned and operated by the city that includes: a detailed description of operation and structural BMPs in use at the facility, annual inspections of the facility, an inventory of materials and equipment stored on site, a site map showing the facilities stormwater drainage, and a plan for responding to spills at the facility.

## NEW Condition S5.C.8, Source Control for Existing Development

- Implement a program to prevent and reduce pollutants in runoff from areas that discharges to the city's MS4.
- Adopt an ordinance requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities by August 1, 2022.
- Establish an inventory of publicly and privately owned commercial and industrial properties which have the potential to generate pollutants to the city's MS4 by August 1, 2022.
- Implement an inspection program for sites identified in the inventory by January 1, 2023.
- Implement a progressive enforcement policy that requires sites to comply with source control requirements within a reasonable time period by January 1, 2023.
- Establish an ongoing program to train staff responsible for implementing the source control program.

## Monitoring

No new monitoring requirements.

## Reporting

- Annual reports must be submitted electronically using Ecology's Water Quality Permitting Portal (WQWebPortal).

## TMDLs

The City of Burien has no TMDL requirements.





## **Appendix 3-2**

Appendix 3-2: Stormwater Program Gap Analysis



## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments	
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments		
<b>Permit Element #55.C.1, Comprehensive stormwater planning.</b>											
Each Permittee shall implement a Comprehensive Stormwater Planning program to inform and assist in the development of policies and strategies as a water quality management tools to protect aquatic resources. Permittees shall conduct a similar process and consider the range of issues outlined in the Stormwater Management Action Planning Guidance (Ecology, 2018). Each Permittee shall convene an interdisciplinary team to inform and assist in the development, progress, and influence of this program.											
55.C.1.a New permit requirement	Coordination with long-range plan updates	i. Each Permittee shall describe, in a report, how stormwater management needs and protection/improvement of receiving water health are informing the planning update processes and influencing policies and implementation strategies in their jurisdiction. The report shall describe the water quality and watershed protection policies, strategies, codes, and other measures intended to protect and improve local receiving water health. (a) On or before March 31, 2020, the Permittee shall describe how water quality and watershed protection were addressed during the 2013-2018 permit cycle in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state mandated long-range land use plans that are used to accommodate growth, or transportation.	Report how stormwater management and conservation of receiving waters are informing planning, policies, and implementation strategies.	3/31/2020	New permit requirement		Prepare a report describing how water quality and watershed protection were addressed during the 2013-2018 permit cycle in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state mandated long-range land use plans that are used to accommodate growth, or transportation.	0.00	The city will need to collect and review the existing Comprehensive Plan and similar long range land use plans and describe how stormwater management and conservation of receiving waters are informing planning. The city may wish to hire a consultant to write this report.		
		(b) On or before March 31, 2022, the Permittee shall describe how water quality and watershed protection are being addressed during this permit cycle in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state-mandated long-range land use plans that are used to accommodate growth, or transportation.	Report how water quality and watershed protection are being addressed in updates to the Comprehensive Plan and other long-range plans.	3/31/2022	New permit requirement		Prepare a report describing how water quality and watershed protection are being addressed during this permit cycle in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state-mandated long-range land use plans that are used to accommodate growth, or transportation.	0.00	The city will need to describe how stormwater management A1land conservation of receiving waters are informing updates to the Comprehensive Plan and similar long range land use plans. If the city hires a consultant to write these plans, the city may wish to include this report as part of the project scope.		
55.C.1.b	55.C.4.a Low Impact Development Code-Related Requirements	i. Permittees shall continue to require LID Principles and LID BMPs when updating, revising, and developing new local development related codes, rules, standards, or other enforceable documents, as needed. The intent must be to make LID the preferred and commonly-used approach to site development. The local development-related codes, rules, standards, or other enforceable documents must be designed to minimize impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations. (a) Annually, each Permittee shall assess and report any newly identified administrative or regulatory barriers to implementation of LID principles or LID BMPs and measures to address the barriers since local codes were updated in accordance with the 2013-2018 Permit cycle (extended to July 31, 2019). The report shall also describe mechanisms developed to encourage or require implementation of LID principles or LID BMPs.	Continue to require LID Principles and LID BMPs in new development related, codes, standards, etc. Annually assess and report any new barriers to LID and measures to encourage or require LID.	Annually	The 2013-2018 permit required the City to incorporate requirements to use LID principles in development and redevelopment projects and report the results of the revision process. On November 7, 2016, the City adopted four ordinances to require LID.	2018 SWMP Plan Website Burien Permit Compliance Matrix	SWM Engineer	0.00	The city will need to write a memo or other document describing new barriers to LID implementation and new implementation measures for the Annual Report. This memo should be a low effort product similar to the current IDDE response report (current permit requirement 55.C.3.d.iv)	0.01	The LID code update process is currently organized under Controlling Runoff from Development, Redevelopment and Construction activities. This process was completed in 2016, and the effort was shifted to implementing the LID Code changes.
55.C.1.c New permit requirement	Stormwater Management Action Planning	i. Receiving water basin assessment. Permittees shall document and assess existing information related to local receiving waters and contributing area conditions to identify receiving waters that will benefit from stormwater management planning. Permittees may choose to meet this permit requirement individually, or as part of a regional effort. Where significant gaps in the state of knowledge exist, a plan and protocol should be developed to improve the assessment.  ii. Receiving water basin prioritization. Informed by the assessment of receiving waters developed above, Permittees shall develop a prioritization method and process to identify and rank areas where the receiving waters receive a benefit from implementation of stormwater facility retrofits and management actions to reduce pollutant loading and address hydrologic impacts from existing development. No later than June 30, 2022, each Permittee shall develop and follow a prioritization process based on local and regional information. (a) Based on conditions in the receiving waters, and the assessment of influence of stormwater management strategies and actions, rank the receiving waters based on priority. The Permittee must document the priority ranking process used to identify high priority areas. The Permittee may reference existing local watershed management plan(s) as source(s) of information or rationale for the prioritization. (b) The prioritization effort shall identify and rank areas where the receiving waters would receive a benefit from implementation of stormwater facility retrofits and targeted or customized implementation of stormwater management actions related to permit sections within 55.C: • IDDE field screening • Prioritizations of Source Control inspections • O&M inspections or enhanced maintenance (for facilities owned or operated by the Permittee, including maintenance that requires capital construction of more than \$25,000), or • Public Education and Outreach behavior change programs. (c) Identify and document a process and schedule to provide future assessment and feedback designed to improve the planning process and implementation of procedures or projects.	Document and assess existing information related to local receiving waters and contributing area conditions to identify receiving waters that will benefit from stormwater management planning. Permittees may choose to meet this requirement individually or as part of a regional effort.  Based on this assessment prioritize and rank areas where the receiving waters would receive a benefit from stormwater facility retrofits and management actions.  Identify and document a process and schedule to provide future assessment and feedback designed to improve the planning process.	6/30/2022	New permit requirement		The City will need to complete the watershed assessment and prioritization process. The process is described in the permit and in the Stormwater Management Action Planning Guidance 2018 DRAFT published by Ecology. Aspects of the assessment have been completed during this Storm Drainage Management Plan process. The city may want to partner with adjacent jurisdictions to complete the watershed assessment. or hire a consultant to complete the assessment and prioritization process. The prioritization must be completed by June 30, 2022.	0.00	The City will most likely hire a consultant to complete this task.		
		iii. No later than December 31, 2022, Permittees shall develop a Stormwater Management Action Plan (SMAP) for at least one high priority area (according to 55.C.1.c.ii) that identifies: (a) Targeted or customized implementation of stormwater management actions. (b) The need for stormwater facility retrofits. (c) A proposed implementation schedule and budget sources. (d) Short-term actions (i.e. actions to be accomplished within six years). (e) Long-term actions (i.e. actions to be accomplished within seven to 20 years). (f) Process to adaptively manage the plan.	Develop a Stormwater Management Action Plan for at least one high priority area identified during the process outlined in 55.C.1.c.ii	12/31/2022	New permit requirement		The City will need to complete the SMAP process by Dec 31, 2022. The process is described in the permit and in the Stormwater Management Action Planning Guidance 2018 DRAFT published by Ecology. Once the SMAP is complete the ongoing activities will be incorporated into the SWMP and CIP program. Add 100 staff hours per year to implement the SMAP.	0.00	The City will most likely hire a consultant to complete this task. Additional staff time will be required for supervising the project and implementing the SMAP.		
FTE						0.00	0.05		Average FTE		

## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments																							
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments																								
<b>Permit Element #55.C.2, Public Education and Outreach</b>																																	
The SWMP shall include an education and outreach program designed to build general awareness about methods to address and reduce impacts from stormwater runoff, effect behavior change and cretestewardship opportunities that encourage community engagement.																																	
55.C.2.a.i 55.C.1.a	General awareness.		Build general awareness of the stormwater problem among the general public, businesses, engineers, contractors, developers, and land use planners.	Ongoing	The program focuses on building awareness among the public and businesses especially homeowners and students. The program includes the Erosion and Sediment Control (ESC) Brochure, the De-Pave program in coordination with King County, the Burien Residential Rain Garden Project, the StormFest stormwater educational event, and the Stormwater PSA Film Contest for High Schoolers.	2018 SWMP Plan Burien Public Works Engineering Organizational Chart Burien Permit Compliance Matrix	Community Environmental Education Specialist SWM Engineer	0.25	None, continue current activities.	0.15	Transfer 300 hours/year from this requirement to the Community Based Social Marketing required in 55.C.2.a.ii.																						
												55.C.2.a.ii 55.C.1.b	Behavior change.		Conduct a new evaluation of the effectiveness of the ongoing behavior change program.	7/1/2020	StormFest is a stormwater education event for 6th graders. StormFest aims to increase knowledge of stormwater pollution and watershed science, as well as increase behaviors that reduce stormwater pollution. Behavior change will be tested after the fall 2018 StormFest events to ascertain whether students adopted a new stormwater BMP behavior.	2018 SWMP Plan Burien Public Works Engineering Organizational Chart Burien Permit Compliance Matrix	Community Environmental Education Specialist SWM Engineer	0.10	A new evaluation of the ongoing behavior change program is required during the new permit term.	0.10	The city will need to conduct a new evaluation of its current behavior change program by July 1, 2020. This is one of the earlier deadlines of the new permit, and the city will want to plan for it immediately. Once the evaluation has been completed, the city will need to adopt a Community-Based Social Marketing approach to behavior change, and the city will likely need to transfer 100 hours to 55.C.2.a.i-b-e										
																									Develop a stormwater Community-Based Social Marketing program.	Feb. 1, 2021	New permit requirement			0.00	Based on the evaluation from 55.C.2.a.ii.(b), follow social marketing practices and methods, similar to Community-Based Social Marketing (CBSM), and develop a program that is tailored to the community, including development of a program evaluation plan. The CBSM program will select from one of the following program types: 1. Develop a strategy and schedule to more effectively implement the existing program; or 2. Develop a strategy and schedule to expand the existing program to a new target audience or BMPs; or 3. Develop a strategy and schedule for a new target audience and BMP behavior change campaign.	0.05	The new permit requires the city to adopt Community-Based Social Marketing (CBSM) techniques for the Public Education and Outreach program. These techniques are described in a free book available at www.cbsm.com. Because the CBSM requirement targets current behavior change and education topics, effort will shift from the existing education programs to CBSM, and only a small amount of additional effort should be required.  The city will need to develop the program by Feb. 1, 2021 and implement it starting April 1, 2021. The program is based on the new evaluation from 55.C.2.a.ii (a), and the city can begin planning for the new approach concurrently with conducting the new behavior change evaluation.
	Evaluate and report on the effectiveness of the stormwater Community-Based Social Marketing program.	Mar. 31, 2024	New permit requirement			0.00	Evaluate and report on the changes in understanding and adoption of targeted behaviors resulting from the implementation of the strategy and any planned or recommended changes to the program in order to be more effective; describe the strategies and process to achieve the results.	0.05																									
55.C.2.a.iii 55.C.1.c	Stewardship		Create stewardship opportunities and/or partner with existing organizations to encourage residents to participate in activities within the community.	Ongoing	The city partnered with King County on Miller and Walker Creek Basin Stewardship and works with King Conservation District (KCD) on Shoreline Stewardship Classes.	2018 SWMP Plan Burien Permit Compliance Matrix Burien Public Works Engineering Organizational Chart	SWM Engineer Community Environmental Education Specialist	0.20	None	0.20																							
<b>FTE</b>						<b>0.55</b>	<b>0.60</b>		<b>Average FTE</b>																								



## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments		
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments			
<b>Permit Element #55.C.3, Public Involvement and Participation A63</b>												
Permittees shall provide ongoing opportunities for public involvement and participation through advisory councils, public hearings, watershed committees, participation in developing rate-structures or other similar activities. Each Permittee shall comply with applicable state and local public notice requirements when developing elements of the SWMP.												
55.C.3.a	55.C.3.a	Input to SWMP	Create opportunities for public to participate in the decision making processes involved in the development, implementation and update of the Stormwater Management Program (SWMP).	Create opportunities for the public to participate in the decision making processes involved in the development, implementation and update of the Stormwater Management Program (SWMP).	Ongoing	The City solicits and receives public comments through the City's website and newsletters. The City's Community Environmental Education Specialist distributes contact information and solicits input at public outreach events. The City involves the public through the Basin Stewardship program.	2018 SWMP Plan Website Burien Permit Compliance Matrix	SWM Engineer Community Environmental Education Specialist	0.50	None, continue current practice.	0.5	
55.C.3.b	55.C.3.b	Availability of Stormwater Program Documents	Post the SWMP, the Annual Report, and all other required permit submittals on the Permittee's website no later than May 31 each year. All other submittals must be available to the public upon request.	Post the SWMP, the Annual Report, and all other required permit submittals on the Permittee's website and make documents available to the public upon request.	Annually by 5/31	The City posts required documents to its web site.	2018 SWMP Plan Website Burien Permit Compliance Matrix	SWM Engineer Community Environmental Education Specialist	0.05	None, continue current practice.	0.05	
<b>FTE</b>							<b>0.55</b>	<b>0.55</b>		<b>Average FTE</b>		
<b>Permit Element #55.C.4, MS4 Mapping and Documentation</b>												
The SWMP shall include an ongoing program for mapping and documenting the MS4.												
55.C.4.a	55.C.4.a	Ongoing Mapping	Ongoing Mapping: Each Permittee shall maintain mapping data for the features listed below: (Note: a long list of items is listed. Requirements are summarized to the right. Please refer to the permit for verbatim requirements.)	Ongoing mapping of the MS4, including outfalls, receiving waters, City-owned stormwater treatment and flow control facilities, and tributary conveyances to outfalls that are 24-inch or larger.	Ongoing	The City continuously updates its GIS stormwater map from as-built drawings and new and re-development projects. A GIS Stormwater Map is available on the City's website.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector	0.1	None, maintain current map.	0.1	
55.C.4.b	New permit requirement	New Mapping	b. New Mapping: Each Permittee shall: i. Beginning on January 1, 2020, where known, map size and material for all known MS4 outfalls. ii. No later than August 1, 2021, complete mapping of all known connections from the MS4 to a privately owned stormwater system. c. Beginning August 1, 2021, the required format for mapping is electronic, with fully described mapping standards.	New mapping of the MS4, including outfalls, and all known connections from the MS4 to a privately owned stormwater system.	8/1/2021	New permit requirement.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector	0	New mapping requirements: map size and material for all known MS4 outfalls, and map of all known connections from the MS4 to a privately owned stormwater system.	0.02	The new mapping requirement will require a temporary increase in effort. Because the city has GIS technicians on staff this effort will most likely be completed in house. Outfall locations should already be identified, and the size and material can be confirmed by city maintenance staff during the 2020 dry weather inspections. The city should also review existing GIS data and as-builts for private developments to identify connections from the MS4 to private storm sewers and document these on the MS4 map. The city may also want to confirm these via field inspection.
<b>FTE</b>							<b>0.10</b>	<b>0.12</b>		<b>Average FTE</b>		

## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments
Permit Section (New Permit/Current Permit)		Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments
<b>Permit Element #55.C.5, Illicit Discharge Detection and Elimination</b> The SWMP shall include an ongoing program designed to prevent, detect, characterize, trace and eliminate illicit connections and illicit discharges into the MS4.										
55.C.5.a	55.C.3.b	<b>Illicit Discharge Reporting and Correcting Procedures</b> a. The program shall include procedures for reporting and correcting or removing illicit connections, spills and other illicit discharges when they are suspected or identified. The program shall also include procedures for addressing pollutants entering the MS4 from an interconnected, adjoining MS4.	Ongoing - current program	The City has developed an enforcement strategy and the SWM ordinance includes escalating enforcement procedures and actions. The City has a Water Quality Audit program, assisted by King County, that provides inspections of businesses of which the City has received reports of illicit discharges.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector		None, continue current practice.		
55.C.5.b	55.C.3.d	<b>Illicit Discharge Hazard Information</b> b. Permittees shall inform public employees, businesses, and the general public of hazards associated with illicit discharges and improper disposal of waste.	Ongoing - Inform public	The City provides illicit connection/illicit discharge training to City staff as needed. The City also conducts public outreach on the hazards of illicit discharges as part of the 55.C.2.a.i.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector		None, continue current practice.		
55.C.5.c	55.C.3.b	<b>Illicit Discharge Ordinance</b> Each Permittee shall implement an ordinance or other regulatory mechanism to effectively prohibit non-stormwater, illicit discharges into the Permittee's MS4 to the maximum extent allowable under state and federal law. i. Allowable Discharges: The regulatory mechanism does not need to prohibit the following categories of non-stormwater discharges (see permit for list): ii. Conditionally Allowable Discharges: The regulatory mechanism may allow the following categories of non-stormwater discharges only if the stated conditions are met: [Note: a long list of items is listed. Requirements are summarized to the right. Please refer to the permit for verbatim requirements.] No change to Allowable or Conditionally Allowable discharges from 2013-2018 permit.	Ongoing - current program	Implement an ordinance to prohibit non-stormwater, illicit discharges and connections to the MS4. Update the allowable, conditionally allowable, and prohibited discharges according to new permit requirements.	2018 SWMP Plan Website Burien Permit Compliance Matrix	SWM Engineer		None, continue current practice.		
55.C.5.d	55.C.3.c	<b>Detection and Elimination Program</b> Each Permittee shall implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the Permittee's MS4. The program shall include the following components: [Note: a long list of items is listed. Requirements are summarized to the right. Please refer to the permit for verbatim requirements.]	On average, 12% each year; Ongoing - Hotline, field staff training.	Implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the MS4, including investigation through a field screening methodology, training field staff, and operating a hotline for public reporting.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector		None, continue current practice.		
55.C.5.e	55.C.3.c	<b>Address Illicit Discharges</b> Implement an ongoing program designed to address illicit discharges, including spills and illicit connections, into the Permittee's MS4. The program shall include: i. Procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges found by or reported to the Permittee. Procedures shall address the evaluation of whether the discharge must be immediately contained and steps to be taken for containment of the discharge. ii. Procedures for tracing the source of an illicit discharge; including visual inspections, and when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures. iii. Procedures for eliminating the discharge; including notification of appropriate authorities (including owners or operators of interconnected MS4s); notification of the property owner; technical assistance; follow-up inspections; and use of the compliance strategy developed pursuant to 55.C.3.b.v, including escalating enforcement and legal actions if the discharge is not eliminated. iv. Compliance with the provisions in (i), (ii), and (iii), above, shall be achieved by meeting the following timelines: • Immediately respond to all illicit discharges, including spills, which are determined to constitute a threat to human health, welfare, or the environment, consistent with General Condition G3. • Investigate (or refer to the appropriate agency with the authority to act) within 7 days, on average, any complaints, reports or monitoring information that indicates a potential illicit discharge.	Ongoing	Address illicit discharges and illicit connections by characterizing discharges, tracing illicit discharges and illicit connections, and eliminating discharges and connections.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector	0.2	None, continue current practice.	0.23 The increase in effort for the IDDE program reflects the increased effort resulting from taking over King County activities in the area, the expected increase in service required over the upcoming permit term and the small increase required by the Mapping element.	
55.C.5.f	55.C.3.f	<b>Staff Training</b> Train staff who are responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges, including spills, and illicit connections, to conduct these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements or staffing. Permittees shall document and maintain records of the training provided and the staff trained.	Ongoing	Train staff who are responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges, including spills, and illicit connections, to conduct these activities.	2018 SWMP Plan Burien Permit Compliance Matrix City of Burien NPDES Staff Training Tracking	SWM Engineer		None, continue current practice.		
55.C.5.g	55.C.3.e	<b>Recordkeeping</b> Permittees shall track and maintain records of the activities conducted to meet the requirements of this section. In the annual report, each permittee shall submit data for all of the illicit discharges, including spills and illicit connections that were found by, reported to, or investigated by the Permittee during the previous calendar year. The data shall include the information specified in Appendix 12 and WQWebIDDE. Each Permittee may either use their own system or WQWebIDDE for recording this data. Final submittal shall be compatible with and follow the format and data schema described in Appendix 12 and WQWebIDDE.	Ongoing	Track and maintain records of the activities conducted to meet the requirements of this section.	2018 SWMP Plan	SWM Engineer		None, continue current practice.		
<b>FTE</b>							<b>0.20</b>		<b>0.23</b>	<b>Average FTE</b>

## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments				
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments					
<b>Permit Element #55.C.6, Controlling Runoff from New Development, Redevelopment, and Construction Sites</b> Each Permittee shall implement and enforce a program to reduce pollutants in stormwater runoff to a regulated small MS4 from new development, redevelopment and construction site activities. The program shall apply to private and public development, including roads.														
55.C.6.a	55.C.4.a		Implement an ordinance or other enforceable mechanism that addresses runoff from new development, redevelopment, and construction site projects. Each permittee shall adopt and make effective a local program that meets the requirements of 55.C.6.b(i) through (iii), below and shall apply to all applications submitted: i. On or after December 31, 2021. ii. Prior to July 1, 2017, that have not started construction by January 1, 2022.				City of Burien Ordinance 657, Burien Municipal Code (BMC) 13.10.130 (Drainage Review - When required - Type) requires all development and land disturbing activity that is subject to a city of Burien undergo, at a minimum, a simplified drainage review and stormwater inspections.  The City adopted the updated 2016 King County Surface Water Design Manual. This Surface Water Design Manual contains the requirements and standards for designing stormwater management systems in the City of Burien. As part of the permit approval process for certain types of permits for proposed projects, Burien requires the construction of surface water and stormwater management systems to mitigate the impacts on natural and existing man-made drainage systems. Low Impact Development (LID) BMPs (called Flow Control BMPs in the manual), will be required for nearly all development projects within the City.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer	0.05	Ecology has released a draft 2019 update to the Stormwater Management Manual for Western Washington (SWMMWW) and will adopt the finalized 2019 SWMMWW in July of 2019. This update and the upcoming Phase 1 NPDES Permit will prompt King County to update the 2016 KCSWDM. Burien will need to review the development code and associated documents to ensure continued equivalence.	0.05	Additional one-time effort to review code and documents to ensure compliance with the 2019 SWMMWW will be required. The City may choose to hire a consultant for this work.	
55.C.6.b	55.C.4.a		i. The Minimum Requirements, thresholds, and definitions in Appendix 1 or a program approved by Ecology under the 2013 NPDES Phase I Municipal Stormwater Permit and amended to include Appendix 10, for new development, redevelopment, and construction sites. Adjustment and variance criteria equivalent to those in Appendix 1 must be included. More stringent requirements may be used, and/or certain requirements may be tailored to local circumstances through the use of Ecology-approved basin plans or other similar water quality and quantity planning efforts. Such local requirements and thresholds shall provide equal protection of receiving waters and equal levels of pollutant control to those provided in Appendix 1.  ii. The local requirements shall include the following requirements, limitations, and criteria that, when used to implement the minimum requirements in Appendix 1 (or program required by Ecology under the 2019 Phase I Permit) will protect water quality, reduce the discharge of pollutants to the MEP, and satisfy the State requirement under chapter 90.48 RCW to apply AKART prior to discharge: (a) Site planning requirements (b) BMP selection criteria (c) BMP design criteria (d) BMP infeasibility criteria (e) LID competing needs criteria (f) BMP limitations Permittees shall document how the criteria and requirements will protect water quality, reduce the discharge of pollutants to the MEP, and satisfy State AKART requirements. Permittees who choose to use the requirements, limitations, and criteria above in the Stormwater Management Manual for Western Washington, or a program approved by Ecology under the 2019 Phase I Permit, may cite this choice as their sole documentation to meet this requirement.  iii. The legal authority, through the approval process for new development and redevelopment, to inspect and enforce maintenance standards for private stormwater facilities approved under the provisions of this section that discharge to the Permittee's MS4.				Update the ordinance and other associated enforceable documents to new standards, including Minimum Requirements, thresholds, and definitions in Appendix 1 of the 2012 Stormwater Management Manual for Western Washington (SWMMWW). Include requirements, limitation, and criteria for site planning, BMP selection, BMP design, BMP infeasibility criteria, LID competing needs criteria, and BMP limitations.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer	0.00	See above.	0.00		
55.C.6.c	55.C.4.b		The program shall include a permitting process with site plan review, inspection and enforcement capability to meet the standards listed in (i) through (iv) below, for both private and public projects, using qualified personnel (as defined in Definitions and Acronyms). At a minimum, this program shall be applied to all sites that meet the minimum thresholds adopted pursuant to 55.C.4.a.i, above. i. Review of all stormwater site plans for proposed development activities.	Conduct site plan review for public and private projects meeting the thresholds adopted pursuant to 55.C.4.a, above.	Ongoing		As of January 1, 2017, all new and redevelopment construction projects, both private and public, must comply with the 2016 King County Surface Water Design Manual. All development, including all redevelopment or new impervious surface, regardless of size, scope and nature that is subject to a City of Burien permit or approval, shall be subject to, at a minimum, the Small Site Drainage Review.	Website - Simplified Drainage Review Requirements Burien Permit Compliance Matrix Burien Municipal Code	SWM Development Review Engineer/ Projects Engineer	0.75	No gap identified; however, recent increases in drainage reviews indicate the need for additional 0.1 FTE to complete reviews in a thorough and timely manner. There were an average of 141 development plan reviews per year from 2010-2014, and an average of 182 per year from 2015-2018.	1.25		
55.C.6.c	55.C.4.b		ii. Inspect, prior to clearing and construction, all permitted development sites that have a high potential for sediment transport as determined through plan review based on definitions and requirements in Appendix 7 Determining Construction Site Sediment Damage Potential. As an alternative to evaluating each site according to Appendix 7, Permittees may choose to inspect all construction sites that meet the minimum thresholds adopted pursuant to 55.C.4.a.i, above. iii. Inspect all permitted development sites during construction to verify proper installation and maintenance of required erosion and sediment controls. Enforce as necessary based on the inspection. iv. Inspect all permitted development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of permanent stormwater facilities. Verify that a maintenance plan is completed and responsibility for maintenance is assigned for stormwater treatment and flow control BMPs/facilities. Enforce as necessary based on the inspection. v. Compliance with the inspection requirements in (ii), (iii) and (iv) above, shall be determined by the presence and records of an established inspection program designed to inspect all sites. Compliance during this permit term shall be determined by achieving at least 80% of scheduled inspections.	Inspect all projects meeting the thresholds adopted pursuant to 55.C.6.a above including pre-construction inspection of sites with high potential for erosion, inspection of all development sites during construction to confirm proper installation and maintenance of erosion and sediment controls, post-construction inspection of permanent stormwater facilities. Compliance shall be determined by achieving at least 80% of scheduled inspections.	Ongoing		The City conducts site inspections for all new development and redevelopment projects that require drainage review during and after construction.G44  The City uses Azteca Cityworks, a Stormwater Asset Management system to track inspections and maintenance.	2018 SWMP Plan Website Burien Permit Compliance Matrix	SWM Development Review Engineer/ Projects Engineer  Building Inspectors Stormwater Inspector	0.50	No gap identified; however, recent increases in development applications are driving an increase in site inspections indicating the need for additional 0.15 FTE to complete inspections in a thorough and timely manner.	0.50		
55.C.6.c	55.C.4.b		vi. An enforcement strategy shall be implemented to respond to issues of non-compliance.	Implement an enforcement strategy to respond to issues of non-compliance.	Ongoing		BMC 13.10.510 outlines enforcement authority and options	2018 SWMP Plan Burien Permit Compliance Matrix	Building Inspectors Stormwater Inspector	0.10	None, continue current practice.	0.10		
55.C.6.d	55.C.4.e		Make available as applicable copies of the "Notice of Intent for Construction Activity" and copies of the "Notice of Intent for Industrial Activity" to representatives of proposed new development and redevelopment. Permittees shall continue to enforce local ordinances controlling runoff from sites that are also covered by stormwater permits issued by Ecology.	Make available as applicable copies of the "Notice of Intent for Construction Activity" and copies of the "Notice of Intent for Industrial Activity" to representatives of proposed new development and redevelopment.	Ongoing		NOIs are available at the permit counter.	N/A	N/A	0.01	None, continue current practice.	0.01		
55.C.6.e	55.C.4.f		Each Permittee shall ensure that all staff whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including permitting, plan review, construction site inspections, and enforcement, 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.	Ensure that all staff whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including permitting, plan review, construction site inspections, and enforcement, are trained to conduct these activities.	Ongoing		The City provides permitting, plan review, construction site inspection, enforcement, and Certified Erosion and Sediment Control Lead (CESCL) training for relevant City staff.	2018 SWMP Plan	SWM Development Review Engineer/ Projects Engineer  SWM Inspector	0.09	None, continue current practice.	0.09		
				0.1 of the FTE for the current program is recorded under 55.C.1 for LID.				<b>FTE</b>		<b>1.50</b>		<b>2.00</b>		<b>Average FTE</b>

## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments	
<b>Permit Element #55.C.7, Operations and Maintenance</b>										
Each Permittee shall implement an operations and maintenance (O&M) program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.										
55.C.7.a	55.C.5.a <b>Establish Maintenance Standards</b>		Each Permittee shall implement maintenance standards that are as protective, or more protective, of facility function than those specified in <i>Stormwater Management Manual for Western Washington</i> . For facilities which do not have maintenance standards, the Permittee shall develop a maintenance standard. No later than December 31, 2021, Permittees shall update their maintenance standards as necessary to meet the requirements of this section. i. The purpose of the maintenance standard is to determine if maintenance is required. The maintenance standard is not a measure of the facility's required condition at all times between inspections. Exceeding the maintenance standard between inspections and/or maintenance is not a permit violation. ii. Unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed: • Within 1 year for typical maintenance of facilities, except catch basins. • Within 6 months for catch basins. • Within 2 years for maintenance that requires capital construction of less than \$25,000. Circumstances beyond the Permittee's control include denial or delay of access by property owners, denial or delay of necessary permit approvals, and unexpected reallocations of maintenance staff to perform emergency work. For each exceedance of the required timeframe, the Permittee shall document the circumstances and how they were beyond their control.							
55.C.7.b	55.C.4.c & 55.C.4.d <b>Maintenance of Stormwater Facilities Regulated by the Permittee</b>		i. The program shall include provisions to verify adequate long-term O&M of stormwater treatment and flow control BMPs/facilities that are permitted and constructed pursuant to 5.5.C.6.c and shall be maintained in accordance with 55.C.7.a.2 The provisions shall include: (a) Implementation of an ordinance or other enforceable mechanism that: o Clearly identifies the party responsible for maintenance in accordance with maintenance standards established under 55.C.7.a. o Requires inspection of facilities in accordance with the requirements in (b) through (c) below. o Establishes enforcement procedures. (b) Annual inspections of all stormwater treatment and flow control BMPs/facilities that discharge to the MS4 and were permitted by the Permittee according to 55.C.6.c, including those permitted in accordance with requirements adopted pursuant to the 2019 Ecology municipal stormwater permits, unless there are maintenance records to justify a different frequency. Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature. (c) Inspections of all permanent stormwater treatment and flow control BMPs/facilities and catch basins in new residential developments every six months until 90% of the lots are constructed (or when construction is stopped and the site is fully stabilized) to identify maintenance needs and enforce compliance with maintenance standards as needed. ii. Compliance with the inspection requirements in (b) and (c) above shall be determined by the presence and records of an established inspection program designed to inspect all sites. Compliance during this permit term shall be determined by achieving at least 80% of all sites.							
55.C.7.c	55.C.5.b & 55.C.5.c & 55.C.5.d <b>Maintenance of Stormwater Facilities Owned by the Permittee</b>  <b>Spot Checks</b>		iii. 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. Records of maintenance inspections and maintenance activities shall be maintained.  i. Each Permittee shall implement a program to annually inspect all municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities, and taking appropriate maintenance actions in accordance with the adopted maintenance standards. Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements must be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature.  ii. Spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities after major storm events (24 hour storm event with a 10 year or greater recurrence interval). If spot checks indicate widespread damage/maintenance needs, inspect all stormwater treatment and flow control BMPs/facilities that may be affected. Conduct repairs or take appropriate maintenance action in accordance with maintenance standards established above, based on the results of the inspections. Conduct repairs or take appropriate maintenance action.							
55.C.7.c	55.C.5.b & 55.C.5.c & 55.C.5.d <b>Catch Basin Inspection</b>		iii. Inspection of all catch basins and inlets owned or operated by the Permittee every two years Clean catch basins if the inspection indicates cleaning is needed to comply with maintenance standards established in the Stormwater Management Manual for Western Washington. Decant water must be disposed of in accordance with Appendix 6 Street Waste Disposal. The following alternatives to the standard approach of inspecting all catch basins every two years may be applied to all or portions of the system: (a) The catch basin inspection schedule of every two years may be changed as appropriate to meet the maintenance standards based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific, less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experiences and must be certified in accordance with G19 Certification and Signature. (b) Inspections every two years may be conducted on a "circuit basis" whereby 25% of catch basins and inlets within each circuit are inspected to identify maintenance needs. Include an inspection of the catch basin immediately upstream of any MS4 outfall discharge point, or connections to public or private storm systems if applicable. Clean all catch basins within a given circuit for which the inspection indicates cleaning is needed to comply with maintenance standards established under 55.C.7.a, above. (c) The Permittee may clean all pipes, ditches, catch basins, and inlets within a circuit once during the permit term. Circuits selected for this alternative must drain to a single point.							

Permit Element continued on next page...

Permit Element continued on next page...

## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments	
<b>5.C.7, Operations and Maintenance</b>										
55.C.7.d	Inspection Compliance	Compliance with the inspection requirements in c, and d above shall be determined by the presence of an established inspection program designed to inspect all sites and achieving at least 95% of inspections.	Compliance with the inspection requirements in b, c, and d above shall be determined by the presence of an established inspection program designed to inspect all sites and achieving at least 95% of inspections.	Ongoing	Inspection and/or maintenance records for both City-owned and private drainage facilities are tracked and documented utilizing the City's asset management system, Azteca Cityworks. The City uses a mobile version of City Works, Freeance Mobile to during inspections and maintenance. The City maintains records of inspections and maintenance/repair activities.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector	0.00	None, continue current practice. Effort is included in 55.C.7.c and 55.C.7h	0.00
55.C.7.e	Municipal Maintenance to Reduce Stormwater Impacts	Each Permittee shall implement and document all practices, policies and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. Lands owned or maintained by the Permittee include, but are not limited to, streets, parking lots, roads, highways, buildings, parks, open space, road right-of-ways, maintenance yards, and stormwater treatment and flow control BMPs/facilities. The following activities shall be addressed: <ul style="list-style-type: none"> <li>• Pipe cleaning</li> <li>• Cleaning of culverts that convey stormwater in ditch systems</li> <li>• Ditch maintenance</li> <li>• Street cleaning</li> <li>• Road repair and resurfacing, including pavement grinding</li> <li>• Snow and ice control</li> <li>• Utility installation</li> <li>• Pavement striping maintenance</li> <li>• Maintaining roadside areas, including vegetation management</li> <li>• Dust control</li> <li>• Application of fertilizers, pesticides, and herbicides according to the instructions for their use, including reducing nutrients and pesticides using alternatives that minimize environmental impacts</li> <li>• Sediment and erosion control</li> <li>• Landscape maintenance and vegetation disposal</li> <li>• Trash and pet waste management</li> <li>• Building exterior cleaning and maintenance</li> </ul>	Implement and document practices, policies and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the City, and road maintenance activities. Such lands include, but are not limited to, streets, parking lots, roads, highways, buildings, parks, open space, road rights-of-way, maintenance yards, and stormwater treatment and flow control BMPs/facilities.	Ongoing	The City is implementing practice to reduce stormwater impacts associated with runoff from streets, parking lots and roads maintained by the City including pipe and culvert cleaning, ditch and roadside areas maintenance such as vegetation management, street sweeping and cleaning, and street repair and resurfacing per the requirements of the King County Road Standards. The City also conducts snow and ice control as needed; arterials are high priority and residential snow and ice control are conducted on an emergency basis.  The City will continue to utilize its adopted Standard Operating Procedure for Pest and Vegetation Management. This procedure provide for mitigation and control of pests in environmentally-friendly ways and to directs operations and maintenance of the City that manages pests or vegetation on public lands, rights-of-way and bodies of water. This procedure applies to all properties and facilities owned or operated by the City.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector	3.00	None, continue current practice.	4.00
55.C.7.f	Staff Training	Implement an ongoing training program for employees of the Permittee whose primary construction, operations or maintenance job functions may impact stormwater quality. The training program shall address the importance of protecting water quality, operation and maintenance standards, inspection procedures, relevant SWPPs, selecting appropriate BMPs, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of training provided. The staff training records to be kept include dates, activities or course descriptions, and names and positions of staff in attendance.	Implement an ongoing training program for employees whose primary construction, operations or maintenance job functions may impact stormwater quality. The training program shall address the importance of protecting water quality, operation and maintenance standards, inspection procedures, selecting appropriate BMPs, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns.	Ongoing	The City's <i>Standard Operating Procedures for Stormwater, Streets, and Parks Operations and Maintenance</i> include procedures for conducting, stormwater conveyance maintenance, street maintenance, building maintenance, utility installation, and landscaping to prevent or minimize impacts to water quality.	NPDES Staff Education Tracking spread+H5sheet  Standard Operating Procedures for Stormwater, Streets, and Parks Operations and Maintenance - Nov 16, 2018  Burien Permit Compliance Matrix	SWM Engineer	0.05	None, continue current practice.	0.05
55.C.7.g	SWPPP for Maintenance Yards	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 in areas subject to this Permit that are not required to have coverage under the <i>Industrial Stormwater General Permit</i> or another NPDES permit that authorizes stormwater discharges associated with the activity. At a minimum, the SWPPP shall include: <ul style="list-style-type: none"> <li>• A detailed description of the operational and structural BMPs in use at the facility and a schedule for implementation of additional BMPs. BMPs selected must be consistent with the Stormwater Management Manual for Western Washington, or a program approved by Ecology. The SWPPP must be updated as needed to maintain relevancy with the facility.</li> <li>• At minimum, annual inspections of the facility, including visual observations of discharges, to evaluate the effectiveness of the BMPs, identify maintenance needs, and determine if additional or different BMPs are needed. The results of these inspections must be documented in an inspection report or check list.</li> <li>• An inventory of the materials and equipment stored on-site, and the activities conducted at the facility which may be exposed to precipitation or runoff and could result in stormwater pollution.</li> <li>• A site map showing the facility's stormwater drainage, discharge points, and areas of potential pollutant exposure.</li> <li>• A plan for preventing and responding to spills at the facility which could result in an illicit discharge.</li> </ul>	Implement a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards, and material storage facilities operated by the City. The SWPPP shall include periodic visual observation of discharges from the facility to evaluate the effectiveness of the BMP.	Ongoing	The city's public works maintenance facility and materials storage yard are covered by the city's SWPPP which was most recently updated in February of 2019.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector	0.20	None, continue to implement and update SWPPP as needed.	0.20
55.C.7.h	Record Keeping	Maintain records of inspection and/or repair activities.	Maintain records of inspection and repair activities.	Ongoing	Inspection and/or maintenance records for both City-owned and private drainage facilities are tracked and documented utilizing the City's asset management system, Azteca Cityworks.	2018 SWMP Plan Standard Operating Procedures for Stormwater, Streets, and Parks Operations and Maintenance - Nov 16, 2018 Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector	0.05	None, continue current practice.	0.05
<b>FTE</b>							<b>9.20</b>	<b>11.70</b>	<b>Average FTE</b>	
<b>Permit Elements #55.C.8 Source Control for Existing Development</b>										
Each Permittee shall implement a program to prevent and reduce pollutants in runoff from areas that discharge to MS4s.										
55.C.8.a	Implement a Source Control Program	Each Permittee shall implement a program to prevent and reduce pollutants in runoff from areas that discharge to MS4s. The program shall include: i. Application of operational and structural source control BMPs, and, if necessary, treatment BMPs/facilities to pollution generating sources associated with existing land uses and activities. ii. Inspections of pollutant generating sources at publically and privately owned commercial and industrial properties to enforce implementation of required BMPs to control pollution discharging into the Permittee's MS4. iii. Application and enforcement of local ordinances at sites, identified pursuant to 55.C.8.b.ii, including sites with discharges authorized by a separate NPDES permit. Permittees that are in compliance with the terms of this permit will not be held liable by Ecology for water quality standard violations or receiving water impacts caused by industries and other Permittees covered, or which should be covered under an NPDES permit issued by Ecology. iv. Practices to reduce polluted runoff from the application of pesticides, herbicides, and fertilizer discharging into MS4s owned or operated by the Permittee.	Implement a source control program for publically and privately owned commercial and industrial properties to prevent and reduce pollutants in runoff to the MS4. The program must include application of source control BMPs to pollution generating sources associated with existing properties, inspection of BMPs, enforcement, and practices to reduce polluted runoff from the application of pesticides, herbicides, and fertilizers.	8/1/2022 - Adopt an ordinance and establish inventory 1/1/2023 - Implement inspection program	The City has adopted a SWM ordinance that requires residents and business to implement source control BMPs (BMC 13.10.250) and gives the director authority to inspect properties (BMC 13.10.500). The SWM ordinance includes the City's enforcement strategy. The City also adopted the King County Stormwater Pollution Prevention Manual by reference (BMC 13.10.020).	2018 SWMP Plan	SWM Engineer SWM Inspector	0	The City's SWM ordinance requires businesses and residents implement of source control BMPs and gives the director inspection and enforcement authority.  The City needs to conduct an inventory of commercial and industrial properties that pose a potential for pollutant discharge to the MS4, and implement an inspection program that inspects a number equal to 20% of inventoried businesses and properties each year.	0
		i. No later than August 1, 2022, Permittees shall adopt an ordinance(s), or other enforceable documents, requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities (see Appendix 8 to identify pollutant generating sources). The requirements of this subsection are met by using the source control BMPs in the SWMMWW, or a functionally equivalent manual approved by Ecology.  Operational source control BMPs must be required for all pollutant generating sources. Structural source control BMPs, or treatment BMPs/facilities, or both, must be required for pollutant generating sources if operational source control BMPs do not prevent illicit discharges or violations of surface water, groundwater, or sediment management standards because of inadequate stormwater controls. Implementation of source control requirements may be done through education and technical assistance programs, provided that formal enforcement authority is available to the Permittee and is used as determined necessary by the Permittee, in accordance with 55.C.8.b.iv below.	Adopt an ordinance or other enforceable document requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities.	8/1/2022	The City has adopted a SWM ordinance that requires residents and business to implement source control BMPs (BMC 13.10.250) and gives the director authority to inspect properties (BMC 13.10.500). The SWM ordinance includes the City's enforcement strategy. The City also adopted the King County Stormwater Pollution Prevention Manual by reference (BMC 13.10.020).	Burien Municipal Code	SWM Engineer	0	None. Current ordinance meets source control requirements.	0



## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements			Current Program Description (2018)				2019-2024 Program (New Program)		Comments	
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments	
55.C.8.b  New permit requirement.  Minimum Performance Measures	ii. No later than August 1, 2022, the Permittees shall establish an inventory that identifies publically and privately owned commercial, and industrial properties which have the potential to generate pollutants to the Permittee's MS4. The inventory shall include: (a) Businesses and/or properties identified based on the presence of activities that are pollutant generating (refer to Appendix 8). (b) Complaint-based response to identify other pollutant generating sources, such as: mobile or home-based businesses and multi-family properties.	Establish an inventory of publically and privately owned commercial and industrial properties with the potential to generate pollutant to the MS4.	8/1/2022	New permit requirement. The city does not currently maintain an inventory of commercial and industrial properties that pose a potential for pollutant discharge to the MS4.	2018 SWMP Plan	SWM Engineer	0	Conduct and maintain an inventory of commercial and industrial properties that pose a potential for pollutant discharge to the MS4.	0.05	The city will need to inventory commercial and industrial properties to identify and prioritize those that pose a potential for pollutant discharge to the MS4. Appendix E of the King County SWMP describes how the County developed their list of properties for source control inspection. This appendix may provide a suitable template for the city's inventory.  Add 100 hours to conduct and maintain the inventory.
	iii. No later than January 1, 2023, Permittees shall implement an inspection program for sites identified pursuant to 55.C.8.b.ii above. (a) All identified sites with a business address must be provided information about activities that may generate pollutants and the source control requirements applicable to those activities. This information must be provided by mail, telephone, electronic communications, or in person. This information may be provided all at one time or spread out over the permit term to allow for tailoring and distribution of the information during site inspections. (b) The Permittee shall annually complete the number of inspections equal to 20% of the businesses and/or properties listed in their source control inventory to assure BMP effectiveness and compliance with source control requirements. The Permittee may count follow-up compliance inspections at the same site toward the 20% inspection rate. The Permittee may select which sites to inspect each year and is not required to inspect 100% of sites over a 5-year period. Sites may be prioritized for inspection based on their land use category, potential for pollution generation, proximity to receiving waters, or to address an identified pollution problem within a specific geographic area or sub-basin. (c) Each Permittee shall inspect 100% of sites identified through legitimate complaints.	Implement an inspection program for sites identified in the inventory [55.C.8.b.ii]. Provide information on pollutant generating activities and source control requirements to businesses, and annually conduct inspections equal to 20% of businesses and properties listed in the inventory. Inspect 100% of sites identified through legitimate complaints.	1/1/2023	New permit requirement. The City does not currently inspect properties for the implementation of source control BMPs.	2018 SWMP Plan	SWM Engineer SWM Inspector	0	Ensure the inspection program inspects a number equal to 20% (re-inspections count) of inventoried businesses and properties each year.	0.1	The city will need to conduct inspections of properties identified during the source control inventory. The city may wish to prioritize businesses as part of the inventory to target those with the largest potential for pollutant discharge (those closest to receiving waters, those with large stocks or outdoor storage of pollutants, etc.). The city should budget time for a notification campaign to alert businesses of the inspections and provide information on source control techniques.  Add 600 hours per year to plan, notify and conduct inspections.
	iv. No later than January 1, 2023, each Permittee shall implement a progressive enforcement policy that requires sites to comply with stormwater requirements within a reasonable time period as specified below: (a) If the Permittee determines, through inspections or otherwise, that a site has failed to adequately implement required BMPs, the Permittee shall take appropriate follow-up action(s) which may include: phone calls, reminder letters, or follow-up inspections. (b) When a Permittee determines that a facility has failed to adequately implement BMPs after a follow-up inspection, the Permittee shall take enforcement action as established through authority in its municipal code and ordinances, or through the judicial system. (c) Each Permittee shall maintain records, including documentation of each site visit, inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating an effort to bring facilities into compliance. Each Permittee must also maintain records of sites that are not inspected because the property owner denies entry. (d) A Permittee may refer non-emergency violations of local ordinances to Ecology, provided, the Permittee also makes a documented effort of progressive enforcement. At a minimum, a Permittee's enforcement effort shall include documentation of inspections and warning letters or notices of violation.	Implement a progressive enforcement policy that requires sites to comply with stormwater requirements.	1/1/2023	The SWM ordinance includes the enforcement strategy and escalating enforcement procedures and actions.	2018 SWMP Plan Burien Municipal Code	SWM Engineer SWM Inspector	0	Expand the current enforcement strategy to properties inspected as part of 55.C.8.b.iii.	0.05	As part of the inspection program, the city will need to conduct enforcement of source control BMPs. Add 100 hours for enforcement.
	v. Permittees shall train staff who are responsible for implementing the source control program to conduct these activities. The ongoing training program shall cover the legal authority for source control, source control BMPs and their proper application, inspection protocols, lessons learned, typical cases, and enforcement procedures. Follow-up training must be provided as needed to address changes in procedures, techniques, requirements, or staff. Permittees shall document and maintain records of the training provided and the staff trained.	Train staff responsible for implementing the source control program. Document and maintain records of the training and staff trained.	1/1/2023	New permit requirement.	2018 SWMP Plan	SWM Engineer	0	Update staff training to include source control inspection protocols for commercial and industrial properties.	0	Add 100 hours to train staff responsible for the source control program.
	<b>FTE</b>						<b>0.00</b>	<b>0.20</b>	<b>Average FTE</b>	

## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments
Permit Section (New Permit/Current Permit)		Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments
<b>Permit Elements #S5.A and #S5.B, Program Implementation, and Other Administration</b>										
S5.A.1	S5.A.1	<b>SWMP Implementation</b>	Develop and implement a SWMP that covers the geographic area subject to the permit. Included with items above.	Develop and implement a SWMP that covers the geographic area subject to the permit. Included with items above.	Ongoing	Included in all program elements	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer	0.10	None, continue to update the SWMP and include new required activities.
S5.A.2	S5.A.2	<b>SWMP Plan</b>	Prepare written documentation of the SWMP and maintain annual updates. Write the plan to inform the public of the planned SWMP activities for the upcoming calendar year. Include a description of planned activities of the program components in S5.C, planned actions to meet applicable TMDL requirements (NPDES Permit Condition S7), and planned actions to meet NPDES Permit Condition S8, Monitoring and Assessment.	Prepare written documentation of the SWMP and maintain annual updates.	Annually 3/31 each year	The SWMP Plan is updated annually, the most recent version was published March 22, 2018.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer		None, continue to update the SWMP and include new required activities.
S5.A.3	S5.A.3	<b>Program Tracking</b>	The SWMP shall include an ongoing program for gathering, tracking, maintaining, and using information to evaluate SWMP development, implementation and permit compliance and to set priorities. a. Each Permittee shall track the cost or estimated cost of development and implementation of each component of the SWMP. This information shall be provided to Ecology upon request.	Track the cost or estimated cost of development and implementation of each component of the SWMP.	Ongoing - for cost tracking 3/31/2015 and annually with Annual Report - for inspection/enforcement/education tracking	Tracking of various permit activities using spreadsheets, timesheets, and CityWorks software.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer		There appears to be a minor gap in tracking the costs of the current permit activities. Activities are tracked via CityWorks, but cost summaries have not been generated.
			b. Each Permittee shall track the number of inspections, follow up-actions as a result of inspections, official enforcement actions and types of public education activities as required by the respective program component. This information shall be included in the annual report.	Track the number of inspections, follow up actions as a result of inspections, official enforcement actions and types of public education activities as required by the respective program component.	Ongoing - for cost tracking 3/31/2015 and annually with Annual Report - for inspection/enforcement/education tracking	Tracking of various permit activities using spreadsheets, timesheets, and CityWorks software.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer Stormwater Inspector		None, continue current practice.
S5.A.5		<b>Coordination Among Permittees</b>	Coordination among entities covered under municipal stormwater NPDES permits may be necessary to comply with certain conditions of the SWMP. The SWMP should include, when needed, coordination mechanisms among entities covered under a municipal stormwater NPDES permit to encourage coordinated stormwater-related policies, programs and projects within adjoining or shared areas, including: i. Coordination mechanisms clarifying roles and responsibilities for the control of pollutants between physically interconnected MS4s covered by a municipal stormwater permit. ii. Coordinating stormwater management activities for shared water bodies or watersheds among Permittees to avoid conflicting plans, policies and regulations. b. The SWMP shall include coordination mechanisms among departments within each jurisdiction to eliminate barriers to compliance with the terms of this permit. Permittees shall include a written description of internal coordination mechanisms in the Annual Report due no later than March 31, 2021.	Coordination among entities covered under municipal stormwater NPDES permits may be necessary to comply with certain conditions of the SWMP. The SWMP should include, when needed, coordination mechanisms among entities covered under a municipal stormwater NPDES permit to encourage coordinated stormwater-related policies, programs and projects within adjoining or shared areas.	3/31/2021 - for description of intrajurisdictional coordination mechanisms Ongoing - for other components	The City coordinates with King County to inspect and maintain private stormwater facilities, to conduct outreach, and provide stewardship opportunities, conduct the Water Quality Audit program; and the City coordinates with King Conservation District to conduct outreach and provide stewardship opportunities.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer		None, continue current practice.
S5.B	S5.B	<b>MEP and AKART</b>	Design the SWMP to reduce discharge of pollutants from the MS4 to the Maximum Extent Practicable (MEP), meet State AKART requirements, and protect water quality.	Design the SWMP to reduce discharge of pollutants from the MS4 to the Maximum Extent Practicable (MEP), meet State AKART requirements, and protect water quality.	Ongoing	Included in all program elements	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer		None, continue current practice.
GJ.B		<b>Duty to Reapply</b>	Reapply for coverage under the next permit.	Reapply for coverage under the next permit.	2/2/2018	Reapply once per permit term.			None, continue current practice.	
							<b>FTE</b>	<b>0.10</b>	<b>0.10</b>	<b>Average FTE</b>

## 2019-2024 Phase II NPDES Municipal Stormwater Permit - Gap Analysis

NPDES Requirements				Current Program Description (2018)				2019-2024 Program (New Program)		Comments	
Permit Section (New Permit/Current Permit)	Requirements Summarized	Permit Due Date	Current Program Description	Source	Responsibility	Level of Effort (FTE, Average Annual)	"Gap" Between Existing Program and Planned and Required Activities in 2019-2024 Permit	2019-2024 LOE (FTE per Year)	Comments		
<b>Permit Element #8, Monitoring and Assessment</b>											
All permittees shall provide, in each annual report, a description of any stormwater monitoring or stormwater-related studies conducting by or on behalf of the permittee during the reporting period, except those conducted as part of the RSMP.											
S8.A	Regional Status and Trends Monitoring	<p>1. Permittees that chose S8.B Status and Trends Monitoring Option #1 in the Phase II Western Washington Municipal Stormwater Permit August 1, 2013 – July 31, 2018 (extended to July 31, 2019) shall pay into the collective fund to implement regional small streams and marine nearshore areas status and trends monitoring in Puget Sound. The payments into the collective fund are due on or before December 1, 2019 and the S8.A amounts are listed in Appendix 11.</p> <p>2. No later than December 1, 2019, all City and County Permittees covered under the Phase II Western Washington Municipal Stormwater Permit August 1, 2013 – July 31, 2018 (extended to July 31, 2019) except the Cities of Aberdeen and Centralia, shall notify Ecology in writing which of the following two options for regional status and trends monitoring the Permittee chooses to carry out during the duration of this permit. Either option will fully satisfy the Permittee's obligations under this section (S8.A.2). Each Permittee shall select a single option for the duration of this permit.</p> <p>a. Pay into a collective fund to implement regional receiving water status and trends monitoring of either small streams and marine nearshore areas in Puget Sound or urban streams in the Lower Columbia River basin, depending on the Permittee's location. The payments into the collective fund are due to Ecology annually beginning August 15, 2020 and the S8.A amounts are listed in Appendix 11.</p> <p>OR</p> <p>b. Conduct stormwater discharge monitoring per the requirements in S8.C.</p>	<p>1. Permittees that chose S8.B Status and Trends Monitoring Option #1 in the 2013 – 2018 permit term shall pay into the collective fund to implement regional small streams and marine nearshore areas status and trends monitoring in Puget Sound. The payments into the collective fund are due on or before December 1, 2019.</p> <p>2. No later than December 1, 2019, notify Ecology in writing which option for regional status and trends monitoring the Permittee chooses:</p> <p>a. Pay into a collective fund to implement regional receiving water status and trends monitoring. The payments into the collective fund are due to Ecology annually beginning August 15, 2020 and the S8.A amounts are listed in Appendix 11.</p> <p>OR</p> <p>b. Conduct stormwater discharge monitoring per the requirements in S8.C.</p>	Payment by 8/15/2020	The city opted to pay into the RSMP.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer		None, continue to pay into the RSMP collective fund.		
S8.B	SWMP Effectiveness and Source Identification Studies	<p>1. Permittees that chose S8.C Effectiveness Studies Option #1 in the Phase II Western Washington Municipal Stormwater Permit August 1, 2013 – July 31, 2018 (extended to July 31, 2019) shall pay into the collective fund to implement effectiveness studies and source identification studies. The payments are due on or before December 1, 2019. The S8.B payment amounts are listed in Appendix 11.</p> <p>2. No later than December 1, 2019, all City and County Permittees covered under the Phase II Western Washington Municipal Stormwater Permit August 1, 2013 – July 31, 2018 (extended to July 31, 2019) shall notify Ecology in writing which of the following two options for effectiveness and source identification studies the Permittee chooses to carry out during this permit cycle. Either option will fully satisfy the Permittee's obligations under this section (S8.B.2). Each Permittee shall select a single option for the duration of this permit term.</p> <p>a. Pay into a collective fund to implement SAM effectiveness and source identification studies. The payments into the collective fund are due to Ecology annually beginning August 15, 2020 and the S8.B amounts are listed in Appendix 11.</p> <p>OR</p> <p>b. Conduct stormwater discharge monitoring per the requirements in S8.C.</p> <p>3. All Permittees shall submit records of SWMP activities tracked and/or maintained in accordance with S5 and/or S9 in response to requests from the Stormwater Action Monitoring (SAM) Coordinator for information associated with effectiveness and source identification studies that are under active SAM contracts.</p>	<p>1. Permittees that chose S8.C Effectiveness Studies Option #1 in 2013 – 2018 permit term shall pay into the collective fund to implement effectiveness studies and source identification studies. The payments are due on or before December 1, 2019.</p> <p>2. No later than December 1, 2019, notify Ecology in writing which of the following two options for effectiveness and source identification studies the Permittee chooses to carry out during this permit cycle.</p> <p>a. Pay into a collective fund to implement SAM effectiveness and source identification studies. The payments into the collective fund are due to Ecology annually beginning August 15, 2020.</p> <p>OR</p> <p>b. Conduct stormwater discharge monitoring per the requirements in S8.C.</p> <p>3. Submit records of SWMP activities tracked and/or maintained in accordance with S5 and/or S9 in response to requests from the SAM Coordinator.</p>	Payment by 8/15/2020	The city opted to pay into the RSMP.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer	0.05	None, continue to pay into the RSMP collective fund.	0.05	
S8.C	Stormwater Discharge Monitoring	<p>1. This section applies only to Permittees who choose to conduct stormwater discharge monitoring per S8.A.2.b, and/or S8.B.2.b in lieu of participation in the regional status and trends monitoring and/or SWMP effectiveness and source identification studies. These Permittees shall conduct monitoring in accordance with Appendix 9 and an Ecology-approved QAPP as follows:</p> <p>a. Permittees who choose the option to conduct stormwater discharge monitoring for either S8.A or S8.B shall monitor three independent discharge locations. Permittees who choose the option to conduct stormwater discharge monitoring for both S8.A and S8.B shall conduct this monitoring at a total of six locations; at least four locations shall be independent (one location may be nested in another basin).</p> <p>b. No later than February 1, 2020, each Permittee shall submit to Ecology a draft stormwater discharge monitoring QAPP for review and approval. The QAPP shall be prepared in accordance with the requirements in Appendix 9. If Ecology does not request changes within 90 days, the draft QAPP is considered approved. The final QAPP shall be submitted to Ecology as soon as possible following finalization, and before August 15, 2020.</p> <p>c. Flow monitoring shall begin no later than October 1, 2020. Stormwater discharge monitoring shall be fully implemented no later than October 1, 2021.</p> <p>d. Data and analyses shall be reported annually in accordance with the Ecology-approved QAPP. Each Permittee shall enter into the Department's environmental Information Management (EIM) database all water and solids concentration data collected pursuant to Appendix 9.</p>	<p>This section only applies to permittees who choose to conduct stormwater monitoring independently.</p> <p>a. Monitor three discharge locations.</p> <p>b. Submit a draft stormwater discharge monitoring QAPP to Ecology by Feb 1, 2020. Submit final QAPP to Ecology by Aug 15, 2020.</p> <p>c. Begin flow monitoring by Oct. 1, 2020. Begin discharge monitoring by Oct. 1, 2021.</p> <p>d. Report data and analysis to Ecology annually.</p>	Draft QAPP due 2/1/2020; Final QAPP due 8/15/2020; Monitoring beginning 10/1/2020	The city opted to pay into the RSMP.	2018 SWMP Plan Burien Permit Compliance Matrix	SWM Engineer		None, no action necessary.		
<b>FTE</b>							<b>0.05</b>	<b>0.05</b>	<b>Average FTE</b>		
<b>Permit Elements #S9.A and #S9.B, Reporting</b>											
S9.A & D	Annual Reports	<p>Submit annual report electronically at <a href="http://www.ecy.wa.gov/programs/wq/permits/pars/webdmr.htm">http://www.ecy.wa.gov/programs/wq/permits/pars/webdmr.htm</a></p> <p>Each annual report shall include:</p> <ul style="list-style-type: none"> <li>- Copy of the current SWMP;</li> <li>- The annual report form found at the URL above, including implementation status of Elements 1 through 5 and questions/instructions in Appendix 3;</li> <li>- Other attachments required in S5.C;</li> <li>- Notice of reliance on another governmental entity to satisfy any obligation of permit, if applicable.</li> </ul>	<p>Submit annual report electronically at <a href="http://www.ecy.wa.gov/programs/wq/permits/pars/webdmr.htm">http://www.ecy.wa.gov/programs/wq/permits/pars/webdmr.htm</a></p>	Annually 3/31 beginning 2020	The city submits the annual reports and posts them to the city website.	Burien Permit Compliance Matrix Website	SWM Engineer	0.10	None, submit the annual report by 31-Mar beginning 2020 and post them to the city website.	0.10	
S9.B.C	Maintain Open Public Records	Maintain records of SWMP and permit activities for five years; make records available to the public upon request.	Maintain records of SWMP and permit activities for five years; make records available to the public upon request.	Ongoing	City maintains records of the SWMP and permit activities.	2018 SWMP Plan Website			None, continue current practice.		
<b>FTE</b>							<b>0.10</b>	<b>0.10</b>	<b>Average FTE</b>		
<b>Program Summary</b>											
<b>Current FTE</b>							<b>12.35</b>	<b>New Program FTE</b>	<b>15.70</b>	<b>Average FTE</b>	

## **Appendix 4-1**

Appendix 4-1: CIP, Study, and Stormwater Project Sheets







## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Shailee Jain, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
CIP #DR7: Stormwater Infrastructure Improvement at S 116<sup>th</sup> Way

Project No.: 32995

### *PROJECT LOCATION:*

S 116th Way between 26th Avenue S and Tukwila International Boulevard on the west side of the street

### *PROBLEM DESCRIPTION:*

The existing curb along the west side of S 116th Way ends just before CB-10224, and the existing stormwater conveyance network of pipe and catchbasins is set back from the existing asphalt edge, such that stormwater runoff is not efficiently routed to the catchbasins. In addition, due to the absence of curb, runoff has formed an alternative flowpath along the grass shoulder, causing erosion and transport of sediment. The sediment deposits in front of the downstream catchbasins, further blocking stormwater from entering the piped conveyance system. The residential area and hillslope to the west is also contributing stormwater runoff and sediment load to the system. Additionally, a portion of pipe GM25820 has been exposed at the surface and there is a visible break. A successful solution will improve the efficiency of the conveyance system, as well as address sediment delivery to the system and maintenance practices. See Figure 1-2 for site photos and Figure 3 for basin map.

### *PROJECT DESCRIPTIONS:*

Extend the existing curb for about 250 feet along S 116<sup>th</sup> Way on the west side of the street, widening the asphalt shoulder. The proposed curb design includes two curb sections running parallel, separated by one foot. Sediment from the western hillslope will build up behind the first curb, slough into the opening between, and will be removed periodically by City maintenance workers. The curb will angle toward and around each catchbasin, and each catchbasin inlet shall be lowered and replaced with vaned grates to improve stormwater capture efficiency. The exposed broken pipe will be removed and replaced. See Figure 4.

### *DESIGN CONSIDERATIONS:*

While the project will force roadway runoff into stormwater conveyance, the steep hill to the west side is on private property and runoff from the hill will bring sediment along with it. It is important to ensure a separate flow path does not form at the back of the curb, thereby causing sedimentation issues at the inlet of the 24" culvert crossing S 116th Way.

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*ESTIMATED PROJECT COSTS:*

\$164,000

*PROJECT LOCATION PHOTOS:*



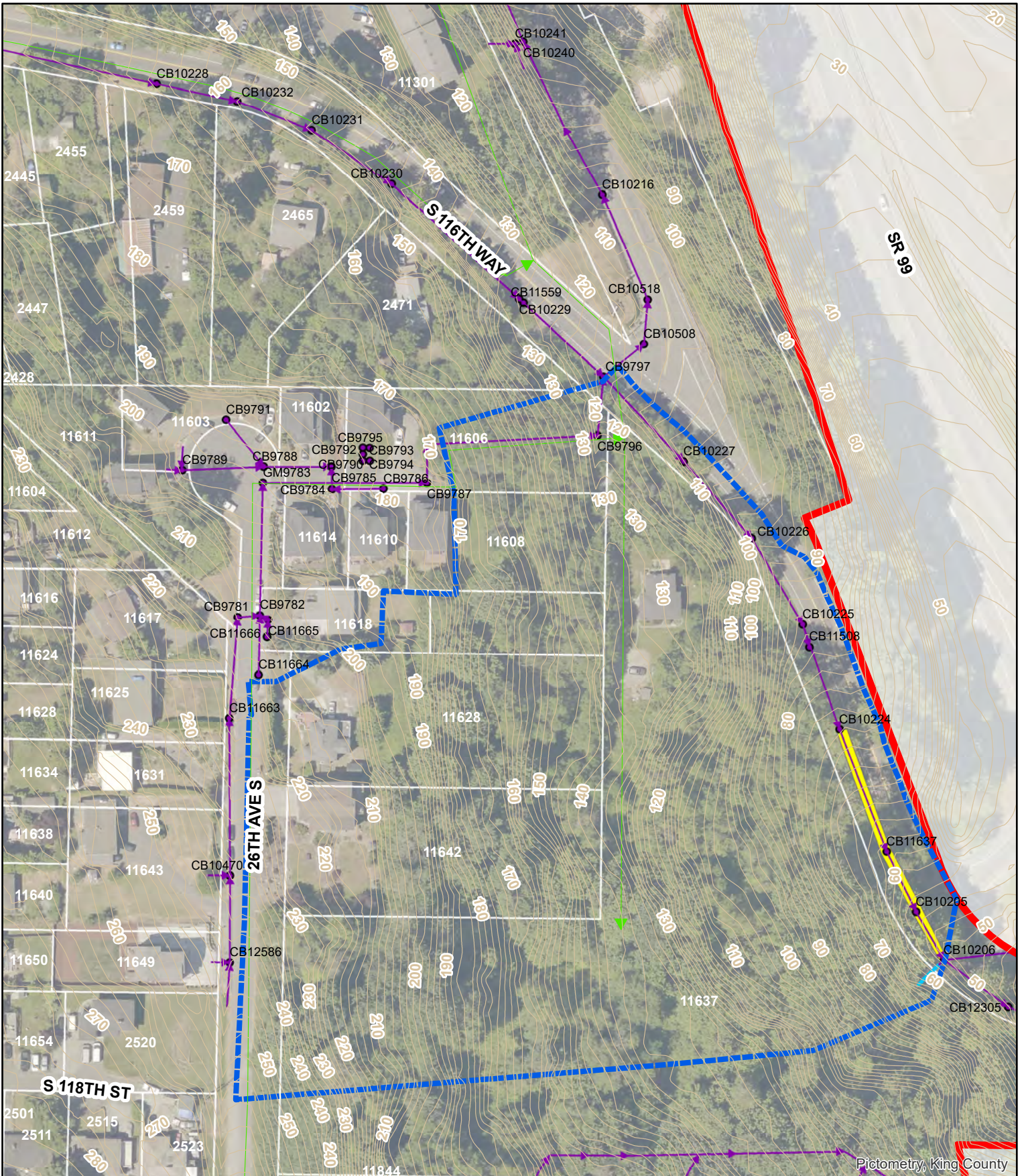
FIGURE 1: Looking north, picture taken 3/12/2019, west side of S 116<sup>th</sup> Way, CB10205, flow direction towards south





FIGURE 2: Looking south, picture taken 3/12/2019, west side of S 116<sup>th</sup> Way, CB11637, flow direction towards south





Pictometry, King County

### BURIEN SMP

DR7 MAP  
 116TH AVE S BETWEEN  
 26TH AVE S AND  
 TUKWILA INT BLVD  
 BURIEN, WA 98168

#### Legend

- Issue Location
- 2 FT Contour
- Storm Sewer
- DR7\_Basin
- Catchbasin
- Manhole
- Pipe
- Watercourse

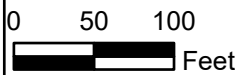
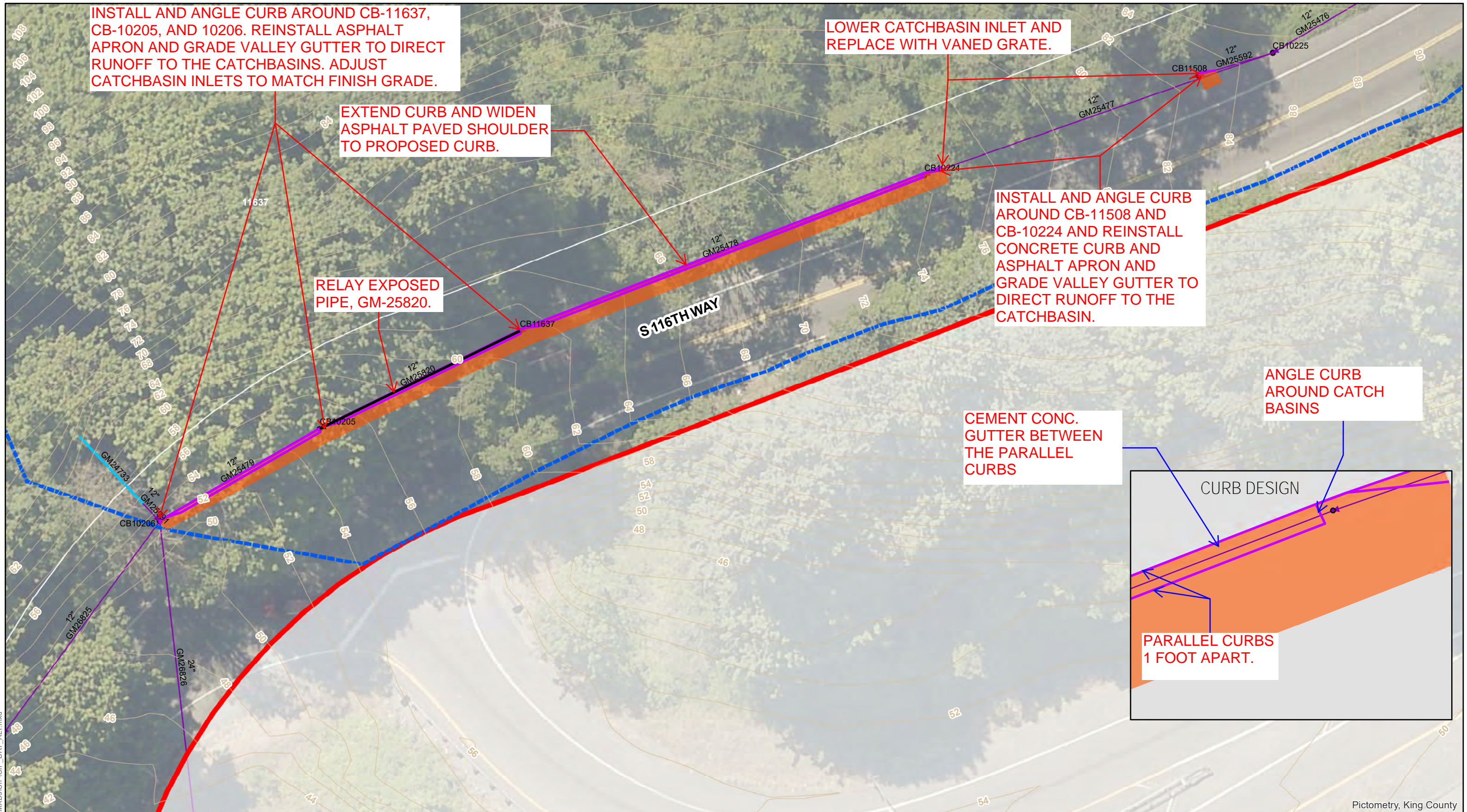


FIGURE 3: DR7 BASIN MAP

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INSTALL AND ANGLE CURB AROUND CB-11637, CB-10205, AND 10206. REINSTALL ASPHALT APRON AND GRADE VALLEY GUTTER TO DIRECT RUNOFF TO THE CATCHBASINS. ADJUST CATCHBASIN INLETS TO MATCH FINISH GRADE.

EXTEND CURB AND WIDEN ASPHALT PAVED SHOULDER TO PROPOSED CURB.

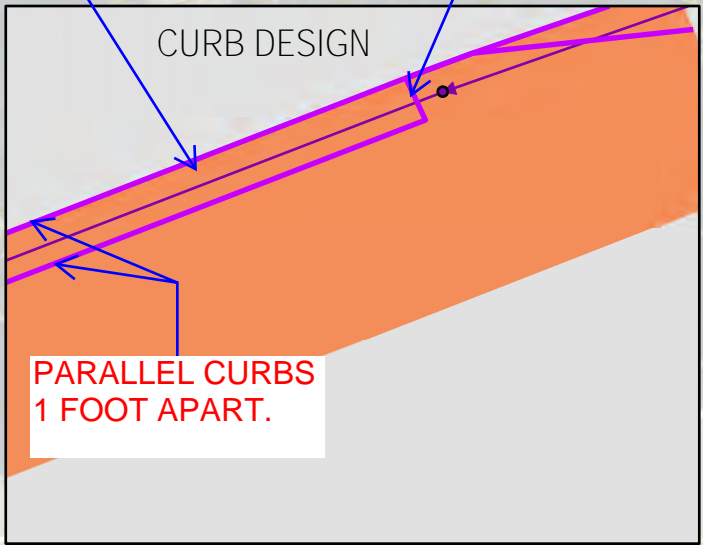
RELAY EXPOSED PIPE, GM-25820.

LOWER CATCHBASIN INLET AND REPLACE WITH VANED GRATE.

INSTALL AND ANGLE CURB AROUND CB-11508 AND CB-10224 AND REINSTALL CONCRETE CURB AND ASPHALT APRON AND GRADE VALLEY GUTTER TO DIRECT RUNOFF TO THE CATCHBASIN.

ANGLE CURB AROUND CATCH BASINS

CEMENT CONC. GUTTER BETWEEN THE PARALLEL CURBS



PARALLEL CURBS 1 FOOT APART.

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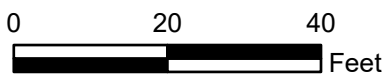
**BURIEN SMP**

DR7 PROPOSED CIP  
116 AVE S BETWEEN  
26TH AVE S AND  
TUKWILA INT BLVD  
BURIEN, WA 98168



**Legend**

- City of Burien
- DR7 Basin
- 2 Ft Contour
- Pipe
- Watercourse
- Replace/Regrade Pavement
- Catchbasin
- Manhole
- Proposed Pipe
- Curb



Pictometry, King County



FIGURE 4: DR7 PROPOSED CIP







PLANNING LEVEL PROJECT COST OPINION					
<b>PROJECT:</b> Burien Stormwater Master Plan - DR7		<b>CHECK BY:</b> GP			
<b>PROJECT ID:</b> 32995		<b>DATE:</b> 5/20/2019			
<b>BY:</b> SJ					
ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	60	SY	\$ 40.00	\$ 2,400
2	PIPE REMOVAL	65	LF	\$ 15.00	\$ 1,000
3	HOT MIX ASPHALT	39	TON	\$ 200.00	\$ 7,800
4	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIA	65	LF	\$ 130.00	\$ 8,500
5	CONNECT TO EXISTING STRUCTURES	2	EA	\$ 500.00	\$ 1,000
6	CEMENT CONC. GUTTER	250	LF	\$ 20.00	\$ 5,000
7	CEMENT CONC. EXTRUDED CURB	500	LF	\$ 40.00	\$ 20,000
8	CRUSHED SURFACING BASE COURSE	34	TON	\$ 50.00	\$ 1,800
9	ADJUST CATCH BASIN INLET & ADD VANED GRATE	2	EA	\$ 500.00	\$ 1,000
<b>Subtotal Construction Elements</b>					<b>\$ 58,422</b>
<i>Required Ancillary Items</i>					
10	DEWATERING		3%		\$ 1,800
11	EROSION & SEDIMENTATION CONTROL		8%	(see note 3)	\$ 4,700
12	TRAFFIC CONTROL		20%	(see note 4)	\$ 11,700
13	CONTINGENCY		30%		\$ 17,600
Subtotal Ancillary					\$ 35,800
<b>Subtotal Construction + Ancillary</b>					<b>\$ 94,222</b>
<i>Mobilization</i>					
14	MOBILIZATION		10%		\$ 9,422
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 103,644</b>
<i>Tax/Engineering/Management/Permitting</i>					
15	STATE SALES TAX		10%		\$ 10,400
16	ENGINEERING/SURVEY/PERMITTING		35%		\$ 36,300
17	CONSTRUCTION MANAGEMENT		10%		\$ 10,400
18	LEGAL/ADMIN		3%		\$ 3,200
Subtotal					\$ 60,300
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 163,944</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 164,000</b>
<b>Notes:</b>					
1. The above cost opinion is in 2019 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.					
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.					





## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Shailee Jain, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
CIP #DR13: Stormwater Infrastructure Improvement at Glendale Way S

Project No.: 32995

### *PROJECT LOCATION:*

Glendale Way S between Des Moines Memorial Drive S and S 118<sup>th</sup> Street on the west side of the street

### *PROBLEM DESCRIPTION:*

Stormwater sheetflow runoff from both Glendale Way S and private property on the west side of the roadway is currently unable to efficiently flow into the existing stormwater conveyance pipe and catchbasins. Significant ponding was observed within the ROW outside the travel lanes. Sediment was also observed to be settling at the toe of slope from the private property on the west. While existing catchbasin spacing follows City of Burien standards, it is insufficient to collect all the stormwater, due to the flat grade of the roadway. See Figures 1-2 for site photos and Figure 3 for basin map.

### *PROJECT DESCRIPTIONS:*

According to USGS soils data, the site is underlain by outwash soils, which indicated an opportunity to infiltrate stormwater runoff. There is approximately 8 feet of asphalt shoulder within the ROW, which could be partially used to provide infiltration in the form of either gravel trenches or infiltrating bioswales.

1. Alternative 1 – Install two catchbasins and connect to existing stormwater infrastructure.  
One new catchbasin would be installed between CB10443 and CB10454 and another between CB10454 and CB10460. CB10460 is not currently located at a low point, so it needs to be adjusted, and pavement should be regraded around it to improve the efficiency of stormwater runoff into its inlet. This option has the lowest cost but may not be sufficient to address the issue of ponding due to the flat roadway grade. See Figure 4.
2. Alternative 2 – Implement LID through Gravel Infiltration Trenches  
Portions of 12" storm drain pipe between CB10443 and CB10468 not directly under a driveway would be replaced with perforated PVC pipe and surrounded by infiltration gravel, completely surrounded by filter fabric. Overflow from the proposed infiltration trenches would be connected to the existing stormwater infrastructure downstream. See Figure 5.

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*Subject*

*[Click here to enter a date](#)*

3. Alternative 3 – Implement LID through Infiltrating Bioswales

Portions of 12" storm drain pipe between CB10443 and CB10468 which are not directly under a driveway would be removed and replaced with Bioretention cells, which would provide water quality treatment by filtering through amended soil prior to infiltration. The bioretention cells would be 2' wide, 1' deep with 2:1 side slopes. Each bioretention cell would have 6" of compost amended soil to provide water quality treatment. Overflow from the bioretention cells would be connected to the existing stormwater infrastructure downstream. See Figure 6.

*DESIGN CONSIDERATIONS:*

The DR13 map that follows shows that, per USGS data, there are areas mapped as till soils in the vicinity of the project site, as well as outwash soils. Further soils testing, including pilot infiltration tests (PIT), would be required to ensure that infiltration would be feasible and cost effective at this location. Additionally, long term operations and maintenance should be considered and defined during final design, if either of the infiltration facility options are chosen as the proposed project.

Any proposed project at this location would need to consider traffic control for Glendale Way S.

*ESTIMATED PROJECT COSTS:*

Alternative 1– \$38,000

Alternative 2– \$210,000

Alternative 3– \$264,000

PROJECT LOCATION PHOTOS:



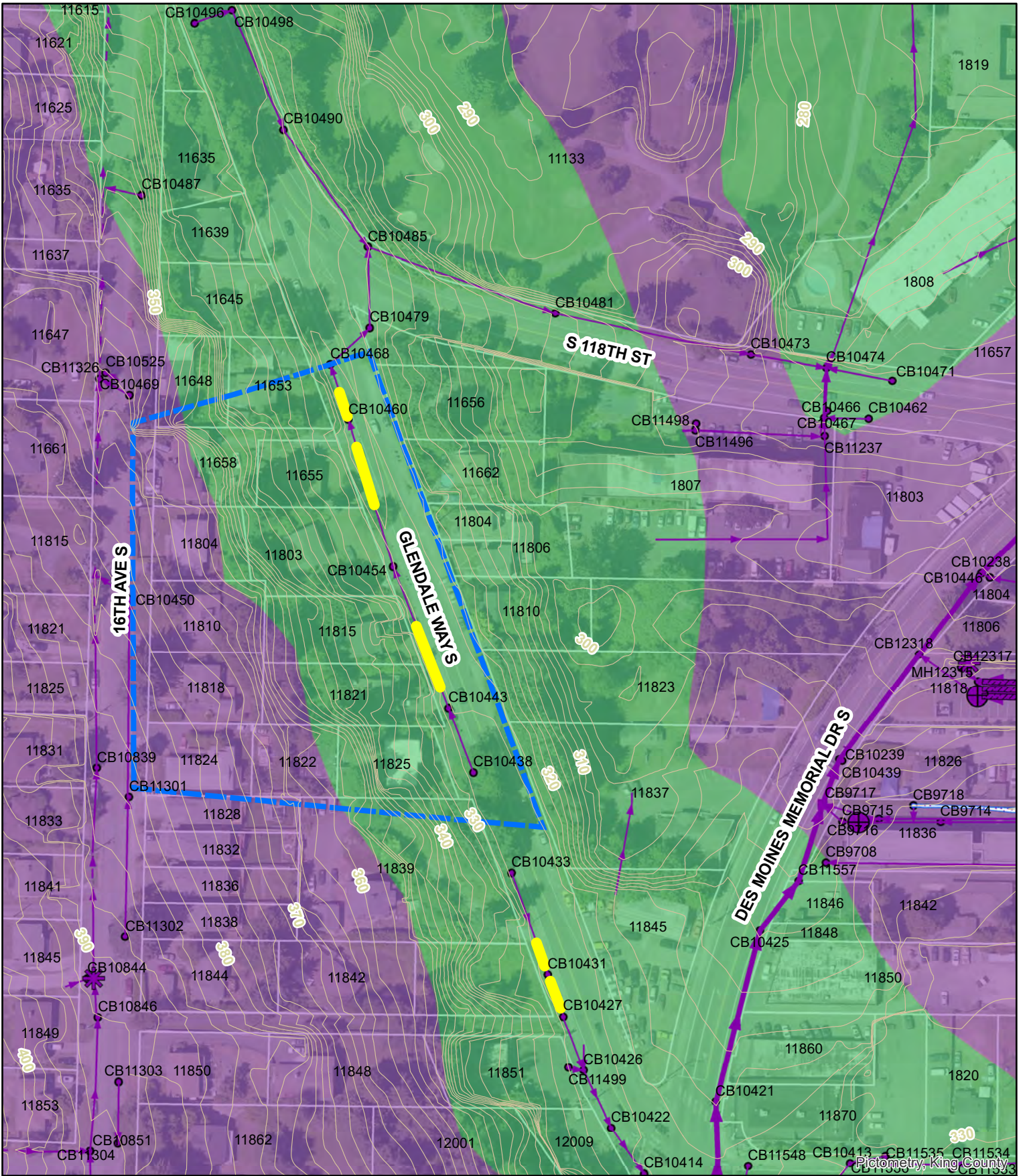
FIGURE 1: Looking southeast, picture taken 4/5/2019, west side of Glendale Way S, CB10460, flow direction towards southeast





FIGURE 2: Looking southeast, picture taken 4/5/2019, west side of Glendale Way S, flow direction towards southeast



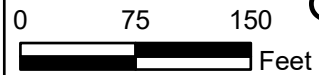


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### BURIEN SMP

DR13 MAP  
11655 GLENDALE AVE S  
BURIEN, WA 98168

PIN: 0985000704



#### Legend

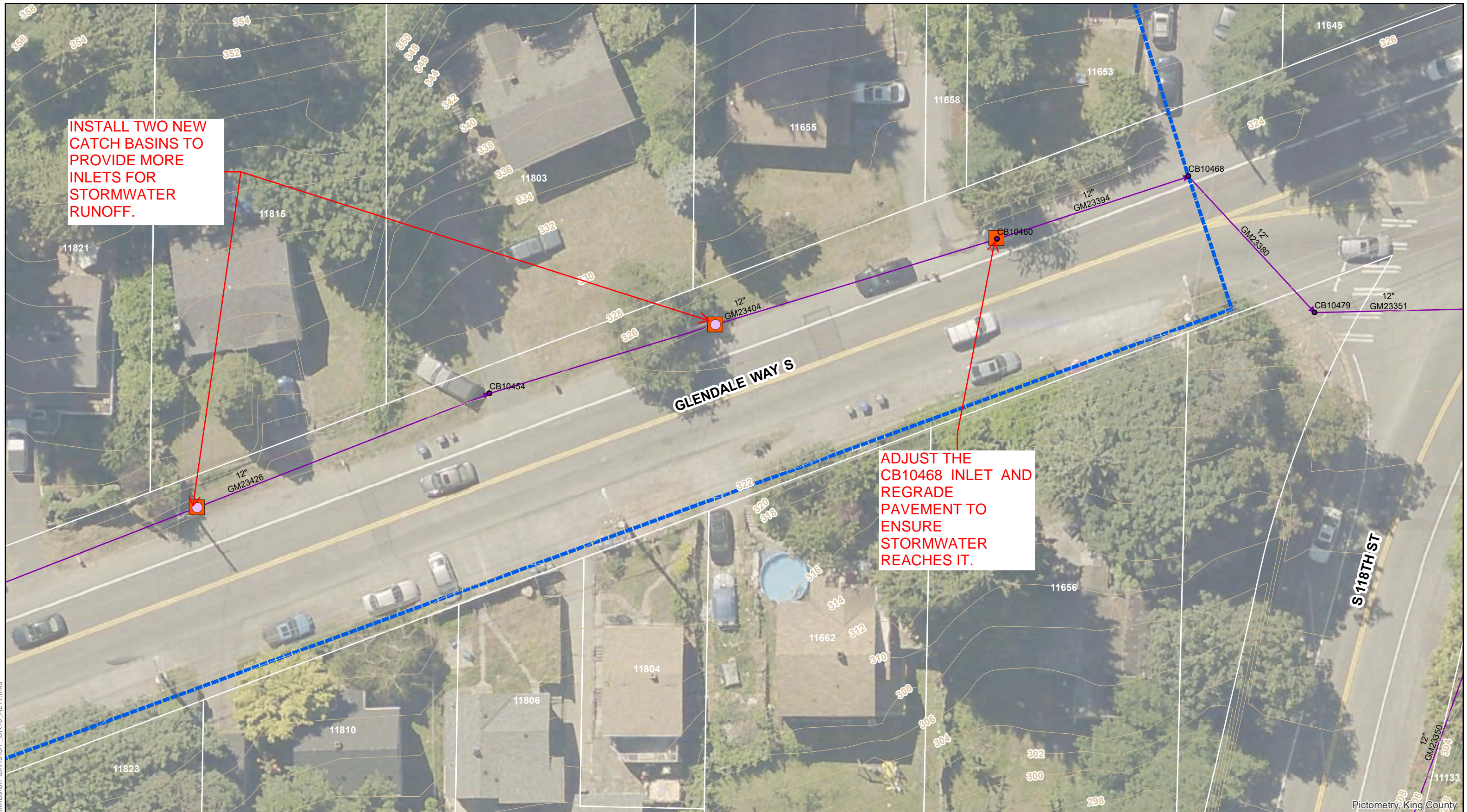
- |                 |            |                |                    |                |         |
|-----------------|------------|----------------|--------------------|----------------|---------|
| Issue_Locations | DR13 Basin | Dispersion BMP | Filter             | Ditch          | Outwash |
| 2 Ft Contour    | Catchbasin | SW Vault       | Control Structures | 4"-12" Pipe    | Till    |
| Manhole         |            |                |                    | 12" - 24" Pipe |         |
|                 |            |                |                    | 24" - 36" Pipe |         |
|                 |            |                |                    | > 36" Pipe     |         |



FIGURE 3: DR13 BASIN MAP







**INSTALL TWO NEW  
CATCH BASINS TO  
PROVIDE MORE  
INLETS FOR  
STORMWATER  
RUNOFF.**

**ADJUST THE  
CB10468 INLET AND  
REGRADE  
PAVEMENT TO  
ENSURE  
STORMWATER  
REACHES IT.**

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**BURIEN SMP**  
 DR13 ALTERNATIVE 1  
 11655 GLENDALE AVE S  
 BURIEN, WA 98168

PIN: 0985000704

0 20 40  
 Feet

**Legend**

DR13_Basin	Pipe	Catchbasin	Proposed Catch Basins
2 Ft Contour	Manhole	Remove/Regrade Pavement	

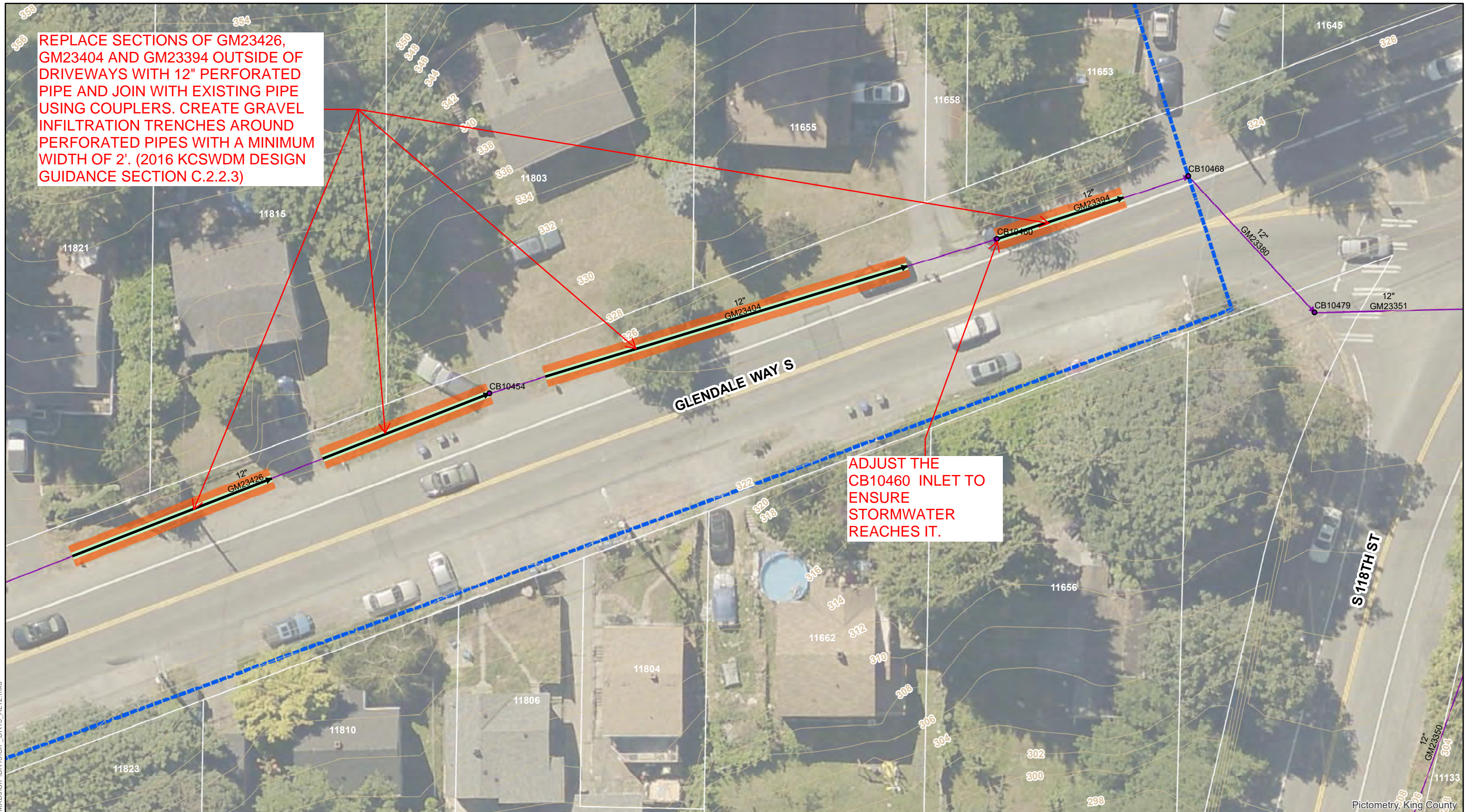
Pictometry, King County

FIGURE 4: DR13 PROPOSED CIP ALTERNATIVE 1



REPLACE SECTIONS OF GM23426, GM23404 AND GM23394 OUTSIDE OF DRIVEWAYS WITH 12" PERFORATED PIPE AND JOIN WITH EXISTING PIPE USING COUPLERS. CREATE GRAVEL INFILTRATION TRENCHES AROUND PERFORATED PIPES WITH A MINIMUM WIDTH OF 2'. (2016 KCSWDM DESIGN GUIDANCE SECTION C.2.2.3)

ADJUST THE CB10460 INLET TO ENSURE STORMWATER REACHES IT.



**BURIEN SMP**  
 DR13 ALTERNATIVE 2  
 11655 GLENDALE AVE S  
 BURIEN, WA 98168  
 PIN: 0985000704

0 20 40  
 Feet

**Legend**

DR13_Basin	Pipe	Catchbasin	Proposed Perforated Pipes
2 Ft Contour	Manhole	Infiltration Trench	Remove/Regrade Pavement

**Otak**

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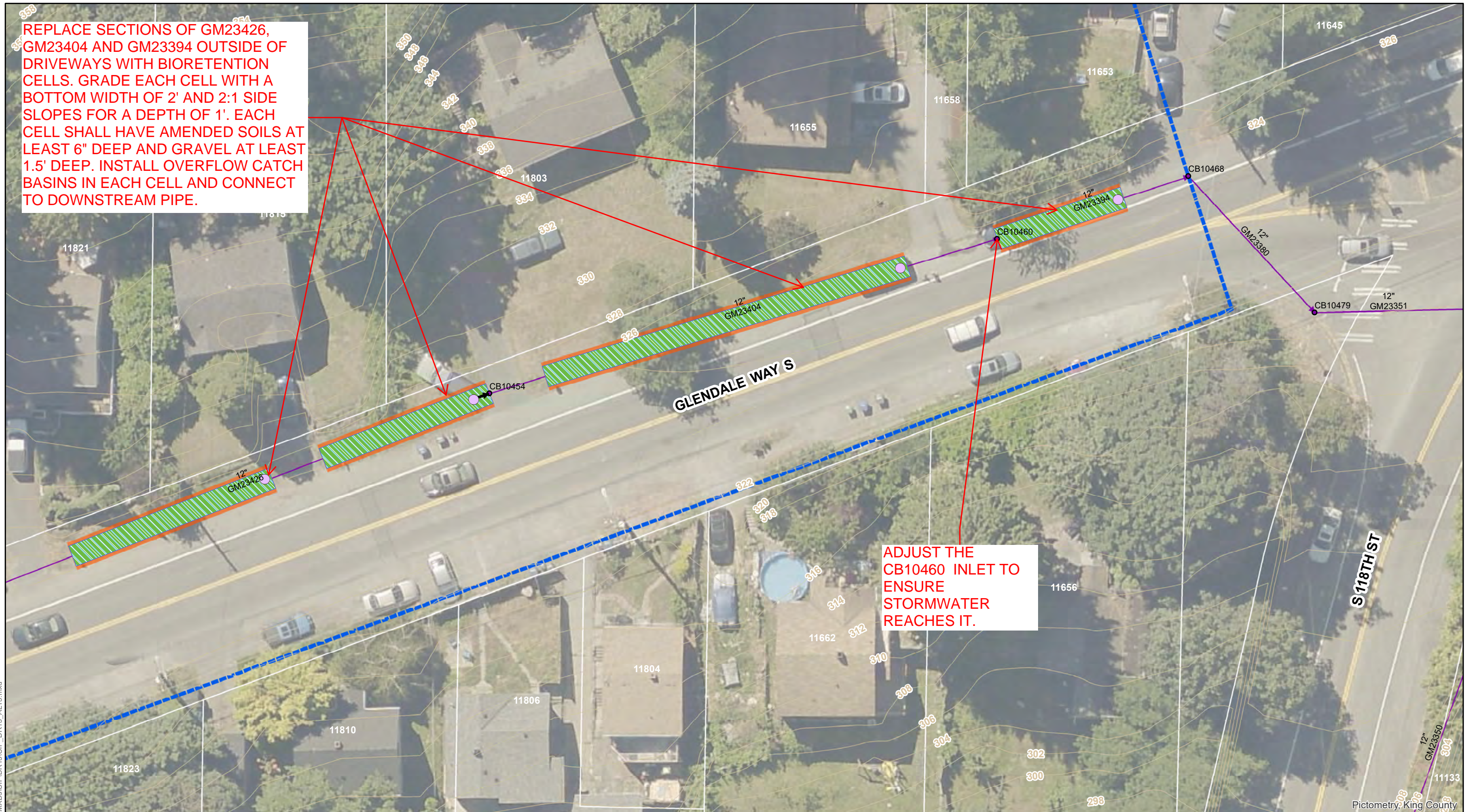
Pictometry, King County

FIGURE 5: DR13 PROPOSED CIP ALTERNATIVE 2



REPLACE SECTIONS OF GM23426, GM23404 AND GM23394 OUTSIDE OF DRIVEWAYS WITH BIORETENTION CELLS. GRADE EACH CELL WITH A BOTTOM WIDTH OF 2' AND 2:1 SIDE SLOPES FOR A DEPTH OF 1'. EACH CELL SHALL HAVE AMENDED SOILS AT LEAST 6" DEEP AND GRAVEL AT LEAST 1.5' DEEP. INSTALL OVERFLOW CATCH BASINS IN EACH CELL AND CONNECT TO DOWNSTREAM PIPE.

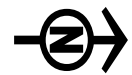
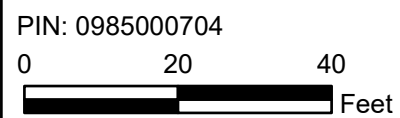
ADJUST THE CB10460 INLET TO ENSURE STORMWATER REACHES IT.



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**BURIEN SMP**

DR13 ALTERNATIVE 3  
11655 GLENDALE AVE S  
BURIEN, WA 98168



**Legend**

- New\_Pipes
- Catchbasin
- Pipe
- DR13\_Basin
- Manhole
- Remove/Regrade Pavement
- 2 Ft Contour
- Bioswale
- Overflow from Bioretention



FIGURE 6: DR13 PROPOSED CIP ALTERNATIVE 3





Otak proj. 032995

PLANNING LEVEL PROJECT COST OPINION					
<b>PROJECT:</b> Burien Stormwater Master Plan - DR13 ALT 1		<b>CHECK BY:</b> GP			
<b>PROJECT ID:</b> 32995		<b>DATE:</b> 5/1/2019			
<b>BY</b> SJ					
ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	10	SY	\$ 40.00	\$ 400
2	PIPE REMOVAL	20	LF	\$ 15.00	\$ 300
3	CATCH BASIN TYPE 1	2	EA	\$ 2,000.00	\$ 4,000
4	HOT MIX ASPHALT	1	TON	\$ 200.00	\$ 200
5	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	16	LF	\$ 130.00	\$ 2,100
6	CRUSHED SURFACING BASE COURSE	1	TON	\$ 50.00	\$ 100
7	ADJUST CATCH BASIN INLETS	1	EA	\$ 500.00	\$ 500
<b>Subtotal Construction Elements</b>					<b>\$ 9,611</b>
<i>Required Ancillary Items</i>					
8	DEWATERING		3%		\$ 300
9	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 500
10	TRAFFIC CONTROL		60%	(see note 4)	\$ 5,800
11	CONTINGENCY		40%		\$ 3,900
Subtotal Ancillary					\$ 10,500
<b>Subtotal Construction + Ancillary</b>					<b>\$ 20,111</b>
<i>Mobilization</i>					
12	MOBILIZATION		10%		\$ 2,011
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 22,122</b>
<i>Tax/Engineering/Management/Permitting</i>					
13	STATE SALES TAX		10%		\$ 2,300
14	ENGINEERING/SURVEY/PERMITTING		45%		\$ 10,000
15	CONSTRUCTION MANAGEMENT		10%		\$ 2,300
16	LEGAL/ADMIN		3%		\$ 700
Subtotal					\$ 15,300
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 37,422</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 38,000</b>
<b>Notes:</b>					
1. The above cost opinion is in 2019 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.					
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.					

Otak proj. 032995

PLANNING LEVEL PROJECT COST OPINION					
<b>PROJECT:</b> Burien Stormwater Master Plan - DR13 ALT 2		<b>CHECK BY:</b> GP			
<b>PROJECT ID:</b> 32995		<b>DATE:</b> 5/1/2019			
<b>BY</b> SJ					
ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	GEOTECHNICAL INVESTIGATION INCLUDING PIT TEST	4	EA	\$ 6,000.00	\$ 24,000
2	PAVEMENT REMOVAL	150	SY	\$ 40.00	\$ 6,000
3	PIPE REMOVAL	250	LF	\$ 15.00	\$ 3,800
4	PIPE COUPLERS	6	EA	\$ 20.00	\$ 120
5	INFILTRATION TRENCH	250	LF	\$ 25.00	\$ 6,300
	GRAVEL	90	CY	\$ 55.00	
	FILTER FABRIC	500	SF	\$ 3.00	
6	HOT MIX ASPHALT	19	TON	\$ 200.00	\$ 3,800
7	PERFORATED PVC PIPE, 12 IN. DIAM.	250	LF	\$ 50.00	\$ 12,500
8	CRUSHED SURFACING BASE COURSE	18	TON	\$ 50.00	\$ 900
9	ADJUST CATCH BASIN INLETS	1	EA	\$ 500.00	\$ 500
<b>Subtotal Construction Elements</b>					<b>\$ 69,622</b>
<i>Required Ancillary Items</i>					
10	DEWATERING		3%		\$ 2,100
11	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 3,500
12	TRAFFIC CONTROL		30%	(see note 4)	\$ 20,900
13	CONTINGENCY		30%		\$ 20,900
Subtotal Ancillary					\$ 47,400
<b>Subtotal Construction + Ancillary</b>					<b>\$ 117,022</b>
<i>Mobilization</i>					
14	MOBILIZATION		10%		\$ 11,702
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 128,724</b>
<i>Tax/Engineering/Management/Permitting</i>					
15	STATE SALES TAX		10%		\$ 12,900
16	ENGINEERING/SURVEY/PERMITTING		40%		\$ 51,500
17	CONSTRUCTION MANAGEMENT		10%		\$ 12,900
18	LEGAL/ADMIN		3%		\$ 3,900
Subtotal					\$ 81,200
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 209,924</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 210,000</b>
<b>Notes:</b>					
1. The above cost opinion is in 2019 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.					
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.					



Otak proj. 032995

PLANNING LEVEL PROJECT COST OPINION					
<b>PROJECT: Burien Stormwater Master Plan - DR13 ALT 3</b>		<b>CHECK BY: GP</b>			
<b>PROJECT ID: 32995</b>		<b>DATE: 5/1/2019</b>			
<b>BY SJ</b>					
ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	GEOTECHNICAL INVESTIGATION INCLUDING PIT TEST	4	EA	\$ 6,000.00	\$ 24,000
2	PAVEMENT REMOVAL	290	SY	\$ 40.00	\$ 11,600
3	PIPE REMOVAL	250	LF	\$ 15.00	\$ 3,800
4	BIORETENTION CELL	1	LS	\$ 16,700.00	\$ 16,700
	BIORETENTION SOIL MIX	28	CY	\$ 30.00	
	PLANTING	1,500	SF	\$ 10.00	
	INLET/OUTLET PROTECTION	8	EA	\$ 100.00	
5	HOT MIX ASPHALT	19	TON	\$ 200.00	\$ 3,800
6	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	10	LF	\$ 130.00	\$ 1,300
7	CRUSHED SURFACING BASE COURSE	18	TON	\$ 50.00	\$ 900
8	CATCH BASIN TYPE 1 WITH BEEHIVE GRATE	4	EA	\$ 2,500.00	\$ 10,000
9	ADJUST/REDESIGN CATCH BASIN INLETS	1	EA	\$ 500.00	\$ 500
<b>Subtotal Construction Elements</b>					<b>\$ 87,278</b>
<i>Required Ancillary Items</i>					
10	DEWATERING		3%		\$ 2,700
11	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 4,400
12	TRAFFIC CONTROL		30%	(see note 4)	\$ 26,200
13	CONTINGENCY		30%		\$ 26,200
Subtotal Ancillary					\$ 59,500
<b>Subtotal Construction + Ancillary</b>					<b>\$ 146,778</b>
<i>Mobilization</i>					
14	MOBILIZATION		10%		\$ 14,678
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 161,456</b>
<i>Tax/Engineering/Management/Permitting</i>					
15	STATE SALES TAX		10%		\$ 16,200
16	ENGINEERING/SURVEY/PERMITTING		40%		\$ 64,600
17	CONSTRUCTION MANAGEMENT		10%		\$ 16,200
18	LEGAL/ADMIN		3%		\$ 4,900
Subtotal					\$ 101,900
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 263,356</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 264,000</b>
<b>Notes:</b>					
1. The above cost opinion is in 2019 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.					
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.					





## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Teddy Thorson, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
CIP #MW25: Stormwater Infrastructure Improvement at 2<sup>nd</sup> Avenue S  
between S 124<sup>th</sup> Street and S 128<sup>th</sup> Street

Project No.: 32995

### *PROJECT LOCATION:*

2nd Avenue S between S 124th Street and S 128th Street on the west side of the street

### *PROBLEM DESCRIPTION:*

Stormwater runoff from both public ROW and private property is ponding in several locations along the west side of 2nd Avenue S (Figure 1, Figure 2). The ponding occurs in both the roadway and along the gravel shoulder. The existing stormwater conveyance on the west side of 2nd Avenue S consists of a system of ditches, culverts and catchbasins. However, much of the existing conveyance is not effective as runoff is unable to efficiently flow to the existing catchbasin or ditches. It also appears that several existing ditches have been filled, which has led to increased ponding in the shoulder and roadway (Figure 2).

### *PROJECT DESCRIPTIONS:*

One solution has been proposed. The solution is to install four (4) new catchbasins on the west side of 2nd Avenue S. The catchbasins will be installed at the low points adjacent to private driveways, where ponding currently occurs. Three of the proposed catch basins are located such that they will intercept existing pipes/culverts to connect to the existing conveyance system. The fourth proposed catch basin connects to existing conveyance through a lateral pipe to the west (Figure 3). The asphalt driveway entrances will be repaved to include a shallow asphalt valley gutter, directing runoff toward the proposed catchbasins or existing drainage infrastructure. Additionally, sections of the gravel shoulder will be regraded such that stormwater sheet flowing from the roadway onto the shoulder will be conveyed to the proposed catchbasins or existing drainage infrastructure (Figure 3).

### *DESIGN CONSIDERATIONS:*

One important design consideration is construction impacts. The project location is on a residential street that experiences limited traffic. The proposed solution could be completed entirely along the west shoulder with limited impacts to the roadway. However, coordination with private property owners would be required, as grading would be occurring in both the shoulder area and citizen's driveways (Figure 3).

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Another design consideration for the proposed solution was utilizing existing drainage infrastructure. During field observation, the existing drainage infrastructure appeared to be in good condition and could continue to be used going forward. Regrading areas in the shoulder and intercepting existing pipes reduces the amount of new infrastructure and decreases overall construction costs.

*ESTIMATED PROJECT COSTS:*

Alternative 1 – \$86,000

*PROJECT LOCATION PHOTOS:*



FIGURE 1: Ponding on 4th Avenue S, facing north. Photo date 3/7/2019

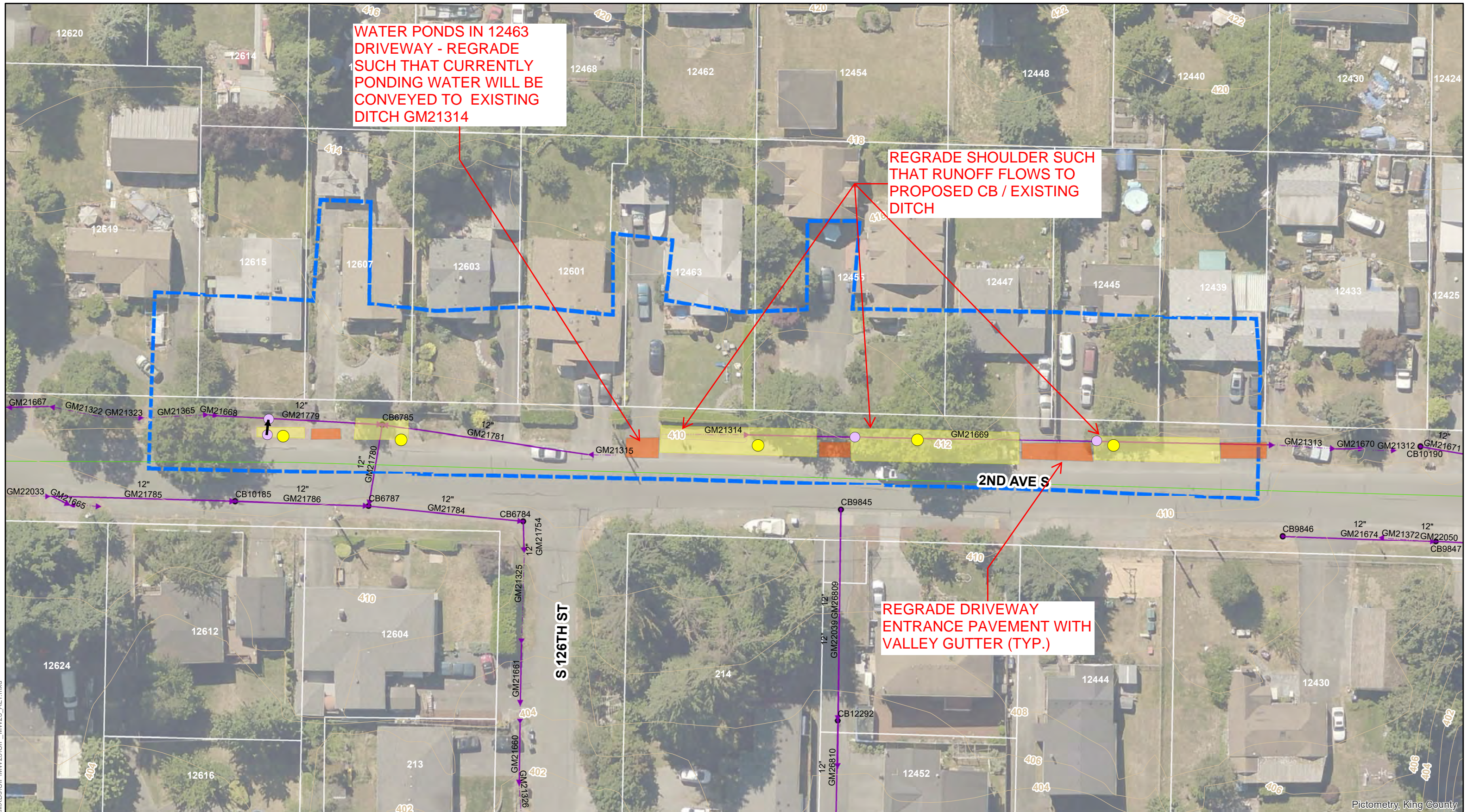




FIGURE 2: Ponding on 4th Avenue S, facing south. Photo date 3/12/2019







**BURIEN SMP**  
 MW25 PROPOSED CIP: ALTERNATIVE 1

2ND AVE S BETWEEN  
 S 124TH ST AND S 128TH ST  
 BURIEN, WA 98166

0 50 100  
 Feet

**Legend**

Flooding Locations	Storm Sewer	Catchbasin	Proposed CB
MW25 Basin	Pipe	Manhole	Regrade Shoulder
2 Ft Contour	Ditch	Proposed Pipe	Replace/Regrade Pavement

**Otak**

Figure 3: Alternative 1 Map







**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - MW25 ALT 1  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/20/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	100	SY	\$ 40.00	\$ 4,000
2	REMOVE PIPE	30	LF	\$ 15.00	\$ 500
3	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	10	LF	\$ 180.00	\$ 1,800
4	TYPE 1 CATCH BASIN	4	EA	\$ 2,000.00	\$ 8,000
5	CRUSHED SURFACING BASE COURSE	30	TON	\$ 50.00	\$ 1,500
6	HOT MIX ASPHALT	35	TON	\$ 200.00	\$ 7,000
7	CONNECT TO DRAINAGE STRUCTURE	3	EA	\$ 500.00	\$ 1,500
8	EXCATATION FOR SHOULDER/DITCH REGRADE	90	CY	\$ 30.00	\$ 2,700
<b>Subtotal Construction Elements</b>					<b>\$ 31,889</b>
<i>Required Ancillary Items</i>					
9	DEWATERING		3%		\$ 1,000
10	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 1,600
11	TRAFFIC CONTROL		15%	(see note 4)	\$ 4,800
12	CONTINGENCY		30%		\$ 9,600
Subtotal Ancillary					\$ 17,000
<b>Subtotal Construction + Ancillary</b>					<b>\$ 48,889</b>
<i>Mobilization</i>					
13	MOBILIZATION		10%		\$ 4,889
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 53,778</b>
<i>Tax/Engineering/Management/Permitting</i>					
14	STATE SALES TAX		10%		\$ 5,400
15	ENGINEERING/SURVEYING/PERMITTING		35%		\$ 18,900
16	CONSTRUCTION MANAGEMENT		10%		\$ 5,400
17	LEGAL/ADMIN		3%		\$ 1,700
Subtotal					\$ 31,400
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 85,178</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 86,000</b>

**Notes:**

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- Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.





## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Teddy Thorson, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
CIP #SC4: Stormwater Infrastructure Improvement at  
11704 Ambaum Boulevard SW

Project No.: 32995

### PROJECT LOCATION:

11704 Ambaum Boulevard SW, Burien, WA 98146

### PROBLEM DESCRIPTION:

Localized ponding occurs on the northeast side of Ambaum Boulevard SW in front of the driveway to house 11704. The driveway entrance to house 11704 is a low point on the northeast side of the roadway. There is no existing stormwater infrastructure on the northeast side of the roadway which results in localized ponding (Figure 1). The stormwater ponding at the low point has two sources. The first source is sheet flow from Ambaum Boulevard. Ambaum Boulevard is an uncrowned roadway at most locations, but near house 11704, it is crowned with the eastern most lane of the roadway sloping towards house 11704 (Figure 1). The second source of runoff is the vacant lot north of house 11704. The vacant lot is sloped towards an existing shallow flow path at its center (Figure 2). Stormwater sheet-flows towards this channel, which flows onto Ambaum Boulevard, resulting in stormwater from the vacant lot ponding at the low point along the ROW in front of house 11704.

### PROJECT DESCRIPTIONS:

The proposed project has two potential alternatives both of which are designed to collect stormwater from both runoff sources at the low point. The first alternative is to install a curb inlet catchbasin at the low point in front of house 11704. The water collected at this location would be connected to the existing system at CB3080 with a pipe crossing Ambaum Boulevard SW (Figure 3). The second alternative would utilize the same curb inlet catchbasin at the same location. However, Alternative 2 proposes to install the new pipe parallel to the direction of traffic flow on Ambaum Boulevard SW and connect to existing structure CB3085 (Figure 4). It is important to note that Alternative 2 would require information to determine its feasibility in terms of available pipe cover. There is approximately 150 feet between the proposed catchbasin location and CB3085, and CB 3085's rim is above the rim of the proposed catchbasin. GM26332, the existing pipe crossing Ambaum Boulevard SW, was approximately 4 feet below the rim when examined during the site visit. The City of Burien specifies a minimum of 1-foot cover for non-flexible pipes. The type of pipe used, and surveying how much elevation change exists between the two locations will determine the feasibility of Alternative 2.

*k:\project\32900\32995\projectdocs\reports\cip\sc4 (originally mw30)\cip-sc4.docx*

Another potential solution approach would be an LID alternative. According to USGS soils data, the existing soils are outwash. However, due to the urban nature of the site, there is insufficient space within City ROW that could be used for an infiltration facility such as bioretention or an infiltration trench without making significant changes to the roadway or adjacent sidewalk.

#### DESIGN CONSIDERATIONS:

Potholing of existing utilities should be performed to assess conflicts with the proposed improvements. Field observations identified a sanitary sewer line along the eastern edge of Ambaum Boulevard SW, which locates the sewer line near the proposed new catchbasin for either alternative. Using a curb inlet and installing the structure underneath the sidewalk as opposed to the roadway would provide sufficient space between the proposed structure and the existing sanitary sewer line. The design will require survey information to determine whether there is sufficient space to install a catchbasin in the roadway without conflicting with the existing utility. There is also a water line utility which runs near the center of Ambaum Boulevard SW. This would need to be potholed as it poses a potential conflict for Alternative 1 (Figure 3).

Another potential design consideration for both alternatives is traffic control. Alternative 1 proposes installing and connecting a new catchbasin to the existing catchbasin laterally under Ambaum Boulevard SW (Figure 3). Ambaum Boulevard has four lanes and was observed to have significant traffic flow during the site visit. Traffic would need to be diverted or managed to construct Alternative 1. For Alternative 2, the majority of the work could be completed within the eastern most lane of Ambaum Boulevard and the adjacent sidewalk, which would present fewer traffic control challenges (Figure 4).

#### ESTIMATED PROJECT COSTS:

Alternative 1 – \$49,000

Alternative 2 – \$97,000



PROJECT LOCATION PHOTOS:

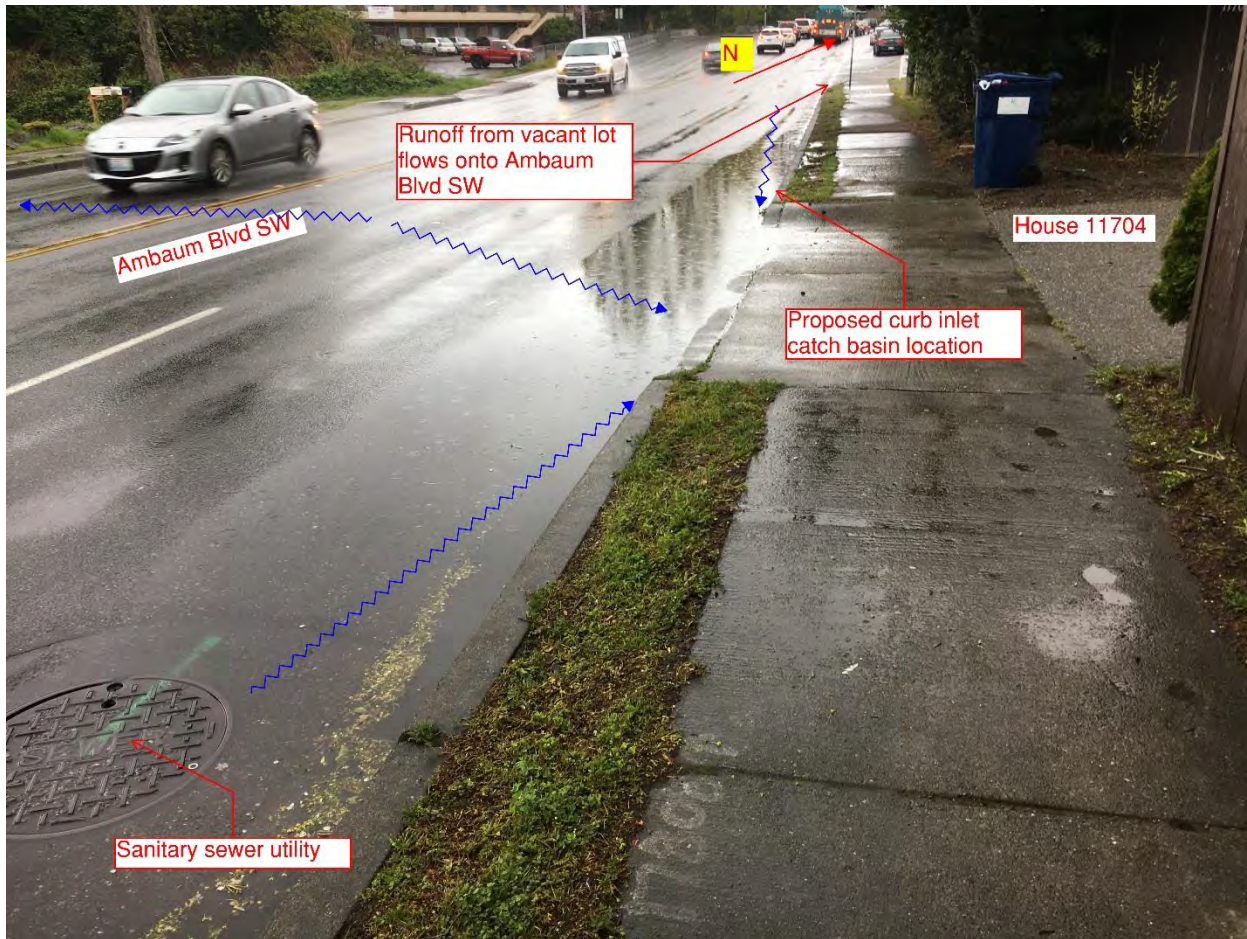


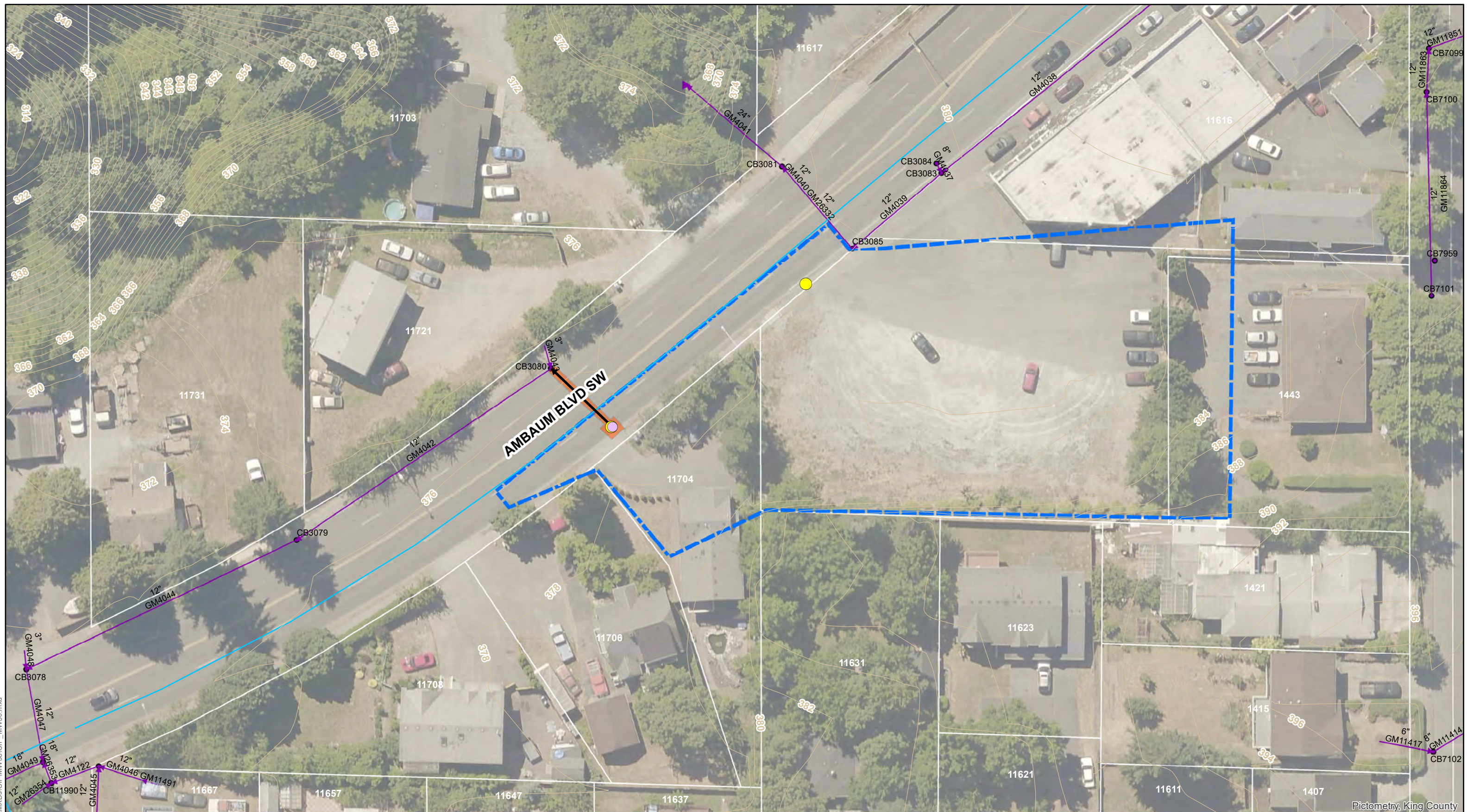
FIGURE 1: Localized ponding on northeast side of Ambaum Boulevard SW. Photo date 4/19/2019





FIGURE 2: Sheetflow from vacant lot to Ambaum Boulevard SW north of issue location. Photo date 4/19/2019





**BURIEN SMP**  
 SC4 PROPOSED CIP: ALTERNATIVE 1

11704 AMBAUM BLVD SW  
 BURIEN, WA  
 98146

**Legend**

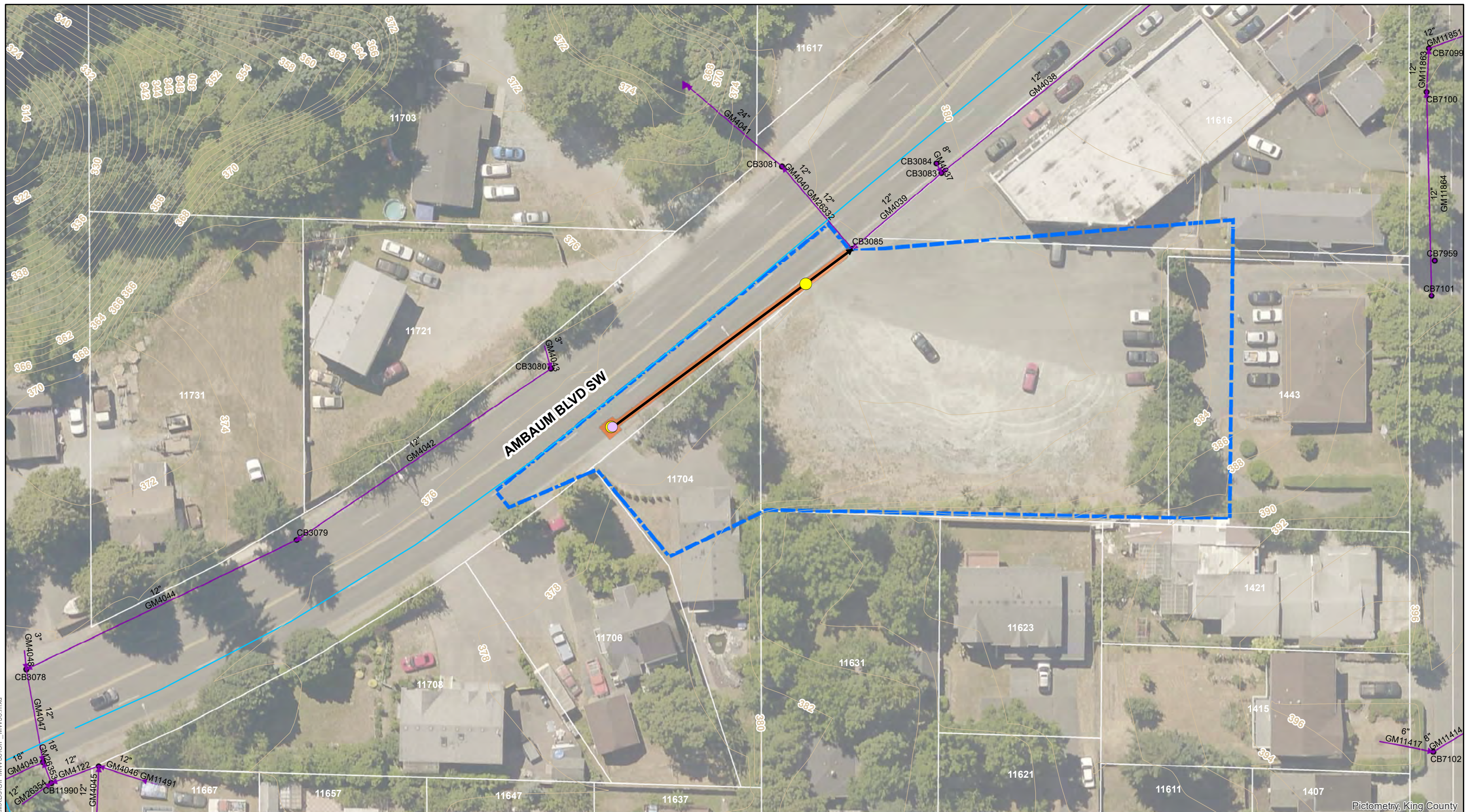
SC4 Basin	Water Main	Catchbasin	Proposed CBs
Issue Location	Pipe	Manhole	Proposed Pipes
2 Ft Contour	Ditch	Outfall	Regrade/Replace Pavement

Figure 3: Alternative 1 Map

Pictometry, King County

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**BURIEN SMP**  
 SC4 PROPOSED CIP: ALTERNATIVE 2

11704 AMBAUM BLVD SW  
 BURIEN, WA  
 98146

0 50 100  
 Feet

**Legend**

SC4 Basin	Water Main	Catchbasin	Proposed CBs
Issue Location	Pipe	Manhole	Proposed Pipes
2 Ft Contour	Ditch	Outfall	Regrade/Replace Pavement

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Pictometry, King County

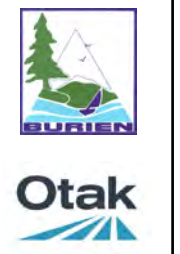


Figure 4: Alternative 2 Map



**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - SC4 ALT 1  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/17/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	25	SY	\$ 40.00	\$ 1,000
2	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	40	LF	\$ 130.00	\$ 5,200
3	CATCH BASIN TYPE 1	1	EA	\$ 2,000.00	\$ 2,000
4	CRUSHED SURFACING BASE COURSE	10	TON	\$ 50.00	\$ 500
5	HOT MIX ASPHALT	10	TON	\$ 200.00	\$ 2,000
6	CONNECT TO DRAINAGE STRUCTURE	1	EA	\$ 500.00	\$ 500
<b>Subtotal Construction Elements</b>					<b>\$ 13,822</b>
<i>Required Ancillary Items</i>					
7	DEWATERING		3%	\$	500
8	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 700
9	TRAFFIC CONTROL		40%	(see note 4)	\$ 5,600
10	CONTINGENCY		40%		\$ 5,600
Subtotal Ancillary					\$ 12,400
<b>Subtotal Construction + Ancillary</b>					<b>\$ 26,222</b>
<i>Mobilization</i>					
11	MOBILIZATION		10%		\$ 2,622
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 28,844</b>
<i>Tax/Engineering/Management/Permitting</i>					
12	STATE SALES TAX		10%		\$ 2,900
13	ENGINEERING/SURVEYING/PERMITTING		45%		\$ 13,000
14	CONSTRUCTION MANAGEMENT		10%		\$ 2,900
15	LEGAL/ADMIN		3%		\$ 900
Subtotal					\$ 19,700
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 48,544</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 49,000</b>

**Notes:**

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- Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.

**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - SC4 ALT 2  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/17/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT AND SIDEWALK REMOVAL	70	SY	\$ 40.00	\$ 2,800
2	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	150	LF	\$ 110.00	\$ 16,500
3	CATCH BASIN TYPE 1	1	EA	\$ 2,000.00	\$ 2,000
4	CRUSHED SURFACING BASE COURSE	10	TON	\$ 50.00	\$ 500
5	HOT MIX ASPHALT	15	TON	\$ 200.00	\$ 3,000
6	CONNECT TO DRAINAGE STRUCTURE	1	EA	\$ 500.00	\$ 500
7	CEMENT CONCRETE SIDEWALK	35	SY	\$ 150.00	\$ 5,300
<b>Subtotal Construction Elements</b>					<b>\$ 36,156</b>
<i>Required Ancillary Items</i>					
8	DEWATERING		3%		\$ 1,100
9	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 1,900
10	TRAFFIC CONTROL		15%	(see note 4)	\$ 5,500
11	CONTINGENCY		30%		\$ 10,900
Subtotal Ancillary					\$ 19,400
<b>Subtotal Construction + Ancillary</b>					<b>\$ 55,556</b>
<i>Mobilization</i>					
12	MOBILIZATION		10%		\$ 5,556
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 61,111</b>
<i>Tax/Engineering/Management/Permitting</i>					
13	STATE SALES TAX		10%		\$ 6,200
14	ENGINEERING/SURVEYING/PERMITTING		35%		\$ 21,400
15	CONSTRUCTION MANAGEMENT		10%		\$ 6,200
16	LEGAL/ADMIN		3%		\$ 1,900
Subtotal					\$ 35,700
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 96,811</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 97,000</b>

**Notes:**

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- 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.
- Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.



## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Teddy Thorson, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
CIP #MW31: Stormwater Infrastructure Improvement on SW 152<sup>nd</sup> Street  
and 16<sup>th</sup> Avenue SW

Project No.: 32995

### *PROJECT LOCATION:*

South shoulder of SW 152nd Street and 16th Avenue SW intersection

### *PROBLEM DESCRIPTION:*

Localized ponding occurs on the south shoulder of SW 152nd St and 16th Avenue SW in front of house number 1603. The SW 152nd St roadway is crowned in the center with minimal slope in the direction of traffic. Stormwater sheet flows off SW 152nd St and into a localized depression on the south shoulder at the intersection (Figure 1). There is an existing 8-10" berm that forms the southern boundary of the depression, causing stormwater runoff to pond behind it. Additional ponding occurs along the south side of SW 152nd St (Figure 2, Figure 3). Between existing catchbasins CB2928 and CB12405 there is no other stormwater capture and conveyance system on the south side of SW 152nd St. Without connection to downstream conveyance, stormwater runoff ponds along the south side of SW 152nd St. The most severe location, however, is at the location listed above.

### *PROJECT DESCRIPTIONS:*

The proposed project has three potential alternatives. The first alternative is to address only the ponding at the SW 152nd St and 16th Ave SW intersection. This solution would involve installing a catchbasin at the low point in the depression to capture the sheet flow from SW 152nd St and install storm drainage pipe to convey the flow across SW 152nd St to CB 2917 (Figure 4).

The second and third alternatives would be to install multiple catchbasins along the south side of SW 152nd St to collect the sheet flow from SW 152nd St at multiple locations of localized ponding, including the project location intersection. Alternative 2 would connect the proposed catchbasins to the existing catchbasins by crossing underneath SW 152nd St (Figure 5). Alternative 3 would connect the proposed catchbasins by running pipes parallel to the existing system on the north side of SW 152nd St and connecting to the existing system at CB2928 and at GM3927 (Figure 6).

A fourth alternative has been proposed that would only address the ponding at the SW 152<sup>nd</sup> St and 16<sup>th</sup> Ave SW intersection. This solution would involve installing a drywell catchbasin at the low point in the depression that

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would infiltrate the runoff. It would also include regrading a section of the shoulder such that all the water that currently flows to the shoulder would enter the drywell (Figure 7). A pilot infiltration test at the proposed drywell location would be required to ensure that the native soil has sufficient infiltration capacity for this alternative.

#### DESIGN CONSIDERATIONS:

Potholing of existing utilities should be performed to assess utility conflicts with the proposed improvements. Field observations identified a sanitary sewer line along the center of the roadway of SW 152nd St. The design of Alternatives 1 and 2 would need to avoid conflict with the sanitary sewer line, when connecting pipes across SW 152nd St (Figure 4, Figure 5).

Another potential design consideration for Alternatives 2 and 3 would be traffic control. Alternative 2 proposes installing and connecting multiple catchbasins to the existing catchbasins laterally under SW 152nd St. During the site visit, SW 152nd St appeared to have significant traffic flow, which would need to be diverted or managed to construct Alternative 2. For Alternative 3, the majority of the work could be completed within the shoulder and bike lane of SW 152nd St, which would present fewer traffic control challenges (Figure 6).

If infiltration is feasible, Alternative 4 provides the simplest solution in terms of constructability. Alternative 4 would not have any known utility conflicts due to the catch basin location in the shoulder. It would also require minimal traffic control as all construction would be completed at one location in the shoulder with no proposed connections to the existing conveyance system (Figure 7).

#### ESTIMATED PROJECT COSTS:

Alternative 1 – \$46,000  
Alternative 2 – \$172,000  
Alternative 3 – \$279,000  
Alternative 4 – \$53,000



PROJECT LOCATION PHOTOS:



Figure 1: Ponding in south shoulder of SW 152<sup>nd</sup> Street and 16<sup>th</sup> Avenue SW intersection. Photo date 4/8/2019



Figure 2: Small localized ponding in south shoulder of SW 152<sup>nd</sup> Street. Photo date 4/8/2019

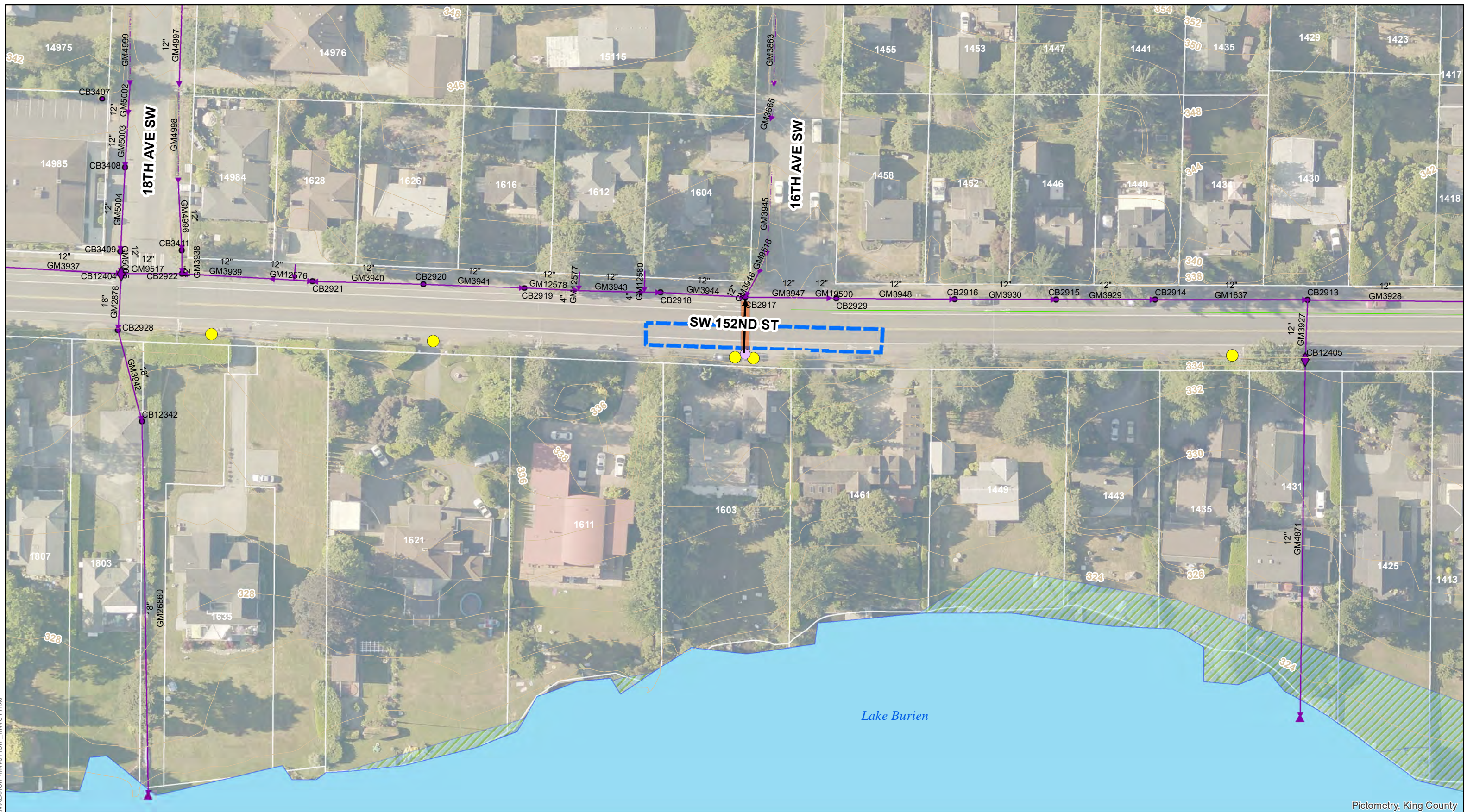




Figure 3: Small localized ponding in south shoulder of SW 152<sup>nd</sup> Street. Photo date 4/8/2019







Pictometry, King County

### BURIEN SMP

MW31 PROPOSED CIP: ALTERNATIVE 1

SW 152ND ST AND  
16TH AVE SW  
BURIEN, WA 98166



### Legend

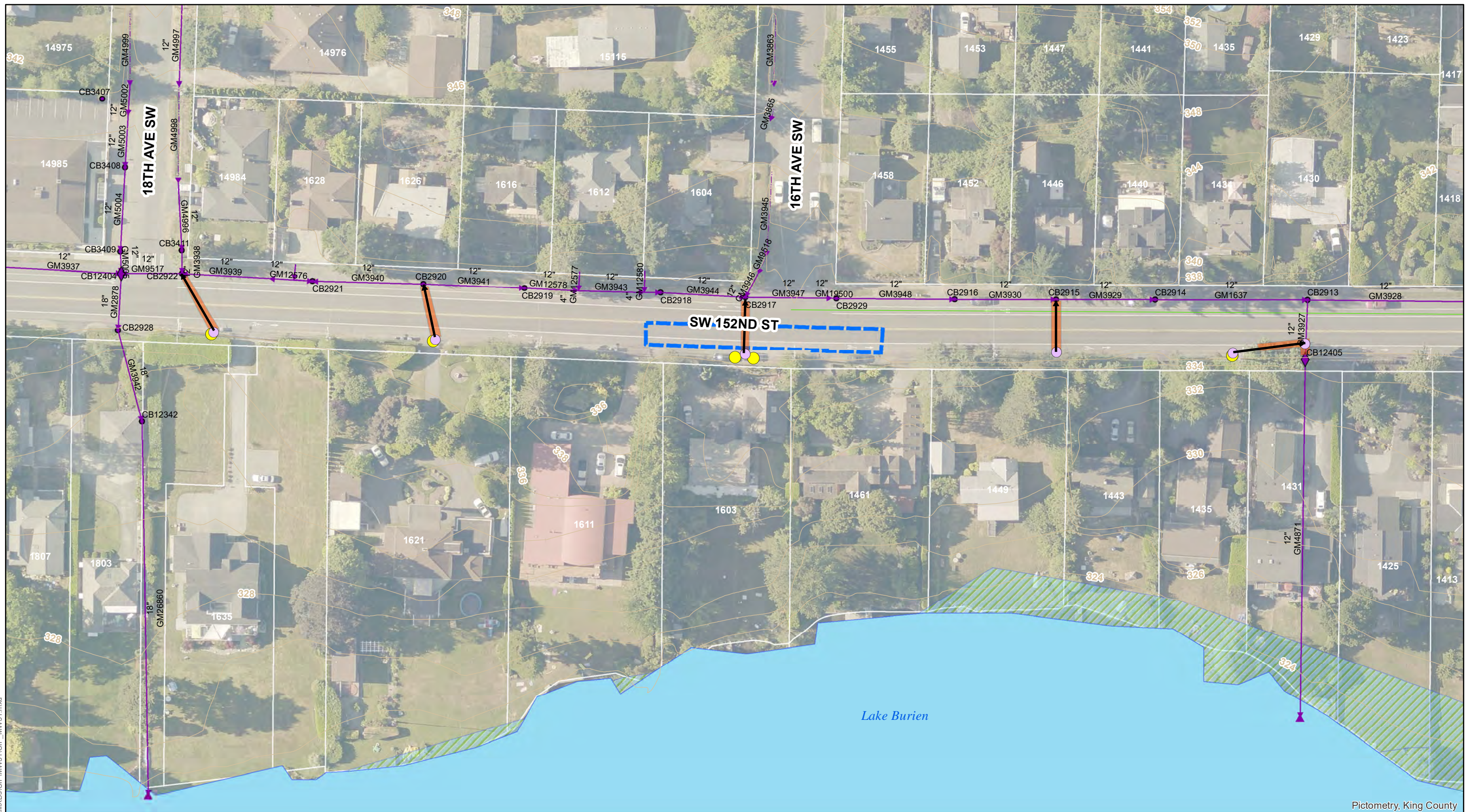
- |                |             |                     |                         |                |
|----------------|-------------|---------------------|-------------------------|----------------|
| MW31 Basin     | Storm Sewer | Oil Water Separator | Outfall                 | Proposed Pipes |
| Issue Location | Pipe        | Catchbasin          | Wetlands                | Proposed CBs   |
| 2 Ft Contour   | Ditch       | Manhole             | Remove/Replace Pavement |                |



Figure 4: Alternative 1 Map

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Pictometry, King County

### BURIEN SMP

MW31 PROPOSED CIP: ALTERNATIVE 2

SW 152ND ST AND  
16TH AVE SW  
BURIEN, WA 98166



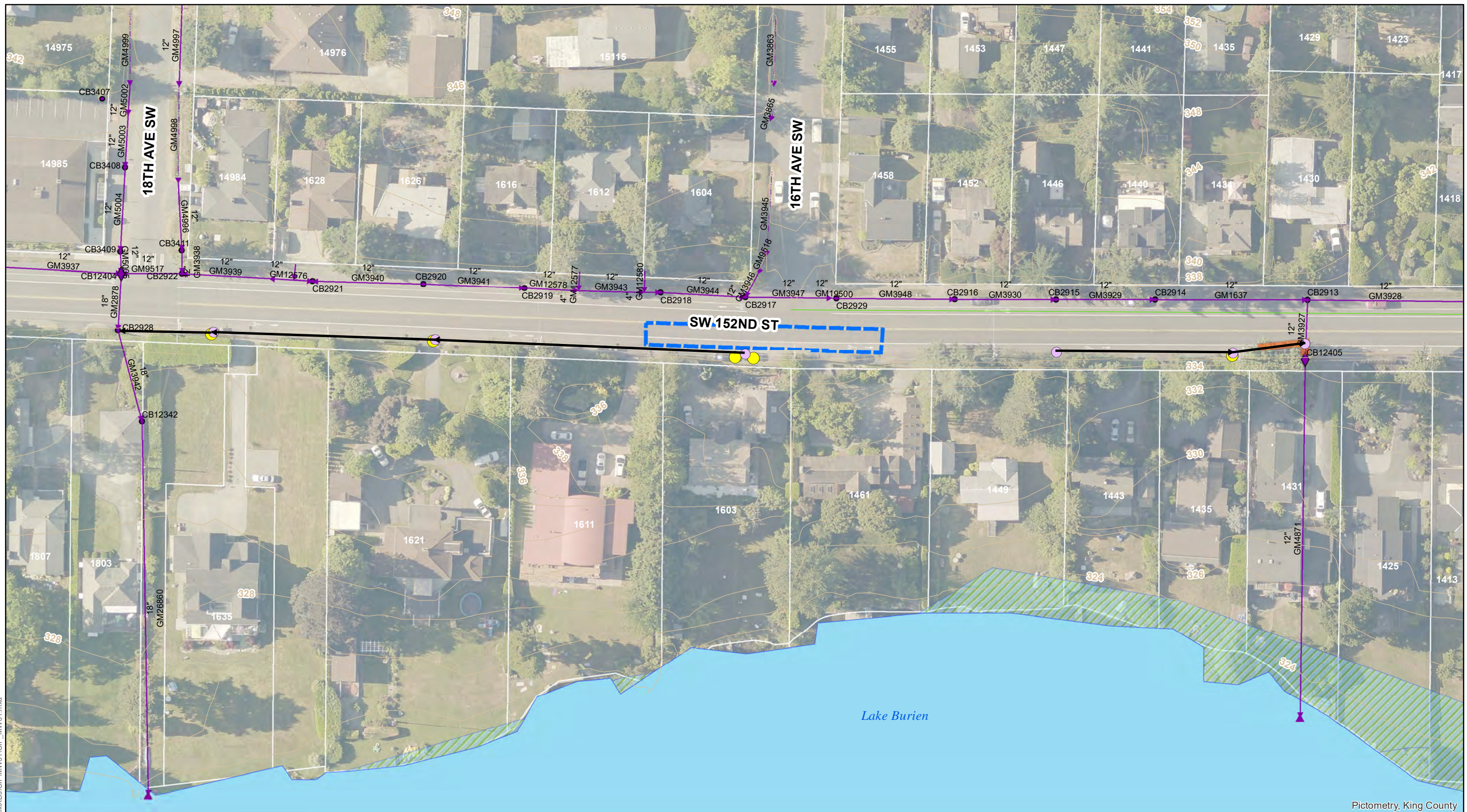
### Legend

- |                |             |                     |                         |                |
|----------------|-------------|---------------------|-------------------------|----------------|
| MW31 Basin     | Storm Sewer | Oil Water Separator | Outfall                 | Proposed Pipes |
| Issue Location | Pipe        | Catchbasin          | Wetlands                | Proposed CBs   |
| 2 Ft Contour   | Ditch       | Manhole             | Remove/Replace Pavement |                |



Figure 5: Alternative 2 Map



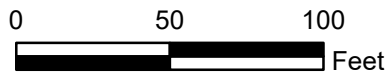


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Pictometry, King County

**BURIEN SMP**  
MW31 PROPOSED CIP: ALTERNATIVE 3

SW 152ND ST AND  
16TH AVE SW  
BURIEN, WA 98166



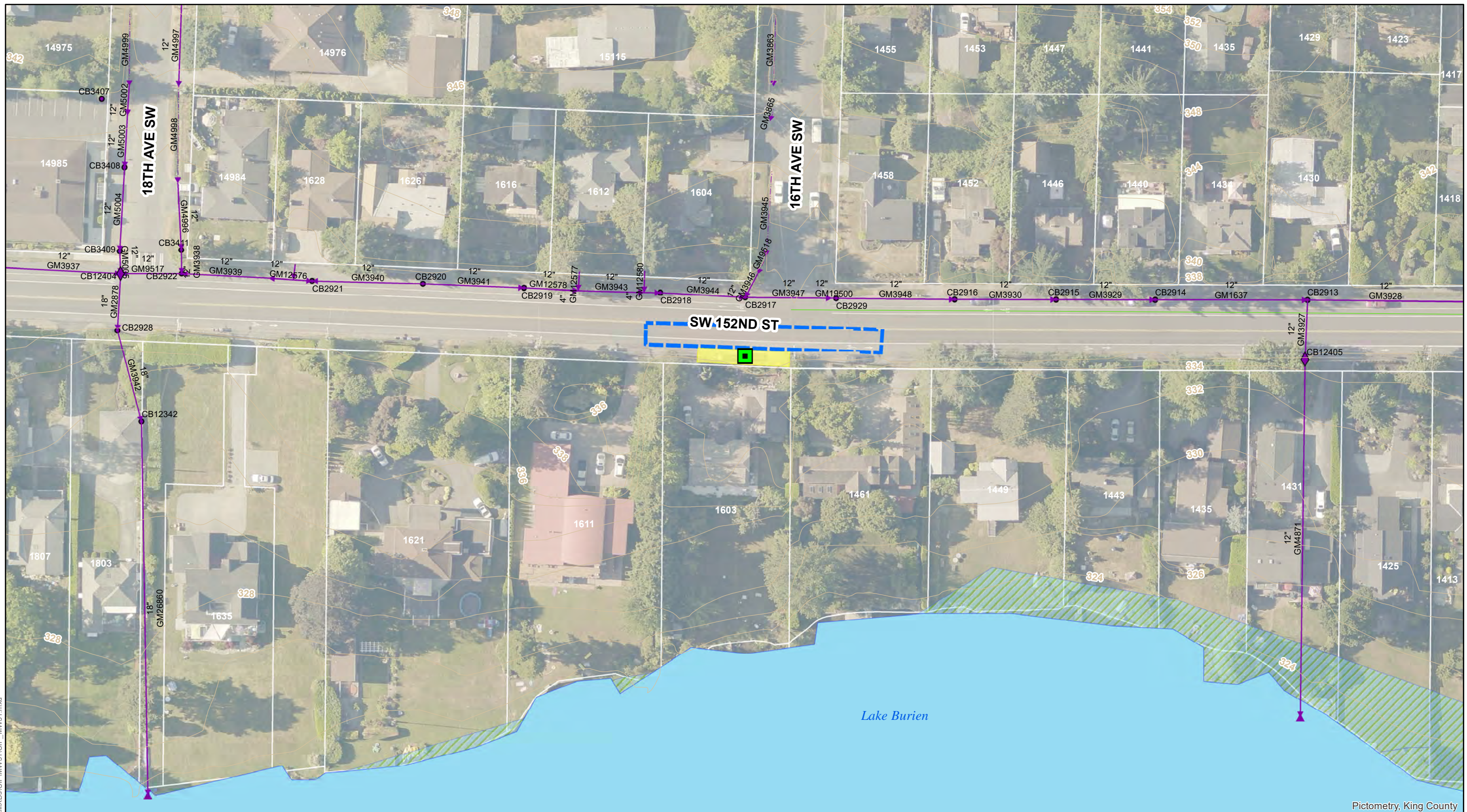
**Legend**

- MW31 Basin
- Issue Location
- 2 Ft Contour
- Storm Sewer
- Pipe
- - - - - Ditch
- ◆ Oil Water Separator
- Catchbasin
- Manhole
- Wetlands
- ▲ Outfall
- Proposed CBs
- Remove/Replace Pavement
- Proposed Pipes



Figure 6: Alternative 3 Map





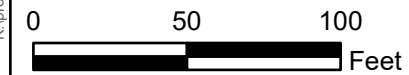
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Pictometry, King County

**BURIEN SMP**

MW31 PROPOSED CIP: ALTERNATIVE 4

SW 152ND ST AND  
16TH AVE SW  
BURIEN, WA 98166



**Legend**

- |              |             |                     |          |                     |
|--------------|-------------|---------------------|----------|---------------------|
| MW31 Basin   | Storm Sewer | Oil Water Separator | Outfall  | Proposed Drywell CB |
| 2 Ft Contour | Pipe        | Catchbasin          | Wetlands | Regrade Shoulder    |
| Ditch        | Manhole     |                     |          |                     |



**Otak**

Figure 7: Alternative 4 Map



**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - MW31 ALT 1  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/1/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	25	SY	\$ 40.00	\$ 1,000
2	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	40	LF	\$ 130.00	\$ 5,200
3	CATCH BASIN TYPE 1	1	EA	\$ 2,000.00	\$ 2,000
4	CRUSHED SURFACING BASE COURSE	10	TON	\$ 50.00	\$ 500
5	HOT MIX ASPHALT	10	TON	\$ 200.00	\$ 2,000
6	CONNECT TO DRAINAGE STRUCTURE	1	EA	\$ 500.00	\$ 500
<b>Subtotal Construction Elements</b>					<b>\$ 13,733</b>
<i>Required Ancillary Items</i>					
7	DEWATERING		3%	\$	500
8	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 700
9	TRAFFIC CONTROL		35%	(see note 4)	\$ 4,900
10	CONTINGENCY		40%		\$ 5,500
Subtotal Ancillary					\$ 11,600
<b>Subtotal Construction + Ancillary</b>					<b>\$ 25,333</b>
<i>Mobilization</i>					
11	MOBILIZATION		10%		\$ 2,533
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 27,867</b>
<i>Tax/Engineering/Management/Permitting</i>					
12	STATE SALES TAX		10%		\$ 2,800
13	ENGINEERING/SURVEYING/PERMITTING		40%		\$ 11,200
14	CONSTRUCTION MANAGEMENT		10%		\$ 2,800
15	LEGAL/ADMIN		3%		\$ 900
Subtotal					\$ 17,700
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 45,567</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 46,000</b>

**Notes:**

- The above cost opinion is in 2019 dollars and does not include future escalation, financing, or O&M costs.
- 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.
- Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.

**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - MW31 ALT 2  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/1/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	130	SY	\$ 40.00	\$ 5,200
2	REMOVE PIPE	15	LF	\$ 15.00	\$ 300
3	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	210	LF	\$ 110.00	\$ 23,100
4	CATCH BASIN TYPE 1	6	EA	\$ 2,000.00	\$ 12,000
5	CRUSHED SURFACING BASE COURSE	40	TON	\$ 50.00	\$ 2,000
6	HOT MIX ASPHALT	45	TON	\$ 200.00	\$ 9,000
7	CONNECT TO DRAINAGE STRUCTURE	2	EA	\$ 500.00	\$ 1,000
<b>Subtotal Construction Elements</b>					<b>\$ 62,489</b>
<i>Required Ancillary Items</i>					
8	DEWATERING		3%		\$ 1,900
9	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 3,200
10	TRAFFIC CONTROL		20%	(see note 4)	\$ 12,500
11	CONTINGENCY		30%		\$ 18,800
Subtotal Ancillary					\$ 36,400
<b>Subtotal Construction + Ancillary</b>					<b>\$ 98,889</b>
<i>Mobilization</i>					
12	MOBILIZATION		10%		\$ 9,889
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 108,778</b>
<i>Tax/Engineering/Management/Permitting</i>					
13	STATE SALES TAX		10%		\$ 10,900
14	ENGINEERING/SURVEYING/PERMITTING		35%		\$ 38,100
15	CONSTRUCTION MANAGEMENT		10%		\$ 10,900
16	LEGAL/ADMIN		3%		\$ 3,300
Subtotal					\$ 63,200
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 171,978</b>
<b>2019 Dollars</b>	<b>Total Estimated Project Cost (Rounded)</b>				<b>\$ 172,000</b>

**Notes:**

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**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - MW31 ALT 3  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/1/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	95	SY	\$ 40.00	\$ 3,800
2	REMOVE PIPE	15	LF	\$ 15.00	\$ 300
3	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	620	LF	\$ 110.00	\$ 68,200
4	CATCH BASIN TYPE 1	6	EA	\$ 2,000.00	\$ 12,000
5	CRUSHED SURFACING BASE COURSE	30	TON	\$ 50.00	\$ 1,500
6	HOT MIX ASPHALT	35	TON	\$ 200.00	\$ 7,000
7	CONNECT TO DRAINAGE STRUCTURE	2	EA	\$ 500.00	\$ 1,000
<b>Subtotal Construction Elements</b>					<b>\$ 109,844</b>
<i>Required Ancillary Items</i>					
8	DEWATERING		3%		\$ 3,300
9	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 5,500
10	TRAFFIC CONTROL		8%	(see note 4)	\$ 8,800
11	CONTINGENCY		30%		\$ 33,000
Subtotal Ancillary					\$ 50,600
<b>Subtotal Construction + Ancillary</b>					<b>\$ 160,444</b>
<i>Mobilization</i>					
12	MOBILIZATION		10%		\$ 16,044
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 176,489</b>
<i>Tax/Engineering/Management/Permitting</i>					
13	STATE SALES TAX		10%		\$ 17,700
14	ENGINEERING/SURVEYING/PERMITTING		35%		\$ 61,800
15	CONSTRUCTION MANAGEMENT		10%		\$ 17,700
16	LEGAL/ADMIN		3%		\$ 5,300
Subtotal					\$ 102,500
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 278,989</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 279,000</b>

**Notes:**

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**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - MW31 ALT 4  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/20/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	EXCAVATION FOR SHOULDER/DITCH REGRADE	30	CY	\$ 30.00	\$ 900
2	PRECAST CONCRETE DRYWELL	1	EA	\$ 7,500.00	\$ 7,500
3	GEOTECHNICAL INVESTIGATION INCLUDING PIT TEST	1	EA	\$ 6,000.00	\$ 6,000
<b>Subtotal Construction Elements</b>					<b>\$ 17,333</b>
<i>Required Ancillary Items</i>					
4	DEWATERING		3%		\$ 600
5	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 900
6	TRAFFIC CONTROL		20%	(see note 4)	\$ 3,500
7	CONTINGENCY		40%		\$ 7,000
Subtotal Ancillary					\$ 12,000
<b>Subtotal Construction + Ancillary</b>					<b>\$ 29,333</b>
<i>Mobilization</i>					
8	MOBILIZATION		10%		\$ 2,933
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 32,267</b>
<i>Tax/Engineering/Management/Permitting</i>					
9	STATE SALES TAX		10%		\$ 3,300
10	ENGINEERING/SURVEYING/PERMITTING		40%		\$ 13,000
11	CONSTRUCTION MANAGEMENT		10%		\$ 3,300
12	LEGAL/ADMIN		3%		\$ 1,000
Subtotal					\$ 20,600
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 52,867</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 53,000</b>

**Notes:**

1. The above cost opinion is in 2019 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.
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.



## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Teddy Thorson, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
CIP #MW32: Stormwater Infrastructure Improvement at 2<sup>nd</sup> Avenue SW  
and SW 124<sup>th</sup> Street, Burien, WA 98146

Project No.: 32995

### *PROJECT LOCATION:*

2nd Avenue SW and SW 124th Street, Burien, WA 98146

### *PROBLEM DESCRIPTION:*

SW 124th Street is a crowned roadway, with stormwater runoff from SW 124th Street flowing west. Sheetflow from the roadway forms a shallow flow path along the south vegetated shoulder of SW 124th Street. This stormwater runoff continues to flow across 2nd Avenue SW and enters CB13013 (Figure 1). CB13013 is an existing type 1 catchbasin drywell located west of the intersection of SW 124th Street and 2nd Avenue SW. There is heavy vegetation surrounding CB13013, as well as several locations where sediment has collected near the CB rim (Figure 2). The drywell itself is heavily sedimented, to approximately 15" below the catchbasin rim, which is likely partially from the result of sediment transport from the shallow flowpath along the south shoulder of SW 124th Street. In its current state, the drywell appears to have insufficient capacity to infiltrate the runoff from SW 124th Street, which results in flooding during major storm events.

### *PROJECT DESCRIPTIONS:*

It is likely that poor infiltration is one reason the drywell CB is not functioning properly. According to USGS soils data, the soil in this area is till. A pilot infiltration test at the drywell location would need to be completed to determine if infiltration would be a viable alternative. Since the available soils information indicates that this site is not suitable for infiltration, the two alternatives proposed both involve collecting the current sheetflow from SW 124th Street and piping the water to the existing conveyance system.

Both alternatives involve using type 1 catchbasins and pipes to convey water south along 2nd Avenue SW. Both alternatives would involve 660-710 LF of feet of pipe and 4 new catchbasins such that there is never more than 200 feet between structures, per the City of Burien 2016 Road Design and Construction Standards section 7-04. Both alternatives also propose installing a berm at the southern edge of the SW 124th Street roadway east of the intersection, to prevent flow along the vegetated shoulder which appeared to be a source of sediment. The berm would extend from the intersection of 2nd Place SW and SW124th Street until an existing ditch begins near 12402 2nd Avenue SW. Both alternatives also propose to regrade the shoulder and ditch area so that sheetflow from the

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roadway can reach the existing ditch and convey runoff to the intersection of 2nd Avenue SW and SW 124th Street. Runoff in the existing ditch will enter a proposed culvert and connect to a proposed catchbasin on the west side of 2nd Avenue SW.

The difference between the two alternatives is the proposed role of the existing drywell CB13013. Alternative 1 proposes continuing to use CB13013 to collect the runoff from SW 124th Street (Figure 3), while Alternative 2 proposes to abandon CB13013 and collect runoff from SW 124th Street at the location where the SW 124th Street runoff crosses 2nd Avenue SW (Figure 4).

### DESIGN CONSIDERATIONS:

Field observations identified a sanitary sewer line in the center of 2nd Avenue SW and water lines at the southeast corner of 2nd Avenue SW and SW 124th Street. The sanitary sewer utility is not expected to be impacted by the proposed new conveyance, but it will be necessary to confirm that the design does not conflict with this utility. The water lines at the southeast corner of the intersection may conflict with the proposed culvert from the existing ditch to the proposed catchbasin. Potholing will need to be done to ensure the design does not conflict with the water utility.

The main design consideration is the impact of abandoning CB13013. If the existing drywell were to be abandoned, a significant amount of pavement regrading would be required to ensure that water would sheetflow to the new proposed catchbasin as opposed to CB13013 (Figure 4). If CB13013 were to remain to collect runoff, a type 2 catchbasin may be required for the catchbasin directly downstream of CB13013 due to CB13013's rim being several feet lower in elevation than the new proposed CB (Figure 3).

### ESTIMATED PROJECT COSTS:

Alternative 1 – \$382,000

Alternative 2 – \$380,000



PROJECT LOCATION PHOTOS:

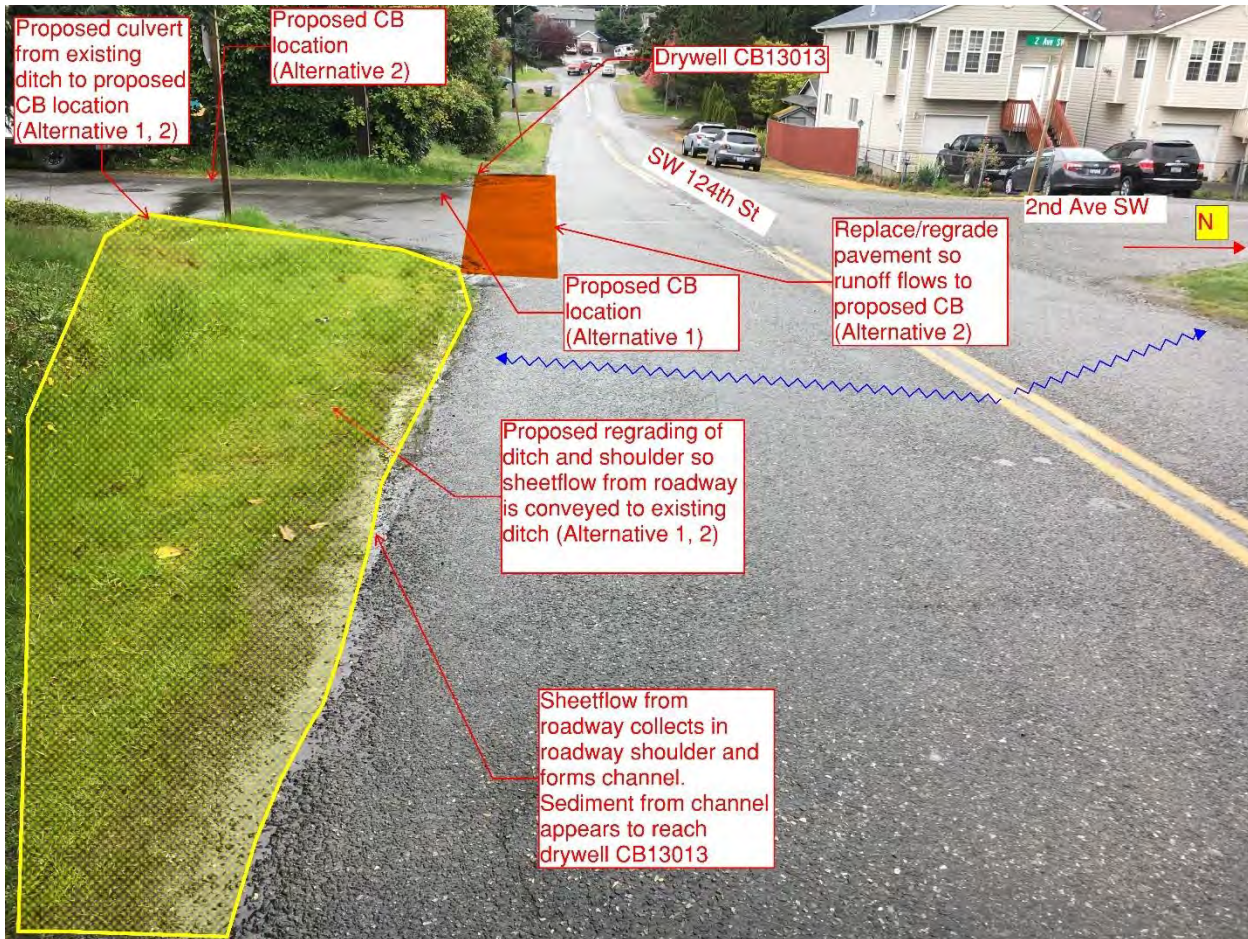


FIGURE 1: Current conditions and proposed improvements upstream of CB13013. Photo date 4/19/2019, photo taken facing west



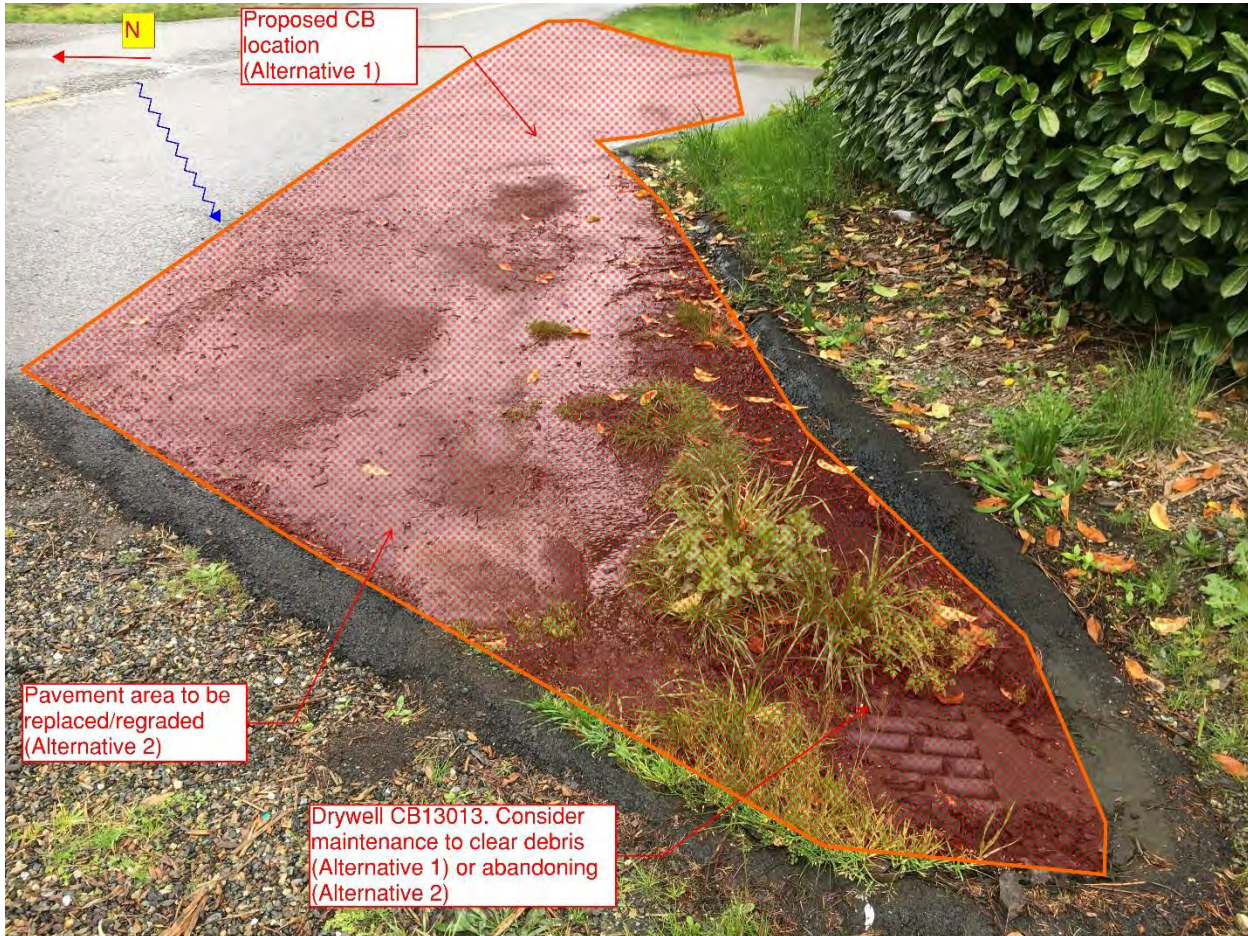
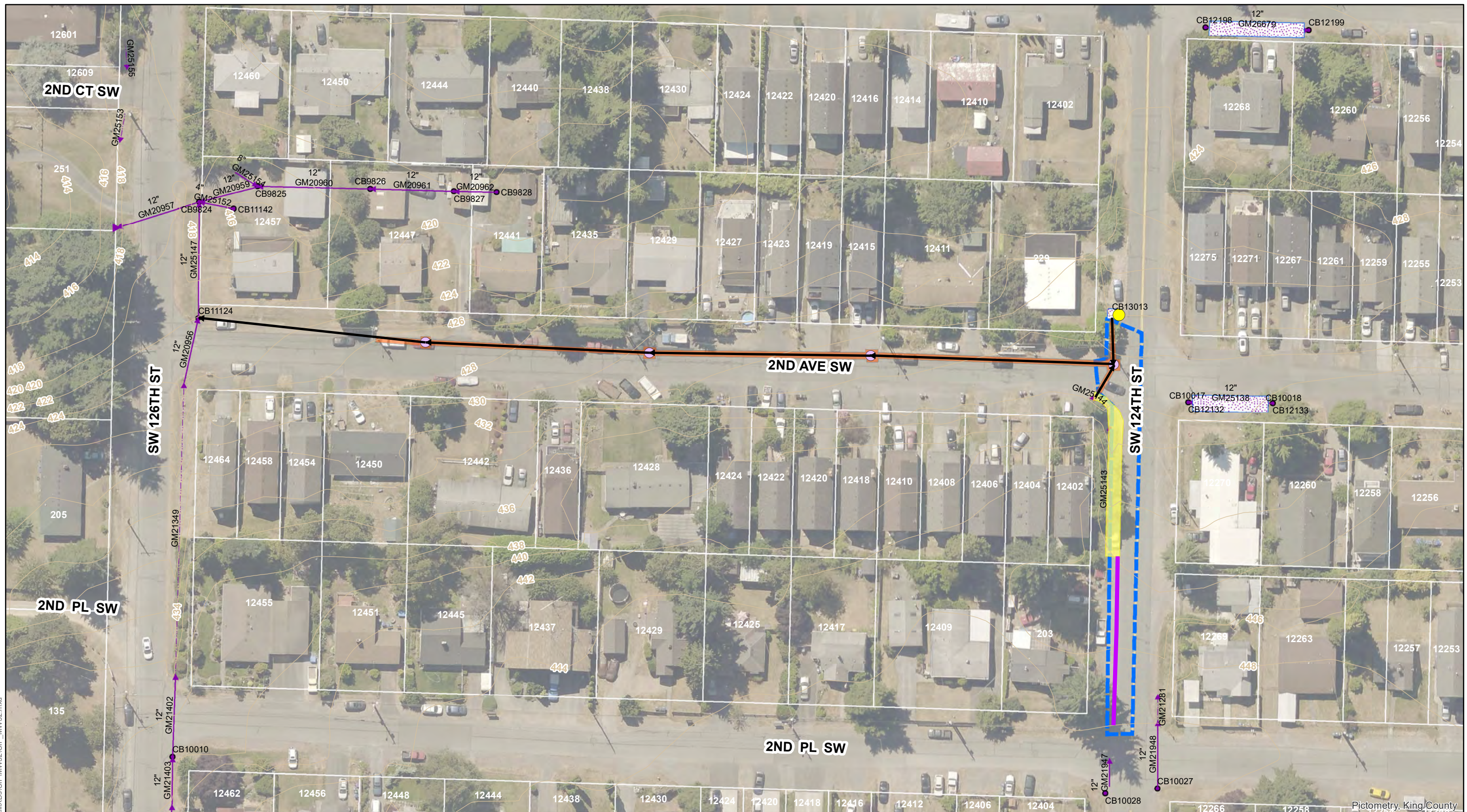


FIGURE 2: CB13013 conditions and proposed improvements. Photo date 4/19/2019, photo taken facing east





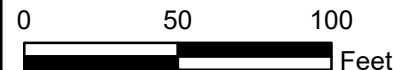
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Pictometry, King County

**BURIEN SMP**

MW32 PROPOSED CIP: ALTERNATIVE 1

SW 124TH ST AND  
2ND AVE SW  
BURIEN, WA 98146



**Legend**

- |                |                |            |               |                          |
|----------------|----------------|------------|---------------|--------------------------|
| MW32 Basin     | Dispersion BMP | Catchbasin | Proposed CB   | Replace/Regrade Pavement |
| Issue Location | Pipe           | Manhole    | Proposed Pipe | Regrade Shoulder/Ditch   |
| 2 Ft Contour   | Ditch          | Outfall    | Proposed Berm |                          |



Figure 3: Alternative 1 Map







**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - MW32 ALT 1  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/1/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	290	SY	\$ 40.00	\$ 11,600
2	ASPHALT BERM	120	LF	\$ 25.00	\$ 3,000
3	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	710	LF	\$ 110.00	\$ 78,100
4	CATCH BASIN TYPE 1	4	EA	\$ 2,000.00	\$ 8,000
5	CRUSHED SURFACING BASE COURSE	90	TON	\$ 50.00	\$ 4,500
6	HOT MIX ASPHALT	105	TON	\$ 200.00	\$ 21,000
7	CONNECT TO DRAINAGE STRUCTURE	2	EA	\$ 500.00	\$ 1,000
8	EXCAVATION FOR SHOULDER/DITCH REGRADE	30	CY	\$ 30.00	\$ 900
<b>Subtotal Construction Elements</b>					<b>\$ 150,044</b>
<i>Required Ancillary Items</i>					
9	DEWATERING		3%		\$ 4,600
10	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 7,600
11	TRAFFIC CONTROL		8%	(see note 4)	\$ 12,100
12	CONTINGENCY		30%		\$ 45,100
Subtotal Ancillary					\$ 69,400
<b>Subtotal Construction + Ancillary</b>					<b>\$ 219,444</b>
<i>Mobilization</i>					
13	MOBILIZATION		10%		\$ 21,944
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 241,389</b>
<i>Tax/Engineering/Management/Permitting</i>					
14	STATE SALES TAX		10%		\$ 24,200
15	ENGINEERING/SURVEY/PERMITTING		35%		\$ 84,500
16	CONSTRUCTION MANAGEMENT		10%		\$ 24,200
17	LEGAL/ADMIN		3%		\$ 7,300
Subtotal					\$ 140,200
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 381,589</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 382,000</b>

**Notes:**

- The above cost opinion is in 2019 dollars and does not include future escalation, financing, or O&M costs.
- 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.
- Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.

**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - MW32 ALT 2  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/1/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	340	SY	\$ 40.00	\$ 13,600
2	ASPHALT BERM	120	LF	\$ 25.00	\$ 3,000
3	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	660	LF	\$ 110.00	\$ 72,600
4	CATCH BASIN TYPE 1	4	EA	\$ 2,000.00	\$ 8,000
5	CRUSHED SURFACING BASE COURSE	100	TON	\$ 50.00	\$ 5,000
6	HOT MIX ASPHALT	120	TON	\$ 200.00	\$ 24,000
7	CONNECT TO DRAINAGE STRUCTURE	1	EA	\$ 500.00	\$ 500
8	EXCAVATION FOR SHOULDER/DITCH REGRADE	30	CY	\$ 30.00	\$ 900
<b>Subtotal Construction Elements</b>					<b>\$ 149,433</b>
<i>Required Ancillary Items</i>					
9	DEWATERING		3%		\$ 4,500
10	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 7,500
11	TRAFFIC CONTROL		8%	(see note 4)	\$ 12,000
12	CONTINGENCY		30%		\$ 44,900
Subtotal Ancillary					\$ 68,900
<b>Subtotal Construction + Ancillary</b>					<b>\$ 218,333</b>
<i>Mobilization</i>					
13	MOBILIZATION		10%		\$ 21,833
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 240,167</b>
<i>Tax/Engineering/Management/Permitting</i>					
14	STATE SALES TAX		10%		\$ 24,100
15	ENGINEERING/SURVEY/PERMITTING		35%		\$ 84,100
16	CONSTRUCTION MANAGEMENT		10%		\$ 24,100
17	LEGAL/ADMIN		3%		\$ 7,300
Subtotal					\$ 139,600
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 379,767</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 380,000</b>

**Notes:**

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- Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.





## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Teddy Thorson, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
CIP #MW33: Stormwater Infrastructure Improvement  
on 4<sup>th</sup> Avenue SW at SW 137<sup>th</sup> Street and SW 139<sup>th</sup> Street

Project No.: 32995

### *PROJECT LOCATION:*

4th Avenue SW and SW 137th Street (NW and NE corner), 4th Avenue SW and 139th Street (NW corner)

### *PROBLEM DESCRIPTION:*

Localized ponding occurs on the roadways of 4th Avenue SW, SW 137th Street, and SW 139th Street at the locations listed above (Figure 1, Figure 2, Figure 3). Stormwater runoff from the roadway and adjacent driveways on SW 137th and SW 139th Street is ponding at the low points at the roadway corners listed above. There are existing catchbasins near the ponding locations, but they are not placed at the low points and cannot effectively collect stormwater runoff. The ponding at the 4th Avenue SW and SW 137th Street is most severe at the NE corner, where ponding was observed to impact the flow of traffic (Figure 1). The ponding at the NW corner is less severe and does not appear to impact the flow of traffic (Figure 2). The ponding at the NW corner of 4th Avenue SW and SW 139th Street was similar in severity to the ponding at the NE corner of 4th Avenue SW and SW 137th Street and was observed to impact the flow of traffic (Figure 3).

### *PROJECT DESCRIPTIONS:*

The proposed project is to install four new catchbasins to effectively capture the runoff from SW 137th Street and SW 139th Street, along with approximately 115 LF of new pipe to connect the catchbasins to the existing drainage system (Figure 4). Two of the proposed catchbasins would be installed to intercept existing stormwater conveyance pipe to connect to the existing conveyance system. The proposed solution would likely also involve limited regrading and repaving around the proposed catchbasins to ensure that the catchbasins are installed at the low point at each of the three locations.

This project could be combined with the Chelsea Park Neighborhood Study (CIP MW36), due to the proximity of the two projects.

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### DESIGN CONSIDERATIONS:

Potholing of existing utilities should be performed to assess utility conflicts with the proposed improvements. Field observations identified a sanitary sewer line along the center of 4th Avenue S. However, existing storm drainage pipes crossing 4th Avenue SW suggest that risk of conflict with the sanitary sewer pipes is low. Field observations also identified evidence of a water utility line on the west side of 4th Avenue SW, and there is a fire hydrant located at the NE corner of 4th Avenue SW and SW 137th Street. Depending on the depth below finished grade, a water main could present challenges in installing a catchbasin and pipe at the location of ponding at this corner (Figure 2, Figure 4). Utility coordination and potholing would be required to complete this design.

### ESTIMATED PROJECT COSTS:

\$88,000

### PROJECT LOCATION PHOTOS:

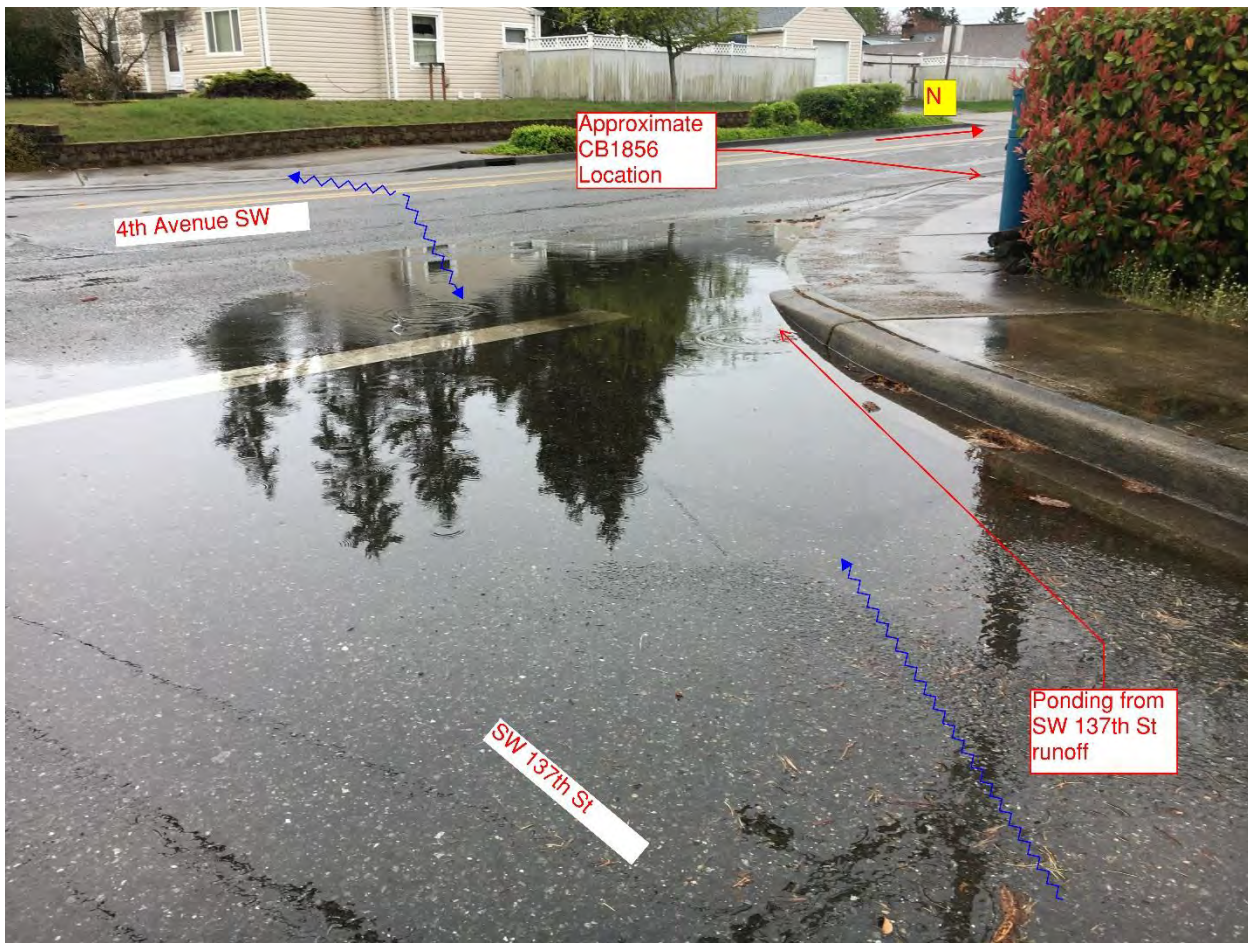


FIGURE 1: Ponding at NE corner of SW 137th Street and 4th Avenue SW. Photo date 4/8/2019





FIGURE 2: Ponding at NE and NW corner of SW 137th Street and 4th Avenue SW. Photo date 4/8/2019





FIGURE 3: Ponding at NW corner of SW 139th Street and 4th Avenue SW. Photo date 4/8/2019





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**BURIEN SMP**  
 MW33 PROPOSED CIP

4TH AVE SW BETWEEN  
 SW 137TH ST AND SW 139 ST  
 BURIEN, WA 98166

0 50 100  
 Feet

**Legend**

MW33 Basin	Pipe	Catchbasin	Proposed Pipes
Issue Location	Ditch	Manhole	Proposed CBs
2 Ft Contour	Regrade/Replace Pavement		

Figure 4: Proposed CIP Map







**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT: Burien Stormwater Master Plan - MW33**  
**PROJECT ID: 32995**  
**BY: TT**

**CHECK BY: GP**  
**DATE: 5/2/2019**

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	PAVEMENT REMOVAL	25	SY	\$ 40.00	\$ 1,000
2	REMOVE PIPE	70	LF	\$ 15.00	\$ 1,100
3	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	120	LF	\$ 110.00	\$ 13,200
4	CATCH BASIN TYPE 1	4	EA	\$ 2,000.00	\$ 8,000
5	CRUSHED SURFACING BASE COURSE	10	TON	\$ 50.00	\$ 500
6	HOT MIX ASPHALT	10	TON	\$ 200.00	\$ 2,000
7	CONNECT TO DRAINAGE STRUCTURE	4	EA	\$ 500.00	\$ 2,000
<b>Subtotal Construction Elements</b>					<b>\$ 32,844</b>
<i>Required Ancillary Items</i>					
8	DEWATERING		3%		\$ 1,000
9	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 1,700
10	TRAFFIC CONTROL		15%	(see note 4)	\$ 5,000
11	CONTINGENCY		30%		\$ 9,900
Subtotal Ancillary					\$ 17,600
<b>Subtotal Construction + Ancillary</b>					<b>\$ 50,444</b>
<i>Mobilization</i>					
12	MOBILIZATION		10%		\$ 5,044
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 55,489</b>
<i>Tax/Engineering/Management/Permitting</i>					
13	STATE SALES TAX		10%		\$ 5,600
14	ENGINEERING/SURVEYING/PERMITTING		35%		\$ 19,500
15	CONSTRUCTION MANAGEMENT		10%		\$ 5,600
16	LEGAL/ADMIN		3%		\$ 1,700
Subtotal					\$ 32,400
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 87,889</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 88,000</b>

**Notes:**

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- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.





## Technical Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Shailee Jain, EIT

Copies: File

Date: May 17, 2019

Subject: CIP Project Summary Sheet  
CIP #MW36: Chelsea Park Neighborhood Bioretention Siting

Project No.: 32995

The Chelsea Park Neighborhood (Site) in the City of Burien (City) covers an area of about 0.6 square miles and is bordered by Ambaum Boulevard SW to the west, SW 146<sup>th</sup> Street to the south, 1<sup>st</sup> Avenue S to the east and SW 132<sup>nd</sup> Street to the north (Figure 1). The Site is mostly residential except at the boundaries with Ambaum Boulevard SW and 1<sup>st</sup> Avenue S. Right-of-way (ROW) within the Site was analyzed to find the optimal locations to site bioretention. The objective is to proactively provide water quality treatment where possible and create green spaces throughout the neighborhood. This project will provide limited stormwater flow control, as the entire Site is on till soils<sup>1</sup> which provide low infiltration rates. This technical memorandum documents the approach taken to site bioretention within the neighborhood.

Note that this project could be combined with the proposed Stormwater Infrastructure Improvements on 4<sup>th</sup> Avenue SW at SW 137<sup>th</sup> Street and SW 139<sup>th</sup> Street, due to the proximity of the two projects.

Criteria used to site bioretention for this project included:

1. Greater than 8 feet available outside of the roadway within the ROW for bioretention
2. Greater than 3 feet available within existing planter strips within the ROW for bioretention cell
3. Topography
4. Types and concentrations of pollutants in the treatment area
  - a. Average Daily Traffic (ADT)
  - b. Existence of intersection(s)
  - c. Existence of parking lot(s)Examples of pollutants include total suspended solids (TSS), metals (specifically copper, lead, and zinc) and minimal quantities of total petroleum hydrocarbons (TPH). The sources of pollutants would be vehicular traffic leakages in parking lots and on roadways as well as abrasion of vehicle tires and breaking and/or wear of the roadway itself. No point source pollutants were observed within the Site.
5. Presence of stormwater infrastructure in the vicinity which can convey stormwater to the bioretention and serve as overflow connection
6. Need for coordination with private property
7. Potential utility conflicts
8. Future transportation improvement projects/capital improvement projects in close proximity
9. Residential roadways wider than 28 feet where a portion of the roadway could be utilized

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All the analysis was done based on best available data in ArcGIS<sup>2</sup> and City transportation projects<sup>3&4</sup> data available publicly.

Types of Bioretention considered:

- Bioretention cell- Bioretention which is a minimum of two feet wide and with vertical walls
- Bioretention bulb-out- Bioretention at intersections which takes up some portion of the existing roadway
- Bioretention – Bioretention which is a minimum of two feet wide and with 2:1 side slopes

### Bioretention Siting on Highly Used Streets:

The areas in the Site where bioretention would be most effective would be primary arterials such as 1<sup>st</sup> Avenue S and Ambaum Boulevard SW which have ADT numbers greater than 15,000 and are roadways heavily used by larger vehicles such as trucks and transit<sup>4</sup>. These two streets also have parking lots adjacent to them and commercially zoned parcels connected to them. However, the footprint required for bioretention is not available on either of the streets, as there is sidewalk on both sides of these streets, which occupies most of the area available in ROW. Furthermore, stormwater from Ambaum Boulevard SW between SW 132<sup>nd</sup> Street and SW 140<sup>th</sup> Street flows away from the Site. Similarly, stormwater from 1<sup>st</sup> Avenue S also flows away from the Site and therefore will not be treated on the Site.

Between SW 140<sup>th</sup> Street and SW 146<sup>th</sup> Street, stormwater from Ambaum Boulevard SW flows towards the Site through stormwater conveyance consisting of pipes and catchbasins. This stormwater currently receives water quality treatment at a facility owned by a local church, with overflow discharging into infiltrating stormwater ponds in Linde Hill Park. It is assumed that the treatment received is sufficient and would not benefit further from bioretention.

Collector arterials SW 136<sup>th</sup> Street, SW 146<sup>th</sup> Street and 4<sup>th</sup> Avenue SW which have an ADT greater than 6000 were analyzed next. Each of the collector arterials has been discussed in detail below.

#### 4<sup>th</sup> Avenue SW

4<sup>th</sup> Avenue SW has sidewalks on both sides of the street and there is no area available in the ROW to install bioretention. Between SW 132<sup>nd</sup> Street and SW 134<sup>th</sup> Street, the street drains north away from the Site. However, between SW 134<sup>th</sup> Street and SW 136<sup>th</sup> Street, 4<sup>th</sup> Avenue SW conveyance drains east on SW 134<sup>th</sup> Street by way of pipes and ditches. Currently this stormwater is not receiving treatment. There is area available with the ROW to install bioretention. 4<sup>th</sup> Avenue SW between 134<sup>th</sup> Street and SW 144<sup>th</sup> Street drains into a City stormwater pond after getting treatment through an oil water separator. 4<sup>th</sup> Avenue SW drains away from the Site south of SW 144<sup>th</sup> Street.

#### SW 146<sup>th</sup> Street

SW 146<sup>th</sup> Street has sidewalks on both sides of the street and there is no area available in the ROW to install bioretention. Further all of SW 146<sup>th</sup> Street drains away from the Site and therefore there is no location with the Site where bioretention can be installed to provide treatment for SW 146<sup>th</sup> Street.

#### SW 136<sup>th</sup> Street

SW 136<sup>th</sup> Street is a collector arterial with an ADT greater than 7,800. The Burien Transportation Improvement Plan for 2018-2023 has roadway improvements such as installation of storm drainage, curb, gutter and sidewalks planned for this street<sup>3</sup>. The planned project has a high priority and installing bioretention for this roadway in conjunction with the transportation project would be a win-win strategy. Under existing conditions, stormwater conveyance manages SW 136<sup>th</sup> Street east of 4<sup>th</sup> Avenue SW and between 8<sup>th</sup> Avenue SW and 6<sup>th</sup> Avenue SW

within the extents of the Site. Topographically, the intersection of SW 136<sup>th</sup> Street with 5<sup>th</sup> Avenue SW is a high point and the street drains either east or west from there. Towards the west, intersections of SW 136<sup>th</sup> Street with 8<sup>th</sup> Avenue SW and 6<sup>th</sup> Avenue SW do not present opportunities as it is assumed that sidewalk and ADA ramps will be added as part of the transportation improvement project after which there will not be area available. Towards the east, there is opportunity to site bioretention towards the north of the street between 5<sup>th</sup> Avenue SW and 3<sup>rd</sup> Avenue SW which may not remain if sidewalk is added. East of 4<sup>th</sup> Avenue SW there is no area available.

Residential streets within the Site were analyzed next. Each street is discussed in detail below.

## Bioretention Siting on Residential Streets:

### SW 132<sup>nd</sup> Street

SW 132<sup>nd</sup> Street is not included in this analysis as it is outside the list of streets within the neighborhood<sup>5</sup>.

### SW 133<sup>rd</sup> Street

Stormwater runoff currently sheet-flows to the west along SW 133<sup>rd</sup> Street between 6<sup>th</sup> Avenue SW and 8<sup>th</sup> Avenue SW, as there is no existing below-ground conveyance system at this location. Bioretention was sited on the north and south sides of SW 133<sup>rd</sup> Street, which could provide treatment as well as conveyance.

### SW 134<sup>th</sup> Street

Stormwater from SW 134<sup>th</sup> Street flows towards a low point at its intersection with 8<sup>th</sup> Avenue SW between Ambaum Boulevard SW and 5<sup>th</sup> Avenue SW. A strategic location for bioretention to provide water quality treatment would be at the northeast corner of the intersection of 8<sup>th</sup> Avenue SW and SW 133<sup>rd</sup> Street where the conveyance for SW 134<sup>th</sup> Street and a portion of 8<sup>th</sup> Avenue SW converge.

Along 134<sup>th</sup> Street between Ambaum Boulevard SW and 5<sup>th</sup> Avenue SW bioretention was sited where there is area available. It should be noted that at some of these locations the existing gravel shoulder is used for residential parking and if bioretention was installed, coordination with private property owners would be required. Bioretention was not sited in areas that are currently paved. Existing stormwater conveyance along 134<sup>th</sup> Street is a system ditches and culverts, which could both flow into the bioretention and be tied into for overflow.

Heading east from 5<sup>th</sup> Avenue SW towards 1<sup>st</sup> Avenue S, stormwater flows towards the east, and potential bioretention locations were sited at the south west corner of the intersection of 134<sup>th</sup> Street with 6<sup>th</sup> Avenue SW, at multiple locations between 6<sup>th</sup> Avenue SW and 4<sup>th</sup> Avenue SW. A strategic location where stormwater could be treated through bioretention is the southwest corner of the intersection of SW 134<sup>th</sup> Street and 2<sup>nd</sup> Avenue SW.

There is insufficient area for bioretention along 134<sup>th</sup> Street between 2<sup>nd</sup> PI SW and 1<sup>st</sup> Avenue S.

### SW 135<sup>th</sup> Street

SW 135<sup>th</sup> Street presents many opportunities for siting bioretention. There are wide gravel shoulders on both sides of the street, which are currently used for residential parking. It is assumed that these gravel shoulders could be converted to bioretention in strategic locations. The road is very flat, and there is limited existing stormwater infrastructure. Therefore, multiple bioretention units were sited to provide treatment as well as conveyance. The overflow from the bioretention would connect into existing infrastructure along either Ambaum Boulevard SW, or 8<sup>th</sup> Avenue SW or 6<sup>th</sup> Avenue SW.

### SW 137<sup>th</sup> Street

There are sidewalks with planter strips on both sides of the roadway, which occupy most of the area within the ROW. Bioretention cells could replace planter strips in areas where the planter strip is wider than 3 feet and is primarily grass with no significant trees. Bioretention bulb-outs could be installed at intersections of SW 137<sup>th</sup>

Street between 10<sup>th</sup> Ave SW and 6<sup>th</sup> Ave SW. A design consideration for bioretention along SW 137<sup>th</sup> Street is limited opportunity to tie into an existing stormwater conveyance system.

### SW 138th Street

There are sidewalks with planter strips on both sides of the roadway, which occupy most of the area within the ROW. Bioretention cells could replace planter strips in areas where the planter strip is wider than 3 feet and is primarily grass with no significant trees. Bioretention bulb-outs could be installed at intersections of SW 138<sup>th</sup> Street at 8<sup>th</sup> Ave SW and 6<sup>th</sup> Ave SW. Stormwater convergence at the intersection of 8<sup>th</sup> Ave SW makes the intersection a good strategic location to site bioretention. A design consideration for bioretention along SW 138<sup>th</sup> Street is limited opportunity to tie into an existing stormwater conveyance system.

### SW 139th Street

There are sidewalks with planter strips on both sides of the roadway, which occupy most of the area within the ROW. Bioretention cells could replace planter strips in areas where the planter strip is wider than 3 feet and is primarily grass with no significant trees. Bioretention bulb-out were sited at the intersection of SW 139<sup>th</sup> Street with 8<sup>th</sup> Ave SW and 6<sup>th</sup> Ave SW which could connect into existing stormwater infrastructure to the west and south respectively. Bioretention was sited was at the cul-de-sac near the intersection of SW 139<sup>th</sup> Street with 10<sup>th</sup> Avenue SW. It is to be noted that there is no existing stormwater infrastructure that this bioretention can connect to easily. Pipe would have to be laid north and then west to tie into infrastructure on Ambaum Boulevard SW.

### SW 140th Street

The only area available is at the high point along SW 140<sup>th</sup> Street, therefore no bioretention was sited.

### SW 141st Street

There are multiple potential locations for bioretention on the south side of SW 141<sup>st</sup> Street near its intersection with 6<sup>th</sup> Avenue SW. Bioretention could also replace the existing stormwater conveyance ditches along the north side of SW 141<sup>st</sup> Street. All bioretention would overflow to the infiltrating stormwater ponds at Linde Hill Park.

### SW 142nd Street

SW 142<sup>nd</sup> Street between Ambaum Boulevard SW and 6<sup>th</sup> Avenue SW is topographically flat and has available area on both sides of the street for bioretention. There is minimal stormwater infrastructure, so bioretention would provide both treatment and conveyance for stormwater along SW 142<sup>nd</sup> Street. If bioretention were installed at the locations shown on Figure 1 overflow could connect into either the existing structure on the east on 6<sup>th</sup> Avenue SW or to existing stormwater conveyance to the west on Ambaum Boulevard SW.

There are multiple potential locations for bioretention between 6<sup>th</sup> Avenue SW and 4<sup>th</sup> Avenue SW on the north side of SW 142<sup>nd</sup> street. Again, bioretention could be used for both treatment and stormwater conveyance in this area. Overflow from bioretention would connect to the stormwater pond at the south east corner of the intersection of SW 142<sup>nd</sup> Street and 6<sup>th</sup> Avenue SW.

Between 4<sup>th</sup> Avenue SW and 2<sup>nd</sup> Avenue SW, SW 142<sup>nd</sup> Street slopes gradually toward the west at a slope slightly greater than 5%. Bioretention was sited at the downstream end on each side of the roadway in this area.

Between 2<sup>nd</sup> Avenue SW and 1<sup>st</sup> Avenue SW, SW 142<sup>nd</sup> Street slopes towards the east. There is existing stormwater conveyance along the north side of the street but none on the south. Bioretention was sited at the downstream end on each side of the roadway. It should be noted that if bioretention were installed at the south side of the street, the overflow would either have to tie into the existing infrastructure across the roadway to the north or additional pipe conveyance would need to be installed to connect into the stormwater infrastructure on 1<sup>st</sup> Avenue SW.



### SW 143rd Street

SW 143<sup>rd</sup> Street slopes towards the west, between Ambaum Boulevard SW and 8<sup>th</sup> Avenue SW, and has area available on both sides of the roadway to install bioretention. There is stormwater infrastructure on both sides of the street but it is minimal. Bioretention could provide both treatment and enhanced stormwater conveyance in this area.

Between 8<sup>th</sup> Avenue SW and 6<sup>th</sup> Avenue SW, SW 143<sup>rd</sup> Street drains towards the east. There are multiple potential sites for bioretention on the south side of SW 143<sup>rd</sup> Street. The corners of the intersection of 6<sup>th</sup> Avenue SW with SW 143<sup>rd</sup> Street would be strategic locations for bioretention, to capture runoff from both the streets.

Bioretention sited at the north east corner of the intersection with 6<sup>th</sup> Avenue SW would handle the runoff from approximately 300 feet of the northern half of the roadway that slopes to the west. As the street slopes back towards the east, potential bioretention locations were sited on the south side of the street. It should be noted that the bioretention locations on the south side of SW 143<sup>rd</sup> Street would have minimal contributing area, and would any overflow would require a substantial length of pipe install to connect to existing downstream conveyance. No bioretention was sited to the north of the street east of 6<sup>th</sup> Avenue SW, as the contributing area for any bioretention installed in available area would be insignificant.

SW 143<sup>rd</sup> Street between 4<sup>th</sup> Avenue SW and 2<sup>nd</sup> Avenue SW slopes towards the west. Potential bioretention locations were sited on both sides of the roadway in locations where there was available area. The bioretention units would be interconnected and overflow to existing drywells located on the north side of the roadway at a low point. While the soils data available shows that the Site is in till soils, the presence of the existing infiltration systems indicates soils may be better suited for infiltration in this area. Until more accurate geotechnical data is available it is assumed that the sited bioretention will provide minimal infiltration.

Between 2<sup>nd</sup> Avenue SW and 1<sup>st</sup> Avenue SW, SW 143<sup>rd</sup> Street slopes partially towards the east and partially towards the west. Most of the area is a plateau at the top of a hill. While there is area available on the plateau, no bioretention was sited this location as it would have minimal contributing area. One potential location for bioretention was identified on the norther side of the roadway, but there is no existing conveyance in this area for overflow to connect to.

### SW 144th Street

Bioretention was sited at a low point on the south side of SW 144<sup>th</sup> Street. There is existing stormwater infrastructure at this location that overflow from bioretention could connect into.

### SW 145th Street

No bioretention was sited along SW 145<sup>th</sup> Street, as the only available area is at the high point along the roadway.

### 2nd Place SW

No bioretention was sited as there was no available area.

### 6th Place SW

The potential locations for bioretention along 6<sup>th</sup> Place SW could replace the existing ditch and would be at a strategic location to treat stormwater from SW 144<sup>th</sup> Place.

### 8th Place SW

Bioretention was sited in the center of the cul-de-sac but would serve minimal contributing area and would require additional piped conveyance to connect overflow to the nearest conveyance on SW 132<sup>nd</sup> Street.

### SW 136th Place

SW 136<sup>th</sup> Place has sidewalks with planter strips on both side of the roadway. Bioretention cells could replace planter strips in areas where the planter strip is wider than 3 feet and is primarily grass with no significant trees. Bioretention bulb-outs were sited at intersections of SW 136<sup>th</sup> Place with 8<sup>th</sup> Ave SW, 6<sup>th</sup> Ave SW and SW 137<sup>th</sup> Street. There is no existing stormwater conveyance along SW 136<sup>th</sup> Place for the bioretention to connect into.

### SW 142nd Place

SW 142<sup>nd</sup> Place slopes downward from 8<sup>th</sup> Avenue SW to Ambaum Boulevard SW. Multiple potential locations for bioretention facilities were identified on the north and south sides of the street. Bioretention along SW 142<sup>nd</sup> Place would provide both treatment and stormwater conveyance.

### SW 144th Place

No bioretention was sited along SW 144<sup>th</sup> Place, as the only available area is at the high point along the roadway.

### 10th Avenue SW

There is existing sidewalk on both sides of 10<sup>th</sup> Avenue SW, therefore there is not enough available area within the ROW to site bioretention. There is area available at the cul-de-sac near the intersection of 10<sup>th</sup> Avenue SW and SW 137<sup>th</sup> Street but it is at a high point. Therefore, no bioretention was sited on 10<sup>th</sup> Avenue SW.

### 8th Avenue SW

The northeast corner of the intersection of 8<sup>th</sup> Avenue SW and SW 146<sup>th</sup> Street would be a strategic location to treat stormwater from 8<sup>th</sup> Avenue SW. While a bioretention has been sited, there is minimal available area at this location. There was no available area for bioretention along 8<sup>th</sup> Avenue SW between SW 138<sup>th</sup> Street and SW 141<sup>st</sup> Street due to presence of sidewalk. However, bioretention bulb-outs were sited at the intersections of 8<sup>th</sup> Ave SW with SW 139<sup>th</sup> Street, SW 138<sup>th</sup> Street and SW 136<sup>th</sup> Place. The intersections of 8<sup>th</sup> Ave SW with SW 138<sup>th</sup> Street and SW 139<sup>th</sup> Street would receive a significant amount of runoff as stormwater conveyance from SW 136<sup>th</sup> Street, SW 137<sup>th</sup> Street and SW 138<sup>th</sup> Street converges here. Overflow from these bioretention units would tie into stormwater conveyance directed north towards SW 141<sup>st</sup> Street. The bioretention bulb-out sited at the intersection of 8<sup>th</sup> Ave SW with SW 136<sup>th</sup> Place would not have existing stormwater infrastructure to connect to.

### 6th Avenue SW

The intersections of 6<sup>th</sup> Avenue SW with SW 142<sup>nd</sup> Street and SW 143<sup>rd</sup> Street would be strategic locations for bioretention to treat stormwater runoff from all three streets. Locations sited along 6<sup>th</sup> Avenue SW south of SW 141<sup>st</sup> Street would provide both treatment and stormwater conveyance. A design consideration for bioretention bulb-outs shown at intersections of 6<sup>th</sup> Ave SW with SW 138<sup>th</sup> Street, SW 137<sup>th</sup> Street and SW 136<sup>th</sup> Place is that the bioretention would not have existing stormwater conveyance to overflow into.

### 5th Avenue SW

No bioretention was sited along 5<sup>th</sup> Avenue SW, as the roadway is a relative north-south ridgeline for the Site.

### 3rd Avenue SW

No bioretention was sited as there was no available area.

### 2nd Avenue SW

North of SW 139<sup>th</sup> Street, there is existing curb and sidewalk, therefore no bioretention was sited along 2<sup>nd</sup> Avenue SW at this location. South of SW 139<sup>th</sup> Street all potential locations for bioretention along 2<sup>nd</sup> Avenue SW could provide both treatment and stormwater conveyance. The intersections of 2<sup>nd</sup> Avenue SW with SW 144<sup>th</sup>

Street, SW 143<sup>rd</sup> Street, SW 142<sup>nd</sup> Street and SW 134<sup>th</sup> Street would be strategic locations for bioretention to capture and treat stormwater runoff from multiple roadways.

## Conclusions:

Strategic locations for bioretention siting for capturing maximum pollution generating area include:

1. Northeast corner of intersection of SW 133<sup>rd</sup> Street and 6<sup>th</sup> Avenue SW (convergence of stormwater through conveyance or sheet flow from SW 134<sup>th</sup> Street, 8<sup>th</sup> Avenue SW and SW 133<sup>rd</sup> Street)
2. Four corners of the intersection of SW 142<sup>nd</sup> Street and 6<sup>th</sup> Avenue SW (low point to capture runoff from both intersecting streets)
3. Southwest corner of intersection of SW 134<sup>th</sup> Street and 2<sup>nd</sup> Avenue SW (potential to treat portions of 2<sup>nd</sup> Avenue SW, 4<sup>th</sup> Avenue SW and SW 134<sup>th</sup> Street)
4. Northwest corner of intersection of SW 141<sup>st</sup> Street and 6<sup>th</sup> Avenue SW (convergence of stormwater through conveyance or sheet flow from NE 134<sup>th</sup> Street, 8<sup>th</sup> Avenue SW and SW 133<sup>rd</sup> Street)
5. Four corners of the intersection of SW 143<sup>rd</sup> Street and 2<sup>nd</sup> Avenue SW (low point to capture runoff from both intersecting streets)
6. 6<sup>th</sup> PI SW (will capture runoff from SW 144<sup>th</sup> PI)
7. Bulb-out at the intersection of 8<sup>th</sup> Ave SW and SW 138<sup>th</sup> Street (convergence of stormwater through conveyance or sheet flow from SW 136<sup>th</sup> Street, SW 136<sup>th</sup> PI, SW 137<sup>th</sup> Street and SW 138<sup>th</sup> Street)

Streets with potential for bioretention for treatment and/or conveyance include

1. 2<sup>nd</sup> Avenue SW (south of SW 140<sup>th</sup> Street)
2. 6<sup>th</sup> Avenue SW (south of SW 139<sup>th</sup> Street and north of SW 136<sup>th</sup> Street)
3. 8<sup>th</sup> Avenue SW (north of SW 136<sup>th</sup> Street)
4. SW 143<sup>rd</sup> Street (west of 6<sup>th</sup> Avenue SW)
5. SW 135<sup>th</sup> Street (west of 6<sup>th</sup> Avenue SW)
6. SW 134<sup>th</sup> Street (multiple locations throughout the extent of the Site)
7. SW 133<sup>rd</sup> Street (multiple locations throughout the extent of the Site)
8. SW 142<sup>nd</sup> Street (multiple locations throughout the extent of the Site)
9. SW 136<sup>th</sup> Place, SW 137<sup>th</sup> Street, SW 138<sup>th</sup> Street and SW 139<sup>th</sup> Street (planter strips along sidewalks)

The City of Burien 2016 Road Design and Construction Standards<sup>7</sup> Table 2.1(B) states that the minimum traveled way for neighborhood collectors should be 22 feet and the minimum roadway width should be 32 feet. The minimum traveled way for sub collectors should be 22 feet and the minimum roadway width should be 28 feet. A next step would be to ensure that the roadway width for the streets where bioretention bulb-outs have been sited is maintained per City of Burien standards.

Projects in the neighborhood that this project could be strategically combined with due to proximity

1. Transportation Improvement Project on SW 136<sup>th</sup> Street
2. Capital Improvement Project to alleviate flooding at the intersections of 4<sup>th</sup> Ave SW and SW 137<sup>th</sup> Street and 4<sup>th</sup> Ave SW and SW 139<sup>th</sup> Street.

While USGS soils data indicates that the Site overlies till soils, the presence of existing infiltrating stormwater ponds at Linde Hill Park and existing drywells indicate that there may be areas where infiltration is more favorable. Geotechnical investigation and infiltration testing should be conducted at the locations chosen for bioretention.



### Estimated Cost Per Bioretention Facility

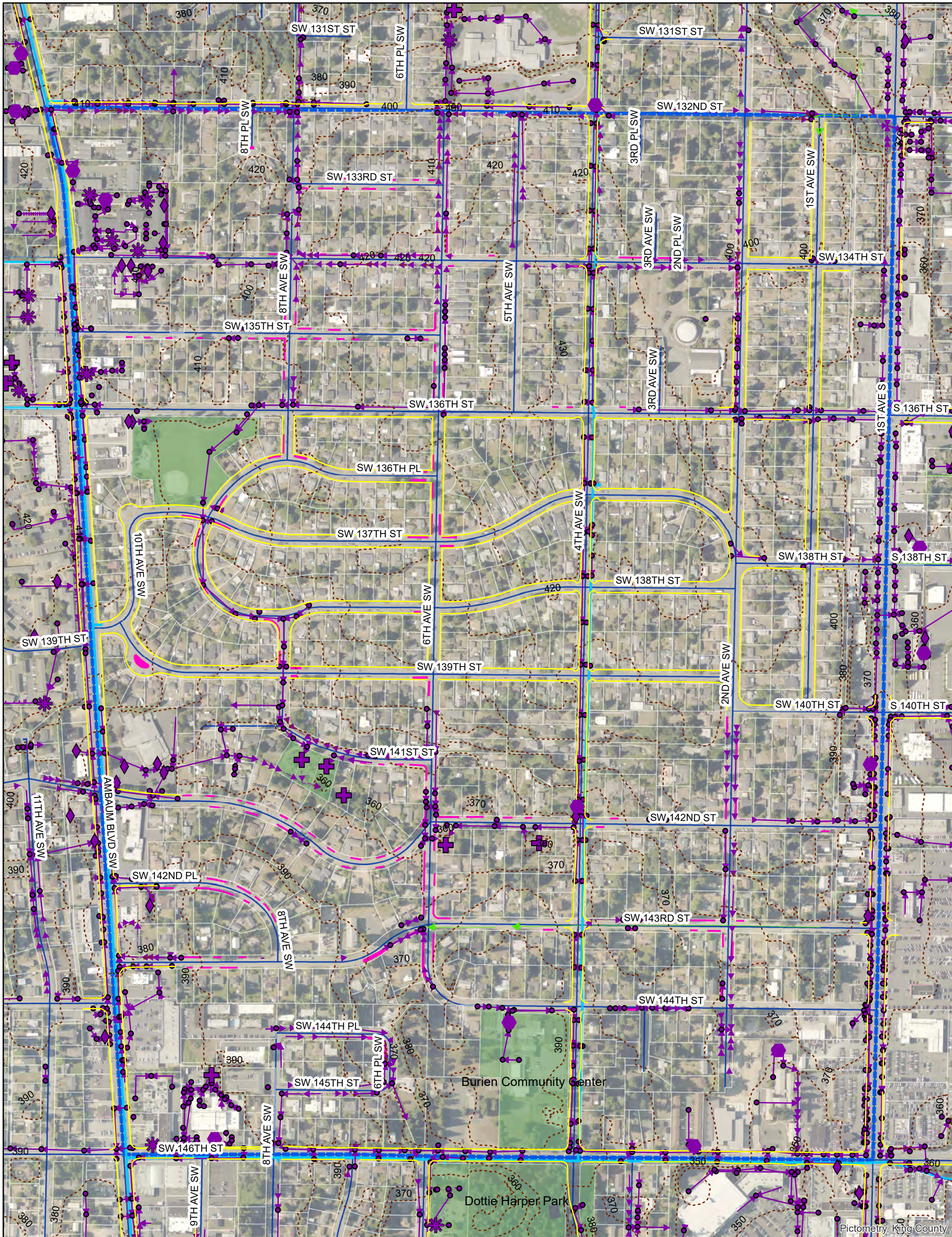
\$65,000

There would likely be cost savings and efficiency gained by installing multiple bioretention facilities, especially if located along a single roadway.

### References:

1. Geologic Map of the Des Moines 7.5' Quadrangle, King County, Washington, 2004  
By Derek B. Booth and Howard H. Waldron
2. GIS Database, City of Burien, Washington, 2017
3. Six Year Transportation Improvement Program, City of Burien, Washington, 2018-2023  
By City of Burien
4. Transportation Master Plan, City of Burien, Washington, 2012  
By Fehr and Peers
5. Chelsea Park neighborhood in Burien, Washington (WA), 98146, 98166 detailed profile  
Accessed April, 2019  
Link: <http://www.city-data.com/neighborhood/Chelsea-Park-Burien-WA.html>
6. Google Streetview in Burien, Washington, Accessed April, 2019  
By Google, Inc.
7. 2016 Road Design and Construction Standards, City of Burien, Washington, 2016  
By City of Burien





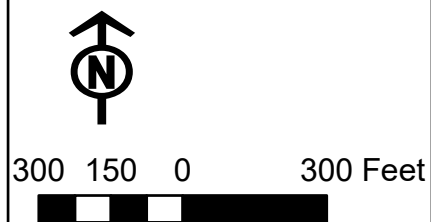
**BURIEN SMP**

MW36 FIGURE 1  
 BIORETENTION SITING  
 FOR CHELSEA PARK  
 NEIGHBORHOOD  
 BURIEN, WA 98168

**Legend**

- |  |                       |  |                     |  |              |
|--|-----------------------|--|---------------------|--|--------------|
|  | Neighbourhood Extents |  | Filter              |  | Water        |
|  | Pipes                 |  | Oil Water Separator |  | Sewer        |
|  | Ditch                 |  | WQ Vault            |  | Bioretention |
|  | Storm Structure       |  | Sidewalks           |  | Parks        |
|  | SW Ponds              |  | Contours 10 ft      |  |              |
|  | SW Vaults             |  |                     |  |              |

Pictometry, King County









Otak proj. 032995

PLANNING LEVEL PROJECT COST OPINION					
<b>PROJECT:</b> Burien Stormwater Master Plan - MW36 TYPICAL BIORETENTION COST		<b>CHECK BY:</b> GP			
<b>PROJECT ID:</b> 32995		<b>DATE:</b> 5/2/2019			
<b>BY:</b> SJ					
ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	GEOTECHNICAL INVESTIGATION INCLUDING PIT TEST	1	EA	\$ 6,000.00	\$ 6,000
2	PAVEMENT REMOVAL	10	SY	\$ 40.00	\$ 400
3	STRUCTURE EXCAVATION CLASS B	60	CY	\$ 25.00	\$ 1,500
4	INLET/OUTLET PROTECTION	2	EA	\$ 100.00	\$ 200
5	BIORETENTION SOIL MIX	6	CY	\$ 30.00	\$ 200
6	PLANTING	160	SF	\$ 10.00	\$ 1,600
7	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 12-IN DIAM	10	LF	\$ 130.00	\$ 1,300
8	HOT MIX ASPHALT	2	TON	\$ 200.00	\$ 400
9	CRUSHED SURFACING BASE COURSE	2	TON	\$ 50.00	\$ 100
10	CATCH BASIN TYPE 1	1	EA	\$ 2,000.00	\$ 2,000
<b>Subtotal Construction Elements</b>					<b>\$ 17,056</b>
<i>Required Ancillary Items</i>					
11	DEWATERING		5%		\$ 900
12	EROSION & SEDIMENTATION CONTROL		10%	(see note 3)	\$ 1,800
13	TRAFFIC CONTROL		40%	(see note 4)	\$ 6,900
14	CONTINGENCY		40%		\$ 6,900
Subtotal Ancillary					\$ 16,500
<b>Subtotal Construction + Ancillary</b>					<b>\$ 33,556</b>
<i>Mobilization</i>					
15	MOBILIZATION		10%		\$ 3,356
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 36,911</b>
<i>Tax/Engineering/Management/Permitting</i>					
16	STATE SALES TAX		10%		\$ 3,700
17	ENGINEERING/SURVEY/PERMITTING		50%		\$ 18,500
18	CONSTRUCTION MANAGEMENT		10%		\$ 3,700
19	LEGAL/ADMIN		3%		\$ 1,200
Subtotal					\$ 27,100
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 64,011</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 65,000</b>
<b>Notes:</b>					
1. The above cost opinion is in 2019 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.					
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. Assumes that bioretention will be installed on existing gravel shoulder where there is no existing conveyance					
6. Bioretention will have a bottom width of 2 feet, depth of 1.5 feet (1 foot ponding + .5 foot freeboard) and 2:1 sideslopes.					
There will be 1.5 feet of bioretention soil mix over 1.5 feet of gravel. The inlet and outlet pipe will be 1 foot diameter CPE.					





## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Shailee Jain, EIT

Copies: File

Date: May 1, 2019

Subject: Small Works Project Summary Sheet  
SW #BS3: Stormwater Infrastructure Improvement at SW 144<sup>th</sup> Place

Project No.: 32995

### *PROJECT LOCATION:*

1309 SW 144<sup>th</sup> Place, Burien, WA 98166

### *PROBLEM DESCRIPTION:*

Under existing conditions, the grate of CB7924 frequently become clogged with vegetation and other debris, which prevents stormwater runoff from entering the inlet, causing localized ponding. Stormwater runoff from private property from the south and a portion of the SW 144<sup>th</sup> Place roadway flows to the catchbasin. See Figures 1-2 for site photos and Figure 3 for basin map.

### *PROJECT DESCRIPTIONS:*

City Staff have determined a need to replace the herringbone grate on CB7924 with a vaned grate inlet and extend the existing asphalt berm around CB2973 towards the southwest for approximately 40 feet, such that the roadway runoff is directed into CB2793. See Figure 4.

### *DESIGN CONSIDERATIONS:*

Stormwater runoff from private property drains into a detention vault that overflows to CB7924. While the proposed project will likely resolve the sediment issue caused by the debris blocking the existing catchbasin inlet, the private stormwater infrastructure should be inspected to ensure it is not a source of sediment to the catchbasin.

### *ESTIMATED PROJECT COSTS:*

\$4,000



PROJECT LOCATION PHOTOS:



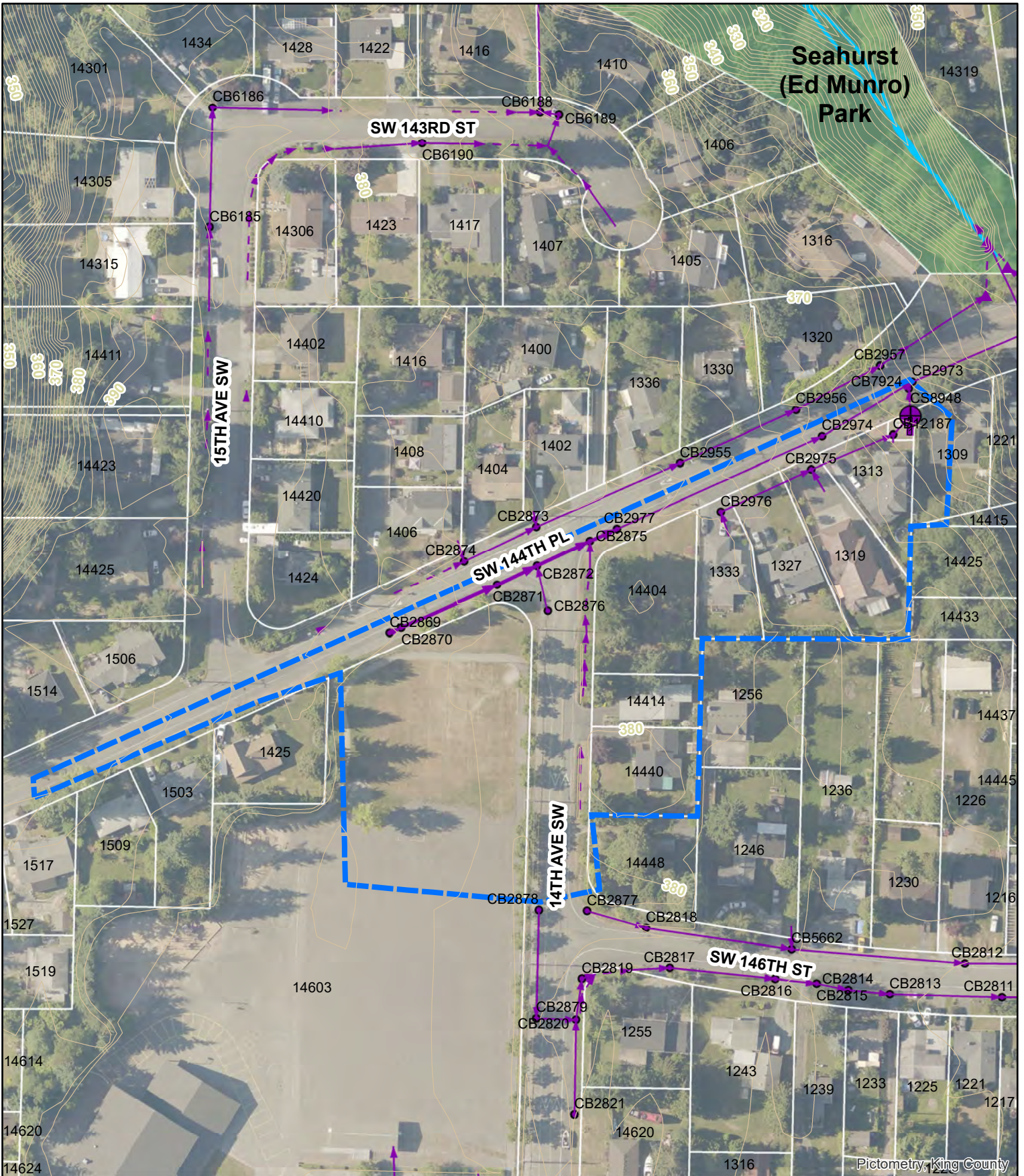
FIGURE 1: Looking northeast, picture taken 4/1/2019, CB2973 to the left and CB 7924 to the right, south side of SW 144<sup>th</sup> Place, general flow direction towards northeast (flow from SW 144<sup>th</sup> Place goes southeast into CB7924 which further drains northeast into CB2973).





FIGURE 2: Looking northeast, picture taken 4/1/2019, CB 7924, south side of SW 144<sup>th</sup> Place, flow direction towards southeast.





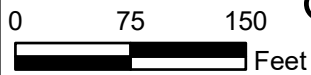
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Pictometry, King County

### BURIEN SMP

BS3  
1309 SW 144th Pl  
BURIEN, WA 98168

PIN: 1430800212



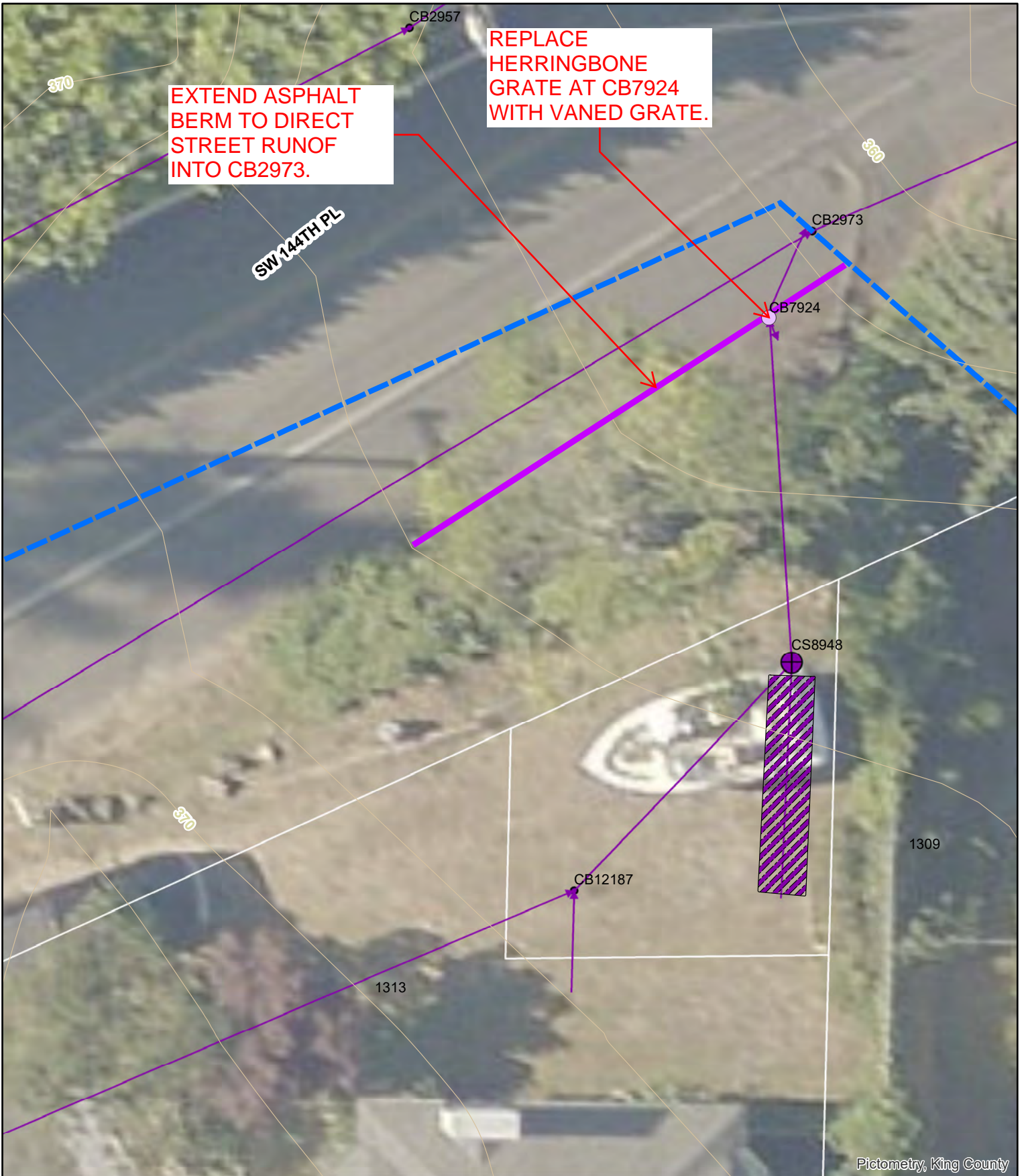
#### Legend

- |              |                    |                |
|--------------|--------------------|----------------|
| 2 Ft Contour | SW Vault           | Ditch          |
| BS3 Basin    | Outfall            | Watercourse    |
| Parks        | Catchbasin         | 4"-12" Pipe    |
|              | Manhole            | 12" - 24" Pipe |
|              | Control Structures | 24" - 36" Pipe |
|              |                    | > 36" Pipe     |



FIGURE 3: BASIN MAP





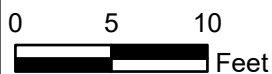
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Pictometry, King County

### BURIEN SMP

BS3 PROPOSED SWP  
1309 SW 144th PI  
BURIEN, WA 98166

PIN: 1430800212



### Legend

- |              |                    |               |
|--------------|--------------------|---------------|
| 2 Ft Contour | SW Vault           | Replace Grate |
| BS3 Basin    | Catchbasin         | Extend Curb   |
| Parks        | Control Structures |               |
|              | SW Conveyance      |               |



FIGURE 4: BS3 PROPOSED SMALL WORKS PROJECT

**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - BS3  
**PROJECT ID:** 32995  
**BY:** SJ

**CHECK BY:** GP  
**DATE:** 5/1/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	VANED GRATE INLET	1	EA	\$ 500	\$ 500
2	ASPHALT BERM	40	LF	\$ 25	\$ 1,000
<b>Subtotal Construction Elements</b>					<b>\$ 1,767</b>
<i>Required Ancillary Items</i>					
2	DEWATERING		3%		\$ 100
3	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 100
4	TRAFFIC CONTROL		20%	(see note 4)	\$ 400
5	CONTINGENCY		15%		\$ 300
Subtotal Ancillary					\$ 900
<b>Subtotal Construction + Ancillary</b>					<b>\$ 2,667</b>
<i>Mobilization</i>					
6	MOBILIZATION		10%		\$ 267
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 2,933</b>
<i>Tax/Engineering/Management/Permitting</i>					
7	STATE SALES TAX		10%		\$ 300
8	LEGAL/ADMIN		3%		\$ 100
Subtotal					\$ 400
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 3,333</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 4,000</b>

**Notes:**

- The above cost opinion is in 2019 dollars and does not include future escalation, financing, or O&M costs.
- 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.
- Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.



## Memorandum

To: Dan O'Brien, PE  
City of Burien

From: Russ Gaston, PE  
Gwyn Perry, EIT  
Teddy Thorson, EIT

Copies: File

Date: May 1, 2019

Subject: CIP Project Summary Sheet  
SW #SC2: Stormwater Infrastructure Improvement at 1598 SW 116<sup>th</sup> Street

Project No.: 32995

### *PROJECT LOCATION:*

1598 SW 116th Street, Burien, WA 98146

### *PROBLEM DESCRIPTION:*

16th Avenue SW is an uncrowned roadway that causes stormwater runoff to sheetflow east to a gutter which directs flow to the intersection of SW 116th Street and 16th Avenue SW. The east side of SW 116th Street has type 1 catchbasins with rectangular ADA grates spaced approximately every 150 feet. CB8168 also has a rectangular ADA grate with no curb inlet. Field observations identified sediment along the curb and gutter section of SW 116th Street, with a significant amount of sediment build-up at the rim of CB8618. The sediment build-up prevents runoff in the curb and gutter from entering CB8618, resulting in localized ponding (Figure 1).

### *PROJECT DESCRIPTIONS:*

City staff have determined a need for a new vane grate lid at the location of CB8168 (Figure 2). Replacing the lid and adding a curb inlet will result in less sediment build up around the catchbasin allowing stormwater to enter the catchbasin as intended. A curb inlet cannot be installed at this location, due to the proximity of the catchbasin to an ADA ramp.

### *DESIGN CONSIDERATIONS:*

Traffic control should be considered for the installation of this project, as field observations showed that the intersection of 16th Avenue SW and SW 116th Street experiences steady traffic. However, the duration of the install should be minor and impacts on traffic should be limited.

Installing a curb inlet catchbasin upstream of the existing CB8168 would further increase efficiency of stormwater flow into the conveyance system and should be considered as a potential solution if ponding continues to be an issue at this location.

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ESTIMATED PROJECT COSTS:

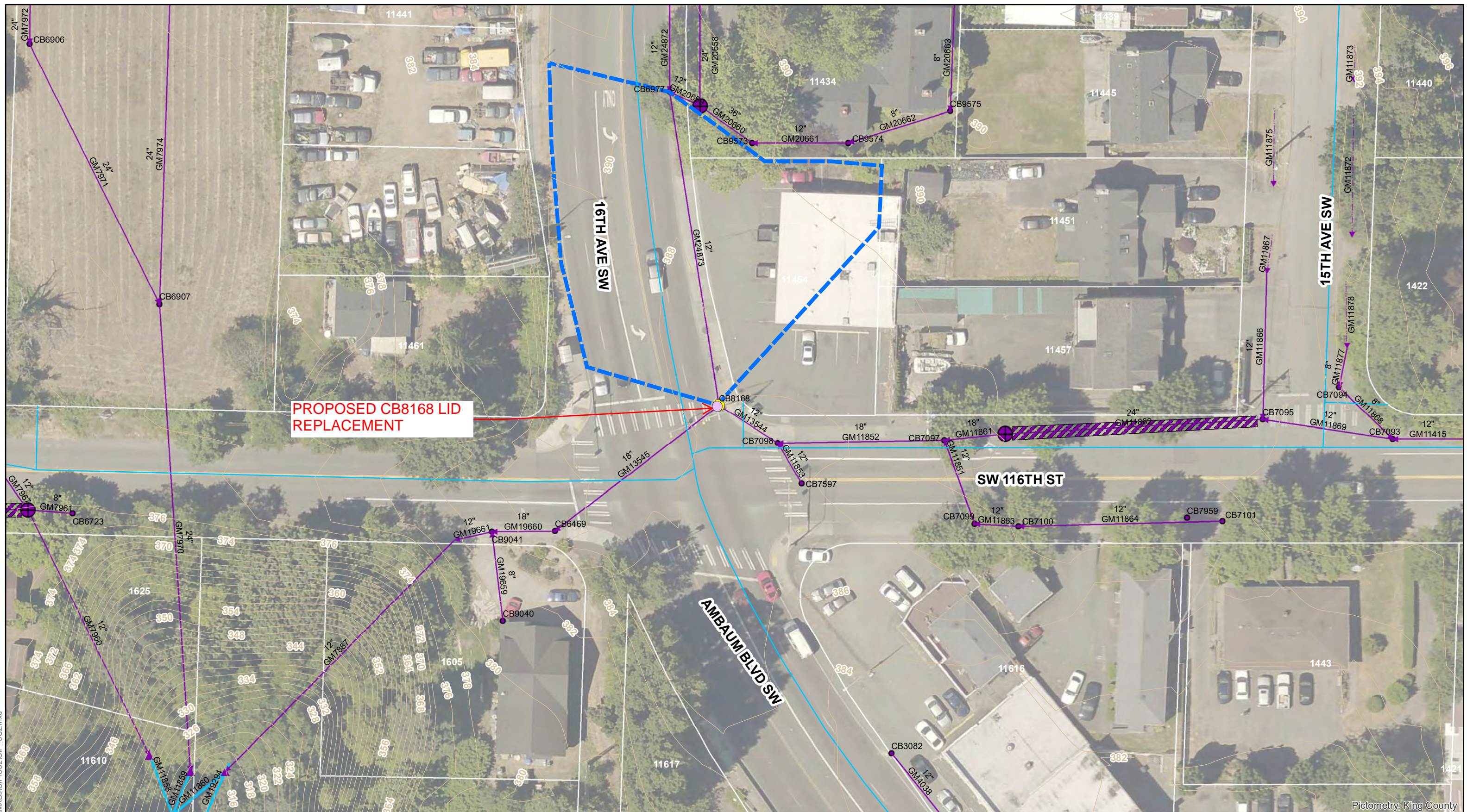
\$2,000

PROJECT LOCATION PHOTOS:



FIGURE 1: Localized ponding around CB8168 during small precipitation event. Photo date 4/8/2019, photo taken facing northeast





**BURIEN SMP**  
 SC2 PROPOSED SMALL WORKS

1598 SW 116TH ST  
 BURIEN, WA  
 98146

0 50 100  
 Feet

**Legend**

SC2 Basin	Water Main	Control Structures	Watercourse	Proposed Vane Grate
Issue Location	SW Vault	Pipe	Catchbasin	Manhole
2 Ft Contour	Outfall	Ditch		

**Otak**

Figure 2: SC2 Map

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Pictometry, King County







**PLANNING LEVEL PROJECT COST OPINION**

**PROJECT:** Burien Stormwater Master Plan - SC2  
**PROJECT ID:** 32995  
**BY:** TT

**CHECK BY:** GP  
**DATE:** 5/2/2019

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<i>Construction Elements</i>					
1	VANED GRATE	1	EA	\$ 500.00	\$ 500
<b>Subtotal Construction Elements</b>					<b>\$ 611</b>
<i>Required Ancillary Items</i>					
2	DEWATERING		3%		\$ 100
3	EROSION & SEDIMENTATION CONTROL		5%	(see note 3)	\$ 100
4	TRAFFIC CONTROL		20%	(see note 4)	\$ 200
5	CONTINGENCY		15%		\$ 100
Subtotal Ancillary					\$ 500
<b>Subtotal Construction + Ancillary</b>					<b>\$ 1,111</b>
<i>Mobilization</i>					
6	MOBILIZATION		10%		\$ 111
<b>Subtotal Construction + Ancillary + Mobilization</b>					<b>\$ 1,222</b>
<i>Tax/Engineering/Management/Permitting</i>					
7	STATE SALES TAX		10%		\$ 200
8	LEGAL/ADMIN		3%		\$ 100
Subtotal					\$ 300
<b>Subtotal Construction + Ancillary + Mobilization + Tax/Engineering/Management/Permitting</b>					<b>\$ 1,522</b>
<b>2019 Dollars Total Estimated Project Cost (Rounded)</b>					<b>\$ 2,000</b>

**Notes:**

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- Increase percentage markup if work is in or immediately adjacent to secondary, arterial, or other high-volume road or temporarily closes a roadway.

