



City of Burien, Washington

Storm Drainage Master Plan



JULY 2012

Acknowledgements

City of Burien, Washington Storm Drainage Master Plan



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Abbreviations and Acronyms

2005 ECOLOGY MANUAL	2005 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
KCSWDM	King County Surface Water Design Manual
LID	Low Impact Development
NERA	Northeast Redevelopment Area
NPDES	National Pollution Discharge Elimination System
PARTNERSHIP	Puget Sound Partnership
PHASE II PERMIT	2007 National Pollution 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

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City of Burien

Storm Drainage Master Plan

Executive Summary

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 construction 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 Phase II Permit.
- 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.

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 Puget Sound – 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 issued the National Pollution Discharge Elimination System (NPDES) Municipal Stormwater Phase II Western Washington General 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 permit term is set to expire in 2012 and the Washington State Department of Ecology (Ecology) intends to issue a new NPDES Phase II Permit that will impact City operations starting in 2013.

Aging Stormwater Infrastructure

At incorporation and during recent annexations, the City acquired an aging stormwater infrastructure system from King County. The stormwater system infrastructure typically has a 50-100 year design life, which the majority of the existing infrastructure has met. The City has 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 function 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 looks to add 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. 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.

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 142nd Street Depression.

In-house vs. Contracted Operation and Maintenance Activities

One challenge the City faces as a fairly young, but largely populated City is to develop a long-term plan to conduct maintenance activities using City staff instead of contracting for these services to King County. The immediate, short term plan is for City staff to start conducting all construction and stormwater facility inspections as required by the NPDES Phase II Permit. The City will take on additional maintenance activities as equipment can be purchased and new staff can be hired.

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.

Potential Future Annexations

This SDMP does not evaluate the programming or infrastructure requirements that would be required to support future annexations. However, stormwater program impacts should be thoroughly evaluated during the review of any future annexations. Adding service area to the City can affect the stormwater program by adding new CIP projects, additional program area for NPDES Phase II Permit requirements, a large maintenance service area, additional aging infrastructure that will need replacement and potential additional water quality issues (new lakes/streams annexed into the City etc.). Any new annexed area will also directly increase the stormwater program budget through the addition of new rate payers, so the cost/benefit to the stormwater program would need to be thoroughly reviewed.

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 already includes many of the required legal authorities, programmatic activities, services, and maintenance actions needed for compliance. Some of these activities will need to be enhanced or expanded for full compliance with current and future regulations.

The program assessment shows an overall need for 2.1 additional Full Time Equivalent (FTE) and \$180,000 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 required for future Stormwater Program implementation.

Table ES-1: Summary of Existing and Future Stormwater Program Expense and FTE

Element	Existing Staff FTE	Existing Staff Cost (\$)	Existing Expense Cost (\$)	Future Staff FTE	Future Staff Cost (\$)	Future Expense Cost (\$)	Notes
1 – Public Education and Outreach	0.10	\$8,600	\$10,000	0.15	\$13,000	\$15,000	Increased outreach and measurement of outreach results as required by NPDES.
2- Public Involvement and Participation	0.05	\$7,800	\$0	0.05	\$5,000	\$0	No change.
3 – Illicit Discharge Detection and Elimination	0.50	\$43,200	\$42,700	0.60	\$50,000	\$30,000	IDDE inspections will be combined with maintenance program.
4- Controlling Runoff from New Development, Redevelopment	0.50	\$53,700	\$7,700	1.30	\$109,000	\$25,000	Revise development code for LID. Increase staffing to review development plans for LID stormwater facilities as required by NPDES.
5 – Pollution Prevention and Operation and Maintenance for Municipal Operations	6.40	\$412,900	\$520,700	7.30	\$608,000	\$503,000	Increase frequencies as required by NPDES. Shift responsibility from outside contracts to City staff.
6 – Program Implementation	0.00	\$0	\$0	0.05	\$4,200	\$30,000	Develop written program policies as required by NPDES.
7 – Total Maximum Daily Load Allocations	N/A	N/A	N/A	N/A	N/A	N/A	No TMDLs apply to the stormwater program.
8 – Monitoring	0.00	\$0	\$0	0.05	\$4,200	\$32,500	City must pay in to regional monitoring program as required by NPDES.
9 – Reporting	0.05	\$5,400	\$10,000	0.05	\$5,000	\$5,000	No change.
10 – Regional Watershed Planning	0.05	\$5,400	\$76,000	0.10	\$9,000	\$76,000	Increased attention to WRIA activities.
11- Underground Injection Control Rule	N/A	N/A	N/A	0.00	\$0	\$0	No change
12 – Capital Improvement Program	0.40	\$52,900	See Section 4	0.50	\$50,000	See Section 4	Program variable based on project development.
13 – Additional Activities	0.70	\$70,400	\$284,100	1.00	\$84,000	\$365,000	Increase funding for equipment purchase and future maintenance facility.
Total	8.75	\$660,000	\$951,000	11.25	\$942,000	\$1,082,000	
Grand Total	8.75	\$1,611,000		11.25	\$2,024,000		Operating only; See Section 4 for CIP

Capital Needs

A major component of this SDMP is the development of an updated CIP projects list. The updated CIP presented in Section 4 includes projects that address flooding, infrastructure and water quality concerns, along with identifying long term stormwater and water quality studies. The CIP also includes Small Works Projects (SWP) and an Infrastructure Replacement Fund to upgrade aging stormwater infrastructure.

Table ES-2 presents the updated capital program. A map of the proposed project locations is included in Section 4. Additional capital projects will be identified through the watershed based studies and ongoing review of drainage complaints reported by citizens and City Staff.

Table ES-2 Summary of CIP Projects, Studies and Small Works Projects		
Project Problem Area	Project Title	Cost ⁽¹⁾
CIP 1	Capacity Improvement at 4 th Avenue SW	\$552,000
CIP 2	20th Ave SW Drainage Improvements	\$390,000
CIP 3	20th Ave S between S 120th Ave and S 124th St Drainage Improvements	\$441,000
CIP 4	SW 165th St between 16th Ave SW and 19th Ave SW	\$322,000
CIP 5	SW 135th St and 6th Ave SW Drainage Improvements	\$154,000
CIP 6	SW 152nd and 8th Ave SW Drainage Improvements	\$457,000
CIP 7	25th Ave SW Drainage Improvements	\$799,000
CIP 8	4th Ave S/Blake Manor Neighborhood Drainage Improvements	\$639,000
	CIP Total	\$3,754,000
Study 1	Lake Burien System Retrofit	\$250,000
Study 2	NERA Master Drainage Plan	\$350,000
Study 3	Des Moines Memorial Drive and S 175th St Sediment Study	\$100,000
Study 4	Hermes and Mayfair Depressions System Evaluation	\$200,000
Study 5	142nd Street Depression Improvements	\$200,000
Study 6	Arbor Lake Water Quality Lake Management Plan	\$150,000
	Studies Total	\$1,200,000

Table ES-2 Summary of CIP Projects, Studies and Small Works Projects		
Project Problem Area	Project Title	Cost ⁽¹⁾
Small Works Project 1	Ambaum Blvd SW/SW 120th Block Drainage Improvements	\$100,000 per year
Small Works Project 2	Occidental Ave S Drainage Improvements	
Small Works Project 3	Eagle Landing Park/25th Ave SW Drainage Improvements	
Small Works Project 4	116th Ave SW between 1st Ave and 4th Ave SW at Church Drainage Improvements	
Infrastructure Replacement Fund	Upgrade/Replace Drainage Infrastructure associated with Roadway Improvement Projects	\$350,000 per year

Note: The cost opinion is in 2012 dollars and does not include future escalation, financing, or O&M costs.

Watershed Enhancement Program

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. Through the Watershed Enhancement Program, the City is joining efforts with local organizations and citizens to improve the health of the streams and natural habitats.

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.

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City of Burien

Storm Drainage Master Plan

Section 1: Introduction

Background

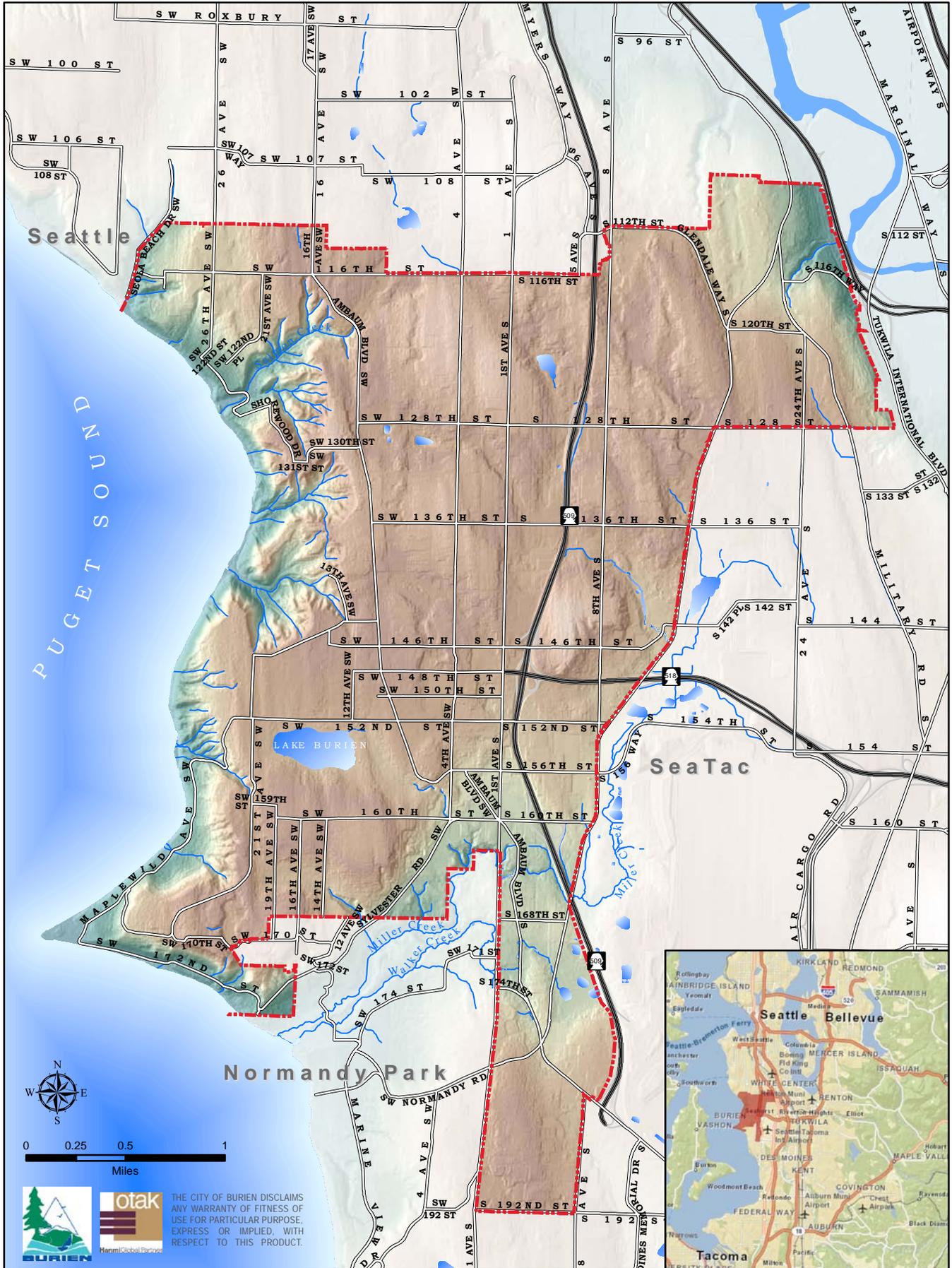
Incorporated in 1993, the City of Burien is a young, growing city faced with the challenges of meeting a myriad of local, state and federal demands on its financial and staff resources. The City's stormwater management program is currently providing stormwater education to citizens, maintaining its drainage 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 2005. The updates address the requirements of the National Pollution Discharge Elimination System (NPDES) Municipal Stormwater Phase II Western Washington General Municipal Stormwater Permit (Permit), bring the City's existing CIP program 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 Phase II Permit.
- 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



Drainage Master Plan

Figure 1-1 Vicinity Map

May 2012



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To this end, the City's Stormwater Program routinely conducts numerous activities and services, ranging from program administration to complaint response, and includes 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 in the City. 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.

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.

The City's Stormwater Program addresses economic development in the following ways:

- By providing clarity during the planning process regarding the City of Burien's stormwater standards, and the developer or business contributions towards stormwater infrastructure.
- By providing clear and straightforward recommendations as to the priority investments in the City's stormwater infrastructure over the next ten years.

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) that 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. The Utility collects approximately \$2.4M per year. In 2011, \$1.6M was slated for program services and \$830K was transferred out of the operating fund to pay for stormwater-related capital projects.

Organization and Staffing

The City's Stormwater Program is under the direction of the Public Works Director, who supervises a Stormwater Engineer, Engineering Technician, the Maintenance Manager and the several Maintenance workers. Portions of each person's salary are covered by the stormwater program budget. The City's maintenance staff shares responsibility to maintain the stormwater system, roadways, and other City infrastructure.

Existing Infrastructure

In order to manage runoff from urban area, the City owns and operates over 112 miles of stormwater conveyance infrastructure, approximately 32 miles of drainage ditches, 15 water quality/detention ponds, and 42 other stormwater facilities (includes oil water separators, water quality vaults, water quality filters). Private owners are responsible for over 60 miles of conveyance line and over 150 stormwater facilities. The majority of the public infrastructure was installed by King County prior to the City's incorporation (1993). The City retains an ongoing relationship with King County to conduct many stormwater related maintenance activities. As part of this SDMP, the contract services have been evaluated to identify services that can be combined or modified to realize cost savings for the City's stormwater program.

Overview of the Stormwater Management Planning Process

This SDMP update was initiated by the City in May 2011, with work continuing through June 2012. 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 program, including program costs and 10-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.

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City of Burien

Storm Drainage Master Plan

Section 2: Characterization of the Study Area

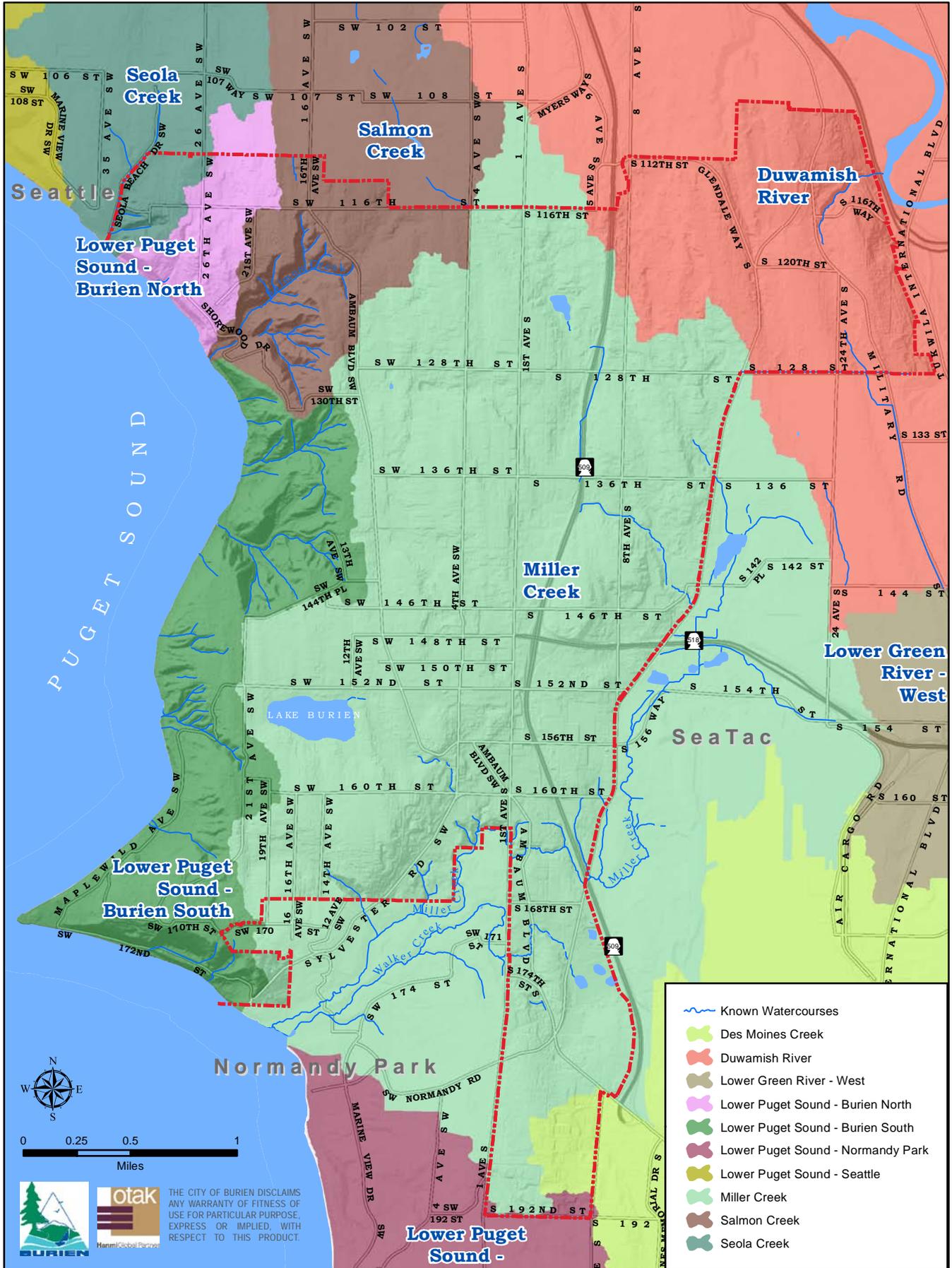
Service Area

The City’s Stormwater Program service area (the City limits) is approximately ten square miles. The City used an extensive Geographic Information System (GIS)-based stormwater inventory to visually track 112 miles of pipe, 32 miles of swales and conveyance channels and nearly 6,000 publically maintained catch basins and other stormwater structures. The City also maintains 15 public water quality/detention ponds and 42 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 map book of the drainage infrastructure throughout the City limits. The map book can be viewed on the City’s website.

Drainage Basins

The City limits include three major drainage basins – Salmon Creek, Miller 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. Small areas of the City also 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	
Drainage Basin ID	Area (Acres)
Miller 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



Drainage Master Plan

Figure 2-1 Major Drainage Basin Map

May 2012

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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, geology 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 38.1 inches with the rainy season beginning in October and continuing through March, often extending into June.

The 2009 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

During the development of this plan, the City experienced several rainfall events that resulted in numerous drainage complaints. While these events were not significant in overall rainfall, they did result in localized flooding and the drainage problem areas were identified and included in the Section 4 analysis.

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

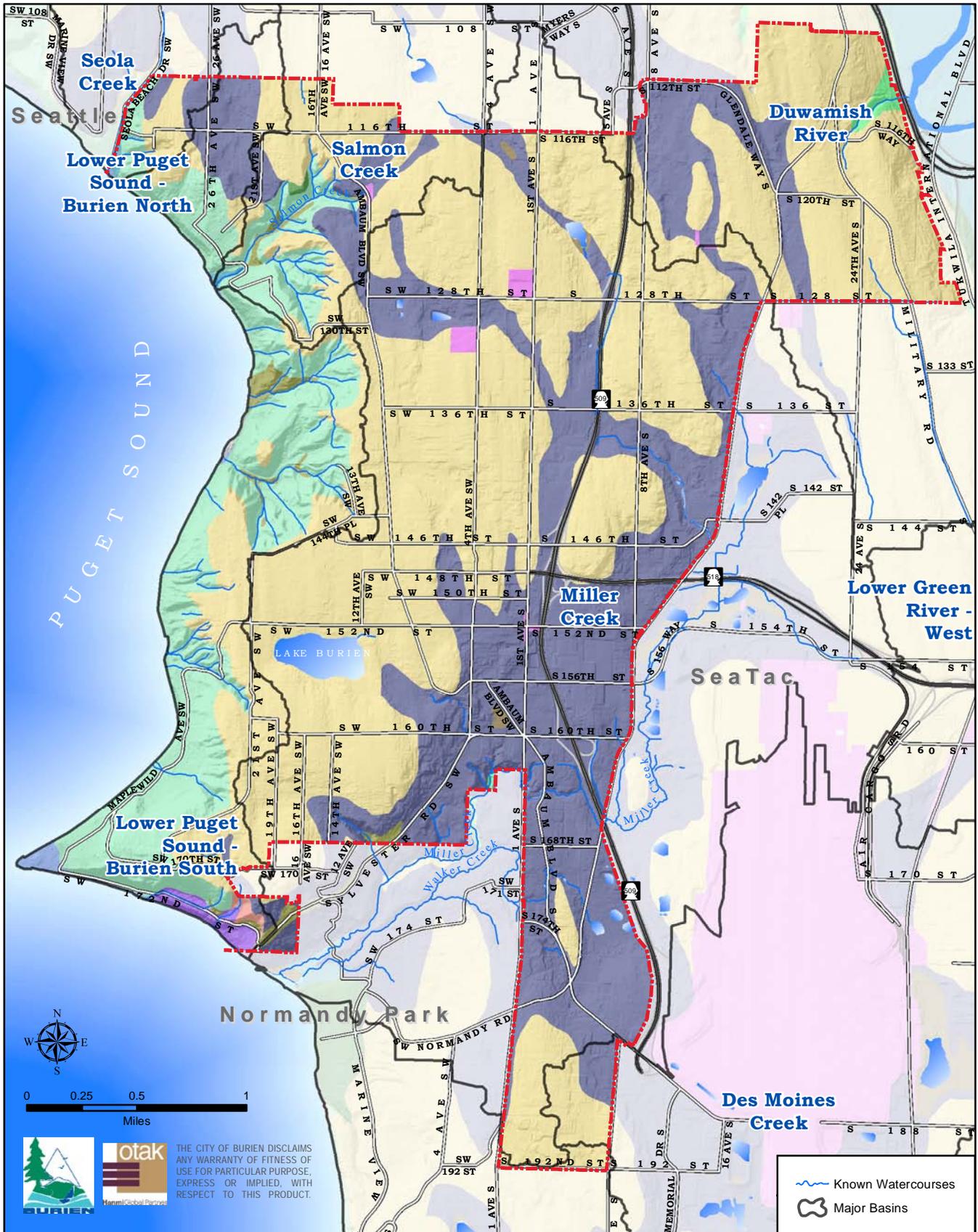
Most of the City of Burien has already been developed. Undeveloped land is generally in park areas and along steep coastal bluffs on the west side of the City. Developed areas in the City are primarily residential. Commercial areas are located along the Ambaum Boulevard SW Corridor, 1st Avenue South 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 135-acre Northeast Redevelopment Area (NERA), located between 8th Avenue South, Des Moines Memorial Drive, and South 138th 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 operations and existing and planned surrounding land uses.

In 2010, the City annexed approximately 2.6 square miles (14,000 residents) from King County in the North Highline area. At the time of this SDMP, the City was in the process of evaluating annexation of a second area in North Highline that would add approximately 3.2 square miles (17,000 residents) to the City limits. This plan does not evaluate the programming or infrastructure requirements that would be required to support such a future annexation.

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.

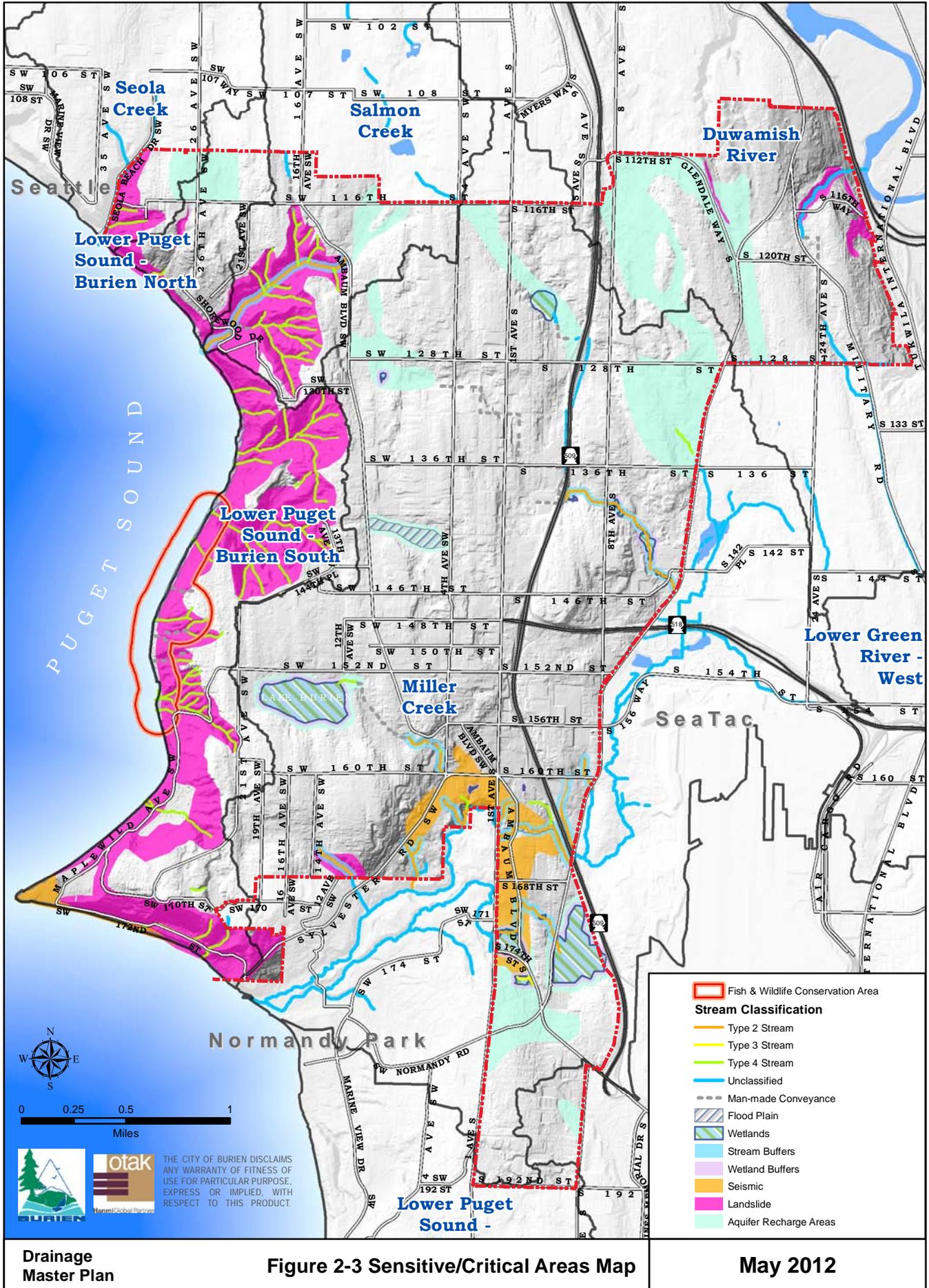


- | | | | |
|--|--|---|--|
| Advance outwash deposits | Mass-wastage deposits (Holocene and Pleistocene) | Sedimentary deposits of pre-Fraser glaciation age (Pleistocene) | Tukwila Formation (late and middle Eocene) |
| Beach deposits (Holocene) | Modified land (Holocene) | Surficial deposits, undivided (Holocene and Pleistocene) | Vashon Drift, undivided |
| Ice-contact deposits | Recessional outwash deposits | Till | Wetland deposits (Holocene) |
| Intrusive rocks (Miocene, Oligocene, and Eocene) | Renton Formation (late and middle Eocene) | Transitional beds (Pleistocene) | Younger alluvium (Holocene) |

Drainage Master Plan

Figure 2-2 Major Drainage Basins w/ Geology Map

May 2012



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 public outreach and education to improve practices (animal waste, fertilizer use, etc.) of the surrounding and upstream 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 capital programs and Watershed Enhancement activities related to Lake Burien.

Arbor Lake Water Quality

Arbor Lake is another 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 birds species. The Lake is supported by neighborhood volunteers who often join together with Burien Park, Recreational and Cultural Services to remove invasive species around the Lake, thereby boosting habitat for native species. As with Lake Burien, providing public education and outreach regarding the water quality issues with Arbor Lake will help the long term health of the Lake.

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 3rd Runway Project. The watershed also encompasses the NERA and stormwater management and mitigation projects are a key aspect of future 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 142nd 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.



City of Burien

Storm Drainage Master Plan

Section 3: Stormwater Program Analysis

This Section provides 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, and the Puget Sound Action Agenda. The City's Stormwater Program already includes many of the required legal authorities, programmatic activities, services, and maintenance actions needed for compliance. Some of these activities will need to be enhanced or expanded for full compliance with current and future 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, along with a summary of the current organization, staffing and the stormwater utility budget. The program analysis evaluates both existing (as of 2011) and future required activities, staffing, and resources. The analysis is structured according to the following sections:

- NPDES Phase II Permit
 - Public Education and Outreach (Special Condition S5.C.1)
 - Public Involvement and Participation (Special Condition S5.C.2)
 - Illicit Discharge Detection and Elimination (Special Condition(S5.C.3)
 - Controlling Runoff from New Development, Redevelopment, and Construction Sites (Special Condition S5.C.4)
 - Pollution Prevention and Operation and Maintenance for Municipal Operations (Special Condition S5.C.5)
 - Total Maximum Daily Load Requirements (Special Condition S7)
 - Monitoring (Special Condition S8)
 - Reporting (Special Condition S9)
- Regional Stormwater Planning (ESA, WRIA, and Puget Sound Action Agenda)
- Underground Injection Control Rule
- Capital Improvement Program
- Additional Activities

A summary of existing and future required activities for each program element is presented below. The detailed results of this regulatory gap analysis are presented in Appendix 3-2. The results of the program analysis, including a summary of existing and future staffing and program expenses are summarized in Table 3-1 at the end of this section.

NPDES Phase II Municipal Stormwater Permit

The City of Burien has been identified by Ecology as a NPDES Phase II community. All Phase II communities are expected to develop a stormwater program that includes the required 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 Phase II Permit apply throughout the entire incorporated area of the City. The City has been implementing the requirements of its NPDES Phase II Permit over the past several years. Documentation of the City’s compliance activities is summarized in 2007- 2011 Annual Reports, which are available at City Hall for review.

The analysis in this section is based on the Draft NPDES Phase II Permit published by Ecology in October 2011. The permit requirements are subject to change prior to final issuance in August 2012.

Permit Timeline

The current Phase II Permit became effective February 16, 2007 and was modified on June 17, 2009. The permit covered a five-year period that was set to expire on February 15, 2012. On October 19, 2011, Ecology released the new Draft Phase II Municipal Stormwater Permit for public comment. In 2012, Ecology expects to issue both an extension to the current permit and a new Phase II Permit with a new effective date of August 2013. See Figure 3-1 for the proposed permit re-issuance schedule.

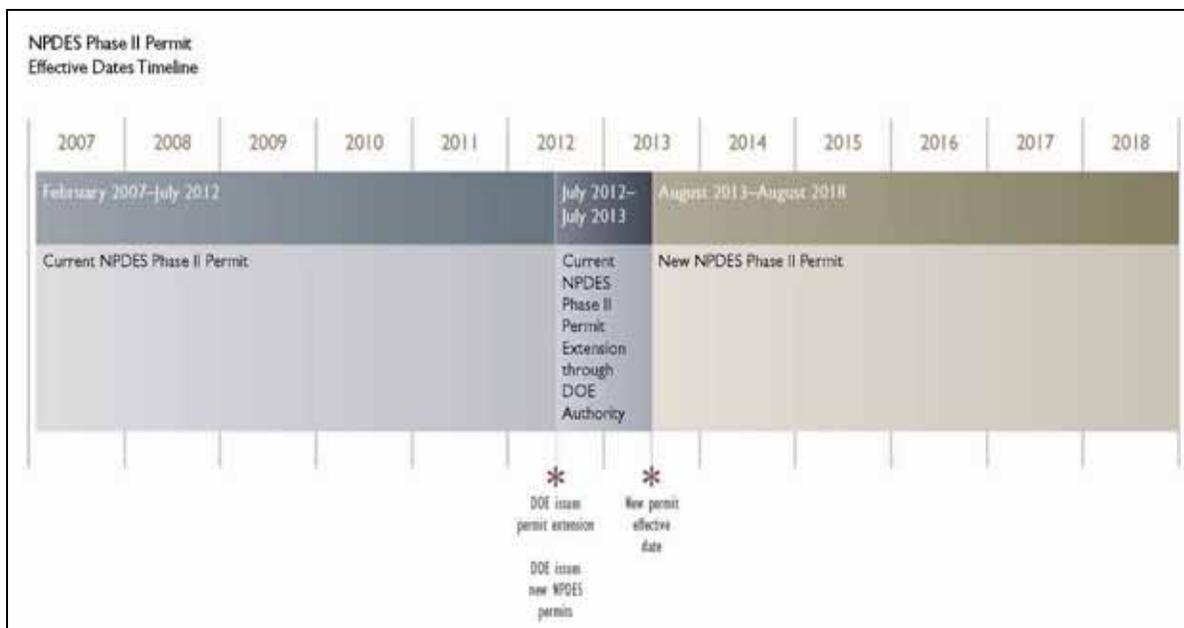


Figure 3-1: NPDES Phase II Permit Effective Dates Timeline

The general permit requirements are expected to remain the same with the issuance of the new permit, with some exceptions and some additions. A summary of the changes can be found in Appendix 3-1. See Figure 3-2 for the Phase II Permit proposed due dates.

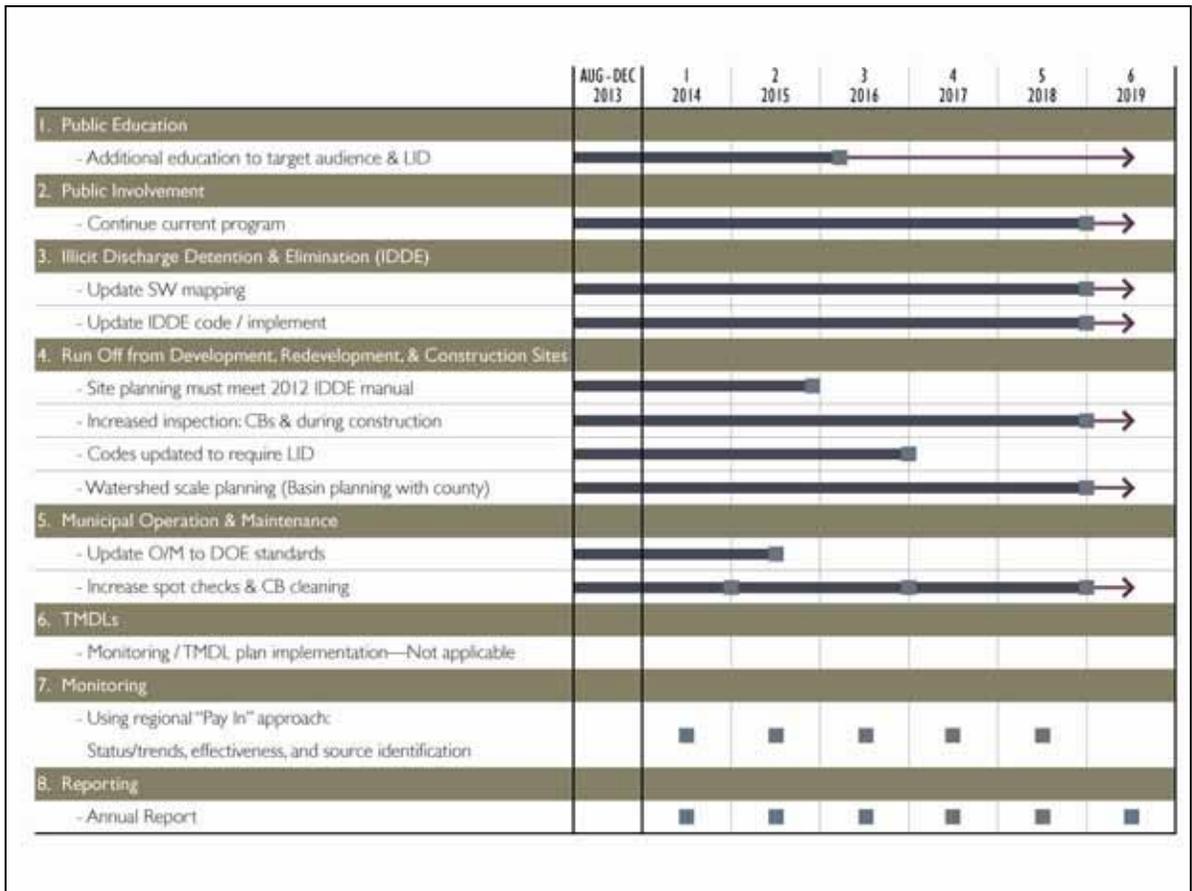


Figure 3-2: Proposed NPDES Phase II Permit Requirements and Milestones

Public Education and Outreach (S5.C.1)

The City has an active public education and outreach program. Recent activities include:

- Partnering with the Environmental Science Center to measure public education effectiveness
- Storm drain stenciling program
- Participating in the Miller/Walker Creek Basin Stewardship program
- Erosion and Sediment Control brochures available for small construction sites

- Conducted natural lawn care workshops through the Environmental Science Center
- Distributing Low Impact Development (LID) information to developers during pre-application meetings with City Staff.
- Posting natural yard care information, as available on the City's website
- Publishing educational information in the City newsletter and on the City website,
- Publicizing and distributing car wash kits for charity groups
- Active participation in the STORM group (the Regional NPDES Education and Outreach Forum) and the *Puget Sound Starts Here* campaign



Natural Yard Care Workshop

As part of the upcoming new Phase II Permit the City will be required to focus the education and outreach efforts on prioritized target audiences, including the business community, property owners/managers, and school aged children. The City is required to evaluate the effectiveness of the outreach program by 2016. Section 5 of this plan includes a detailed summary of the City's planned Watershed Enhancement Program, which is designed to address the Public Education Requirement of the Phase II Permit.

Program Implementation

These increased efforts will require some additional staff time and additional funding beyond current levels starting in 2013.

Public Involvement and Participation (S5.C.2)

As required, the City posts the most current Annual Report to Ecology and the Stormwater Management Program update on its website. In the summer of 2011, as part of the development of the SDMP, the City conducted a stormwater survey to request information about known stormwater problems. The City formed an Advisory Committee to participate in the development and review of this SDMP. As part of the upcoming new Phase II Permit the City will need to ensure the Annual Report and Stormwater Management Program documents are posted on their website by May 31 each year. The City must continue to provide opportunities for public involvement and participation in the stormwater program.

Program Implementation

No changes to staffing or funding are required.

Illicit Discharge Detection and Elimination (S5.C.3)

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.

Over the last few years, the City has spent considerable effort establishing 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 Department. The GIS Stormwater Map is available on the City's website and upon request from the public.

The City has established a general IDDE Program to implement the Phase II Permit Requirements. Current activities include:

- Contracting with King County to conduct a "Water Quality Audit" program that performs visits to commercial businesses to provide education on illicit discharge. Follow-up enforcement is the responsibility of the City's Code Enforcement Officer.
- Performing visual inspections of priority receiving waters (Miller Creek, Walker Creek, and Salmon Creek) with technical assistance from King County and Ecology.
- Establishing a hotline¹ for citizens to report spills and illicit discharges.
- Contracting with King County to respond to major spills.
- Maintaining records of the IDDE program in CityWorks (public works asset management software).
- Holding IDDE training for all field staff, including follow-up training as staff comes on board or new policies/procedures are put into place.

Program Implementation

To address ongoing NPDES Phase II Permit requirements, the City will need to establish a written IDDE Plan and Procedures Manual and identify primary staff responsible for overseeing inspections and follow-up activities. The procedures manual should be developed, taking into account the IDDE program requirements in the new permit. The new Permit will also require the City to expand IDDE inspections in 2013 to cover all catch basins on a rotating basis. With proper staff training, the IDDE inspections can be conducted jointly with required maintenance inspections, saving both staff resources and program cost.



¹ IDDE Hotline: (206) 439-3154

Controlling Runoff from New Development, Redevelopment, and Construction Sites (S5.C.4)

The City's oversight of development is codified in BMC Chapter 13. The City has adopted the 2009 King County Surface Water Design Manual (KCSWDM) with no exemptions to guide stormwater management from new development and redevelopment projects. The ordinance allows non-structural preventive actions and source reduction approaches, such as LID techniques, to minimize the creation of impervious surface and the disturbance of native soils and vegetation.

The City's Stormwater 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 and post construction. The City tracks all development reviews and inspections in CityWorks.

The new NPDES Phase II Permit requirements will place an increased emphasis on the evaluation and use of LID techniques to manage stormwater runoff and water quality. All codes, rules, standards and other enforceable documents must be revised to require LID principles and LID Best Management Practices (BMPs). The City must conduct an LID review and revision process of their existing codes and report the results to Ecology. These code revisions will apply to both the stormwater ordinance and the City's overall development code. LID amendments must include measures to minimize impervious surfaces, measures to minimize loss of native vegetation, and measures to minimize stormwater runoff.

Program Implementation

These new Permit requirements will mean increasing workload for the City's Stormwater Engineer under the new NPDES Phase II Permit. Initially, the work will need to focus on the required code revisions to incorporate LID principals. As the economy recovers, drainage review for development and redevelopment will likely expand to a full-time staff position. Currently, the City has elected to not reimburse the Stormwater Program with development fees that could potentially help cover the costs of an additional staff person. The new Permit will also require additional staff training on LID and requirements in the 2012 Ecology Manual.

The stormwater program will need to partner with Community Development to complete the required development code review and update to remove barriers to the use of LID in the City. Through that process, the City can evaluate whether LID techniques will be required, encouraged, or incentivized during the site planning phase. Utilizing LID techniques in stormwater management is already required through the 2009 KCSWDM.

The City should also consider evaluating the water quality treatment standards for incorporated areas. The 2009 KCSWDM designates all unincorporated areas as either Basic Treatment or Sensitive Lake Water Quality Treatment areas. The City has not established equivalent designations within the City limits and should consider whether the more stringent Sensitive Lake Water Quality Treatment standard should be applied to areas surrounding local waterbodies.

Pollution Prevention and Operation and Maintenance for Municipal Operations (\$5.C.5)

Contracted Maintenance Services

The City currently contracts most major maintenance activities to King County. The City does not yet own a street sweeper, vactor truck, or other stormwater system maintenance equipment. The City's limited fleet of maintenance vehicles is housed at the City's Public Works Maintenance Shop (rental facility). The City has a long-term vision to purchase property for the construction of a permanent maintenance shop, equipment yard, and storage area. Establishing a maintenance facility and purchasing equipment are two major steps in allowing the City to staff their own maintenance program and move away from contracts with King County.



**Local Burien Roadside
Drainage Ditch**

Inspections

The City has been contracting with King County to perform required inspections of water quality and flow control facilities on an annual basis. The City also inspects catch basins on a rotating basis with a plan to have all catch basin inspected once before the current Phase II Permit ends. At the end of 2011, the City had completed inspections of all 5,900+ catch basins within the City limits, cleaning those that exceeded sediment accumulation standards. The new permit is expected to increase catch basin inspection frequency from once in the 5-year permit term to once every other year. Stormwater facilities will still require annual inspections.

The short term plan is for City staff to start conducting all construction and stormwater facility inspections as required by the NPDES Phase II Permit. The City will take on additional maintenance activities as equipment can be purchased and new staff can be hired.

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, inspection and repair/replacement activities. The NPDES Permit

requires the City to take corrective maintenance action based on the state of each catch basin or stormwater facility during maintenance inspections. While maintenance standards are not changing in the new NPDES Permit, the increased inspection frequency is likely to identify more areas that need maintenance attention. The capital program evaluation (Chapter 4) also identified a list of drainage concerns that were referred for additional maintenance.

The City also contracts with King County Street to conduct street sweeping to reduce particulate and pollutant loading to the conveyance system and local receiving waters. Public streets are swept twice per year with downtown streets and arterials swept at a higher frequency.

Complaint Response

The City's Stormwater Program is responsible for receiving and responding to public complaints. Drainage complaints are documented and responded to using maintenance referrals or Customer Service Request Forms, as submitted by citizens at City Hall or through complaints received on the phone. 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 will become part of the City's Illicit Discharge and Elimination program that is required by the Phase II Permit.

Minor Surface Water Improvements

Maintenance crews actively investigate and address minor stormwater issues such as isolated flooding or erosion, and conducts repairs. Most of these repairs are made in the field and are routinely conducted by maintenance crews. Small works projects have been identified and included in Section 4.

Pollution Prevention

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 per the requirement of the King County Road Standards. 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 has an Integrated Pest Management Brochure and uses pollution prevention techniques during sediment and erosion control, 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 is also implementing a Stormwater Pollution Prevention Plan for the public works storage area.

Recordkeeping

The City uses CityWorks to track operations and maintenance activities.

Program Implementation

The City will need to continue all current maintenance program activities. Maintenance crews will take on the additional responsibility of conducting all facility and catch basin inspections, combining the required maintenance inspection and IDDE inspection into a single site visit. This will require additional staff time to complete approximately 3,000 catch basin inspections annually, but will reduce the expense of contracting those services to King County. Inspection staff will need additional training to understand the inspection requirements and all maintenance staff should receive ongoing training to understand stormwater facility maintenance standards, illicit discharge reporting, pollution prevention techniques, and the importance of recordkeeping.

The increased inspection requirements also come with an added recordkeeping burden. The City needs an efficient system to translate inspection records into maintenance work orders and a system to track that maintenance actions have been completed. The City may also consider integrating tracking of maintenance activities with the existing GIS system. The NPDES Permit will allow the City to reduce the required inspection frequencies if inspection records show that portions of the system do not need frequent attention. The City's efforts in developing comprehensive maintenance records may pay off with reduced inspection requirements in the future.

Total Maximum Daily Load Allocations (S7)

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

Program Implementation

No change to the existing staffing or program funding.

Monitoring (S8)

The City has submitted all monitoring documents required under the current Phase II Permit including the required monitoring site selection documents to Ecology that identify potential locations for regional monitoring activities. The new NPDES Phase II Permit gives the City the option of conducting their own monitoring program or paying in to a collective fund that Ecology will use to conduct regional monitoring activities. Phase I Permittees are spending hundreds of thousands of dollars annually to conduct their own monitoring

programs under the existing Phase I Permit. The draft Permit identified that Burien's cost to pay into the regional monitoring program will be approximately \$32,000 per year.

Program Implementation

The City should budget to participate in the regional monitoring program at an annual cost of approximately \$32,000 per year. In addition to the significant cost savings over conducting an individual monitoring program, the pay-in program shifts liability and responsibility away from the City and to Ecology for meeting the monitoring obligations of the Phase II Permit.

Annual Reporting (S9)

The City completed their Annual Report and Stormwater Management Program (SWMP) documents each year and submitted the two documents to Ecology annually in March. As part of the upcoming new NPDES Phase II Permit the City will continue to submit annual reports to Ecology.

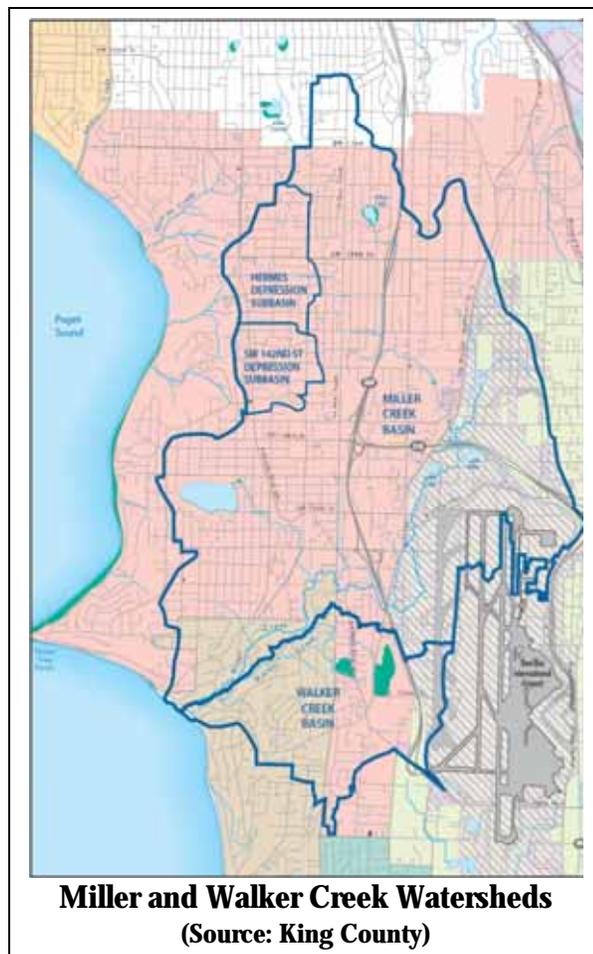
Program Implementation

No change to the existing staffing or program funding.

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. Steelhead trout are also protected under the same regulations as threatened Pacific salmonids. 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.

Between 1998 and 2009 the Green/Duwamish and Central Puget Sound Watershed Ecosystem Form comprised of 16 cities, including Burien, made recommendations to the King Conservation District on watershed protection, restoration and salmon conservation projects to be funded leveraging King Conservation District to secure matching grants.

Projects completed include:

- The King County Miller Creek Basin Plan that outlined an inter-jurisdictional plan for stormwater management, water quality protection and habitat improvements in the watershed
- City of Burien: Seahurst Park Monitoring 2007 to determine the success of a 2005 bulkhead and shoreline restoration project for adaptive management
- City of Burien Walker Creek Headwaters Purchase that acquired 21 acres of wetlands to protect them from development
- City of Burien Seahurst Park Nearshore Restoration that identified fish use and other habitat elements before construction of site restoration projects to understand success of such restoration projects

Puget Sound Action Agenda

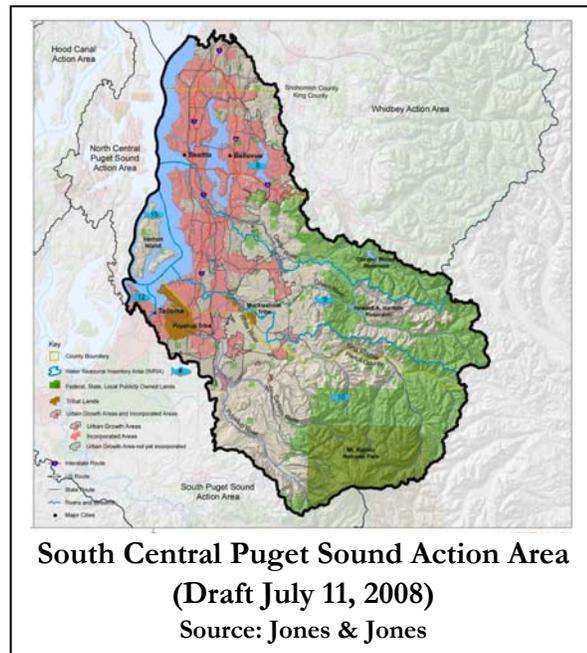
In April, 2007, the Washington State Legislature passed legislation creating the Puget Sound Partnership (Partnership) to coordinate and lead the effort to restore and protect Puget Sound. (The Puget Sound Partnership replaced the former Puget Sound Action Team.) The Partnership’s charge is to define 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 replaces the prior Puget

Sound Water Quality Management Plan. The Action Agenda sets state policy, is a strategy for cleaning up, restoring and protecting Puget Sound, and includes 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 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 business, environment, 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 encouraging LID for new development and redevelopment.



Program Implementation

The City currently participates in regional watershed planning by making annual contributions to fund WRIA #9 and 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 program and providing annual funding for projects.

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 known publically 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.

Program Implementation

No change to the existing staffing or program funding.

Capital Improvement Program

The Capital Improvement Program 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 approximately one stormwater-related capital improvement project each year. The City also maintains a small works roster for projects that City staff can design in-house with construction costs less than \$100,000. The City also leverages Stormwater Program funds to upgrade stormwater infrastructure when transportation or other utility projects are scheduled on local roadways.

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.

Additional Activities

Additional Activities includes 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 includes the Stormwater Programs interest payments on past loans and engineering services to support the program.

Program Implementation

Existing administrative activities, interest payments, and fees are expected to remain generally constant. The City would like to establish a “Maintenance Facility and Equipment” fund that would accumulate monies to purchase and construct a city-wide maintenance shop, equipment shed, and material storage facility. The fund would also pay for long term purchases of maintenance equipment (vector truck, street sweeper, etc.) that would allow City staff to conduct more maintenance actions and reduce contracts with King County. The Maintenance Facility and Equipment fund would receive transfers from all Public Works Department (as well as other City Departments as determined by City Council). For budgeting purposes, the Stormwater Programs contribution is estimated at \$100,000 per year starting in 2013.

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 both the current and upcoming 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.

Table 3-1: Summary of Existing and Future Stormwater Program Expense and FTE

Element	Existing Staff FTE	Existing Staff Cost (\$)	Existing Expense Cost (\$)	Future Staff FTE	Future Staff Cost (\$)	Future Expense Cost (\$)	Notes
1 – Public Education and Outreach	0.10	\$8,600	\$10,000	0.15	\$13,000	\$15,000	Increased outreach and measurement of outreach results as required by NPDES.
2- Public Involvement and Participation	0.05	\$7,800	\$0	0.05	\$5,000	\$0	No change.
3 – Illicit Discharge Detection and Elimination	0.50	\$43,200	\$42,700	0.60	\$50,000	\$30,000	IDDE inspections will be combined with maintenance program.
4- Controlling Runoff from New Development, Redevelopment	0.50	\$53,700	\$7,700	1.30	\$109,000	\$25,000	Revise development code for LID. Increase staffing to review development plans for LID stormwater facilities as required by NPDES.
5 – Pollution Prevention and Operation and Maintenance for Municipal Operations	6.40	\$412,900	\$520,700	7.30	\$608,000	\$503,000	Increase frequencies as required by NPDES. Shift responsibility from outside contracts to City staff.
6 – Program Implementation	0.00	\$0	\$0	0.05	\$4,200	\$30,000	Develop written program policies as required by NPDES.
7 – Total Maximum Daily Load Allocations	N/A	N/A	N/A	N/A	N/A	N/A	No TMDLs apply to the stormwater program.
8 – Monitoring	0.00	\$0	\$0	0.05	\$4,200	\$32,500	City must pay in to regional monitoring program as required by NPDES.
9 – Reporting	0.05	\$5,400	\$10,000	0.05	\$5,000	\$5,000	No change.
10 – Regional Watershed Planning	0.05	\$5,400	\$76,000	0.10	\$9,000	\$76,000	Increased attention to WRIA activities.
11- Underground Injection Control Rule	N/A	N/A	N/A	0.00	\$0	\$0	No change
12 – Capital Improvement Program	0.40	\$52,900	See Section 4	0.50	\$50,000	See Section 4	Program variable based on project development.
13 – Additional Activities	0.70	\$70,400	\$284,100	1.00	\$84,000	\$365,000	Increase funding for equipment purchase and future maintenance facility.
Total	8.75	\$660,000	\$951,000	11.25	\$942,000	\$1,082,000	
Grand Total	8.75	\$1,611,000		11.25	\$2,024,000		Operating only; See Section 4 for CIP

Short Term Implementation Activities

Over the next year, City should continue to conduct all current activities established to comply with the NPDES Phase II Permit including public education and outreach activities, public involvement and participation activities, development review, and regular maintenance activities. The City should fill the empty staff position (Stormwater Engineering Technician) to continue required IDDE activities and facility inspections. In addition, the City needs to complete the following activities in 2012 to maintain compliance with the current Permit:

- Conduct follow up survey to measure effectiveness of education efforts related to proper vehicle washing
- Post the 2011 Annual Report and 2012 SWMP Update on the City's website
- Develop IDDE written procedures for field assessments, and characterizing, tracing and removing sources
- Conduct quarterly Stormwater Pollution Prevention Plan (SWPPP) inspections and repairs as necessary for heavy equipment maintenance or storage yards and materials storage facilities

Long Term Implementation Activities

Starting with the new permit effective date in 2013, the City will need to expand or enhance the Stormwater Program in the following ways to address increasing Permit requirements:

- Evaluate target audiences and re-focus the City's public education messages to support the Watershed Enhancement Program (Section 5).
- Establish written plans and procedures for the City's IDDE Program, Development Review and Enforcement, Stormwater Maintenance Standards, Private Facility Inspection and Enforcement, and Municipal Maintenance Pollution Prevention Practices. A budget of \$30,000 (Element 6.1) has been allocated for this activity. Sample plans for some elements are available on the Ecology website. It is recommended that the City work with a consultant to ensure the programs will comply with Permit requirements.
- Expand IDDE Facility inspections to cover all publically maintained catch basins on a rotating basis (starting in 2013). These inspections should be combined with required maintenance inspections and conducted by City staff.
- Conduct follow-up investigations of identified IDDE concerns. Follow corrective action and enforcement procedures as needed.
- Conduct annual training for City staff responsible for IDDE inspections, and maintenance activities, and development review. An annual training budget of \$20,000 has been allocated between Elements 3.6, 4.6, and 5.7.
- Perform and track maintenance activities performed in response to facility inspections.
- Continue to evaluate contracted services and identify activities and equipment needs to expand the services that can be performed by City staff.

- Revise City Code to incorporate LID requirements for both planning, development approval, and engineering design standards. Additional staff time and a budget of \$15,000 (Element 4.1) have been allocated for this activity.
- Pay into the regional monitoring program (starting in 2013).
- Actively participate in regional watershed planning efforts, advocating for regional funding to support projects in City of Burien watersheds.
- Establish a maintenance facility and equipment fund and designate annual transfers from the Stormwater Program to fund future construction of a City maintenance shop and vehicle/equipment storage yard.
- Construction of a new maintenance facility will also require development and implementation of a SWPPP for the new facility. Development of the SWPPP should be included in the cost of designing the facility.

Staffing Plan

In the 2011 budget, the Stormwater Program funded 8.75 FTEs². This includes:

- 0.45 FTE Public Works Director
- 0.5 FTE Maintenance Supervisor
- 0.8 FTE Stormwater Engineer, including 0.5 FTE for development review and 0.3 FTE for the CIP program
- 1.0 FTE Stormwater technician (currently not filled) to coordinate facility, IDDE, and maintenance inspections and follow-up investigations
- 5.5 FTE Maintenance worker
- 0.5 FTE Administrative support

The program analysis shows an overall need for 2.5 additional FTEs to support the Stormwater Program. Additional staff time is recommended in the following areas:

- Add 0.5 FTE City Engineer – New position possibly shared with transportation program budget to oversee the City’s capital programs and contracting of engineering services. This position would also include coordination with maintenance staff for small infrastructure repairs.
- Add new 1.0 FTE Stormwater Engineer – new position to coordinate the City’s NPDES permit requirements, including implementing increasing LID requirements, coordinating public outreach efforts, tracking and responding to stormwater related complaints, overseeing the stormwater utility billing with King County, establishing consistent policies, procedures, and tracking mechanisms across the Stormwater Program, and writing grant applications for additional Stormwater Program activities and infrastructure.

² The 2012 budget included 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.

- Add 0.5 FTE to Stormwater Engineer – brings Stormwater Engineer to 1.3 FTE, with 1.0 FTE allocated to development review and site inspections, and 0.3 FTE remaining for the CIP program. Initially, the development review work will need to focus on revising City code to incorporate LID principals. As the economy recovers, drainage review for development and redevelopment will likely expand to a full-time staff position.
- Add 0.5 FTE to Maintenance Worker – brings Maintenance Worker to 6.0 FTE for maintenance staff to take on increasing responsibility for tasks currently contracted to King County and to increase catch basin inspections to every other year.

Stormwater Program Budget

Table 3-1 shows that Programmatic activities presented in this section are expected to require \$2,024,000 annually starting in 2013. This funding is necessary to meet minimum compliance requirements of the NPDES Phase II Permit and other regulatory obligations. In addition to increased funding to pay for staff salary and benefits, the stormwater program budget will see the following significant changes in 2013:

- Increased Public Outreach programs at \$10,000 per year (Element 1.1)
- Increased cost for staff training (\$20,000 in Elements 3.6, 4.6, and 5.7).
- Stormwater program contribution to a larger Community Development project to revise City Code to incorporate LID requirements as required by the Permit (\$15,000 in Element 4.1).
- Increased cost to develop written plans and procedures for the City's IDDE Program, Development Review and Enforcement, Stormwater Maintenance Standards, Private Facility Inspection and Enforcement, and Municipal Maintenance Pollution Prevention Practices (\$30,000 in Element 6.1).
- Increased cost to conduct additional conveyance system cleaning (\$25,000 in Element 5.5).
- Savings of approximately \$115,000 (Elements 3.3, 5.2 and 5.4) by reducing contracts with King County and conducting facility and catch basin inspections with City staff.
- Annual Pay-in to the regional monitoring program (\$32,000 in Element 8).
- Stormwater program contribution to a fund to support future purchase of maintenance equipment and development of a City-wide maintenance shop and storage area (\$100,000 in Element 13.1).

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

Additional Considerations

This Program Analysis includes Stormwater Program costs based on the City's service area in 2012. 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 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.

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City of Burien

Storm Drainage Master Plan

Section 4: Stormwater Program Capital Needs

Introduction

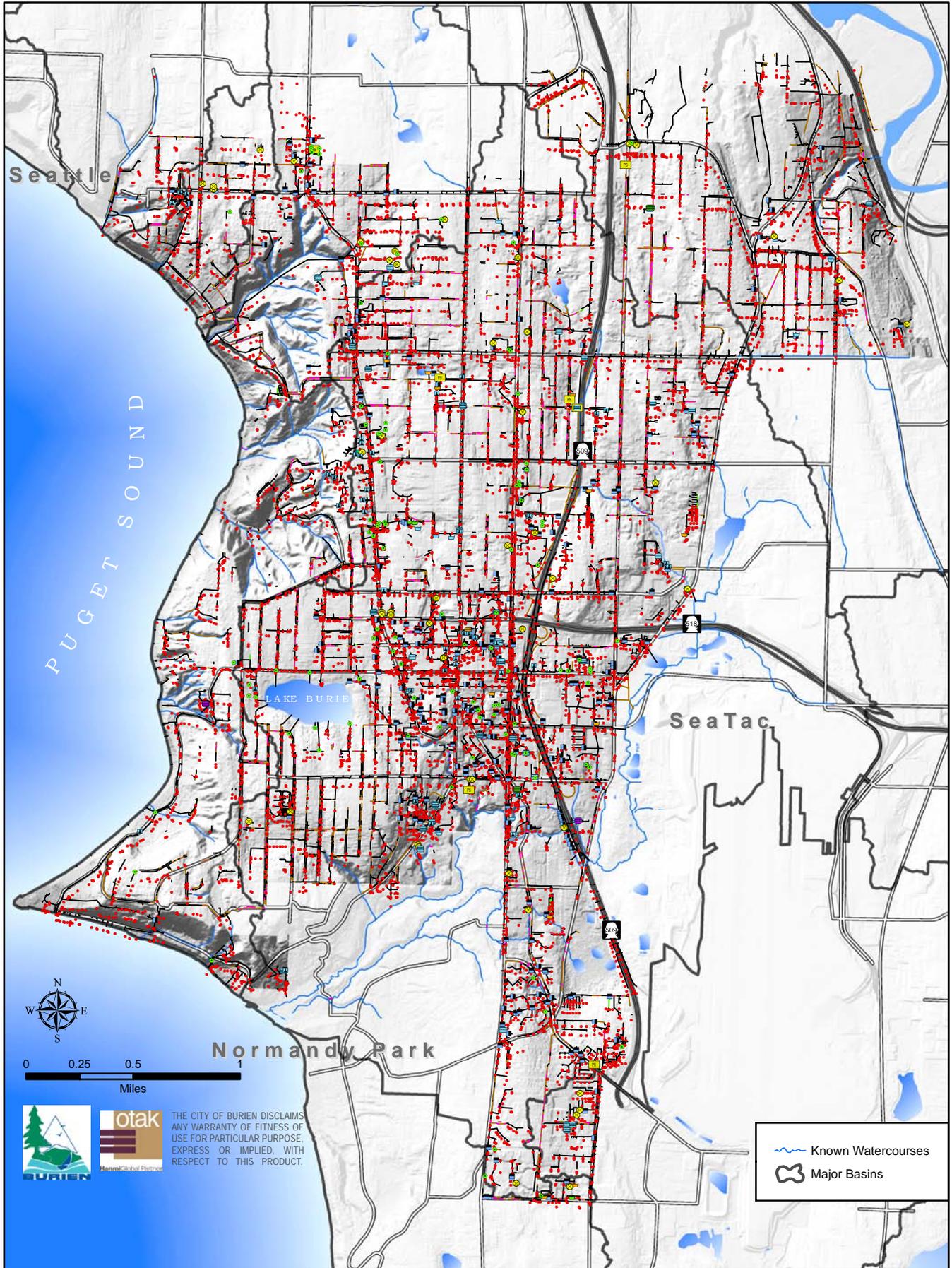
A major component of this SDMP is the development of an updated CIP projects list. The updated CIP includes projects that address flooding, infrastructure and water quality concerns, along with identifying long term stormwater and water quality studies.

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 2012 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.



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 RESPECT TO THIS PRODUCT.

Table 4-1 Existing Stormwater Inventory*					
Type	Right-Of-Way	Parks	City Owned Property	Private Property	Total in City
Stormwater Ponds	15	-	-	unknown	unknown
Control Structures	66	5	8	213	292
Oil Water Separators	15	0	2	85	102
Water Quality Vaults	1	0	1	1	3
Water Quality Filters	12	1	0	36	49
Catchments (catch basins, yard drains, manholes etc)	5,831	122	22	2,787	8,762
Discharge Points (Outfalls, Infiltration)	72	26	8	114	220
Headwalls/Inlets/Outlets	3,182	40	12	220	3,454
Fittings (Joints, Elbows, etc)	96	16	8	832	952
Pipe (ft)	576,963	14,584	2,638	279,881	874,066
Ditch (ft)	124,150	2,080	648	13,561	140,439
Culvert (ft)	39,277	303	N/A	2,265	41,845
Swale (ft)	1,668	78	561	4,090	6,397
Watercourse (ft)	N/A	20,218	1,327	28,438	49,983
Other Gravity Mains (ft)	262	477	N/A	1,440	2,179

*As of December 30, 2011

Recent Capital Improvement Projects

The City has completed capital improvement projects identified in the 2005 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 2005 plan is included in Appendix 4-1.

Table 4-2 Completed Stormwater Capital Projects from the 2005 Plan	
Project Title	Previously Listed Project Cost
SW 132nd Street Flooding	\$26,000
Century Apartments Drainage Systems	\$205,000
142nd Street Depression (2 Projects)	\$740,000 \$956,000
15th Ave SW Drainage System	\$258,000
S 132nd Street Depression	\$518,000

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 shown in Figure 4-2 with additional details described below.

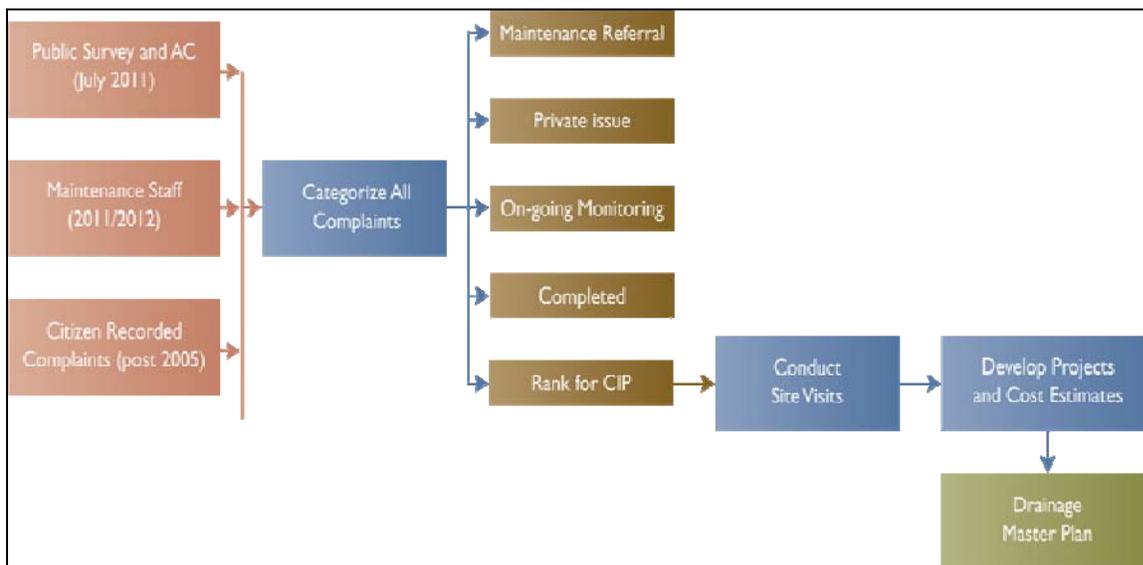


Figure 4-2: CIP Development Process Flow Chart

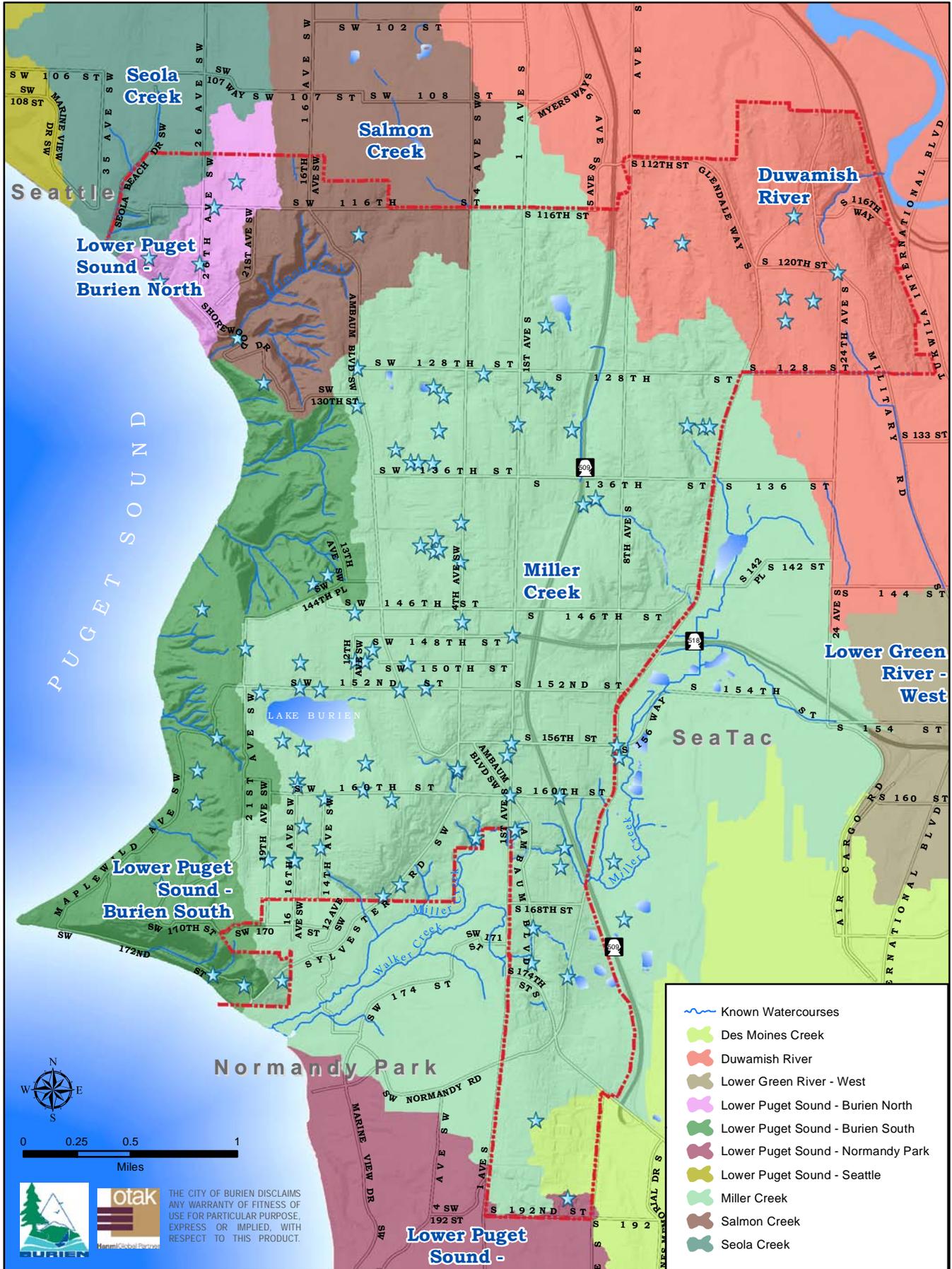
Step 1: Problem Identification and Mapping

The first step in developing the CIP projects was to identify existing drainage concerns and problem areas throughout the City. The data collection resulted in the identification of 131 drainage problems reports located across the City as summarized in Table 4-3. The problem report locations are shown on Figure 4-3 and described in detail in the evaluation matrix presented in Appendix 4-2¹.

Table 4-3 Number of Drainage Problem Reports by Source		
Source of Drainage Problem Reports	Description	Number of Problems*
City Maintenance Staff	In late 2011 and early 20012, City of Burien Maintenance Staff compiled a list of known drainage problems and areas requiring frequent maintenance.	59
Other City Staff	Throughout the CIP evaluation process, City of Burien Public Works Engineering Staff compiled a list of known drainage problems and areas of frequent public complaints. Problem areas were also reported by the Public Works Director and Council members.	10
Advisory Committee Meeting and Public Survey	In July 2011 the Advisory Committee had a meeting and discuss citizen reported drainage problems. The City also posted a drainage survey on the City's website asking Burien residents and business owners for information regarding observed stormwater problems. Citizens were asked to provide the location, a brief description of the problem, frequency, impacts and damages, and public safety concerns. The returned surveys identified a number of localized drainage problems and water quality concerns.	19
Public Citizen Complaints – Recorded by City	The City records public citizen drainage complaints within the City boundaries that are received by phone. All public citizen complaints that were received post 2005 (after development of the last stormwater plan) were added to the complaint database.	66
2005 Plan: CIP Project List	All projects listed in the 2005 Plan that had not been completed by the development of this plan were added to the list of drainage complaints for consideration in the CIP development process.	11

*Note that some complaints had multiple sources. There were a total of 131 complaints recorded.

¹ The City's drainage complaint tracking database is constantly updated with new complaints received from citizens and City staff. The CIP program presented in this SDMP was developed based on the drainage complaint database as of April 30, 2012. Future changes to the database may require adding or removing projects from the City's CIP program plan.



Step 2: Categorizing Drainage Concerns

Problem reports ranged from minor problems due to clogged structures to more serious flooding and water quality to issues that will require additional study, design, and construction. A description of each problem report is included in Appendix 4-2.

After compiling the drainage concerns into a database, developing the location map, and completing the site reconnaissance (at some locations), each drainage concern was categorized based on the possible future action needed to address the issue. The 131 problem reports were categorized as shown in Table 4-4 and Appendix 4-2.



Table 4-4 Summary of Drainage Concern Categorization		
Problem Category	Number of Drainage Concerns	Description
Maintenance Referral	41	Drainage concerns referred to City maintenance staff for further action.
Private Issue	14	Problems originating and impacting private property that should be addressed by private citizens or business owners.
Ongoing Tracking	9	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	31	Drainage concerns that are not surface water related or had previously been addressed by City staff. No further action is required.
Potential Capital Project	36	Drainage concerns that likely require more detailed study and/or a significant construction to address the problem.
Total	130*	

*One Complaint was categorized as “not enough information”

The largest category of drainage concerns were problem areas requiring additional maintenance. These include localized ponding areas that may be caused by debris or sediment accumulation in the existing drainage network. A total of 41 drainage concerns were referred to the maintenance program for further attention. An additional nine concerns were identified as areas that need additional tracking to identify the source or severity of the reported problem.

Thirty-six drainage complaints were categorized as potential future capital projects. Many drainage complaints have related causes and/or solutions, so the 36 evaluated problem reports were grouped into 18 problem areas for further evaluation.



Step 3: Ranking of Potential CIP

The rating/ranking process utilized eight criteria, grouped according to the three major concerns of the City: flood reduction hazard, environmental impacts and community considerations, as shown in Table 4-5. Each of the eight criteria was weighted according to the City local priorities and concerns. Detailed scoring of each problem area is provided in Appendix 4-2.

Step 4: Development of Capital Projects

In the final step of the CIP development, the 18 distinct problem areas were investigated to develop potential capital project solutions. 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 reoccurring problem areas, the project team discussed proposed solutions, and selected a preferred project concept for each potential CIP that would address the long term needs of the City's drainage infrastructure at eight of the 18 locations.

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

Table 4-5 Ranking Criteria for CIP Projects			
General	Specific	Score Range	Weight
Flood Hazard Reduction	Flood Location	0 = no impact 3 = impacts private property 5 = impacts public streets in terms of traffic, infrastructure and public safety	1.5
	Flood Source	0 = no flooding. 3 = Private Water 5 = Public Water	1.5
	Flood Frequency	0 = flooding only during major (10+-year storm) 3 = flooding on an annual basis 5 = flooding on a monthly basis during rainy season	1
Environmental	Erosion	0 = No erosion 3 = Erosion with no public safety impact 5 = Streambank erosion or hillside erosion with public safety impact	1
	Water Quality	0 = No water quality concerns 3 = minor water quality concerns 5 = measurable water quality concerns	1.5
	Habitat	0 = No habitat impact 3 = Impact of habits of 1 to 2 species 5 = Impacts of 3 or more species	1
Community Considerations	Economic Impact	0 = No economic impacts 3 = Minor economic impacts to public or private property 5 = High economic impacts, such as commercial and high use areas	1
	Complaint History	0 = No related complaints 3 = 1 or 2 related problem reports 5 = more than 3 related problem reports; OR Projects part of past CIP.	1.5
		Total Possible Score	50

Table 4-6 Summary of CIP Projects		
Project Problem Area	Project Title	Cost
CIP 1	Capacity Improvement at 4 th Avenue SW	\$552,000
CIP 2	20 th Avenue SW Drainage Improvements	\$390,000
CIP 3	20 th Avenue S between S 120 th Avenue and S 124 th Street Drainage Improvements	\$441,000
CIP 4	SW 165 th Street between 16 th Avenue SW and 19 th Avenue SW	\$322,000
CIP 5	SW 135 th Street and 6 th Avenue SW Drainage Improvements	\$154,000
CIP 6	SW 152 nd and 8 th Avenue SW Drainage Improvements	\$457,000
CIP 7	25 th Avenue SW Drainage Improvements	\$799,000
CIP 8	4 th Avenue S/Blake Manor Neighborhood Drainage Improvements	\$639,000
	Total	\$3,754,000

Note: The cost opinion is in 2012 dollars and does not include future escalation, financing, or O&M costs.

Concept level projects were developed to address each of the problem areas. Projects include adding and upsizing inlets, replacing damaged pipes, and installing new or retrofitting existing stormwater infrastructure (pipes, ditches, 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.

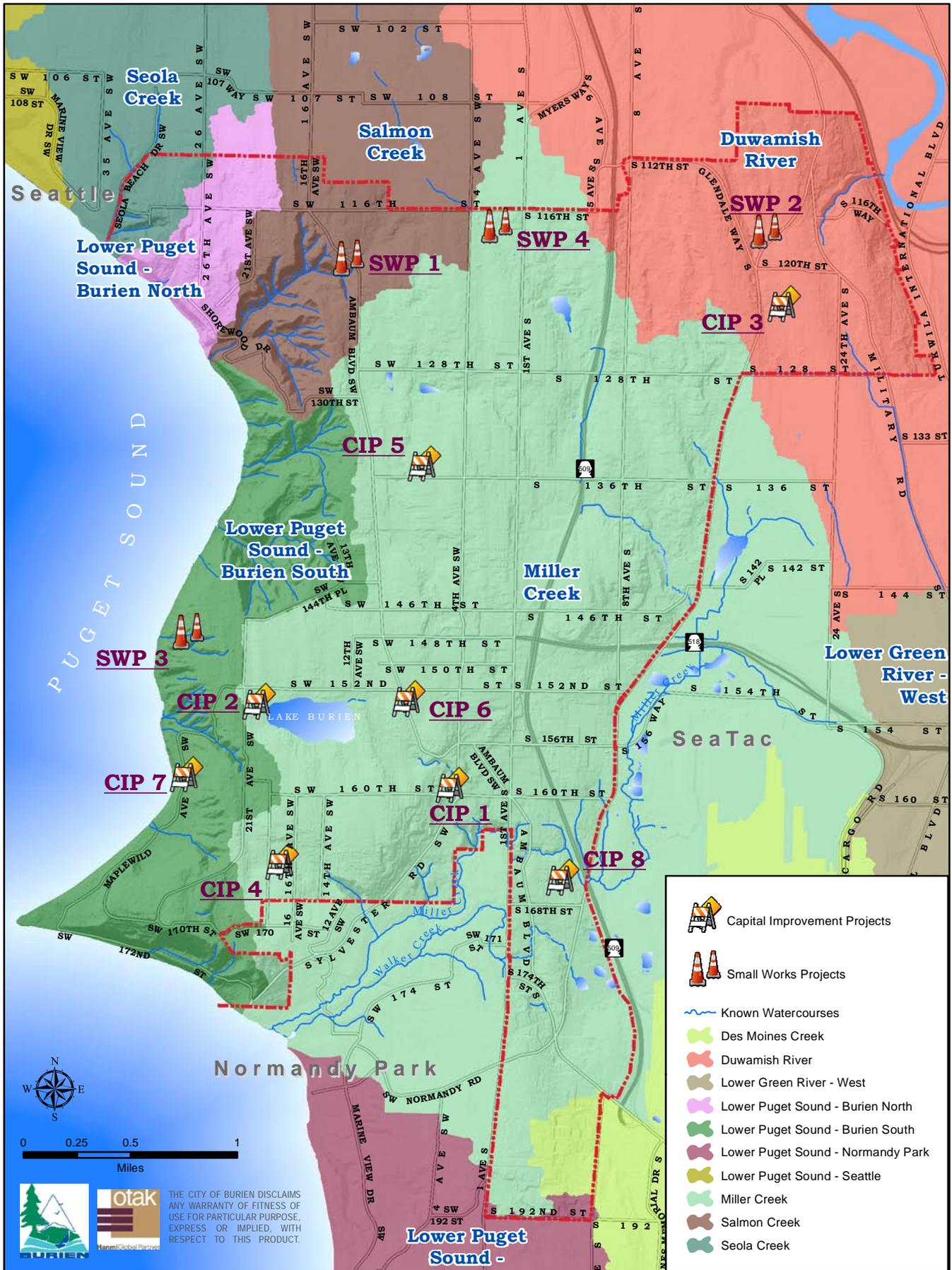
Table 4-7 Summary of Studies		
Study Number	Project Title	Cost
Study 1	Lake Burien System Retrofit	\$250,000
Study 2	NERA Master Drainage Plan	\$350,000
Study 3	Des Moines Memorial Drive and S 175 th Street Sediment Study	\$100,000
Study 4	Hermes and Mayfair Depressions Master Plan	\$200,000
Study 5	142 nd Street Depression Improvements	\$200,000
Study 6	Arbor Lake Water Quality Lake Management Plan	\$150,000
	Total	\$1,200,000

Note: The cost opinion is in 2012 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 City's Small Works Roster. 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 work project list is expected to expand as additional drainage complaints are received, categorized, and ranked according to the criteria presented in the SDMP.

Table 4-8 Summary of Small Works Projects		
Small Works Project Number	Project Title	Cost
Small Works Project 1	Ambaum Blvd SW/SW 120 th Block Drainage Improvements	\$100,000 per year
Small Works Project 2	Occidental Ave S Drainage Improvements	
Small Works Project 3	Eagle Landing Park/25 th Avenue SW Drainage Improvements	
Small Works Project 4	116 th Avenue SW between 1 st Avenue and 4 th Avenue SW at Church Drainage Improvements	

Note: The cost opinion is in 2012 dollars and does not include future escalation, financing, or O&M costs.



Drainage Master Plan

Figure 4-4 Capital Improvement & Small Works Projects Map

May 2012

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 (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 – Weirs installed in Miller Creek Downstream of 1st Avenue South; \$350,000
- Walker Creek Headwater Purchase – Property Purchase; \$50,000 for protection activities; ~\$425,000 for property purchase

The Ambaum Regional Detention Facility was expanded by 7.4 acre-feet 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 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 publically 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.



**Capital Repair at 6th Avenue
SW and SW 122nd**

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 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. In 2011, the City transferred \$830,000 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 is expected to require between \$1.1M and \$1.3M 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.



City of Burien Storm Drainage Master Plan Section 5: Watershed Enhancement Program

Background

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.

During the development of the SDMP, the City worked with residents to form a Stormwater Advisory Committee to inform the priorities and activities proposed in this SDMP. The Advisory Committee provided critical information related to drainage problem areas throughout the City. During an April 2012 Advisory Committee meeting, citizens also identified a need for the City to increase messaging and outreach to residents, businesses, and other citizen groups related to watershed health and water quality protection. In response to this meeting, the City is developing a Watershed Enhancement Program. This program builds upon the Public Outreach and Education requirements in the NPDES Phase II Permit and expands the City's efforts to promote individual action and responsibility related to water quality protection. Through the Watershed Enhancement Program, the City is joining efforts with local organizations and citizens to improve the health of the streams and natural habitats.

Program Focus and Messages

Based on discussions with the Advisory Committee and the Miller/Walker Creek Basin Steward, the City has identified some key messages and focal points for the Watershed Enhancement Program. In general, the program messages will focus on reducing or eliminating pollutants at the source and source control activities to prevent pollutants from reaching natural systems. Some examples of these messages include:

- Encouraging residents to "Know Your Watershed" and understand what basin their property is part of.



- Reducing pollutant discharge to natural systems through focused landscaping practices such as limiting use of chemicals, proper fertilizer application when necessary, using natural techniques for weed control, and retaining trees and natural vegetation.
- Reducing stormwater runoff and pollutants by replacing developed surfaces (impervious areas or managed lawn) with pervious surface and/or native plantings.
- Promoting pet waste clean-up through messaging and installation of pet waste stations in parks and along shorelines.
- Encouraging residents to inspect side sewers for decaying pipes.
- Providing car wash kits to charity groups.
- Extending car wash education to Fire Stations and other municipal groups that maintain fleets of vehicles.
- Education and Inspections to automotive businesses to identify potential pollutant sources and identify source control techniques to reduce the potential for spills or illicit discharges to the stormwater system.
- Promoting Low Impact Development and Green Stormwater Infrastructure among the planning, development, engineering, and contractor communities.

Target Audiences and Methodology

Changing individual behaviors requires focused messaging at target groups. It often takes multiple “touches” for a message to resonate with the target audience. Additional messaging is generally required to enact a concrete change in behavior. The Watershed Enhancement Program will utilize a variety of media and methods to reach target audiences.

The City will consider the following methods for promoting messages about individual responsibility for watershed health:

- Working with local nurseries and plant distributors to encourage native planting, and natural landscaping materials. Messaging should focus on the cost effectiveness and time saving advantages of natural landscaping materials.
- Developing Brochures and “leave behind” materials. Locations for media displays may include City Hall, the Community Center, Library, Festivals, and Farmer’s Markets.
- Including water quality messaging and related articles in the City Newsletter.
- Developing pilot projects to install rain gardens, bioinfiltration swales, and other green stormwater infrastructure facilities. Pilot projects become hands-on learning tools for the development and contractor communities and also provide an opportunity for residents to increase their understanding of the system aesthetics and function.
- Working with citizen groups to hold a Native Garden Tour of local residences and public projects that have utilized native plants and other “green” approaches.

- Partnering with schools or other local groups to provide watershed-based education opportunities to school-aged children.
- Business outreach program to educate local businesses about their water quality impact and potential to reduce the discharge of pollutants into the watershed. Messaging can focus on illicit discharge, source control, runoff control and/or landscaping practices.

Partnerships

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 City of Burien's participation in the Basin Stewardship program is a key element of the Watershed Enhancement Program. 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, storm drain protection, conserving water, household hazardous waste disposal, and Low Impact Development. The Basin Stewardship Program also 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 Watershed Enhancement Program will evaluate opportunities to partner with the following additional agencies and organizations:

- Local Businesses
- Sustainable/Ecological Non-Profit Groups (Sustainable Burien)
- Neighborhood Groups
- Sewer Districts/Other Utility Providers
- Highline School District and/or Highline Schools Foundation

Low Impact Development

The Watershed Enhancement Program is also focused on promoting Low Impact Development (LID) and Green Stormwater Infrastructure approaches to manage stormwater runoff and improve watershed health. Using LID techniques for surface water management on new developments and capital improvement projects is a way to improve water quality in a manner that more closely mimics flow characteristics from natural forested conditions. LID has been emerging over the past several years as a new way of managing stormwater runoff. The goal of LID is twofold: 1) capture pollutants in stormwater prior to discharging to a lake or stream (usually through settling and filtration); and 2) reduce peak flows that are caused by converting land from forest to buildings, streets and parking lots (via detention/storage and or infiltration in an LID facility). A reduction in peak flows helps prevent erosion of stream channels and destruction of aquatic habitat.



In 2008 the City published a study titled “City of Burien Low Impact Development Implementation Framework” with the purpose of providing direction for developing a programmatic implementation plan and LID barriers analysis. The programmatic implementation framework for implementing successful LID outlined in the report included:

- Remove Barriers
- Provide Tools
- Provide Examples
- Promote Application of LID
- Educate the Public
- Fund Improvements
- Adapt

The City’s has adopted the 2009 KCSWDM, which requires the City to implement LID techniques (called Flow Control BMPs) on projects for both flow control and water quality on projects where appropriate. As described in Section 3, the next NPDES Permit will also require the City to review and update the development code to remove barriers from the use of low impact techniques in site planning and stormwater management.

The City has an active citizen base, including Sustainable Burien, a group whose mission is to educate, promote and participate in the creation of a sustainable community in Burien, including removal of invasive plant species in the stream corridors. Residents have also been

active in promoting the use of LID stormwater techniques in the Lake Burien basin through activism with Ecology and City Staff.

Operations and Capital Program

In addition to the Watershed Enhancement strategies described in this section, the City's stormwater program operations and capital programs are focused on promoting watershed health. The program operations described in Section 3 are designed to protect and improve water quality under the Federal Clean Water Act. Specific program 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 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 capital project program 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. Through the Watershed Enhancement Program, the City is joining efforts with local organizations and citizens to improve the health of the streams and natural habitats.

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City of Burien

Storm Drainage Master Plan

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 CIP project list and identifying the actions and staff demands for both the current and future regulatory requirements. This 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 capital improvement program in Section 4 as well as the priorities identified through the advisory committee process described in Chapter 5. Stormwater Program costs assume full implementation of the new NPDES Phase II Municipal Permit that will begin in 2013.

Table 6-1 Recommended Annual Stormwater Program		
Stormwater Program Element	Average Annual Cost (2012 Dollars)	Notes
SWM Program (NPDES Compliance and Maintenance)	\$2,024,000	Adds 2.5 FTE to meet future NPDES Permit requirements. Shifts inspection responsibility to City staff. Funds contribution for equipment and maintenance shop.
CIP Projects	\$450,000	Constructs 8-10 projects over 10-year period. Additional projects identified through watershed studies.
Watershed Studies	\$200,000	Funds one study/year for next 3-5 years. Shift funding to CIP Projects in later years.
Small Works Projects	\$100,000	Assumes ongoing program.
Infrastructure Replacement Fund	\$350,000	Annual transfer to support long term replacement and upgrade program.
Annual Program Total	\$3,124,000	

The City's Stormwater Program is driven by activities required by the NPDES Phase II Permit. This SDMP identified program cost savings and program efficiencies to reduce the cost of NPDES Permit compliance (i.e. combining IDDE and maintenance inspections, transferring activities from contractors to City staff). However, required activities still constitute approximately 65 percent of the total recommended Stormwater Program budget.

The remaining budget funds infrastructure-related enhancement projects, including CIPs, Watershed Studies, Small Works Projects, and the Infrastructure Replacement Fund. It is recommended that the City establish a set transfer from the stormwater utility to the stormwater capital construction fund. Spending from the capital construction fund will then vary annually based on the City's priorities, which are set by Council and the Public Works Director.

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 2012 Stormwater Utility revenue is expected to be \$2,508,000. As program costs increase, additional funding will 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.



City of Burien
Storm Drainage Master Plan
Section 7: References

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