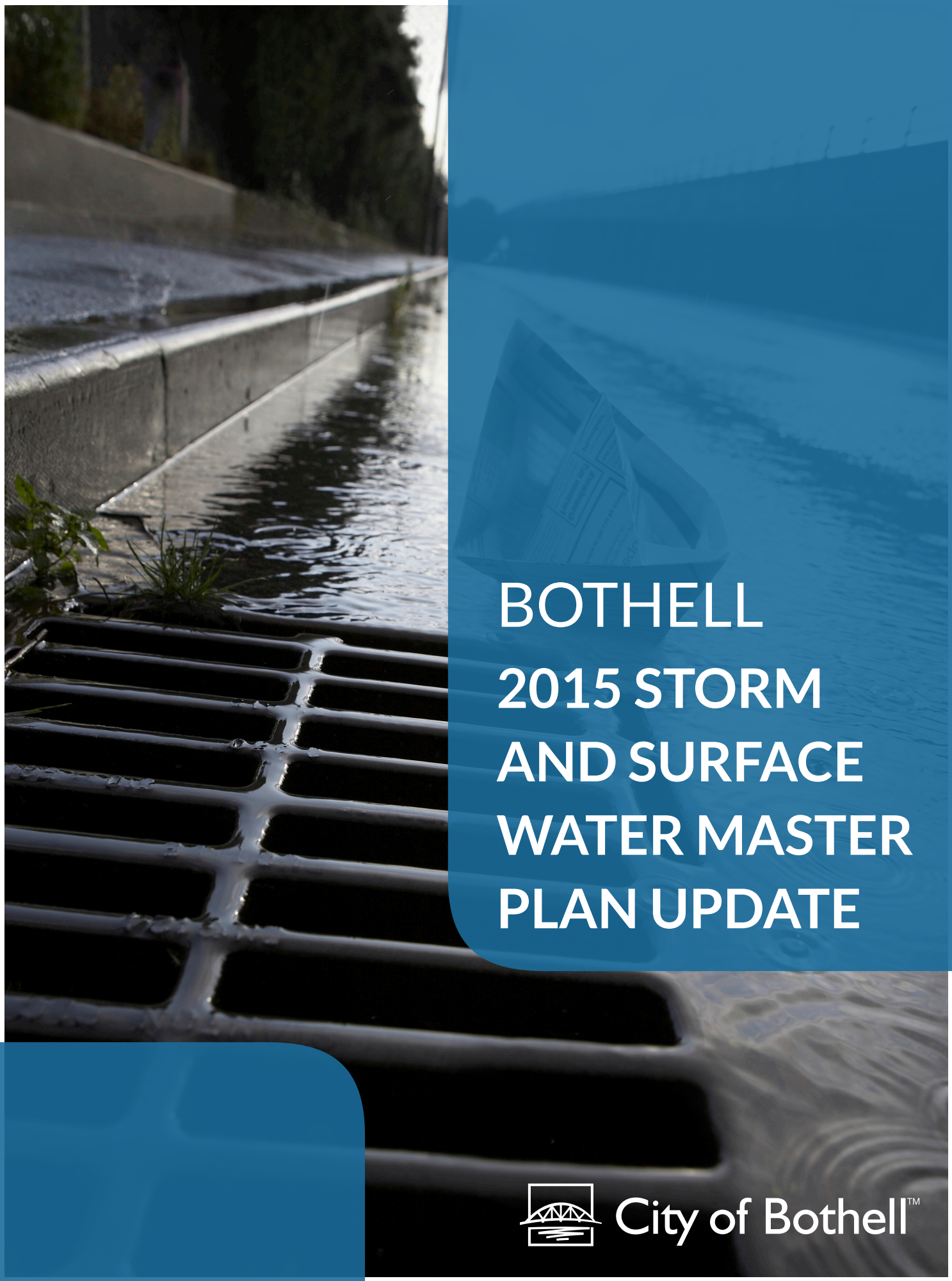

BOTHELL

2015 STORM AND SURFACE WATER MASTER PLAN UPDATE

City of Bothell™

CITY OF BOTHELL

2015 STORM AND SURFACE WATER MASTER PLAN UPDATE

From Bothell City Code, Section 18.10.170 B

"Comprehensive Storm Water Master Plan: It is the finding of the city that storm water master plans are essential to establishing a comprehensive approach to a capital improvement program, maintenance of facilities and regulation of new developments. A plan should analyze the measures needed to control surface and storm water runoff which results from existing and anticipated development within the city. The measures investigated to control runoff should include land use regulation such as setback requirements or community plan revisions which revise land use densities as well as the use of drainage facilities. A plan also should recommend the quantity and water quality runoff control measures required to further the purposes set forth in the current city's comprehensive plan, and community goals. The institutional requirements and regulations, including but not limited to land use management, funding needs, and incentives for preserving the natural surface water drainage system should be identified in the plan."

CITY OF BOTHELL
2015 SURFACE WATER MASTER PLAN UPDATE

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This 2015 Storm and Surface Water Master Plan Update was prepared between May 2014 and October 2015 by Craig Stampher from the City of Bothell with assistance from PACE Engineers, Inc. and Herrara.

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Abbreviations and Acronyms

BMC ..... Bothell Municipal Code
BMP ..... Best Management Practice
CFC ..... Capital Facilities Charge
CIP/CFP ..... Capital Improvement Program/Capitol Facilities Plan
City ..... City of Bothell (municipal organizations were capitalized, city areas were lower case)
CWA ..... U.S. Clean Water Act
Ecology ..... Washington Department of Ecology
EPA ..... U.S. Environmental Protection Agency
ESA ..... Endangered Species Act
FTE ..... Full Time Equivalent (staff)
GIS ..... Geographic Information System
GMA ..... Growth Management Act
HOA ..... Homeowners Association
IDDE ..... Illicit Discharge Detection and Elimination
LF ..... Linear feet
LID ..... Low Impact Development
LSC ..... Local Source Control
MUGA ..... Municipal Urban Growth Area
NPDES ..... National Pollutant Discharge Elimination System
O&M ..... Operations and Maintenance
PCHB ..... Pollution Control Hearings Board (State of Washington)
Phase II Permit ..... Western Washington Municipal Stormwater Permit
PSP ..... Puget Sound Partnership
PWTF ..... Public Works Trust Fund
QAPP ..... Quality Assurance Project Plan
RSMP ..... Regional Stormwater Monitoring Program
ROW ..... Right-of-Way
SEPA ..... State Environmental Policy Act
SCP ..... Stormwater Comprehensive Plan
SOP ..... Standard Operating Procedure
SQG ..... Small Quantity (Pollution) Generator
SR ..... State Route
STORM ..... Stormwater Outreach for Regional Municipalities
SWMA ..... Surface Water Management Area
SWMP ..... Stormwater Management Program
SWPPP ..... Stormwater Pollution Prevention Plan
TSS ..... Total suspended solids
UGA ..... Urban Growth Area
UIC ..... Underground Injection Control
Utility ..... Bothell Storm and Surface Water Utility
WQIP ..... Water Quality Implementation Plan
WDFW ..... Washington Department of Fish and Wildlife
WSDOT ..... Washington State Department of Transportation

SUMMARY

Overview

Much has changed since Bothell completed a Comprehensive Stormwater Master Plan in 1994, and initiated the forming of Bothell storm and surface water utility (Utility).

The City has grown in both population and land area through a combination of annexations and internal development. The 2014 annexation alone added over 6,000 citizens and about 1.6 square miles. The city now encompasses 13.7 square miles.

Stormwater quality requirements under the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act) have become increasingly complex and comprehensive.

Listings of several surface and storm water affected species as endangered or threatened has placed an increased focus on water quality and the surface water environment.

Since the 1994 Plan, the City prepared a draft Surface Water & Drainage Master Plan in 2005. The draft reviewed the City's stormwater project plans, operations, and financial program. The 2005 draft Plan recommended updates to the program to address new federal Clean Water Act requirements and provided additional program background and history that was used in the development of this Bothell Storm and Surface Water Master Plan Update.

The City had a Surface Water Quality Plan prepared in 1996 and subsequently began a systematic assessment of the health of city's surface waters through water quality monitoring that began in 2010. To date the monitoring shows degraded conditions throughout the city's managed area with nearly all sampling stations reporting water quality failing to meet one or more State water quality standards at some time during the five years of data collection. All stations sampled for in-stream biological health found none currently support healthy biotic communities of stream insects and fish populations.

In early December 2007, a series of unusually large storms caused flooding throughout the city. The magnitude of the event exceeded typically-planned rainfalls and an emergency was declared by the Governor for affected areas of Washington. This event placed significant attention on the City's stormwater infrastructure. City staff identified over 60 problem locations, drafted a Flood Action Plan and had consultants analyze several specific problems. Since 2007, some of the problems have been addressed, but several issues are still outstanding.

This Plan Update helps define the Bothell Surface and Storm Water efforts for the foreseeable future. It covers the incorporated city area as it exists in 2015, including the 2014 annexation. The Plan Update also acknowledges the impacts and conditions of surface and stormwater both upstream and downstream of the incorporated city area.

The Plan Update is organized by the following sections:

SECTION 1 - PROGRAM OVERVIEW AND EVALUATION

SECTION 2 - PROJECT PLANNING

SECTION 3 - WATERSHED MANAGEMENT

SECTION 4 - FINANCIAL MANAGEMENT

SECTION 5 - RECOMMENDED ACTIONS

SECTION 1

Program Overview and Evaluation

Section 1 provides an overview and evaluation of the Utility's functions and identifies program actions where appropriate. Although compliance with federal regulations under the Clean Water Act - National Pollution Discharge Elimination System (NPDES) Permit is a significant driver for the Utility's program, this Plan Update recognizes that the Utility provides a broader range of services than complying with regulations. Focus areas for the program evaluation and summary overview include:

Systems Operations and Management

- Cleaning and maintaining the City storm system
- Identifying and correcting deficiencies in Utility-maintained system
- Requiring private system operators to maintain their systems
- Identifying and completing Natural Environment Projects

Regulatory Compliance

- Tracking and responding to NPDES and other state and federal requirements

Stormwater Pollution Control

- Spill response
- Illicit connection and discharge elimination
- Stream and system monitoring, evaluation and testing
- Education and outreach for behavior change
- Water quality planning and action items

System Expansion (through Land Use and City Projects)

- Review and inspection of stormwater reports and designs,
- Creation and updating of stormwater design standards,
- Tracking and integrating new construction into inspections and asset management

Financial Planning and Management

- Rate setting and billing
- Financial tracking
- Asset management funding

Reporting and Record Keeping

- Internal records management
- Maintenance and Asset Management database

Summary of Evaluation:

No major overhaul or expansion of the Utility is planned during 2015-2020 as the Utility is expected to meet its minimum long term program needs within the current projected rates[1, 2]. However, the near term burden of the Horse Creek daylighting project will put financial limitations on the Utility's cash flow in 2015-2017.

Significant effort will be needed in the next two years to address the following items associated with the City's NPDES permit:

- Low Impact Development Integration (due December 31, 2016)
- Updated Storm Design Standards (due December 31, 2016)
- Illicit Storm Connections Screening (due December 31, 2017)

Staffing and Equipment Needs:

Based on an assessment of its current program, the Utility-funded staffing and equipment levels are adequate to handle existing needs.

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[1]A rates analysis was last presented to Council on October 14, 2014 and no increase was recommended for 2015. Increases of 9% in 2016, 5% in 2017, and 2% per year from 2018-202 are assumed in this Plan Update.

[2]An 8.5% rate increase was approved by City Council. Nov 3, 2015.

However, some significant additions to the Utility managed storm system are being constructed by the city and developers. These additions are identified in the 2015-2021 Bothell Capital Facilities Plan to require an estimated two additional utility Operations personnel at a cost of about $300,000 per year beginning in 2016 for the personnel and equipment needs.

Section 5 contains a complete list and description of action items that the Utility will consider.

SECTION 2

Project Planning

Section 2 identifies major drainage and natural environment, retrofit, replacement, and other projects that are appropriate and fundable within a 2015-2020 planning period.

Major Drainage and Natural Environment Projects:

The 2015-2020 planning period begins with significant spending in the downtown area. During 2015-2016, the majority of the Utility's project funding (estimated at about $11 million as of mid-2015) will be directed toward completing the Horse Creek daylighting and downtown revitalization efforts. The City issued revenue bonds to finance these projects. The annual bond repayment cost is over $0.9 million which is being paid from a combination of facility connection charges and rate revenue.

A significant portion of the funding for the downtown projects is expected to come from developer connection charges, estimated at $6.1 million[2].

Once the downtown area projects are substantially complete by 2017, the Utility will be in a better financial position to fund other drainage and natural environment projects[3]. Assuming rates and expenses follow current expectations, the Utility should be able to invest about $5 million from 2017-2020 to address problems.

Facility Retrofit Projects

As of 2015, the Utility directly manages nearly 200 stormwater flow control and treatment facilities (mostly ponds, vaults, and bioswales). Many of these facilities were built to older design standards and provide little flow control and no water quality benefits.

These Utility-managed facilities represent a potential opportunity to improve surface water conditions because the facilities could be retrofitted with new designs that provide improved function and reduce maintenance. Although no detailed analysis of the costs to retrofit facilities has been performed, this Plan Update includes $400,000 during 2017-2020 to fund facility retrofits. Before these funds are spent, the Utility should perform an analysis to identify and prioritize facilities for retrofit.

System Replacement Projects:

In addition to fixing problems and restoring natural surface water areas, the Utility accounts for replacement of aged infrastructure like pipes, catch basins, and stormwater vaults. The Utility annually expenses over $400,000 for the depreciation of its infrastructure. From 2015-2020, this amounts to a total of over $2.7 million that is to be depreciated for system replacement. A portion of the capital projects in this Plan Update includes system replacement.

An asset replacement plan should be developed to recommended priority asset replacement projects and to refine the annual cash amount ascribed to asset replacement.

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[2] *The City is currently evaluating the rates and coverage area for the downtown facilities charges.*

[3] *Positive cash flow beginning in 2017 relies heavily on downtown facilities charges coming in as projected.*

Other Projects:

During the planning period of this Update, the Utility will be completing significant additional projects. These projects include:

- Establish a maintenance/asset management system
- Completion of a 2021-2027 Master Plan Update

SECTION 3

Watershed Management

Section 3 of this Plan Update provides an overview of the Utility's watershed management efforts. This section identifies an additional approach to help focus these efforts.

The approach divides the Utility's service area into eleven sub-areas, termed surface water management areas (SWMAs), based on natural and built characteristics, such as stream conditions and land use. These surface water management areas are evaluated using GIS data, aerial photography, and known characteristics. Each surface water management area is then given an initial management strategy and a preliminary set of actions.

The delineated surface water management areas are:

- Canyon Park SWMA
- Parr Creek SWMA
- Queensborough SWMA
- Little Bear Creek SWMA
- Little Swamp Creek SWMA
- Riverside SWMA
- Fitzgerald SWMA
- Waynita SWMA
- Boy Scout Creek SWMA
- Juanita SWMA
- Horse Creek SWMA

An action item of this Plan Update is to further develop the strategies and develop action plans for each of the surface water management areas as part of a proposed water quality action plan.

A complete discussion of these surface water management areas is found in Section 3 and individual areas are detailed in appendix B.

SECTION 4

Financial Management

Section 4 includes a financial review of the Utility for 2015-2020 focusing on the following:

Financial performance and projected fund health

Over the next six years the stormwater Utility's financial picture looks adequate. For 2015-2017, the Utility's funding of Horse Creek and downtown projects will result in short term demands on Utility cash. For 2018-2020, the Utility's cash flow will be adequate to meet operations requirements and fund several projects if significant downtown facilities charges are received and proposed rate increase are approved as projected.

Current billing structure

The Utility currently bills stormwater fees based upon a tiered rate structure that groups properties into categories based on ranges of impermeable area. The Plan Update recommends an action item to evaluate the fairness and appropriateness of this rate structure and present alternatives.

Bill collection alternatives

Stormwater billing is currently being done through Snohomish and King County property tax billing services. The Plan Update recommends evaluating this approach and considering alternative billing, such as direct Utility billing and third party billing.

Asset replacement

The Utility's expenses include over $400,000 per year to depreciation of the stormwater system. This expense is intended to assure that the Utility has adequate resources to replace aged infrastructure.

The Plan Update identifies that over $2.7 million dollars will be expensed between 2015 and 2020 toward depreciation. When the Utility completes an Asset Management plan, the amount of funding set aside each year may be adjusted and a life-cycle spending/replacement plan will be developed.

SECTION 5

Recommended Actions

Priority Actions

Section 5 of the Plan Update compiles the actions identified in the prior section. It includes a discussion of potential costs, funding sources, and timelines for actions. Key priorities for the Utility include the following:

Critical Actions Include

C1: Complete planned drainage and environmental projects

C2: Screen city for illicit discharges and eliminating them where found

C3: Revise Bothel Municipal Code and policies to incorporate Low Impact Development

C4: Update the Surface Water Design Manual to the latest Ecology standards

C5: Review and update Utility rates to keep them current

High Actions Include:

H1: Review Utility rate structure and billing practices

H2: Create maintenance management and asset management systems

H3: Assess long term staffing and equipment needs

H4: Develop water quality action plan

H5: Review private facilities maintenance options

H6: Identify and prioritize small natural environment/water quality projects

H7: Develop a Utility-operated facility retrofit plan

H8: Clarifying Utility's role in City critical areas management

H9: Review Utility's Emergency Preparation planning

H10: Develop Surface Water Management Area-based strategies and actions prioritized to recover water bodies

Medium Actions Include:

M1: Assist Snohomish County with Little Bear Creek Watershed Plan development

M2: Consider expansion of Local Source Control program to more businesses

M3: Create a grants tracking system

M4: Conduct study of groundwater impacts and develop management policy for Utility

M5: Assume oversight of North Creek Levee System

M6: Analyze impacts of climate change on Utility

M7: Prepare for 2018 NPDES Permit issuance

M8: Prepare next Master Plan Update

Additional Considerations

Future Growth Beyond City Limits

This plan update covers the city limits as they exist in 2015. It does not include the city Municipal Urban Growth Area (MUGA) beyond current city limits. As the City pursues future annexations into the MUGA, this Plan Update or future updates will need to be revised to address the impacts of added area on the Utility's Storm and Surface Water Program.

Climate Change:

Change in regional climate can have a dramatic impact on the Utility's program. For example, if storm intensity, duration, or frequency increases, the Utility's systems may become inadequate to address flooding. Also, if climate change causes extended warmer and drier periods, the city's creeks and natural systems may become increasingly affected by stormwater runoff due to higher concentration of pollutants.

There is currently uncertainty about the potential effects associated with climate change for our region. Adaptation to changes is not included in the Utility's current program assessment, but is an issue that is important to continue to watch and include in future planning.

The following table provides additional information regarding the planned action items.

Action Items Implementation Costs and Spending Schedule

#	Name	Costs in Thousands of $'s						
		Total Cost	2015 (Budgeted)	2016 (Budgeted)	2017	2018	2019	2020
C1	Complete planned drainage and environmental projects	17,702	6,150	6,359	844	1,908	682	1,759
C2	Screen Utility for illicit discharges and eliminating them where found	100*	-	100	*	*	*	*
C3	Revise BMC and policies to incorporate Low Impact Development	75*	75	*	*	*	*	*
C4	Update Surface Water Design Manual to the latest Ecology standards	30*	-	30	*	*	*	*
C5	Review and update Utility rates to keep them current	50	-	25	-	-	-	25
H1	Review Utility rate structure and billing practices	25	25	*	*	*	*	*
H2	Create maintenance management and asset management systems	368	20	164	46	46	46	46
H3	Assess long term staffing and equipment needs	50*	-	50	*	*	*	*
H4	Develop a water quality action plan	0*	-	0	*	*	*	*
H5	Review private facilities maintenance options	50*	-	-	50	*	*	*
H6	Identify and prioritize small natural environment/ water quality projects	0**	-	0	**	**	**	**
H7	Develop a Utility-operated facility retrofit plan	0**	0	**	**	**	**	**
H8	Clarify Utility's role in City critical areas management	0*	0	*	*	*	*	*
H9	Review Utility's Emergency Preparation planning	0*	-	-	0*	*	*	0*
H10	Develop Surface Water Management Area-based strategies and actions prioritized to recover water bodies	0*	0	*	*	*	*	*
M1	Assist Snohomish Co. with Little Bear Creek Watershed Development	0*	0	*	*	*	*	*
M2	Consider expansion of Local Source Control program	0*	-	-	0*	*	*	*
M3	Create a grants tracking system	0*	-	0	-	-	-	-
M4	Conduct study of groundwater impacts/develop management policy for Utility	150*	-	-	150*	*	*	*
M5	Assume oversight of North Creek Levee System	0*	0	-	-	-	-	-
M6	Analyze impacts of climate change on the Utility	0*	-	-	0*	*	*	0*
M7	Prepare for 2018 NPDES Permit issuance	0*	-	-	0*	*	*	*
M8	Prepare next Master Plan Update	175*	-	-	-	-	-	175
Totals		18,775*	6,270	6,728*	1,090*	1,954*	728*	2,005*

* Ongoing costs will depend on results of study, analysis, or plan to be developed

** Project costs are included in Item C1

A complete description of these action items, potential costs, and schedule is found in Section 5 and Appendix C.

SECTION 1

PROGRAM OVERVIEW AND EVALUATION

Purpose of Utility

The purpose of the City's Storm and Surface Water Utility (hereafter "Utility") is addressed in the Bothell Municipal Code as follows:

> Establishment of this utility is necessary in order to promote the public health, safety and welfare by promoting a comprehensive approach to surface and storm water problems. This comprehensive approach includes the following elements: basin planning, land use regulation, construction of facilities, maintenance, public education, and provision of surface and storm water management services. Because the most cost effective and beneficial approach to surface and storm water management is through preventative actions and protection of the natural drainage system, the utility shall give priority to methods which provide protection or enhancement of the natural surface water drainage system over means which primarily involve construction of new drainage facilities or systems.

In short, the Utility manages, protects, and regulates the built (stormwater) and natural surface water systems in Bothell by:

Actively participating in activities (land use, basin plans, and critical areas management) to protect and enhance the natural water system
Assuring that the drainage systems function well to minimize flooding impacts
Building and requiring new systems that protect or enhance the natural environment
Regulating and monitoring storm drainage to minimize its impact on the natural systems
Educating and engaging the public to foster positive behavior for the natural environment
Managing the Utility's efforts in a financially responsible way to achieve the Utility's goals while minimizing the impacts on ratepayers

The Utility funds and maintains an expanding inventory of stormwater facilities and collection and conveyance systems and helps assure compliance with an increasingly complex regulation environment. The Utility works in concert with other City functions and Departments to manage, restore, and protect the city's surface water natural resources.

Utility Structure

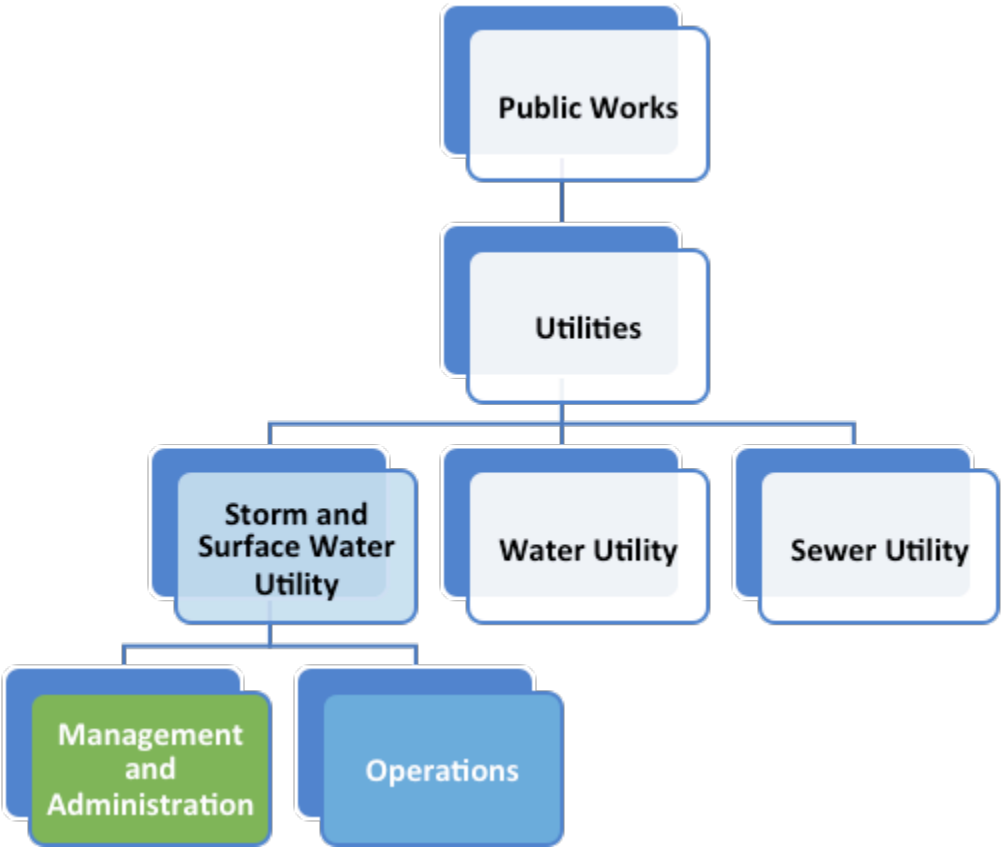
The Storm and Surface Water Utility operates under the general direction of the City Manager. The City Manager proposes and receives policy direction from the City Council who are elected by the citizens.

The Utility serves the existing city limits and is primarily funded by all developed properties within the city.

The Utility is included in the Public Works Department and is managed under the direction of the Public Works Director. The Director reports to the Assistant City Manager.

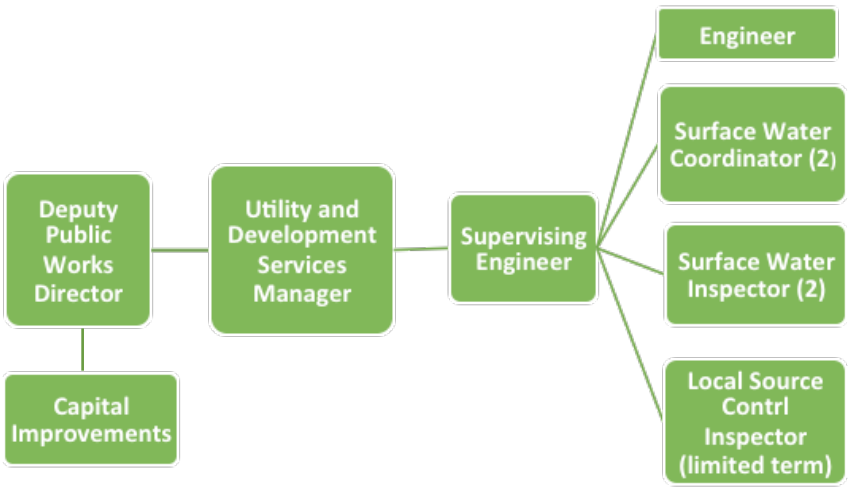
There are 15 full time staff and one full time term-limited staff in the Utility. The Utility employs seasonal and intern staff for specific efforts and seasonal work. In addition, the Utility funds additional staff in other areas of the City and uses consultant support where specific expertise or short-term capacity is needed.

Under the Director, the Utility's services are divided into two functional areas: Management and Administration, and Operations. These two functional staff groups are supported by other Public Works and City staff (e.g., Legal, Finance) and non-utility support as needed.



Management and Administration:

The Utility's management and administration team includes seven full time positions who oversee the Utility's protection and enhancement actions, project planning, regulations, outreach and education, water quality monitoring, restoration, reporting, public and private facilities inspection, and financial aspects of the Utility.



The management and administration team is supervised by a Supervising Engineer and led by the Utility and Development Services Manager,

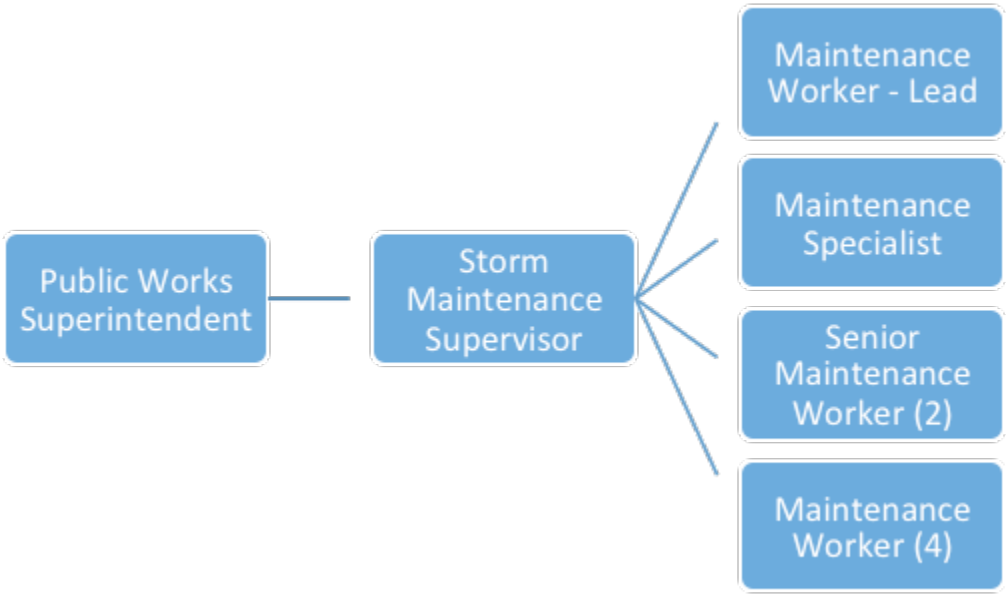
who reports to the Deputy Public Works Director.

The supervising engineer oversees six full-time staff, including:

- Engineer
- Surface Water Coordinators (2)
- Surface Water Inspectors (2)
- Local Source Control Specialist

Operations:

The Utility's operations team includes nine full time positions who monitor and maintain the public storm and surface water system. The team maintains public stormwater flow control and water quality facilities; cleans and repairs catch basins, pipes, and ditches; sweeps streets for water quality; and responds to floods and spills.



The operations team is supervised by a Maintenance Supervisor and led by the Public Works Superintendent who reports to the Public Works Director. The Maintenance Supervisor oversees eight full-time staff, including:

- Maintenance Worker – Lead
- Senior Maintenance Worker (2)
- Maintenance Specialist
- Maintenance Worker (4)

Staff fully funded by Utility include the following (16 FTE) positions:

Management and Administration	Operations
Supervising Engineer	Storm Maintenance Supervisor
Engineer	Maintenance Worker - Lead
Surface Water Coordinators (2)	Maintenance Specialist
Surface Water Inspectors (2)	Senior Maintenance Workers (2)
Local Source Control Specialist	Maintenance Workers (4)

Staff partially funded by Utility include the following (2.41 FTE equivalent) positions:

Staff	FTE
Public Works Director	0.15 FTE
Deputy Public Works Director	0.25 FTE
Capital Division Manager	0.05 FTE
Public Works Superintendent	0.20 FTE
Supervising Engineer - Capital	0.05 FTE
Utility and Development Services Manager	0.30 FTE
Senior Engineering Technician	0.40 FTE
Administrative Support Manager	0.20 FTE
Recycle & Public Services Project Administrator	0.15 FTE
Administrative Assistant - Operations	0.20 FTE
Administrative Assistant – Management and Administration	0.05 FTE
Administrative Assistant - Projects	0.05 FTE
Administrative Assistant - Projects	0.10 FTE
Senior Construction Inspector	0.10 FTE
Office Specialist - Operations	0.16 FTE
Total	**2.41 FTE**

These partially funded positions provide management oversight, technical and administrative services to the Utility.

Additional Staff Support:

In addition to dedicated staff, the Utility partially funds or relies on staffing and support throughout the City as needed for its operations.

- **GIS and IT Services:** The Utility funds staff support for the development and management of the City's Geographic Information System (GIS) to track the storm infrastructure and customer base ($79,656 in 2015). The Utility funds Information Technology services related to computer-based maintenance and asset management systems.
- **Financial and Human Resources Services:** The Utility funds support for financial services and human resources ($105,647 in 2015). These services include fund tracking, investing and billing support and human resources.
- **Legal Services:** The Utility funds legal services that support and advise the Utility as needed ($24,489 in 2015). The Utility pays directly for any needed outside legal services
- D**evelopment Services:** The Utility coordinates with two senior Civil Engineers and two senior construction inspectors in Development Services, who provide stormwater design and construction review and administration through developer fees.
- **Project Support Staff:** Large stormwater capital projects are often supported by the Public Work's Capital Division.
- **City Management:** The Utility funds general management housed in the City Manager office ($78,499 in 2015). The City Manager provides the Utility's policy direction and authorization that is made by the City Council.

Utility Contribution to General City Functions:

The Utility contributes to general City functions through the transfer of funds to the following:

Insurance:

The Utility pays a share of the City's cost for self-insurance ($149,994 in 2015).

Facilities:

The Utility pays for its share of the costs associated with City facilities ($53,331 in 2015).

Additional External Support:

In addition to City staff and services, the Utility relies on services from vendors, private parties and other agencies, including:

Consultant Services:

Engineering and administration often uses consulting services to assist the Utility with design and special studies.

Vendor Services:

Both the engineering/administration group and the maintenance/operations group use outside vendors to assist the Utility with specific efforts that require specialized equipment or staff.

Interagency Support:

The Utility is also supported by other public agencies and coalitions. These agencies provide services like utility billing, water quality monitoring, flood management, public outreach, and funding. Supporting agencies and coalitions include other cities, King and Snohomish County, King and Snohomish Conservation Districts, Washington Department of Ecology, WRIA 8, Puget Sound Partnership, and EPA.

Systems that the Utility Operates and Manages

The Utility manages the system of pipes, ponds, vaults and other built infrastructure that handles storm runoff throughout the Utility. The Utility also works in cooperation with other City divisions, property owners, local, regional, state and federal agencies to maintain, restore and protect the natural surface water system throughout Bothell.

Streams, excluding Sammamish River (miles)	51.6
Pipe (public and private miles)	277.6
Inlets (public and private)	14,120
Ditches, (public) (miles)	50
Detention Pipes or Vaults	390
Stormwater Ponds (#/acres)	114/23
Outfalls	390

This storm and surface water system can be grouped into the following categories by function:

Category	Includes
Natural Surface Water Systems	Creeks, rivers, and other aquatic lands
Collection and Conveyance Systems	Inlets, catch basins, pipes, and ditches
Storm Water Flow Control and Treatment Facilities	Created ponds, detention pipes, vaults, and filters

These components of the system are detailed as follows:

Natural Surface Water Systems

The Utility's natural surface water systems include about 25 small drainage basins that flow into North Creek or the Sammamish River or flow out of the City into Swamp Creek or Juanita Creek. Bothell primarily regulates these natural systems through its Critical Areas and Utility ordinances. Bothell Municipal Code, Section 18.01.010 (20), defines surface waters, of which watercourses are a subset. The natural drainage system includes rivers, streams, water courses, piped streams, lakes and wetlands.

Bothell Municipal Code further defines watercourses as follows:

"Watercourse" means any portion of a channel, bed, bank, or bottom waterward of the ordinary high water line of waters of the state including areas in which fish may spawn, reside, or through which they may pass, and tributary waters with defined beds or banks, which influence the quality of fish habitat downstream. This definition includes watercourses that flow on an intermittent basis or which fluctuate in level during the year and applies to the entire bed of such watercourse whether or not the water is at peak level. This definition does not include irrigation ditches, canals, storm water run-off devices, or other entirely artificial watercourses, except where they exist in a natural watercourse that has been altered by humans.[1]

The Utility helps private property owners and the City manage these natural systems by performing the following:

- Basin planning
- In-stream maintenance for flood control
- Protection, restoration, enhancement and management through code enforcement and projects
- Public outreach, education and awareness
- Pollution control
- Water quality and stream health monitoring

[1] *Bothell Municipal Code 14.04.005*

Collection and Conveyance Systems

The system of inlets, pipes and ditches throughout the city collects storm runoff and conveys it to streams and the Sammamish River. This system includes both public and private elements. The Utility funds the maintenance, repair, and replacement of the public portion of the collection and conveyance system. The majority of this system is located in city streets. Private property owners maintain the remainder of the system, generally located on private property.

Public collection and conveyance system

- Inlets: The Utility maintains about 8,500 inlets that collect runoff and convey it to the piped system.
- Public storm pipe: The Utility maintains about 150 miles of storm pipe, ranging from eight inches to over 48 inches in diameter.
- Ditches and Channels: The Utility maintains over 50 miles of built ditches and channels that collect and convey runoff.

Private collection and conveyance system

- Inlets: Private property owners maintain about 5,500 inlets throughout the City. The Utility periodically observes these inlets for pollutants, blockage, and structural condition where they are connected to stormwater flow control and treatment facilities and notifies the owners when observations indicate that maintenance is needed. However, the private property owners are required to maintain these systems at least semi-annually per the Bothell Municipal Code.
- Private Storm pipe: There are about 130 miles of private storm drain pipes that the Utility has identified. Private owners are required to maintain these pipes. The Utility staff only observes the portion of the pipes that it can see from the inlets and does not assume responsibility for assuring that the system is in good condition and function.
- Ditches and Channels: Private property owners also maintain ditches and channels that collect and convey stormwater in Bothell. The Utility periodically observes these private systems where they connect to flow control and treatment facilities.

Stormwater Flow Control and Treatment Facilities:

There are about 661 flow control and treatment facilities (facilities) throughout Bothell. These facilities have generally been constructed to manage the stormwater flow from developed property and city streets. The facilities may control the rate of release of stormwater to avoid overwhelming downstream systems. They may contain elements that collect, contain, and treat pollutants to protect downstream surface water.

The facilities usually consist of open ponds or underground vaults or large storage pipes with structures that controls the outflow from the facility. In some instances the facilities may include stormwater treatment swales (bioswales), filter vaults or rain gardens (bio-retention cells) or may infiltrate soils into the ground. As new properties develop and new City projects are completed, additional facilities will be added that many include increased infiltration and treatment methods that focus on low impact development standards.

Facilities that are often located on private property are either sited on separate tracts of land (typical in single family developments) or within the private parcels. Public facilities are often located within the street or on a separate private parcel with an easement to the City or a City-owned parcel.

Public Flow Control and Treatment Facilities:

- Ponds: There are 37 Utility-maintained ponds in the City. The Utility inspects these ponds every year and maintains them to the standards that they were built. This maintenance is performed by Utility Operations and includes clearing vegetation, debris and sediment and management of the control structure and outlet systems.
- Detention Vaults and Pipes: There are 109 Utility-maintained underground vaults or detention pipes in the City. These detention systems usually consist of concrete structures or large buried pipes and are often located under the City streets. Some vaults contain filters or systems to provide water quality treatment. The Utility inspects these vaults every year and maintains their function. Typical maintenance includes removal of sediment, maintenance of the control structure, and filter maintenance.
- Bioswales, filters and other treatment: There are about 38 Utility-maintained water quality swales (bioswales) or other stormwater treatment facilities throughout the city. These water quality/treatment systems are inspected annually and receive maintenance such as vegetation control, sediment removal and filter treatment material replacement.

Private Flow Control and Treatment Facilities:

- Ponds: There are 77 privately maintained stormwater ponds in the city. These ponds are maintained by both residential and non-residential property owners. Many of the ponds are located on separate tracts of land in residential subdivisions, but there are several ponds on non-residential properties. The Utility strives to inspect these facilities annually to assure that they are functioning as they were designed to do. Typical maintenance includes removal of sediment, debris and overgrown vegetation and cleaning of the control structure.
- Detention Vaults and Pipes: There are 231 privately maintained detention vaults and pipes in the city. These typically include buried concrete vaults or large diameter pipes with a flow control structure at the outlet. The primary purpose of these vaults and pipes is to control the rate of stormwater release from new development. The private property owners are responsible for maintaining these vaults and pipes. Typical maintenance includes cleaning and structural repairs. The Utility strives to inspect these systems annually to assure that they are functioning as they were designed.
- Bioswales, filters and other treatment: There are about 169 privately-maintained water quality swales (bioswales) or other stormwater treatment facilities throughout the city.

Public versus private management of stormwater facilities:

The designation of a facility as public or private is neither clear nor consistent throughout the city. Facilities that were permitted and built under Bothell regulations and serve private property are required to be maintained by the property owners. Facilities that were built under jurisdiction of either Snohomish or King County and added to the City through annexation may not have been maintained by property owners. For example, facilities in residential developments in unincorporated King County were maintained by King County, so the City has continued this practice for these developments. This inconsistency creates a potential inequity among private owners in the city.

Currently, all properties in the city pay a utility fee based on the percent of impervious area of their property. Private properties that have and maintain their own facilities pay the same fee rate as private properties where the Utility maintains the facilities. All stormwater facilities serve to protect the downstream systems and receiving waters of the city's streams and river, regardless of ownership or maintenance responsibility.

Other Systems and Areas Not Directly Managed by the Storm and Surface Water Utility:

The Utility works in cooperation with others to help manage many systems and areas that are associated with storm and surface water. The Utility's role is parallel with others in managing these systems or areas.

Most areas are covered under the City's Critical Areas Code, which is administered by the Directors of Community Development and Public Works. These areas include:

City-Defined Critical Areas, including:

- Designated Wetlands
- Critical Aquifer Recharge Areas
- Frequently Flooded Areas
- Geological Hazard Areas
  - Erosive Hazard Areas
  - Landslide Hazard Areas
  - Seismic Hazard Areas
  - Other geologic Hazard Areas
- Fish and Wildlife Habitat Areas

Designated Wetlands:

The Storm and Surface Water Utility does not currently take an active role in monitoring or enforcing regulations of wetlands in Bothell. Wetland areas include both City and privately-owned property. Because wetlands receive, hold, and treat storm and surface water throughout the City, they are an important element in assuring clean water and providing runoff storage the reduce flooding. The Utility should, as appropriate, recommend, pursue, and fund projects to restore, enhance, or protect wetlands as part of its responsibilities.

Critical Aquifer Recharge Areas:

The Utility does not monitor or manage aquifer recharge in Bothell. However, as low impact development projects and efforts expand, the Utility may need to become involved in aquifer recharge management in the future.

Frequently Flooded Areas:

The Utility does not manage floodplains and floodways in the city. Bothell participates in the National Flood Insurance Program (NFIP), requires Bothell to actively monitor and regulate its designated and mapped floodplains. Most of this management is performed by the Public Works Department through development services. The Public Works Director is the City's NFIP Floodplain Administrator. The City's participation in the National Flood Insurance Program is funded though the City's General Fund and does not include Utility funds.

Geological Hazard Areas

The Utility does not directly regulate or oversee geologic hazard areas. However, the City's storm drainage code defines Geologically Hazardous Drainage Areas to limit activities that drain through geologically hazardous areas. These areas are often influenced by surface or storm water, so the Utility often participates with other City and private parties to address specific issues in geologic hazard areas as they arise.

Groundwater

Generally, groundwater collection and conveyance systems are not considered stormwater and these systems are not directly managed by the Utility. Groundwater, however, does impact surface water and storm systems by adding flow. In some instances, this flow is beneficial as it adds cool, clear water to streams. In other instances, the surfacing of groundwater puts a burden on stormwater collection and conveyance systems.

Contaminated groundwater and soils are also not addressed by the Utility unless the contamination is tied to the Utility's storm system.

Maintenance and Management of Surface Water Resource Areas:

On Public Land: As the Utility identifies and programs natural resource projects like Sammamish River restoration, the Utility will need to address the long term maintenance and management of these areas. As the financial and management responsibility for these areas is included in the Utility, additional staffing and equipment (and associated funding) will need to be considered.

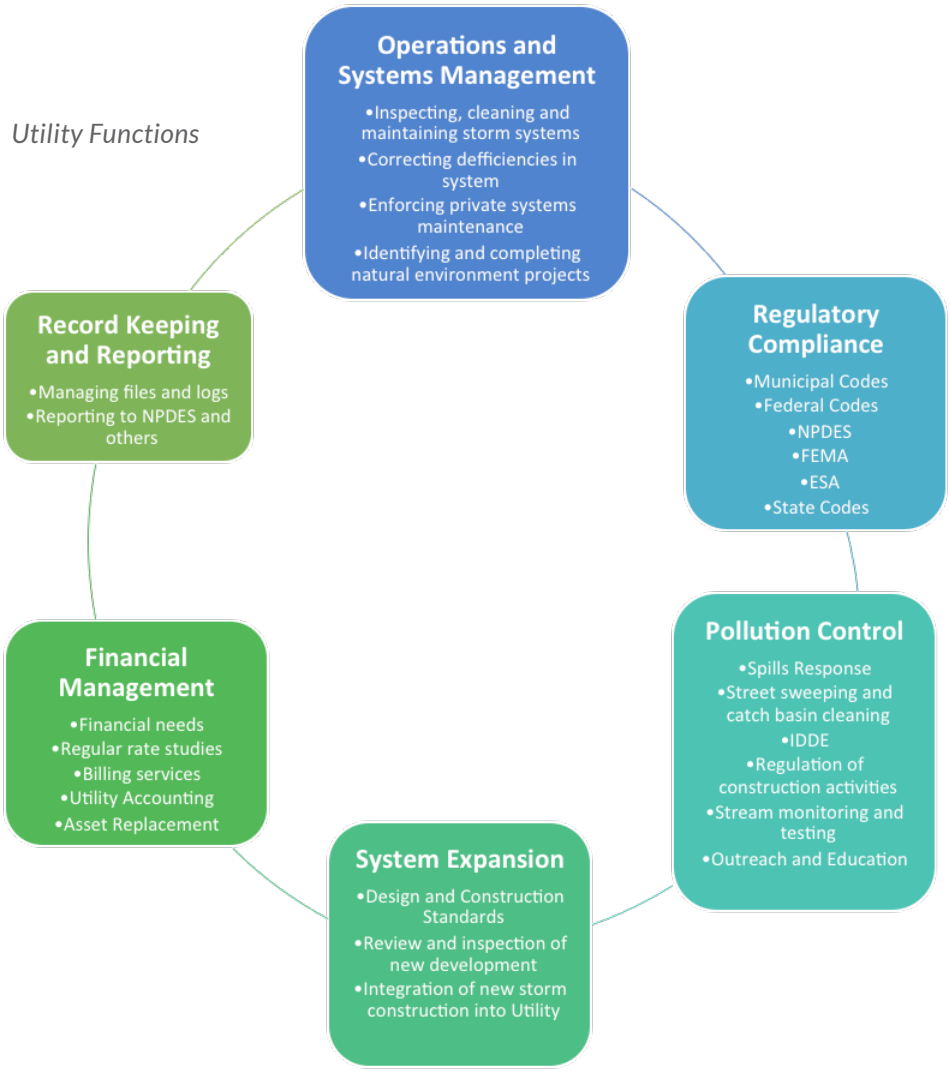
On Private Land: Management of critical areas on private land can have a dramatic impact on surface water quality. The Utility often meets with property owners regarding issues of erosion, sedimentation, flooding, land movement and other issues that are often connected to surface water. The Utility provides some limited guidance and assistance to property owners, however, oversight or assistance management of critical areas on private land is not a specifically funded effort for the Utility.

This Plan Update does not include an analysis of the potential impacts of Utility maintenance and management of added surface water resource areas.

Utility Functions and Program Evaluation

In 2015, the Utility functions are shown on the following graphic:

Table 1: Utility Functions



These functions are detailed and evaluated as follows:

A primary function of the Utility is to provide highly effective and efficient built and natural storm and surface water systems.[6] This effort includes keeping the existing systems clean and in good repair and health. It also involves planning and completing projects to correct deficiencies in the system.

The Utility addresses these efforts through *four elements*, with an emphasis on methods which provide protection or enhancement of the natural surface water drainage system over means which primarily involve construction of new drainage facilities or systems.

1. Inspecting, cleaning, and maintaining the Utility's storm system:
   - Cleaning pipes and inlets
   - Dredging and controlling vegetation in ditches
   - Maintaining stormwater flow control and water quality facilities
   - Completing minor repairs of storm drains and facilities
2. Identifying and correcting systems deficiencies
   - Tracking customer complaints and flooding information
   - Conducting studies of portions of the system
   - Identifying and completing projects to correct deficiencies
3. Enforcing Private Systems Maintenance:
   - Inspecting private facilities
   - Working collaboratively with property owners to keep facilities functional
   - Enforcing compliance with Bothell requirements for facility maintenance
   - Monitoring FEMA certification and management of the private North Creek levee
4. Identifying and completing natural environment projects that restore/protect surface water related natural environment

Assessment of Operations and Management Performance

This following overviews the adequacy of the Utility's performance of the four systems operation and management elements.

1. Inspecting, Cleaning and Maintaining the Utility's storm system:

The efforts that the Utility puts into inspecting the public storm water facilities are provided by a combination of Operations staff and inspectors in Management and Administration. Cleaning and maintaining the public storm conveyance system is managed by Public Works Operations staff.

The Utility's operations and systems management effectiveness has been evaluated on follows:

A. Meeting NPDES Permit Requirements
B. Storm Water System Performance
C. Efficiency of Operation

[6] *Built systems include the storm drainage collection, treatment, detention and conveyance system of inlets, pipes, ponds, vaults ditches and other constructed elements. Natural systems include the streams, wetlands, natural ponds, rivers, and lakes. The line between built and natural systems is sometimes blurred, as is the case for constructed wetlands and restored/daylighted streams.*

A. Meeting NPDES Permit Requirements:

The NPDES regulatory system put in place a minimum level of inspection, cleaning and maintenance of storm drain systems to address water quality. NPDES does not address maintenance associated with flood control management.

In 2014 and in prior years, the Utility operations met the minimum requirements of the NPDES permit. The 2013-2018 NPDES Permit as issued on August 1, 2013 continued or placed the following new requirements on the system maintenance and protection by the Utility:

i) Implement maintenance standards that are as protective as the 2012 Stormwater Management Manual for Western Washington

ii) Annually inspect all municipally owned or operated stormwater treatment and flow control facilities in accordance with adopted maintenance standards

iii) Spot check potentially damaged facilities after major storm events

iv) Inspect all catch basins and inlets owned or operated by the Permittee at least once by August 1, 2017 and every two years thereafter

v) Implement practices, policies and procedures to reduce stormwater impacts from lands owned or maintained by the City, including streets, parking lots, highways, buildings, parks, open space, road right-of-ways, maintenance yards, and stormwater treatment and flow control facilities

vi) Train employees whose functions might affect stormwater quality about the importance, procedures and ways to protect stormwater

vii) Implement a Stormwater Pollution Prevention Plan for all heavy equipment maintenance or storage yards/facilities

viii) Maintain records of inspections and maintenance or repair activities.

Conclusion of A:

Operations is anticipated to meet the requirements listed above within the existing 2015-2016 Utility budget and staffing levels and future rates.

B. Storm Water System Performance:

The ability of the existing storm water system to handle stormwater is controlled by both adequate system design and maintenance of inlets, pipes, and facilities.

Unlike sewer and water utilities, which receive a relatively steady demand, stormwater systems are highly affected by relatively unpredictable storm events. To account for these events, systems are generally designed to a certain level of storm. These system designs assume that the inlets, pipes and facilities are clean and fully functional during these design storm events.

Top 10 Wettest Days in Seattle, 1948-2013

Rank	Date	Precipitation (inches)
1	Oct. 20, 2003	5.02
2	Dec. 3, 2007	3.77
3	Nov. 20, 1959	3.41
4	Nov. 6, 2006	3.29
5	Feb. 8, 1996	3.06
6	Nov. 25, 1998	3.04
7 (tie)	Jan. 18, 1986	2.98
7 (tie)	Feb. 9, 1951	2.98
9	Nov. 9, 1990	2.95
10	Nov. 24, 1990	2.93

One measure of the adequacy of the system is to look at its performance during actual major storm events. Such an event occurred on December 3, 2007. This event, which followed two days of heavy rain, caused flooding at numerous locations throughout Bothell.

Many of the known locations of flooding were evaluated and assessed as to whether the problem was related to the system capacity or a need for maintenance.

Top Five Rainiest Days in Seattle, 2007-present	
Rainfall	**Date**
3.77"	Dec. 3, 2007
2.29"	Jan. 7, 2009
2.19"	Dec. 12, 2010
2.15"	Nov. 6, 2008
2.13"	Nov. 19, 2012

Following the 2007 storm event, numerous maintenance issues were addressed and Operations has refined its program to check on specific problem areas and respond during storm events.

Since 2007, the Utility has not experienced another significant storm event of equal intensity to test its system. Because there have not been significant tests of the systems by big storms since 2007, the Utility should not assume that the system is in adequate condition without further investigation.

A thorough analysis of the adequacy of the Utility's storm system would typically include a detailed hydrology and hydraulic model study. This type of study would predict the amount of stormwater that each pipe in the system would need to handle. Although no comprehensive hydrology and hydraulic study of the Utility's storm systems has been performed, many local studies have been done as part of developments and design of repairs to known problem areas.

Absent a major storm test of the system, the Utility could perform a detailed hydrology (storm runoff) and hydraulic (pipe and system flow capacity) study to theoretically evaluate the system. These types of studies have been performed on portions of the system, but not on a system-wide basis.

Another way to assure system performance is to regularly inspect the system to make sure that it is free of issues that might affect its capacity. Utility staff currently inspect the system routinely. The Utility is working in concert with Sewer and Water Utilities to establish a maintenance management system to assist in tracking and addressing maintenance needs for the system.

Conclusion of B:

While performance of the storm systems to handle events has been relatively untested since 2007, improvements have been completed and problem areas have been maintained. The system should regularly be evaluated to assure that it is reasonably adequate to handle storm events.

C. Efficiency of Operation

A third measure of the adequacy of the Utility's operations and management is an assessment of how efficiently it is performing. An analysis of efficiency could begin by benchmarking the Utility with comparable other stormwater utilities. It would then evaluate the efficiency of operations by looking at:

- Performance Measures
- Staffing Levels
- Equipment Needs
- Funding
- Recommendations

The 2005 draft Master Plan Update contains a brief evaluation of the Utility's system maintenance, but the 2005 analysis is outdated due to growth and increased permit requirements. The Utility's system management efforts are reaffirmed with each City budget approval process and each rate review. However, these reviews are

generally based on the incremental changes that are anticipated each time the budget or rate reviews are presented. These analyses assume a fixed baseline of activities based on prior years.

The impacts of growth in the Utility-managed systems and impacts of regulation have generally been addressed by adding staff, equipment and funds for outside services. These increases have been added to the Utility's baseline budget. Over the next six years, an additional $300,000 and two full time equivalent personnel have been identified to be needed in Operations to address increased system maintenance requirements.

Conclusion of C:

To assure that the Utility is operating efficiently, a thorough benchmarked review needs analysis should be performed. This analysis would compare staffing levels and efforts with other similar utilities and would assess the efficiencies of key Utility activities.

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2. Identifying and Correcting Deficiencies in Utility-Maintained Storm Water System:

Deficiencies in the Utility's systems, such as undersized pipes or inadequate inlets, can contribute to flooding of properties and damage to the natural environment. Finding and correcting deficiencies before damage occurs has been an ongoing challenge for the Utility. Past master planning and the 2007 flood event provide some measure of system performance. In addition, studies of North Creek and the Sammamish River and monitoring of small streams throughout the city provide indications of natural environment needs.

A current exercise to identify and prioritize storm and surface water projects was needed and has been conducted as part of this Plan Update. The effort relies on past master plan work, the 2008 Flood Action Plan, and staff and public input to identify potential projects. It uses a systematic identification process and rating system, combined with the financial projections for the Utility to program projects from 2015 through 2021.

The majority of funding for correcting deficiencies is planned to come from Utility funds and private properties. Grants through organizations like King County Flood Control District and FEMA are additional potential sources that can help keep Utility rates down. The Utility should develop and use a system to track and manage potential grant opportunities.

The results of the project planning is contained in Section 2 of this Master Plan Update.

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3. Enforcing Private Systems Maintenance:

An important component of the Utility's storm and surface water system is the network of stormwater flow control and treatment facilities in the city. These facilities have generally been constructed to mitigate for development of property and roadways. Depending on where and when the facilities were installed, they might be managed and maintained by either the Utility or by private property owners.

Utility-managed facilities include about 37 ponds, 109 vaults, and 38 swales. These are included in the section on inspecting, cleaning and maintaining the Utility system. Privately maintained facilities include about 77 ponds, 231 vaults, and 169 swales.

The Utility has an active program of inspecting all flow control and water quality facilities. The Utility employs two full time storm inspectors, who visit the 661 Utility and private facilities and evaluate their conditions. Inspecting and enforcing maintenance of private systems is difficult because the requirements for maintenance may vary significantly based on when the facility was installed. Enforcement is also a challenge because the Utility has limited enforcement and incentive tools.

Evolving requirements

Design requirements and purposes of stormwater facilities have evolved significantly since the City was formed. Older systems were built primarily to provide flow control and were designed with engineering standards that have since been shown to be inadequate to address the Puget Sound's storm events. Newer systems provide both flow control and water quality benefits. Engineering design continues to evolve as more is learned about modeling storms. As the climate changes, design standards will likely continue to be revised.

The Utility's inspection of privately operated facilities currently considers the design standards with which the facility was built. The oldest developments in the City typically have no facilities to maintain. Where older facilities do exist, the maintenance requirements are often less stringent and expensive than newer systems. This inconsistency creates a perceived inequity among property owners. This perceived inequity is further exacerbated by the fact that the Utility maintains some facilities that service private properties.

Limited Enforcement and Incentive Tools:

When the Utility inspects private facilities and finds that maintenance or repair is needed, it issues a correction notice to the responsible party. The notice identifies the issues and gives the owner/operator a schedule to correct the issues. This correction notice can be followed up with further notices and fines for non-compliance. If necessary, the Utility can enter the facility and correct the issues if they are deemed to create a public nuisance or hazard.

This system of inspection and enforcement sometimes creates a potentially adversarial situation for privately-maintained facilities. Facility owners/operators, especially those who manage residential facilities, are often not equipped to maintain the storm facilities and are not prepared for the cost of maintenance.

Credits and Fee Reductions

Utility fee credits can, when crafted and implemented well, provide a useful system of incentives and inequity correction tools for the Utility. When the Utility was established, it included rate reductions and credits for certain customers. Some of these reductions became outdated, were not universally accessed, or proved a challenge to effectively and fairly administer.

Credits and reductions included:

- Undeveloped Parcels – Properties that have not been developed are exempt from rates and charges of the storm and surface water utility.
- Non-Single-Family Properties – Non-single family properties could receive a reduction in their fee if they maintained drainage facilities that mitigated runoff contribution from their property. A 25 to 50 percent reduction in Utility charge was available for these properties. (This credit was eliminated in 2014)
- Road System – City and State roads receive a 70 percent reduction in rates based on the presumption that the road systems provide substantial annual programs for construction and maintenance of drainage facilities and their facilities serve as an integral part of the surface and storm water management system.
- Senior/Disabled Low Income Discount – Parcels owned by persons qualifying for senior or disabled property tax exemption are exempt from storm and surface water service charges.

- Parcels Served by Privately-Maintained Facilities – Parcel owners who maintained and operated retention/detention facilities could request a reduction in fees based on their costs to maintain and operate required retention/detention facilities (Non-residential properties could request a fee reduction under another section of the Bothell Municipal Code). (This credit was eliminated in 2014)
- School districts that provided education provisions were permitted a credit until January 1, 1997, when this credit opportunity sunsetted.

Beginning in 2014, the fee reductions and credits for maintenance of private systems were eliminated[9] based on the idea that the operations and maintenance of these systems is now standard practice required by City and State requirements. The Utility incurs substantial costs associated with inspecting and enforcing these operations and maintenance requirements. Elimination of the credit system simplified some stormwater bills and increased Utility revenues and improved the equity of the fee system.

Evaluation of Management Options for Private Facility Maintenance

Due to ongoing challenges with private facility maintenance enforcement, the Utility previously considered alternatives to the requirement that private property owners maintain their systems. A differentiation is often made between facilities that are maintained by single family homeowners and other owners because non-single family properties often have professional maintenance systems in place to deal with storm facilities.

The 2005 draft Master Plan considered the possibility of the Utility taking over the maintenance of private systems in platted residential developments (single family home tracts). When the 2005 draft Plan was prepared it estimated that the cost to the Utility to assume maintenance of residential facilities would be $52,500 per year. The current validity of this number has not been checked but is expected by staff to be low because facilities have been added through development and annexation and Utility maintenance costs have increased since 2005.

Many different approaches to private facilities maintenance are possible. Each option involves issues associated with administration, cost recovery, consistency, and fairness.

One option could include the Utility taking over all private facilities. This would involve the Utility assuming maintenance responsibility for the cleaning, repair and function of the 477 systems on private property that are currently maintained by commercial and residential property owners. The cost to the Utility for this approach would be significant and would require an increase in Utility rates. This approach would allow the Utility to consistently maintain facilities throughout the City.

Another option would involve the Utility taking only the responsibility only for private facilities that are currently being managed by single family residential properties and their associations. Facilities located on non-single family residential properties would continue to be maintained by the owners of these properties. This approach assumes that non-single family properties are more likely to have professional management systems in place to maintain their facilities. This option would not require as extensive a rate increase as taking over all facilities, but would not resolve fairness of costs to property owners without a system of credits.

[9] *The Credit system was modified by City Ordinance 2130*

A recommended action item for this Plan Update is to complete a policy analysis of the alternatives for private system maintenance.

Monitoring of FEMA certification and management of the North Creek Levee System:

The North Creek levee system is a privately installed and maintained levee system designed to protect the adjacent business park from flooding associated with the North Creek flood plain. The levee is one of only two FEMA-certified levee systems in King County (the other is associated with the Green River) and a unique private system that protects a significant economic and employment area of the city.

The Utility will take on the task of monitoring certification and management of this system as part of its flood management services. Monitoring of the North Creek levee system will be a new task for the Utility. The extent of effort to monitor the system will need to be determined and a monitoring plan will need to be established.

Stream Maintenance on Private Properties:

Many of the creeks and waterways in the city flow, in part, on private property. These watercourses are important elements in the city's surface water system. The Utility, however, does not routinely inspect or require maintenance activities on the watercourses located on private property, except where public infrastructure is impacted.

4. **Identifying and Completing Natural Environment Projects:**

The Utility does not directly or solely manage the natural environment in the city, but works with other City divisions, private properties, and other agencies to protect, preserve and restore the environment related to storm and surface water.

The Utility should work in concert with the Community Development and Parks and Recreation Departments to identify, prioritize and seek funding for natural environment projects that address storm and surface waters in Bothell.

Natural environment projects address different needs than built storm systems projects. They may be pursued to restore habitat, improve water quality, address fish passage, or protect resources. These needs are typically prioritized differently from stormwater flooding issues.

Funding for natural environment projects often relies heavily on grants because these projects often address regional resources. The Utility can be a source of matching funds for these grants.

For the development of this Plan Update, Utility staff reviewed existing watershed management documents, including:

- North Creek Watershed Management Plan, September 6, 1994, by Snohomish County Public Works
- Surface Water Quality Plan, City of Bothell, 1996, by CH2M-Hill
- North Creek Drainage Needs Study, December 2002, Snohomish County
- Sammamish River Corridor Action Plan, 2002, Tetra Tech
- Swamp Creek Drainage Needs Report, 2002, Snohomish County

- Restoration Plan for the City of Bothell Shorelines, May 2012, The Watershed Company
- Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan, 2005, WRIA 8
- Stream Health Assessment Reports, City of Bothell Staff, 2010 through 2014.

Based on available information, the Utility developed a list of major natural environment projects and rated these projects. The rated list was used to develop the projects planned for 2015-2020. This list is not assumed to be a comprehensive listing of potential restoration or protection projects within the city.

The Utility has not developed a rated list of smaller natural environment projects. Such a list would be useful for prioritizing efforts and preparing for grant funding. The list could be developed by Watershed Management Area (discussed in Section 3).

Overall Operations and Systems Management Recommendations:

- Drainage and environmental project completion should continue to be a priority for the Utility. The lists of projects contained in this Plan Update should be regularly reviewed and revised as appropriate.
- The Utility should perform a comprehensive assessment of its long term staffing and equipment needs, including a benchmarking against similar utilities,
- The Utility should evaluate options to its current approach for private facilities maintenance.
- A list of small environmental projects should be developed and projects should be prioritized and completed as funding allows.

Climate Change:

The Utility must continually adapt to variations in storm intensity and duration to effectively manage the Utility's storm and surface water system. This presents an ongoing challenge because the storm events in and around Bothell are highly variable. Long term trends for Bothell associated with regional and global climate change are uncertain.

A report by the University of Washington[10] suggests that storm intensity and duration will increase, but there is some uncertainty as to how significant the change would be for Bothell. Larger, more frequent storms may not be accommodated by portions of the Utility's storm infrastructure, causing flooding. Upgrading the infrastructure to accommodate larger storms and changes in seasons would be a significant effort that is currently not planned by the Utility.

The report also indicates that stream flows and water quality (primary temperature) will be negatively affected, with summer flows declining and water temperature increasing. The Utility may need to adapt its approach to storm runoff management to address these changes. Adaptation could include increased use of infiltration, changes in stormwater detention and treatment, and modification to stream buffers and channels.

[10] *State of Knowledge Report – Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers (2013)*

Stormwater Element	Predicted Response to Climate Change
Storm intensity	Increased magnitude and frequency of peak flows
Annual precipitation amount and seasonal distribution	Moderate increase in winter precipitation
	Moderate decrease in summer precipitation
	Increased average runoff in winter and spring
	Decreased summer base flow
Flood risk	Increased flood risk from increased peak flow magnitudes
	Increased flood risk from channel migration
Water Quality	Increased average and summer water temperature
	Lower dissolved oxygen
	Increased algal blooms
Water Movement	Increased evapotranspiration
	Lower soil moisture
	Reduced summer base flow in creeks
	Reduced groundwater recharge
	Wetland conversion from perennial to seasonal

Regulatory Compliance

The Utility seeks to assure that Bothell is compliant, to the extent feasible, with all local, state and federal regulations and agreements related to storm and surface water management.

These regulations and requirements include:

- Federal Clean Water Act - NPDES Municipal Stormwater Permits and Section 410
- Endangered Species Act
- Washington State Regulations, including:
  - Washington State Water Pollution Control Act
  - Water Quality Standards for Ground Waters,
  - Water Quality Standards for Surface Waters,
  - Sediment Management Standards,
  - Growth Management Act,
  - Shoreline Management Act,
  - Critical Areas requirements,
  - Comprehensive Environment Recovery and Compliance Act
  - Boldt decision
- City Comprehensive Plan
- Bothell Municipal Code
- FEMA flood management
- WRIA 8 interagency agreement

Much of the regulatory environment was established, in large part, to address deficiencies in the management of storm and surface water. These deficiencies have been identified as creating public health problems and safety and threatening the existence of native species.

Assessment of Existing Regulatory Compliance Level of Effort:

As of 2015, the Utility is currently compliant with local, state and federal permit requirements.

Over the next few years some known specific additional efforts will be needed to stay compliant. These known requirements can be accommodated in the Utility's plan and projected rates.

Additional regulations related to storm and surface water may arise during the timeframe of this Plan. As additional regulations arise, the Utility may need to adjust staffing and spending to accommodate changes. The Utility may recommend reprogramming existing activities within existing funding levels to accommodate unforeseen changes or it might seek to increase rates to expand its program.

Recommendation:

The Utility should proactively review new regulations to assure that it stays compliant.

Pollution Control

The Utility performs a wide range of activities focused on protecting the Bothell's streams and river, and ultimately Puget Sound, from pollution.

Per the Clean Water Act:

The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

Pollution control activities that the Utility performs include systems management and City practices as discussed earlier. In addition to these operations activities, the Utility performs the following activities specifically to address surface water pollution:

- **Spill Response** - When a material spill happens in the city, Utility staff reviews the incident to determine if the spill may affect the Utility's managed storm and surface water system. Operations responds to spills with equipment and staff when the spills occur on public property. For private property spills, Management and Administration regulates and observes the private property owner's spill response efforts.
- **Street sweeping** - The Utility funds 100 percent of city-wide street sweeping on the assumption that street sweeping provides water quality and flood reduction benefits. The sweeping is managed and performed by Operations staff.
- **Detection and elimination of illicit connections to the storm system** - Identification of illicit connections and discharges to the Utility's system is performed by both Operations and Management and Administration staff in conjunction with routine maintenance and inspection duties.
- **Regulation of construction activities** - The Utility manages the regulations that are applied to both City projects and private development to minimize surface water impacts during and after construction. These regulations include system design requirements, sediment and erosion control, and pollution protection during construction.

Enforcement of the construction standards is provided by the City's Capital and Development Services personnel and is funded through project and developer funds.

- Stream and system monitoring and testing - Management and Administration staff monitor key stream locations throughout the city for pollution. The monitor locations are based in a combination of staff understanding of potential problem areas and State-managed TMDL locations. In addition to staff monitoring, the Utility contracts with other agencies for pollution source control tracking and monitoring. The Utility has chosen to participate in the NPDES Phase II permit required monitoring of effectiveness with option of paying into a general fund with other cities to fund a regional approach to monitoring.
- Education and Outreach - Education and outreach staff in Management and Administration address non-point source pollution through awareness, engagement, and technical assistance to alter public perceptions and behaviors that cause or contribute to stormwater pollution.

  Utility staff also provide regular education and outreach efforts directed at various target audiences such as businesses, residents, and the general public.

The following is a table of outreach and education activities planned for the near future:

Residents	• Septic systems • Pet waste • Hazardous chemical use, storage, and disposal • Home maintenance (carpet cleaning, pressure washing, yard care, construction, etc.) • Vehicle maintenance (car washing, auto repair and maintenance) • Low impact development techniques-rain gardens, cisterns, green roofs, pervious pavement
Businesses	• Impacts from pollution on hard surfaces • How to prevent and report spills to minimize their damage • Impacts from pollution on local rivers, lakes, and streams • Opportunities to volunteer, participate, and help • Dumpster and equipment maintenance • Mobile business hiring- what they need to know • Low impact development techniques • How to properly inspect and maintain their stormwater systems
General Public	• Youth education on stormwater pollution • Impacts from water pollution • Restoration • Volunteer opportunities that protect and preserve our water • Impacts from spills outdoors and how to report them • Low impact development techniques • Our plans to improve local water conditions

Local Source Control Program:

Beginning in 2012 the Utility, through a contract with Ecology, began a new program of outreach to local businesses and other organizations - the Local Source Control (LSC) program. This program provides hands-on pollution prevention advice and regulatory assistance to businesses and other organizations that generate small quantities of dangerous waste.

The Utility's LSC program has conducted over 400 technical assistance visits. The goal of these visits is to reduce negative impacts to stormwater and keep businesses in compliance through education/outreach rather than enforcement. The City is under contract on a biennial cycle with Ecology using grant funding from the EPA National Estuary Program.

Future expansion of the LSC program could include hazardous waste generators of all sizes and business sectors. Currently the program only provides outreach to high priority small quantity generators (SQGs). An assessment of the city's waste generating businesses and a cost/benefit analysis of expanding the program should be completed to inform future expansion.

Assessment of Existing Pollution Control Level of Effort:

Measurement of the adequacy of the Utility's pollution protection effort is a challenge. The Utility is meeting its current NPDES Permit performance expectations regarding spill response, street sweeping, IDDE, education and outreach, and stream and system monitoring.

As is the case with many stormwater management approaches, the Utility's approach to effectiveness could be based on the assumption that following and achieving compliance with certain practices like spill response and street sweeping will result in adequate pollution protection.

Another approach to assessing the adequacy of the Utility's pollution protection efforts is to consider the results of testing and monitoring over time. The Utility staff have been collecting data on Bothell watersheds and continue to assess this data. The data generally shows a decline in water quality within the basins. Whether this decline is attributable to inadequate pollution protection efforts or other factors has not been conclusively determined.

Recommendation:

The Utility should routinely evaluate the effectiveness of its programs based on their outcomes toward water quality. These evaluations, along with the Utility's stream monitoring data, should be used to inform the development of a water quality action plan. The water quality action plan can be focused and prioritized by watershed management areas (see Section 3 of this Update).

System Expansion

The Utility participates in both private development and City capital project oversight to assure that these projects have minimal reasonable impact on the surface water system and to assure that the Utility has adequate resources to address additions to the system.

This participation includes:

- **Design and Construction Standards** - Management and Administration assures that the Utility has current design standards for new construction and land use activities. Application of these design and construction standards is carried out by Development Services in concert with Community Development.

- **Review and inspection of new developments and projects** - The City's Development Services and Utility staff assure that new developments follow appropriate and current design standards and construction practices and consults with Utility Management and Administration as needed, primarily to ensure downstream analyses include all relevant local drainage information.
- **Integrating newly constructed storm infrastructure into the Utility's system** - Management and Administration assures that newly completed storm and surface water infrastructure is integrated into the Utility's system for routine inspections, maintenance and asset management. Operations plans for new additions to the system by reviewing and planning for the added workload.

Assessment of System Expansion Level of Effort:

Surface Water Design Manual

The Utility's Surface Water Design Manual was last updated in August 2009. The Manual still meets current NPDES Permit requirements. However, new design standards were released by Ecology in 2012. Permittees, including Bothell, must adopt standards that are at least equivalent to the 2012 Ecology Manual. This update must be done no later than the end of 2016.

Interaction with Development Services

The Utility has some involvement in development review, stormwater system design review and construction inspection. It provides clarification to questions regarding the Design Manual.

Integrating Completed Infrastructure into the Utility

The process of integrating newly built infrastructure into the Utility's oversight, maintenance and operations is currently relatively informal. This has resulted in gaps where Utility staff has not adjusted to the City's acceptance of developer or contractor-completed infrastructure.

Increasing Capacity to Manage Added Infrastructure

Operations is particularly impacted by the addition of infrastructure, especially where the new infrastructure requires Utility maintenance and operation. This expansion in infrastructure can occur through annexations, new development and Bothell's capital projects. The expansion often requires increased Operations efforts and equipment.

Bothell's recent annexation of unincorporated King County is one example of a significant system expansion. Other examples include the daylighting of Horse Creek and the incorporation of low impact design in the reconfiguration of downtown roads.

The 2015-2021 City Capital Facilities Plan identifies the need to add $300,000 and two full time equivalent positions to Operations to managed storm infrastructure added to the Utility-managed system by City projects.

Recommendations:

The Utility should:

- Improve its communication systems with Development Services and Capital Facilities to assure that new infrastructure is integrated into the Utility
- Regularly review the impacts on the Utility of expansion of infrastructure from both development and City projects
- Periodically review staffing and equipment levels to assure that appropriate levels of resources are matched to the Utility's goals.

Financial Management

The Utility tracks its financial needs, recommends rates, and manages Utility spending.

This effort involves:

- Financial Needs - Operations and Management and Administration separately track and manage their spending throughout the current budget cycles and recommend financial needs for upcoming budgets. These financial needs include regular expenses, capital project needs, and one-time needs. The Utility generally does not budget for extraordinary costs, such as natural disasters, spills, or major storms.

  Capital project costs can create a challenge for the Utility, as demonstrated by the Horse Creek project. The cost of this project is significantly higher than was initially estimated. This increase has had a significant impact on both Utility rates and short term cash flow.

  In addition to managing spending, the Utility predicts the receipt of developer-generated revenue (facilities charges). This revenue source is only to be used for capital projects.

  The Utility also applies for and manages grants to fund projects and operations. These grants range from annual non-competitive grants that can be used for a wide range of efforts to competitive, project-related grants.
- Regular Rate Studies - Management and Administration prepares an annual review of Utility rates for Council consideration to assure that rate revenues are sufficient. This annual review is based on a combination of historical information and prediction of anticipated upcoming expenses and revenues.

  The Utility prepares a rate model-based analysis every few years to help predict future rates. This model was last prepared in 2011 by FCS Group. The Utility plans to update this rate model in 2016.
- Billing Services - Management and Administration coordinates and performs billing services. Most property owners are currently billed by King or Snohomish County through the property tax billing systems. These bills are based on rate structures that Bothell established when it created the Utility in 1994.

  The Utility directly bills federal properties, state highways, and City streets because these properties do not receive property tax statements from King or Snohomish County. As required by state law, state highways and City streets are charged 30 percent of the utility rate.

  In 2013, the Utility self-audited the bills that are sent to property owners. The audit evaluated the accuracy of the impervious surface calculations of the bills and uncovered many discrepancies. These errors were corrected in 2014 and resulted in about $390,000 in additional annual revenue for the Utility.
- Utility Accounting - Management and Administration coordinates with the Bothell's Finance Department to monitor the Utility's finances throughout the budget cycle. Utility Management and Operations staff track spending and revenues by using a worksheet that is updated from data received by the Finance Department.
- Asset Replacement Funding - To assure that the Utility has adequate funding to maintain and operate its system, the Utility expenses funds each year for the system's depreciation. This depreciation expense, if not used for replacement, is be rolled back into the Utility's total cash balance to be used for asset replacement in future years.

Assessment of Existing Financial Management Level of Effort

The Utility's ability to manage its financial needs has been influenced by a combination of Horse Creek project costs and delays in anticipated receipt of downtown facilities charges. These needs mean that the Utility has less cash than normal during 2015 through 2017 to address other projects.

Although current projects will burden the Utility's cash flow, it is expected to have adequate cash to cover expenses. The cash flow limitations are expected to peak in the beginning of 2017. By the beginning of 2018, the Utility is expected to have adequate cash reserves to increase its capital program work because the Horse Creek project should be completed.

The Utility is diligent and thorough at managing its rates and financial accounting. Rate studies are consistently performed and presented to the City Council for consideration each year. In addition to annual rate analyses, the Utility periodically updates its rate model.

The Utility's recent self-audit of billing improved accuracy and fairness of its fee collection.

The Utility has not formally evaluated its billing system and rate structure since the Utility was formed in 1995. The billing of Utility fees through the Counties' tax billing offers convenience, limited flexibility, and a potential lack of transparency. The Counties charge the Utility for billing and send bills to property owners twice per year. Since billing is included alongside property tax billings many property owners are likely not aware of the stormwater bill.

The Utility's billing structure is based on a tiered system with increasing rates for each tier of impervious area. This tiered structure means that properties may be nearly identical but fall into different tiers and therefore pay significantly different fees. This tiered structure was probably created for convenience in calculating fees at a time when accurate calculations of impervious area were difficult. The structure may have also been used to match what the Counties use for their calculations. Current Geographic Information System (GIS) tools make accurate calculations for each property practical. Also, County billing systems may allow the Utility to use actual impervious area.

The Utility depreciates its infrastructure, but does not have separate asset replacement fund and does not have a prioritized plan to replace aged assets. However, the Utility has performed several significant storm projects that have replaced aged assets. The asset replacement value of these projects is currently tracked in the Bothell's financial management system.

Recommendations:

- The Utility should review its billing and rate systems on a regular basis to assure fairness, adequacy, transparency and efficiency. In 2015, the Utility is conducting an analysis of billing options and revisions to its tiered rate structure.
- The Utility should continue to annually review its rates and update its rate model approximately every four years, with the next rate model update in 2016.

The Utility creates and uses records to assist its decision-making, confirm its regulatory compliance, and inform the public of its activities.

Record Keeping and Reporting

This record keeping and reporting includes, but is not limited to:

Work Orders	Permit Files	System Mapping
Inspection Reports	Equipment Logs	Grants
Customer Complaints	Project Files	Billing Files
Condition Assessments	Studies and Reports	Financial Files
Maintenance Records	Enforcement Files	GIS Data Management
Spill Reports	Monitoring Data	Reference Materials
Personnel Files	Annual Reports to Ecology	Levee Files
Communication Files	Miscellaneous Files	

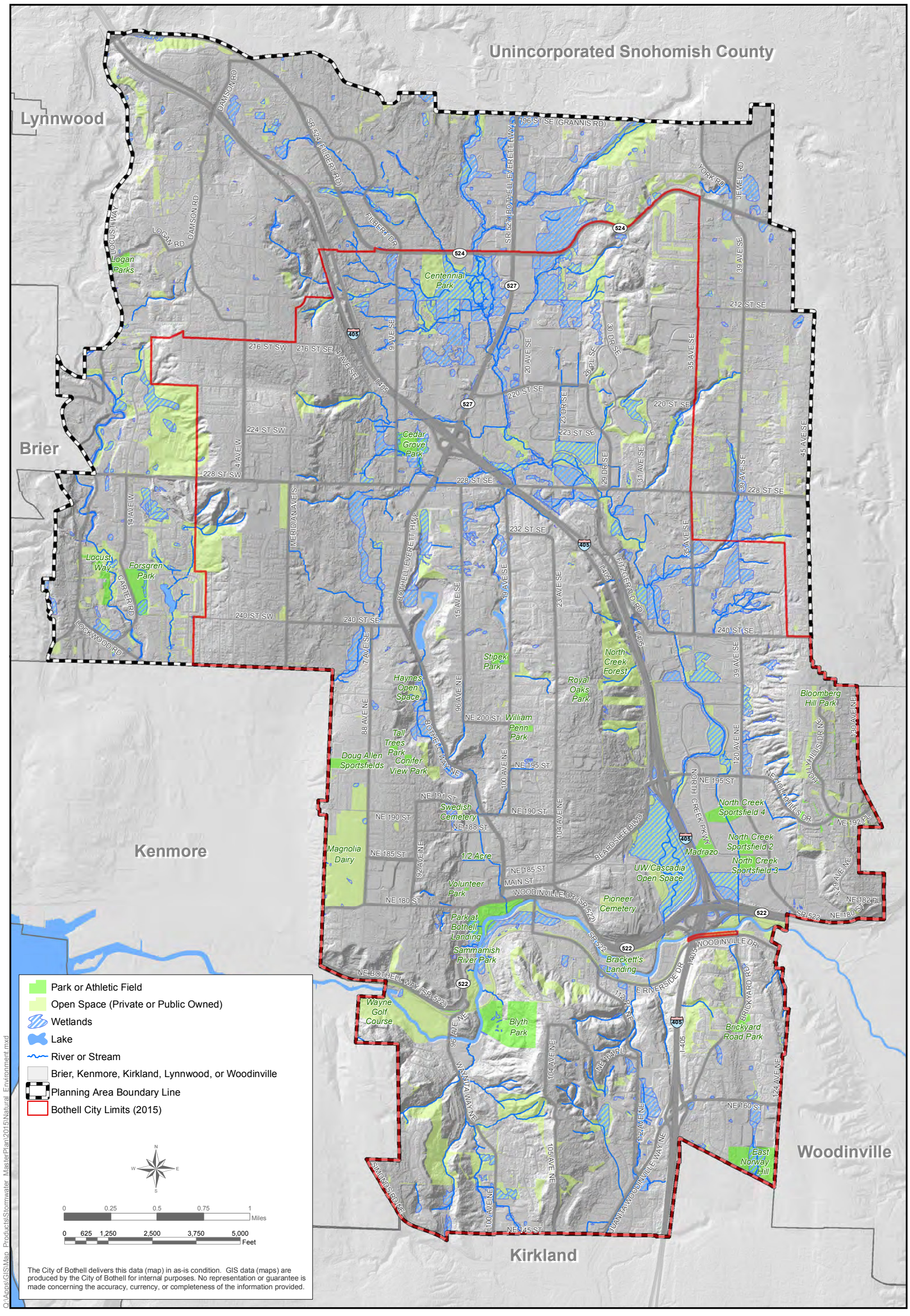
Assessment of Existing Record Keeping and Reporting Level of Effort:

The Utility's record keeping has been developed independently by many different individuals and groups. As a result, it lacks consistency. Individuals have created unique filing and labeling systems that cannot be easily accessed by others. Information is filed in a variety of electronic and paper systems in a variety of locations.

Recommendation:

The Utility will participate with ongoing efforts of the Public Works Department to establish and use a record management system to allow its staff to efficiently access records and produce its required reporting.

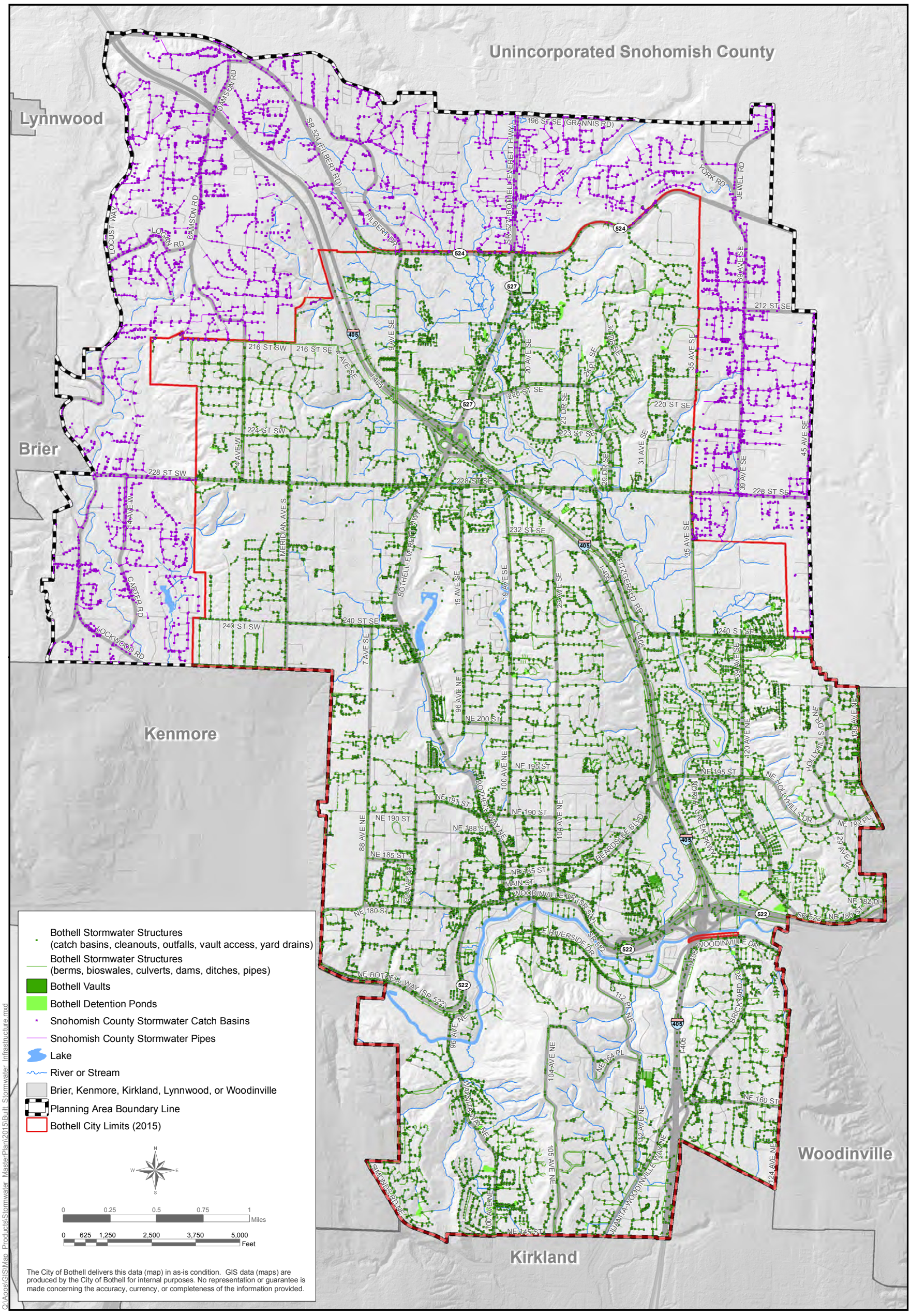
The following maps detail our natural and built environment as well as our current stormwater outfalls into our natural drainage system.



Bothell Storm and Surface Water Master Plan Update – 2015

Natural Environment

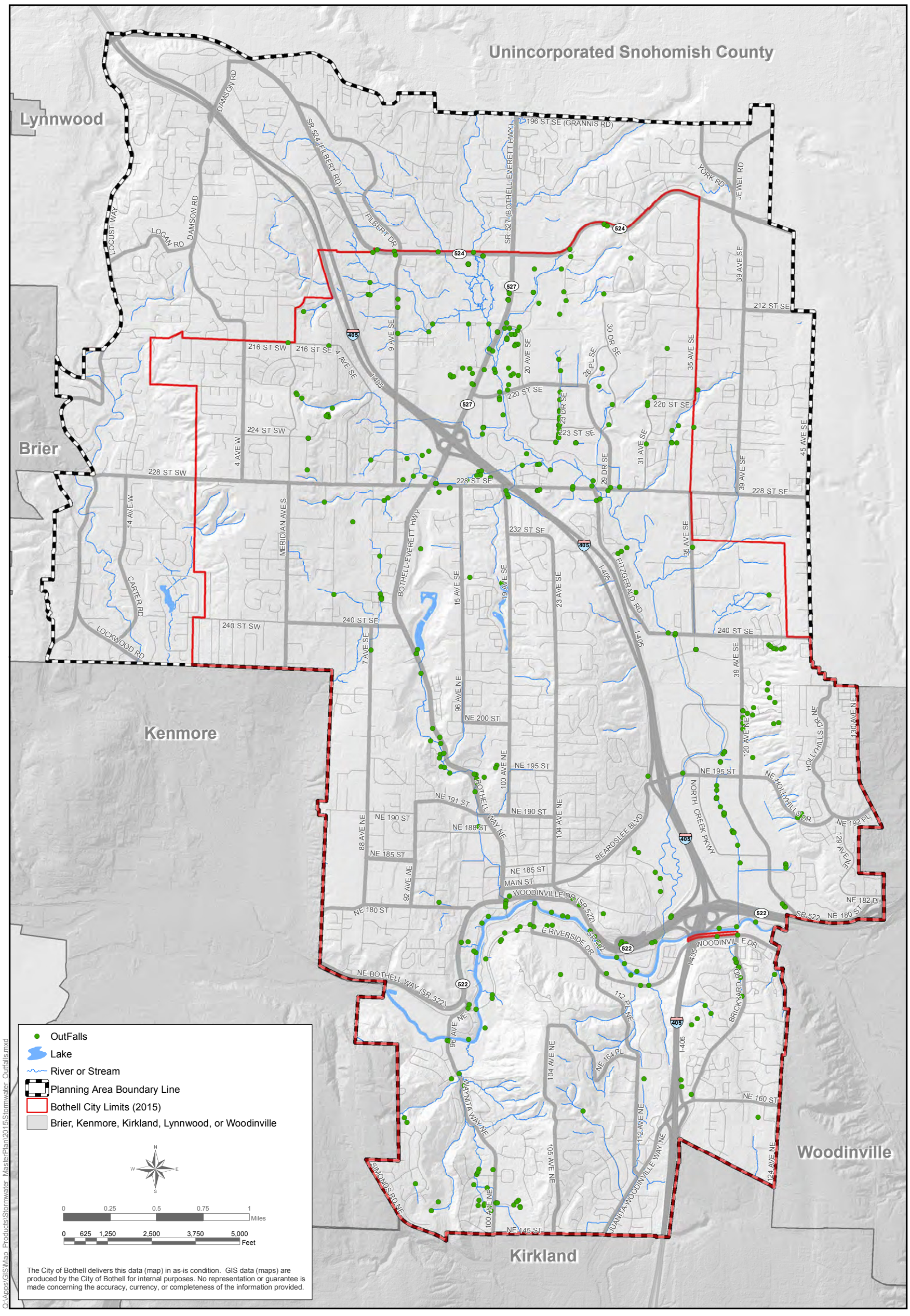
City of Bothell



Bothell Storm and Surface Water Master Plan Update – 2015

Built Stormwater Infrastruture

City of Bothell



Bothell Storm and Surface Water Master Plan Update – 2015

Stormwater Outfalls

City of Bothell

SECTION 2

PROJECT PLANNING

Introduction - Project Planning

An important function of the Storm and Surface Water program is to identify and support projects that address the function and condition of both the built storm water and natural surface water systems in Bothell. Project planning allows the Utility to identify needed projects and schedule the projects based on a combination of pr iorities and expected available funding.

Built System and Natural Environment Projects

This Plan Update groups its project needs into categories that reflect the purpose and potential funding sources for each type of project. Projects are grouped into Built and Natural categories to reflect the differences in how these types of projects are evaluated, funding and managed. Typically built system projects are fully the responsibility of the Utility (or private property owners). Natural environment projects often have a larger purpose and benefit and are funded through a combination of Utility revenues, grants, and other contributions.

1. **Built Drainage System Projects:**
   a. Major projects (requiring long term planning and significant funding)
   b. Small projects (Can be programmed as needs arise within an existing budget cycle)
   c. System Expansion (additions to the built system – normally provided by development)
   d. Rehabilitation/Retrofit (not tied to an urgent flood issue)
   e. Replacement (replacing worn-out parts of the system)
2. **Natural Surface Water Environment Projects:**
   a. Major projects (requires long term planning and funding)
   b. Small projects (able to be programed as needed within an existing budget cycle)

Built Drainage System Projects

The built system generally includes the inlets, pipes, stormwater ponds, vaults, ditches and other constructed stormwater features that are designed to collect, control, treat, and convey stormwater from developed area to the natural surface water environment. It also includes culverts and constructed systems that convey creeks under roadways.

Built projects are true "Capital Projects":

Built system projects are capitalized. This means that the Utility recognizes that these improvements will age and need to be replaced to continue to provide flood control and conveyance. Pipes, concrete structures, and similar improvements are investments that have a limited useful life. Good financial and management practice is to plan for the preservation and replacement of these "capital" assets.

Built projects are mostly a local, Utility expense:

Most of the built system projects are appropriately funded by local (generally city-wide) sources because they usually affect and benefit the rate payers/property owners in the Utility. These projects mostly address the Utility's system and operations. Funding typically comes from a combination of rate payer-generated revenue, developer contributions, and connection charges. To a lesser extent, regional stormwater and flood control grants are sometimes available to help fund these projects.

Built system projects would typically address either existing problems or long term needs in the stormwater system. These projects might address:

1. **Flood Control:** Some parts of our existing drainage system are not adequate to handle storms without flooding. This normally include pipes or ditches that are too small or are regularly clogged by debris or sediment.
2. **Expansion:** The Utility's built system needs to expand the drainage system to address growth through development and redevelopment. The projects associated with expansion of the system are typically needed to accommodate development and most expansions are installed by developers.

   In some cases, the Utility may take on a large system expansion project and create a mechanism for developers to repay the Utility for the project.
3. **Retrofit and Rehabilitation:** The Utility performs some projects that restore or improve the function of existing systems, even though there is no associated flooding. This may be done to restore or improve the capacity of a pond to control the outflow and protect the downstream built and natural systems. It could also include improving the ability of a system to address water quality.
4. **Replacement:** The built system has a limited useful life and the Utility recognizes that it should plan for replacement of worn-out elements. To do this, the Utility assigns a certain portion of its revenues each year for system replacement. In 2015, the Utility identified $428,000 to be assigned to system replacement. This amount was based on a simple formula with some basic assumptions about useful life and replacement schedules for the Utility's built system.

   The Utility is working in concert with the Sewer and Water Utilities to develop a more systematic approach to its replacement funding and project planning by putting in place an asset management system. This system will likely not be complete until 2016 or later.

Natural Surface Water Environment Projects

Natural environment projects mostly include systems of stream enhancement, sediment management, fish access, and associated wetlands and flood plains restoration. Needs for these types of projects focus on protecting, restoring, and enhancing water quality, fish and wildlife habitat and human-to-nature interface. The considerations for ranking natural projects normally focuses on the environmental benefit, in contrast to "Built Drainage System" projects that focus on flood control benefits such as life, safety, and protection of property use.

Natural projects are not capitalized:

Natural environment projects do not age like inlets, pipes and vaults. The Utility does not put aside money or assume that most natural projects will need to be replaced in the future.

Natural projects are often a regional expense:

Many natural environment projects support a regional ecosystem and the benefits and reasons for these projects extend beyond the Utility rate payers. For this reason, the majority of funding for most natural projects comes from regional sources, including grants managed by counties,

WRIA 8, Puget Sound groups, State and Federal agencies.

Natural systems projects typically include restoration, protection or enhancement of the natural surface water system. This might include enhancing flow management in stream systems, installing or improving natural water quality systems, providing or correcting fish access, and addressing stream characteristics.

Maintenance and Management of Natural Environment

Ongoing management of restored or enhanced surface water areas is not well defined in Bothell. In part this is because the Utility has performed very few restoration-related projects. As the number and extent of projects that the Utility takes on grows, the issue of managing and maintaining these areas will need to be addressed.

Identifying and Selecting Projects

Initial identification:

Drainage and natural surface water environment needs were first identified by compiling past studies. These included the following large scale assessments:

- Comprehensive Stormwater Master Plan, Barrett Consulting Group, June 1994
- Surface Water Quality Plan, City of Bothell, by CH2M Hill, February 1996
- Surface Water and Drainage Master Plan (Draft), EarthTech, December 2005
- Flood Action Plan 2008
- WRIA 8 Studies, Reports and Work Plans
- North Creek Drainage Needs Report
- Shoreline Restoration Plan, The Watershed Company, May 15, 2012
- Sammamish River Restoration

In addition, several focused reports were compiled, including:

- Flood Mitigation Assessment, 120th Avenue NE and NE 195th Street, Herrera Environmental Consultants, January 2010
- East Riverside Drainage Study, Gray & Osborne, Inc, April 24, 2008
- Royal Ann Road Area Drainage Improvements, BHC, November 5, 2009
- Meridian Drive SE, BHC, November 5, 2009
- 20th Avenue SE, Roth Hill, LLC, February 9, 2010
- 15th Avenue SE, Roth Hill LLC, February 9, 2010
- 216th and 9th Avenue W, BHC, November 5, 2009
- 19th Avenue SE, G&O, December 5, 2014
- Blyth Park Drainage Improvements, BHC, November 5, 2009
- East Riverside Drainage Study, Gray & Osborne, April 24, 2008

Outreach:

All known storm and surface water problem areas were plotted on a Utility map and a list was developed to describe these projects. Utility staff were asked to determine if the list was complete.

The public was then presented the opportunity to identify projects through a questionnaire that was available on the City's website and identified through several citywide publications. Two open houses were conducted On October 8 and 9, 2014 to provide opportunities for the public to meet with staff and identify problem areas. An additional open house took place April 23 to allow for additional comment on the rated project lists.

Initial Screening:

The Storm and Surface Water Staff and consultant then screened the problems based on the type of issue, responsibility and significance. Problems that represented significant issues were carried forward for further screening if the problems were at least partially the responsibility of the Utility. Where reasonable,

associated problems were grouped together to create a combined project description.

Problems were then categorized into two project types – Built and Natural.

Results of Initial Screening and Grouping:

Once the initial list of problems was filtered by Utility staff to a list of significant built and natural problems, preliminary projects were identified. The initial screening and grouping by staff identified 13 significant built system projects and 18 natural environment projects for further consideration. Based on this initial filtering, projects were described.

Significant Projects

Once significant built and natural projects were identified, staff rated the projects to allow the Utility to prioritize, schedule and plan its resources. Built and natural projects were rated separately due to their significantly different needs, goals and funding.

Built System Projects Screening and Rating

Built System:

Built system projects were initially screened based on their ability to effectively reduce risk while providing environmental and operational benefits. Also considered to a lesser degree were the feasibility, responsibility, and coordination of the project.

The initially screened built system projects were then rated for the following:

Life/Safety/Property (Maximum score = 40):

This category considers how the current problem affects the public. Elements include the impact of flooding on roads and property. Also included are the severity and frequency of the flooding. Problems that include significant risk of damage or safe use of multiple properties or that create potentially unsafe roads or public areas are giving a high score.

The rating also considers how successful a project might be in reducing or eliminating the impacts. Projects with a low likelihood of taking care of the problem were given a lower score.

Environment (Maximum score = 15):

This category considers how the problem affects the environment and how much potential benefit is expected from a project to address the problem. In situations where flooding is impacting streams, fish habitat, or sensitive areas, scores are high.

Operations (Maximum score = 15):

This category considers how much effort Utility Operations and/or private parties currently spend in dealing with the problem. It also considers how effective a project would be in reducing or eliminating this effort. Projects that effectively reduce a significant level of effort are scored high.

Feasibility (Maximum score = 10):

This category considers how feasible a project is. It considers the likelihood that permitting will be obtained and that necessary access and property rights might be obtained. Projects entirely on public right-of-way or City property and not requiring permitting score high.

Timing and Coordination (Maximum score = 10)

This category considers the possibility to coordinate a project with other projects or efforts in the area.

Preliminary ratings for the projects are provided in Appendix D.

Natural Surface Water Environment Projects:

Natural projects were rated differently from built system projects because these types of projects generally do not address an immediate or near-term risk to life and property. These projects are normally focused on longer-term benefits to habitat and water quality.

Public value was also a significant consideration in rating natural projects. This public value may be directly experienced by completion of the project, such as improved opportunity to directly experience natural systems, or may result from an external benefit of the project such as improved fish and wildlife conditions.

Rating of natural projects also included consideration of the effects the projects might have on Utility operations. Some projects might reduce current efforts to deal with sediment and water quality, and others might increase efforts by adding new maintenance requirements.

Cost and fundability are other considerations for natural projects. Built system projects are often funded entirely from rate revenues. Natural projects, however, can be viewed as having a broader impact and benefit to the community and region. As such, the funding for natural projects may be partly reliant on sources beyond rate revenues. This funding will often include grants and other contributions. Rating of these projects considered the likelihood that funding would be achievable.

The initially screened natural surface water environment projects were then rated for the following:

Environmental Benefit (Maximum score = 40):

This category considers the extent of the existing problem and the overall environment benefits that a project might achieve. Benefits might include improved water quality, wetland function, stream health, fish accessibility or habitat, and wildlife benefits. Projects that address a documented or clearly identified problem and are likely to achieve positive results score high.

Public Value (Maximum score = 25):

This category considers the possible value that the public might place on addressing the current environmental problem. A portion of this rating is based on the public's current awareness of the issues related to the project. In some cases the public value may be related to the general value expected for the existence of healthy fish and wildlife. Projects or their outcomes that are expected to be valued by the public will score high.

Cost and Fundability (Maximum score = 15):

This category considers the likelihood that the project can achieve adequate funding to complete a meaningful project. It considers how the potential project is currently rated on other tracking systems such as the WRIA 8 projects ranking and the City's Shoreline Restoration Plan. Projects that are achievable within existing rate funds or are expected to receive sufficient grant funding are scored high.

Operational Benefits (Maximum score = 10):

This category considers the operational considerations associated with projects. Included in this consideration is the existing level of effort spent dealing with the current problem. Projects that either reduce current level of effort will score high. Projects that add operational effort will score low.

Timing and Opportunities (Maximum score = 10):

This category considers the possibility that a project might be able to be coordinated with other efforts in the watershed. This coordination might be direct, such as combination with a built system project or other infrastructure project by the City or development. It also might be an indirect coordination, such as an education or outreach effort. Projects that include

coordination with other efforts were scored closer to 10.

Project Programming

The next step in programming projects into a plan and schedule was to consider the combined Utility costs for all the projects and then assess the possible timing needed for the Utility to complete the projects. This required some assumptions regarding how the projects would be funded or financed.

Projects Funding

The Storm and Surface Water Utility should fund a reasonable portion of projects based on its mission. In evaluating the Utility's funding of projects, the following are considered:

- What portion of the project can be funded by Utility funds? In some cases, projects include both public and private responsibilities. In these cases, the Utility should only fund the portion of the project that is reasonably ascribed to the Utility and its ratepayers.
- How much of the Utility's annual revenues should be used to fund projects? The Utility funds a combination of operations, engineering and administration, regulatory compliance, education and outreach, and projects. Much of these costs are fixed each year and must be paid before the Utility can fund projects. The amount that is left over, if any, after paying the Utility's fixed costs (and required reserves) is potentially available to fund projects.

A Pay-as-you-go Approach Verses Financing

Utilities often use a combination of cash and financing and build projects. Both methods have advantages and disadvantages.

With the exception of the Horse Creek and Downtown Revitalization projects, the City's Utility has generally built projects on a "pay-as-you-go" approach that uses accumulated unrestricted cash from rate revenues. This approach has the advantage of avoiding costs associated with financing.

This pay-as-you go method of paying for projects means that the Utility has to schedule projects based on its cash flow. Pay-as-you-go limits the Utility to construction of larger projects only when enough cash has accumulated. When several large projects are needed, this can mean the projects need to be delayed or rates need to be increased.

Financing (usually through the sale of revenue bonds or obtaining low interest loans) allows a utility to complete projects now and spread the cost out over time. This often improves the fairness to current and future ratepayers who will benefit from the projects. Disadvantages of financing is that it has costs associated with interest and management of debt.

The approach assumed in this Master Plan is pay-as-you-go. The Utility could consider use of financing to spread out the cost of these projects over time.

Natural Environment Funding

Natural environment projects rely heavily on funding sources outside of the Utility revenues. These sources mostly include grants from State, Federal, or regional entities. In many cases the Utility provides a small portion of the project cost in the form of a match to the grant. Most natural environment projects will not be completed without outside funding.

Utility staff looked at projected revenues and expenses for 2015 through 2020 to estimate how much funding could be made available for projects. A major influence on the amount of funding available for projects is the current effort to improve the City's downtown, which includes Horse Creek and other downtown storm projects.

The total cost of the Horse Creek and downtown projects from 2011 through 2020 is expected to be about $19.5 million. During this time, the

Utility is expected to receive about $6.7 million[1] in downtown facility connection charges. In addition, the Utility is expected to receive about $1.4 million in citywide facility connection charges from 2012-2020.

To provide the cash necessary to complete the Horse Creek and downtown projects, the City issued bonds in 2014. The Utility will pay back $12.5 million of these at a cost of almost $1 million per year.

The Utility is expected to have a total of about $17 million for projects for 2015-2020. About $10.5 million of this funding will be used for Horse Creek and downtown, leaving about $6.5 million for city-wide Utility funding for projects.

Projects Planned for 2015-2020

In addition to the downtown area projects, the following projects are planned for 2015-2020:

For 2015-2016:

Current expected spending for projects outside of downtown is now about $2.3 million with about $1.4 million from grants and about $0.9 million from Utility revenues. The projects identified to be funded during 2015-2016 include:

Storm and Surface Water Projects 2015-2016	Total Project (Estimated) 2015-2016	Utility Funded (Estimated)
Combined Built/Natural Projects		
Horse Creek	$8,815,715	$8,815,715
Small Drainage Projects	$150,000	$150,000
Built Drainage System Projects		
Downtown Revitalization	$959,000	$959,000
Parr Creek @ 120th Avenue NE	$575,000	$75,000
Perry Creek Crossing near 19th	$200,000	$200,000
Main Street Enhancement	$25,000	$25,000
Natural Environment Surface Water Projects		
Sammamish River Side Channel at 102nd	$1,500,000	$225,000
Retrofit Projects		
Queensborough LID	$360,000	$0
Other Projects		
Maintenance/Asset Management System	$184,000	$184,000
Master Planning	$100,000	$100,000
Totals	**$12,508,715**	**$10,773,715**

[1] *The City is currently considering a change in the downtown facility connection charge that would affect the amount of revenue that the Utility would receive.*

Horse Creek: The Utility is replacing the Horse Creek pipe with a combined open channel/culvert system along 98th Avenue SE. The majority of this project is being funded by Utility funds that come from a combination of annual stormwater fees and downtown capital facilities charges. The project began in 2011 and is expected to cost about $18 million when it is complete. One-third to one-half of the project funding is expected to come from downtown storm water capital facilities charges imposed upon all parcels developed within the downtown subbasin. Bond financing is being used to help smooth out the expense of this project, and the Utility is paying the annual cost of the bonds.

Downtown Revitalization: Capital projects in the Downtown Revitalization Area are being pursued to address inadequate and aged infrastructure. The current estimated cost for these projects is $1.5 million with nearly $1 million planned in 2015-2016. The current City budget and approved capital facilities plan identifies $199,000 for downtown revitalization, so the additional funding is assumed to come from re-programming of funding from the $1,025,000 budgeted for "Annual Storm & Surface Water Capital Projects" for 2015-2016.

Parr Creek Improvements at 120th Avenue SE: The Utility currently has $75,000 allocated toward drainage improvements in this area. This is a chronic area of roadway flooding and the $75,000 will go toward a permanent solution to the roadway flooding. This planning exercise assumes additional $500,000 could become available from grant funds and the property owner where the creek flows adjacent to the roadway. A significant portion of the drainage problems associated with 120th Avenue SE originate on private property and the Utility is working with the property owners to collectively address issues, so additional work by the owners for this section of Parr Creek is anticipated.

Sammamish River Side Channel: This natural environment project began concept and design work in 2011 for restoration of a historic side channel in the vicinity of 102nd Street. Between 2011 and 2014 $193,000 was spent on design, of which about $130,000 was funded by grants. Construction of the side channel is planned for 2015-2016 if Bothell is able to obtain grant funding for a majority (approximately $1 million) of the project. If Bothell gets grant funding, the Utility will contribute match funds of up to $225,000 toward the project. If grant funding for construction is not received in 2015-2016, this project will be delayed.

Perry Creek – (Near 19th Avenue SE): The metal pipe culvert crossing for Perry Creek near 19th Avenue SE is undersized and corroded. The project has been designed and is ready for construction once funding is available. The cost of this project is currently estimated at about $200,000.

Queensborough LID Retrofit: The Utility led a grant-funded effort to identify Queensborough watershed retrofitting in 2014. During this evaluation, staff estimated that $360,000 would be needed to install LID, so the 2015-2021 City CFP includes a $360,000 project for 2015. The project was entirely contingent on receipt of grant funding. The preliminary design study indicates that LID is not feasible in this area so the project is not planned to go forward.

Small Drainage Projects: Over the 2015-2016 biennium $150,000 is earmarked for miscellaneous small drainage projects. This allocation allows the Utility to address small flooding and natural environment issues that arise during the biennium.

Purchase of Maintenance and Asset Management System: The Utility will participate in purchase and implementation of a maintenance management and asset management system in the biennium. The system will be a computer-based tracking and decision tool to allow better management of the storm and surface water infrastructure. It will also provide a systematic, objective approach to preserving and replacing the built system. The cost of purchasing the system and implementation is budgeted at $20,000 in 2015 and $164,000 in 2016 for a total of $184,000.

Storm and Surface Water Master Planning: Master planning should be done by the Utility on a relatively regular cycle. This Master Plan is part of that cycle and staff expects to spend about $100,000 in 2015-2016 to complete the Plan. The next planning effort would occur in about six years.

For 2017-2020:

After 2016, the majority of downtown and Horse Creek improvements are expected to be complete. This will free up unrestricted Utility revenues to design and complete several major drainage and natural projects. During 2017-2020 about $5 million could be available for drainage, natural, and minor surface water projects. The potential projects include:

Storm and Surface Water Projects 2017-2020	Total Project Cost (Estimated)	Planned Years	Utility Cost (Estimated)
Horse Creek (channel establishment)	$124,738	2017-2020	$124,738
East Riverside Drive Drainage and Sediment	$870,000	2018-2020	$600,000
Small Projects (to be determined as needed)	$400,000	2017-2020	$400,000
Downtown Revitalization	$570,000	2017	$570,000
Monte Villa Ditch and Culvert Drainage	$440,000	2017	$250,000
Perry Creek near 228th Culvert Crossing	$350,000	2019-2020	$350,000
Palm Creek – 228th Vicinity Drainage	$390,000	2018	$390,000
Royal Anne Road Culverts	$500,000	2018-2019	$500,000
Parr Creek Channel Restoration	$2,000,000	2017-2018	$150,000
208th Water Quality	$500,000	2018-2019	$250,000
Sammamish R / Waynita Creek Restoration	$1,500,000	2017-2020	$500,000
Blyth Creek Sediment	$183,000	2017-2018	$120,000
Royal Anne and Filbert Creeks Restoration	$1,500,000	2020	$400,000
Miscellaneous Facility Retrofits	$400,000	2017-2020	$400,000
Master Planning (for adoption in 2021)	$175,000	2020	$175,000

These 2017-2020 proposed projects are further described as follows:

Parr Creek Flood Control and Stream Restoration: A cooperative effort is underway in 2014-2015 between business park owners and operators and the Utility to improve flood control and enhancement and restoration of Parr Creek from its headwaters to the Sammamish River. This effort will include Utility and private property projects. The total cost to address flooding and relocation/restore the creek is currently estimated at $2.5 to $3 million. In addition to the $75,000 that the Utility has budgeted in 2015-2016 to address flooding along 120th Avenue NE, $150,000 is identified during 2017-2020 to address City-owned culvert replacement as part of the restoration of the Parr Creek channel through the business park.

Monte Villa Flooding: Street and property flooding occur in the vicinity of 35th Avenue SE and the Monte Villa Business Park. Solutions include improving roadway crossings and realigning and improving ditches and roadway flow. These projects would include a combination of public and private work with a total cost estimated at $440,000 and the Utility portion of the project is initially estimated at $250,000.

Royal Anne Road Culverts: A combination of road and property flooding associated with Royal Anne Creek affects property near 208th Street SE in northern Bothell. Several road culverts are suspected of being undersized and some catch basins are not positioned for optimum storm management. Projects in this area would mostly involve correcting the street storm system problems. Design and construction work is earmarked for the 2017-2018 and 2019-2020 bienniums and preliminary cost is $500,000.

Blyth Park Sediment Management Improvements: This is a combined built and natural project to address ongoing sediment issues that overwhelm the City-maintained sediment pond and allow sediment transfer to the Sammamish River. The current 2015-2021 City Capital Facilities Plan (CFP) identifies $183,000 to address the sediment issues, with an anticipated $120,000 from Utility revenues and an anticipated $63,000 from grants.

Palm Creek Culverts: Flooding related to a combination of pond and culvert problems needs to be addressed in the Palm Creek basin around 220th Street SE. These problems are a combination of public and private issues and the Utility portion of the cost to solve these issues is estimated at $390,000. The projects in this vicinity are programmed for 2018.

Perry Creek Culverts and Ditch: In addition to the crossing near 19th Avenue, several culverts and ditch systems in the Perry Creek system near 228th Street SW west of I-405 are undersized. Remaining work in this area is estimated at about $350,000 and planned in the 2019-2020 biennium.

East Riverside: A combination of sediment issues and inadequate drainage systems have caused issues in this area near the Sammamish River. Significant drainage improvements were installed in 2010. Some culvert and ditch improvements are still needed along East Riverside Drive and between the road and Sammamish River. Sediment control from upstream properties affects the management of the storm conveyance system. The potential work in this vicinity is a combination of public and private responsibility. Remaining Utility-funded work on East Riverside is planned for design in the 2017-2018 biennium with construction in the 2019-2020 biennium. The preliminary cost estimate for remaining work is $870,000, with an expectation that the Utility would fund $600,000 and the remainder possibly coming from grants and partnership with private parties and WSDOT.

208th Street SE Water Quality: This project would add water quality treatment to 208th Street SE to protect water quality in North Creek. The estimated cost for this project is about $500,000, of which an estimated $250,000 could come from the Utility with the remainder from grants. The project could occur in the 2017-2018 biennium.

Sammamish River - Waynita Area: This project would include restoration and protection of the Sammamish River and Waynita Creek drainage. The project has not been estimated, but an assumption of a cost of $1.5 million is made for this plan. The Utility includes $500,000 as matching funds for grants to fund this project. The project is identified for 2017 through 2020.

Royal Anne and Filbert Creek Restoration: This project would include culvert and wetlands work in this area that drains into North Creek at the north side of Bothell. This plan assumes the Utility would contribute $400,000 toward the project area, with the remainder to be funded from grants. A project cost of $1.5 million is assumed. The project is identified for 2020.

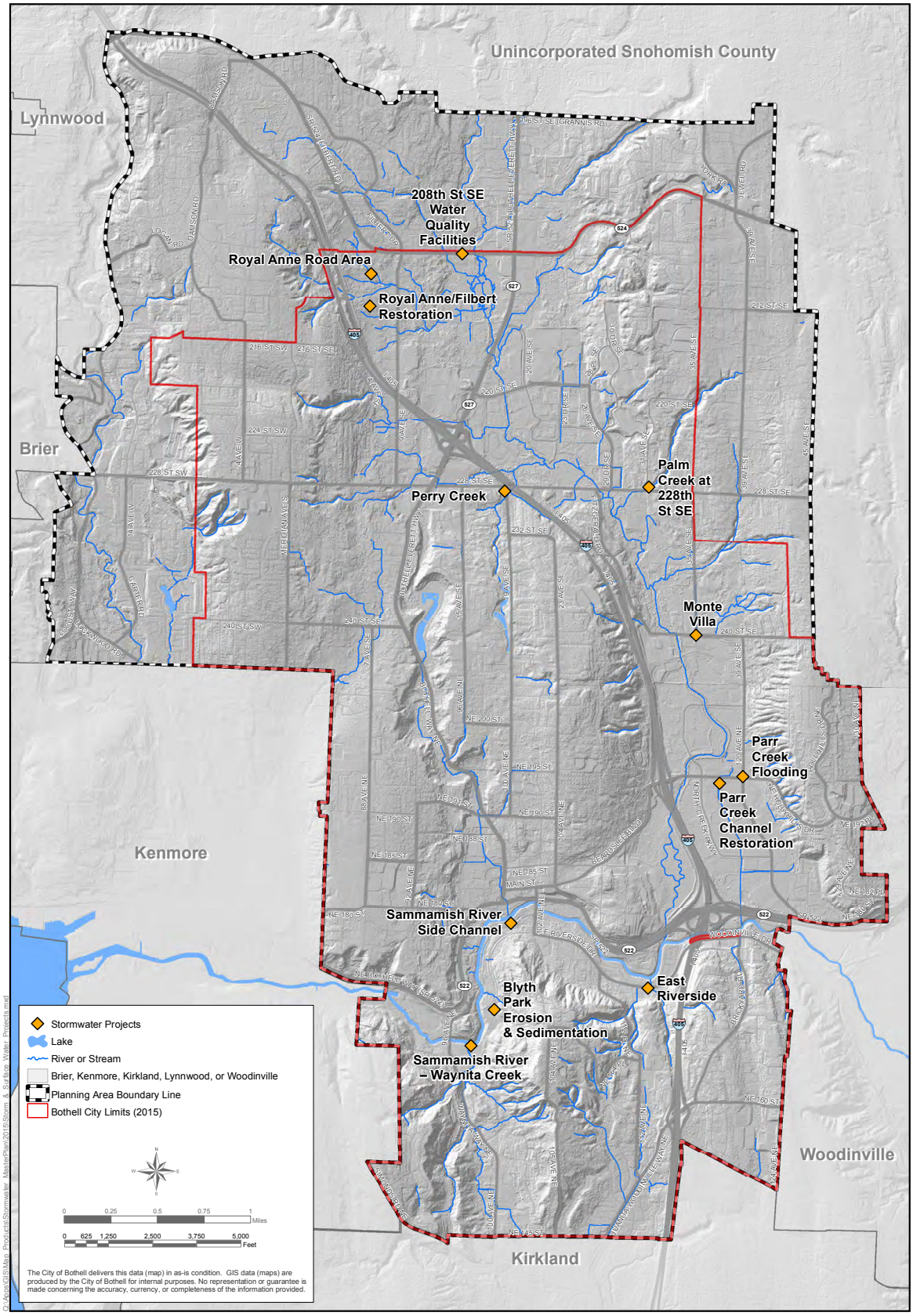
Small Drainage Projects: $400,000 is included for small projects in 2017-2020. Specific built and natural environment projects will be identified as they arise during this period.

Facility Retrofit or Restoration Projects: $400,000 is earmarked in 2017-2021 for retrofitting existing stormwater detention and treatment facilities throughout the City to improve water quality and flow control. Projects will be identified through the preparation of a prioritized retrofit/restoration plan in 2015-2016.

Storm and Surface Master Plan: $175,000 is included for updating or replacing the Master Plan in 2020 for adoption in 2021. The new Plan would cover 2021-2027.

System Replacement: Using current depreciation rates, the Utility's drainage assets will depreciate by nearly and half million dollars million per year. Over the 2015 through 2020 timeframe over $2.7 million will be expensed to depreciation. These funds should be programmed through the Utility's Asset Management Plan to be developed.

Project details are included in Appendix A.



Bothell Storm and Surface Water Master Plan Update – 2015

Storm and Surface Water Projects

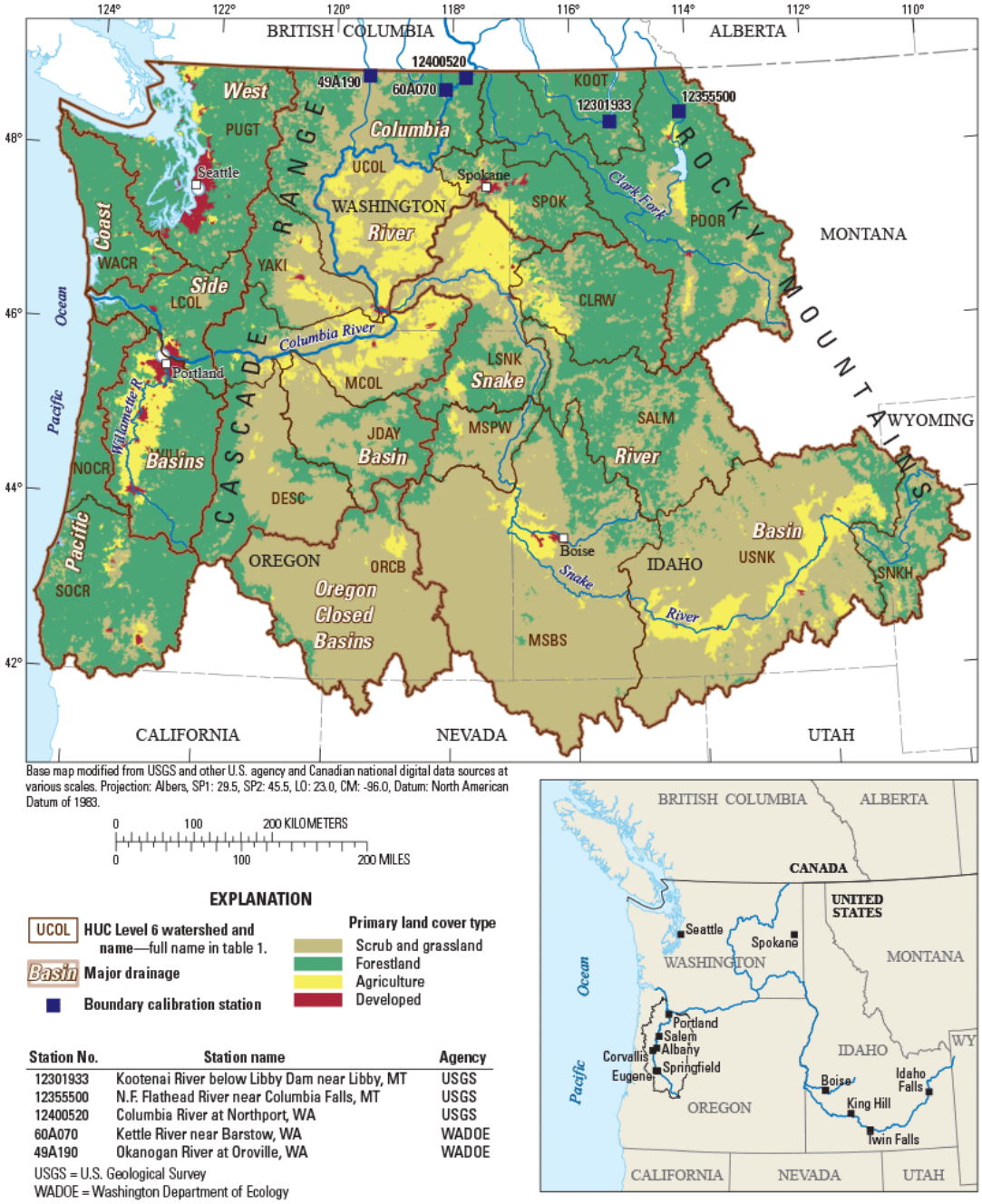
City of Bothell

SECTION 3

WATERSHED MANAGEMENT

Bothell's Watershed Setting:

Bothell is located in the Pacific Northwest area that drains to the Pacific Ocean, either directly or through the Columbia River system or Puget Sound. Bothell specifically drains to Puget Sound.



Base map modified from USGS and other U.S. agency and Canadian national digital data sources at various scales. Projection: Albers, SP1: 29.5, SP2: 45.5, LO: 23.0, CM: -96.0, Datum: North American Datum of 1983.

0 100 200 KILOMETERS

0 100 200 MILES

EXPLANATION

UCOL — HUC Level 6 watershed and name—full name in table 1.

Basin — Major drainage

Boundary calibration station

Primary land cover type

- Scrub and grassland
- Forestland
- Agriculture
- Developed

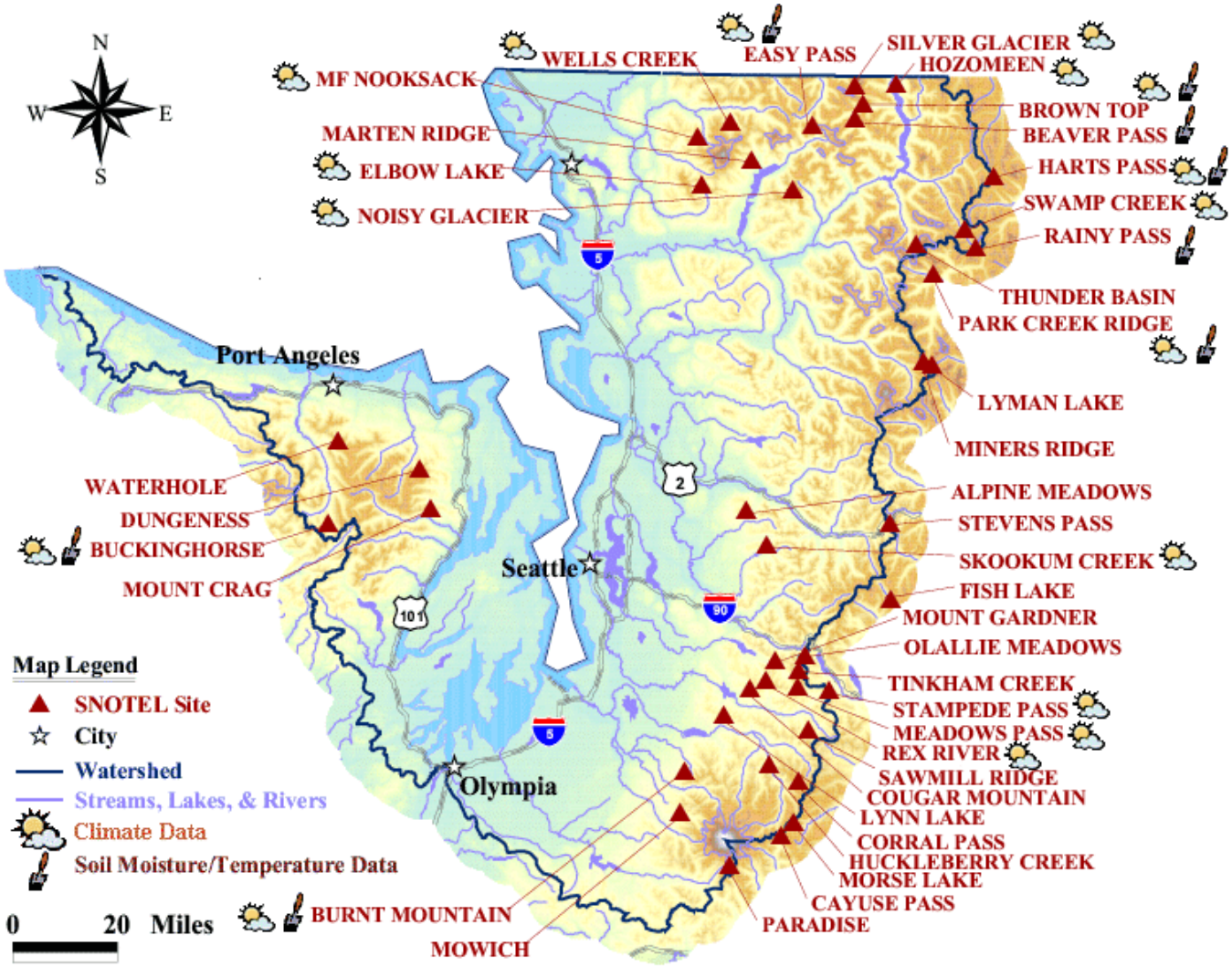
Station No.	Station name	Agency
12301933	Kootenai River below Libby Dam near Libby, MT	USGS
12355500	N.F. Flathead River near Columbia Falls, MT	USGS
12400520	Columbia River at Northport, WA	USGS
60A070	Kettle River near Barstow, WA	WADOE
49A190	Okanogan River at Oroville, WA	WADOE

USGS = U.S. Geological Survey
WADOE = Washington Department of Ecology

Pacific Northwest

Bothell is located in the west side basins of the Pacific Northwest region, and is part of the Puget Sound watershed. This 2,138 square mile watershed contains unique marine and fresh water habitat. The Sound is also home to about 4.3 million people who rely on its resources for recreation, food, transportation, and other basic needs.

Basins in this watershed are part of the Western Washington stormwater management area, which has a distinctly different hydrology than basins on the Olympic Peninsula or east of the Cascade Range. This difference is evident in the Western Washington approach to drainage and stormwater management permitted by the Washington State Department of Ecology.



WRIA 8

The city of Bothell is fully contained in the Lake Washington/Cedar/Sammamish Watershed (known as Watershed Resource Inventory Area or WRIA 8) of Puget Sound.

This WRIA is considered the most densely populated, developed and degraded watershed within Puget Sound Basin, yet is also home to some native populations of salmon and other migratory and resident fish. About 55 percent of the watershed area is within Urban Growth Areas, including 28 different municipalities. WRIA 8 supports a population expected to grow to 1.6 million people by 2022.

Most of the watershed character was originally influenced by glacial activity which created the hillsides, topography and soil characteristics. The glacial soils in Bothell include widespread fine grained glacial tills that are relatively impermeable, easily erodible, and relatively unstable. In addition to the glacial till, there are some areas of organic soils, including peat, that may influence water quality and sometimes affect flood management.

Development in WRIA 8 for human uses has dramatically altered aquatic habitat conditions and the processes that form and maintain them. The factors that limit salmon habitat are similar for the lakes, rivers, and creeks in the watershed, although the magnitude of impact varies by type of water body and specific watershed area. It is important to understand that the limiting factors interact with one another to worsen the habitat problems seen in the aquatic systems. The factors that limit habitat, degrade water quality and increase local flooding include:

- Altered hydrology (e.g., low base flows, higher peak flows following storms, and increased 'flashiness', which means more frequent and rapid responses when it rains)
- Loss of floodplain connectivity (e.g., reduced access to side-channels or off-channel areas due to bank armoring and development close to shorelines)
- Lack of riparian vegetation (e.g., from clearing and development)
- Disrupted sediment processes (e.g., too much fine sediment deposited in urban stream
- Loss of channel and shoreline complexity (e.g., lack of woody debris and pools)
- Barriers to fish passage (e.g., from road crossings, weirs, and dams)
- Degraded water and sediment quality (e.g., pollutants and high temperatures)
- Loss or degradation of fish habitat
- Reduced summer base flows due to changed infiltration and groundwater recharge

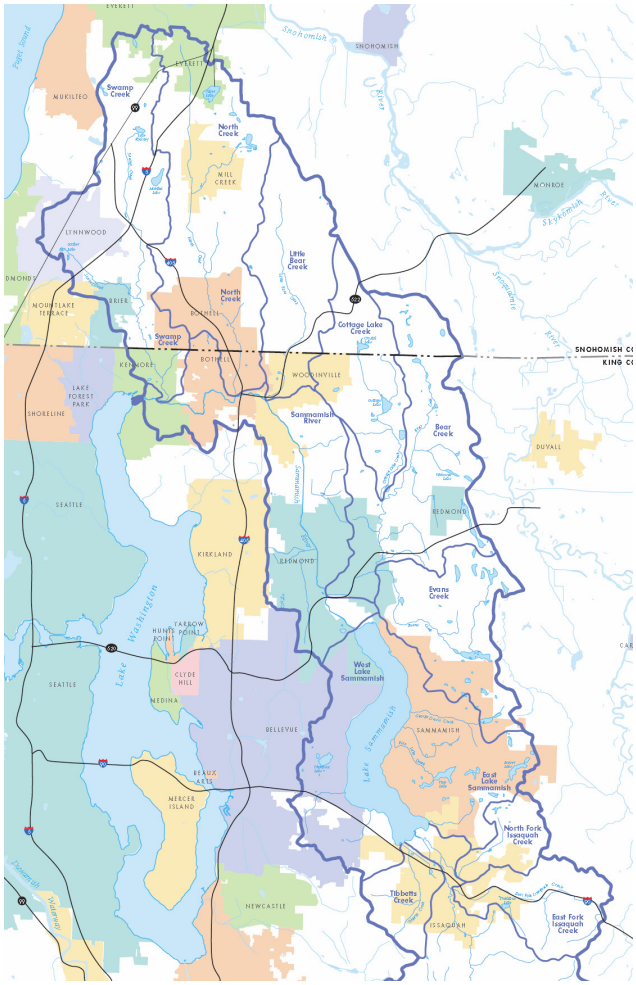
Bothell represents less than two percent of the total area within WRIA 8.

Sammamish River Basin

(Includes the following municipalities: Sammamish, Issaquah, Bellevue, Redmond, King County, Woodinville, Bothell, Lake Forest Park, Kenmore, Snohomish County)

The Sammamish watershed is part of the greater Lake Washington - Cedar River drainage, encompassing the land area in which rainwater drains to Lake Sammamish, the Sammamish River and out into Lake Washington.

The majority (about 98%) of Bothell drains to

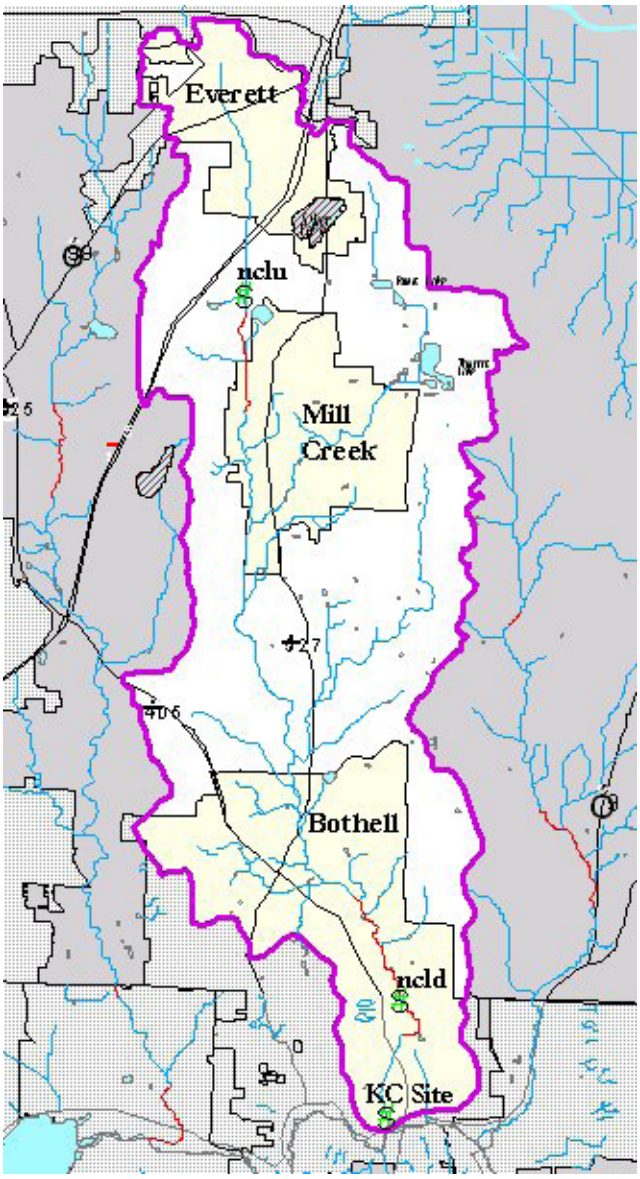


the Sammamish River, either directly or through North, Swamp, Waynita or Little Bear Creeks. A small portion (about 2%) of the southern part of Bothell drains into Juanita Creek through the city of Kirkland on its way to Lake Washington.

North Creek

(Includes municipalities of Everett, Snohomish County, Mill Creek, Bothell)

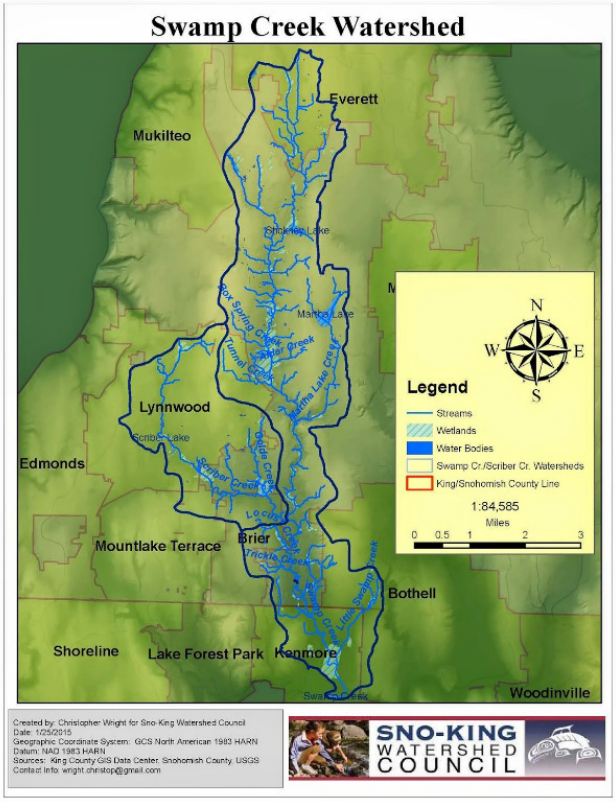
Bothell is located at the downstream end of North Creek where it confluences with the Sammamish River. North Creek begins in highly-urbanized south Everett near the Everett Mall and then flows through unincorporated Snohomish County and Mill Creek before reaching Bothell. The North Creek watershed includes about 28.5 square miles, of which two-thirds are in unincorporated Snohomish County.



Swamp Creek

(Includes municipalities of Everett, Lynnwood, Snohomish County, Brier, Bothell, Kenmore)

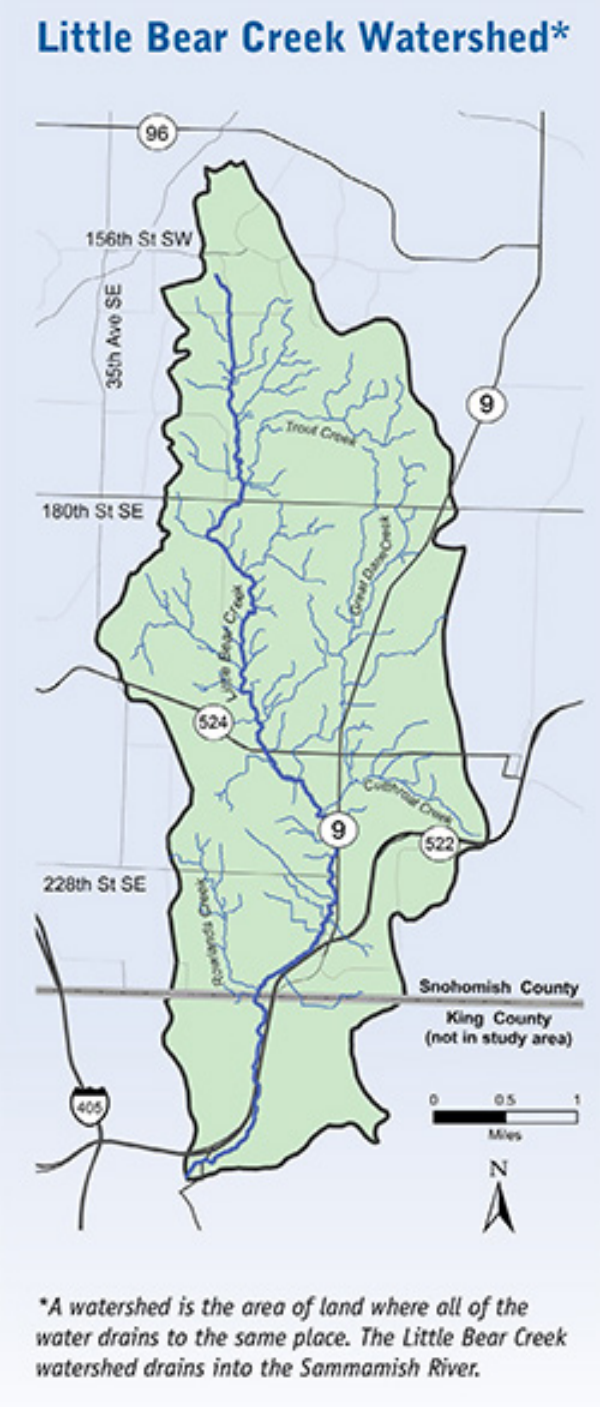
About 1.4 square miles (10%) of Bothell drains toward Swamp Creek on its way to the Sammamish River and Lake Washington in Kenmore. This amount represents about six percent of the overall Swamp Creek Basin.



Little Bear Creek

(Includes municipalities of Snohomish County, Woodinville, Bothell)

About 0.2 square miles (1.4%) of Bothell drains to Little Bear Creek on its way to the Sammamish River in Woodinville. This represents about one percent of the total Little Bear Creek watershed.



Juanita Creek

(Includes municipalities of Bothell, Kirkland)

About 0.7 square miles (5%) of Bothell drains to Juanita Creek in Kirkland on its way to Lake Washington. This represents about 10 percent of the 4224 acre Juanita Creek Watershed. A detailed analysis of the watershed was performed in August 2012 (Stormwater Retrofit Analysis and Recommendations for Juanita Creek Basin in the Lake Washington Watershed were developed by King County, the City of Kirkland, Ecology and WSDOT)

Bothell contains numerous small creeks and drainage basins that drain into North Creek, Swamp Creek, Little Bear Creek, Juanita Creek and the Sammamish River. These small areas sometimes support creeks and ecosystems that are important to the overall health of the larger environment. The condition of these individual basins varies greatly throughout the city depending on factors such as how developed the basin is or how protected the stream buffers and wetlands are.

Utility staff monitors the health of these basins and periodically produces a Stream Health Assessment report to help inform the public and policy makers on the condition of Bothell's streams. The latest report can be found on the City's website or obtained by contacting Utility staff.

Individual named basins identified by the Utility include:

- Royal Anne Creek
- Filbert Creek
- Maltby Hill Creek
- Spring Stream
- Middle Creek
- Palm Creek
- Perry Creek
- Queensborough (Crystal) Creek
- Woods Creek
- Boy Scout Creek
- Junco Creek
- Spring Stream
- Red Basin
- Parr Creek
- Horse Creek
- Little Swamp Creek
- Cougar High Creek
- Park and Ride Basin
- Little Bear Creek (not currently assessed)
- Blyth Creek
- E. Riverside Creek
- Riverside Creek
- Waynita Creek
- Juanita Creek (not currently assessed)
- Brickyard Creek

Watershed Management for Bothell - Utility-wide and Multi-Level Efforts

Surface watershed management in Bothell takes place at a wide range of levels, from individual inlets or catch basins to Utility-wide or regional management. Many design requirements, regulations, inspections, and education and outreach efforts are applied relatively equally throughout the Utility. In some cases, efforts focus on specific watersheds or sub-basins, of which there are at least 25 in the city. Some situations call for a regional approach to watershed management, such as response to listing of Chinook salmon through the region's Watershed Resource Inventory Area or WRIA approach. Other situations call for a very specific response, such as the City's approach to managing and developing the Horse Creek basin.

This section of the Plan Update presents an added approach to managing storm and surface water efforts in Bothell. The approach includes dividing the city into Surface Water Management Areas (SWMA's) - planning and management areas with similar characteristics, needs, strategies, and actions.

Some goals of the Utility's various watershed management approaches include:

- Protecting and improving health of the city's aquatic lands and surface waters
- Reducing stormwater impacts on developed properties by protecting and restoring natural surface water systems
- Meeting state and federal water quality requirements
- Efficiently deploying Utility resources

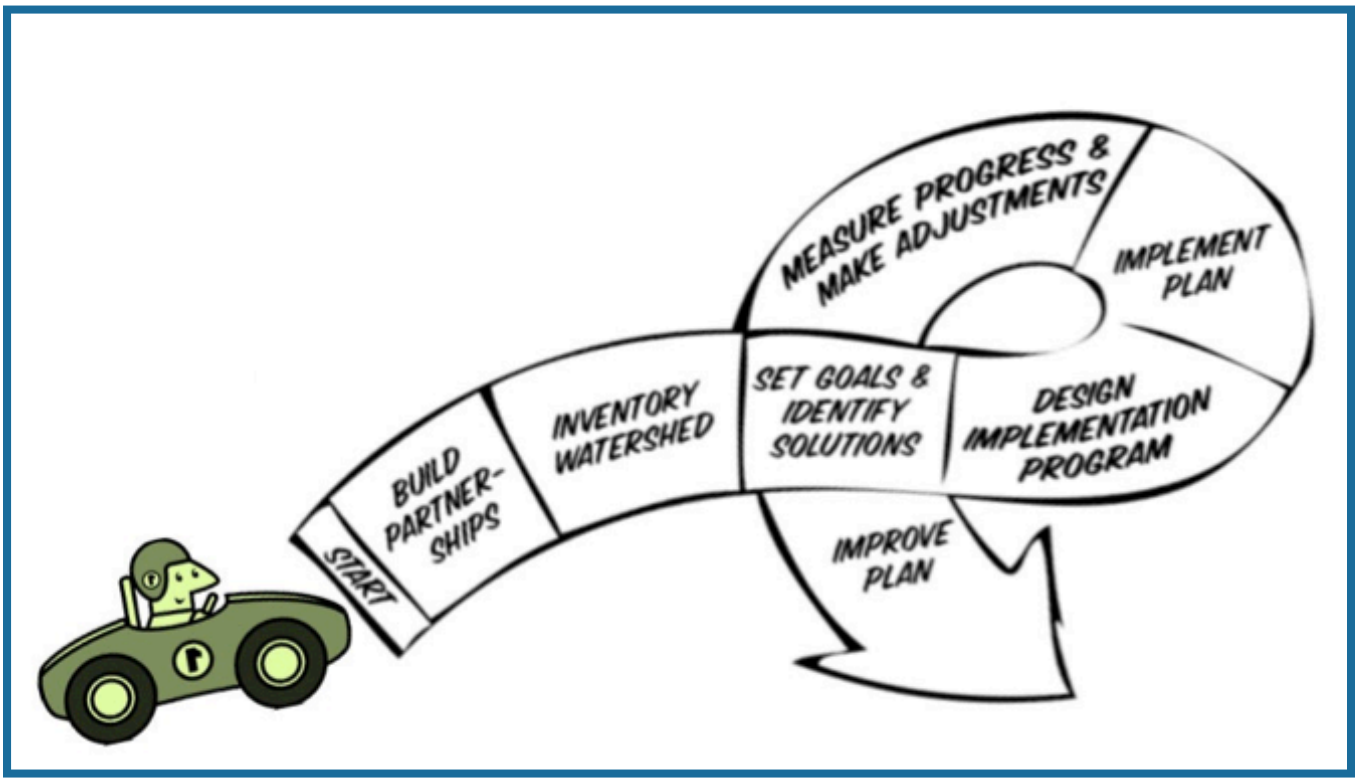


Figure 3: Source: A QUICK Guide to Developing Watershed Plans to Restore and Protect Our Waters – US EPA

The Utility's watershed management planning includes:

1) Identifying watershed units to be managed

   As mentioned, the city's watersheds are, and will continue to be, managed at a wide range of levels. This Plan Update introduces an intermediate management unit that subdivides the city into surface water management areas. This level of management can be used to focus much of the Utility's water quality, public outreach, and operations efforts.

2) Describing the conditions and attributes of watershed management units

   Various watershed units in and surrounding the city have been described in past stormwater master plans, the City's Comprehensive Plan and by several past reports, including:

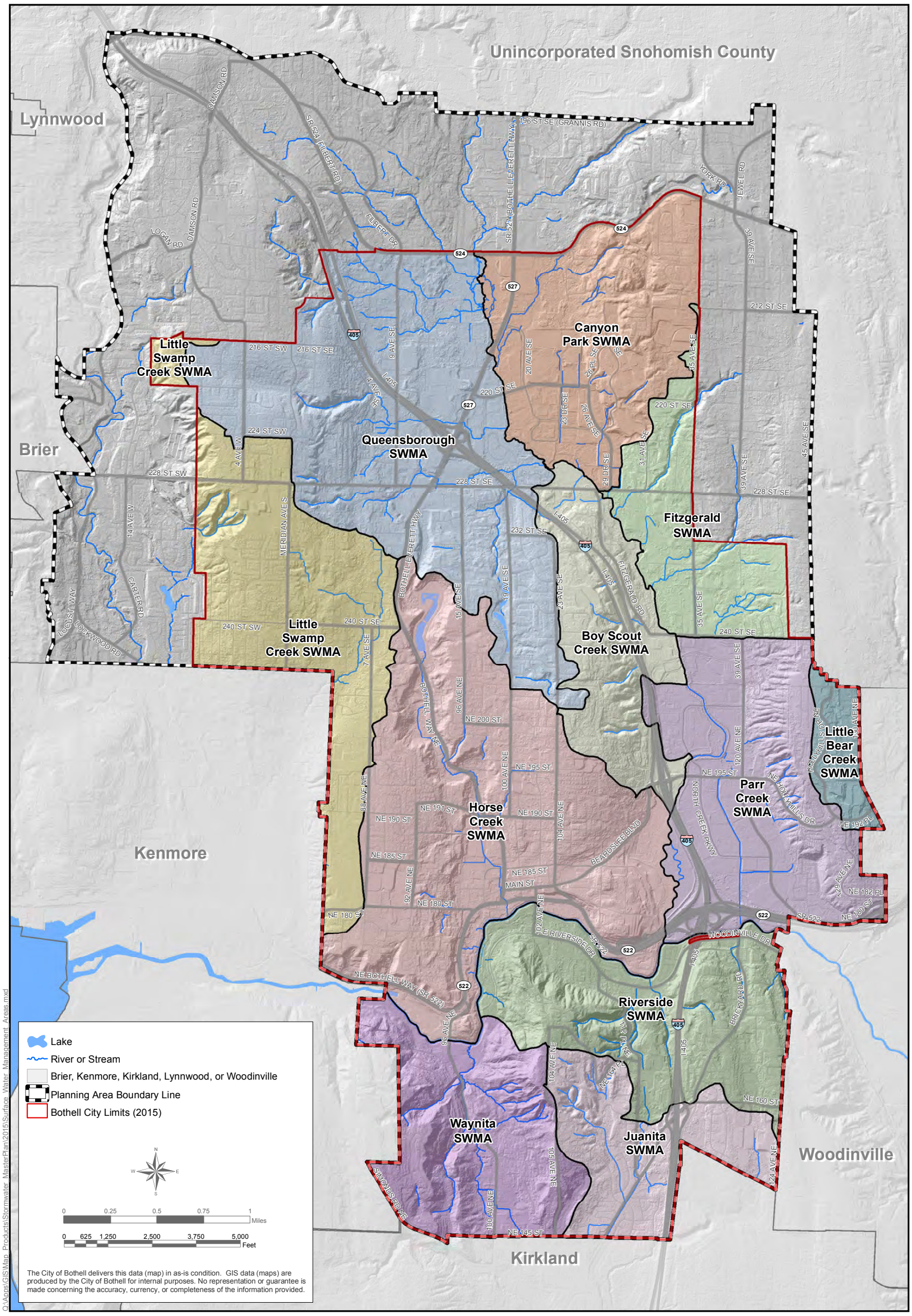
- North Creek Watershed Management Plan, September 6, 1994, by Snohomish County Public Works
- Surface Water Quality Plan, City of Bothell, 1996, by CH2M-Hill
- North Creek Drainage Needs Study, December 2002, Snohomish County
- Sammamish River Corridor Action Plan, 2002, Tetra Tech
- Swamp Creek Drainage Needs Report, 2002, Snohomish County
- Restoration Plan for the City of Bothell Shorelines, May 2012, The Watershed Company
- Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan, 2005, WRIA 8
- Stream Health Assessment Reports, City of Bothell Staff, 2010 through 2014

This Plan Update also describes the characteristics of each SWMA by compiling GIS-based land use data, natural environment information and stream monitoring reporting. This information is organized by SWMA in Appendix B.

3) Identifying goals, expectations, strategies, and action plans for watershed management units

Watershed goals and action plans have been developed at various levels for Bothell watershed units:

- As part of the region's salmon recovery plan, Bothell is a participant in watershed planning for the Cedar-Sammamish Watershed Resource Inventory Area 08.
- The City has participated in regional efforts with Snohomish County and surrounding jurisdictions to address management of North Creek. Efforts have been done to identify goals and expectations for the Sammamish River, Juanita Creek, and Swamp Creek. A watershed plan is currently being performed for Little Bear Creek, led by Snohomish County.
- The State, as part of water quality regulations, has established water quality plans for Swamp Creek, North Creek and the Sammamish River.
- The City has prepared city-wide efforts for watershed management as part of its critical areas planning. In addition, the City has prepared a North Creek Fish and Wildlife Critical Habitat Protection Area to address, in part, watershed goals for a roughly 220 acre area of the city.
- This Plan Update presents initial draft goals and expectations by Surface Water Management Area (SWMA).



Bothell Storm and Surface Water Master Plan Update – 2015

Surface Water Management Areas

City of Bothell

Addition of a Surface Water Management Area Approach

In establishing and using SWMA's, the Utility will not be eliminating other levels of management where appropriate. Much information that is collected and monitored will continue to be done at various levels. Basins will still be tested for water quality. Built drainage systems will still be managed at the inlet and pipe level. The City will still regulate at a range of levels based on physical characteristics and need.

The SWMA approach, however, will allow customization and prioritization of many Utility efforts based on needs and conditions within each area.

Pros and Cons of a SWMA Approach:

A surface water management approach by SMWA may provide the following benefits:

- Water Quality: Focusing and limiting water quality efforts to a specific area or SWMA with similar overall surface water characteristics may improve watershed health because action plans can be designed to match the SWMA's unique needs and characteristics.
- Education and Outreach: Designing and delivering education and outreach efforts based on land use and surface water conditions of each SWMA may improve relevance of the messaging of the outreach.
- Maintenance: Tailoring maintenance efforts to match the needs of each SWMA may improve effectiveness and efficiency by adjusting levels of effort for tasks such as street sweeping and catch basin cleaning to match the conditions of each SWMA.
- Funding: Prioritizing restoration, protecting, and rehabilitation efforts by SWMA may result in improved access to grant funding and effective use of Utility funds by demonstrating the Utility's focus on needs within a specific SWMA..

The SWMA approach may result in the following issues:

- Complexity and Cost: Increased complexity, due to having an additional level of management, may add some costs or time for Utility staff to design and tailor efforts to the SWMA level.

(However, other than the costs associated with creating and using SWMA's, the SWMA approach should not add new tasks or surface water efforts that the Utility should not already be undertaking to address water quality and watershed management.)

- Equity and Prioritization of Efforts: Managing surface water at the SWMA level could be perceived as inequitable to rate-payers because surface water rates are assessed at a constant level throughout the Utility. A SWMA approach might highlight more spending in some SWMA's than other SWMA's to address specific water quality or education and outreach efforts or to address higher maintenance needs.

(The Utility's current spending, however, is faced with the same issue because it spends funds and efforts where there are problems. The Utility does not equally spread its efforts across the city, but focuses its efforts where they are needed. The end result of the Utility's spending, however, is designed to improve water quality and protect properties throughout the city.)

Prioritized Efforts within SWMA's:

The SWMA approach outlined in this Plan Update does not prioritize any SWMA over others. It does, however, develop area-based strategies and actions prioritized to recover water bodies.

Definition of Surface Water Management Areas

A surface water management area (SWMA) should not be confused with a watershed. A watershed is a physical basin or an area of land that usually drains to a specific stream, river, or lake. It is defined by a fixed, mapped area created by topography and drainage flows.

SWMA's are planning areas that the Utility created because these areas have enough similarity to be managed in common ways to promote efficiency and effectiveness. SWMAs are planning areas similar to the Neighborhoods in the City's Comprehensive Plan, but SWMA's are focused on storm and surface water management.

Some considerations the Utility used in dividing the city into SWMAs include:

- The city should be divided into a manageable number of SWMAs:

  If there are too many WMAs, it will result in too complex a management system to be valuable. If there are too few SWMAs, programs will not be tailored specific enough to provide a benefit.
- The SWMAs should have relatively similar characteristics and needs:

  A SWMA does not need to be uniform. In fact, it is not really practical to divide up the city into areas with the same land use or other characteristics. However, a WMA should have similar enough characteristics to call for tailored management efforts.
- SWMAs can include multiple watersheds and parts of watersheds

  There may be several streams within a SWMA and each stream has its own characteristics. In some cases, a stream may cross over from one SWMA into another. In many cases, streams start or end outside of the city limits. These situations are acceptable. The primary purpose of the SWMAs is to divide the city into useful management units.

Customized Efforts by SWMA:

Establishing Surface Water Management Areas provides the Utility with an additional tool to focus and communicate efforts where they will have the most value. For example, a SWMA may be mostly comprised of single family homes with few natural creeks, limited stream buffers and wetlands, and an older built drainage network. In this area, the Utility might focus outreach and education efforts on things that homeowners can do to help water quality and reduce runoff, such as yard care and rain garden installation. In another SWMA that is comprised of mostly business parks and some natural streams that flood periodically, the focus may be outreach and education on stream awareness, business and property management practices that affect water quality, and employee opportunities to participate in surface water efforts.

Selection of Surface Water Management Areas:

Once the Utility staff considered possible ways to use SWMA's, it began to divide the city into management units. The evaluation started by simultaneously looking at land use, topography, creek basins, and known geographic features. Using this information, staff grouped areas together to form SWMA's. These areas have the following general characteristics:

- Are roughly based on drainage basins but are not necessarily limited by the basins themselves
- May split up drainage basins into more than one SWMA
- Are limited by city boundaries (at this time, the SWMAs do not extend into the city's urban growth area)
- Include enough common storm and surface water management features to warrant a tailored management strategy

Eleven potential SWMAs were outlined by staff and named based on their prominent creek or land use. These SWMAs include the following, starting at the north end of the city:

1. Canyon Park SWMA
2. Queensborough SWMA
3. Little Swamp Creek SWMA
4. Fitzgerald SWMA
5. Boy Scout Creek SWMA
6. Horse Creek SWMA
7. Parr Creek SWMA
8. Little Bear Creek SWMA
9. Riverside SWMA
10. Waynita SWMA
11. Juanita SWMA

The characteristics of these SWMAs are described and potential management strategies are developed for each of the areas. These descriptions and potential strategies are provided in Appendix B.

Next Steps:

Utility staff will prepare plans for each SWMA. The efforts will be integrated into an overall water quality action plan for the Utility. The steps for developing the plans for the SWMAs include:

a) Identifying watershed goals within each SWMA. Examples of goals might include:
   - Specific water quality levels and stream health for monitoring stations/streams in a SWMA
   - Targeted amount and quality of aquatic habitat within an SWMA
   - Desired reduction/limit of impervious surface coverage within the SWMA

b) Establishing measurements/indicators for each goal. Examples might include:
   - Stream health and water quality testing and observations
   - Wetland and stream buffer assessments
   - GIS-based land cover assessments

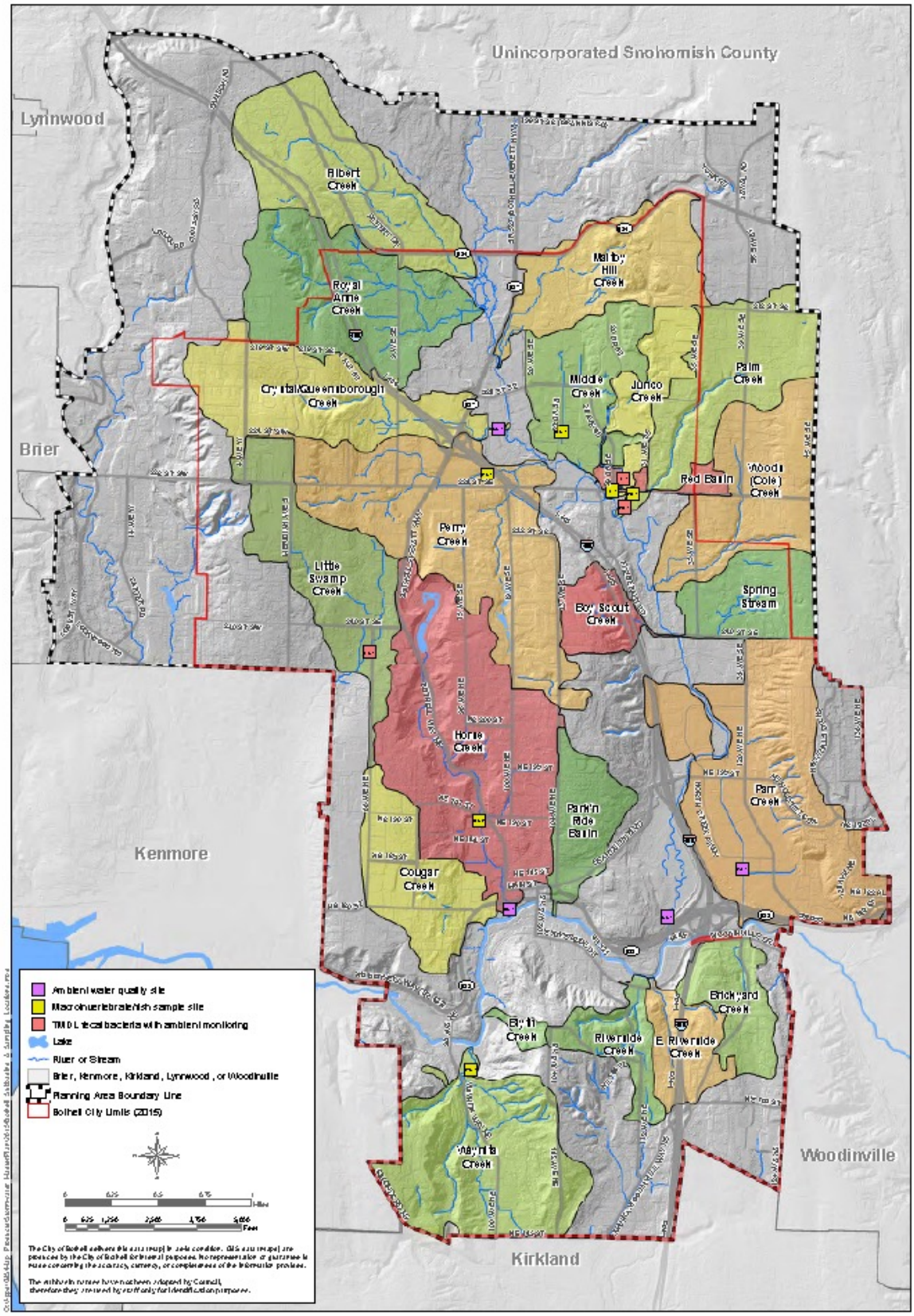
c) Defining management activities that may achieve goals. Examples might include:
   - Education and outreach programs targeted to specific pollution-generating activities or problems within the SWMA
   - Maintenance activities, such as street sweeping, catch basin cleaning, and facilities maintenance, focused on specific areas or issues where problems are identified
   - Retrofitting facilities and reducing existing impervious areas to minimize storm runoff
   - Increased focus on stormwater code enforcement in problem areas, including illicit discharge elimination
   - Development or refinement of specific land planning and development efforts to address the goals of each SWMA

d) Estimating technical and financial needs and available resources to implement the plan for each SWMA.
   - This effort will likely require revisiting the goals and management activities for each SWMA to align with the Utility's financial and technical capacity.

e) Describing and defining interim, measurable milestones, and schedules for these milestones.

f) Developing a monitoring and reporting plan for each SWMA.

g) Implementing the watershed actions for each SWMA.



2015 Stormwater Master Plan

Bothell Subbasins and Samping Locations

City of Bothell

SECTION 4

FINANCIAL MANAGEMENT

Financial Overview

This limited financial program review for the Plan Update focuses on the following:

1. An overview of the Utility's projected expenses and revenues
2. Rate Path
3. Financial Policies
4. Financial Performance Expectations

Expenses:

The Bothell Storm and Surface Water Utility funds most of the Utility's day-to-day storm and surface water activities as well as projects that support the built and natural storm and surface water systems. In addition to paying for operations and projects, the Utility pays back the cost of loans and bonds that are used to finance projects not appropriately funded by cash.

Like other City utilities, Storm and Surface Water pays excise tax. However, it does not currently pay a City utility tax.

In addition to paying for operations and projects, the Utility funds replacement of worn out storm infrastructure. These funds are tracked as depreciation expenses and are currently added back into the Utility's year-end cash balance if they are not used to replace depreciated infrastructure.

Revenues:

Rates: The primary source of funds for the Utility come from rate payers, who pay an annual fee based on the extent that their property is developed. These revenues first go to annual operating expenses, taxes and debt repayment. Any rate revenues that exceed these annual expenses are available to fund projects. In 2014, the Utility collected $4,424,373 in rate revenue. By 2020, based on assumed rate increases and growth, rate revenues are expected to be about $5.85 million.

Capital Facilities Charges: In addition to rate revenue, the Utility collects stormwater capital facilities charges for new development to connect to the Utility storm drain system. Capital facilities charges are one-time revenues that are highly dependent on the market activity that affects development. These one-time revenues must be used only to fund capital projects.

Two facilities charges were established in 2011 – a city-wide charge and a Downtown sub-basin charge. These charges fund a stormwater capital improvement fund. In 2014, the Utility collected $170,467 in city-wide charges and $224,353 in Downtown sub-basin charges.

Loans and Bonds:

When necessary to provide cash for large projects and to be fair to current and future ratepayers, the Utility accesses loans or seeks revenue bond funds to finance projects. The cost of projects financed through these sources is then repaid by the Utility over time through its debt repayment expense. The Public Works Trust Fund administered by the State Public Works Board has been a past source of project financing for the Utility. In 2014, the Utility received $564,022 in Public Works Trust Fund loan proceeds and $5,548,562 in revenue bond proceeds.

Grants:

Grants are sought by the Utility to the extent practical to partially fund projects and programs. These grants may come from federal or state agencies such as the Environmental Protection Agency, Federal Emergency Management Agency, or State Department of Ecology (Ecology). The Utility also accesses grants from county districts like the King Conservation District and King County Flood Control District. In 2014, the Utility received $126,141 in grant funds from Ecology and FEMA for local programs. It received $88,700 from King Conservation District and the State Recreation and Conservation office to fund the design of a Sammamish River side channel restoration.

Beginning in 2012, the Utility began obtaining a recurring Local Source Control grant administered by Ecology. The grant funds a local source control specialist in the Utility who provides technical assistance to small businesses that generate small quantities of hazardous materials. In 2014, the Utility received $84,513 from Ecology for the Local Source Control program.

Other:

A small amount of funding is collected each year by the Utility for permits and fees. In 2014, this amounted to $28,789.

Rate Path:

1995-2007: Beginning on January 1, 1995, the Utility imposed charges on all developed property in the city based on the extent that the property is covered by impervious surface. Since 1995, the rates have been subject to annual review by the City to assure that the revenue they generate is adequate to meet the Utility's needs. For the first 11 years, rates increased moderately.

2008-2013: In 2008, a significant (42%) rate increase was enacted to allow the Utility to meet new requirements under the federal Clean Water Act NPDES program. Rates were steady from 2008 until 2011, when a thorough rate analysis was performed. The 2011 rate analysis included development of a rate model that looked at operations and capital needs through 2018. The analysis recommended substantial increases in 2012 (15%) and 2013(13.74%). Rates were raised by eight percent in 2012 and 15 percent in 2013.

Addition of capital facilities charges in 2012, offset some of the need to use rate revenues to fund the Utility's capital needs. In 2012, the Utility collected $211,907 in city-wide charges. In 2013, the city-wide charges revenue increased to $276,574 and the Downtown charges began to come in at $367,836. In 2014, city-wide charges dropped to $170,467 and the Downtown charges dropped to $224,353.

Two significant changes that reduced the projected need for a rate increase in 2014 include:

- **Billing Corrections:** In 2013, Utility staff reviewed customer bills and corrected inaccuracies for some properties. This audit resulted in an increase in rate revenue of about $290,000 per year beginning in 2014.
- **Elimination of Credits for Maintenance:** In 2013, the Utility eliminated reductions against rate charges for non-single family properties that maintain their stormwater detention facilities. Elimination of this rate reduction resulted in an increase in revenue of about $185,000 per year beginning in 2014.

Horse Creek Project: Increased costs of the Horse Creek project partially offset the reduced needs created by billing corrections and elimination of credits. In 2014, the Utility expended $6,640,270 toward the Horse Creek project. By the time the project is substantially complete in 2016, the Utility will have expended nearly $18 million for its construction. This expense will be partially off-set through the

Downtown capital facilities charge, which is currently projected to generate about $7 million through 2020.

The Utility will receive bond proceeds of $12.5 million by the end of 2016 to finance the project and downtown stormwater revitalization work. These revenue bonds created a long term debt repayment obligation to the Utility of about $0.9 million per year over the next 20 years. This debt repayment is projected to be paid through rates revenues.

Annexation:

On February 28, 2014, Bothell annexed 1,005 acres from unincorporated King County. The annexations increased the service area of the Utility and increased the rate revenues by about $400,000 per year for the Utility.

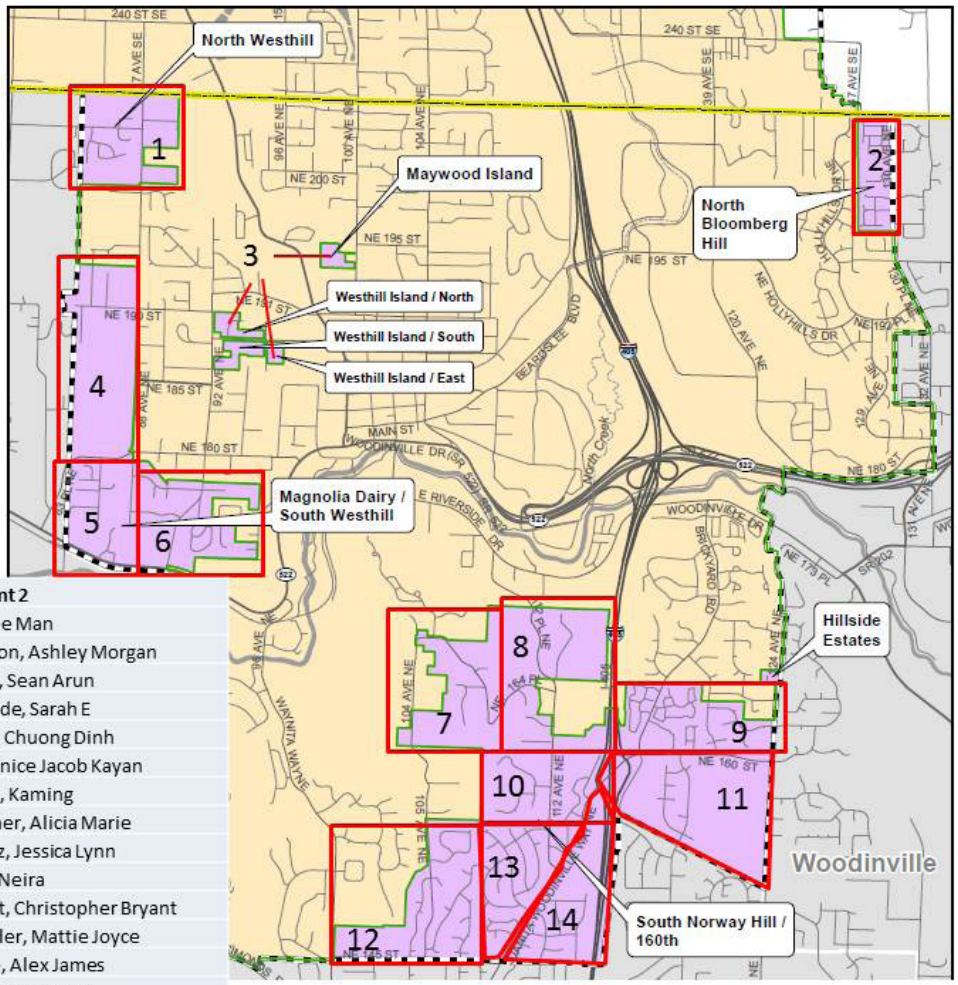
Internal review by Utility staff before and after the annexations indicate that the effects of the annexations were rate-neutral if no significant capital spending is needed in the newly annexed areas.

Projected Rates 2016 – 2020:

To address the increased costs of the Horse Creek project, the Utility is anticipating recommending a nine percent rate increase in 2016 and a five percent increase in 2017. Following these two projected increases, the Utility is projecting a two percent per year increase in rates through 2021 to account for increased program needs and project funding.

The projected rates assumes that the Utility's rate base will increase by one percent per year due to growth through development.

New Bothell Annexations



Student Research Pairs

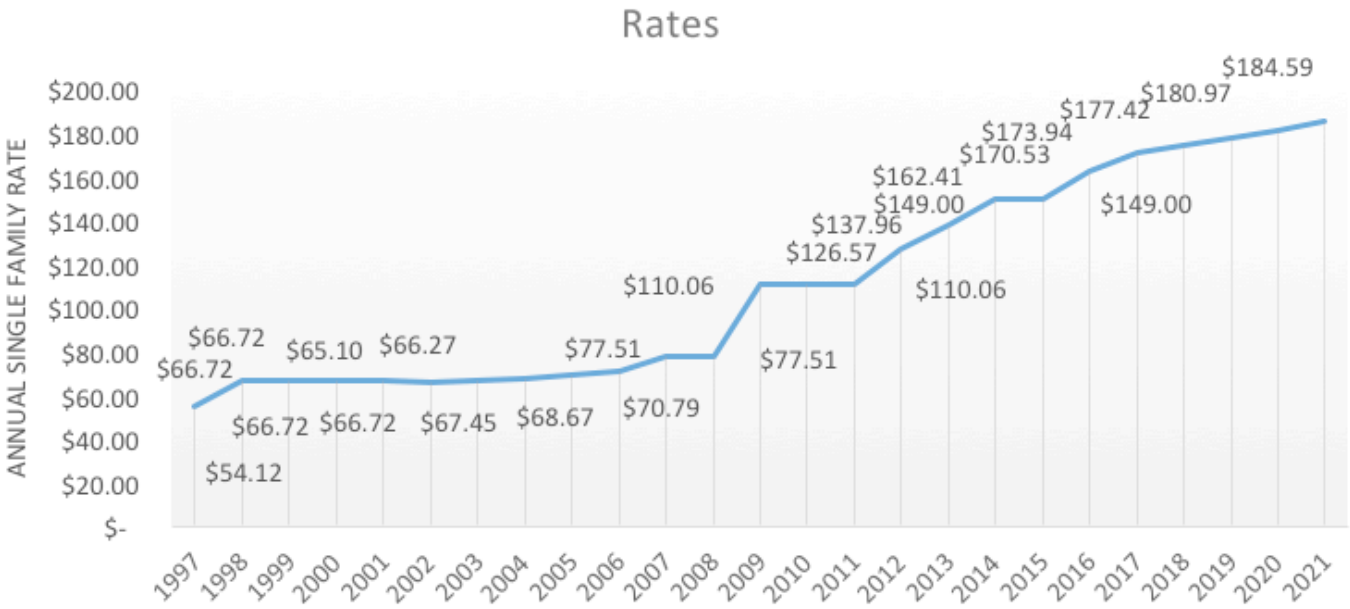
UWB – Suzan Yu and Henry Situ

Site #	Student 1	Student 2
1	Chuang, Tiffany Sheau-Zo	Liu, Yee Man
2	Barnts, Taylor Rae	Brandon, Ashley Morgan
3	Murray, Spencer Jonathan	Naidu, Sean Arun
4	Dunn, Thomas Lee	Verlinde, Sarah E
5	Chan, Dexter Hoi Cheung	Pham, Chuong Dinh
6	Fox, Grace Emily	Jap, Janice Jacob Kayan
7	Lehner, Evan Christopher	Yeung, Kaming
8	Malik, Samar Ahmad	Messner, Alicia Marie
9	Selch, Shari Germaine	Valdez, Jessica Lynn
10	Nativo, Bernadette Anna	Tirak, Neira
11	Sanayei, Mehrgon Mark	Wright, Christopher Bryant
12	Niblack, Caitlin Adrien	Wheeler, Mattie Joyce
13	Free, Shauna	Searle, Alex James
14	Walker, Echo Dawn	Zukanovic, Adila

No annexations or other significant rate base additions are assumed in the rate projections.

Other significant assumptions in the projected rate path for 2016-2021 include:

- Salary costs increase at two and a half percent per year
- Personnel benefits costs increase five percent per year
- Additional Operations staff are added in 2017 and 2020 (total of 2 FTE) to accommodate system expansion
- Service costs increase by 2.5 percent per year
- Operations costs inflate by three percent per year
- Operations costs also increase by $192,000 in 2017 and $93,000 in 2020 to accommodate system expansion



Class	Impervious Surface %	2013 Rate	2014 Rate
Residential	N/A	$137.96 per parcel/year	$149.00 per parcel/year
Very Light	>0% to <10%	$137.96 per parcel/year	$149.00 per parcel/year
Light	>10% to <20%	$321.83 per acre/year	$347.58 per acre/year
Moderate	>20% to <45%	$667.60 per acre/year	$721.01 per acre/year
Moderate Heavy	>45% to <65%	$1,289.34 per acre/year	$1,392.49 per acre/year
Heavy	>65% to <85%	$1,634.08 per acre/year	$1,764.81 per acre/year
Very Heavy	>85% to 100%	$2,142.23 per acre/year	$2,313.61 per acre/year
City Streets	N/A	Set in accordance with RCW 90.03.525	Set in accordance with RCW 90.03.525
State Highways	N/A	Set in accordance with RCW 90.03.525	Set in accordance with RCW 90.03.525
Undeveloped	0%	Exempt	Exempt

Financial Policies:

The Utility's rates are controlled by fiscal policies that identify its financial needs. These policies help the Utility establish funding levels and manage uncertainty in cash flow, project costs, and potential revenue shortfalls.

Revenue Requirements:

The Utility recommends rates to the City Council to assure that it remains self-sufficient. Its expenditures are controlled through the City's biennial budget, which currently covers 2015-2016. Revenue requirements are generally recommended by Utility staff to assure that the Utility maintains and adequate cash balance to cover its ongoing and project expenses. The Utility also assures that it has cash reserved to address fluctuations in customer bill payment, emergencies, unforeseen costs and long term asset replacement needs. In 2014, the Utility's reserves totaled about $1.9 million.

Rates:

Each year, the Utility is obligated to present information to the City Council so that it may review the charges for sufficiency.

Bothell Municipal Code 18.10.110 D:

Annual Review of Schedule. The city council will review the surface water management service charges annually to ensure the long-term fiscal viability of the program and to guarantee that debt covenants are met. The program shall use equitable and efficient methods to determine service charges.

The last rate review by City Council was on November 18, 2014. No change to the prior rates was recommended or enacted at that time.

Reserves:

The following fiscal policies relating to reserves are included in the City's Capital Facilities Program:

Operating Reserve: The Utility reserves cash to meet the short-term payment needs such as payroll. Because the Utility currently collects its primary revenues from rates through Snohomish and King County property tax billings, there is a considerable lag in receipt of these rate revenues throughout the year. To cover its cash operating needs, the Utility maintains a reserve of 120 to 150 days of cash for operating expenses. In 2014 this amounted to $830,747.

Capital Emergency Reserve: capital fund includes the balances from two accounts, the capital contingency reserve and the capital reserve. A capital emergency reserve is an amount of cash set aside for emergencies, should a piece of equipment or a portion of the Utility's infrastructure fail unexpectedly. The Capital Emergency Reserve is set at two percent of the value of the Utility's infrastructure and was $265,507 in 2014.

Capital Reserve: In addition to the capital emergency reserve, the capital reserve is intended to provide an extra buffer for capital project cost overruns. For the Utility, the minimum target capital reserve fund balance is set at 10% of the two year average capital cost (average between current year and the following year). In 2014, the capital reserve was $804,018, primarily due to significant capital spending for the Horse Creek project.

Projects Funding: The Utility has operated on a combination of debt financing and cash to fund projects. Most small to medium Utility projects have been paid through cash

that the Utility has on hand from rates and grants. Recently, the Utility participated with the Water and Sewer utilities (the City created a combined utility in 2014) to issue revenue bonds to finance the Horse Creek and downtown revitalization projects. This financing allows the utilities to spread the cost of this significant work out over many years and keep rate changes to a minimum.

For all other project anticipated by the Utility in 2015-2021, this Plan uses a pay-as-you-go approach that pays for projects with cash and grants. Cash for these projects generally comes from rate revenues and anticipated facilities charges. Projects that rely on facilities charges and/or grants will not proceed if these charges or grants are not received.

Asset Replacement: The Utility funds the replacement of aging system facilities by establishing an annual expense for depreciation. Through 2014, the depreciation expense has been added back into the Utility as cash balance at the end of the year. This approach assumes that the projects completed by the Utility have contributed an amount at least equal to the annual depreciation towards the lifecycle value of the Utility's assets.

Debt Coverage: The City owns, operates and maintains a Combined Utility System (water, sewer, storm and surface water); the coverage requirement will be a function of the combined rate revenue compared with combined operating expenses and annual revenue bond debt service. Bond covenants typically establish a minimum debt coverage ratio as a means of protecting an agency against the risk of nonpayment. For any future bond issues, it is assumed that the stormwater utility would be required to meet the 1.25 revenue bond coverage ratio.

Financial Performance for 2015-2016 Budget

During 2015-2016, rate revenues are expected to provide about $9 million, which will fund operating expenses of about $6.2 million and debt payment of about $2.5 million.

The 2015-2016 Utility budget includes about $12.5 million in project costs. Debt is being used to provide about $7.2 million in cash for projects in 2015-2016. About $2 million of project costs is anticipated to be funded through grants. Capital Facilities Charges are expected to provide about $0.9 million.

Combined operating and project costs during 2015-2016 are expected to exceed revenues by about $1.2 million. This situation is expected to begin to reverse in 2017.

Projected Financial Performance for 2017-2020

At the end of 2017, the Utility is expected to improve its cash situation due to the winding down of the downtown project spending.

By 2018, the Horse Creek and Downtown projects are expected to be substantially complete, freeing up Utility revenues. Also, during 2018, the Utility is projecting to receive over $3 million in downtown facilities connection charges from new development in the downtown area.

By the end of 2018 the Utility should have enough cash to cover its reserves after funding about $1.8 million in additional projects and setting aside an accumulated asset replacement fund of $1,764,100.

For 2019 through 2020, the Utility is expected to continue to generate sufficient revenues to cover its ongoing expenses, debt payments, and reserves, while accumulating about $2.4 million toward new projects. During this period, the

Utility should be able to accumulate another $0.9 toward asset replacement, for a cumulative total of about $2.7 million.

By the end of 2020, the Utility should have about $4.8 million in total cash. Of this $4.8 million, $2.7 should be available for asset replacement and about $2 million will be restricted as reserves. This leaves little to no unrestricted cash balance at the end of 2020 to deal with the following:

- Uncertainty in the cost associated with new NPDES regulations to be issued in 2018
- Variability in Project costs
- Unforeseen flood or other emergency events

If these or other unforeseen events occur, the Utility would need to consider reducing other expenses, delaying projects or recommending additional rate increases.

Significant assumptions for the 2017-2020 period include:

- Rate increases will be approved by the City Council, including:

  9% in 2016

  5% in 2017

  2% per year 2018-2020

- No significant changes in the Utility's program will occur as a result of changes in regional, state or federal requirements or City policy.
- The downtown area will develop and generate significant facilities charge payments as follows:

  $287,010 (2015)

  $440,696 (2016)

  $700,510 (2017)

  $3,167,046 (2018)

  $1,499,107 (2020)

The following table provides an overview of the Utility's financial overview for 2015-2020. Actual financial information for 2014 is included for comparison and background.

Storm and Surface Water Utility Financial Overview for 2014-2020

Revenues	Actual	Budgeted		*Projected*			
	2014	2015	2016	2017	2018	2019	2020
Rates Revenues	$ 4,424,373	$ 4,584,788	$ 5,047,393	$ 5,352,760	$ 5,514,413	$ 5,680,948	$ 5,852,513
Grants	$ 296,098	$ 196,899	$ 1,987,644	$ 161,661	$ 169,146	$ 150,487	$ 162,752
Citywide Facilities Charge	$ 170,467	$ 150,000	$ 150,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
Downtown Facilities Charge	$ 224,353	$ 287,010	$ 440,696	$ 700,510	$ 3,167,046	$ -	$ 1,499,107
Loans and Bond Proceeds	$ 6,112,584	$ 5,468,978	$ 1,718,438	$ -	$ -	$ -	$ -
Other	$ 579,289	$ 27,909	$ 27,909	$ 29,304	$ 29,304	$ 30,770	$ 30,770
Total Revenues	**$11,810,419**	**$10,715,583**	**$ 9,372,080**	**$6,344,235**	**$8,979,910**	**$5,962,205**	**$ 7,645,141**

Expenses	Actual	Budgeted		*Projected*			
	2014	2015	2016	2017	2018	2019	2020
Operating	$ 3,085,687	$ 3,119,890	$ 3,280,448	$ 3,695,835	$ 3,731,738	$ 3,928,189	$ 4,051,983
Taxes	$ 74,877	$ 94,080	$ 117,082	$ 122,936	$ 122,936	$ 129,083	$ 129,083
Projects	$ 6,848,004	$ 6,150,000	$ 6,358,715	$ 843,941	$ 1,908,388	$ 681,907	$ 1,758,502
Debt Repayment	$ 1,533,155	$ 955,049	$ 953,281	$ 955,481	$ 951,881	$ 952,931	$ 952,731
Asset Replacement	$ 441,747	$ 428,000	$ 431,000	$ 452,550	$ 452,550	$ 475,178	$ 475,178
Total Expenses	**$11,983,469**	**$10,747,019**	**$11,140,526**	**$6,070,743**	**$7,167,493**	**$6,167,287**	**$7,367,476**

Yearly Fund Balance	Actual	Budgeted		*Projected*			
	2014	2015	2016	2017	2018	2019	2020
Beginning Cash Balance	$ 1,798,536	$ 1,770,918	$ 2,167,482	$ 830,036	$ 1,556,078	$ 3,821,044	$ 4,091,140
Revenues	$ 11,810,419	$ 10,715,583	$ 9,372,080	$ 6,344,235	$ 8,979,910	$ 5,962,205	$ 7,645,141
Expenses	$ 11,983,469	$ 10,891,019	$ 11,140,526	$ 6,070,743	$ 7,167,493	$ 6,167,287	$ 7,367,476
Asset Replacement Contrib.	$ -	$ 428,000	$ 431,000	$ 452,550	$ 452,550	$ 475,178	$ 475,178
End Cash Balance	**$1,770,918**[12]	**$ 2,167,482**	**$ 830,036**	**$1,556,078**	**$3,821,044**	**$4,091,140**	**$4,843,982**

Rates	Actual		*Projected*				
	2014	2015	2016	2017	2018	2019	2020
Monthly Single Family	$ 12.42	$ 12.42	$ 13.54	$ 14.21	$ 14.50	$ 14.79	$ 15.08
Percent Change	8%	0%	9%	5%	2%	2%	2%

[12] *Difference between beginning cash and ending cash in 2014 includes an adjustment for annualized capital expenses.*

SECTION 5

PRIORITY ACTIONS

Priority Actions

This final section of the Master Plan Update presents prioritized action items for the Utility to address. The importance of the action items are prioritized as:

"Critical" - These items are essential to the ongoing mission of the Utility.

"High" - These actions are highly valuable for the Utility in pursuit of its mission.

"Medium" - These items generally help the Utility achieve its mission.

Action items are listed in the following tables.

A detailed description of each Action Item is provided in Appendix C.

Action Items Implementation Costs and Spending Schedule

#	Name	Costs in Thousands of $'s						
		Total Cost	2015 (Budgeted)	2016 (Budgeted)	2017	2018	2019	2020
C1	Complete planned drainage and environmental projects	17,702	6,150	6,359	844	1,908	682	1,759
C2	Screen Utility for illicit discharges and eliminating them where found	100*	-	100	*	*	*	*
C3	Revise BMC and policies to incorporate Low Impact Development	75*	75	*	*	*	*	*
C4	Update Surface Water Design Manual to the latest Ecology standards	30*	-	30	*	*	*	*
C5	Review and update Utility rates to keep them current	50	-	25	-	-	-	25
H1	Review Utility rate structure and billing practices	25	25	*	*	*	*	*
H2	Create maintenance management and asset management systems	368	20	164	46	46	46	46
H3	Assess long term staffing and equipment needs	50*	-	50	*	*	*	*
H4	Develop a water quality action plan	0*	-	0	*	*	*	*
H5	Review private facilities maintenance options	50*	-	-	50	*	*	*
H6	Identify and prioritize small natural environment/ water quality projects	0**	-	0	**	**	**	**
H7	Develop a Utility-operated facility retrofit plan	0**	0	**	**	**	**	**
H8	Clarify Utility's role in City critical areas management	0*	0	*	*	*	*	*
H9	Review Utility's Emergency Preparation planning	0*	-	-	0*	*	*	0*
H10	Develop Surface Water Management Area-based strategies and actions prioritized to recover water bodies	0*	0	*	*	*	*	*
M1	Assist Snohomish Co. with Little Bear Creek Watershed Development	0*	0	*	*	*	*	*
M2	Consider expansion of Local Source Control program	0*	-	-	0*	*	*	*
M3	Create a grants tracking system	0*	-	0	-	-	-	-
M4	Conduct study of groundwater impacts/develop management policy for Utility	150*	-	-	150*	*	*	*
M5	Assume oversight of North Creek Levee System	0*	0	-	-	-	-	-
M6	Analyze impacts of climate change on the Utility	0*	-	-	0*	*	*	0*
M7	Prepare for 2018 NPDES Permit issuance	0*	-	-	0*	*	*	*
M8	Prepare next Master Plan Update	175*	-	-	-	-	-	175
Totals		18,775*	6,270	6,728*	1,090*	1,954*	728*	2,005*

* Ongoing costs will depend on results of study, analysis, or plan to be developed

** Project costs are included in Item C1

A complete description of these action items, potential costs, and schedule is found in Section 5 and Appendix C.

The following three tables provide details of the Action Items, including their objectives and potential impacts on the Utility's program.

Critical

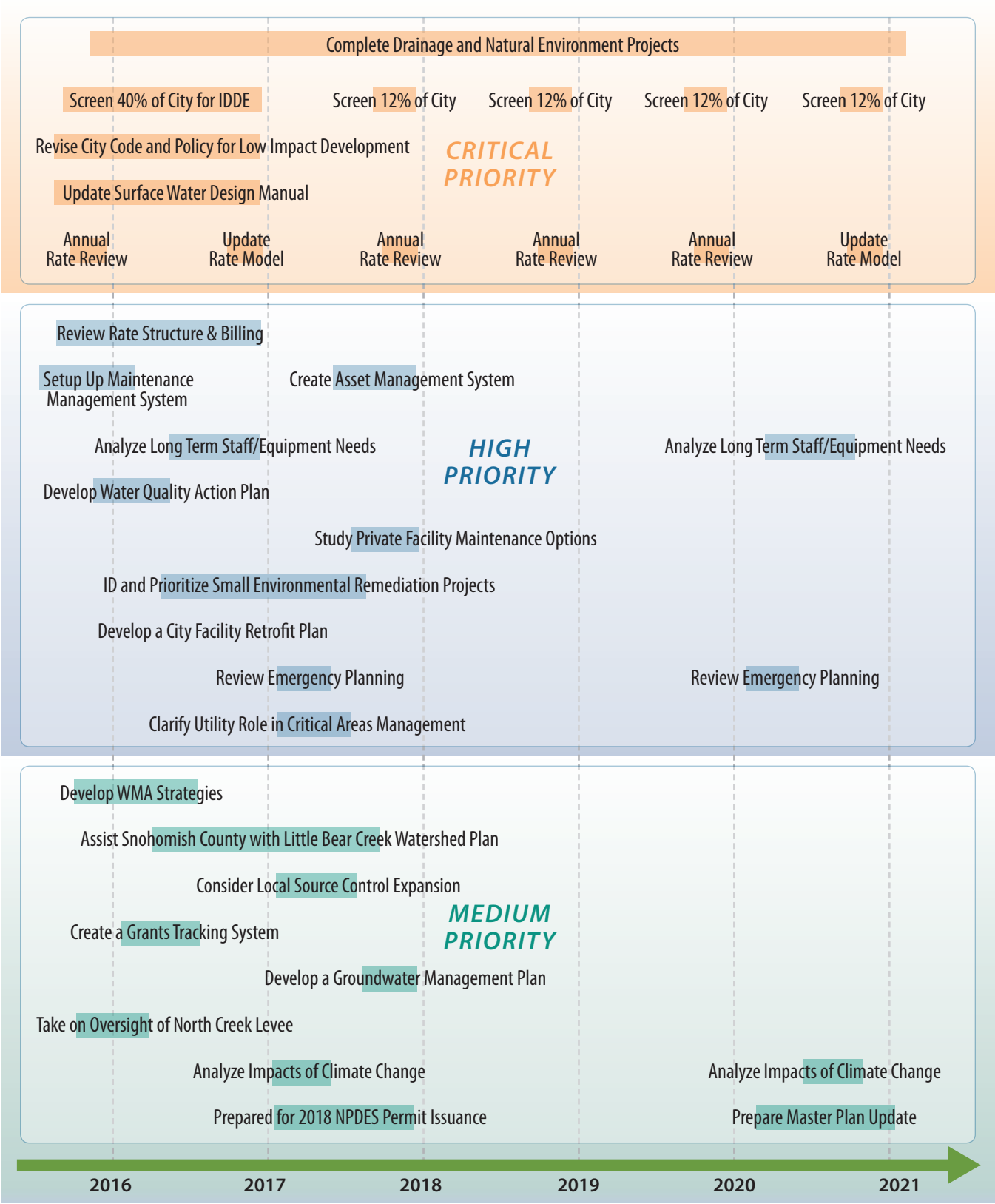
	Action	Description	Objective	Required by Regulation	Initial Set-up Costs/Impacts	Long Term Implementation Impacts
C1	**Drainage and Environmental Projects**	Design and construct planned drainage and environment projects.	To improve natural environment conditions and reduce flooding.	No	Project management will be provided by City Capital staff, funded through projects allocation.	Some projects will increase maintenance costs and others will reduce existing efforts. Net impact to be determined.
C2	**Illicit Discharge Detection and Elimination**	Screen the City for illicit discharges to the surface water system and eliminate where found.	Reduce pollution entering and degrading the surface water system.	Yes - NPDES	Consulting services to set up and assist with screening: $50K to $100K.	Identification of illicit discharges may require increased enforcement efforts for staff. Actual impact is not known. No additional staff are assumed.
C3	**Low Impact Development**	Revise City Code for Low Impact Development by December 31 2016.	Reduce impacts of development on the surface water system.	Yes - NPDES	Consultant services to perform code review: $75K.	Increased LID installations may increase City inspection and maintenance costs. Since actual impacts are not known and no new staff or equipment are included.
C4	**Stormwater Design Manual**	Update stormwater design manual to latest standards.	Require latest design methods to minimize impact of new development on surface water.	Yes - NPDES	Consultant services to draft updated manual: $30K.	New design standards are not expected to have a significant long term impact on Utility costs.
C5	**Utility Rate Setting**	Perform annual rate reviews and regular long-term rate modeling.	To assure that rates are set appropriately to match Utility needs and goals.	Yes - NPDES	Consultant services to update rate model (twice): $50K.	Rate setting will not result in any increased staff costs but will keep the program financially healthy.

High

	Action	Description	Objective	Required by Regulation	Initial Set-up Costs/Impacts	Long Term Implementation Impacts
H1	**Rate structure and billing practices**	Complete and implement revisions to tiered rate structure and billing.	Improve equity and transparency of bills and efficiency of billing.	No	Consulting services to review and recommend changes to rate structure/billing: $15K.	Changing billing from County tax bills could require additional staffing or contract work.
H2	**Maintenance/ Asset Management**	Convert records to new maintenance management system.	Improve efficiency, reduce risk.	No	Contract services to develop systems: $190K.	Support of systems would require about $50K per year in contract work.
H3	**Staffing and Equipment Needs**	Complete a benchmarked review of staff/equipment needs.	Assure that staffing and equipment needs remain appropriate for Utility goals.	No	Contract services to review staffing and equipment needs: $50K	Outcomes of review not determined at this time.
H4	**Water Quality Action Plan**	Develop an action plan to address water quality problems.	Improve water quality where monitoring program has identified ongoing problems.	No	Existing staff to develop action plan based on ongoing stream monitoring data.	Level of spending on actions to be determined.
H5	**Private Facilities Maintenance**	Consider alternatives to existing approach to private maintenance of storm detention/ treatment facilities.	Improve facilities maintenance and equity.	Yes - NPDES	Consulting services may be used to help assess alternatives: $50k	Range of impacts includes no change to significant increased Utility costs if Utility takes over private maintenance.
H6	**Small Environmental Projects**	Create a prioritized list of small surface water environment projects.	Improve natural environment by completing prioritized small projects.	No	Existing staff may develop prioritized list.	Projects would require consulting and contracting services.
H7	**Facilities Retrofits**	Develop plan to retrofit or improve existing Utility flow control and water quality facilities for improved function	Improve water quality through increasing effectiveness of existing facilities.	No	Existing staff may develop initial plan and priorities.	Consulting services will likely be used to design specific retrofits. Cost of retrofits to be determined.
H8	**Critical Areas Management**	Define the Utility's role and activities in managing critical areas in the city	Protect water quality by helping to preserve and restore aquatic lands.	No	Existing staff to work with Community Development and Parks to clarify roles.	Additional participation in critical areas will require undetermined Utility resources.
H9	**Emergency Preparation Planning**	Review Surface Water role in city emergency planning	Assure that the utility is prepared for potential emergencies	No	Existing staff would be used to evaluate emergency planning	Rearranging of existing activities to new efforts and costs based on evaluations.
H10	**Surface Water Management Areas**	Develop strategies and action items to improve surface water conditions for each WMA, prioritized to recover water bodies	Focus surface water efforts for effectiveness and efficiency.	No	Existing staff to develop strategies and action items.	Rearranging of existing activities to new efforts and costs based on evaluations. Costs and staffing to be determined.

Medium

	Action	Description	Objective	Required by Regulation	Initial Set-up Costs/Impacts	Long Term Implementation Impacts
M1	**Little Bear Creek Watershed Plan**	Participate with Snohomish County in plan development and implementation.	Develop a model watershed management plan for Little Bear Creek.	Yes - NPDES	Some staff time, but no direct costs are expected during planning stage.	Implementing of watershed plan could require land use changes, additional monitoring and water quality efforts. Costs to be determined.
M2	**Local Source Control**	Evaluate possible expansion of existing "small quantity generator" program to all possible generators.	Reduce pollution entering surface water from commercial and industrial properties.	No	Program expansion analysis could be done by existing staff.	Expansion of program would require additional Utility staff and expenses. Potentially 1.0 FTE/$100k.
M3	**Grants Tracking**	Create a grant tracking system.	Assure that the Utility accesses external funding appropriately.	No	Existing staff will develop grant tracking system.	Increased grant access could reduce financial impacts on ratepayers or allow for additional Utility efforts.
M4	**Groundwater Management**	Develop a plan to address impacts and management of groundwater effects on Utility.	Improve water quality and system function by appropriately addressing effects of groundwater.	No	Consultant services to prepare study: $150K.	Costs and benefits of Utility groundwater management are not known at this time.
M5	**North Creek Levee**	Conduct annual reviews of levee reports and activities.	Assure that the levee is maintained and monitored per the agreement with the City.	Yes - City Agreement	Existing staff will conduct annual reviews.	No long term direct cost impacts are anticipated.
M6	**Climate Change**	Regularly review the possible impacts of climate change on the Utility.	Assure that Utility adapts its efforts as needed to address changes in climate.	No	Existing staff will track and review climate change information.	Long term impacts are not known at this time.
M7	**2018 NPDES Permit**	Prepare for 2018 NPDES Permit issuance.	Pursue compliance with Permit.	Yes	Existing staff will evaluate new permit requirements	Long term impacts are not known at this time.
M8	**Master Plan Update**	Implement 2015 Master Plan Update.	Guide Utility actions for effectiveness and efficiency.	Yes - City Code	Consultant services to prepare plan: $175K.	Updated Master Plan would include an analysis of long term impacts.


Complete Drainage and Natural Environment Projects
Screen 40% of City for IDDE
Screen 12% of City
Screen 12% of City
Screen 12% of City
Screen 12% of City
Revise City Code and Policy for Low Impact Development
CRITICAL PRIORITY
Update Surface Water Design Manual
Annual Rate Review
Update Rate Model
Annual Rate Review
Annual Rate Review
Annual Rate Review
Update Rate Model
Review Rate Structure & Billing
Setup Up Maintenance Management System
Create Asset Management System
Analyze Long Term Staff/Equipment Needs
HIGH PRIORITY
Analyze Long Term Staff/Equipment Needs
Develop Water Quality Action Plan
Study Private Facility Maintenance Options
ID and Prioritize Small Environmental Remediation Projects
Develop a City Facility Retrofit Plan
Review Emergency Planning
Review Emergency Planning
Clarify Utility Role in Critical Areas Management
Develop WMA Strategies
Assist Snohomish County with Little Bear Creek Watershed Plan
Consider Local Source Control Expansion
MEDIUM PRIORITY
Create a Grants Tracking System
Develop a Groundwater Management Plan
Take on Oversight of North Creek Levee
Analyze Impacts of Climate Change
Analyze Impacts of Climate Change
Prepared for 2018 NPDES Permit Issuance
Prepare Master Plan Update
2016
2017
2018
2019
2020
2021

APPENDIX A

PROJECTS

This Appendix contains individual description sheets for the projects that the Utility should consider as part of this Plan Update.

PROJECT LOCATION	TIMEFRAME	SWMA
Parr Creek Flooding	**2015-2017**	**Parr Creek**

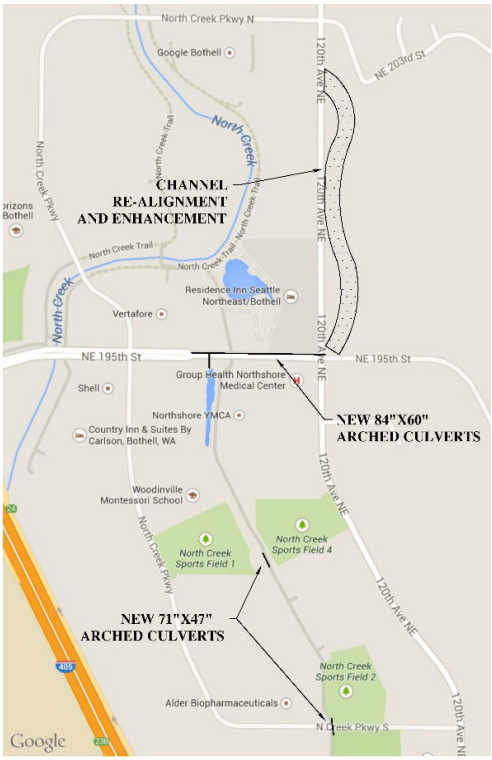
Problem Description/Impacts

The Parr Creek conveyance system from its origin at NE 203rd Street and 120th Avenue NE through the North Creek Business Park experienced severe flooding during the December 3, 2007 storm.

Impacts included chronic flooding along 120th Avenue NE, infrequent flooding at the intersection with NE 195th Street, and flooding and high water through the business park.

Potential causes of the flooding include sediment buildup, settlement, inadequate detention systems, and inadequate design and/or maintenance of both channels and pipes.

Site Map



Possible Actions

A combination of channel improvements, culvert replacement, routine maintenance, and possibly detention system improvements is needed to address the ongoing issues. Part of the costs for this project are associated with private properties. The City is working with the property owner representatives to address comprehensive solutions. An engineering analysis of options is being updated from an earlier study. Following the completion of this study, an understanding is expected to be finalized among the private stakeholders and the City. The City anticipates that the overall project will be funded through grants and partnerships with the private parties. This project summary includes an assumption that the Bothell Storm and Surface Water Utility will provide a portion percent of the overall project cost.

Planning Level Estimated costs (Surface Water Utility Costs only)

Overall public and private costs to address both flooding and reconstruction/restoration of the Parr Creek system have not been fully developed but may be on the order of one to two million dollars. This project planning exercise assumes the Utility would fund $75,000 in 2015-2016 for drainage improvements along 120th and $150,000 in matching work (culvert replacement) for channel restoration through the business park in 2017.

PROJECT LOCATION	TIMEFRAME	SWMA
Perry Creek	**2016, 2019-2020**	**Queensborough**

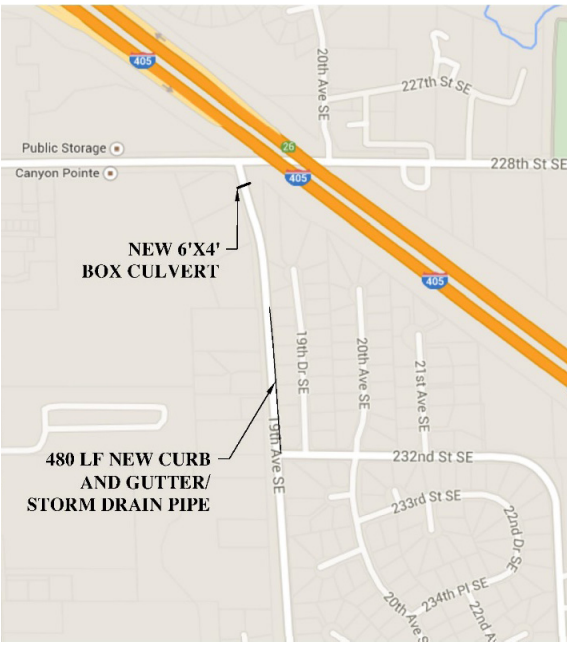
Problem Description/Impacts

Flooding problems during the December 3, 2007 storm event occurred in the Perry Creek area south of 228th Street SE along 19th Avenue SE.

The Perry Creek system overflowed onto the street for several hours. Several intersections were impacted by flooding. Undersized and failing pipes and culverts contributed to the flooding. Siltation within channel and pond and ditch systems contributed as well. The drainage inlets in this area are easily clogged and need frequent maintenance. The wetland does not drain adequately and can lead to over topping of the roadways.

A historical record of flooding exists in this area and has affected homes, other properties and roadways. Flooding severity during the December 3, 2007 storm was rated as high.

Site Map



Possible Actions

The 2010 report consultant report identifies a combination of actions, including culvert replacements, pond excavation and regular maintenance of the system.

A culvert crossing for Perry Creek near 19th Avenue SE is currently failed and a design has been completed for replacing this culvert. This portion of the overall Perry Creek project area is ready for construction in 2016 at a cost of about $200,000. The remaining portions of the project would be designed in 2019 and constructed in 2020.

Planning Level Estimated costs (Surface Water Utility Costs only)

Construction	$360,000
Contingency (30%)	$110,000
Engineering/Survey/Permitting/CM	$80,000
Total Project	$550,000

(In project Year Dollars, Rounded UP to Nearest $10,000)

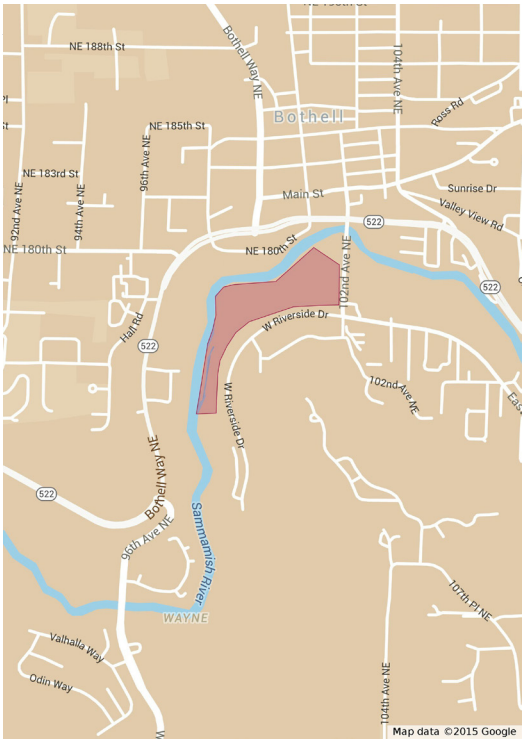
PROJECT LOCATION	TIMEFRAME	SWMA
Sammamish River Side Channel	**2015-2016**	**Riverside**

Problem Description/Impacts

The Sammamish River channel has been modified from its historic conditions and the habitat suffers from a combination of fish passage issues, disconnected and degraded riparian habitat and side channels, and lack of cool-water refuge pools.

Fish habitat and water quality are impacted by the current conditions. US EPA and the State Department of Ecology have identified concerns with water temperature and dissolved oxygen in the Sammamish River through Bothell.

Site Map



Possible Actions

Enhance and reconnection of wetlands and side channels in this area to address fish refuge and water temperature.

The City is currently completing the design for restoring the side channel and has applied for grants to fund construction. Work includes improving flow through the side channel by replacing culverts, dredging, and vegetation.

Planning Level Estimated costs

This project is currently identified in the City's 2015-2016 budget with an estimated cost of $1,500,000. The budget assumes that $1,275,000 of this cost would be funded by grants and that the Utility would provide $225,000. The City is applying for grants and will only proceed with the project at this time if successful with grant applications.

PROJECT LOCATION	TIMEFRAME	SWMA
Blyth Park Erosion and Sedimentation	**2015-2017**	**Riverside**

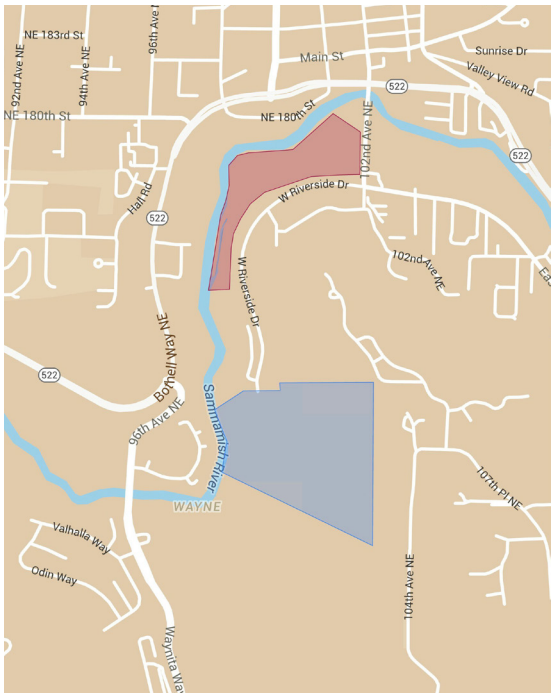
Problem Description/Impacts

Tributary erosion upstream of the developed park causes sedimentation issues to the storm system and turbidity and sediment build-up within the Sammamish River.

The tributary is piped through the lower portions of the park to its confluence with the Sammamish River.

Sediment buildup in the small pond happens quickly enough that Utility crews must dredge the pond at least twice a year to keep it from overflowing into the park and Sammamish River

Site Map



Possible Actions

A combination of improvements might include:

- upstream sediment control through vegetation and stream bank stabilization
- improvements to the function of the existing sediment pond in the park, and
- daylighting of the tributary through the park to the River (Identified in the 2014 Park Master Plan).

Planning Level Estimated costs (Surface Water Utility Costs only)

This project is currently identified in the City's 2015-2016 budget with an estimated design and construction cost of $183,000. The budget assumes that $63,000 of this cost would be funded by grants and that the Utility would provide $120,000.

PROJECT LOCATION	TIMEFRAME	SWMA
Monte Villa	**2017-2018**	**Fitzgerald/Parr Creek**

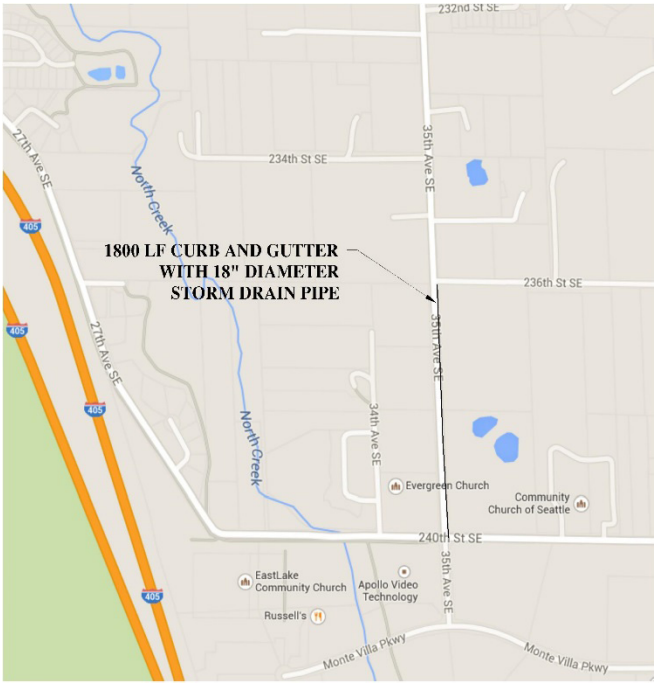
Problem Description/Impacts

Flooding occurred in 2007 at the crossing at 23600 block of 35th Ave SE and along 35th Ave SE corridor between 228th and 240th overflowing from the north down the ditch lines. Culverts and inlets were clogged with debris and the culverts are undersized. During the December 3, 2007 storm, the ditch overtopped 35th Ave and flowed into Monte Villa Business Park.

Flooding concerns was prioritized as "Low" in the 2008 Flood Action Plan, however, Utility Operations staff indicates that this is a chronic flooding area.

Part of the need for this project is related to the existing road and private ditch system. The storm and surface water utility is only assumed to provide about half of the total cost of the project, with other possible sources to include grants, City General Funds, and private funds.

Site Map



Possible Actions

Roadway crossing of 35th Avenue SE can be upsized. Roadway improvements, such as installation of curb and gutter, could reduce the flooding caused by the inadequate ditch adjacent to 35th Avenue SE. In addition, the stream to the east of 35th Avenue SE could be re-routed away from 35th. The project assumes that the Utility would fund $250,000 of this project with the remainder from private participation or grants.

Planning Level Estimated costs (Surface Water Utility Costs only)

Construction	$270,000
Contingency (30%)	$80,000
Engineering/Survey/Permitting/CM	$90,000
Total Project Cost (Rounded)	$440,000

(In project Year Dollars, Rounded to Nearest $10,000)

PROJECT LOCATION	TIMEFRAME	SWMA
Palm Creek at 228th St SE	**2017-2018**	**Fitzgerald**

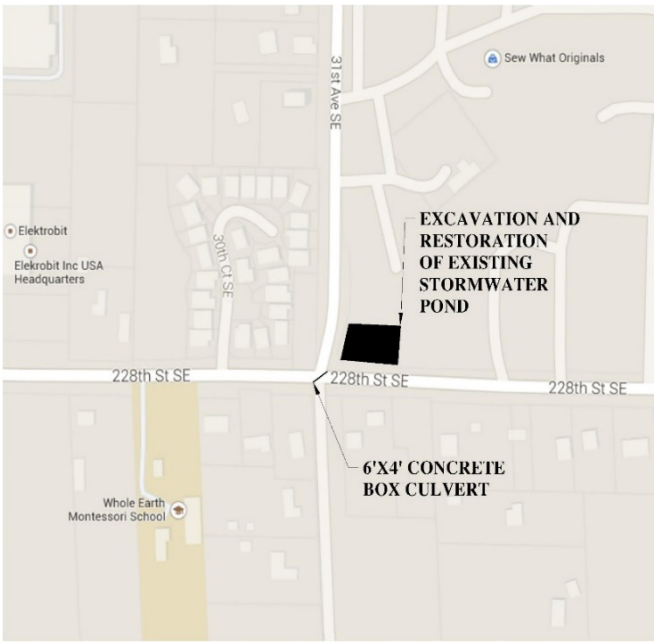
Problem Description/Impacts

Flooding problems during the December 3, 2007 storm event occurred in the Palm Creek area at the intersection of 228th Street SE near 31st Avenue SE.

An existing stormwater pond at the northeast corner of the 31st Avenue SE and 228th Street SE intersection contributed to flooding of the intersection due to a combination of system blockage and inadequate pond capacity.

The culvert crossing for 228th/31st that outlets the pond is potentially undersized, also contributing to flooding in the area.

Site Map



Possible Actions

The culvert crossing across the 228th/31st intersection should be replaced with a larger box culvert crossing.

The stormwater pond upstream of the intersection should be enlarged and the structure controlling the outflow from the pond should be evaluated for reconfiguration.

The project assumes that the Utility would fund 100 percent of the project cost.

Planning Level Estimated costs (Surface Water Utility Costs only)

Construction	$240,000
Contingency (30%)	$70,000
Engineering/Survey/Permitting/CM	$80,000
Total Project	$390,000

(In project Year Dollars, Rounded to Nearest $10,000)

PROJECT LOCATION	TIMEFRAME	SWMA
East Riverside	**2017-2018, 2020-2021**	**Riverside**

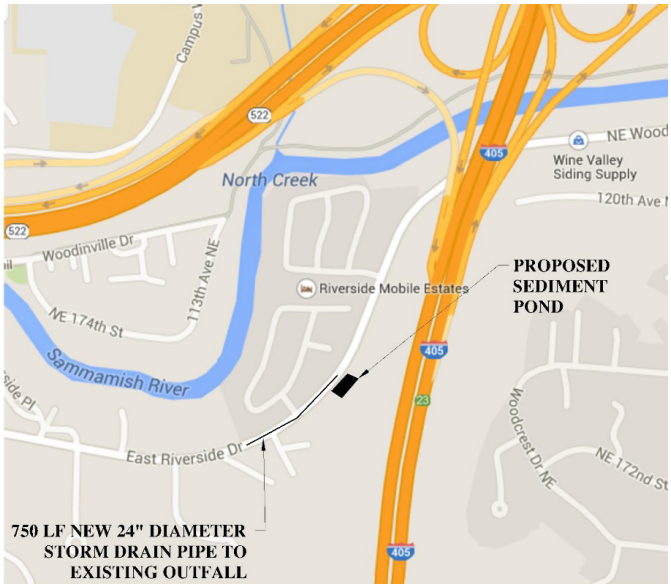
Problem Description/Impacts

Flooding problems have occurred in and around East Riverside Drive from two un-named tributaries to the Sammamish River. These tributaries discharge water from property to the south of East Riverside Drive, including I-405 right-of-way.

The tributaries transmit sediments from upstream and are constricted by existing culverts and channels in and around the roadway. Significant flood events occurred in 2007 and the Utility removed sediment and debris from the system.

In subsequent years the Utility has installed some conveyance improvements in the area to reduce flooding potential.

Site Map



Possible Actions

A combination of inlet and conveyance improvements along with sediment and debris control is needed to reduce flooding potential. Improvements constructed by the Utility following the 2007 flooding events partially addressed the flooding risk.

Part of the costs for this project could be funded through grants and partnerships with private and other public parties (such as WSDOT and City General Fund for road improvements). This project summary assumes that the Bothell Storm and Surface Water Utility will provide $600,000 toward the overall project cost.

Planning Level Estimated costs (Surface Water Utility Costs only)

Construction	$370,000
Contingency (30%)	$110,000
Land Acquisition for Sediment Pond	$240,000
Engineering/Survey/Permitting/CM	$150,000
Total Project	$870,000

(In project Year Dollars, Rounded to Nearest $10,000)

PROJECT LOCATION	TIMEFRAME	SWMA
Royal Anne Road Area	**2018-2020**	**Queensborough**

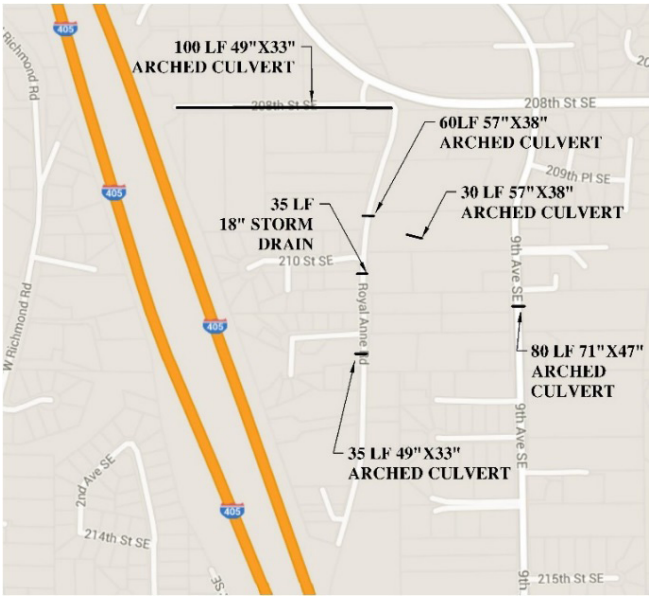
Problem Description/Impacts

The major storm on December 3, 2007 caused flooding in the Royal Anne Road area. The flooding temporarily impacted roadways around Royal Anne Road and is reported to have affected the house at 310 208th Street SE. To address the flooding at 301 208th Street SE, Utility crews restored a ditch line and cleaned culvert outfalls in December 2007. No report of flooding on the home has been received by the Utility since the work.

Stormwater from I-405 is believed to have increased due to widening of the freeway. The additional runoff is believed to result in several roadway culverts in the vicinity of Royal Anne Road being unable to adequately handle the storm runoff during a severe event such as occurred on December 3, 2007. During site visits in 2008, staff discovered that several catch basins along 210th St have rims that are too high, causing additional flooding.

Flooding in 2007 around Royal Anne Road was identified as significant and a high priority for repair. There is no information as to any property damage or life-safety concerns related to the flooding. Since the 2007 event, no significant additional flooding in the area has been noted.

Site Map



Possible Actions

A report contracted by the Utility in 2009 recommended replacing several undersized culverts in the vicinity of Royal Anne Road. The report also recommended that several catch basins rims should be lowered so they are level with the road surface elevation.

The Plan assumes the Utility would fund 100 percent of the project cost.

Planning Level Estimated costs

Construction	$260,000
Contingency (30%)	$80,000
Engineering/Survey/Permitting/CM	$90,000
Total Project Cost (Rounded)	$430,000

(In project Year Dollars, Rounded to Nearest $10,000)

PROJECT LOCATION	TIMEFRAME	SWMA
208th St SE Water Quality Facilities	**2020**	**Canyon Park**

Problem Description/Impacts

Runoff from 208th Street SE/Filbert Road currently flows untreated into North Creek.

Site Map

Possible Actions

Installation of treatment for the roadway surface before it enters Filbert Creek and North Creek. Treatment could include installation of bioswales, filtration, or other methods

Planning Level Estimated costs (Surface Water Utility Costs only)

Preliminary costs for this project were estimated at $387,000 in the 2002 North Creek Drainage Needs Report. Current total costs may now be about $500,000.

This project Plan assumes that about half of the project funding would come from grants and that the Utility would provide $250,000 in 2017-2018 as matching funds.

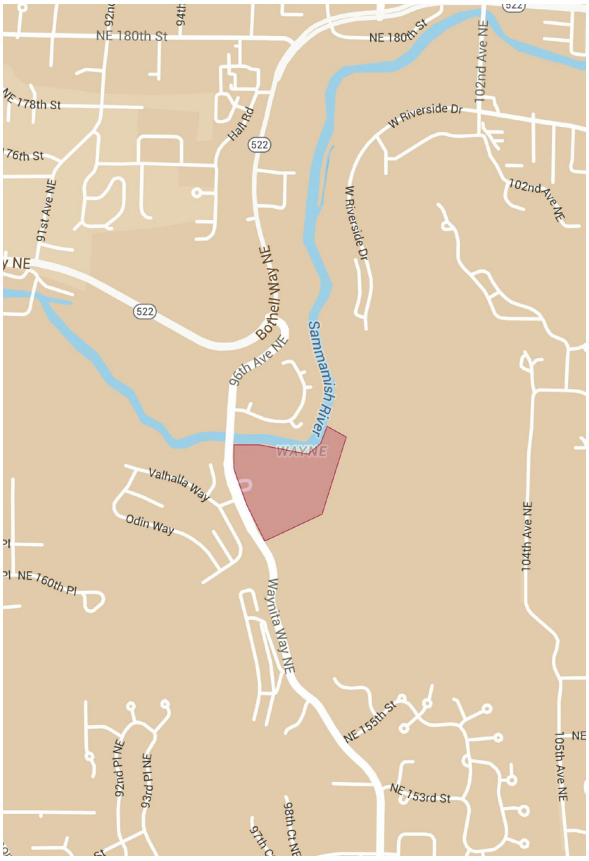
PROJECT LOCATION	TIMEFRAME	SWMA
Sammamish River – Waynita Creek	**2020**	**Waynita**

Problem Description/Impacts

The Sammamish River channel has been modified from its historic conditions and the habitat suffers from a combination of fish passage issues, disconnected and degraded riparian habitat and side channels, and lack of cool-water refuge pools.

Fish habitat and water quality are impacted by the current conditions. US EPA and the State Department of Ecology have identified concerns with water temperature and dissolved oxygen in the Sammamish River through Bothell.

Site Map



Possible Actions

Restoration and reconnection of wetlands and side channels in the confluence area to address fish refuge and water temperature. Protect and restore tributaries (Waynita Creek) to the Sammamish River in this vicinity.

Planning Level Estimated costs (Surface Water Utility Costs only)

Costs for this project have not been developed. This project planning exercise assumes that projects in this area might be similar to the current Sammamish River Side Channel project being designed for the Utility. That project is estimated to cost between one to two million dollars. This planning assumes that the majority of the project will be funded through grants and that the utility would provide $500,000 in 2017-2020 as matching funds.

PROJECT LOCATION	TIMEFRAME	SWMA
Royal Anne/Filbert Restoration	**2020**	**Queensborough – Royal Anne**

Problem Description/Impacts

Creek crossings and stream habitat areas in the vicinity of 208th Street SE are impacted by flooding and erosion. Fish passage and habitat are affected.

Site Map

Possible Actions

Improvement of restoration in the vicinity of culvert and upgrade of culverts will improve the habitat area.

Planning Level Estimated costs (Surface Water Utility Costs only)

Scope and cost estimates for restoration in this area have not been developed. For this project planning exercise, a project cost of about $1,500,000 is assumed, with the City Utility providing matching funds of $400,000 in 2020-2021. The majority of the project funding is planned to come from grants.

PROJECT LOCATION	TIMEFRAME	SWMA
Parr Creek Channel Restoration	**2015-2017**	**Parr Creek**

Problem Description/Impacts

Parr Creek primarily flows in either a manufactured ditch or pipe system from its headwaters on 120th Avenue SE to the Sammamish River.

Portions of the upper creek adjacent to 120th Avenue SE are silted in to the point that the creek tends to flow over the sidewalk and into the piped storm system. Between 120th Avenue SE and its southern reach through the North Creek Business Park, the creek flows through an under-capacity pipe.

Through the business park, the creek is impacted by culvert restrictions, lack of vegetation cover, insufficient channel capacity, and the need for regular maintenance.

Site Map

Possible Actions

Enhancements could include improving flows by addressing restrictions in the open channel through the business park, and enhancing the channel banks through the business park. In addition, enhancements near the Sammamish River confluence could be provided to enhance habitat for fish and provide water quality improvements to the River.

Planning Level Estimated costs (Surface Water Utility Costs only)

Project costs for restoration and enhancement of the Parr Creek system would likely be funded by a combination of public and private money. The Utility contribution assumes that most of the costs to relocate Parr Creek along 1120th Avenue SE and to enhance/restore the creek and wetland system downstream from NE 195th Street would come from grants and private property owners. This project planning exercise assumes that the Utility would provide $150,000 toward natural environment projects by replacing a culvert for Parr Creek in 2017.

APPENDIX B

SURFACE WATER MANAGEMENT AREAS DESCRIPTIONS

This Appendix contains descriptions of each proposed Surface Water Management Area, including data tables and potential strategies for the area.

Canyon Park Surface Water Management Area

General and Physical Character.

The Canyon Park Surface Water Management Area encompasses 805 acres (1.26 square miles, 9.1% of the city) in the northeast corner of the city. General terrain is made up of relatively flat lands associated with the North Creek floodplain in the west and central portion of the SWMA and relatively flat hills to the east and northeast. Topography varies from 440 feet at Bloomberg Hill in the northeast corner to around 100 feet above sea level at its lowest point along North Creek.

Soils include over 90 percent infiltrative (Hydric Soil Type A or B) types with about 40 percent soils prone to erosion. The area drains entirely to North Creek, which is located on its western border.

Land use and Development.

The prominent land use feature of this SWMA is the Canyon Park Business Park located in lower portions of the SWMA near North Creek. Surrounding the Business Park in the eastern hillsides are single family developments and a school. Some commercial development is located along the Bothell-Everett Highway.

Forty percent of the area is covered by impervious surfaces, making it one of the more developed SWMA's in the city. It contains portions of the Bothell-Everett Highway (State Route 527) and 208th Street SE (Maltby Road), which carry moderate to high traffic volumes.

One quarter of the impervious area is road surface (pollutant generating).

The Canyon Park business park, which was mostly constructed in the 1980s and 1990s, contains large uncovered paved parking lots with limited outdoor storage to support the businesses. Much of the roadway and associated storm systems in the business park is privately owned and maintained

Natural Environment.

The area contains three small streams (Junco, Middle, and Maltby Hill creeks) with a total combined length of 6.5 miles. The western boundary includes about 1.5 miles of North Creek. Twelve percent of the area is mapped as wetlands.

The City has assessed habitat and biologic conditions for two of the three small streams (Junco Creek and Middle Creek) within the area and found both to have very impaired biological communities and poor aquatic habitat diversity. However, fish diversity within Junco Creek was good relative to other streams in the city.

All streams in the area have low dissolved oxygen levels and are on Ecology's 303(d) list for impaired water bodies. One stream that drains much of Canyon Park (Middle Creek) has been found to have high temperatures.

Stormwater Infrastructure.

The amount of ditches (4.8 miles), pipes (26 miles), and catch basins (1,387) within the area are typical for the size of the SWMA. The area has some detention ponds and detention

pipes, but few water quality/treatment facilities except for about 240 linear feet of bioswale. Lack of water quality treatment for 208th Street SE is a concern noted in the City's Shorelines Restoration Plan.

Surface Waters of the Canyon Park SWMA.

The entire area of this SWMA drains to North Creek as it enters into Bothell on its way to the Sammamish River and Lake Washington. Almost all of the stream basins in this area originate and are contained within the city limits, with a small portion of the Maltby Hill Creek lying in unincorporated Snohomish County.

The Canyon Park SWMA contains Middle Creek. This creek basin is intensively developed with over 50 percent impervious area. The natural environment of Middle Creek is heavily impacted by the intensive development of the area.

The Junco Creek basin, in the southern portion of the SWMA, is more moderately developed and less impacted by land use than Middle Creek, with a mixture of residential and non-residential uses. Fish diversity is good relative to other City streams.

The Maltby Hill Creek basin's land use is mostly single family residential with some light industrial and commercial. Not much is documented about the natural environment and condition of the Maltby Hill Creek watershed.

A small portion of the SWMA discharges directly to North Creek. This area is primarily light industrial and commercial with some single family residential.

Surface Water Management Strategies

Since much of this area is highly developed and altered, surface water efforts should focus on improving water quality and flow control with focus on protecting North Creek, with a primary effort focused on the Canyon Park business uses.

Some possible efforts include:

- Add water quality treatment to Maltby Road/208th

  The Project Planning section of this Plan Update includes this project at a preliminary estimate of $500,000, with half of this amount from Utility funds and half from grant funds. Addition of road stormwater treatment will require increased maintenance costs for the Utility.

- Revise development standards to require improved stormwater facilities for Canyon Park when redevelopment occurs.

  Current development standards exempt redevelopment projects from improving storm facilities if the redevelopment adds little to no new impervious area. This means that properties can significantly redevelop and add significant impacts to an area through increased land use, but not be required to bring storm systems up to current standards.

  The Canyon Park area is being considered for significant redevelopment that may include intensification of land use. Under existing standards, this redevelopment would not require any improvement to the existing storm facilities.

  The Utility should evaluate the possibility of revising its requirements to upgrade storm systems when property significantly redevelops but does not add impervious area. This revision could be done on a city-wide basis or for selected SWMA's such as Canyon Park and the downtown area.

- Inspect existing private and public facilities once per year.

  The Utility's facilities are currently subject to annual inspection, so this level of effort would not have an impact on the Utility's capacity.

- Outreach and education should focus on employees of business park and commercial uses as well as transient/mobile businesses include landscape maintenance companies and mobile fleet repair and maintenance practices. Parking lot issues could be a focus – sweeping, washing, detection of spills, etc. Riparian enhancement efforts could also raise awareness of existing streams while improving stream temperatures and dissolved oxygen in small creeks along the road system.

  The potential focused outreach and education efforts here could be captured at the same level of effort that the Utility currently performs.
- Utility Operations BMPs should focus heavily on activities to minimize roadway pollution from entering North Creek. Note that many roadways within the Canyon Park Business Park are privately owned and maintained, which may limit what the Utility can require in this portion of the SSWMA.

  The Utility should study the effectiveness of activities in this area and consider street sweeping and system cleaning to optimize effectiveness for water quality.

  This evaluation might result in additional Utility costs if it shows that increased frequency or magnitude of effort is appropriate. Additional costs, if any, could be offset by reduced efforts in other SWMA's or could result in higher overall operations costs of the Utility.
- Local Source Control – Determine Small Quantity Generator status for sites in the business park. Possibly using a GIS assessment. Provide enhanced Local Source Control to qualifying businesses.

  A focused assessment of potential pollution generators could be performed for the SWMA. This assessment could be performed by Utility staff or an outside consultant.
- Needs assessment of current riparian conditions for the small streams and North Creek. This important effort would be valuable for all streams in Bothell as well as wetlands and their buffer/riparian protective areas.

This effort is not currently planned in the Utility's program.

Canyon Park SWMA Data Table

Area	
Surface Water Management Area (acres/square miles)	805/1.26
Land Use	
Light Industrial (%)	52%
Single Family Residential (%)	38%
Commercial (%)	5.9%
Campus Institutional (%)	4.2%
Parks and Open Space (%)	0.4%
Non-Single Family Residential (%)	0.0082%
Land Cover	
Impervious (acres / %)	332 / 41%
Road Surface - All (acres / %)	81 / 10%
Soil	
Infiltrative (acres / %)	728 / 90%
Erosive (acres / %)	319 / 40%
Landslide Prone (acres / %)	0 / 0%
Wetlands	
Wetland Area (acres / %)	93 / 12%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	26 / 3%
Watersheds	
Maltby Hill Creek (% of SWMA / stream miles)	38% / 1.9
Middle Creek (% of SWMA / stream miles)	33% / 1.1
Junco Creek (% of SWMA / stream miles)	14% / 0.93
North Creek (a) (% of SWMA / stream miles)	13% / 2.5
Red Basin (% of SWMA / stream miles)	1.2% / 0.0019
Storm Infrastructure	
Ditches (miles / linear feet per acre)	4.8 / 31.7
Inlets (number / number per acre)	1,387 / 1.7
Pipes (miles / linear feet per acre)	26 / 172
Detention Pipes (linear feet / linear feet per impervious acre)	108 / 0.3
Detention Ponds (acres / sq. feet per impervious acre)	4.8 / 629
Bioswales (linear feet / linear feet per impervious acre)	2,707 / 8.1
Outfalls (number / number per acre)	79 / 0.1

Queensborough surface water management area

General and Physical Character.

The Queensborough SWMA encompasses 1,549 acres (2.42 square miles, 18% of city) in the northwest corner of the city. This is the largest SWMA designated in Bothell. The terrain is mixed with moderate sloping topography approaching Interstate 405, where slopes steepen as the land falls to the east toward and around I-405. The area is deeply incised by Crystal (Queensborough) Creek. The east side of I-405, slopes more gently toward North Creek. Topography varies from a high of 510 feet at Nike Hill to its lowest point at about 100 feet in the east at North Creek.

About one third of the soils in this area are identified as prone to erosion and over 80 percent of the soils are mapped as being conducive to infiltration (Hydric Soil Type A or B). Erosion has been an ongoing issue for Queensborough Creek where it flows in a deeply incised channel toward I-405.

Land use and Development.

The western portion of the area is dominated with older single family homes with some interspersed newer housing developments. A prominent land use is the large commercial shopping area near the interchange of I-405 and the Bothell-Everett Highway. To the north of I-405, the area contains business and light industry with some commercial land use.

Interstate 405 corridor runs through the middle of the area and makes up about two percent of the SWMA. In addition, the SWMA includes a significant length of the Bothell-Everett Highway. The remaining roadways are primarily used for relatively low volume residential access.

Forty-three percent of the SWMA is covered by impervious surfaces, making it one of the more intensively developed SWMAs in the city, and nearly half of the impervious area is road surface (pollutant generating). Commercial and business parking areas are significant around I-405 and the Bothell-Everett Highway.

Natural Environment.

The area contains four creek watersheds that are tributary to North Creek. These watersheds include Queensborough (Crystal), Perry, Royal Anne, and Filbert creeks as well as an area that drains directly to North Creek. Crystal Creek and Perry Creek basins are almost entirely within the city limits, while only 61 percent of Royal Ann Creek and only seven percent of Filbert Creek basins are contained within the city limits.

Total stream length within the SWMA is 11.6 miles and ten percent of the SWMA is mapped as wetlands.

The Utility has assessed habitat and biologic conditions for Crystal Creek and Perry Creek within this SWMA and found both to have severely impaired biological communities and poor aquatic habitat diversity. However, fish diversity within Crystal Creek was good relative to other streams in the city. All streams in the SWMA except for Royal Anne Creek are known to have low dissolved oxygen levels and are on Ecology's 303(d) list for impaired water bodies and Crystal Creek has been found to have high temperatures.

Stormwater Infrastructure.

The amount of ditches (11 miles), pipes (48 miles), and catch basins (2,412) within the North Creek B SWMA are average-low for the size of the SWMA. This may be due in part to the older residential development in the western portion of the area. The amount of detention ponds, detention pipes, and bioswales is high relative to the total impervious area in the basin, which indicates maintenance of existing facilities is more important for protection of natural resources in this SWMA.

Watersheds of the Queensborough SWMA.

Royal Anne Creek watershed, with 61 percent in the city, is primarily single family residential, and little has been documented about the natural environment.

Crystal Creek watershed is almost entirely within the city limits, with mostly single family residential in its upper portion. The lower part of the creek flows through commercial/business development north of the I-405 interchange where it enters North Creek in the Canyon Park business center. Nearly half the watershed is covered with impervious surface, and the level of impairment of the natural environment is typical of Bothell streams.

Perry Creek watershed, entirely within the city, is two-thirds single family residential. Perry Creek begins as two smaller creeks until they join together east of I-405 near North Creek. The north fork of the creek flows through the commercial center south the I-405 interchange. The level of impairment of the natural environment is typical of Bothell streams.

The portion of the SWMA that discharges directly to North Creek is two-thirds light industrial and significant areas of some single family residential.

Only seven percent of the Filbert Creek watershed within the city limits and 50 percent of the area within the city limits is impervious.

Surface Water Management Strategy

(Retrofit and Enhance)

Surface Water efforts should focus on protecting and enhancing Royal Anne and Filbert Creek drainage areas and converting old stormwater development by adding flow control where possible. Old infrastructure will need to be preserved/replaced as it wears out.

Possible efforts include:

- Develop a management/restoration/protection strategy for Royal Anne and Filbert Creek areas

  A potential cost of about $50,000 might be appropriate to develop a strategy for protection and restoration. Implementation costs would be estimated as part of the strategy development.

- Continue to evaluate LID implementation for older Queensborough Creek residential development area – This may include land acquisition and installation of facilities

  The Utility completed a study of potential LID retrofits in the residential area of Queensborough to assess the possibility of improving watershed conditions through installation of infiltration systems. The study did not produce high feasible installations. Further analysis could be done to consider other locations or opportunities.

- Evaluate restoration and stream bank protection for Queensborough Creek

  An evaluation of restoration efforts could be initially conducted by Utility staff. Consulting services would be appropriate to develop a complete plan and restoration design. No funding is currently identified in this Plan for a restoration plan and construction for the creek banks.

- Correct culvert capacity issues for Perry Creek area

  Culvert replacement is included in the projects identified in this Update.

- Outreach/Education should focus on residential practices, such as vehicle maintenance, yard care, mobile business contracting, and hazardous waste use, handling, and disposal.

  This effort would be a focusing of existing efforts by Utility staff.

- IDDE should focus on bacteria sources, such as failing septic systems

  This effort would be a focusing of existing efforts by Utility staff.
- Inspections in this area are generally not as high a priority as other areas – maybe consider a longer cycle.

  This level of effort could increase staff capacity for other areas.
- Develop a retrofit program, actions and funding, to provide storm water control to those areas developed primarily pre-storm water drainage regulations.

  Retrofit planning is identified as an action item in this Update.

Queensborough SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	1,549/2.42
Land Use	
Single Family Residential (%)	65%
Light Industrial (%)	11%
Non-Single Family Residential (%)	7.8%
Commercial (%)	7.6%
Parks and Open Space (%)	5.3%
Limited Access Highway (%)	2.5%
Campus Institutional (%)	1.3%
Office Professional (%)	0.31%
Land Cover	
Impervious (acres / %)	663 / 43%
Road Surface - All (acres / %)	322 / 21%
Soil	
Infiltrative (acres / %)	1,284 / 83%
Erosive (acres / %)	515 / 33%
Landslide Prone (acres / %)	0 / 0%
Wetlands	
Wetland Area (acres / %)	150 / 10%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	18 / 1%
Watersheds	
Perry Creek (% of SWMA / stream miles)	45% / 4
Crystal/ Queensborough Creek (% of SWMA / stream miles)	24% / 1.9
Royal Anne Creek (% of SWMA / stream miles)	18% / 3.2
North Creek (b) (% of SWMA / stream miles)	9.8% / 2.3
Filbert Creek (% of SWMA / stream miles)	2% / 0.27
Storm Infrastructure	
Ditches (miles / linear feet per acre)	11 / 37
Inlets (number / number per acre)	2,412 / 1.6
Pipes (miles / linear feet per acre)	48 / 163
Detention Pipes (linear feet / linear feet per impervious acre)	7,309 / 11
Detention Ponds (acres / sq. feet per impervious acre)	5.3 / 348
Bioswales (linear feet / linear feet per impervious acre)	2,917 / 4.4
Outfalls (number / number per acre)	88 / 0.06

Little Swamp Creek Surface Water Management Area

General and Physical Character. The Little Swamp Creek Surface Water Management Area encompasses 918 acres (1.43 square miles, 10.5% of city) on the west side of the city. Despite the size of the SWMA (relatively large for Bothell) the entire area only makes up six percent of the total Swamp Creek basin.

Nike Hill (Elevation 510 feet) is at the center of the Little Swamp Creek SWMA. The hill slopes steeply to the west and a ridge extends more gradually to the south. The west side of the ridge slopes moderately to the west-southwest and drains towards Swamp Creek and the east side of the ridge drains southeast forming the headwaters of Little Swamp Creek. The northern portions of the SWMA slope steeply to the west and the southern portion of the SWMA slopes gradually to the west.

Over 90 percent of soils are mapped as being conducive to infiltration (Hydric Soil Type A or B), with about 40 percent soils prone to erosion.

Land use and Development.

The center of the SWMA is primarily single family residential with a federal office building, Bothell fire station, and school to the north. The northwestern edges of the SWMA are comprised of steep forested slopes, while the southern portion of the SWMA contains the city's largest agricultural land use.

Thirty percent of the area is covered by impervious surfaces, making it one of the less developed SWMAs in the city. One third of the impervious area is road surface (pollutant generating).

Natural Environment.

The SWMA includes the upper reaches of Little Swamp Creek and smaller unnamed tributaries of Swamp Creek with a total combined length of 2.9 miles. Three percent of the area is mapped as wetlands.

Swamp Creek has high levels of fecal coliform bacteria and is on Ecology's 303(d) list for impaired water bodies. A Water Quality Improvement Report and Implementation Plan for Swamp Creek (Ecology) was produced in 2006 and includes actions each jurisdiction can take to reduce fecal coliform pollution. One possible source of bacteria is from the numerous septic systems in this area.

Stormwater Infrastructure.

The amount of ditches (1.6miles), pipes (19 miles), and catch basins (975) within the SWMA is typical too low for the size of the SWMA. The area has a limited number of flow control and water quality treatment facilities.

Watersheds of the Little Swamp Creek SWMA.

The entire area drains to Swamp Creek, either via Little Swamp Creek or other unnamed tributaries, to the west towards unincorporated Snohomish County and the city of Kenmore.

Surface Water Management Strategies

Since this mostly residential area drains out of the city to Swamp Creek, which is affected by high fecal coliform counts, management efforts should focus on controlling water quality impacts due to septic systems, pet waste, and animal attractants like waterfowl feeding. Management efforts should be coordinated with the City of Kenmore and other jurisdictions in the Swamp Creek basin.

Possible efforts include:

- Consider methods to reduce septic systems – possible regulations/enforcement, Local Improvement District or other techniques

  This effort could require a refocusing of existing Utility staff.

- IDDE might focus on sources of bacteria in this area

  This effort would be provided by existing Utility staff.

- Outreach might focus on septic system evaluation, maintenance and conversion to sewer. Pet waste management, and reducing concentrated waterfowl attraction may also be included.

  This would be a focusing of existing Utility staff efforts.

- Inspections of drainage facilities in this area should be performed at the standard city-wide baseline rate.

  This would require no change in Utility efforts.

- City Operations, including catch basin cleaning, street sweeping, vegetation control, and storm facility maintenance should be performed at the Utility's standard baseline rate.

  This would require no change in Utility efforts.

Little Swamp Creek SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	918/1.43
Land Use	
Single Family Residential (%)	77%
Campus Institutional (%)	8.3%
Agricultural (%)	7.3%
Commercial (%)	4.4%
Office Professional (%)	1.3%
Non-Single Family Residential (%)	0.84%
Parks and Open Space (%)	0.8%
Land Cover	
Impervious (acres / %)	274 / 30%
Road Surface - All (acres / %)	103 / 11%
Soil	
Infiltrative (acres / %)	840 / 92%
Erosive (acres / %)	359 / 39%
Landslide Prone (acres / %)	0 / 0%
Wetlands	
Wetland Area (acres / %)	23 / 3%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	0 / 0%
Watersheds	
Swamp Creek (% of SWMA / stream miles)	100% / 2.9
Storm Infrastructure	
Ditches (miles / linear feet per acre)	1.6 / 9.4
Inlets (number / number per acre)	975 / 1.1
Pipes (miles / linear feet per acre)	19 / 108
Detention Pipes (linear feet / linear feet per impervious acre)	1,326 / 4.8
Detention Ponds (acres / sq. feet per impervious acre)	0.8 / 119
Bioswales (linear feet / linear feet per impervious acre)	228 / 0.8
Outfalls (number / number per acre)	7 / 0.008

Fitzgerald Surface Water Management Area

General and Physical Character.

The Fitzgerald SWMA makes up 436 acres (0.68 square miles, 5% of city) in the eastern portion the Ccity and terrain slopes gradually from east to west. The entire SWMA drains to east side of North Creek and topography varies from nearly 350 feet in the upper Spring Stream basin to under 100 feet along North Creek.

Approximately half of the soils within the basin are prone to erosion and over 80 percent of the soils are mapped as being conducive to infiltration (Hydric Soil Type A or B).

The City had a detailed study of this area performed in 2006, titled the North Creek Fish and Wildlife Critical Habitat Protection Area Study. This study delineated and assessed the importance of wetlands, streams and other critical areas and their contribution to quality of cool groundwater inputs to North, Palm, Woods/ Cole Creeks.

Land use and Development.

Nearly the entire SWMA is low to moderate density single family residential land use making it one of the least intensively developed SWMAs in the city with only 22 percent of the SWMA covered by impervious surface, approximately half of which is road surface (pollutant generating). The most intensively developed portions of the SWMA include a mobile home park in Palm Creek basin in the northern portion of the SWMA and church and an apartment complex in the southeastern corner of the SWMA.

Natural Environment.

The area includes two streams (Palm Creek and Woods [Cole] Creek), two basins where the primary conveyance is the storm drain network (Red Basin and Spring Stream basin), and an area that drains directly to North Creek. The total stream length within the SWMA is 6.5 miles. Eleven percent of the SWMA is mapped as wetlands.

The City has assessed habitat and biologic conditions for Palm Creek and found it to have the least impaired biological community of all streams in the city, though the creeks are still severely to moderately impaired. Fish diversity in Palm Creek is also fair to good relative to other streams in the city but habitat complexity is low. All streams in the SWMA are known to have low dissolved oxygen levels and are on Ecology's 303(d) list for impaired water bodies.

Stormwater Infrastructure.

The amount of ditches (1.6 miles), pipes (7.8 miles), and catch basins (400) within the North Creek C SWMA is average-low for the size of the SWMA as is the number of flow control and water quality facilities.

Watersheds of the Fitzgerald SWMA.

The entire area drains to North Creek as it enters Bothell on the way to the Sammamish River and Lake Washington. All of the streams in this SWMA originate outside of the city limits and two thirds or more of Palm Creek basin and Wood Creek basin are outside of the city.

Palm Creek is one of the least impaired streams in the city, but most of the tributary basin is outside of city control.

The portion of Woods Creek basin within the city is only 14 percent impervious, which is the second lowest of any watershed within the city, however the upper portions of the basin (outside of the city) include some denser single family residential development.

Conveyance within the Spring Stream and Red Basin watersheds is primarily comprised of the storm drain system and the amount of natural stream channel is limited. Red Basin is more intensively developed and a quarter of the basin is covered with road surface.

Surface Water Management Strategies:

This SWMA has some of the higher quality basins that support North Creek in Bothell. Surface Water efforts should focus on protecting and preserving stream buffers and enhancing stormwater controls to the relatively higher quality creeks in this area.

Possible efforts include:

- Address culvert problems with Palm Creek, especially on 228th

    This effort is included as a project in the Plan Update.

- Focus on monitoring of creeks frequently to assure early detection of issues

    This would include a reassignment of existing Utility staff efforts.

- Outreach should focus on residential activities, including pet waste, low impact development installation, and stream buffers and management

    This would include a reassignment of existing Utility staff efforts.

- IDDE should be priority in this area to protect streams.

    This would include a reassignment of existing Utility staff efforts.

Fitzgerald SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	436/0.68
Land Use	
Single Family Residential (%)	58%
Non-Single Family Residential (%)	39%
Light Industrial (%)	1.5%
Campus Institutional (%)	0.49%
Office Professional (%)	0.27%
Land Cover	
Impervious (acres / %)	95 / 22%
Road Surface - All (acres / %)	34 / 8%
Soil	
Infiltrative (acres / %)	370 / 85%
Erosive (acres / %)	214 / 49%
Landslide Prone (acres / %)	0 / 0%
Wetlands	
Wetland Area (acres / %)	49 / 11%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	9 / 2%
Watersheds	
Spring Stream (% of SWMA / stream miles)	35% / 1.5
Palm Creek (% of SWMA / stream miles)	24% / 0.86
Woods (Cole) Creek (% of SWMA / stream miles)	18% / 0.96
North Creek (c) (% of SWMA / stream miles)	16% / 2.3
Junco Creek (% of SWMA / stream miles)	4.2% / 0.93
Red Basin (% of SWMA / stream miles)	2.9% / 0.0019
Storm Infrastructure	
Ditches (miles / linear feet per acre)	1.6 / 19.1
Inlets (number / number per acre)	400 / 0.9
Pipes (miles / linear feet per acre)	7.8 / 95
Detention Pipes (linear feet / linear feet per impervious acre)	0 / 0
Detention Ponds (acres / sq. feet per impervious acre)	1.2 / 570
Bioswales (linear feet / linear feet per impervious acre)	412 / 4.3
Outfalls (number / number per acre)	15 / 0.03

Boy Scout Creek Surface Water Management Area

General and Physical Character.

The Boy Scout Creek SWMA includes 507 acres (0.79 square miles, 5.8% of the city) in the center of Bothell, just north of downtown. The SWMA is transected by Interstate 405 (I-405) and includes large undeveloped wetland areas along North Creek and a large area designated as the North Creek Forest. The central portion of the SWMA drains steeply from over 350 feet in elevation down to approximately 50 feet at the edge of I-405, and slopes more gradually from the eastern edge of I-405 to North Creek.

Sixty-two percent of the soils within the basin are prone to erosion and 88 percent of the soils are infiltrative (Hydric Soil Type A or B).

Land use and Development.

The western portion of the area, near the headwaters of Boy Scout Creek and south along the ridge, is single family residential development. Where the ridge becomes steep on the east, the residential development transitions to forested land. A school, athletic fields, and associated parking occupy the northern third of the Boy Scout Creek basin and new residential development is occurring in the southern portion of the SWMA. East of I-405 there is a large church and parking lots on the south, and denser single family residential and apartments on the north.

This SWMA has the highest percentage of land set aside for parks and open space (9.7 percent) of any of the SWMA's, but the I-405 corridor makes up approximately five percent of the SWMA (also highest in the city). Despite the large amount of open space, the SWMA is still 40 percent impervious cover and over half of the impervious area is road surface (pollutant generating).

Natural Environment.

Boy Scout Creek is the only named stream within the SWMA. The SWMA has a total stream length of 3.1 miles, most of which is North Creek. This SWMA has the highest percentage of wetland area in the city (15 percent). Not much has been documented about the habitat and biologic conditions in the SWMA. Boy Scout Creek is on Ecology's 303(d) list for impaired water bodies due to low dissolved oxygen levels.

Stormwater Infrastructure.

The amount of ditches (5.3 miles), pipes (17 miles), and catch basins (858) within the Boy Scout Creek SWMA is high for the size of the SWMA. The amount of flow control and water quality facilities is average to high relative to the total impervious area in the basin (when compared to other SWMAs).

Watersheds of the Boy Scout Creek SWMA.

The entire area drains to North Creek as it enters into Bothell on its way to the Sammamish River and Lake Washington. Boy Scout Creek basin lies entirely within the city limits and is one of the smallest named stream basins within the city. The head waters are intensively developed and discharge to steep erodible slopes.

The southern portion of the SWMA, which discharges directly to North Creek, has similar characteristics to the Boy Scout Creek basin. The northern and eastern portion of the SWMA are more gradually sloping with some areas of more intensive development.

Surface Water Management Strategies

Since this area contains a large public forested open space, efforts should focus on reducing erosion and protecting the open space through stormwater controls.

Possible efforts include:

- Evaluating the need for addition of stormwater flow and treatment controls

  This effort is not currently included in this Plan Update. Any new efforts would likely require consulting services and addition of projects to the Utility's planning and finances.

- Coordinate with WSDOT on stormwater efforts

  This would require a refocusing of existing Utility staff time.

- Monitor erosion related to stormwater runoff

  Additional monitoring would require reallocation of Utility staff.

- Outreach focuses on awareness of existing upland forests and the value they provide

  This effort would require a refocusing of Utility outreach and education staff efforts.

Boy Scout Creek SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	507/0.79
Land Use	
Single Family Residential (%)	48%
Non-Single Family Residential (%)	17%
Light Industrial (%)	17%
Parks and Open Space (%)	9.7%
Limited Access Highway (%)	5.4%
Campus Institutional (%)	4%
Commercial (%)	0.12%
Land Cover	
Impervious (acres / %)	217 / 43%
Road Surface - All (acres / %)	129 / 26%
Soil	
Infiltrative (acres / %)	444 / 88%
Erosive (acres / %)	316 / 62%
Landslide Prone (acres / %)	0 / 0%
Wetlands	
Wetland Area (acres / %)	77 / 15%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	32 / 6%
Watersheds	
North Creek (d) (% of SWMA / stream miles)	79% / 2.8
Boy Scout Creek (% of SWMA / stream miles)	21% / 0.39
Storm Infrastructure	
Ditches (miles / linear feet per acre)	5.3 / 54.8
Inlets (number / number per acre)	858 / 1.7
Pipes (miles / linear feet per acre)	17 / 172
Detention Pipes (linear feet / linear feet per impervious acre)	2,304 / 10.6
Detention Ponds (acres / sq. feet per impervious acre)	1.2 / 241
Bioswales (linear feet / linear feet per impervious acre)	1,198 / 5.5
Outfalls (number / number per acre)	17 / 0.03

Horse Creek Surface Water Management Area

General and Physical Character.

The Horse Creek Surface Water Management Area encompasses 1,613 acres (2.52 square miles, 18.4% of the city) in the center of the city and includes the downtown area in the west side of the city. General terrain is made up of moderate slopes from north to south.

The SWMA is defined by hills on the east and west sides and Pleasant Lake to the north. Beckstrom Hill (elevation 380 feet) is the highest point in the SWMA and defines its eastern edge. Beckstrom Hill slopes moderately to the south forming the Park and Ride basin and moderately to the west towards Horse Creek. West Hill (elevation 280 feet) defines the western edge of the area and drains south to Cougar High Creek and east to Horse Creek. Pleasant Lake, in the northern portion of the SWMA, forms the headwaters of the Horse Creek basin.

Approximately 90 percent of soils are mapped as being conducive to infiltration (Hydric Soil Type A or B), with about 65 percent of soils prone to erosion.

Land use and Development.

A prominent land use feature in this SWMA is the Downtown Subarea, which includes mixed commercial land uses and City campus with some office professional and multi-family residential areas, as well as a sports stadium with associated parking. The Bothell-Everett Highway (State Route 527) runs north from downtown bisecting the SWMA. Some wetlands and forested areas are present along the highway. Areas to the east and west of the Bothell –Everett Highway are predominantly single family residential and there is a recreational vehicle park and shopping center at the northern edge of the SWMA.

Bothell High School, with associated parking and sports fields, is the most prominent feature in the western portion of the SWMA. Single family residential areas lie to the north and south of the high school. University of Washington Bothell campus complex, including Cascadia College is in the southeastern corner of the SWMA and there is a large wetland complex northeast of the campus.

The southern edge of the SWMA along the Sammamish River is predominantly commercial land uses associated with State Route 522.

Forty two percent of the area is covered by impervious surfaces, making it typical for the city. About 40 percent of the impervious area is road surface (pollutant generating).

Natural Environment.

Horse Creek, the primary stream in the SWMA, flows for 3.3 miles from its headwaters at Lake Pleasant through a wetland and wooded area before entering a storm drain pipe north of NE 190th Street and flowing to its discharge point at the Sammamish River. The natural environment of Horse Creek is degraded. Though Horse Creek is not on Ecology's 303(d) list for water quality impairment, it is known to have low dissolved oxygen and high temperature. The benthic index of biotic integrity (B-IBI) score indicates extreme impairment and the lowest B-IBI score among Bothell streams samples. Aquatic habitat diversity is also poor. The habitat, biological, and water quality data indicate Horse Creek is one of the most impaired water bodies in the city. The City is progressing in daylighting the southern portion of Horse Creek.

Stormwater Infrastructure.

The amount of ditches (4.3 miles), pipes (60 miles), and catch basins (3,368) within the SWMA are typical-high for the size of the SWMA. The area has a significant number of detention pipes and bioswales relative to the impervious area in the western half of the SWMA. Residential areas to the east have inadequate stormwater conveyance capacity.

Watersheds of the Horse Creek SWMA.

The primary stream basin in this area is Horse Creek, which is currently undergoing a project to replace the piped section near the Sammamish River with an open creek. The SWMA also includes two smaller basins with little to no open stream channel. These include Cougar High Creek basin on the western side of the SWMA and the Park and Ride Basin on the eastern side of the SWMA. The southern downtown generally drains directly into the Sammamish River, which is a flow-control exempt water body. The area surrounding the UW Bothell campus drains to the downstream reach of North Creek near its confluence with the Sammamish River. This area contains a large, partially restored wetland complex and constructed stream channel.

Surface Water Management Strategies:

A large portion of this SWMA is redeveloping, but there is still significant area with older infrastructure. Efforts should focus on assisting with conversion of Horse Creek to an open system and redevelopment of new systems. The majority of this area drains to the Sammamish River, so water quality treatment may be more important than flow control if conveyance systems are adequate.

Possible efforts include:

- Participating in design review of new systems as areas redevelop to address water quality

  This will require allocation of existing staff efforts.
- Providing input into improved function of Horse Creek

  This will require allocation of existing staff efforts.
- Assist the Capital group with downtown City street redevelopment

  This will require allocation of existing staff efforts.
- IDDE should focus on detecting possible cross connections with sewer

  This work would be done as part of the Utility's IDDE program.
- Outreach should focus on IDDE, business operations and protection of Horse Creek

  This will require allocation of existing staff efforts.

Horse Creek SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	1,613/2.52
Land Use	
Single Family Residential (%)	49%
Commercial (%)	21%
Office Professional (%)	8.4%
Parks and Open Space (%)	7.8%
Non-Single Family Residential (%)	6.9%
Campus Institutional (%)	6%
Limited Access Highway (%)	0.59%
Agricultural (%)	0.56%
Light Industrial (%)	0.052%
Land Cover	
Impervious (acres / %)	677 / 42%
Road Surface - All (acres / %)	277 / 17%
Soil	
Infiltrative (acres / %)	1,451 / 90%
Erosive (acres / %)	1,049 / 65%
Landslide Prone (acres / %)	37 / 2%
Wetlands	
Wetland Area (acres / %)	31 / 2%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	56 / 3%
Watersheds	
Horse Creek (% of SWMA / stream miles)	46% / 3.3
Cougar High Creek (% of SWMA / stream miles)	16% / 0.3
Sammamish River 1 (% of SWMA / stream miles)	13% / 0.68
Park'n Ride Basin (% of SWMA / stream miles)	10% / 0.023
North Creek (e) (% of SWMA / stream miles)	9.7% / 0
Sammamish River 2 (% of SWMA / stream miles)	5.1% / 0.63
Storm Infrastructure	
Ditches (miles / linear feet per acre)	4.3 / 14.1
Inlets (number / number per acre)	3,368 / 2.1
Pipes (miles / linear feet per acre)	60 / 196
Detention Pipes (linear feet / linear feet per impervious acre)	11,706 / 17.3
Detention Ponds (acres / sq. feet per impervious acre)	0.9 / 61
Bioswales (linear feet / linear feet per impervious acre)	5,335 / 7.9
Outfalls (number / number per acre)	61 / 0.04

Parr Creek Surface Water Management Area

General and Physical Character.

The Parr Creek Surface Water Management Area is 897 acres (1.4 square miles, 10.2% of the city) situated on the east side of Bothell just north of State Route 522 and the Sammamish River, east of I-405 and west of Holly Hill (elevation 360 feet). The SWMA includes steep forested slopes on the east side and the central and western areas are flat and more intensively developed. The entire area drains to the Sammamish River to the south and ultimately to Lake Washington.

Approximately one third of the soils within the area are prone to erosion and approximately half of soils are mapped as being conducive to infiltration (Hydric Soil Type A or B).

Land use and Development.

The eastern edge of the SWMA (Holly hills area) is comprised of single family homes at the top of a steep forested hillside. The area below the hill includes numerous office parks and commercial development. Interstate 405 and limited access portions of SR 522 make up nearly four percent of the SWMA, making this a relatively significant feature of the area.

The SWMA is 49 percent impervious surface (second highest in the city), less than 40 percent of which is road surface (pollutant generating). However, a significant portion of the road surface carries moderate to high volume vehicle traffic.

Natural Environment.

Most of the area drains to the Parr Creek basin and a small portion drains directly to North Creek or the Sammamish River. The SWMA includes approximately 2.8 miles of stream channel (not counting North Creek channel length). Four percent of the area is mapped as wetlands, most of which is along North Creek above and below I-405.

Stormwater Infrastructure.

The amount of ditches (9 miles), pipes (41 miles), and catch basins (3,506) in the SWMA is high for the size of the SWMA. The number and size of flow control facilities in this SWMA are high when compared to other city SWMAs.

Watersheds of the Parr Creek SWMA.

The entire area drains to the Sammamish River east of downtown Bothell via Parr Creek, North Creek, and some direct discharge into the Sammamish. Parr Creek has a significant flooding problem and there is an ongoing study to address those issues.

Surface Water Management Strategies:

Efforts should focus on containing and restoring Parr Creek. Possible efforts include:

- Restore Parr Creek to the extent feasible

  This effort is currently part of the Utility's efforts and identified as a project in this Plan Update.
- Reconfigure drainage systems to reduce flooding potential

  This effort is currently part of the Utility's efforts and identified as a project in this Plan Update.
- Address sediment transfer/erosion that impacts Parr Creek

  This effort is currently part of the Utility's efforts and identified as a project in this Plan Update.
- IDDE focuses on business park activities that might be sources of spills or illicit connections

  This would require a reallocation of existing staff efforts.

- Coordinate with WSDOT on stormwater efforts associated with I-405

  This would require a reallocation of existing staff efforts. Outcomes of this effort could result in new projects or efforts that are not currently contained in this Plan Update.

- Outreach might focus on property maintenance, vehicle maintenance, and facility operations that might affect water quality. Habitat awareness for Parr Creek could be emphasized.

  This would require a reallocation of existing staff efforts.

- Local Source Control – Determine Small Quantity Generators status for sites in the business park. Possible GIS assessment. Provide LSC to qualifying businesses.

  This would require a reallocation of existing LSC staff efforts.

Parr Creek SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	897/1.40
Land Use	
Light Industrial (%)	46%
Single Family Residential (%)	18%
Office Professional (%)	16%
Commercial (%)	7.2%
Parks and Open Space (%)	6.7%
Limited Access Highway (%)	3.8%
Campus Institutional (%)	1.4%
Non-Single Family Residential (%)	0.0042%
Land Cover	
Impervious (acres / %)	436 / 49%
Road Surface - All (acres / %)	172 / 19%
Soil	
Infiltrative (acres / %)	496 / 55%
Erosive (acres / %)	301 / 34%
Landslide Prone (acres / %)	0 / 0%
Wetlands	
Wetland Area (acres / %)	36 / 4%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	360 / 40%
Watersheds	
Parr Creek (% of SWMA / stream miles)	81% / 2.5
North Creek (e) (% of SWMA / stream miles)	12% / 0
Sammamish River 3 (% of SWMA / stream miles)	6.8% / 0.29
Little Bear Creek (% of SWMA / stream miles)	0.23% / 0
Storm Infrastructure	
Ditches (miles / linear feet per acre)	9 / 53
Inlets (number / number per acre)	1,803 / 2
Pipes (miles / linear feet per acre)	41 / 240
Detention Pipes (linear feet / linear feet per impervious acre)	3,506 / 8
Detention Ponds (acres / sq. feet per impervious acre)	3.4 / 338
Bioswales (linear feet / linear feet per impervious acre)	1,543 / 3.5
Outfalls (number / number per acre)	58 / 0.06

Little Bear Creek Surface Water Management Area

General and Physical Character.

The Little Bear Creek Surface Water Management Area encompasses 127 acres (0.2 square miles, 1.4% of the city) on the east side of the city, and comprises only one percent of the Little Bear Creek watershed.

The topography slopes moderately from an elevation of approximately 350 feet in the northwest corner of the SWMA down to 150 feet in the southeastern corner.

Soils are mapped as 100 percent infiltrative types (Hydric Soil Type A or B) with about 50 percent soils prone to erosion.

Land use and Development.

Land use within the SWMA is single family residential with the exception of one school in the southeast corner.

Fifty two percent of the area is covered by impervious surfaces, making it one of the most developed SWMAs in the city. Less than one third of the impervious area is road surface (pollutant generating.

Natural Environment.

The SWMA does not include any mapped stream channels but drains to Little Bear Creek.

Little Bear Creek has high levels of fecal coliform bacteria and is on Ecology's 303(d) list for impaired water bodies. A Water Cleanup Plan for Little Bear Creek (Ecology) was produced in 2005 and includes actions for the City of Woodinville and Snohomish County, but does not address the Bothell, likely because the city represents such a small percentage of the Little Bear Creek drainage basin.

Stormwater Infrastructure.

The SWMA has a limited amount of ditches (0.1 miles), but the length of pipes (5 miles) and number of catch basins (297) are high for the size of the SWMA. The area has some flow control facilities.

Watersheds of the Little Bear Creek SWMA.

The entire area drains to Little Bear Creek to the east to unincorporated Snohomish County and the city of Woodinville before Little Bear Creek drains to the Sammamish River.

Surface Water Management Strategies

This small area drains away from the city toward Little Bear Creek. Snohomish County is leading a watershed planning area for its portion of Little Bear Creek. The City should follow and inform this planning effort.

Possible efforts include:

- Assist Snohomish County with watershed planning efforts and consider actions identified in the completed plan.

  This will require a minor reallocation of staff time.
- Outreach should include standard residential property management issues and information to property owners about the County's planning efforts.

  This requires no change in Utility efforts.
- Inspections of drainage facilities in this area should be performed at the standard city-wide baseline rate.

  This requires no change in Utility efforts.
- City Operations, including catch basin cleaning, street sweeping, vegetation control, and storm facility maintenance should be performed at the Utility's standard baseline rate

  This requires no change in Utility efforts.

Little Bear Creek SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	127/0.2
Land Use	
Single Family Residential (%)	92%
Campus Institutional (%)	7.2%
Land Cover	
Impervious (acres / %)	66 / 52%
Road Surface - All (acres / %)	25 / 20%
Soil	
Infiltrative (acres / %)	127 / 100%
Erosive (acres / %)	62 / 49%
Landslide Prone (acres / %)	0 / 0%
Wetlands	
Wetland Area (acres / %)	0 / 0%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	0 / 0%
Surface Waters	
Little Bear Creek (% of SWMA / stream miles)	100% / 0
Storm Infrastructure	
Ditches (miles / linear feet per acre)	0.15 / 6.2
Inlets (number / number per acre)	297 / 2.3
Pipes (miles / linear feet per acre)	4.8 / 199
Detention Pipes (linear feet / linear feet per impervious acre)	308 / 4.6
Detention Ponds (acres / sq. feet per impervious acre)	0.5 / 344
Bioswales (linear feet / linear feet per impervious acre)	0 / 0
Outfalls (number / number per acre)	?

Riverside Surface Water Management Area

General and Physical Character.

The Riverside Surface Water Management Area encompasses 799 acres (1.25 square miles, 9.1% of the city) in the southern portion of the city. The area is bounded by Norway Hill (elevation 480 feet) on the southwest, Sammamish River on the north, and the city limits on the east. The area is characterized by numerous steep slopes and known landslides on the west, north, and east sides of Norway Hill. The area is bisected by I-405 and the land to the east of I-405 slopes moderately from Brickyard Road Hill (elevation 320 feet) to the south down the Sammamish River on the north.

Soils are mapped as only 25 percent infiltrative types (Hydric Soil Type A or B) with about 68 percent soils prone to erosion. Nearly one third of the SWMA is landslide prone.

Land use and Development.

Land use within the SWMA is mostly single family residential with a mixture of office professional and commercial areas along the I-405 corridor. There are mobile home parks to the north along the Sammamish River.

Thirty six percent of the area is covered by impervious surfaces, which is slightly below average for the city.

Natural Environment.

Riverside Creek and Brickyard Creek are the primary stream basin within the SWMA and include 3.8 miles of mapped stream channel. The natural habitat and biological conditions within the SWMA have not been characterized extensively, but both streams are on Ecology's 303(d) list of impaired water bodies for low dissolved oxygen and high fecal coliform bacteria.

Three percent of the SWMA is covered by wetlands, most of which are in the headwaters of Riverside Creek.

Stormwater Infrastructure.

The SWMAs ditches (4.4 miles), pipes (26 miles) and number of catch basins (3,027) are typical to low for the size of the SWMA and the number of flow control and water quality treatment BMPs is typical for the amount of impervious area.

Watersheds of the Riverside SWMA.

The entire area drains to the Sammamish River to the north via several small creeks and basins, including East Riverside/Riverside, Brickyard, and Blyth Creeks.

Surface Water Management Strategies:

Efforts should be focused on sediment issues caused by stormwater. WSDOT and upstream developers should be engaged to address downstream sediment problems. Roadway flooding should be reduced.

Possible efforts include:

- Continue to work with WSDOT and upstream properties on sediment control

  This could require a reallocation of staff efforts.
- Improve storm system along East Riverside Drive to reduce flooding

  This is identified as a project in this Plan Update.
- Address sediment management at Blyth Park

  This is identified as a project in this Plan Update.
- Develop an evaluation and management plan for the Brickyard Creek basin

  This is a new effort that would either require reallocation of existing staff or consulting services that are currently not planned in this Plan Update.
- Outreach might focus on sediment and soils

management, low impact development techniques appropriate for the area, and on residential property management

This would be a reallocation of existing staff efforts.

- Inspections might be increased in the 160th area to address potential water quality impacts.

  This would be a reallocation of existing staff efforts.

- City Operations should evaluate and improve or replace, if needed, its yard and decant facility on Brickyard Road.

  This is a new effort that is not included in this Plan Update's projects or staffing efforts.

- Work with development review and Community Development to assess and develop, as needed, adequate stream protections on unstable hillsides.

  This is a new effort that would require reallocation of staff and use of consulting services. This effort is not included in this Plan Update.

Riverside SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	799/1.25
Land Use	
Single Family Residential (%)	61%
Non-Single Family Residential (%)	14%
Parks and Open Space (%)	9.4%
Commercial (%)	7.8%
Limited Access Highway (%)	2.4%
Office Professional (%)	2.2%
Campus Institutional (%)	1.5%
Light Industrial (%)	1.3%
Land Cover	
Impervious (acres / %)	289 / 36%
Road Surface - All (acres / %)	139 / 17%
Soil	
Infiltrative (acres / %)	197 / 25%
Erosive (acres / %)	546 / 68%
Landslide Prone (acres / %)	250 / 31%
Wetlands	
Wetland Area (acres / %)	23 / 3%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	27 / 3%
Surface Waters	
Sammamish River 4(a) (% of SWMA / stream miles)	45% / 0.78
E. Riverside Creek (% of SWMA / stream miles)	32% / 2.5
Brick Yard Creek (% of SWMA / stream miles)	20% / 0.53
Blyth Creek (% of SWMA / stream miles)	2.7% / 0.0083
Storm Infrastructure	
Ditches (miles / linear feet per acre)	4.4 / 28.8
Inlets (number / number per acre)	1,185 / 1.5
Pipes (miles / linear feet per acre)	26 / 172
Detention Pipes (linear feet / linear feet per impervious acre)	3,027 / 10.5
Detention Ponds (acres / sq. feet per impervious acre)	1.3 / 190
Bioswales (linear feet / linear feet per impervious acre)	1,711 / 5.9
Outfalls (number / number per acre)	35 / 0.04

Waynita Surface Water Management Area

General and Physical.

The Waynita Surface Water Management Area encompasses 657 acres (1.03 square miles, 7.5% of the city) in the southeast corner of the city. The area is bounded by Norway Hill (elevation 480 feet) on the east and the city limits on the west. The Sammamish River is the northern boundary of the SWMA. The area is characterized by numerous steep slopes and known landslides, but there are some moderately sloping areas to the south.

Soils are mapped as only 17 percent infiltrative types (Hydric Soil Type A or B) with about 78 percent soils prone to erosion and over half of the SWMA is landslide prone.

Land use and Development.

Land use within the SWMA is almost entirely single family residential some parks and open space including part of a golf course to the north. Only 24 percent of the area is covered by impervious surfaces, making it second least developed SWMA in the city.

Natural Environment.

Waynita Creek is the primary stream basin within the SWMA and includes over 4 miles of mapped stream channel. The City has evaluated the natural environment of Waynita Creek and found it to have one of the least impaired biological community of all streams in the city, though still severely to moderately impaired. Fish diversity in Waynita Creek is also fair to good relative to other streams in the city even though habitat complexity is low. Waynita Creek is not on Ecology's 303(d) list for impaired water bodies, but has been noted to have low dissolved oxygen levels.

Three percent of the SWMA is covered by wetlands, most of which are in the Waynita Creek basin.

Stormwater Infrastructure.

The SWMA has a limited amount of ditches (1.7 miles), but the length of pipes (19 miles) and number of catch basins (782) are typical for the size of the SWMA and the number of detention pipes and bioswales is high.

Surface Waters of the Waynita SWMA.

The entire area drains to the Sammamish River to the north by way of Waynita Creek and direct discharge, except for a small of the area that drains to Juanita Creek to the south.

Watersheds Management Strategies:

Surface water efforts in this area should be focused on managing flow control for Waynita Creek and on working with the City and region in any efforts to preserve and protect the creek. Restoration of habitat and water quality features in the Sammamish River floodplain should be pursued.

Possible efforts include:

- Evaluating the need for addition of stormwater flow and treatment controls

  This effort is not included in this Plan Update and would require additional staff and consultant services.
- Monitor erosion related to stormwater runoff

  This effort is not included in the Plan Update and would require additional staff efforts.
- IDDE might be a lower due to limited potential connections

  This could result in a reallocation of staff time and consultant efforts to other areas.

- Outreach might focus on creek protection and sediment management. New LID installation should be monitored and outreach should be provided to new property owners. LID Infiltration techniques should consider potential impacts on any landslide or liquefaction areas south of the Sammamish River.

  This would be a reallocation of existing staff time.

- Inspections should focus on working with property owners to develop proactive and effective facilities maintenance. An inspection program will need to be developed for new LID.

  This would be a refocusing of existing staff time.

- City Operations should focus on street sweeping and basin cleaning at a normal frequency.

  This would not require a change in the Utility's efforts.

- A sediment management plan should be performed in this area.

  This would be a new effort that would require staff time and consulting services. A sediment management plan is not included in this Plan Update and costs to develop a plan have not been estimated.

Waynita SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	657/1.02
Land Use	
Single Family Residential (%)	94%
Parks and Open Space (%)	6%
Non-Single Family Residential (%)	0.037%
Land Cover	
Impervious (acres / %)	159 / 24%
Road Surface – All (acres / %)	65 / 10%
Soil	
Infiltrative (acres / %)	112 / 17%
Erosive (acres / %)	516 / 78%
Landslide Prone (acres / %)	364 / 55%
Wetlands	
Wetland Area (acres / %)	21 / 3%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	0 / 0%
Surface Waters	
Waynita Creek (% of SWMA / stream miles)	75% / 4.5
Sammamish River 4(b) (% of SWMA / stream miles)	24% / 2.6
Juanita Creek (% of SWMA / stream miles)	0% / 0
Storm Infrastructure	
Ditches (miles / linear feet per acre)	1.7 / 13.8
Inlets (number / number per acre)	782 / 1.2
Pipes (miles / linear feet per acre)	19 / 151
Detention Pipes (linear feet / linear feet per impervious acre)	1,402 / 8.8
Detention Ponds (acres / sq. feet per impervious acre)	3.2 / 881
Bioswales (linear feet / linear feet per impervious acre)	1,200 / 7.5
Outfalls (number / number per acre)	29 / 0.04

Juanita Surface Water Management Area

General and Physical Character.

The Juanita Surface Water Management Area is 438 acres (0.68 square miles, or 5% of the city), and makes up approximately 10 percent of the Juanita Creek basin area. The SWMA is situated in the southeastern corner of the dity and terrain slopes generally from east to west. The SWMA is divided roughly into thirds by I-405 (running from north to south) and the Tolt Pipeline Trail (running from northwest to southeast). The entire watershed drains to Juanita Creek to the south in the city of Kirkland and ultimately to Lake Washington.

Norway Hill (Elevation 480 feet) is at the northwest corner of Juanita Creek SWMA and a ridge extends south from Norway Hill creating the western boundary of the SWMA. The western portion of the SWMA slopes moderately to steeply from the ridge formed by Norway Hill northwest towards a tributary stream of Juanita Creek on the southeast. The eastern half of the SWMA has flat to gradual slopes.

Approximately 71 percent of the soils within the basin are prone to erosion and approximately 74 percent of soils are mapped as being conducive to infiltration (Hydric Soil Type A or B).

Land use and Development.

The eastern third of the SWMA (area east of I-405) is comprised of some single family residential areas with two large schools and a park. The southern portion of the SWMA is single family residential land use with a small commercial area. The northern portion of the SWMA is a mixture wetlands, low to moderate intensity single family residential development, and pockets of more intensive development, such as Brickyard Road Park and Ride, an apartment complex, and small commercial areas.

The SWMA is 41 percent impervious surface, approximately half of which is road surface (pollutant generating). The Interstate 405 corridor makes up four percent of the SWMA, which is high for the city.

Natural Environment.

The SWMA includes small tributaries of Juanita Creek, with a total combined length of 2.2 miles. Six percent of the area is mapped as wetlands. The downstream reaches of the Juanita Creek basin has been studied extensively by King County and other jurisdictions and a stormwater retrofit analysis was completed in 2012 that includes recommendations for restoring beneficial uses in the stream through stream channel enhancement and stormwater management practices that reduce flow and improve water quality.

Stormwater Infrastructure.

The amount of ditches (2.1 miles), pipes (10 miles), and catch basins (653) in the SWMA are typical for the size of the SWMA. The detention pipe length (2,972 feet) is high for the amount of impervious area in the SWMA when compared to other SWMAs.

Watersheds of the Juanita Creek SWMA.

The entire area drains to Juanita Creek in the city of Kirkland to the south. Juanita Creek discharges to Lake Washington in Juanita Bay.

Surface Water Management Strategies

Storm and surface water efforts in this area should be coordinated with the City of Kirkland to assist with addressing basin issues for Juanita Creek.

Possible efforts include:

- Focus on the 160th area and on ongoing sediment issues.

  This would require a refocusing of existing staff and could require consulting services that are not identified in this Plan Update.
- Coordinate with WSDOT on stormwater efforts.

  This is a continuation of existing efforts by Utility staff.
- Inspections of drainage facilities in this area should be performed at the standard city-wide baseline rate.

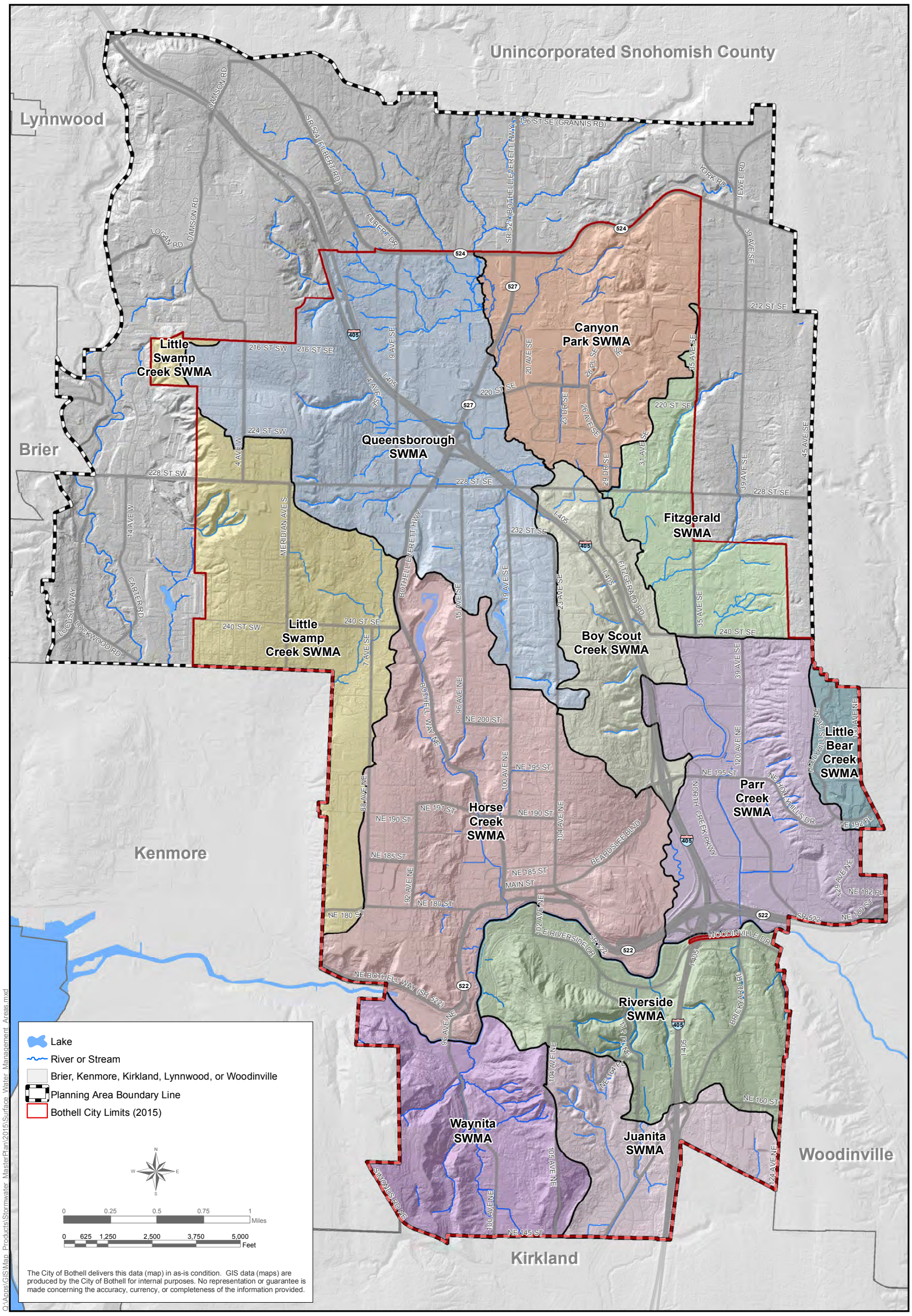
  This would not require any change in Utility efforts.
- City Operations, including catch basin cleaning, street sweeping, vegetation control, and storm facility maintenance should be performed at the Utility's standard baseline rate

  This would not require any change in Utility efforts.
- Outreach and education should focus on youth education programs, residential practices, and multifamily hazardous waste use, handling and storage.

  This would be a refocusing of existing staff efforts.

Juanita SWMA Data Table

Area	
Surface Water Management Area (acres/sq. miles)	438/0.68
Land Use	
Single Family Residential (%)	63%
Commercial (%)	14%
Campus Institutional (%)	7.4%
Non-Single Family Residential (%)	6.4%
Parks and Open Space (%)	5.2%
Limited Access Highway (%)	4.2%
Office Professional (%)	0.14%
Land Cover	
Impervious (acres / %)	179 / 41%
Road Surface - All (acres / %)	88 / 20%
Soil	
Infiltrative (acres / %)	322 / 74%
Erosive (acres / %)	310 / 71%
Landslide Prone (acres / %)	28 / 6%
Wetlands	
Wetland Area (acres / %)	26 / 6%
Flood Plain	
Flood Plain and Flood way Area (acres / %)	0 / 0%
Surface Waters	
Juanita Creek (% of SWMA / stream miles)	100% / 2.2
Storm Infrastructure	
Ditches (miles / linear feet per acre)	2.1 / 25.9
Inlets (number / number per acre)	653 / 1.5
Pipes (miles / linear feet per acre)	10 / 124
Detention Pipes (linear feet / linear feet per impervious acre)	2,972 / 16.6
Detention Ponds (acres / sq. feet per impervious acre)	0.3 / 81
Bioswales (linear feet / linear feet per impervious acre)	873 / 4.9
Outfalls (number / number per acre)	1 / 0.002



Bothell Storm and Surface Water Master Plan Update – 2015

Surface Water Management Areas

City of Bothell

APPENDIX C
ACTION ITEMS

This Appendix contains descriptions of the Action Items recommended as part of this Plan Update.

Critical Action Items

C1 Complete planned drainage and environmental projects

The project planning section of this report identifies over $16 million (including Horse Creek) in projects during 2015-2020. For the majority of these projects, the Utility is the primary sponsor. However, the Utility does not include any dedicated project management, design or construction administration staff.

To complete its projects, the Utility has typically relied on external consultants to design projects and has used a combination of City Capital Division staff and consultants for project and construction administration. Utility staff should continue to engage the Capital Division to complete the planned projects.

Action Steps:

1. Propose adding projects to Capital Facilities Plan and City Budgets
2. Coordinate design of projects with Capital Division and consultants
3. Pursue grants or other funding or participation
4. Design, bid and complete projects

Implementation Schedule:

Add proposed projects to the 2016-2022 Capital Facilities Plan

Design and completion of projects is ongoing

Initial Cost:

The initial cost of designing and completing projects is expected to exceed $16 million.

Long Term Cost/Impacts:

Some projects will add maintenance and administration costs and others will reduce costs by taking care of existing problems. The overall cumulative impact of completion of projects has not been fully assessed.

C2 Screen Utility for illicit discharges and eliminating them where found

The current NPDES Permit requires Bothell to screen at least 40% of the City's system by December 31, 2017 and an average of 12% for each year thereafter. The Permit references guidelines for conducting IDDE screening, but does not dictate where the City must first conduct screening or exactly how the work must be done.

The Utility recognizes the value of detecting and eliminating pollution sources from the city's system.

The Utility will need to develop a plan of how it will approach this work. Utility staff should identify where the initial screening will be done based on a combination of logistics and the value of the effort. Areas could be prioritized by WMA.

Existing staff capacity is expected to be insufficient to meet the initial screening requirement deadlines, so the use of a consultant is anticipated. The consultant could help Utility staff develop the initial plan and could conduct the screening of the first 40% of the city.

Future screening (at least 12% per year) could be conducted by Utility staff through reassignment of workloads. A combination of Utility inspectors and Operations staff would conduct visual and camera inspections, sampling, and documenting of Utility systems. Utility engineering staff will lead enforcement.

Action Items:

1. Hire a consultant to assist with initial screening and plan
2. Develop a screening plan
3. Complete screening per permit requirements

Implementation Schedule:

Hire consultant by January 2017

Complete Screening Plan by March 2017

Complete Screening of 40% by December 31, 2017

Continue ongoing annual screening with existing staff

Initial Cost:

The Utility is expecting about $50,000 to $100,000 in initial consulting services to assist in the initial program development and screening.

Long Term Cost/Impacts:

Long term impacts will depend on the screening results and the follow-up activities that are identified. Elimination of illicit discharges and connections would reduce the need for other, more expensive measures like environmental clean-up or restoration.

C3 Revise BMC and policies to incorporate Low Impact Development

The current NPDES permit requires that Bothell perform a comprehensive review of its development-related codes, rules, standards, or other enforceable documents to incorporate and require Low Impact Development principles and practices for managing stormwater, where feasible.

"Low-impact development (LID) is a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design." Department of Ecology

Bothell is required under its NPDES permit to integrate LID by December 31, 2016.

The Utility intends to hire a consultant in mid-2015 to assist with the process of integrating LID into our codes and standards and to train staff to implement LID. Consultant cost for implementation are included in the 2015-2016 Budget.

Action Steps:

1. Select consultant
2. Develop work plan
3. Complete recommended code updates
4. Present to Planning Commission and Council

Implementation Schedule:

Hire consultant by September 2015

Complete recommended code updates by July 2016

Implement changes by December 31, 2016

Initial Cost:

The Utility is expecting to spend about $75,000 for consulting services to assist with LID code review and updates in 2015.

Long Term Cost/Impacts:

Implementing LID will require changing the way the Utility inspects and maintains storm infrastructure. In theory, the use of LID should reduce the need for other stormwater conveyance and treatment, thereby reducing the long-term increase in Utility costs associated with new development and projects.

C4 Update Surface Water Design Manual to the latest Ecology standards

The current NPDES permit requires that Bothell update its Surface Water Design Manual to meet the requirements of the latest Department of Ecology standards by December 31, 2016. The City last updated its manual on August 15, 2009 with the assistance of a consultant.

Due to a lack of staff capacity and need for specific expertise, the Utility intends to propose to hire a consultant to assist it in updating its Manual. This process is expected to begin in fall 2015 by selection of a consultant and be completed by mid-2016. Consultant costs are not currently identified in the 2015-2016 Budget and are expected to be about $25,000.

Action Steps:

1. Hire consultant
2. Complete proposed updates (engage development community)
3. Present to Council for approval

Implementation Schedule:

Hire consultant by October 2015

Complete proposed updates by July 2016

Present to Council in fall 2016

Initial Cost:

Consulting services to assist with the Manual update are expected to cost about $25,000.

Long Term Costs/Impacts:

No significant additional staff impacts or direct Utility costs are expected as a result of the Manual update. Long-term, the Utility should benefit by increased surface water protection.

C5 Review and update Utility rates to keep them current

The Utility has used consulting services to develop the original Utility Rate Study (November 4, 1994) and to create a new rate model in 2012. These rate studies and model have been used by the Utilities manager to annually recommend rates to the City Council for approval.

The current rate model developed in 2012 should continue to be useful for rate setting information through 2016. At that time it should be updated to account for growth, additional program requirements, capital planning and financing, and this Plan Update. The updated rate model should be updated again in 2020 along with the update of the Master Plan. In between rate model updates, rate adjustments should continue to be considered annually.

Action Steps:

1. Hire consultant to update rate model (2016 and 2020)
2. Update rates each year

Implementation Schedule:

Hire consultant in Summer 2016 and Summer 2020

Complete rate reviews by October of each year

Initial Cost:

Consultant cost to revise the rate model is expected to cost about $25,000 per round, for a total of $50,000 through 2020.

Long Term Costs/Impacts:

Appropriate rate setting will increase the financial performance of the Utility.

High Priority Action Items

H1 Review Utility rate structure and billing practices

Staff has determined that periodic review of both the rate structure and billing options is appropriate to assure that the Utility is fair, transparent, and efficient for our customers.

The current stormwater rate structure and billing options were developed when the Utility was created in 1994. The rate structure has been relatively tied to billing options because the billing entities (Snohomish and King Counties) have required that we follow their rate structures.

Currently, stormwater bills are sent to most property owners in the city through property tax billing by Snohomish and King Counties.

Action Items:

1. Hire consultant to develop options analysis
2. Develop recommendations
3. Present to Council for approval as needed

Implementation Schedule:

Complete options analysis by September 2015

Present to Council by November 2015

Initial Costs:

Consulting costs to evaluate revisions to rate structure and billing is expected to cost about $25,000, to be spent in 2015.

Long Term Costs/Impacts:

Revisions to the rate structure could be designed to be revenue-neutral.

Billing options could cost between $10,000 to $120,000 per year, compared with the $50,000 per year that the Utility currently pays Snohomish and King County for property-tax billed services.

H2 Create maintenance management and asset management systems

The Utility does not currently have a comprehensive database system to track and document maintenance activities and influence priorities and scheduling. A well-designed and used system will link to the City's GIS and allow users to track activities and condition of infrastructure and to generate reports about maintenance activities.

An asset management system will provide an objective and systematic approach to managing the useful life of the stormwater infrastructure. The system will inform the Utility where and when to replace pipes, inlets and facilities.

The City's Water, Sewer, and Storm Utilities are currently working with the City's Information Technology personnel to select a vendor to provide and set up the software program and data for a maintenance management system. The system development is funded in the 2015-2016 Budget. The Asset Management capabilities of the maintenance management system are still being evaluated.

Action Steps:

1. Continue work with other utilities on selection/hiring of vendor and software
2. Implement system, including training, and data input
3. Use the maintenance management system software or a separate system to generate recommended asset management strategy and funding levels

Implementation Schedule:

Select vendor/software in 2015

Complete data input and training in 2016

Develop asset management system by end of 2016

Initial Cost:

Costs to set up the maintenance management system are about $200,000 and are included in the 2015-2016 budget. The ongoing costs to maintain the system are estimated to be about $50,000.

The costs to add asset management to the system have not been determined, but may be on the order of $50,000 to set up and use the system to develop annual asset management activities.

Long Term Costs/Impacts:

Over the long term, the benefits of both a maintenance management and asset management system are expected to outweigh the costs of establishing and maintaining the systems.

H3 Assess long term staffing and equipment needs

This Master Plan Update did not extensively review the Utility's Management and Administration and Operations staffing and equipment to address adequacy and efficiency.

To assure that the Utility is effectively using its revenues, it should periodically review its staffing levels, equipment needs, and performance measures. Although these activities are considered during each City budget cycle, the review performed for the budget is often an evaluation of incremental additions to existing staff and equipment. A comprehensive review that evaluates the baseline needs is typically not conducted at that time.

This Plan Update recommends that the Utility conduct a review to assure that staffing, equipment, and services continue to align with the goals and needs for the Utility. This review should be conducted in early to mid-2016 to align with the 2017-2018 City budget process.

Action Items:

1. Complete a benchmarked review of long term staff and equipment needs.
2. Incorporate needs in rates and budget.

Implementation Schedule:

Complete benchmarked review by mid-2016.

Incorporate needs into 2017-2018 budget and rates by 3rd Quarter of 2016.

Initial Cost:

Consultant services to assist with benchmarked review = $50,000

Long Term Costs/Impacts:

Unknown. Depends on the adopted recommendations of the benchmarked review.

H4 Develop a water quality action plan

Protecting, preserving and restoring surface waters is one of the basic elements of the Utility.

The Utility is currently monitoring numerous locations around the city for water quality. This monitoring is, in part, being done to satisfy our requirements as part of the Clean Water Act.

In February 1996, the Utility had a consultant (CH2M-Hill) complete a Surface Water Quality Plan. The Plan presented a five-year program to address the requirements of the Puget Sound Water Quality Management Plan. Many of the elements of the 1996 Water Quality Plan were integrated into the Utility's program as general, city-wide efforts to improve water quality.

Water quality monitoring at staff-selected locations, however, shows that water quality is declining.

A logical next step in this monitoring program is to focus in on particular locations where monitoring reveals problems and attempt to determine the source(s) of the problems. Following this determination, the Utility should lead efforts to solve the problems.

This effort could include the development of an action-specific water quality plan to augment the Utility's existing water quality efforts. This plan would identify specific, targeted actions. The plan could be organized by Watershed Management Areas to allow for focusing of actions by area.

Action Items:

1. Hire a consultant to develop the Water Quality Action Plan
2. Address the actions identified in the Plan

Implementation Schedule:

Hire consultant in Spring 2016

Completion of Water Quality Action Plan by end of 2016.

Initial Cost:

Consultant services to develop Water Quality Action Plan = $150,000. Grant funding through the Ecology Centennial program or Federal Section 319 may be available.

Long Term Costs/Impacts:

Long term costs are not known at this time. Action items proposed by the Water Quality Action Plan may require additional spending by the Utility and will need to be considered in light of other needs and rate constraints.

H5 Review private facilities maintenance options

The Utility contains a mix of public and private storm facilities (typically detention pipes, vaults, and ponds). There are about 140 Utility-maintained facilities and 120 privately maintained facilities spread throughout the city. These facilities all serve to protect the downstream storm and surface water system from excessive and/or polluted stormwater.

Since its inception, the Utility has required that flow control and water quality facilities constructed to handle runoff from private property are owned and maintained by the property owners. This requirement has changed as the city has grown and annexed areas that were under the jurisdictions of Snohomish and King County. Now the city contains a mix of facilities with different ownership and maintenance responsibilities. This inconsistency creates possible inequity among private property owners. In addition to the inequity associated with who maintains the facilities, the mix of responsibilities creates potential for highly variable system maintenance levels.

The Utility's role on private facility maintenance is to inspect and enforce maintenance standards. This approach results in highly varied levels and costs of maintenance and facility function for privately maintained facilities. Public facilities, on the other hand, are both inspected and maintained by the Utility, which potentially leads to more consistent maintenance standards.

The Utility should analyze options for maintenance of private facilities. Goals of this analysis should include:

- Improved water quality and flow control through consistent maintenance
- Equity among ratepayers
- Efficiency and cost effectiveness

Options to consider for private system maintenance might include:

- Status Quo
- Utility assumes maintenance and operations responsibilities for some or all private facilities and adjusts rates accordingly
- Utility requires private systems to be inspected, maintained, and certified by a third party
- Utility allows private maintenance at the option of property owner, with appropriate credits against fees

Action Steps:

1. Identify specific policy considerations
2. Hire consultant to prepare and analyze options
3. Develop a plan to implement changes, if recommended
4. Revise program

Implementation Schedule:

Conduct analysis in 2016.

Implement changes in 2017.

Initial Cost:

The cost for consultant services to help analyze options to current private facilities maintenance practices is expected to cost about $50,000.

Long Term Costs/Impacts:

Long term costs will depend on decisions regarding alternatives for private maintenance.

H6 Identify and prioritize small natural environment/water quality projects

The Utility may have the opportunity to improve water quality in its streams and natural systems by providing low cost, high value projects. Funding for these projects could come from money that is allocated each budget for small projects.

Traditionally, the small projects budget has been used to address small cost and localized flooding issues. Occasionally, natural environment or water quality projects have also been included. However, no formalized system of identifying and prioritizing small natural environment projects has been done. By developing a prioritized approach, the Utility should increase the value of its spending for improving the surface water environment.

Action Steps:

1. Staff assesses city for potential projects
2. Staff creates a prioritized list of projects

Implementation Schedule:

Complete list by mid 2017

Initial Cost:

Existing staff would develop and prioritize the list of projects.

Long Term Costs/Impacts:

The total cost of potential projects would not be known until a list is created. Benefit-cost review of each project will be considered before moving forward with any project.

H7 Develop a Utility-operated facility retrofit plan

The Utility should review its flow control and treatment facilities (especially its ponds) to consider if retrofits are possible to enhance these facilities' function. The review would identify potential retrofit opportunities, estimated costs and funding, and priories for retrofits. The Utility should consider conducting an analysis to capture and rate older systems with inadequate flow and water quality control. This way, grant dollars could be applied for and received based on greatest need.

Action Steps:

1. Hire consultant to review Utility facilities and identify potential retrofit opportunities.
2. Develop a retrofit plan.

Implementation Schedule:

Begin facilities review in Spring 2016

Complete retrofit plan by end of 2016

Initial Cost:

Consultant services are estimated at about $100,000 to develop a retrofit plan. Grant funding through Ecology Centennial and Federal Section 319 programs may be available for this effort.

Long Term Costs/Impacts:

Cost for retrofitting of Utility facilities is not known. Some facilities retrofits might increase maintenance costs while others might lower maintenance costs. A benefit-cost review should be considered before each project is carried forward.

H8 Clarify Utility's role in City critical areas management

In its role of protecting natural drainage systems, the Utility should be engaged in supporting the role that critical areas provides in water quality. To date, the Utility's role in many aspects of critical areas management has been limited. Occasional issues regarding wetlands, stream buffers, floodplains and other natural habitat arise and include efforts by the Utility staff.

The level of effort required to address critical areas is likely to increase as water quality standards become more stringent. Any increased level of effort is not included in the current rate projections, staffing, and other efforts of the Utility.

Bothell currently has limited formal analysis of the many publically owned and managed wetland areas are within City limits. The Utility should consider mapping all known wetlands areas, paying special attention to mitigation projects, and set up a regular maintenance schedule based on site conditions and State requirements.

As the Utility identifies and completes natural environment projects in Bothell critical areas, it will likely cause the City to have increasing costs associated with managing these restored or enhanced areas. The responsibility for these costs is not currently clearly defined.

The Utility should work with other Public Works divisions, Parks, and Community Development to develop a coordinated plan to manage critical areas.

Action Steps:

1. Utility staff coordinates with Parks and Community Development to define potential options for critical areas management.
2. Utility creates its critical areas management plan.

Implementation Schedule:

Begin coordination in first quarter of 2016

Complete a Utility plan for critical areas management by mid-2016.

Initial Cost:

Existing staff will develop the Utility's critical areas management plan.

Long Term Costs/Impacts:

Long term management costs will be determined through the plan development process.

H9 Review Utility's Emergency Preparation planning

The Utility participates in the City-wide efforts related to emergency preparation. The Utility should evaluate any storm and surface water needs that it may have that are not included in the City-wide emergency plan.

Action Steps:

1. Conduct internal review of Utility's emergency preparation
2. Participate in City-wide emergency preparation.

Implementation Schedule:

Conduct mini-reviews prior to each winter.

Conduct a thorough review in early 2017 and again in 2020.

Initial Cost:

Reviews would be conducted by Utility staff. Costs associated with preparation would be assessed during reviews.

Long Term Costs/Impacts:

Preparation should help limit or control long term costs.

H10 Develop Surface Water Management Area-based strategies and actions prioritized to recover water bodies

The Surface Management Area approach presented in this Plan Update provides an additional approach to managing many of the Utility's program activities. The Plan Update delineates SWMAs and characterizes the areas. The next step in this approach is to develop specific strategies for each SWMA prioritized to recover water bodies.

The development of these strategies needs follow the city's Comprehensive Plan and align with the strategies in the Subareas addressed in the Comprehensive Plan. The Subarea boundaries of the Comprehensive Plan do not need to coincide exactly with the SWMAs. However, the strategies and action items for the SWMAs need to follow and amplify the adopted Comprehensive Plan Subarea sections for Land Use, Natural Environment, and Urban Design.

The following items are expected as part of the strategies for each area:

- Development of a prioritized outreach and engagement plan for each SWMA
- Prioritized water quality monitoring and testing
- Specific illicit discharge detection and elimination efforts
- Tailored stormwater facilities inspections, maintenance requirements and retrofitting
- Special coordination efforts with other agencies or significant stormwater contributors
- Specific Low Impact Development goals for each SWMA
- Development of operations standards (street sweeping, catch basin cleaning, etc.)
- Identification of long term study needs

Action Steps:

The process for development and implementation of strategies could include the following:

1. Meet with Community Development staff to develop a plan to review strategies and determine the appropriate approval level and process for strategies.
2. Develop and obtain approvals of strategies, action items, and implementation plan priortized to restore water bodies.
3. Implement actions

Implementation Schedule:

Development of SWMA strategies can begin as soon as the Plan is complete.

Strategies should be completed by Mid 2016.

Implementation of strategies an ongoing process.

Initial Costs:

Development of SWMA strategies is expected to be performed by existing Utility staff.

Long Term Costs/Impacts:

Long term costs and impacts will depend on the action items identified for the SWMA's. The action items could be designed based on existing funding or could require additional spending.

The development of SWMA-based strategies should not be more expensive than the citywide approach to surface water management because the focus areas are more specific and the action items are more tailored to the specific problems in the SWMA.

The SWMA approach is not expected to create any new surface water management actions, but simply focus existing or needed actions.

Medium Priority Action Items

M1 Assist Snohomish Co. with Little Bear Creek Watershed Development

Snohomish County is conducting a watershed plan for the portion of the Little Bear Creek watershed within the County. The city has a small portion of this watershed within our city limits. Bothell will need to provide information to Snohomish County as it conducts the planning effort. In addition, the City will need to consider the outcomes and recommendations of this planning effort and how the City will implement the recommendations.

The watershed planning is expected to be complete in 2018. The Utility should continue to coordinate with Snohomish County throughout this process.

Action Steps:

1. Coordinate with Snohomish County as needed during plan development
2. Define City's implementation steps.

Implementation Schedule:

Snohomish County's planning efforts are expected to be complete in 2018

Initial Cost:

At this point, the City's costs for providing information and participation with the County are unknown and expected to be minimal.

Long Term Costs/Impacts:

Long term costs to the City are not known but may include retrofitting and property acquisition.

M2 Consider expansion of Local Source Control program

Future expansion of the LSC program could include hazardous waste generators of all sizes and business sectors. Currently the program only provides outreach to high priority small quantity generators (SQGs). An assessment of the city's waste generating businesses and a cost/benefit analysis of expanding the program should be completed to inform future expansion.

These assessments could include the following.

- Baseline inventory of all businesses in Bothell.
- GIS hotspot analysis of businesses by generator status using WMAs
- Risk impact assessment of larger generators
- Cost/benefit analysis for expansion to larger generators

Action Steps:

1. Review the LSC program and assess if expansion is appropriate.
2. Implementation Schedule:
3. Conduct review in early 2017

Initial Cost:

Evaluation of program expansion would be conducted by Utility staff.

Long Term Costs/Impacts:

Expansion of the program to other generators would increase Utility costs. These costs would be considered during the evaluation.

M3 Create a grants tracking system

In addition to rate revenues, the Utility uses grants, fees, loans and other debt to fund and finance its operations and projects. The Utility's process of tracking and pursuing these additional funding sources has been performed in an ad-hoc fashion that has often been reactive or ineffective, causing the Utility to potentially miss opportunities. To remedy this, the Utility should develop and use a systematic scheduled approach to track and access outside funding.

The Utility should consider identifying and mapping all facilities that connect groundwater into our public stormwater system to determine how many stormwater facilities currently connect groundwater sources into our existing stormwater system.

Action Steps:

1. Create a grants tracking system.

Implementation Schedule:

Begin and complete work in first quarter of 2016.

Initial Cost:

Work would be performed by Utility staff.

Long Term Costs/Impacts:

Use of a grants tracking system would improve access to funding.

M4 Conduct study of groundwater impacts/develop management policy for Utility

Surface waters and storm systems throughout the Utility area are influenced by groundwater. Streams are fed, in part, by groundwater. The Utility's built systems often intercept and convey groundwater. However, the Utility does not have a defined role or plan to address groundwater issues throughout the city.

The Utility should begin to clarify its role in city groundwater management by preparing a policy position paper that identifies and assesses the Utility's possible approaches to groundwater management. Based on the policy decision, the Utility could then conduct a comprehensive study of groundwater issues throughout the city and could develop a specific action plan to address the Utility's role and responsibilities in city groundwater management.

Action Items:

1. Prepare Policy Position Paper
2. Hire consultant to develop groundwater management plan

Implementation Schedule:

Prepare policy position during 1st quarter of 2018

Complete Groundwater Management Plan by end of 2018

Initial Cost:

Consultant services for groundwater plan = $150,000

Long Term Costs/Impacts:

Unknown. Depends on the adopted recommendations of the groundwater management plan.

M5 Assume oversight of North Creek Levee System

Properties adjacent to North Creek are protected from high water in the creek by a privately constructed and managed levee system. Bothell has an agreement with the property owners to assure that the levee system is actively monitored and maintained. Until now, the oversight of the levee system monitoring and maintenance has not been a task performed by the Utility staff. Beginning in June 2015, the Utility will manage the City's role in overseeing monitoring and maintenance of the levee.

The first step in taking over the oversight is to evaluate the Utility's tasks and level of effort. The anticipated level of effort is expected to be manageable with existing staff.

Action Steps:

1. Staff review of files and agreement between City and owners.
2. Establish a procedure for Utility oversight.

Implementation Schedule:

Review began in mid-2015.

Procedure for oversight to be completed in first quarter of 2016.

Initial Cost:

Existing staff will perform the oversight unless specific expertise is needed.

Long Term Costs/Impacts:

Impacts on staff for providing oversight is expected to be minimal.

M6 Analyze impacts of climate change on the Utility

The impacts of climate change on the Utility are unknown, but potentially significant. The Utility should continue to monitor predictions and forecasts that might affect its needs and services.

Action Steps:

1. Review available information regarding impacts of climate change
2. Prepare a summary of potential impacts and action items.

Implementation Schedule:

Conduct reviews during first quarter of 2017 and second quarter of 2020

Initial Cost:

Reviews would be conducted by Utility staff.

Long Term Costs/Impacts:

Long term impacts are not known at this time.

M7 Prepare for 2018 NPDES Permit issuance

The current NPDES permit is scheduled to expire on July 31, 2018. Prior to this expiration, Ecology will be proposing the next cycle of permit requirements. The Utility should participate in review of this new permit. The Utility's Surface Water Supervising Engineer (or equivalent) should be designated as the Utility contact person with Ecology.

Action Steps:

1. Monitor Ecology for information regarding new permit issuance.
2. Evaluate potential impacts of new permit.

Implementation Schedule:

Follow Ecology release and review schedule.

Initial Cost:

Utility staff will perform initial reviews. Consultant services may be needed, but are not known at this time.

Long Term Costs/Impacts:

Long term costs and impacts are not know at this time.

M8 Prepare next Master Plan Update

The Utility should begin preparing its next Plan update January 2020 so that it can be completed and adopted prior to 2021. The focus areas of this next update should be determined in late 2019 and consultant assistance should be contracted at that time.

Action Steps:

1. Hire consultant to prepare Master Plan Update

Implementation Schedule:

Hire consultant in fourth quarter of 2019.

Complete Master Plan Update in fall of 2020.

Initial Cost:

Consultant cost is estimated at $175,000 based on prior updates and plan.

Long Term Costs/Impacts:

Long term impacts of an update are not known at this time and will partly depend on new NPDES permit requirements and City goals regarding water quality at that time.

Additional Focus Areas

The following items are focus areas that the Utility should address to improve its overall progress toward its mission. They are not specific action items because they do not contain well-defined tasks and schedule. In general, these focus areas can be addressed by existing staff within the planned rates and financial constraints of the Utility.

Focus Area 1:

Improve integrating new City and developer project facilities and natural environment restoration areas maintenance into Operations

The Utility should work with the City's Capital and Development Services groups, Operations, and Parks to improve systems to track and prepare for integration of new infrastructure and natural environment maintenance and operations needs to be provided by the Utility.

Focus Area 2:

Increase participating in development review and land use process:

Utility staff has been somewhat indirectly involved in the review and processing of land use/development activities. The Utility prepares and maintains the City's Surface Water Design Manual to assure that development is compliant with the latest required standards put forth by Ecology. However, Utility staff has not normally participated in individual reviews unless requested by development staff in Public Works and/or Community Development. The Utility could increase its participation by attending developer pre-application reviews and project meetings when stormwater issues warrant.

The Utility staff should also work to develop better integration with the City's comprehensive planning process. This will include increased interaction with Community Development. One approach could be to establish routine coordination events, perhaps quarterly, to communicate and prepare for upcoming or ongoing efforts.

Focus Area 3:

Update maintenance practices to latest NPDES requirements:

The Utility's Operations team will need to adjust its practices to be in compliance with the 2013-2018 NPDES permit. The areas of adjustment include:

Compliance with 2012 Ecology Manual standards

- Continue annual inspection of all City-owned facilities
- Continue spot check of damaged facilities after major storms
- Complete inspection of all City-owned inlets by 2017 and every two years
- Continue use of BMPs on City owned and operated land
- Continue training all City staff who might affect stormwater quality about BMPs
- Continue storm pollution prevention plans for yards and equipment
- Maintain records of inspection, repair and maintenance
- Consider formal participation in the Regional Road Maintenance Forum

These adjustments are not expected to cause significant changes in effort or require any new staff for the Operations team.

Focus Area 4:

Integrate stormwater services with other City functions:

City activities in capital facilities, solid waste, facilities, streets, and parks affect surface and storm water. The Utility is often not fully participating in these other service areas to effectively protect the surface waters of the city. To improve the effectiveness of the Utility's efforts to protect and preserve the natural surface water environment and address storm drainage, it should improve its integration with other Bothell functions.

This effort could be initiated by establishing or enhancing regular coordination/communication events with each of the other Bothell functions. Examples might include:

- Establish quarterly coordination meetings with the Capital division,
- Establish quarterly coordination with the new Parks Department
- Establish and hold quarterly coordination meetings with Solid Waste

In addition to regularly coordinating with other Bothell functions, the Utility should jointly evaluate the following areas with other City functional areas:

- Roadway – Storm maintenance efforts
- Critical Areas – Surface water lands maintenance and management

Focus Area 5:

Flood Zone Administration:

Bothell participates in the National Flood Insurance Program. As a participant, the City reviews and regulates activities in the designated flood zones in the city. The Utility should review and clarify its role in the city's flood zone administration.

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[1] *Difference between beginning cash and ending cash in 2014 includes an adjustment for annualized capital expenses.*

9th Avenue SE Culvert	*30*	*Roadway flooding due to inadequate culvert crossing for Royal Anne Creek near Cedar Grove Park. Headwall recently replaced*	*6*	*Improved flows for Royal Anne Creek*	*8*	*On Operations crossing monitor list. No active work.*	*9*	*Culvert replacement could be done mostly in public right-of-way*	*2*	*No projects identified in area for coordination.*	*55*	*100%*	*All work in roadway.*
Blyth Park	*20*	*Issue only affects park area and no inhabited structures or roadways.*	*8*	*Reducing sediment and turbidity would benefit Sammamish River*	*11*	*Operations efforts to dredge sediment pond and respond to issues would be significantly reduced.*	*9*	*System is almost entirely on City property. Minimal permitting would be needed.*	*5*	*Park master plan identifies park improvements that could be affected by and coordinated with this problem.*	*53*	*100%*	*This project is mostly about wetlands and streams, which is not a direct/primary function of the Utility.*
Fitzgerald - 240th	*25*	*Roadway flooding. May be more of a roadway problem than drainage. Partly caused by siltation of system and vegetation.*	*9*	*Reduced flooding would benefit both tributary and North Creek.*	*7*	*City Ops manages vegetation in ditch.*	*8*	*City has HPA to maintain these culverts.*	*3*	*No projects identified in area for coordination.*	*52*	*100%*	*Road and roadside ditches*
216th Street SW and 9th Avenue W	*30*	*High priority in FAP. No property damage listed. Primarily infrequent roadway flooding with possibility of overflow onto private property.*	*2*	*No significant benefits noted from fixing this problem.*	*8*	*Will reduce need for root treatment and staff monitoring.*	*8*	*Low cost, easy access.*	*1*	*No other projects in area.*	*49*	*100%*	*Work is in ROW or easement.*
4th Avenue SE	*25*	*Medium in 2008 Flood Action Plan. Road flooding only.*	*5*	*Part of larger problem of old storm design and lack of adequate flow control facilities in Queensborough.*	*6*	*Causes problems with roadway pavement*	*5*	*Some of the system is private. Road reconstruction can be done within ROW.*	*3*	*No other projects in area. City recently completed a study of LID potential to reduce flash flows in system.*	*44*	*25%*	*Work is in ROW unless larger retrofit is part of solution.*
Ross Road - 108th	*25*	*Older downtown area with nuisance flooding during high storms. Clogged storm drains were related to a large maple tree leaves. Tree removed.*	*2*	*No direct benefits noted*	*7*	*Not a big issue for Ops now that maple tree is gone.*	*5*	*Work could be done in right-of-way. Would require expansion of systems.*	*4*	*No immediate projects in the area. Downtown redevelopment may provide some connection though.*	*43*	*50%*	*Involves a mix of conveyance and collection on public roads and private property.*
15th Avenue SE	*20*	*Described as minor in 2008 Flood Action Plan (FAP). Only significant flooding occurred Dec 3 2007.*	*2*	*No significant environment benefits noted from fixing this problem.*	*10*	*Operations regularly visits the site.*	*8*	*Easy access, minimal permitting*	*1*	*No other projects in area.*	*41*	*100%*	*All work in roadway.*

Major Natural Environment Surface Water Projects

Project Name	Environment Benefit		Public Value		Cost & Fundability		Operational Benefit		Timing & Coordination			Potential Contribution from Utility	
	Score (Max 50)	Comments	Score (Max 15)	Comments	Score (Max 15)	Comments	Score (Max 10)	Comments	Score (Max 10)	Comments	Total Score	Percent	Justification
Parr Creek - Relocation and Restoration SR-6	*35*	*Restoration of creek would improve habitat and reduce sediment transfer to Sammamish River.*	*23*	*Public work and recreate around this portion of Parr Creek and North Creek.*	*8*	*Much of the system is privately owned and maintained except streets and easements.*	*9*	*The City spends considerable time addressing creek overflows in this area.*	*9*	*The ongoing flooding and stakeholder involvement make this a timely opportunity.*	*84*	*25%*	*City is responsible for storm systems in 120th and 195th as well as some culverts in channel.*
Sammamish River C - 102nd - Side Channel Restoration SR-2	*35*	*Restoration would likely provide water quality benefit and possibly improve fish habitat in the Sammamish River.*	*21*	*Public access via Sammamish River Trail and proximity to City park and downtown increases likelihood of public value of the project.*	*10*	*A relatively expensive project that is a medium priority. Part of the WRIA 8 Plan. Grant funding has been received for design in 2014.*	*2*	*The area is currently part of the Sammamish River flood plain managed by King County.*	*9*	*City is applying for construction grant funding in 2015.*	*77*	*15%*	*This project is mostly about wetlands and streams, which is not a direct/primary function of the Utility.*
Blyth Park Erosion and Sedimentation	*22*	*The project would address a turbidity and sediment source that affects water quality in the Sammamish River.*	*16*	*The public park site provides opportunity to create public value.*	*12*	*The majority of the property involved is public park. A project is currently in the City budget.*	*9*	*City staff spends significant time and effort dealing with sedimentation in Blyth Creek.*	*7*	*The project is currently in the City Capital Facilities Plan.*	*66*	*100%*	*Most of the source land for sediment is in City control.*
208th Street SE - Water Quality System for Roadway - NC-M1-18-20	*30*	*May improve water quality, but no direct habitat links.*	*13*	*Public would not directly see the benefits but would receive value from improved North Creek.*	*14*	*City can fund and complete this project*	*2*	*Addition of treatment would increase Operations efforts for maintenance of facilities.*	*7*	*No immediate drivers. Identified in North Creek DNR and City Shoreline Restoration Plan*	*66*	*50%*	*Directly tied to water quality. Utility collects fee from streets. Could seek grant funding.*
Sammamish River - Waynita Creek - Habitat and Side Channel Restoration	*30*	*Restoration and possible removal of fish barriers in tributary will improve health and function of Sammamish River*	*15*	*This is a somewhat visible and used section of the Sammamish River next to public trail. Sammamish River restoration is a high priority in City Shorelines Restoration Plan.*	*7*	*Expected to be a project that is part of the WRIA 8 and Shorelines Plan*	*2*	*The area is currently part of the Sammamish River flood plain managed by King County.*	*7*	*The project is listed as a high priority, near term project in the City Shoreline Restoration Plan.*	*61*	*10%*	*This project is mostly about wetlands and streams, which is not a direct/primary function of the Utility.*
Royal Anne and Filbert Creeks - Habitat Restoration - NC-11	*27*	*Directly improves habitat that is known to contain fish and impacts wetlands for North Creek.*	*12*	*Public will be able to see and appreciate these improvements to habitat. Fish populations and wetlands are valued.*	*10*	*City controls much of this area.*	*7*	*Improvements would reduce flood response by City.*	*5*	*No immediate drivers. Identified in North Creek DNR and City Shoreline Restoration Plan (Medium priority)*	*61*	*25%*	*City has little control of upstream. Project should include regional contribution. Link to utility is only moderate.*

Queensborough Watershed - Creek Erosion Management	*30*	*Effectiveness seems uncertain. Value of creek not high.*	*15*	*Improvements to creek system would benefit the neighborhood.*	*5*	*Much of the system is privately owned and maintained except streets and easements.*	*6*	*Improved flow control would possibly reduce the City's response to flooding. New systems may require more Operations efforts.*	*3*	*The City recently studied LID opportunities in this area.*	*59*	*10%*	*Watershed is mostly private except local streets. Should include significant grant funding or possible local assessment. A little public benefit for reduced operations.*
Perry Creek - Channel Scour Management	*25*	*Improving flows would improve downstream habitat, but primarily limited to Perry Creek.*	*15*	*Perry Creek is not a high focal point for the public.*	*5*	*The ponds are private, so use of utility funds should be limited to public need.*	*1*	*City operations spends little effort in this area. Modifications to the private ponds might obligate the City.*	*4*	*There is no driving force to address this issue now. Identified in draft 2005 Master Plan and City Shorelines Restoration Plan (low priority).*	*50*	*10%*	*Most of system is private and benefits from project are not expected to be great. Grant funding could be used after other higher priorities are addressed.*
Upper Horse Creek - Stream Restoration and Flow Control	*25*	*Restoration would provide some water quality benefit. Fish habitat is uncertain.*	*20*	*Restoring upper Horse Creek could create a place for the public to appreciate.*	*5*	*Some of the system is privately controlled. Costs are expected to be high due to land needs.*	*3*	*City staff does not spend much resources in this area now.*	*7*	*Timing is enhanced by the City's current efforts to restore lower Horse Creek.*	*60*	*10%*	*Much of the piped system could be done as part of area redevelopment. The City does not control the pond.*
Sammamish River B - I-405 - Wetland Restoration SR-8	*25*	*Restoration would likely provide water quality benefit and possibly improve fish habitat in the Sammamish River and North Creek.*	*20*	*Public access through both North Creek Trail and Sammamish River Trail increase likelihood of public value of the project.*	*7*	*A relatively expensive project that is a medium priority. Part of the WRIA 8 Plan*	*2*	*Area is currently managed by WSDOT and King County.*	*5*	*The project could be seen as related to the Cascadia Project restoration of North Creek wetlands. Classed as a long term project in Shorelines Plan*	*59*	*10 to 20*	*This project is mostly about wetlands and streams, which is not a direct/primary function of the Utility.*
East Riverside Drive Erosion and Sedimentation SR-5	*21*	*Project would reduce a limited area of siltation in the Sammamish River in an area of no known high value environment.*	*15*	*A limited number of members of the community would directly value this project.*	*6*	*Much of the area contributing to sediment is privately controlled.*	*9*	*Operations spends considerable effort dealing with sediment buildup in the storm drainage in this area.*	*7*	*Frequent flooding and WSDOT and Cedar Park Church activity provide an opportunity to address this.*	*58*	*10%*	*Most of the source land for sediment is outside City control. WSDOT and private upstream property owners may be contributing to the problem.*
Waynita Creek - Scour and Turbidity Management	*20*	*Improvements would reduce sediment and scour in natural systems, including Sammamish River.*	*15*	*This is a visible area and includes important wetlands and habitat for the Sammamish River*	*9*	*Costs for this project are expected to be moderate.*	*7*	*City operations resources would likely be reduced if detention pond function is improved.*	*7*	*Ongoing development in the area and the high priority for the Sammamish River restoration increase the urgency of addressing this.*	*58*	*10%*	*The ponds that provide flow control are private.*

Little Swamp Creek - Habitat Enhancement and TMDL - SC-1	*20*	*Reduces Little Swamp Creek's contribution to pollution of the Swamp Creek*	*15*	*Public contact in Swamp Creek is impaired due to fecals*	*10*	*Portions of the watershed and possible sources of pollution are privately controlled.*	*5*	*Operations spends little effort here, but City staff monitors and tests the stream regularly.*	*8*	*City is under a TMDL order. The project is identified as a high priority in the Shorelines Restoration Plan.*	*58*	*0 to 20*	*The sources of pollution are most likely private.*
Lower Palm Creek - Habitat Restoration and Fish Passage	*25*	*Directly improves habitat that is known to contain fish and impacts wetlands for North Creek.*	*15*	*Project would improve fish habitat for North Creek.*	*12*	*City access to this area is not known.*	*1*	*Operations spends little effort here. A short-term effort to maintain habitat may be required.*	*4*	*Identified in City Shoreline Restoration Plan as a low priority.*	*57*	*10%*	*Mostly related to fish use and not directly connected to Utility function.*
Sammamish River A - Norway Hill - Wetland and Fish Refuge Restoration SR-7	*20*	*Project would improve fish habitat in the Sammamish River.*	*15*	*The Public might value both the improved habitat and fish.*	*8*	*A relatively expensive project that is a medium priority. Part of the WRIA 8 Plan*	*2*	*Area is currently managed by King County.*	*4*	*Identified in City Shoreline Restoration Plan as a long term project.*	*49*	*10 to 20*	*This project is mostly about wetlands and streams, which is not a direct/primary function of the Utility.*
Lower North Creek - Wetland and Mouth Restoration NC-2,8	*20*	*Restoration could provide improved fish habitat wetland/ water quality function.*	*15*	*Improved habitat here might improve fish use of North Creek.*	*5*	*The project is identified as a low priority in the Shoreline Restoration Plan. Property is controlled by King Co and WSDOT*	*1*	*The City spends no efforts here and would receive little Operations benefit from a restoration project.*	*7*	*The project would tie in to the recent Cascadia Project.*	*48*	*5%*	*This project is mostly about wetlands and streams, which is not a direct/primary function of the Utility.*
Crystal Creek - Flow Control/ Water Quality	*15*	*Effectiveness seems uncertain. Value of creek not high.*	*10*	*Improvements to flow control are not expected to be valued significantly.*	*10*	*The system is private.*	*2*	*The City spends little time in this area since the stormwater is primarily private.*	*2*	*There are no immediate drivers for improvements here.*	*39*	*5%*	*Watershed is mostly private except local streets. Should include significant grant funding or possible local assessment.*
Brickyard Creek Stream Erosion	*15*	*Environmental impacts in the Brickyard Creek system have not been studied.*	*10*	*Improvements to the system are not identified as a priority in City efforts to date.*	*5*	*Possible costs for improvements and ownership of the creek system has not been evaluated*	*1*	*City Operations has a yard in the area but spends no resources outside of City property.*	*5*	*There is no driving force to address this issue now.*	*36*	*10%*	*Most of the property is probably private.*

Palm Creek 228th - Fish passage		*Projects not rated*
Boy Scout Creek - Sediment management		*Projects not rated*
Middle Creek Canyon - Fish access and ponds		*Projects not rated*
Maltby Hill Creek		*Projects not rated*

APPENDIX D: DRAFT PROJECT RATING SHEETS

This Appendix contains the preliminary project rating sheets that were used to prioritize built and natural environment projects. The following sheets print best at 11 inch by 17 inch size sheets.

Major Drainage Capital Projects

Project	Life/Safety/Property		Environment		Operations		Feasibility		Timing & Coordination Total Score			Financial Contribution from Utility	
	Score (Max 50)	Comments	Score (Max 15)	Comments	Score (Max 15)	Comments	Score (Max 10)	Comments	Score (Max 10)	Comments	Total Score	Percent	Justification
Parr Creek	*40*	*Chronic flooding of 120th and high water issues through business park would be reduced.*	*12*	*Stream enhancements would improve Parr Creek and Sammamish River (temp, water quality)*	*13*	*Would reduce significant City Operations efforts in area to manage roadside creek overflow.*	*3*	*Much of the issues are on private property and would require significant participation from owners.*	*4*	*Constant roadway degradation and settlement may provide a coordination opportunity. No immediate projects are identified.*	*72*	*33%*	*City would deal with street storm system. Much of the creek flows on or through private property*
Monte Villa	*36*	*Flooding frequently affects roadway and property use. No structure flood damage identified.*	*10*	*Project would reduce impacts of flooding on stream system and habitat.*	*12*	*Project would relieve frequent response and maintenance by City Operations*	*7*	*City can do most of the project in the Public ROW. Some of the ditch flows on private property.*	*2*	*No other projects identified for coordination.*	*67*	*50%*	*City controls ROW culverts, but ditch/stream is on private property.*
Royal Anne Road	*35*	*The 2008 FAP describes this as high priority. Roadway access impaired. House flooding noted in 2007.*	*10*	*Fish passage impaired area.*	*10*	*City currently allocates moderate resources that would be relieved from this project.*	*7*	*Culverts are in City ROW.*	*3*	*No other projects for coordination, except restoration within area.*	*65*	*100%*	*Culverts are in Public ROW.*
Palm Creek - 228th Street SE Vicinity	*35*	*Part of a corridor of roadway and property flooding that occurred in 2007.*	*10*	*Would reduce long term degradation of stream systems due to flood flows.*	*11*	*Improvements would reduce Operations response. Debris management has already reduced efforts some.*	*5*	*System is a combination of public and private. Permitting for creek work may be significant, but City has an HPA now.*	*2*	*There are no immediate drivers for improvements here.*	*63*	*50%*	*Some ponds and systems are private. Much of the work would probably be done in the street ROW.*
Perry Creek - 228th Street SE Vicinity	*35*	*Part of a corridor of roadway and property flooding that occurred in 2007.*	*8*	*Would reduce long term degradation of stream systems due to flood flows.*	*11*	*Improvements would reduce Operations response. Debris management has already reduced efforts some.*	*5*	*System is a combination of public and private. Permitting for creek work may be significant.*	*2*	*There are no immediate drivers for improvements here.*	*61*	*90%*	*Some ponds and systems are private. Much of the work would probably be done in the street ROW.*
East Riverside Drive	*35*	*Flooding of roadway and threat to a few homes would be reduced.*	*8*	*Would reduce sediment and turbidity issues in Sammamish River.*	*11*	*Operations performs significant sediment management and monitoring that would be reduced.*	*4*	*Conveyance system is partly in public ROW but source of sediment and outfalls are outside of City responsibility*	*2*	*No other projects identified for coordination. City installed major improvements to conveyance.*	*60*	*50%*	*City is responsible for roadway culverts. Outflows are onto private property before reaching Sammamish River. Upstream sediment control on private property.*

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