December 2011

City of Shoreline
Surface Water Master Plan Update

Prepared in Association with SvR Design Company

CITY OF SHORELINE

SAIC®

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ACKNOWLEDGMENTS

This Surface Water Master Plan Update was prepared by SAIC, in coordination with the City of Shoreline. The Surface Water Master Plan Update required the expertise of various City staff and consultants. The Plan was prepared and reviewed by the following lead staff:

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The City and SAIC would also like to thank the public for their input on the Public Draft report.

Section 1
INTRODUCTION

1.1 Need for the Plan Update

The City's original Surface Water Master Plan (SWMP) was developed in 2004 and 2005, and it included the development of a capital improvement program (CIP), rate study, maintenance program and other elements to support the City's Surface Water Program. It focused on the immediate needs for the City at that time. Since then, a number of factors affecting the City's Surface Water Utility have changed. Some of these include:

- Completion of several capital improvements that has substantially reduced the number of drainage complaints the City receives.
- Real-time experience in expanding the program to comply with the current NPDES permit as well as further anticipated increases in program requirements that will be needed to comply with the next permit cycle (2013-2018) anticipated to be issued in 2013.
- Construction of additional and new types of surface water management infrastructure that requires additional maintenance management.
- Greater regional emphasis on water quality, habitat restoration, and sustainability including low impact development strategies and green infrastructure solutions.
- New policies or changes to existing policies that need to be incorporated into the plan.

The original SWMP did not include detailed basin planning. Basin planning, typically includes detailed examination of the drainage basin to understand and identify problems, system needs and management activities to address the needs and problems. In 2008, the City began the process to implement basin plans for each of the City's basins. The Thornton Creek Watershed Plan was the first basin plan and was completed in 2009. Additional basin plans will be completed over the next several years.

This SWMP Update is needed to guide the City's Utility as a result of these changed factors.

1.2 Goals of Plan

The goals of the plan are:

- To serve as a management plan (i.e., business plan) to more efficiently manage the capital and operational (including maintenance and NPDES permit compliance) programs of the Surface Water Utility for the next five years, at which time the basin plans should be completed.

- To incorporate sustainability components into the recommended programs, projects, and regulations, as part of the commitment to create an environmentally sustainable community within the Shoreline Environmental Sustainability Strategy.
- To evaluate Utility rates and project surface water management fees for the next five years to ensure the continued financial viability of the Utility.

Two of the principal drivers behind the goals for this plan update include a transition to a basin planning approach and desire to transition the current program to have a higher level of sophistication in its management and operations. These drivers are described in greater detail below.

Stormwater Basin Planning

The City has started a watershed or basin planning approach to stormwater management. The basin plans will provide detailed drainage system assessments, floodplain mapping, and asset inventory about the major drainage basins in the City. The basin plans will include a comprehensive analysis of existing conditions and focus on flooding, water quality, and stream/wetland enhancement. Once completed, they will provide a higher level of detail on stormwater operational, maintenance, and capital needs within each basin and will provide regulatory, programmatic and capital recommendations to meet these needs. The basin plans will also identify applicable low impact development (LID) and green infrastructure approaches, in addition to conventional approaches, to meet the flooding/drainage, water quality and aquatic habitat needs of the system.

The first basin plan (Thornton Creek) was completed in 2009 and additional basin plans will be completed over the next five years. A goal of this plan is to determine the priority for implementing future Basin Plans and to identify the best approaches for conducting these basin plans.

Surface Water Utility Program Transformation

Historically, the Surface Water Division began as a small informational Surface Water unit designed to provide minimal plan reviews, provide educational materials to improve the environmental, and conduct specific drainage studies to address flood control. Today, the Surface Water Division has morphed into a more long range operational and planning Utility that needs the tools and staff resources to develop more purposeful and well managed utility programs. As a Utility, the Surface Water Division, must rise to a higher level of sophistication in order to more efficiently address capital, maintenance, and NPDES permit compliance needs.

The following are examples of how the Utility can make this transition:

- Provide a higher level of sophistication in managing the stormwater infrastructure by developing an asset management system which would provide better information to cost effectively manage the City's aging infrastructure, and maximize the return on the City's investment.
- Integrate the scheduling and cost sharing of stormwater-related project needs with other needs identified in the City's Comprehensive Land Use Plan, Transportation

Plan, Parks Master Plan and in the Shoreline Environmental Sustainability Strategy.

- Improve the level of programmatic planning to define a stormwater management strategy for the future.
- Better identify the staffing needs, including technical competencies, to support an improved management system.

1.3 Process for Development and Review of the Plan Update

City staff retained SAIC (formerly RW Beck) to assist the City of Shoreline in the development of this SWMP Update. Work began in August 2010. During the process for plan development, the City held a public meeting, completed the State Environmental Policy Act (SEPA) process, issued a public draft of the SWMP Update for review and obtained input from the City Council and City Planning Commission. In addition, throughout the planning process, Shoreline citizens were able to provide input on the plan through a web based survey. More information about these efforts is included in the following paragraphs.

Public Meeting

On January 19, 2011, an open house was held at City Hall to discuss the City's Surface Water Utility and gather public input on issues or problems within the City. The public was also given a list of potential areas of concern and asked to vote on their priorities within the City. The results, in order of descending priority, are provided below. Copies of the presentation boards and specific comments received from the public are included in Appendix D.

- Water Quality
- Flooding
- Aging Drainage Pipes/Facilities
- Aquatic (Streams/Wetlands) Habitat
- Sustainability
- System Maintenance
- Keep Rates Affordable
- Public Outreach

Citizens were also able to comment on these same questions and provide additional input through an online survey that was linked to this public meeting notice. The information received from this online survey is also included in Appendix D.

SEPA

State policy requires state and local agencies to consider the likely environmental consequences of a proposal before approving or denying the proposal. This process is defined in the State Environmental Policy Act (SEPA), which provides a way to identify possible environmental impacts that may result from governmental decisions.

The City was responsible for identifying and evaluating the potential adverse environmental impacts of the SWMP Update. This evaluation was documented in the form of an environmental checklist and sent to other agencies and the public for their review and comment.

A determination of non-significance (DNS) was issued on September 12, 2011 for the SWMP Update. A copy of the SEPA checklist is included in Appendix B.

Draft Plan Update.

A Draft SWMP Update plan was developed and posted on the City's website on September 6, 2011. A 14 day review and comment period was allotted for public and agency input. Comments received during this time were reviewed by the City and incorporated into the Final SWMP where appropriate. A summary of comments received as well as specific responses to the comments are included at the end of Appendix B.

Planning Commission Meeting

A presentation and discussion of the draft SWMP Update was conducted on July 21, 2011.

City Council Meetings

City staff made a presentation to the City Council on May 2, 2011 to discuss important surface water program that are being reviewed as part of the planning process. The goal of the meeting was to get City Council input on the Utility direction issues. A copy of the Council Packet that summarizes these issues can be viewed from the City's website at *http://www.cityofshoreline.com/index.aspx?page=372*.

A public hearing for the SWMP occurred on Oct 3, 2011. A follow-up discussion with Council occurred on November 21, 2011. The plan was adopted by the City Council on December 12, 2011.

Section 2
CURRENT CONDITIONS

2.1 Achievements Since the 2005 Plan

2.1.1 Utility Program Achievements

The Surface Water Utility accomplished a number of program advances since the completion of the 2005 SWMP. Table 2-1 provides a summary of achievements and outcomes for the 2005 broad program goals; flood reduction, water quality improvement, and aquatic enhancement. Many of the achievements relate to compliance with the NPDES Phase II permit which required a series of stormwater program elements be established over a phased time schedule. A brief summary of the NPDES permit requirements is provided below. A more detailed explanation of the permit is included in Section 3.

The City of Shoreline is subject to regulation under the Western Washington Phase II Municipal Stormwater Permit administered by the Washington State Department of Ecology (DOE). The permit was created by the Department of Ecology to fulfill federal Environmental Protection Agency NPDES Requirements governing stormwater. By complying with the permit, the City is allowed to discharge stormwater to waters of the State (i.e., local lakes, streams and Puget Sound) if it takes certain actions to prevent stormwater pollution. The full permit can be viewed at the DOE's website: NPDES Phase II Municipal Stormwater Permit.

The permit requires the City to create and implement a Stormwater Management Program (SWMP). The SWMP outlines the City's plan to develop and implement the following programs and processes:

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Controlling stormwater run-off from construction sites
- Operations and maintenance of stormwater facilities after construction

The permit went into effect in February 2007. The City is allowed to phase in the implementation of these programs and processes over a 4-year period (until 2011). A new permit cycle will begin in 2013 (Ecology will re-issue the current permit for 2012) and the permit requirements will be changing. Anticipated changes to the permit requirements are described in Section 3.

2.1.2 CIP Projects Completed

For each of the three Utility program goals, flood reduction, water quality improvement and aquatic enhancement, the 2005 Surface Water Master Plan developed capital project recommendations and prioritized them as either Priority 1, 2, or 3. Table 2-2 includes a brief definition for these classifications by program area.

The plan recommended that Priority 1 projects be implemented in a phased approach over the following 6 year period (2005-2011), with Priority 2 and 3 projects considered in following years as funds become available. Tables 2-3, 2-4, and 2-5 list the 2005 Priority 1 projects and the current status of their implementation.

Table 2-1
2005 SWMP Program Goals, Achievements, and Outcomes

Program	Goal	Achievements	Outcomes
Flood Reduction	Reduce flood hazards to Priority 1 Project Areas (i.e., critical flooded areas)	■ Implemented an annual CIP and completed over 10 major flood reduction CIPs ■ Implemented a maintenance and operations program to increase reliability of conveyance system ■ Completed the City's first FEMA floodplain mapping effort (Thornton Creek)	Reduced potential for flood damages and increased safety
Water Quality	Maintain water quality to meet state and federal standards and rehabilitate water quality by reducing non-point source pollution, controlling erosion, and improving the stormwater system	■ Developed public outreach and educational programs such as: stenciling catch basins to inform the public that they drain to surface waters; hosting an annual earth day event which includes educational and community volunteering activities; and providing car wash kits. ■ Developed a Public Involvement and Participation Program and organized several volunteer efforts with public participation, such as planting native vegetation in the riparian areas of the City's streams. ■ Implemented an Illicit Discharge Detection and Elimination (IDDE) Program including adopted ordinances to prohibit illicit discharges, investigating potential sources of illicit discharges into the stormwater system and educating the public on measures to prevent illicit discharges. ■ Updated the City's drainage design standards for new development and redevelopment that require greater quality and quantity controls. ■ Implemented a Capital program to include both water quality treatment system improvements and low impact development techniques on both City roads (e.g., 17th Ave NE Street Demonstration Project and Green Works project) and City projects (e.g., new City Hall) ■ Implemented a water quality monitoring program to develop a	Improvement in surface water quality, increased ability to control quantity and quality of runoff from new and re-development sites, increased ability to reduce illicit discharges, decreased liability under state and federal water quality protection laws, and began to develop a base line of water quality data to measure the effectiveness of the program.

Table 2-1
2005 SWMP Program Goals, Achievements, and Outcomes

Program	Goal	Achievements	Outcomes
		base line of water quality conditions ■ Expand the Utility's maintenance and operations program (e.g., increased frequencies to improve water quality such as catch basin cleaning and street sweeping)	
Aquatic (Stream/ Wetland) Enhancement	Protect and preserve and improve aquatic stream/wetland habitat, particularly in areas with anadromous fish	■ Implemented miscellaneous projects to restore riparian habitat. ■ Included aquatic habitat enhancements as part of other Utility projects completed for flood hazard reduction and water quality (i.e. fish passable culverts) ■ Participated in Water Resource Inventory Area (WRIA 8) Planning ■ Participating in several public involvement and education programs targeting preservation of habitat areas (such as Backyard Wildlife Habitat Program, volunteer Park planting programs, environmental Mini-Grant program) ■ Implemented a program to remove invasive species along certain reaches of Thornton Creek ■ Completed the 2007 Bioassessment Report, Biological and Habitat Assessment of Shoreline Streams	Preservation of the aquatic habitat and localized areas of habitat enhancements

Table 2-2
2005 SWMP Priority Descriptions

Utility Program Goals	Priority 1	Priority 2	Priority 3
Flood Reduction	Projects that are deemed critical because they will improve public safety and prevent or minimize structure damage and flooding of principal, minor, and collector arterials	Projects that would improve the effectiveness of the City's surface water system	Projects that provide additional benefits to surface water conditions. In general, most of the projects in this priority level would prevent or minimize flooding and damage in yards, driveways, and on residential streets
Water Quality Improvement	Critical projects and activities that need to be implemented to meet minimum regulatory requirements, particularly the NPDES Phase II municipal stormwater permit	Project and programmatic activities that would enhance the ability of the City's surface water system to improve water quality	Project and programmatic activities that would enhance the ability of the City's surface water system to improve water quality beyond the City's funding (i.e., rely on grants or developer mitigation fees)
Aquatic Enhancement	Activities to meet regulatory requirements, monitoring, enforcement, removal of invasive plants, and other actions that would enhance habitat in streams with salmonid fish species	Programs and projects that would further focus on enhancement of habitat in streams with salmonid fish species	Project and programmatic activities that would provide additional benefits to stream habitat such as enhancing sections of streams with potential habitat immediately upstream of existing reaches with salmonid fish. Activities may also focus on stream reaches with habitat for non-salmonid fish, thereby providing additional benefit to the overall surface water system

Table 2-3
Status of Priority 1 Flood Hazard Reduction Projects

ID No.	Basin	Name	Complete (yes/no)	Year	Comments
F-1	Boeing Creek	3rd Avenue Drainage Improvements	Yes	2006	
F-2a	Thornton Creek	Ronald Bog Conveyance Improvements	Yes	2008-2010	Project elements were phased between 2008 and 2011. Projects included downstream culvert improvements, street drainage improvements including a pump and force main, replacement of bog outlet pipe, and bog level monitoring system
F-2b	Thornton Creek	Ronald Bog Wetland Improvements	NA	NA	Project element was eliminated and replaced with a different alternative of a flood berm. Construction was completed in early 2011.
F-2c&d	Thornton Creek	Cromwell Park Wetland	Yes	2010	Provides additional storage for Ronald Bog as well as water quality enhancement
F-2e	Thornton Creek	Pump Station #25	In progress	2011	Currently under design and construction is expected in late 2011/early 2012.
F-2f	Thornton Creek	Serpentine Place Storm Improvements	Yes	2005	
F-3	Boeing Creek	Midvale Ave N Drainage	Yes	2009	
F-4	Boeing Creek	Darnell Park Neighborhood Drainage	Yes	2009	
F-9	Boeing Creek	Hillwood Park Emergency Bypass	NA	-	Eliminated project because it was unnecessary after the 3rd Avenue roadway improvement project.
F-13	Thornton Creek	Ridgecrest Drainage at 10th Ave NE	Yes	-	Completed a drainage system along 175th and 10th NE to split flows between 10th Ave NE and Serpentine area north of NE 175th St.
F-14	City-wide	SWM CIP Formulation	Yes	Ongoing	This element was included to provide engineering conceptualization and design for Priority 2 projects as well as newly identified projects
F-15	City-wide	Surface Water Small Projects	Yes	Ongoing	This element is used for smaller projects that become high priority (such as a failed culvert)
Not Identified	Boeing	Pan Terra Regional Stormwater Improvements	Yes	2009	Retrofit of existing pond to provide a higher level of flow control.

Table 2-4
Status of 2005 Priority 1 Water Quality Projects

ID No.	Basin	Name	Complete (yes/no)	Year	Comments
WQ-1	Boeing	Third Ave Water Quality Facilities	NA	-	Project was no longer needed with roadway and bioswale improvements
WQ-2	Boeing	Wetland Addition to Darnell Park Detention Pond	Yes	2009	Provides water quality feature to existing wetpond.
WQ-3	Thornton	Wetpond Addition to Detention Pond in the Ridgecrest Neighborhood in Vicinity of 10th Ave NE	No	-	This project was moved to a Priority 2 category
WQ-4	Thornton	Wetpond addition to Cromwell Park Detention Pond	Yes	2009	
Not Identified	Boeing	Aurora Phase I (145th – 165th)	Yes	2008	Included retrofit of Aurora drainage for water quality

Table 2-5
Status of 2005 Priority 1 Aquatic Enhancement Projects

ID No.	Basin	Name	Complete (yes/no)	Year	Comments
H-1	Boeing	Boeing Creek Reach 1 – Streambank Restoration	No	-	The need for this project will be reassessed as part of the future basin plan.
H-2	Boeing	Boeing Creek Reach 8 – Streambank Restoration	No	-	The need for this project will be reassessed as part of the future basin plan.
H-3	City-wide	Stream Rehabilitation/ Habitat Enhancement Program	Ongoing	Ongoing	The Utility has implemented miscellaneous stream rehabilitation projects such as Ballinger Creek Habitat Enhancement Project, removal of a failing culvert along Ballinger Creek (Summer 2011), and developed conceptual design for a project to enhance the Meridian Wetland (Fall 2010).
H-4	City-Wide	Advanced Surface Water Right-of-Way Acquisition	No	-	City has not yet identified specific right-of-way acquisition locations, and proposes this be done as a part of future basin plans.

2.1.3 Maintenance Program Improvements

While the capital projects have significantly reduced major flooding and drainage problems, the Surface Water Utility has improved maintenance since the 2005 Surface Water Master Plan. The Utility's current SWM O&M program has been designed to meet the current NPDES permit requirements and to ensure the continuing functionality of the drainage system. The Utility has 4.25 maintenance staff and also contracts out certain maintenance activities, including street sweeping, annual ditch maintenance, annual and emergency catch basin cleaning (vactoring), emergency storm drainage repair, etc. The maintenance staff is part of the Street Maintenance Division. The maintenance staff also perform inspections of the drainage system. In recent years, new infrastructure associated with the recent capital projects requires a higher level of maintenance. Table 2-6 provides the stormwater facilities maintained by the Utility.

Table 2-6:
Surface Water Utility Maintenance Program

Approximate linear feet of stormwater pipes to maintain	640,000
Approximate linear feet of ditches to maintain	150,000
Number of City owned stormwater facilities to inspect and maintain	34
Number of catch basins to inspect and maintain	7626
Number of City owned water quality facilities to inspect and maintain	37
Number of dams to inspect and maintain	5
Number of privately owned stormwater facilities to inspect	263
Number of pump stations to inspect and maintain	8
Annual miles of street sweeping (lane miles/yr)	3,000

2.2 Current Utility Staffing and Organization

Public Works Department

The term Surface Water Utility (Utility) is used in this report to be the collection of surface water management activities which are completed by a number of City Departments. Many of the activities are completed by Public Works Department staff. Figure 2-1 presents the current organization of the Surface Water and Environmental Services (SWES) group, which is a part of the City's Public Works Department. This group includes five full time equivalents (FTEs), 3.65 FTEs funded through the Utility and 1.35 FTEs funded through the General Fund.

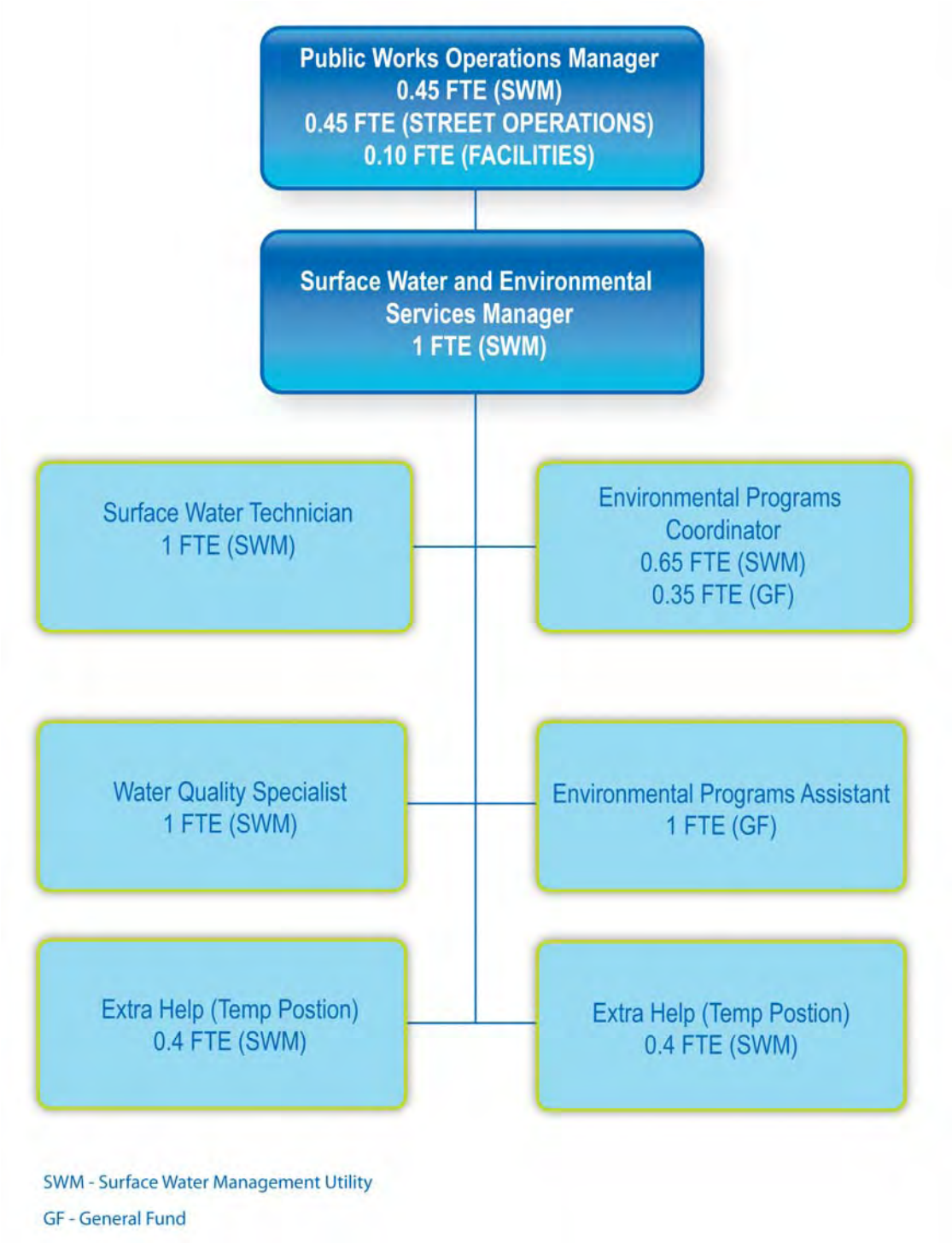


Figure 2-1: Surface Water and Environmental Service Program Staffing (Existing)

Other Public Works Department programs and their contribution in terms of FTEs are shown below. The total number of FTEs supported by the Utility includes a staff of approximately 10.85.

- Roads Maintenance – 4.25 FTE for maintenance
- Engineering and Capital Projects – 3 FTEs for implementing projects

Coordinating with Other City Departments

The Surface Water Utility manages a suite of programs that reduce flooding, protect and improve water quality, and protect and enhance aquatic streams and lakes. Meeting these surface water management goals as well as compliance with the NDPES Phase II Permit requires coordination of activities in several City departments. For this report, the collection of current surface water management activities are organized into the following programs:

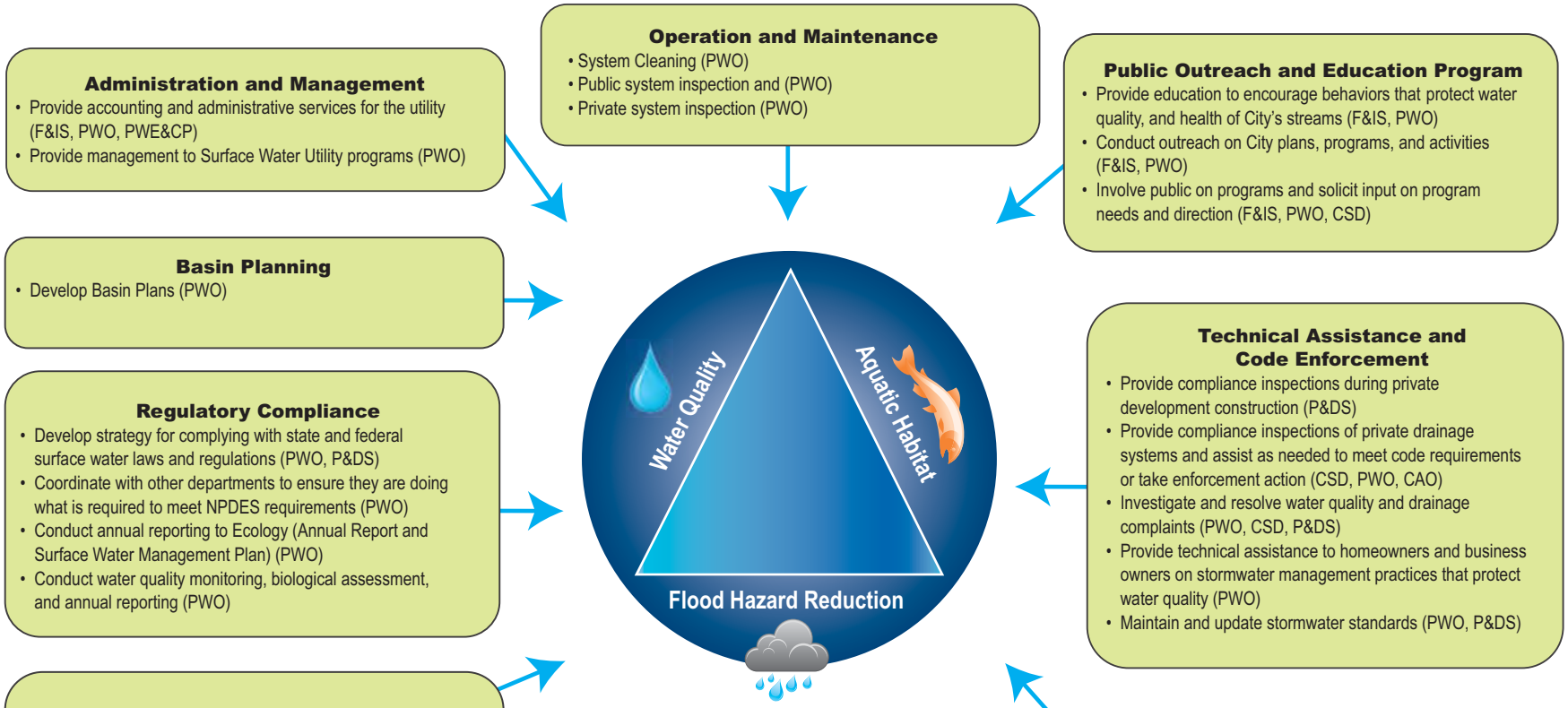
- Operation and Maintenance
- Public Outreach and Education
- Technical Assistance and Code Enforcement
- Monitoring and Research
- Capital Program
- Regulatory Compliance
- Basin Planning
- Administration and Management

These programs are carried out largely by the Public Work Department, with assistance from Financial and Information Services, Planning and Development Services, Parks Recreation and Cultural Services, and City Manager's Office (City Attorney). Figure 2-2 provides a summary of the current Utility programs and provides examples of activities within each program as well as other City department involved in those activities. The figure also relates these activities to the program goals developed in the 2005 Plan.

Overall, the Surface Water Utility is responsible to ensure that the program activities performed both by the Utility and the other City departments are successful. In particular, the Utility is responsible to ensure that activities performed by other departments necessary for regulatory compliance such as the NPDES Phase II program are followed. The Surface Water Utility staff coordinate City efforts, and will meet with staff from other departments on about a semi-annual basis to insure that on-going and planned activities meet Permit requirements.

Figure 2-2

Current Surface Water Relationship Between Utility Goals, Programs and City Departments



Legend:

CAO – City Attorney's Office
CCO – City Clerk's Office
CMO – City Manager's Office
CSD – Community Service Division
F&IS – Financial and Information Services
PR&CS – Parks Recreation & Cultural Services
P&DS – Planning & Development Services
PWT – Public Works - Transportation
PWE&CP – Public Works – Engineering & Capital Projects
PWO – Public Works – Operations (includes Surface Water Utility, Fleet & Property Management and Roads Maintenance)

Note: For each activity, contributing departments are shown in parenthesis.

CITY OF SHORELINE

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2.3 Existing Conditions and Problems in Shoreline's Watersheds

2.3.1 Watershed Characteristics Summary

Overview

The City of Shoreline is located in the northwestern corner of King County along the shores of Puget Sound. The City is generally bounded by the City of Lake Forest Park to the east, the City of Seattle to the south, Puget Sound to the west, and Snohomish County to the north (including the Cities of Mountlake Terrace, Edmonds, and the Town of Woodway). Puget Sound is the City's only "shoreline of statewide significance," as defined by the Washington State Shoreline Management Act, but the City has several lakes and ponds including Echo Lake, Hidden Lake, Ronald Bog and Twin Ponds. Numerous small streams and creeks are also found within the City's seven watersheds, which cover over 7,500 acres.

Over many years, urban development in the City of Shoreline has drastically altered the City's watersheds. Previously forested areas and wetlands have been replaced with residential, commercial, and public land uses. Limited areas of open space remain. Shoreline's development history began with original settlements dating back to the late 1800s. While the area developed over time, most of this development took place in the 1970s prior to the implementation of stormwater mitigation regulations. Currently, the City is substantially developed, with only about one percent of the total land area remaining vacant (City of Shoreline, *Comprehensive Plan*, 2005).

Urban development has produced a large amount of impervious surfaces including streets, sidewalks, parking lots, and roofs. When rain falls on these impervious surfaces the water runoff flows directly into streams and local water bodies instead of naturally being absorbed into the ground or retained by wetlands. Surface water runoff picks up soil, chemicals and other pollutants and carries them into lakes, rivers and marine waters. There are numerous types and sources of pollutants that enter stormwater. Typical pollutants include heavy metals (particularly copper and zinc), solids, pesticides, herbicides, nutrients, oils and grease. Typical sources of these pollutants are leakage of oils and gas from automobiles and other vehicles, deposition of heavy metals from vehicular breaking, deposition of solids from exposed soils (typically related to construction activities), and application of chemicals related to landscaping practices. In addition, other chemicals can be introduced into stormwater as a result of improper handling and disposal of chemicals or accidental spills.

The large amount of impervious surfaces in the City of Shoreline greatly affects the condition of the City's surface waters, and can result in flooding problems, degradation of water quality, and degradation of aquatic streams/wetlands.

This section provides a description of each basin. Table 2-8 provides some statistical data on each basin as well as some summary information. The following basin descriptions often reference two recent studies prepared by the City of Shoreline. These studies include the "2007 Bioassessment Report – Biological and Habitat

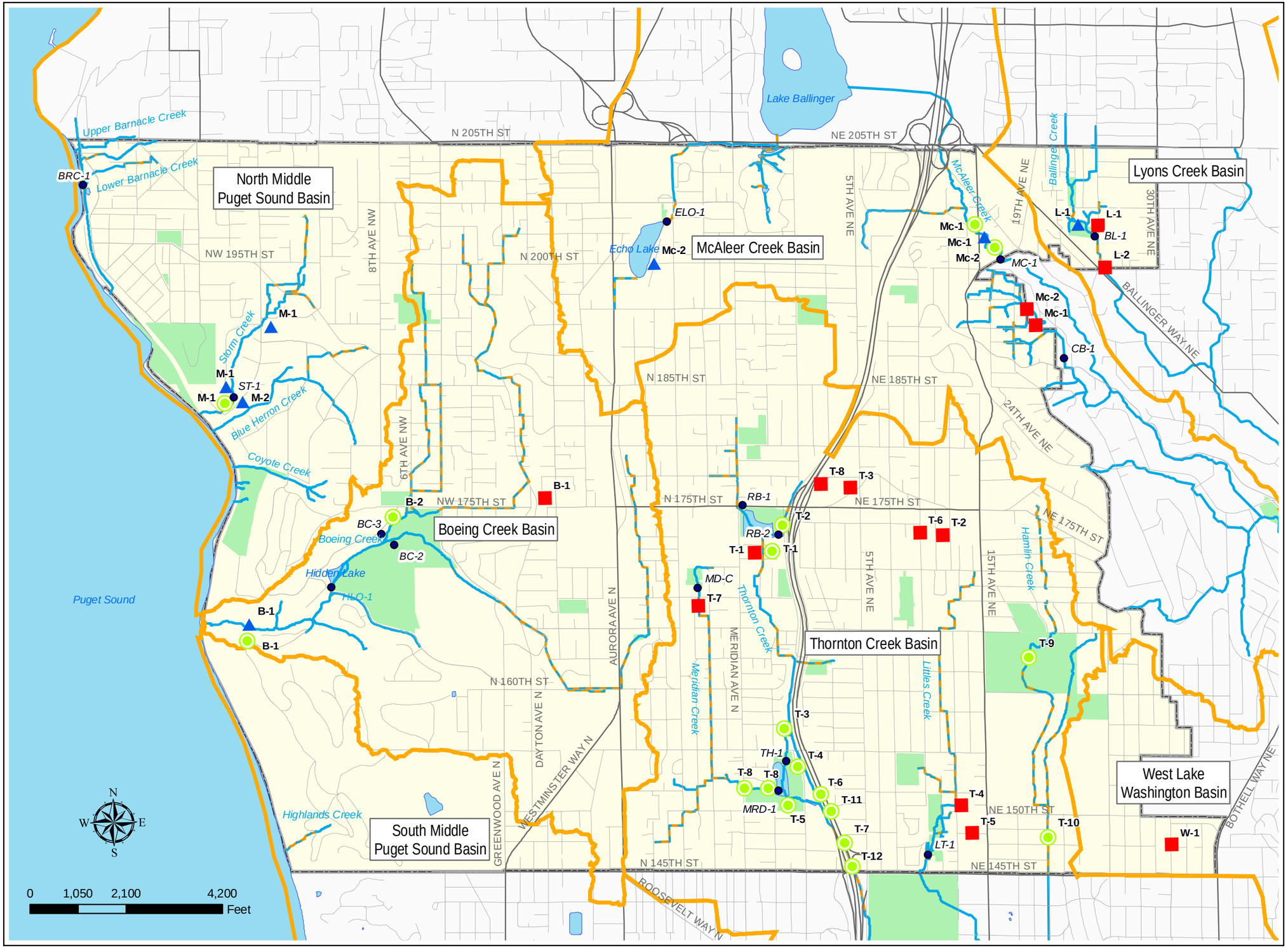
Assessment of Shoreline Streams" (Watershed Company, 2009) and the "State of Water Quality in Shoreline Streams, Lakes and Wetlands (City of Shoreline, 2009).

The Bioassessment Report summarizes the results of biological (benthic invertebrates), physical habitat and Water Quality Index assessment of Shoreline's streams. The Benthic Index of Biotic Integrity (B-IBI) is an important component of the City's monitoring program, and the B-IBI was utilized to assess temporal changes in water quality and overall stream health. The strength of B-IBI bioassessment lies in its' ability to determine the health of a water body based on the instream biological community. These communities can communicate detail about the overall health of the water body because of their intimate exposure to all perturbations, point and non-point pollution, within their watershed. The B-IBI index categorizes the stream's level of biological impairment using the following categories; none, slight, moderate, severe, and extreme. In general, the City's creeks were rated mostly between severe and extreme. This is typical of streams in historically developed urban areas.

The "State of Water Quality in Shoreline Streams, Lakes and Wetlands" summarizes the findings for water quality monitoring conducted by the City's Surface Water and Environmental Services Program between 2002 and 2009. As a part of the study, water quality parameters were measured for nine streams: Boeing Creek, Thornton Creek, Littles Creek, Meridian Creek, McAleer Creek, Cedar Brook Creek, Storm Creek, Barnacle Creek and Ballinger Creek. In addition, lakes and other water bodies were assessed, including: Echo Lake, Hidden Lake, Ronald Bog, and Meridian Park Wetland. Sampling locations are shown on Figure 2-3. In general, the report used the following guidelines to characterize water quality parameters.

Table 2-7:
Designated Use Support Rating Categories

Percentage of Data Points Meeting Water Quality Standards	Designated Use Support Rating
90 percent or greater	Good
75 percent to 90 percent	Fair
Less than 75 percent	Poor



Legend

- Basin
- Open Water Course
- Piped Water Course
- Water Body
- Park
- Shoreline City Limits
- WQ Monitoring Station
- Flooding/Drainage Problem (F)
- Water Quality Problem (WQ)
- Aquatic Stream/ Wetland Problem (AQ)
- **T** Thornton Creek Basin
- **M** North/South Middle Puget Sound Basin
- **Mc** McAleer Creek Basin
- **L** Lyons Creek Basin
- **B** Boeing Creek Basin

Figure 2-3
Basin Map
City of Shoreline

CITY OF SHORELINE

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From Science to Solutions

R:\Seattle\011262 City of Shoreline\9641100090 Rate Study and Master Plan Update\Data Analytical\GIS\Figure_2-3.mxd

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Basin Descriptions

Thornton Creek

The Thornton Creek basin is the largest basin in the City. It encompasses approximately 2,304 acres within the City limits. The portion within the City limits—about a third of the 7,402-acre total basin area—consists of 10 subbasins. The basin is east of Aurora Avenue North and drains south through the City of Seattle to Lake Washington.

The Thornton Creek Basin is almost completely developed, with only about 3 percent of the basin remaining as vacant or open space. Land use in the basin is primarily single family residential. Commercial areas are the next most prevalent land use. Institutional uses, including Fircrest, schools and other public facilities, make up a portion of the basin. There is a relatively small amount of multifamily use or apartments. A dominant feature in the Thornton Creek Basin is Interstate 5 (I-5), which separates the basin in a north-south direction.

Stormwater conveyance in the Thornton Creek Basin, including Littles Creek, Hamlin Creek and the Thornton Creek main stem, is primarily a combination of reaches of open streams, culverts under roads, smaller networks in residential areas, and open roadside ditches. Currently, a large portion of the former headwaters of Thornton Creek are piped water courses. Relative to all streams in the City, Thornton Creek contains the least amount of natural channel.

Thornton Creek begins within the City just north of Ronald Bog and flows generally south, crossing the City limits in a culvert under I-5 at North 145th Street. Two tributaries, Littles Creek (within Paramount Park) and Hamlin Creek (within Hamlin Park Open Space), lie east of I-5 and flow south, primarily in pipes and channelized water courses. Portions Littles Creek and Hamlin Creek flow as open stream channels through Paramount Park and Hamlin Park, respectively.

Ronald Bog, Twin Ponds and Peverly Pond provide some storage to naturally attenuate downstream flows. Similarly, the wetland areas in the Paramount Park Open Space provide some storage to attenuate downstream flows. Some of the main constructed stormwater features include Pump Station #25 located north of NE 175th Street and east of I-5, Retention Pond and Pump Station #30 at NE 170th Street and 15th Avenue NE, and the detention facility at NE 175th Street and 10th Avenue NE.

Flooding had been a major concern in the Thornton Creek basin, primarily south of Ronald Bog. As a result, a watershed plan (basin plan) for Thornton Creek was completed in November 2009 (R.W. Beck, 2009). This was the first basin plan to be completed by the City. The basin plan provided a comprehensive evaluation of flooding, water quality, and aquatic habitat problems in the basin. As part of the basin plan, hydraulic modeling on the North Branch in the reach downstream from Ronald Bog to the Shoreline city limit was performed in order to define the floodplain and evaluate solutions to flooding south of the bog. A FEMA 100-year floodplain map was subsequently developed. A series of capital improvements have been constructed to alleviate flood hazards and a final project, a flood control berm at the south end of Ronald Bog was constructed in Fall 2010/Winter 2011.

Water quality in the Thornton Creek was recently evaluated (2009, City of Shoreline), and water quality sampling was conducted on Thornton Creek, Ronald Bog, Meridian, Creek, and Littles Creek. The results of the sampling concluded that water temperature and pH were generally good, but dissolved oxygen and turbidity were rated fair to poor. One particular concern occurs in the area of the I-5 King County Metro Bus Facility, which is an older facility constructed prior to current standards.

Biological and habitat assessments were recently evaluated (2007, City of Shoreline) using macroinvertebrates as a biological parameter for stream health. Based on the number of macroinvertebrates found, the creek was classified (B-IBI, see explanation in Section 2.3.2) as having an extreme level of biological impairment.

Boeing Creek

The Boeing Creek basin is the second largest basin in the City and encompasses approximately 1,600 acres. The basin, approximately 90 percent developed, lies primarily west of Aurora Avenue North and drains to Puget Sound. Land use in the basin is mostly single-family residential; other uses include open space, schools, and commercial/industrial development. A small portion of the basin consists of multi-family housing.

Some of the larger individual uses include Shoreline Community College, Sears, Boeing Creek Park and Shoreview Park, which combined encompass approximately 14 percent of the basin. Commercial areas are located mostly along Aurora Avenue North.

Land use by subbasin varies with percent impervious varying between approximately 38 percent up to nearly 61 percent. Under full buildout conditions, the future total impervious area is expected to increase to a weighted average of 57 percent.

Most of the creek system, especially the headwaters, has become piped as a result of prior development. At the downstream end of the basin, approximately 1.55 miles of the main stem of Boeing Creek exists as open stream channel. This open channel extends downstream from the intersection of Carlyle Hall Road and Greenwood Avenue North to the mouth of the creek. This portion of Boeing Creek is contained within a steeply sloped ravine that is subject to erosion and downcutting. The removal of the natural vegetation, conversion to impervious area, and the resulting increase of stormwater runoff result in a high erosion potential particularly along the steeper portions of the creek.

Upstream of Carlyle Hall Road in the eastern portion of the basin, the creek is contained primarily in pipes that drain a large area, including the commercially developed area around Aurora Square. The northern portion of the basin (north of N 175th Street) includes two main stems flowing north to south and both are almost entirely piped.

Significant open water features of Boeing Creek include Hidden Lake and the open channel within Darnell Park. Hidden Lake was constructed from the natural streambed and associated wetlands and beaver pond of Boeing Creek (when Boeing Creek was previously known as Hidden Creek) in the early 1900s. Hidden Lake occupies approximately 2.1 acres. By the mid 1970s, the lake had filled with silt and

was no longer visibly a lake. In 1996, King County restored Hidden Lake as part of a habitat restoration project/sediment pond facility and subsequently dredged the project facility again after a storm induced washout refilled the lake with debris in January 1997. Since then, it has generally been dredged of sediment every other year and sometimes every year depending on the severity of storms and deposition into the lake.

The Boeing Creek Basin has three dams managed by the Surface Water Utility. Each major tributary of Boeing Creek has a dam to control flows; the M1-dam is located on the south fork, the North Dam on the north fork, and the Hidden Lake dam on the mainstem downstream of the north fork and south fork confluence. The open channel through Darnell Park was enhanced in 2009 as part of conveyance improvements constructed immediately upstream of Darnell Park to minimize flooding of several homes in the vicinity of North 165th Street and Stone Avenue North. The park provides some flood storage, thereby attenuating flows downstream.

Water quality in the Boeing Creek was recently evaluated by the City (2009, City of Shoreline). Sampling was conducted at two sites (referred to as BC2 and BC3 - See Figure 2-3) on Boeing Creek. The sites are located south of NW 175th Street just upstream of the confluence of the north branch (BC2) and the east branch (BC3). The Study, through the results of the sampling, concluded that water temperature, pH and turbidity were rated good, whereas summer dissolved oxygen was rated were rated fair (BC3) and poor (BC2).

As discussed previously, the majority of stream channel has been highly impacted by urban development. In all, just 26 percent of the stream remains as natural channel and only the first 2,300 feet of the lower reach are accessible to anadromous fish use (such as Coho). The Creek flows through a large forested natural area whose size and quality provide excellent overhead shading and protection in the lower reach and fair physical habitat in the upper reach. Other than the railroad crossing and one trail crossing, the lower reach appears to be relatively undisturbed. Despite the quality of the physical habitat, the B-IBI score was low and fine sediments were observed in both the lower and upper reaches of the creek. The sediment and low B-IBI score suggest that stormwater runoff from the upper urbanized areas may be delivering organic pollutants and fine sediment to this reach of Boeing Creek.

Overall, this basin is considered to have the highest water quality even though it drains many commercial properties in the headwaters of the basin. In addition, there will be opportunities for further water quality improvement as large commercial properties (such as Sears, Shoreline Community College, and Christian Ministries) redevelop. For example, the Shorewood High School Project in the upper portion of the basin is using groundwater injection of stormwater. Another example is retrofitting for water quality during the improvements to Aurora Avenue within the basin. Also noteworthy is that the entire basin is located within the City of Shoreline, so the City has greater control of its management than most other basins in the City.

Middle Puget Sound Basin

The Middle Puget Sound drainage basin is part of the larger area draining directly into Puget Sound. The portion of the Puget Sound drainage that lies within the City of Shoreline encompasses about 1,250 acres north of the mouth of Boeing Creek and about 310 acres south of Boeing Creek. Although geologically and hydrologically similar, they are hydraulically separated. The Middle Puget Sound North Basin is estimated at 90 percent developed (Tetra Tech/KCM, 1997), while the Middle Puget Sound South Basin is approximately 67 percent developed. Current land use is mostly single-family residential. Small areas are developed as multi-family, schools, commercial, and parks and open space. One unusual characteristic of this basin is that much of the areas include large privately owned developments. In these areas where roads are private, such as the Highlands, the City does not maintain the drainage system.

There are 12 subbasins in the Middle Puget Sound Basin which include six drainages within the basin: Upper Puget Sound North, Upper Puget Sound South, Innis Arden North, Innis Arden South, Highlands Creek and Storm Creek. Drainage in the Middle Puget Sound Basins begins as urban runoff or as seepage from hillsides. The headwaters of North Upper Puget Sound and Storm Creek are located beyond the City limits in the cities of Woodway and Edmonds. All other streams originate from wetlands, hillside seeps and urban runoff within the City of Shoreline. Storm Creek drains the largest area in the basin.

As part of the habitat investigation completed by the City (2009, Watershed Company) it was found that physical habitat in Storm Creek is poor. Although portions of the creek are located in a ravine with good overhead shading, large wood recruitment potential, and a very wide riparian buffer there is significant channel erosion in the steeper sections of the ravine. This is likely due to the combination of the existing steep slopes and resulting high creek velocities, the nature of the existing geologic surficial soils that are easily erodible and high peak runoff rates and volumes due to the urbanized nature of the Storm Creek watershed. The water quality index score for Storm Creek indicates that the quality of the waters was of high concern (2009, Shoreline). The B-IBI score and habitat findings also suggest that Storm Creek is severely impaired. There has been significant erosion at the mouth of Storm Creek that has been raised as an issue by residents adjacent to the ravine. One specific water quality issue that occurred in the past was the illicit draining of a private swimming pool water into Storm creek. In addition, the marine shoreline area at the northwest corner of the City in the Richmond Beach Park area is listed in Ecology's 303(d) list for fecal coliform (Section 2.2.2 includes an explanation of 303(d) listed waters).

Due to the ongoing erosion problems, the City of Shoreline recently started a new Basin Plan for Storm Creek. It is planned to be complete in 2012.

Two small basins adjacent to the Middle Puget Sound South Basin are the Seattle Golf Course Basin and the Bitter Lake Basin. The Seattle Golf Course Basin lies in the southwest portion of the City (not shown on Figure 2-3). Until recently, this basin was a closed depression that did not have a surface water outlet. Runoff in the basin was collected to a 2.1-acre wetland and infiltrated into the ground. An outlet was

constructed that now discharges into Highlands Creek. The basin is approximately 138 acres and is situated almost entirely within the City of Shoreline, with a small portion in Seattle. The geology of this area is mostly till and land use in the basin includes a golf course.

Bitter Lake is located in the City of Seattle near the southwest corner of the City of Shoreline. Only 54 acres of the Bitter Lake Basin lie within the City of Shoreline (not shown on Figure 2-3). This area shares the general geologic, land use, and habitat characteristics of the Middle Puget Sound South Basin. None of this basin's major water courses lie within the City of Shoreline. The land encompassed by these two basins is privately owned and therefore are not maintained by the City.

Additional detail of the stream systems for this basin can be found in the Middle Puget Sound, Seattle Golf Club and Bitter Lake Basins Characterization Report (Tetra Tech/KCM, 2004d).

McAleer Creek Basin

The McAleer Creek Basin is located on the east side of the City and drains approximately 4,018 acres upstream of the monitoring station at 196th St NE (Figure 2-3). The reach length of McAleer Creek located within the City is roughly 4,000 feet long.

The Creek has more than one distinct headwater stream. One of the headwaters originates south of Echo Lake, within the City of Shoreline, and flows north to Echo Lake. Echo Lake then drains north towards Lake Ballinger. Several other streams, the largest being Halls Creek located on the north end of Lake Ballinger in the City of Lynnwood, feed Lake Ballinger. McAleer Creek flows east out of Lake Ballinger, and is joined by the Cedar Brook Creek Tributary at the boundary with the City of Lake Forest Park. It flows through the Nile Golf Course and the City of Lake Forest Park to Lake Washington.

Urban development dominates McAleer Creek's watershed within City of Shoreline. The level of impervious surfaces in the watershed is currently at 46 percent (Table 2-8). Aurora Avenue, Ballinger Way, NE 205th Street, and Interstate 5 represent major urban modifications within the watershed. The length of channel conveyed in pipes is 46 percent (Table 2-8). While some high quality forested habitat exists within riparian areas short distances from the creek (e.g., 50 feet), most of the stream length lacks high quality habitat within 50 feet due to existing single-family homes, apartments, and lawns.

There is one stormwater detention dam located on the main stem of McAleer Creek at NE 196th Street that was designed to reduce downstream peak flows and alleviate past flooding. The entire main stem of McAleer Creek within the City of Shoreline up to Interstate-5 is utilized by anadromous fish. Little is known about the anadromous use of the various tributaries. Other notable water features include the two lakes, Echo (13.5 acres) in the City of Shoreline and Ballinger (101.4 acres), which is located in the cities of Mountlake Terrace and Edmonds.

The area in the vicinity of Echo Lake is densely developed. The Shoreline YMCA and multifamily housing surround the south side of Echo Lake. Costco, Home Depot, a Metro bus station, and a Washington State Department of Transportation (WSDOT) maintenance facility encroach upon the area adjacent to the open channel between Echo Lake and the City of Shoreline north boundary (just downstream of Lake Ballinger). The WSDOT facility stockpiles sand and salt for winter road maintenance.

A small branch south of Lake Ballinger is a natural channel with several intermittent ponded areas. Mature vegetation immediately surrounds this tributary to Lake Ballenger. Immediately outside of the vegetated buffer are several apartment buildings (Ballenger Apartments).

Downstream (south) of Lake Ballinger, McAleer Creek has a relatively low gradient. A moderate amount of large woody debris was observed in this portion of McAleer Creek (2009, Watershed Company). Overhead shading and canopy cover is rated as generally good, and consists of native species trees, shrubs, and ground covers, although the presence of invasive species such as Himalayan blackberry and knot weed are present throughout the shrub layer. The water quality score for McAleer Creek is of high concern (2009, Shoreline). Echo Lake is listed on the 303(d) list for fecal coliform (Ecology's 2008 water quality assessment).

Lake Ballinger (within the cities of Edmonds and Mountlake Terrace) is listed for total phosphorous and numerous tissue medium parameters (Aldrin, Dieldrin, Mercury, PCB, Chordan, etc.). Downstream of the city limits, McAleer Creek (City of Lake Forest Park) is listed for several 303(d) parameters (dissolved oxygen and fecal coliform). As a result of Lake Ballinger being 303(d) listed for total phosphorus, a TMDL was submitted by Ecology and approved by EPA in 1993. A TMDL is an analysis of the pollutant load a waterbody can assimilate without violating water quality standards.

In 2008, six local jurisdictions within the Lake Ballinger/McAleer Creek watershed joined together through an interlocal agreement to prepare a strategic action plan that addresses issues related to water quantity and water quality within the drainage basin. The cities of Edmonds, Lake Forest Park, Lynnwood, Mountlake Terrace and Shoreline along with Snohomish County agreed to language in an interlocal agreement that forms the Lake Ballinger/McAleer Creek Watershed Forum. Since then, additional studies have been prepared and several actions have been defined. The City of Shoreline continues to be an active member of the forum in terms of planning and coordinating activities, but elected to be a non-financial contributor to the planned projects. This was due, in part, because the portion of the watershed within the City of Shoreline does not represent a significant contribution to the basins problems.

A general drainage concern of this basin is high groundwater issues, primarily east of 15th Avenue NE extending east to the city limits. The high groundwater in the area has been a concern for seepage into basements and crawl spaces, increasing flows to already overloaded systems, and contributing to unstable slopes.

The culvert crossing at 15th Avenue NE and NE 190th Street has been reported to be undersized (2010, City of Shoreline) and likely contributes to upstream flooding of three homes in the vicinity of NE 190th Street as well as high water in the area between 24th Avenue NE and 25th Avenue NE, south of NE 185th Street.

A detailed description of the basin can be found in the McAleer Creek basin characterization study (Tetra Tech/KCM, 2004b).

Lyons Creek

The Lyons Creek watershed comprises approximately 2,500 acres and lies within five municipal jurisdictions. The size of the basin within Shoreline's city limits is approximately 184 acres. The basin is located along the eastern-most boundary of the City (Figure 2-3). The majority of the Lyons Creek Basin is located in the cities of Mountlake Terrace, Brier and Lake Forest Park. Lyons Creek flows southeast through the City of Shoreline and into Lake Forest Park before discharging into Lake Washington.

The most common land use is single family and multifamily residential, but there is a mix of all other land uses in the area. Commercial developments are clustered along NE Ballinger Way north of 19th Avenue NE. Multifamily developments are found along NE Ballinger Way, mostly south of 19th Avenue NE. A large school complex is at the intersection of 25th Avenue NE and NE 200th Street. Bruggers Bog and Ballinger Park are located along 25th and 24th Avenues NE, respectively (KCM 1997).

Water quality sampling was conducted on Ballinger Creek, a tributary of Lyons Creek, which only passes through the City of Shoreline for about 2,200 feet before entering Lake Forest Park (2009, Shoreline). The results of the sampling concluded that water temperature, and pH were rated good to fair, whereas summer dissolved oxygen was rated poor. Habitat assessment was not conducted for Ballinger Creek, but portions of the creek run through an open space within Bruggers Park and Bruggers Bog Park, which provides some natural stream buffer. South of the park, the creek buffer and riparian zone are encroached by a 30-unit apartment building, a condo development, a school, and King County road maintenance facility decant station.

There are also known incision issues in the creek within Bruggers Park as well as flooding in the area. Flooding problems occur from an undersized and failing culvert located in Bruggers Bog Park which causes the upstream system to back up and inundate low lying areas (2010, City of Shoreline). Also a compressed box culvert crossing of NE 195th Street at the City boundary with Lake Forest Park, backs up flow to cause flooding upstream to condominiums along the creek and the King County decant facility.

West Lake Washington

The West Lake Washington Basin is located in the very southeast corner of the City adjacent to the McAleer Creek and Thornton Creek basins. The total size of the West Lake Washington Basin (including areas outside the City) is approximately 450 acres and drains south and east to Lake Washington. The upper portion of the basin within the City of Shoreline includes 136 acres. One portion of this upper basin, 118 acres, flows to the lake through the City of Lake Forest Park. A smaller portion of the upper basin, 18 acres, flows toward Lake Washington through the City of Seattle. None of the upper portion within the City of Shoreline contains streams.

The upper West Lake Washington Basin is fairly flat, with elevations ranging from 400 to 500 feet. Land use in the basin is mostly residential, with small areas of commercial use along Bothell Way.

Drainage occurs as overland flow or through drainage ditches, roadway culverts, and storm sewers. No wetlands were identified in the basin.

The geology of the West Lake Washington Basin is similar to the Thornton Creek Basin and is almost exclusively composed of till. The Soil Conservation Service (1952) mapped both the Thornton and West Lake Washington Basins as primarily Alderwood gravelly sandy loam.

There is one known drainage problem related to root intrusion of a conveyance pipeline located on private property (parallel to 30th Avenue NE and south of NE 149th Street).

Table 2-8
Summary of Watershed Characteristics

	Thornton Creek	Boeing Creek	Storm Creek (within the Middle Puget Sound Basin)	McAleer Creek	Lyons Creek	West Lake Washington
Basin Size[1,2] (Acres)	2,304	1,600	474[3]	1,300	184	136
Percent of Total City Acreage	30 percent	21 percent	6 percent	17 percent	2 percent	2 percent
Stream Characteristics[2] Percent Piped Percent Artificial Percent Natural	 63 percent 19 percent 18 percent	 63 percent 11 percent 26 percent	 29 percent 25 percent 46 percent	 46 percent 28 percent 26 percent		No natural streams
Percent Impervious[2] Surface - Existing	44 percent	44 percent	36 percent	46 percent	47 percent	47 percent
Percent Impervious [4] Surface – Build-out	55 percent	57 percent	North 51 percent South 47 percent	58 percent	64 percent	58 percent
Geology & Soils	Predominantly Vashon Till with Esperance Sands	Dominated by glacial till.	Predominantly till in the plateau and mixture of Esperance Sands and lacustrine clay-silt on western slopes	Primarily of Esperance Sands in the eastern portion and glacial till, hardpan, in the western half	Primarily of Esperance Sands with small portion of transitional beds along the lower portion of the creek near the City limits	Predominantly Alderwood gravelly sandy loam
Significant Water Features	Thornton Creek Meridian Creek Little's Creek Ronald Bog Twin Ponds	Boeing Creek North Fork West Fork Hidden Lake	Upper Barnacle Creek Lower Barnacle Creek Storm Creek Blue Heron Creek Unnamed creeks	McAleer Creek Echo Lake	Open space within Bruggers Park and Bruggers Bog Park	None
Receiving Waterbody	Lake Washington via City of Seattle	Puget Sound	Puget Sound	Lake Washington via Cities of Mountlake Terrace, and Lake Forest Park	Lake Washington via Cities of Mountlake Terrace and Lake Forrest Park	Lake Washington and small portion to Lake Washington via Seattle

[1] Includes acreage within City of Shoreline Only.
[2] Source: 2009 Stream Assessment Report (2009, City of Shoreline)
[3] Includes only Storm Creek: The entire Middle Puget Sound Basin includes a total of 1,560 acres.
[4] Source: Series of watershed characterization reports completed in 2004 by TetraTech/KCM

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2.3.2 Remaining Surface Water Problems

As discussed previously, the City has implemented several capital projects to address the highest priority problems that were identified in the 2005 SWMP. However, there are still flooding, water quality and habitat problems that remain. This section summarizes known remaining problems. It is noted that additional problems may also be identified as the City develops future basin plans that include more detailed investigations and analysis.

The remaining surface water problems for this SWMP Update were identified through a number of sources:

- Review of the 2005 SWMP Problems. Problems that were identified in the 2005 Plan that have not been addressed are included in this report.
- Interviews with City Staff. Several new problems were identified through interviews with City staff and their understanding of the problems through citizen complaints and observations.
- New Basin Plans. Since the 2005 SWMP, the City completed the Thornton Creek Watershed Plan (2009, R.W. Beck). Problems identified in the watershed plan are included in this report.
- New studies. The City completed both a 2009 Stream Assessment Report (City of Shoreline, Stream Assessment Report, 2009) and a 2007 Bioassessment Report Biological and Habitat Assessment of Shoreline Stream (Watershed Company, 2009). Specific problems identified in these studies are included in this report.
- Community Meeting. A public open house was held on January 19, 2011 and citizens provide input on problems.

The following paragraphs describe some of the general problems that are broad and extend in many areas throughout the City for flooding and drainage, water quality and stream/wetland aquatic problems.

Tables 2-9 through 2-14 include the specific problems and are organized by basin. These tables also include a potential solution. Of note is that the number of problems identified in the Thornton Creek Basin is much higher than other basins. One reason for this is because the more detailed examination of the basin done as a part of the Thornton Creek Watershed Plan results in the identification of more problems. As the City develops other basin plans in next few years, it is very likely to identify more problems within these basins.

Flooding and Drainage

The City has made some significant strides in addressing the highest priority flooding problems. At the same time, many of the smaller flooding problems exist in several basins as documented in the following tables. However, one additional concern facing the City regarding the potential for flooding is its aging infrastructure. A large portion of the City's stormwater drainage system is old and is nearing the end of its useful life (50-75 years). There are also many systems that were not constructed with long-term functionality; an example would be a former roadside ditch had been gradually turned

into a culvert/pipe system by various private property owners and now consists of a number of different pipe sizes and materials installed using poor construction practices. This is a growing concern of Utility staff, and staff recognizes the need for stormwater infrastructure condition assessments. This concern is further discussed in Section 3.

It is also noted that potential drainage problems were also identified during the public open house as well as the web survey (off the City's internet site). These potential problems are noted in the complaints included in Appendix D. These problems were not included into specific problem tables 2-9 through 2-14 at this time. Additional investigations by City staff is necessary to confirm the nature of the problem and whether the City has responsibilities to implement corrective measures. These investigations will be conducted under future basin plans and/or asset condition assessments.

Water Quality Problems

Urban development can lead to a wide range of water quality problems resulting from a variety of common development activities. Examples were previously provided in this section and include chemical contamination from automobiles and machinery operation (e.g., oil, grease, hydraulic fluids, and heavy metals), erosion and sediment transport from disturbed soils (sediment and nutrient loading), and nutrient and biological pollution from domestic pets (e.g., phosphorus and fecal coliform bacteria). Water quality problems in the vicinity of Shoreline are typical of problems encountered in other urban areas throughout the Puget Sound.

Although provisions for water quality treatment and protection facilities are now required as part of new developments, much of the existing development in the City occurred before stormwater treatment requirements were established. Thus, runoff from most of the existing developed areas in the City receives little or no treatment before it reaches the nearest waterway.

Within the City of Shoreline there are two water bodies that are listed on the Washington Department of Ecology's (Ecology's) section 303(d) list of impaired and threatened water bodies, including Echo Lake (total phosphorus) and Puget Sound at Richmond Beach (fecal coliform). Water bodies that are listed outside of the City, but that the City drains to include:

- Thornton Creek – dissolved oxygen and temperature
- Lyon Creek – fecal coliform, dissolved oxygen, temperature, and mercury
- McAleer Creek – fecal coliform and dissolved oxygen
- Lake Ballinger – total phosphorus plus a number of other 303(d) parameters

Impaired waters are those not meeting state water quality standards. Water bodies on Ecology's 303(d) list are selected for further studies referred to as total maximum daily load (TMDL) determinations. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. Section 303 of the federal Clean Water Act establishes the water quality standards and TMDL programs. Water quality standards identify the uses for each

waterbody (for example, drinking water supply, swimming, and fishing) and the scientific criteria to support those uses. A TMDL study includes a problem formulation and an analysis of how to control the discharge of particular pollutants to surface waters. Of the above listed water bodies a TMDL study has only been done for Lake Ballenger in 1993. The City should keep abreast of any new TMDL plans for these other waters and determine if the plans require specific actions that affect the City.

In response to the NPDES Phase II program, the City expanded many of its activities and regulatory controls since 2005 (such as new standards) to improve water quality. While improvements are being made, there are still some general water quality problems affecting many of the City's systems. Examples include high fecal coliform, low dissolved oxygen, high concentrations of oils/grease and metals, and high temperatures. The City's State of the Water Quality in Shoreline Streams, Lakes and Wetlands report (2009, City of Shoreline) provides water quality results for all of the major stream, lakes, and wetlands and provides ratings (poor, fair, and good). In general, the data shows that some streams have relatively good water quality and that there has been modest both improvement in water quality since the City's monitoring began.

The water quality problems listed in the following tables include specific known water quality problems. They do not reiterate the general water quality findings from the State of the Water Quality in Shoreline Streams, Lakes and Wetlands report. This is in part because identifying more specific problem, their causes, and developing specific strategies targeted to the unique water quality conditions in each basin will be developed under future basin plans.

Stream/Wetland Aquatic Problems

As described above, the Final 2007 Bioassessment Report (The Watershed Company, 2009) summarizes the results of biological (benthic invertebrates), physical habitat and Water Quality Index assessment of Shoreline's streams. The report also documented any identifiable positive or negative trends in the ecological health of these stream systems over time (between 2003 and 2007). In 2003, the BIBI indicated that all five streams sample (Thornton Creek, McAleer Creek, Boeing Creek, and Storm Creek) were degraded, and samples from each survey site were rated as "extreme", with the exception of McAleer Creek, which scored slightly higher and was rated as "severe."

The 2007 results differed little from those reported in 2003, when low B-IBI scores ("extreme" rating) were measured at all five study sites. Some physical habitat parameters varied slightly between 2003 and 2007, but the survey did not detect any large changes in stream habitat over time. Silt and sand were generally a dominant substrate type in many of the survey areas. High fine sediment volumes also affected the macroinvertebrate community, which were commonly dominated by species capable of living in sandy, silty substrates. Some of the general concerns affecting the City's aquatic stream/wetlands include:

- encroachment of the riparian zones
- riparian areas lacking forest/diverse vegetative cover

- impacted channel migration zones within floodplains
- direct discharges from surface water piped systems without any form of treatment/detention

Also as part of this study, some specific problems and recommendations were noted for specific stream systems. Theses basin specific problems are described in Tables 2-9 through 2-14.

Table 2-9:
Thornton Creek Basin Flooding/Drainage, Water Quality, and Aquatic Problems

Thornton Creek Basin Flooding/Drainage, Water Quality, and Aquatic Problems

ID	Problem Area	Problem Description	Potential Solution
T-F1	Ronald Bog	Flooding of the neighborhood south of Ronald Bog.	The City has completed a comprehensive examination of the problem and identified a series of culvert replacements, channel improvements, pipe system replacements, a flood control berm as well as flood monitoring and early warning system. Most of the improvements are constructed. The last remaining element of the solution is a flood wall along the south edge of the bog. This construction is completed. See the Thornton Creek Watershed Plan for more information.
T-F2	12th Avenue NE and 11 Avenue NE between NE 175th Street and NE 170th Street	The existing drainage system from NE 170th Street to NE 175 Street, between 13th Avenue NE and 12th Avenue NE, daylights on the west side of 12th Avenue NE and discharges into residential backyards. The water is then collected in catch basins on 11th Avenue NE and conveyed to a pond located at 17021 11th Avenue NE. The pond was designed to infiltrate flows and has no outlet. This closed depression area is subject to flooding during significant events. In addition, flooding has been noted in the backyard of 17042 11th Avenue NE during storm events.	Implemented a phased program to reduce flood hazard. Initial phase includes expanding the existing ditch along 12th Avenue NE for use as an infiltration ditch. The ditch will provide additional storage and help infiltrate runoff to help attenuate the flows coming into the area. This initial phase of the project was constructed in the summer of 2011. The City would implement additional controls if flooding continues. See the Thornton Creek Watershed Plan for more information.
T-F3	Serpentine Pump Station near Avenue NE near NE 178th Street	Serpentine drainage system is a complex set of gravity pipes and pump stations that currently does not provide a 25-year level of service for flood protection. Drainage currently accumulates at the low spot on 5th Avenue NE near NE 178th Street because the capacity of the Serpentine Pump Station is inadequate to convey the necessary flow up into the system that runs down NE Serpentine Avenue	This problem was studied under the Thornton Creek Watershed Plan. Two alternative solutions were identified (ranging from $900,000 to $1.8 million). Prior to implementing one of these solutions, the City is investing in some LID/Green infrastructure in the contributing basin to see if this improves the situation. The City received a grant in 2010 and will be implementing the LID/Green infrastructure in 2012.
T-F4	Littles Creek near 14849 12th Avenue NE	During the December 2007 storm event, Littles Creek backed up and flooded 12th Avenue NE where the creek exits a culvert and takes a 90-degree turn to the west between the properties at 14849 and 15021 12th Avenue NE. The residents at 15021 12th Avenue sandbagged their driveway to prevent flooding of their garage. The residents at 14849 12th Avenue NE reported that they raised the grounds surrounding their house by about 6 inches in order to reduce the potential for their house to be flooded. Residents also reported flooding of NE 150th Court during heavy rains. Based on discussions with local residents, this is a recurrent problem.	The recommended solution for this flooding problem is to excavate approximately 450 feet of downstream channel to improve capacity. Although this is not a salmonid-bearing stream reach, the improvements would include habitat-friendly improvements. Also a 20-foot-long by 8-foot-wide by 5-foot-deep sump is proposed at the exit of the culvert at 12th Avenue NE to allow for sedimentation. See the Thornton Creek Watershed Plan for more information.
T-F5	NE 148th Street just west of 15th Avenue NE	The outlet pipe from the catch basin in front of the apartment building at 1237 NE 148th Street is not connected to any system, resulting in ponding of the area during storm events. According to the City, the pipe, a 12" CMP, is partially filled with sediment and is blocked at the downstream end. This is a recurrent problem.	Installation of an infiltration pipe/trench in the roadway shoulder(s) and connecting them to this catch basin. In addition to this improvement, the City could also work with the property owners who contribute runoff to this area to implement LID techniques, which would further reduce runoff directed toward the low area. See the Thornton Creek Watershed Plan for more information.
T-F6	10th Avenue NE near NE 174th Street	During the December 2007 storm event, 10th Avenue NE south of NE 175th Street was flooded. Based on City observation, this is a recurrent problem. The roadway drainage system backed up and flow came up out of the catch basins on the east side of the roadway, which resulted in stormwater flowing down the driveways into garages at 17112 and 17030 10th Avenue NE.	A preliminary solution was identified in the Thornton Creek Watershed plan and included detention and conveyance improvements. The detention could be on the south side of NE 175th Street between 10th and 11th Avenues NE. See the Thornton Creek Watershed Plan for more information.

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Table 2-9 (continued)
Thornton Creek Basin Flooding/Drainage, Water Quality, and Aquatic Problems

ID	Problem Area	Problem Description	Potential Solution
T-F7	N 167th Street and Wallingford Avenue N	Runoff from Meridian Park drains southward through private property and then east around the property at 16529 Wallingford Avenue N until it joins the drainage system in the Wallingford Avenue N right-of-way. There is also a high flow pipe and long open channel section in the area. This secondary system conveys flow east between the properties at 16533 and 16529 Wallingford Avenue N until it joins the conveyance system within the Wallingford Avenue N right-of-way. Conveyance capacity is limited at the N 167th Street crossing and the subsequent pipes that lead southbound through private property. In addition, both the low flow and high flow pipes that convey the flow from the short open channel section to the Wallingford Avenue N right-of-way are undersized and during very large events, the properties at 16533 and 16529 Wallingford Avenue N both flood. Based on City observation, this is a recurrent problem.	Replace the low- and high-flow pipe systems with open channel system to increase conveyance capacity. The solution can also include stream/aquatic improvements. See the Thornton Creek Watershed Plan for more information.
T-F8	Pump Station No. 25 (located north of N 175th St and east of I-5)	Flooding of structures, yards, and driveways due to undersized pump station.	Replace pump and force main to provide additional pumping capacity. The City received a grant to correct this problem in addition to implementing LID/Green infrastructure in the tributary basin in 2010. The pump station project is under design and scheduled for construction in the spring of 2012. The LID/green infrastructure elements are scheduled for 2012 and will also help to reduce flows to Problem T-F2. See the Thornton Creek Watershed Plan for more information.

Thornton Water Quality Problems

ID	Problem Area	Problem Description	Potential Solution
T-WQ1	Thornton Creek	Elevated temperatures in Thornton, Littles, and Hamlin Creeks and reduced groundwater inputs.	Plant shade-producing vegetation in open channel reaches and monitors temperature in each tributary.
T-WQ2	Thornton Creek	Reduced dissolved oxygen concentrations and elevated nutrient levels.	Improve soils and ground vegetation in buffers. Implement education, outreach, and incentive programs to reduce fertilizer use.
T-WQ3	Thornton Creek.	High Bacterial (fecal coliform) contamination.	Improve soils and ground vegetation in buffers. Implement education, outreach, and incentive programs to control pet waste.

Thornton Stream/Wetland Aquatic Problems

ID	Problem Area	Problem Description	Potential Solution
T-AQ1	Pipe outlet pipe system from Ronald Bog.	Partial fish passage barrier of long pipe system at pond outlet.	In 2010, the City replaced the existing outlet pipe because of its failing condition. The replacement pipe was designed to meet the fish passage requirements defined by the Washington State Department of Fish and Wildlife as part of the Hydraulic Project Approval permit process. Project completed, this is no longer considered a problem.
T-AQ2	Degraded wetland fringe areas around Ronald Bog.	Wetland and buffer areas along the east edge of Ronald Bog Park are infested with invasive Himalayan blackberry and they lack a diverse native plant assemblage and habitat structures.	Excavate areas along the east edge of the bog to enhance wetland hydrology; enhance and restore the inlet stream channel as fish and wildlife habitat, including placement of log structures; remove existing non-native vegetation; supplement topsoil; and implement a native revegetation plan. See the Thornton Creek Watershed Plan for more information.
T-AQ3	Fish passage barrier at the flow splitter upstream of Twin Ponds between Corliss Ave N and I-5.	The flow splitter upstream of Twin Ponds has been identified as a fish passage barrier according to previous reports. The Thornton Creek Watershed plan classified it as a partial fish passage barrier.	Reconstruct the stream channel up- and downstream of the flow splitter based on site-specific information to daylight piped stream sections as much as feasible and improve fish passage. Provide revegetation, bank stabilization, log structures, non-native vegetation removal, and other habitat features to the localized area as appropriate. See the Thornton Creek Watershed Plan for more information.

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Table 2-9 (continued)
Thornton Creek Basin Flooding/Drainage, Water Quality, and Aquatic Problems

ID	Problem Area	Problem Description	Potential Solution
T-AQ4	High plunge pool within Twin Ponds Park	In Twin Ponds Park, log structures had been placed below a culvert upstream of the ponds to effectively backwater it and eliminate a previous fish barrier plunge at its outfall. However, a moderate plunge now occurs at the lower log structure that could be improved.	In-stream work to re-grade the channels and modify or supplement structures such that plunge pools will definitely allow fish passage. Line the culvert just upstream of the north pond with spawning sized gravel. Add native vegetation along the stream bank between the two culverts mentioned upstream of the north pond (especially along the left bank). See the Thornton Creek Watershed Plan for more information.
T-AQ5	Fish passage barrier/culvert under 1st Ave NE	Reports document this culvert as a potential low-flow fish barrier.	Modify culvert and adjoining channel to conditions that result in adequate water depth within the culvert, as feasible, for fish passage at low flows. See the Thornton Creek Watershed Plan for more information.
T-AQ6	Fish Passage Barrier at outfall of Peverly Pond east of 1st Ave NE along I-5 and north of N. 149th St.	A concrete ramp channels outflow from Peverly Pond down ~5 feet to a straight channel adjacent to I-5.	Install a series of grade controls along the concrete channel leading up to the outlet of Peverly Pond such that the plunge from the pond is reduced to a fish passable height. The resulting grade-controlled section of the concrete channel extending upstream of the pond outlet would provide a significant amount of off-channel, beaver-dam-like rearing habitat. See the Thornton Creek Watershed Plan for more information.
T-AQ7	Culvert under I-5, downstream of Peverly Pond.	The approximately 1,950-foot-long culvert under I-5 is a likely fish passage barrier.	Action by the City of Shoreline is not indicated because this is a WSDOT owned culvert. The City should encourage WSDOT to provide a fish-passable culvert under I-5 at this location. See the Thornton Creek Watershed Plan for more information.
T-AQ8	Meridian Creek, upstream to Meridian Ave N from the south pond in Twin Ponds Park.	The problem includes a fish passage barrier due to the cumulative effects of the stagnant, weed-choked channel. Some Himalayan blackberry has been removed and native plants have been added by community volunteers, but the problem persists. Reed canary grass dominates some interior channel segments.	Restore the channelized stream sections, approximately 600 feet in length, from Twin Ponds upstream to Meridian Avenue N near the Evergreen School. Add spawning-sized gravel and in-stream structure for substrate/habitat improvement. Add native vegetation for bank stabilization and stream canopy cover. Maintain or thin existing alders currently on-site to accommodate vegetative diversity. See the Thornton Creek Watershed Plan for more information.
T-AQ9	Restoration site in Paramount Park Open Space/along Littles Creek stream bank.	Invasive plant species are invading a prior restoration project in the Paramount Park Open Space	Eradicate invasive plant species, such as Himalayan blackberry and Japanese knotweed. The estimated area to be cleared is 120,000 square feet (2.75 acres). Plant additional native riparian vegetation including native conifers and deciduous trees. See the Thornton Creek Watershed Plan for more information.
T-AQ10	Hamlin Creek, south from the Fircrest campus along 20th Ave NE.	Reach of Hamlin Creek has high proportion of piped stream length and the poor habitat with little vegetative cover along the ditched and piped sections extending southward from the campus along 20th Avenue NE.	The Washington Department of Social and Health Services (DSHS) is in the process of preparing a master plan for the portions of the Fircrest Campus (located in the City of Shoreline) not used by the Fircrest School or the Department of Health (DOH). One element of the master plan is a proposal to daylight and/or restore sections of upper Hamlin Creek, which are now conveyed in piped and ditched systems across the property. The proposed daylighting and enhancement of the drainage system is intended to largely restore natural stream headwater functions including biofiltration, water infiltration and storage, wetland and wildlife habitats, and, in general, to provide high-quality, less flashy flows to downstream fish and wildlife habitat areas. See the Thornton Creek Watershed Plan for more information.
T-AQ11	Lower Thornton Creek (including downstream reaches in Seattle).	Much of the length of the Thornton Creek channel lacks coarse-grained sediment (gravel) and much of the watershed lacks sufficient access to floodplain sediment and in-stream structure to trap and accumulate sediment. While this shortcoming tends to be more prevalent in the lower channel segments in the basin that carry more flow, primarily those downstream of Shoreline and in the City of Seattle, it also applies to certain stream segments higher in the basin within the City of Shoreline.	Reduce bank armoring and streambed grade controls where feasible; allow stream access to floodplain gravel through channel migration; provide in-stream structure to catch and accumulate sediment; and introduce additional gravel supply to sections of the stream that are sediment-starved and/or at locations where such gravel would be effectively distributed downstream. Examples of such locations are downstream of instream ponds or low-gradient reaches because such areas tend to accumulate course sediments and prevent their movement farther downstream. See Thornton Creek Watershed Plan for more information.
T-AQ12	Lower Thornton Creek	Coho prespawn mortality rates are high, averaging 79% throughout Thornton Creek. This problem primarily extends downstream into the City of Seattle, but it is affected by water quality from the entire watershed.	Contribute to projects that improve water quality and LID in the headwater areas. Improvements in the City of Shoreline water quality may improve spawning success further downstream in lower Thornton Creek. See the Thornton Creek Watershed Plan for more information.

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Table 2-10
Boeing Creek Basin Flooding/Drainage, Water Quality, and Aquatic Problems

Boeing Creek Basin Flooding and Drainage Problems

ID	Problem Area	Problem Description	Potential Solution
B-F1	Fremont Ave NE near NE 175th St	Three (3) 12-inch diameter pipes come together into another 12-inch pipe that discharges down a steep ravine. At the base of the ravine, the system pressure blows out the system and has caused flooding of basements.	Provide detention upstream of the 12-inch outfall pipe and/or provide additional conveyance capacity downstream of the flooding.

Boeing Water Quality Problems

ID	Problem Area	Problem Description	Solution
B-WQ1	Lower Boeing Creek	Erosion of stream reaches. Some reaches are through exposed sand banks. The most severe reach is above Hidden Lake. Results in high sediment loading.	Possible solutions include instream stabilization, upstream detention and LID to reduce flows and velocities.

Boeing Stream/Wetland Aquatic Habitat Problems

ID	Problem Area	Problem Description	Solution
B-AQ1	Lower Boeing Creek	Low B-IBI score and fine sediments suggest that stormwater runoff from upper, urbanized areas of the watershed may be delivering organic pollutants and fine sediments via erosion in the upper reaches to the lower reach of Boeing Creek.	Possible solutions include efforts to reduce fine sediment loads should focus on reducing peak flows within the basin, such as through increased infiltration, LID and detention and possibly instream stabilization (installation of large wood, etc.) above Hidden Lake
B-AQ2	Upper Boeing Creek (above the South Fork Boeing Creek confluence)	Portion of creek experiences wide channel widths, paucity of pool habitats, and prevalence of fine sediments.	Possible solutions include efforts to reduce fine sediment loads should focus on reducing peak flows within the basin, such as through increased infiltration, LID and detention and possibly instream stabilization (installation of large wood, etc.) above Hidden Lake

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Table 2-11
Middle Puget Sound Basin Flooding/Drainage, Water Quality, and Aquatic Problems

Middle Puget Sound Flooding and Drainage Problems

ID	Problem Area	Problem Description	Solution
General	Miscellaneous culverts	Some culverts have become plugged due to sediment deposition from upstream areas of erosion (e.g. 13th Ave NW and crossing of 17th Pl NW)	Efforts to reduce erosion in ravines should help to reduce this problem. Jetting/clearing of pipes is also part of the maintenance plan.

Middle Puget Sound Water Quality Problems

ID	Problem Area	Problem Description	Solution
M-WQ1	Storm Creek (primarily downstream of 15th Ave NW)	Reaches of significant erosion and sedimentation in the steep reach of creek	Consider the strategic installation of large wood throughout Storm Creek to help stabilize streambanks, attenuate flow energy, provide for pool formation, and create fish habitat in places where natural recruitment is diminished or unlikely.
M-WQ2	Storm Creek	Low Dissolved Oxygen	Improve soils and ground vegetation in buffers. Implement education, outreach, and incentive programs to reduce fertilizer use.
M-WQ3	Community Pool near Storm Creek and 15th Ave NW	Swimming pool water was pumped into creek.	Public Education

Middle Puget Sound Stream/Wetland Aquatic Habitat Problems

ID	Problem Area	Problem Description	Solution
M-AQ1	Storm Creek (primarily downstream of 15th Ave NW)	Poor physical habitat due to episodic erosion and sedimentation.	Consider the strategic installation of large wood throughout Storm Creek to help stabilize streambanks, attenuate flow energy, provide for pool formation, and create fish habitat in places where natural recruitment is diminished or unlikely.

Table 2-12
McAleer Creek Basin Flooding/Drainage, Water Quality, and Aquatic Problems

McAleer Creek Flooding and Drainage Problems

ID	Problem Area	Problem Description	Solution
Mc-F1	NE 190th St and 18th Ave NE	Flooding of three homes east of 15th Avenue NE	Solution to be developed as part of basin plan.
Mc-F2	Generally west of 16th Ave NE to City limits	High groundwater that leads to wet crawl spaces, seepage in basements, wet yards, and slope instability.	Solution to be developed as part of basin plan.

McAleer Creek Water Quality Problems

ID	Problem Area	Problem Description	Solution
Mc-AQ1	McAleer Creek	Low dissolved oxygen during summer months.	Improve soils and ground vegetation in buffers. Improve infiltration/biofiltration of stormwater. Implement education, outreach, and incentive programs to reduce fertilizer use. Recommendations that are more specific would be developed in future basin plan.
Mc-AQ2	Echo Lake	High concentrations of Total Phosphorus. High temperatures and low dissolved oxygen.	Improve soils and ground vegetation in buffers. Implement education, outreach, and incentive programs to reduce fertilizer use. Recommendations that are more specific would be developed in future basin plan.

McAleer Creek Stream/Wetland Aquatic Habitat Problems

ID	Problem Area	Problem Description	Solution
Mc-AQ1	McAleer Creek Culvert at 15th Ave NE.	Culvert is identified as a fish passage barrier.	Replace 48-inch box culvert beneath 15th Ave NE with a fish passable culvert.
Mc-AQ2	McAleer Creek riparian area	Riparian buffer is heavily infested by non-native invasive species like Himalayan blackberry and Japanese knot week.	Remove invasive vegetation within the riparian buffer and revegetate, where appropriate, with native vegetation. Preference should be given to coniferous trees where possible.

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Table 2-13
Lyons Creek Basin Flooding/Drainage, Water Quality, and Aquatic Problems

Lyons Creek Basin Flooding and Drainage Problems

ID	Problem Area	Problem Description	Solution
L-F1	South of NE 200th Street and 25th Avenue NE	Failing culvert in park causes backwater resulting in upstream areas of inundation	The culvert was removed and a pedestrian bridge was installed across the creek in the Summer of 2011
L-F2	Lyons Creek crossing of NE 195th Street	Damaged (compressed) culvert crossing of NE 195th Street causes backwater resulting in upstream flooding to road, King County offices and decant station, and of approximately 30 apartments.	Replace culvert with fish passable culvert. Investigate if new culvert will resolve all flooding issues in the area. Possibly provide detention upstream of problem to prevent increasing flows downstream from replaced culvert.

Lyons Creek Water Quality Problems

ID	Problem Area	Problem Description	Solution
L-WQ1	Bruggers Park open space	Erosion and channel incision in Bruggers Park open space.	Solution to be developed as part of future basin plan.

Table 2-14
West Lake Washington Basin Flooding/Drainage, Water Quality, and Aquatic Problems

West Lake Washington Flooding and Drainage Problems

ID	Problem Area	Problem Description	Solution
W-F1	South of NE 149th Street and east of 30th Ave NE within private property.	Stormwater pipe has possible root invasion problem or is undersized resulting in lost capacity and flooding. Also see the private complaint in Appendix D from the Public meeting that is in this proximity.	Investigate to confirm root invasion. Possible reroute of City runoff around private properties and either abandon existing pipe within private property or let owners maintain existing pipe within private property.

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Section 3
CURRENT TRENDS AND ISSUES AFFECTING SURFACE WATER MANAGEMENT IN SHORELINE

Six years have passed since completion of the City's first Surface Water Management Plan. During that time there have been shifts in priorities for managing stormwater on the local, state, and federal levels. For example, there continues to be growing emphasis at all levels of government and also private interest groups for water quality and protecting streams and Puget Sound. There have also been new and ongoing planning efforts by the City (such as parks, transportation, and sustainability plans) that will influence future surface water management. The purpose of this chapter is to provide a broad understanding of these trends and summarize these recent planning efforts and how they may affect surface water management.

3.1 Community Vision, Public Awareness and Opinion

Since the City's incorporation in 1995, the City has identified numerous goals and completed several planning efforts. The City adopted its first land use plan in 1998 (1998 Comprehensive Plan) in response to the requirements of the Growth Management Act (GMA) (RCW 36.70A). The 1998 Comprehensive Plan was then updated in 2005 in response to the GMA requirement that each city in King County take action to review and, if needed, revise its comprehensive plan and development regulations to comply with all requirements of the GMA.

The 2005 Comprehensive Plan was built off the 1998 plan and is a 20-year plan that articulates the community's vision and is a reflection of community values. The goals and policies included in the Comprehensive Plan provide a basis for the City's regulations and guide future decision making. The Comprehensive Plan also addresses anticipated population and employment growth and how facilities and services will be maintained or improved to accommodate the expected levels of growth. The 2005 Comprehensive Plan outlined goals and policies for land use, housing, transportation, parks, capital facilities, utilities, shoreline program, economic development and community design.

Concurrent with the 2005 Comprehensive Plan, the City also developed its first Surface Water Master Plan (2005 SWMP). A part of the 2005 SWMP effort included providing a tabular summary of policies and goals from the 2005 Comprehensive Plan that were relevant to surface water management. These tables are included at the end of this chapter (Tables 3-2 through 3-5). The overarching goal of the 2005 SWMP plan was to **"Manage the storm and surface water system through a combination of engineered solutions, the preservation of natural systems, and public education in order to provide for public safety; prevent property damage; protect water quality; preserve and protect fish habitat and critical areas; and maintain a hydrologic balance."**

Together with the Comprehensive Plan, the Surface Water Utility programs are shaped by the visions and values of the community as well as State and Federal regulations such as the NPDES Phase II permit. A schematic of this framework is presented on Figure 3-1. Since completion of the 2005 SWMP, there have been some changes in community priorities as well as vision for the City. In addition, the regulatory environment continues to evolve. This Section of the report discusses some of the major shifts in both community values and priorities as well as the evolving regulatory framework that affects the Utility.

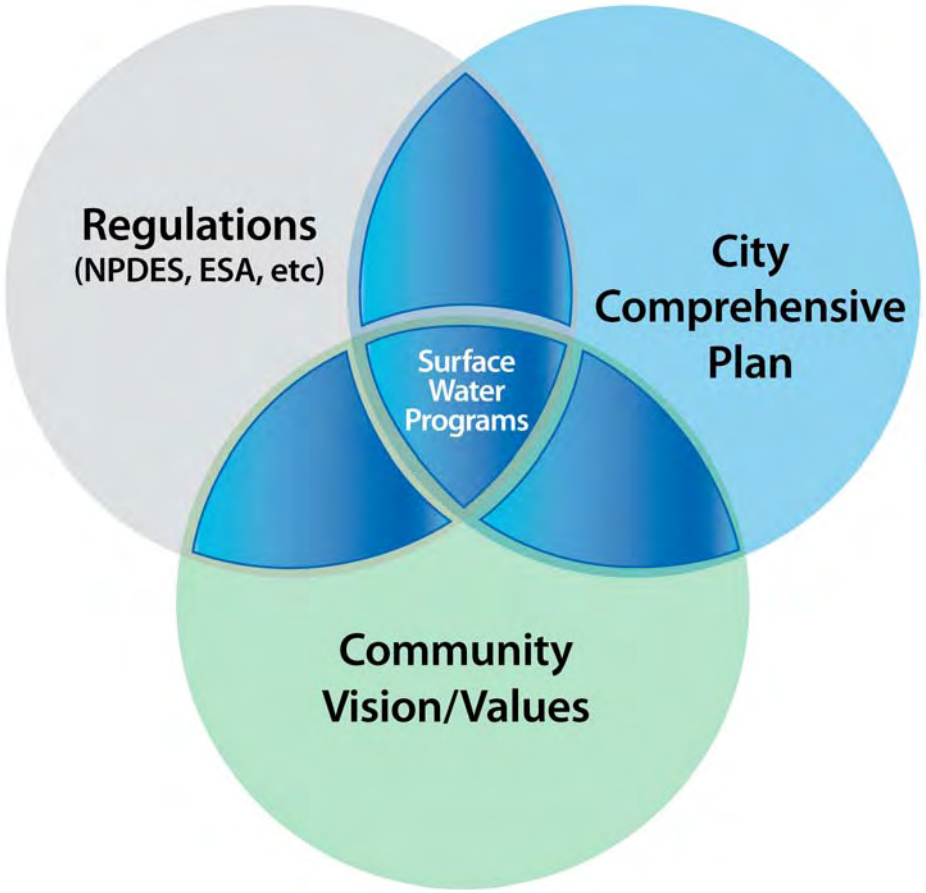

Figure 3-1: Surface Water Program Framework

Annual City Council Goals

The Shoreline City Council sets yearly goals that, along with the City's Vision, Values and Strategic Plan, guide the City's work plan for the year. The City adopted the following goals for 2011-2012. Several of these goals relate either directly or indirectly on surface water management. Goals 1 and 5 will provide opportunities to elicit input from the public. Goal 1 also would increase tree canopy to reduce runoff rates and volumes to City streams. Goals 2 and 4 will provide the opportunity for implementing new stormwater infrastructure. Goal 6 directs the City to provide

healthy (sustainable) strategies and measures to improve the quality of living in Shoreline.

City of Shoreline Council Adopted Goals for 2011-2012

1. Implement the adopted Community Vision by updating the Comprehensive Plan and key development regulations in partnership with residents, neighborhoods and businesses. One of the specific work plan element of this goal is to adopt amendments to the tree regulations, adopt a policy of increasing tree canopy through voluntary programs, and become a Tree City USA
2. Provide safe, efficient, and effective infrastructure to support our land use, transportation, and surface water plans
3. Improve economic development opportunities in Shoreline
4. Construct the Aurora improvements from 165th to 205th Street
5. Expand opportunities for effective citizen communication and community engagement
6. Develop a "healthy city" strategy
7. Acquire Seattle Public Utilities water system in Shoreline

Shoreline Environmental Sustainability Strategy

In 2008, Shoreline City Council adopted the Shoreline Environmental Sustainability Strategy. Working with public input, the strategy defined the following mission statement:

"The City of Shoreline will exemplify and encourage sustainable practices in our operations and in our community by:

- Being stewards of our community's natural resources and environmental assets;
- Promoting development of a green infrastructure for the Shoreline community;
- Measurably reducing waste, energy and resource consumption, carbon emissions and the use of toxics in City operations; and
- Providing tools and leadership to empower our community to work towards sustainable goals in their businesses and households."

Because this mission statement scope was so broad, and the universe of sustainability so vast, the City proposed a strategy that provides overarching direction for future efforts through the delineation of 10 guiding principles and focus areas:

1. Develop and integrate the sustainability program into all City functions
2. Develop a residential green building program
3. Build and support a sustainability leadership structure
4. Measure emissions in permitting and planning and take steps to mitigate

5. Prioritize non-motorized transportation investment and planning
6. Adopt a more aggressive green fleet policy
7. Adopt a clear and aggressive green building policy
8. Adopt a comprehensive environmental purchasing policy
9. Strengthen internal recycling efforts and community outreach
10. Structure and prioritize natural resources enhancement

This SWMP update considers the focus areas identified in the strategy and identifies how the stormwater management can support the sustainable strategy mission statement. The focus areas identified in the plan are:

- City operations, practices and outreach
- Energy conservation and carbon reduction
- Sustainable development and green infrastructure
- Waste reduction and resource conservation
- Ecosystem management and stewardship

Parks Plan

At the May 16, 2006, election, 70 percent of Shoreline voters approved the $18.5 million bond levy to purchase open space properties, make park improvements and develop trails. Open space acquisition accounts for over half of the bond including $6 million to purchase 12.6 acres of South Woods Property, $3.3 million to purchase 8.3 acres adjacent to Hamlin Park and $950,000 to purchase and make improvements at the four-acre Kruckeberg Botanic Garden.

More recently, the City engaged in preparing an update to the Parks and Recreation Plan. This effort has included a significant public input/involvement effort including a public survey in the summer of 2010. The Parks and Recreation Plan, adopted in July 2011, includes a series of new goals, policies, and strategies. The Parks and Recreation Plan goals reflect the City's aspirations. The policies are more precise statements that describe how elements of the overarching goal can be achieved.

The implementation strategies are specific actions to achieve the policies and ultimately the goals. The goals and associated policies and strategies relevant to surface water management include:

GOAL - Preserve, enhance, maintain, and acquire built and natural facilities to ensure quality opportunities exist (Goal 1)

Related Policies

- Preserve, protect and enhance natural, cultural and historical resources, and encourage restoration, education and stewardship (1.1).
- Maintain environmentally sustainable facilities that reduce waste, protect ecosystems, and address impacts of past practices (1.4).

- Maintain safe, attractive facilities using efficient and environmentally sustainable practices (1.6).

Related Implementation Strategies

- Provide coordination, technical assistance and restoration plans to volunteers to promote enhancement of natural resources.
- Incorporate innovative, low-impact development design and techniques to renovate and develop facilities.
- Utilize sustainable best management practices and sound maintenance to ensure responsible stewardship.
- Reduce potable water consumption by using efficient, cost-effective fixtures, drought tolerant and native plants, and explore non-potable water sources for irrigation.

GOAL - Establish and strengthen partnerships with other public agencies, non-governmental organizations, volunteers, and City departments to maximize the public use of all community resources (Goal 4).

Related Policies

- Collaborate with and support partners to strengthen community-wide facilities and programs.(4.1)
- Seek partners in the planning, enhancement and maintenance of facilities and programs. (4.2)
- Develop mechanisms for public outreach, communication and coordination among partners. (4.3)

Related Implementation Strategies

- Coordinate with other City departments to enhance and restore habitat and flood protection of historic watersheds.
- Coordinate with public and private school districts to allow public use of facilities.
- Actively involve stakeholders and the community in the development and management of facilities and programs.

Transportation Master Planning

The 2005 Transportation Master Plan (TMP) is a long-range plan that helps guide how the City develops its Capital Improvement Program, coordinates transportation improvements with land uses, and plans for what is needed to respond to growth.

Shoreline is updating the TMP due to significant changes that have been completed and that are planned for the City's transportation system since the TMP was originally created in 2005. Completed changes include the Interurban Trail, improvements to Aurora, and the pedestrian bridges. New bus rapid transit service from both Metro and Community Transit and the light rail extension from the Northgate neighborhood are changes that are coming to Shoreline's transportation system.

The City began the TMP update in July 2009 with an open house to solicit feedback about bicycle, pedestrian and transit needs. Along with the comments received at the open house, responses to questionnaires, email feedback and the input of a citizens' advisory committee regarding bicycle and pedestrian needs, the City began crafting policies addressing transportation issues.

One of the strategies of the TMP (from the Draft Plan), relates to maximizing opportunities to incorporate sustainable practices within the right-of-way. The City's largest property asset is its right-of-way, covering 2.1 square miles and including roadway surface, amenity zones, sidewalks and overhead and underground utilities (including electricity, telephone, cable, water, sewer and natural gas). Additionally, the vast majority of the City's stormwater management facilities are located in the right-of-way. The right-of-way presents many opportunities to incorporate sustainable practices, such as natural stormwater treatment, which improve the environment in various ways. Smart design of our transportation infrastructure can reduce negative environmental impacts or even provide positive contributions to environmental sustainability. Goals and policies related to overall sustainability and quality of life include:

- Encourage a variety of transportation options that provide better connectivity within Shoreline and throughout the region (Existing Comprehensive Plan Goal FG 13).
- Provide safe and friendly streets for Shoreline citizens (Existing Comprehensive Plan Goal T I).
- Work with transportation providers to develop a safe, efficient and effective multimodal transportation system to address overall mobility and accessibility (Existing Comprehensive Plan Goal T II)
- Maximize the people carrying capacity of the surface transportation system.
- Make safety the first priority of citywide transportation planning and traffic management. Place a higher priority on pedestrian, bicycle and automobile safety over vehicle capacity improvements at intersections (Existing Comprehensive Plan Policy T1 (modified).
- Reduce the impact of the City's transportation system on the environment through the use of technology, expanded transit use and nonmotorized transportation options (Recommended Policy).

Surface Water Master Plan Update Public Input

As previously described in Section 1, the City held an open house on January 19, 2011, to discuss the City's Surface Water Utility and gather public input on issues or problems within the City. The public was also given a list of potential areas of concern and asked to vote on their priorities within the City. The five highest priorities were as follows:

- Water Quality
- Flooding

- Aging Drainage Pipes/Facilities
- Aquatic (Streams/Wetlands) Habitat
- Sustainability

3.2 Physical and Demographic Changes in the City

3.2.1 Population and Demographics

In February, the U.S. Census Bureau released population figures for the State of Washington from the 2010 Census. The figures show a very slight decline in Shoreline's population, from 53,025 in 2000 to 53,007 today. According to the census, the current ethnic composition of the City is approximately 71 percent white, 15 percent Asian, 7 percent Hispanic or Latino, 5 percent Black or African American, 0.8 percent American Indian or Alaskan Native, 0.3 percent Native Hawaiian or other Pacific Islander, and less than 1 percent other race.

In spite of the lack of population growth over the past decade, it is almost certain that Shoreline's population will grow over the next decade. Because the Central Puget Sound region is a desirable place to live, its population is expected to grow over the next 20 years. Shoreline, due to its location and amenities, is likely to grow as well (2005, Shoreline). Also, another factor is that as more of the City's senior citizens move out of the large homes where they raised their families over the past several decades and into smaller units, and as more young families move in to purchase their first homes, the City will experience increases in population (Information from the City of Shoreline Planning and Development Services website, 2011).

3.2.2 Annexations

As of 2010, the City of Shoreline consists of an area of 12.3 square miles, of which approximately 330 acres are dedicated to park land and open space. The City is currently bounded by incorporated cities on 3 sides and Puget Sound to the west, so the City does not expect to grow much through future annexations. One exception is the unincorporated Snohomish County area of Point Wells in the Richmond Beach Area.

3.2.3 Climate Change and Sea Level Rise

Based on the findings of ongoing studies related to climate change, precipitation may become more severe in the next century. The trend is for more intense storms. Increases in precipitation would likely have an effect on flooding frequency and also result in an increase of stream flows and susceptibility to erosion in natural water courses (University of Washington's Climate Impacts Group, 2010).

In addition, coastal zones are particularly vulnerable to sea level rise. Higher temperatures are expected to further raise sea level by expanding ocean water, melting mountain glaciers, and causing portions of Greenland and the Antarctic ice sheets to

melt. The International Panel on Climate Change (IPCC) estimates that the global average sea level will rise between 0.6 and 2 feet in the next century (IPCC, 2007). Key concerns with sea level rise include land loss and increases flooding of coast areas.

The City of Shoreline has approximately 3.4 miles of shoreline. Any increase in sea rise can have an effect to property owners and increase the likelihood of coastal flooding.

The City will continue to maintain awareness of technical advances related to climate change and may consider an added factor of safety in their design protocol for critical stormwater systems.

3.3 Regulatory Framework

The City of Shoreline's surface water program must comply with a number of state, federal, and local regulations that are pertinent to stormwater. Based on findings of ongoing research related to the impacts of stormwater runoff on the quality of surface waters and impacts to the native fish populations, the regulatory environment in the last decade has reflected these by requiring more stringent stormwater control for urban runoff.

By implementing its own policies, regulations, and ordinances, the City is succeeding in complying with the regulations as well as meeting local needs. Table 3-1 provides a brief summary of the regulations and policies that affect surface water planning in the City of Shoreline. Following this table, a more detailed description is provided for the more significant regulations.

Table 3-1
Regulatory Framework Affecting Surface Water Management

Federal

Law	Regulatory Programs	Intent	Specifics
Clean Water Act	Section 402 - National Pollution Discharge Elimination System (NPDES). Included are the following elements:	Restore and maintain the chemical, physical, and biological integrity of the Nation's waters.	
	NPDES Phase II Municipal Separate Storm Sewer System Permit		Delegates permittee responsibility for the quality of water leaving a storm sewer system and requires certain actions to protect water quality. An update to this permit is currently in draft form. See discussion below.
	NPDES Industrial Permit		Requires action for those conducting certain industrial activities, including construction/ land development to obtain a permit and develop a pollution prevention plan for stormwater discharges.
	Section 303(d)		Requires the State to note water bodies that fail to meet water quality standards and requires development of a Total Maximum Daily Load Plan (TMDL) for each pollutant in each water body that exceeds standards.
	Section 401 and 404		U. S. Army Corps permits related to dredging or placement of fill material into Waters of the United States.
Tribal Agreements and Related Case Law		Protect fish populations in traditional fishing grounds of Indian Tribes.	Muckleshoot Indian Tribe, Tulalip Tribal Council, Sauk/Suiattle Tribe are party to SEPA review of development proposals and programs.
National Flood Insurance Act, Flood Disaster Protection Act	National Flood Insurance Program	Reduce property damage and public safety threats from flooding.	City enacts restrictions/requirements on development in floodplain and residents are eligible for reduced flood insurance rates in return.
Endangered Species Act (ESA)	Listing of Chinook Salmon, Coastal Puget Sound Bull Trout, Puget Sound Steelhead, as a Threatened Species; and listing of the Southern Resident killer whale as endangered	Provide properly functioning conditions to protect fish and their habitat	In 2001, 27 local governments in King and Snohomish counties, including the City of Shoreline, signed an Interlocal Agreement (ILA) to create the WRIA 8 Forum and jointly fund the development of a conservation plan to protect and restore Chinook salmon, the first of the ESA listed species. After the development of the WRIA 8 Chinook Salmon Conservation Plan (the Plan) in 2005, the WRIA 8 Salmon Recovery Council (SRC) was created to oversee the implementation of the Plan. The plan charts the path to restoration and eventual de-listing of species. Plans to address the other listings are evolving and the City monitors implications they may have to the surface water program.

State

Law	Regulatory Programs	Intent	Specifics
Water Pollution Control Act	City of Shoreline – Shoreline Master Plan	Discharge to state waters shall not cause pollution of State waters, which would impair beneficial uses.	Requires the use of all known and reasonable technologies (AKART) and best management practices (BMPs) approved by Ecology.
State Environmental Policy Act (SEPA)	City of Shoreline reviews proposals and issues SEPA determinations	Identify and require mitigation of the environmental impacts of project proposals and programs.	Addresses impacts that are not covered in other City requirements.
Shoreline Management Act (SMA)	City of Shoreline – Shoreline Master Plan	The SMA of 1971. The overarching goal is "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."	Shoreline Municipal Code (SMC) 16.10 adopts by reference Chapter 25 of King County Code to implement the SMA of 1971

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Table 3-1 (continued)
Regulatory Framework Affecting Surface Water Management

Law	Regulatory Programs	Intent	Specifics
Hydraulic Project Approval (HPA)	Washington Department of Fish and Wildlife (WDFW)	Prevent damage or loss of fish and shellfish habitat, which may result in direct loss of fish or shellfish production. Direct killing of fish or shellfish is usually a one-time loss. Damaged habitat, however, can continue to cause lost production of fish and shellfish for as long as the habitat remains altered. Major construction projects individually have a large potential for damage, but more habitat is lost from the cumulative effects of many smaller projects, each with a minimal level of impact.	Any form of work that uses, diverts, obstructs, or changes the natural flow or bed of any fresh water or saltwater of the state, requires a Hydraulic Project Approval (HPA). To obtain the approval, appropriate construction practices (such as limiting in-stream work to a season when fish are not using the stream), and possibly mitigation measures may be required.
Growth Management Act	City Comprehensive Plan, City zoning and critical areas regulations	Prevent uncoordinated and unplanned growth to protect environment.	City Comprehensive Plan to Set vision goals policies and implementation strategies for managing growth within the City over a 20-year period
Water Quality Protection Act	Replaced the Puget Sound Water Quality Authority with the Puget Sound Action Team, which has been replaced by the Puget Sound Partnership	Provide an integrated stormwater management approach through the development and implementation of programs by local jurisdictions, and the development of rules, permits and guidance by Ecology.	The Puget Sound Partnership replaces the Puget Sound Action Team and is a community effort of citizens, governments, tribes, scientists and businesses working together to restore and protect Puget Sound. The Partnership is charged to create an Action Agenda that leads to a healthy Puget Sound. The Action Agenda is intended to prioritize cleanup and improvement projects, coordinate federal, state, local, tribal and private resources, and make sure that they are all working cooperatively. The goal is to make Puget Sound healthy, and create a roadmap for how to get it done.

City

Law	Regulatory Programs	Intent	Specifics
Growth Management Plan	City Comprehensive Plan City zoning and critical areas regulations	Set vision goals policies and implementation strategies for managing growth within the City over a 20-year period.	As part of the GMA, King County provides planning policy and guidelines, e.g. King County Countywide Planning Policies and Puget Sound Regional Council - Vision 2020. These guidelines do not result in statutory requirements affecting the City, but provide direction to coordinate growth within the County. The goals and policies included in the City's Comprehensive Plan provide a basis for the City's regulations and guide future decision making.
Chapter 13.10 – Surface Water Utility	Setting of drainage Standards for new and redevelopment (Chapter 13.10.200)	Promote public health, safety, and welfare by providing design, construction, and maintenance criteria for permanent and temporary surface water drainage facilities for development and redevelopment activities	The city adopts by reference the most recent version (2005) of the Stormwater Management Manual for Western Washington published by Washington State Department of Ecology. The code requires all activities which have the potential to impact surface water and stormwater comply with the standards set forth in the manual. The code also requires that low Impact development techniques be employed wherever feasible, reasonable and appropriate before conventional on-site detention and infiltration methods are considered. The code also prohibits illicit discharges.

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3.3.1 Federal Clean Water Act – NPDES Phase II Municipal Separate Stormwater System Permit Program

Current Permit (2007 until 2013)

The City of Shoreline has obtained coverage under a NPDES (National Pollution Discharge Elimination System) Phase II Municipal Stormwater Permit issued by the Washington State Department of Ecology. The NPDES is a federal requirement under the Clean Water Act that regulates stormwater and wastewater discharges to waters of the State. The permit requires that all affected municipalities create and implement a Stormwater Management Program (SWMP), which address five required program elements. These elements are:

1. Public Education and Outreach
2. Public Involvement
3. Illicit Discharge Detection and Elimination (IDDE)
4. Runoff Controls for New Development, Redevelopment and Construction Sites
5. Pollution Prevention and Good Housekeeping for Municipal Operations

While the Permit went into effect in February of 2007, the permit itself phases program implementation requirements through February of 2012 (the five-year permit term). The permit requires each jurisdiction to complete two reports on an annual basis that document the City's progress in permit compliance. These documents are titled the Annual Report and the Surface Water Management Plan (SWMP). These documents are made available to the public through the City's surface water management web page.

Future Permit (effective (2013-2018))

Ecology is presently in the process of developing draft language for the next permit cycle. For more than 2 years, Ecology has been working with interested parties and advisory groups in Western Washington to develop future permit requirements. Two of the prominent groups were providing input on monitoring and low impact development requirements. A draft of proposed changes to the permit is currently available (October, 2011). Ecology is conducting a lengthy public input process where input is used to consider these changes. The following paragraphs provide a description of key permit changes and the schedule relevant to the City of Shoreline.

Schedule

- Spring 2011: Ecology released preliminary draft permit language for low impact development (LID) and monitoring for informal public comment.
- August 19, 2011: Existing permittees had to submit a reapplication form for the next permits.
- October 2011: Ecology issued complete draft permits out for public comment.

- Fall 2011: Ecology and other organizations issued updates to several guidance documents that will be referenced in the new permits. The 2005 Stormwater Management Manual for Western Washington (that the City currently references as a design standard) was updated and issued in draft form as the 2012 Stormwater Management Manual for Western Washington. Ecology expects to issue the final 2012 Manual in the summer of 2012. Other documents include the Low Impact Development Guidance Manual for Puget Sound (Puget Sound Action Team and WSU Pierce County Extension); Integrating LID into Local Codes: A Guidebook for Local Governments, Puget Sound Partnership; and the Rain Garden Handbook for Western Washington Homeowners (WSU Pierce County Extension).
- July 2012: Ecology will issue an extension of the existing permit to be effective from August 31, 2012 to August 1, 2013. At the same time, Ecology will issue the final new permits to be effective on August 1, 2013. Like the current permit, the new requirements will be phased in over the permit term.

Key Preliminary Changes

- Reporting: In the current permit, each jurisdiction is required to submit a SWMP (Stormwater Management Program) that describes the current program activities. For clarification, the draft permit now calls this document a SWMP Report (or SWMPR). In addition, the report will need to include descriptions of the "planned activities" for the coming year as opposed to looking at completed activities (S5.A.2).
- Reporting Coordination: The draft permit proposes a new reporting requirement for information about intra-governmental coordination that describes roles, responsibilities and organizational relationships (S5.A.5). The reporting will need to include a current organizational chart of all departments that conduct stormwater-related activities and specifying the departments' key personnel.
- Public Education and Outreach: Ecology proposes requirements that permittees continue education activities for target audiences as appropriate, and also implement a more developed educational effort for at least one new subject audience in at least one new subject area. This new educational effort would target a priority audience and have the ability to measure the changes in understanding and behavior for at least a year beginning by February 2, 2015. After a year, permittees would need to use the information gathered to improve the program (S5.C.1.c).
- Drainage System Mapping: The requirement for mapping is similar to the current permit, but the requirements were reformatted for clarity. Ecology intends for permittees to update the system map on a regular basis. One note of importance is that low impact development (LID) BMPs, where used to meet the requirements for development and redevelopment, will need to be mapped. But since they are typically widely distributed features, often found throughout the development sites (as opposed to centralized stormwater facilities), Ecology will allow permittees to place single points on the system map that reference permanent stormwater control plans (used during permitting) rather than each individual BMP (S5.C.3.a).

- Illicit discharges: Ecology is proposing adding language to require permittees to implement a "compliance strategy" that includes various steps in addition to enforcement that permittees may use to achieve compliance with the local illicit discharge and detection elimination (IDDE) code. The proposed language adds public education and informal technical assistance in addition to requirements for formal enforcement (S5.C.3.b). The language changes will require the City to update its code relative to illicit discharges. Ecology is also proposing a broader means of learning about illicit discharges: pro-active MS4 screening, complaints from an informed public, and referrals from trained municipal field staff. Ecology proposes to broaden the field screening requirement to include other methods in addition to dry weather outfall reconnaissance, but will allow each permittee to develop the method or methods that are most effective and efficient. Ecology also proposes to change the requirement for the area to be screened from a given number of priority water bodies to a percentage of the City area. The draft permit would require permittees to field screen approximately 20 percent of the City per year for illicit discharges. Ecology proposes a schedule of completing at least 40 percent by February 2, 2016. The Draft permit also describes general municipal field staff training requirements. (S5.C.3.c).
- Elimination of the One-Acre Threshold: Ecology is proposing to apply the requirements for new development, redevelopment and construction sites at project sites smaller than one-acre. The current (2007) Western Washington Phase II permit does not require application of the S5.C.4 and Appendix 1 requirements to project sites smaller than one acre, except where the sites are part of a common plan of development or sale (S5.C.4). The City of Shoreline previously decided to apply these requirements to sites less than 1 acre.
- Inspection of private stormwater treatment and flow control BMPs. To verify adequate long term maintenance, annual inspections are required by the City (S5.C.4.c). The City will need to keep records of inspections and enforcement actions (S5.C.4.d). Whereas, under the current permit, the City was only required to inspect projects in excess of 1 acre, it will now be required for all projects permitted by the City. With the added types of LID BMPs, these new requirements will require greater effort by the City. A separate inspection frequency is required for residential subdivisions. Due to the tendency for residential subdivision construction activities to extent over long periods of time, more frequent inspections are required. Inspections are required every 6 months until 90 percent of the lots are constructed. (S5.C.4.c).
- LID requirements. 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. Ecology has proposed to distinguish between LID BMPs and LID principles in the draft permit language, as follows

  - **LID Best Management Practices:** Distributed stormwater management practices, integrated into a project design, that emphasize pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration. LID BMPs include, but are not limited to, bioretention/rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, vegetated roofs, minimum excavation foundations, and water re-use.
  - **LID principles:** Land use management strategies that emphasize conservation, use of on-site natural features, and site planning to minimize impervious surfaces, native vegetation loss, and stormwater runoff

- By highlighting the difference in the draft permit (S5.C.4.g), Ecology wants to emphasize that permittees need to amend stormwater and land use codes, rules, standards, and other enforceable documents as necessary to apply both LID BMPs and LID principles along with new LID standards for development and redevelopment.
- The draft permit also includes significant updates to the LID BMP requirements (within Minimum Requirement #5 in Appendix A of the permit) for new development and redevelopment.
- Watershed Scale Planning: Ecology is adding a new requirement for watershed scale planning in areas where impending growth threatens high-value habitat or water resources. The primary objective of the planning would be to identify whether and how the watershed could accommodate the planned growth and still maintain the beneficial uses of the watershed's surface waters. The proposed watershed planning process directs the affected Phase I and Phase II permittees to use their land use management authorities to develop plans that can more comprehensively address the impacts of urbanization. The proposed permit would require some Phase II permittees to participate with Phase I permittees in the watershed planning process (S5.C.4.h).
- Maintenance Standards: The draft permit requires maintenance standards to be updated and be consistent with those in the 2012 SWMMWW (S5.C.5).
- Inspection Requirements: The draft permit requires annual inspection of all municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities. Permittees may reduce the inspection frequency shall be based on maintenance records of double the length of time of the proposed inspection frequency. Inspection of all catch basins and inlets owned or operated by the Permittee are required at least once every two years. The catch basin inspection schedule of every two years may be changed based on maintenance records of double the length of time of the proposed inspection frequency.
- TMDLs: TMDLs are discussed below under Section 3.3.2 and previously in Section 2 as it relates to Lake Ballinger. Under the draft permit, Ecology identifies (in Appendix 2) all TMDLs in Western Washington that have requirements that are not already found in the draft permit. The TMDL for Lake Ballinger is not listed

indicating that no additional requirements will apply for this TMDL within the City of Shoreline.

- Monitoring requirements (S8): The preliminary draft language proposes a collaborative, regional approach to stormwater monitoring throughout western Washington. The proposed structure includes a coordinated monitoring program based on shared costs among permittees, with Ecology acting as the service provider to administer contracts. Permittees would participate in a formal oversight committee. This proposed approach removes specific monitoring requirements from the permits and relieves individual permittees of the obligation to individually conduct monitoring activities. Ecology indicates that the benefits for a regional approach are:
  - Feedback on improvements in water quality in receiving waters,
  - Regionally consistent methods to collect comparable and valid data,
  - A repository of information on pollution sources, and
  - Transferable studies of the effectiveness of specific stormwater program activities.

  The regional stormwater monitoring program is defined in three separate areas of monitoring:
  - *Status and trends monitoring* to answer basic questions as to whether conditions in receiving waters are improving or deteriorating.
  - *Regional effectiveness studies* that will provide direct quantitative feedback about the results of different stormwater management activities and programs.
  - *Source identification and diagnostic monitoring information repository* to allow permittees to share source identification program information and provide a regional understanding of pollutant sources to support new policy initiatives.

  Ecology has developed some preliminary cost sharing allocations. Ecology wants the cost allocation to be based on readily available data, verifiable data, and relatively easy to administer. On a preliminary basis, the costs to the City of Shoreline are $37,591/year with the first payment due August 15, 2014. This cost is broken down by Status and Trends Monitoring: $13,327; Effectiveness Monitoring: $22,205; and Source Identification and Diagnostic monitoring: $2,059.

Shoreline Stormwater Code (Chapter 13.10 SMC — Surface Water Utility)

The Stormwater Code establishes the goals of the Utility and the framework for how it operates. Key elements of the code include:

- Purpose – In summary the purpose of the Utility is to promote public health, safety, and welfare by establishing a program to comprehensively manage surface water with the intent of reducing flooding, erosion and sedimentation, preventing habitat loss, and enhancing groundwater recharge as well as protecting and enhancing the water quality consistent with the Federal Clean Water Act, NDPES Phase II

Permit, and providing design, construction, and maintenance criteria for permanent and temporary surface water drainage facilities for development and redevelopment activities.

- Establishment of the Utility – It creates the Utility as an enterprise fund, authorizes the Director to administer and enforce the provisions of the Utility, and establishes the ability to collect fees for the administering, operating, maintaining, or improving the surface water system.
- Adopts standards for development and redevelopment – It adopts by reference the Stormwater Management Manual for Western Washington published by Washington State Department of Ecology. It also specifies that low impact development techniques shall be employed wherever feasible, reasonable and appropriate before conventional on-site detention methods are considered. It also requires source control best management practices.
- Authority for Inspections – It gives the authority to inspect private drainage systems for compliance with the Stormwater Code and for applicable permits.
- Requires Maintenance of Surface Water Systems – It requires owners of surface water systems to prepare an operation and maintenance plan for the constructed surface water drainage facilities and give the authority to the Director to require declaration of covenant of the plan with the King County recorder's office when appropriate.
- Prohibits illicit discharges – It prohibits discharges to the City's stormwater system that is not composed entirely of stormwater. Examples of illicit discharges include domestic sewage, construction materials, trash, steam cleaning/pressure washing waste, domestic animal wastes, yard wastes, petroleum products, soaps/detergents, and degreasers/solvents.

3.3.2 Federal Clean Water Act –Total Maximum Daily Load Plans

Under section 303(d) of the Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These are waters that are too polluted or otherwise degraded to meet the water quality standards set by states, territories, or authorized tribes. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters. A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

3.3.3 Federal Endangered Species Act – Listing of Chinook Salmon as a Threatened Species

The National Oceanographic and Atmospheric Administration (NOAA) listed Puget Sound Chinook salmon as a threatened species under the Endangered Species Act on March 24, 1999 and reaffirmed the threatened status on June 28, 2005.

The ESA provides for both the conservation and protection of plant and animal species that face the threat of extinction as well as for the ecosystems upon which they

depend. To prevent further decline of the species and to encourage restoration, the ESA prohibits "take "of listed animals which includes significantly modifying its habitat.

Those agencies or individuals found to be creating take of the species are subject to third-party lawsuits, the outcome of which could have severe economic consequence for the region, such as curtailing of development or requiring costly mitigation projects.

Potential impacts to fish habitat arise from City activities such as road maintenance and surface water management measures, and City-impose land use regulations. Although the City has been proactive, especially over the last several years, in implementing best management practices and public education to minimize the introduction of pollutants into waters of the state. In addition, the City is part of the ESA Regional Roads Form and employs the tri-county road maintenance standards.

The ESA requires that a plan be developed and implemented to address recovery of the species. To reflect local conditions, NOAA agreed to allow WRIAs to develop the draft salmon recovery plans for their approval.

In 2001, 27 local governments in King and Snohomish counties, including the City of Shoreline, signed an Interlocal Agreement (ILA) to create the Water Resource Inventory (WRIA) 8 Forum and jointly fund the development of a conservation plan to protect and restore Chinook salmon. WRIA 8 encompasses the Cedar-Sammamish-Lake Washington watershed.

After the development of the WRIA 8 Chinook Salmon Conservation Plan (the Plan) in 2005, the WRIA 8 Salmon Recovery Council (SRC) was created to oversee the implementation of the Plan. Currently, two council members serve on this committee attending the SRC's bi-monthly meetings.

3.3.4 Hydraulic Code (RCW 77.55)

The Washington Department of Fish and Wildlife (WDFW) requires a Hydraulic Project Approval (HPA) for construction activities that use, divert, obstruct, or change the natural flow or bed of any waters of the state. The purpose of the requirements, which are administered through the HPA permit process, is to protect fish habitat in stream channels, to prevent erosion, and to protect freshwater and nearshore marine aquatic life. Any construction activity such as bridge painting, channel improvements, stream restoration, or culvert replacements within the ordinary high water mark of any stream would fall under the HPA permit requirements. Flood-damage repair and prevention activities may be permitted as a five-year plan, avoiding the need to permit each individual activity.

An HPA is applied for by submitting a Joint Aquatic Resource Permit Application (JARPA) to WDFW. This is the same form that can be submitted for permits from Ecology, the Corps, and DNR. After a 45-day review period, WDFW will approve, deny, or condition the permit. WDFW generally may require modifications to plans and specifications that avoids or compensates for project impacts on fish ecology. Possible modifications include, but are not limited to:

- Making a culvert fish passable (includes consideration of 95 and 10 percent exceedance flows, minimum flow depth, and maximum hydraulic drop);
- Providing large woody debris in a stream channel;
- Moving grading limits outside the ordinary high water line;
- Specifying construction practices that prevent entry of construction equipment and/or materials into the watercourse; or
- Specifying bed material, construction methods, construction period, riparian vegetation, and any required mitigation.

If it is more cost-effective, the applicant may be permitted to perform off-site mitigation, provided it would generate equal or greater biological functions and values compared to on-site mitigation.

3.3.5 Floodplain Management (RCW 86.16)

Chapter 86.16 RCW Floodplain Management establishes statewide authority through regulations promulgated by the Washington State Department of Ecology (Ecology) for coordinating the floodplain management regulation elements of the National Flood Insurance Program (NFIP). Under Chapter 173-158 WAC, Ecology requires local governments to adopt and administer regulatory programs compliant with the minimum standards of the NFIP. Ecology provides technical assistance to local governments for both identifying the location of the 100-year (base) floodplain and in administering their floodplain management ordinances.

Ecology also establishes land management criteria in the base floodplain area by adopting the federal standards and definitions contained in 44 CFR, Parts 59 and 60, as minimum state standards. Ecology has approval authority over local floodplain management ordinances. Federal regulations allow residential and nonresidential development in the floodplain if the proponent demonstrates that the project is constructed to be one foot above the 100-year base flood elevation as determined by a flood insurance study. Ecology will disapprove an ordinance if minimum federal criteria for enrollment in NFIP or state regulations on development in the floodplain are not met. State regulations allow only for repair or reconstruction of existing residential structures within the floodplain that do not increase the ground floor area and that cost less than 50 percent of the market value of the existing structure.

The City currently does not participate in the Community Rating System (CRS). The Community Rating System (CRS) is an incentive program that encourages communities to adopt floodplain management activities exceeding the minimum NFIP requirements. Participants receive discounts on flood insurance. Examples of the activities that the CRS credit include:

- Maintaining elevation certificates on all new and substantially improved buildings in the Special Flood Hazard Area.
- Maintaining elevation certificate data in computer format.

- Making copies of elevation certificates on newer properties available at the CRS Coordinator's office.
- Providing information on FIRMs and the flood insurance purchase requirement to inquirers and publishing a document that tells lenders, insurance agents, and real estate agents.
- Informing insurance agents about the availability of flood certificates.
- Keeping a log of FIRM requests and responses.
- Keeping the City's FIRM updated and maintaining old copies of the FIRM.
- Maintaining flood protection materials in the public library.
- Maintaining the City's elevation reference marks.
- Enforcing the requirement that all new buildings must be elevated above the street or otherwise protected from drainage problems.

Prior to the floodplain mapping of Thornton Creek in 2009, the City's only FEMA mapped floodplains were located along Boeing Creek and the shoreline of the City. As the City moves forward to complete additional FEMA mapping of streams and the Puget Sound shoreline, it should consider joining the CRS program.

Recent legal decisions affect FEMA's administration of the NFIP in Washington State and thereby affect Ecology's implementation of this program as well.

In response to a 2004 federal court order, the National Oceanic and Atmospheric Administration, Department of Fisheries (NOAA Fisheries) released a biological opinion in September 2008 addressing the effects of FEMA's continued administration of the NFIP throughout the Puget Sound region. NOAA Fisheries determined the existing NFIP and CRS need revision to avoid violating the Endangered Species Act (ESA) when authorizing floodplain development. FEMA issued guidance to local jurisdictions in 2010, which includes a model ordinance that incorporates a simple and direct set of rules to protect human development from floods while minimizing the impacts of new construction and redevelopment on aquatic and riparian habitat. Jurisdiction must adopt the model ordinance or an equivalent ordinance by September 2011.

The FEMA guidelines are anticipated to include:

- New Model Floodplain Ordinance
- Checklist to see if existing shoreline ordinance is sufficient
- Guidance document on
  - How to perform a habitat assessment and mitigate if necessary
  - How to calculate CRS credits
  - How to develop necessary maps. (Change the mapping program to include prioritization of mapping based upon the presence of sensitive salmon populations; improve the maps' accuracy; and condition FEMA's processing

of "Letters of Map Change caused by manmade alterations" only when a proponent has avoided or mitigated adverse effects on habitat)

3.3.6 Puget Sound Partnership

The Puget Sound Partnership is a state agency created by the Washington State Legislature in 2007. The Partnership works collaboratively with all levels of government, tribes, businesses and citizen groups in its charge to lead and coordinate efforts to protect and restore Puget Sound by 2020. The Partnership, which began work on July 1, 2007, is governed by a Leadership Council of independent citizens from around the Sound and is advised by an Ecosystem Coordination Board and a Science Panel. An Executive Director leads day-to-day operations and employs a professional staff including the former staff of the Puget Sound Action Team. As of January 1, 2008, the regional salmon recovery functions performed by Shared Strategy for Puget Sound become the responsibility of the Partnership.

Brief history

During the 1960s and 1970s, people became increasingly concerned that the health of Puget Sound was deteriorating. In spite of its outwardly beautiful appearance, the Sound's environment had been suffering from the effects of urbanization and development since settlers first set up steam sawmills on its shores in the 1800s. Over time, the region's swelling population and development continued to put stress on the ecosystem. While many government agencies were involved in preserving Puget Sound's water quality, no single entity was coordinating the entire effort. In 1985, the Washington State Legislature made a commitment to protect and restore Puget Sound by creating the **Puget Sound Water Quality** Authority.

In July 1996, the authorizing legislation for the Puget Sound Water Quality Authority expired. In that same year, the Legislature enacted the Puget Sound Water Quality Protection Act. Under this law, the **Puget Sound Action Team**, Puget Sound Council and a professional staff assumed the Authority's responsibility.

Recognizing that the state's efforts of the past 20 years had not been enough, in December 2005 Governor Chris Gregoire appointed a high-level advisory commission of 22 prominent leaders called the Puget Sound Partnership to look for answers. That advisory commission spent a year studying the scientific, geographical, political and funding issues behind the Sound's environmental problems. The Partnership scrutinized other large ecosystem protection efforts around the country and engaged an extensive cross-section of Washington citizens, businesses, governments and tribes in recommending ways to do it better. The Partnership presented its final report to the governor in December 2006. The recommendations included increased accountability and a new government structure, better integration of science, a long-term public education effort and a renewed focus on how to pay for the large-scale actions necessary to return the Sound to health.

The Governor considered the recommendations and worked with the 2007 Legislature to create a new state agency with the same name as the advisory commission, the

Puget Sound Partnership. The Partnership officially began work on July 1, 2007, incorporating the former staff of the Puget Sound Action Team.

Mission of the Partnership

The mission of the Puget Sound Partnership differs from previous recovery efforts, such as the Puget Sound Water Quality Authority or the Puget Sound Action Team in several key ways:

- The Partnership has an expanded scope of work with lead responsibility for salmon recovery in the Puget Sound basin and the duty to ensure a sufficient water supply for people and wildlife.
- The Partnership has authority to establish a 2020 Action Agenda with actions and benchmarks needed for all levels of government and watershed groups.
- The Partnership is required to oversee the work toward these priorities, with tools and the responsibility to hold entities accountable.
- The Partnership's geographic scope is clearly expanded to include the entire Puget Sound basin from the crests of the Cascades and the Olympics to the center of the Sound.
- The Partnership has a firm deadline for its efforts—recovery of the Sound by 2020.
- The Partnership has the responsibility to collaborate with local watershed groups and work within the existing watershed framework.
- The Partnership must use independent science advice and expertise in its work.

The Partnership worked with private interest groups, businesses and governments to create a long-term plan called the 2020 Action Agenda. The Action Agenda, first developed in 2008, explains what a healthy Puget Sound is, describes the current state of Puget Sound, prioritizes cleanup and improvement efforts, and highlights opportunities for federal, state, local, tribal and private resources to invest and coordinate. The Action Agenda is a living document, designed to be adapted and adjusted. By statute, the near-term strategies and actions described in the Action Agenda must be updated every two years.

The Partnership recognizes that several federal agencies have significant environmental management, resource protection and scientific analysis responsibilities that contribute to the restoration and protection of Puget Sound. These agencies include the Environmental Protection Agency, the National Oceanographic and Atmospheric Administration, U.S. Fish and Wildlife, U.S. Geological Survey, the National Park Service, and the Forest Service. A report prepared on behalf of the Puget Sound Partnership last year estimated that about $116 million/year is spent by federal agencies for the restoration and protection of Puget Sound. In 2006, the federal agencies formed a workgroup of agency managers in Puget Sound to better coordinate the work of the federal government and integrate it with the work of state agencies, tribes, local governments and others through the Partnership.

Table 3-2:
Flooding–Related Goals and Policies from the 2005 Comprehensive Plan

Flooding- Related 2005 Comprehensive Plan Goals and Policies	Direction Given to Surface Water Management Program
Goal LU XVII Policies LU105, LU137, LU131, LU139, LU145, LU147, LU149, and LU106	Manage the storm and surface water system through a combination of engineered solutions, the preservation of natural systems, and public education in order to provide for public safety; prevent property damage; protect water quality; preserve and enhance fish habitat and critical areas; and maintain a hydrologic balance. Resolve existing flooding problems and prevent new ones. Ensure adequate surface water services to provide defined levels of service to new and future development. Develop surface water facilities that protect water quality, enhance public safety, prevent erosion, preserve and enhance habitat, and protect critical areas. Manage new development so that it does not aggravate existing flooding problems. Manage larger development projects to retrofit existing paved areas with new controls that help alleviate downstream flooding problems. Promote low-impact new development that reduces runoff from the site and helps to alleviate downstream flooding. This includes protecting natural flood storage areas. Identify the City as the responsible party for maintaining stormwater systems in City right-of-way to prevent flooding. Identify private property owners as the responsible party responsible for maintenance of their own systems to prevent flooding on their land. Design and construct flood protection projects to solve existing flooding problems, but also to provide additional benefits to the extent possible that meet goals, policies, and community needs expressed for habitat and surface water quality. Prioritize the resolution of flooding problems such that problems, which frequently cause property/structure damage or pose a public safety risk have the highest priority.

Table 3-3:
Water Quality–Related Goals and Policies from the 2005 Comprehensive Plan

Water Quality-Related 2005 Comprehensive Plan Goals and Policies	Direction Given to Surface Water Management Program
Goal LU XVII Policies LU140, LU141, LU142, LU143, LU144, LU146, LU147, LU148, LU149, LU150, LU151, and LU135	Manage the storm and surface water system through a combination of engineered solutions, the preservation of natural systems, and public education in order to provide for public safety; prevent property damage; protect water quality; preserve and enhance fish habitat and critical areas; and maintain a hydrologic balance. Maintain surface water quality as defined by federal and state standards. Rehabilitate degraded surface water by reducing nonpoint source pollution, controlling erosion, and improving the stormwater system. Actively pursue state and federal grants to improve surface water management and water quality Support the use of appropriate landscaping, swales, "green street" improvements, retention facilities, and treatment facilities to enhance water quality and the percolation of water at natural rates near its source to limit soil instability or damage to roadways or other improvements. Sweep streets to reduce pollutants entering the stormwater drainage system Educate citizens about proper waste disposal. Prevent direct disposal into storm drains. Promote practices that prevent pollutants from entering the stormwater system as a result of lawn and garden maintenance, car cleaning or maintenance, and roof cleaning or maintenance. Maintain and enhance natural drainage systems. Identify the City as the responsible party for maintaining stormwater systems in City right-of-way to prevent flooding. Identify private property owners as the responsible party responsible for maintenance of their own systems to prevent flooding on their land. Cooperate with other jurisdictions and agencies to improve regional surface water management, protect water quality, and resolve related interjurisdictional concerns. Design and construct water quality projects to solve existing water quality problems, but also to provide additional benefits to the extent possible that meet goals, policies, and community needs expressed for flood protection and habitat. Pursue funding to conduct baseline monitoring and improvement of water quality in lakes and streams in the City. Protect surface and ground water quality through regulation and educational outreach. Adhere to state and federal environmental standards in all City-funded projects. Work with neighboring communities to improve water quality and stream habitat in basins that share interjurisdictional boundaries.

Table 3-4:
Stream Habitat–Related Goals and Policies from the 2005 Comprehensive Plan

Stream Habitat-Related 2005 Comprehensive Plan Goals and Policies	Direction Given to Surface Water Management Program
Goals LUXVII and LUXVIII Policies LU114, LU149, LU116, LU126, LU127, LU128, LU130, LU131, LU133, LU134, LU136, LU129, and LU135	Manage the storm and surface water system through a combination of engineered solutions, the preservation of natural systems, and public education in order to provide for public safety; prevent property damage; protect water quality; preserve and enhance fish habitat and critical areas; and maintain a hydrologic balance. Preserve, protect, or restore wetlands, shorelines, surface water, and ground water for wildlife, appropriate human use, and the maintenance of hydrological and ecological processes. Actively participate in regional species protection efforts, including salmon habitat protection and restoration. Preserve aquatic and riparian habitats in a natural state and maintain appropriate buffers around these areas. Develop a basin stewardship program to prevent negative impacts to stream habitat and identify opportunities for restoration. Avoid permanently altering streams except in certain types of projects. Require that any stream alteration result in a net improvement to habitat and encourage streams to return to natural channel migration patterns where feasible. Give preference to channel stabilization over culvert installation. Promote citizen involvement and seek community consensus on attempts to restore surface water features, which have been altered. Restoration efforts may include the daylighting of streams, which have been diverted into underground pipes or culverts. Identify, prioritize, and eliminate barriers to fish passage. Work with citizen volunteers, state and federal agencies, and Indian tribes in these efforts. Preserve and protect natural flood storage areas. Use the state Shoreline Management Act to guide protection efforts for shorelines of statewide significance and for other water features that do not qualify for state regulation. Work with citizen and watershed groups and cooperate with adjacent county and local governments, regional governments, state agencies, and Indian tribes to develop and implement watershed action plans and other types of basin plans for basins that lie within or partially within Shoreline's boundaries. Provide additional public access to Shoreline's natural features, including the Puget Sound shoreline. Seek consensus of local communities and neighborhoods when private property owners might be negatively affected by this action. Design and construct habitat projects to solve existing habitat problems, but also to provide multiple benefits to the extent possible that meet goals, policies, and community needs expressed for flood protection and surface water quality. Implement activities that, in the following order of priority, (1) protect and preserve existing habitat, (2) enhance and expand habitat in areas where wild anadromous fish are present, and (3) enhance and expand habitat in areas where other wild fish are present. Work with neighboring communities to improve water quality and stream habitat in basins that share interjurisdictional boundaries

Section 4
UTIILTY GOALS AND RECOMMENDED PROGRAM DIRECTIONS

As previously described, the Surface Water Utility has three basic goals, flood reduction, water quality protection/improvement, and stream/wetland enhancement. Considering the trends affecting surface water management discussed in the prior section, this section discusses objectives and approaches to achieve these goals. It also discusses recommended program directions (i.e., changes in operational guidelines) for certain surface water management activities. In addition, the framework for a level of service analysis is described. This framework is used to select a preferred level of service for each of the Utility's program areas that balance the need to meet regulatory requirements and advance the Utility goals in each program area, while being affordable to the rate payers.

4.1 Utility Goals

4.1.1 Flood Reduction

Flood reduction involves reducing flood hazard safety risks, flood damage to property, and disruption of mobility and critical services. Although the Utility has addressed many of the major flooding problems with capital projects and improved maintenance since the 2005 SWMP, there are still some localized flooding problems, including flooding of some homes/apartment buildings, basements etc., nuisance flooding and standing water in roadways. Of the remaining problems, the City would likely continue on a program of addressing the more significant remaining problems followed by the less severe problems, e.g., those that do not affect structures or arterials.

4.1.2 Water Quality Protection/Improvement

Although protecting and improving water quality is largely driven by regulatory requirements, such as the NPDES Phase II program, the Utility wishes to go beyond the minimum regulatory requirements to improve the quality of the City's streams and water bodies. The water quality program involves preventing pollution through public education and involvement, enforcement, maintenance, and capital projects. This includes monitoring pollutant levels in streams and wetlands throughout the City, addressing sources of pollution, constructing treatment facilities, and maintaining the City's stormwater drainage systems with street sweeping, catch basin and pipe cleaning, and other activities such as inspections and code enforcement of commercial facilities, and implementation of low impact development techniques where feasible and appropriate, such as rain gardens and bio-swales.

4.1.3 Stream/Wetland Aquatic Enhancement

Although also regulatory driven, especially as related to salmon habitat, enhancement of aquatic streams/wetlands is a focus of the Utility. Efforts include identifying and preserving existing habitat, enforcing development standards that protect critical areas such as stream and wetland buffers, providing public education, and coordinating public efforts to protect or enhance habitat. The Utility may also implement stream/wetland enhancement capital projects where there is a direct linkage to stormwater flooding, water quality, or erosion.

4.2 Applying New Objectives to Achieve Goals

The Utility is proposing a number of new objectives to help achieve the desired Utility goals. The extent to which each of these will be implemented and the resources dedicated is evaluated in Chapter 5.

4.2.1 Stormwater Basin Planning

The 2005 SWMP heavily relied on prior documents and readily available information to identify problems without performing detailed examination of the drainage systems. The Utility has been transitioning to a Basin Plan approach that will provide detailed drainage system assessments, floodplain mapping, and asset inventory about the major drainage basins in the City. The basin plans will look at the portions of each watershed that are located within the city limits as a whole and use an integrated process to evaluate and address problems related to flooding, water quality, and aquatic streams/wetlands.

Once completed, they will provide a higher level of detail on stormwater operational, maintenance, and capital needs within each basin and will provide regulatory, programmatic and capital recommendations to meet these needs. The basin plans will also identify applicable low impact development (LID) and green infrastructure approaches, in addition to conventional approaches, to meet the flooding/drainage, water quality and aquatic habitat needs of the system. Recognizing the benefits of this approach, the Utility completed its first basin plan (Thornton Creek) in 2009.

4.2.2 Addressing aging infrastructure (Asset Inventory)

Although the City has only been incorporated since 1995, the area encompassed by the City was largely developed in the 1960s and 1970s. Consequently, the age of the majority of the City's stormwater infrastructure is greater than 40 years. Since the life expectancy of this type of infrastructure (pipes and catch basins), is estimated at 50 years, the majority of the stormwater infrastructure in the City is at or approaching its useful life. Currently the Utility addresses infrastructure replacement on a reactive basis, meaning when a portion of the system fails, such as a pipe break or root intrusion, it is replaced. Instead, the Utility would like to move in the direction of implementing an Asset Management Program.

What is Asset Management? Managers of municipal infrastructure assets must make technical decisions regarding when and how to maintain, repair, or renew their assets. Examples of these technical decisions include:

- How much annual maintenance is required?
- Is it more cost-effective to maintain, repair, or replace a certain component of the system?
- How can the remaining service life of a component or system be calculated so that system replacements can be scheduled?
- Will the maintained, repaired or replaced component meet the desired performance requirements?
- What are the probabilities of failure for individual components and what are the consequences of failure?
- How can an asset manager make a logical, cost-effective and objective decision with many unknowns?

Asset management is a body of management practices that maximizes the cost-effective use of capital assets over the life of the asset (Sivalingam, 2001). Simply stated, it gets the most use out of each asset over the life of the asset for the least long-term cost. For pipeline management, asset management can be defined as managing infrastructure capital assets to minimize the total cost of owning and operating them, while delivering the City's target level of service. Several large municipalities have implemented asset management planning using sophisticated information systems, and extensive personnel resources. Such municipalities are responsible for making sure that its system stays in good working order – regardless of the age of components or the availability of additional funds. Asset management programs with long-range planning, life cycle costing, proactive operations and maintenance, and capital replacement plans based on cost-benefit analyses can be the most efficient method of meeting this challenge. Use of asset management will help protect the system integrity by (GASB, 1999):

- Making sure components are protected from premature failure through proper operations and maintenance
- Facilitating proactive capital improvement planning, and implementation over longer cycles to reduce annual and overall costs
- Reducing the cost of new or planned investments through economic evaluation of options using life-cycle costing and value engineering
- Focusing attention on results by clearly defining responsibility, accountability, and reporting requirements

Key elements of more sophisticated asset management programs include (USEPA 2002):

- Level of service
- definition Selection of performance goals
- Information system
- Asset identification and valuation
- Failure Impact evaluation and risk management
- Condition assessment
- Rehabilitation and replacement planning
- Capacity assessment and assurance
- Maintenance analysis and planning
- Financial management
- Continuous improvement

Investing in such long-term decision making has historically been difficult for the Utility due to competing resource needs (e.g., solving flooding problems) and lack of physical data about the system. As a consequence, system replacements have tended to be reactive (e.g., replacing a system after it has failed) or opportunistic (e.g., replacing a system at the same time as another City project is working in the area, thus being cost-effective). This is an increasing concern for the Utility.

The Utility recognizes the need to move toward more formal and proactive asset management. The initial steps to building a functioning asset management program include data gathering and documentation and condition assessment. A condition assessment would be the first "building block" of the future asset management program. The asset inventory and condition assessment would include updating the City's storm drain inventory maps to locate the Utility's entire drainage infrastructure. The condition assessment would additionally include such things as video of underground stormwater pipes to assess pipe age and condition as well as assessment of catch basin and manhole structures and culverts. The Utility also needs to select and purchase GIS compatible software, which can integrate the mapping inventory, conditions, assessment, and apply the asset management planning tools. This assessment would occur with the basin plan studies, to provide a comprehensive stormwater management strategy to improve watershed conditions.

The objective would be for the Utility to perform inventory and condition assessments of over the next five years. This information would allow the Utility to better schedule repairs and replacements of existing infrastructure. This information would also be of value to determine if replacement should occur as part of other City projects such as a road improvement project. This method of managing aging infrastructure would allow work to be completed in a more cost effective manner.

4.2.3 Developing Sustainability Strategies for Utility

As previously discussed in Section 3, an objective of this SWMP update is to consider the focus areas identified in the City's sustainable strategy and identify how the stormwater management can support the mission statement. The focus areas identified in the plan are:

- City operations, practices and outreach
- Energy conservation and carbon reduction
- Sustainable development and green infrastructure (an example are Green Works Projects discussed below)
- Waste reduction and resource conservation
- Ecosystem management and stewardship

4.2.4 Green Works Projects

The City of Shoreline has included Surface Water Management Green Works Projects in the 2011-2016 Capital Improvement Program. These projects will apply low impact

development techniques to reduce flows and improve water quality through stormwater infiltration, bioretention, and bioinfiltration. These projects are designed to enable safe access for pedestrians, bicyclists, and motorists; provide natural drainage solutions, and enhance the natural habitat and human community. The Utility would like these projects to be an opportunity to increase the public awareness of low impact development techniques by working with adjacent homeowners and businesses. Additionally, these small drainage projects provide an opportunity for Utility staff to monitor the effectiveness of the various facilities.

4.2.5 Use of Emerging Technologies

Emerging technologies to help manage surface water continue to evolve in recent years. Much of the emphasis is placed on urban drainage water quality treatment and new and expanding types of LID techniques. As new water quality treatment technologies are developed, they have to be approved by Ecology to be used for controlling runoff from new development or redevelopment. Some of the new technologies include:

- Pervious pavements (both asphalt and concrete), an LID technique that reduces runoff from paved areas.
- Several types of water quality filter systems are available through different manufacturers. One type (used on the Aurora Project) includes underground vaults and above ground plantings of trees and shrubs to filtrate stormwater through a soil/plant media.
- Chemical treatment of construction site runoff to help sediment drop out from turbid water
- Underground injection of stormwater into the ground after sufficient water quality treatment
- Green Works (as described above)

The objective of the Utility is to avoid simply relying on the traditional methods for managing surface waters and apply these new technologies where appropriate.

4.3 Program Direction Changes

As a part of this plan update, Utility staff identified several instances where specific program directions (i.e., guidelines for management decisions) were identified and input was sought from the City Council. These are summarized in Table 4-1 and described below.

Table 4-1:
Relationship between Program Direction Issue, Affected Programs, and Utility Goals

Program Direction Issue (as discussed with Council May 2, 2011)	Affected Programs	Implementation Strategy
Emphasis on Repair and Replacement over Capital Projects	Operations and Maintenance, Asset Inventory and Management	Inventory condition assessment as part of basin planning process; Update asset inventory and management resources (software and staff)
Low Impact Development (LID) Incentives/Rate Issues	Public Outreach, Administration and Management	Provide LID incentives (discounted rain barrels, grant programs, etc.) to residents Study rate class structure for residential surface water fees Audit of King County parcel information
Management on Private Property	Regulatory Compliance, Capital Improvement Program	Development of a formal set of guidelines for deciding management actions on private property
Car wash permits	Public Outreach and Education, Technical Assistance, and Code Enforcement	Develop a formal no fee-permit for non-commercial car wash activities

4.3.1 Shifting Utility Priority from Capital Projects to Maintenance and Preserving Existing Infrastructure.

The concern over the aging drainage infrastructure was discussed earlier in this section with the objective to implement an inventory and conditions assessment of over the next five years to form a "building block" of information to help implement an asset management program. The ideal program would maximize the service life of the City's infrastructure.

Because the Utility has implemented majority of the recommended critical CIP projects listed in the 2005 SWMP and the City is experiencing fewer calls for flooding assistance during major storm events, the Utility is proposing more emphasis be placed on system maintenance and asset management and less on major capital projects for the next 5 year planning period.

4.3.2 Use of Stormwater Utility Funds for Stream/Wetland Enhancement Projects

Utility staff requested clarification from the City Attorney's office on when stormwater Utility funds may be used on stream/wetland enhancement as a result of recent court findings on this issue (that could potentially limit the use of funds on these types of projects). Working with the Attorney's office, Utility staff proposed the following clarification:

- Stormwater Utility funds may be used on stream/wetland enhancement projects where there is a direct linkage to stormwater flooding, water quality, or erosion (i.e., purposes of the utility formation). Utility funding for stream/wetland enhancement or projects containing aquatic habitat elements will need to be evaluated on a case by case basis to confirm this linkage. Examples of stream/wetland enhancement projects (or habitat elements of larger projects) include:
  - Bank stabilization, which can be the best available science to enhance habitat while accomplishing erosion control (e.g., installation of large woody debris)
  - Other in-channel work to alleviate flooding or erosion can include aquatic habitat enhancement for mitigation (e.g., installation of large woody debris to provide channel roughness, channel/streambank re-grading and associated native vegetation planting)
  - Other aquatic habitat enhancement when it is mitigation for project permitting (e.g. riparian plantings or installation of large woody debris due to WDFW HPA permit conditions)
  - Projects that involve some stream/wetland enhancement resulting from past flooding, erosion or water quality damages due to stormwater (e.g., installation of boulders or large woody debris to stabilize a channel that has been excessively incised and causing excessive erosion due to a repeated storm events)
  - Non-project but habitat related studies/analysis that may provide mitigation opportunities (e.g., water quality studies that use steam bioassesment methods)

An example of a habitat project that should not be funded by the utility is a culvert replacement for the sole purpose of improving fish passage. Alternatively, if the culvert replacement were necessary due to flooding or repair needs, it would be appropriate to replace the culvert with a fish passable culvert (a Washington State Department of Fish and Wildlife permitting requirement).

4.3.3 Utility Coordination with Parks and Transportation

The first SWMP, completed in 2005, was prepared at the same time that new plans were also being developed for Parks and for Transportation. At that time, it was agreed that redevelopment of the City of Shoreline's parks and improvement of roads would in some cases provide an opportunity to fix aging storm drainage infrastructure within the City. Specific Surface Water Utility actions or budgets for these types of projects were not developed. Rather, a cost allocation was assigned (based upon a percentage of the project cost) to the Utility, independent of the actual cost of drainage infrastructure. For future projects, the Utility is proposing the following "guiding principles" for project participation and coordination with other City departments.

- Surface Water Utility dollars will only be used to fund the flood protection, water quality, and aquatic enhancement elements associated with future Parks and Transportation projects.

- For such projects, the Utility will need to be considered a partner and have direct involvement in how the Utility dollars are spent (e.g., to make sure there is commensurate benefit for the investment). The Utility will promote a collaborative nature on such projects.
- The Utility recognizes that during Parks or Transportation projects there may be cost-effective opportunities to upgrade or replace its aging facilities by providing multiple benefits under a single capital improvement project.
- The Utility will promote sustainability goals on joint projects. The Utility will promote beneficial surface water projects in parks for water quality, flood reduction, or habitat preservation, where such projects will not detract from park use or needs.
- The Utility recognizes that there may be a case when a major road project has a significant drainage improvement cost exceeds the proposed annual SWM capital budget for a given year or years. In such a case, the Utility will have to consider other options such as tapping into the Utility's funding contribution or working with the Departments to phase the project.

4.3.4 Private Property and Public Drainage Systems

Historically, there has been uncertainty regarding the City's responsibilities with respect to drainage on private property. The uncertainty is most often created because of incomplete system ownership records passed on from King County. In 1995, the City received a blanket transfer of stormwater easements and facilities but this list was only as accurate as the records that King County maintained. In cases where the City has drainage easements, the City is responsible for maintenance of these systems. Conversely, in most cases, the City has no easements and these systems are considered private (i.e., there is a presumption that the system is not publicly owned if there is no easement). In addition to stormwater entering and exiting city rights-of-way, some drainage systems include public and private reaches.

City staff routinely receive questions from citizens when problems occur on these private drainages. Most often, a citizen or a group of citizens will request that the City solve a problem that exists on private property. From a legal perspective, the City is not responsible for solving problems on private property. However, there may be certain situations where there is an overriding public benefit (such as solving flooding for an entire neighborhood) and the City should consider accepting improvements on private property as a public work and assume ownership of the system for future maintenance. Working with the City Attorney's office, Utility staff developed draft guidelines for making decisions on when surface water management activities (i.e. use of utility funds) should occur on private property. These draft guidelines are included in Appendix C and will be further reviewed and likely be refined following the completion of this SWMP update.

4.3.5 Rate Credits Vs. Incentives for LID

In recent years, the Shoreline City Council (Council) has expressed interest in exploring rate credits as incentives for promoting Low Impact Development (rain gardens and other infiltration systems). Utility staff considered two alternative options to encourage LID and presented this information to the Council.

- Option 1: Allow revenue-neutral rate credits to promote Low Impact Development. The Utility's rate structure for residents would be modified to allow for existing properties to receive a rate credit when implementing LID practices (note that this does not include new development or redevelopment because the City code requires LID). The intent is to provide incentives and encourage existing property owners to implement LID where none are required. For the Utility to maintain a revenue neutral budget, the rate credits would have to be offset by an increase in surface water rates to those properties that do not receive the rate credit or there would need to be a reduction in programs or services to offset the credit.
- Option 2: Promote LID through other options such as discounted rain barrels, grant programs, or possibly one-time rebates. Promotion of LID through other incentives may result in a higher level of participation from residents than a rate credit.

Of the two options considered, the Utility selected the second option. Encouraging low impact development would be better administered through incentives, grant programs, or onetime rebate programs. It also allows for more flexibility and creativity to develop incentives that increase participation and LID implementation. Examples, through its outreach programs, could include offering discounted rain barrels, downspout splash blocks, trees, or free do-it-yourself LID design booklets. The Utility could also pilot a grant program for residents to install rain gardens or similar features on their properties. Another option may be a rebate program that provides a property owner with a one-time rebate for each square foot of surface water runoff that is detained on their property.

4.3.6 Car Wash No-Fee Permits

In an effort to help the community minimize impacts from large-scale non-commercial car washing events, the City will provide, free of cost, car wash kits to those groups wishing to hold a car wash. The kit is designed to intercept the dirty water before it enters a storm drain and direct it towards a proper disposal location.

The City supplies the kit and instructions for use and conducts on-site assessments to make sure that the car wash location is suitable for the use of a car wash kit or is near a grassy area where the wash water can soak into the ground and naturally filter out the contaminants.

The purpose of the free permit is to educate residents about water quality and the role certain activities have on the environment. The no-fee permit would be required for all non-commercial car wash events and enforced only from an educational perspective; by permitting the events, the City can regulate the car washes that are being held on sites that will not pose a threat to water quality.

4.4 Levels of Service Framework

For each of the major program components within the Utility, City staff examined two potential levels of service to be delivered by the Utility to the rate payers. The two levels of service are referred to as Level of Service (LOS) 1 and LOS 2. The LOS 1 is generally defined as providing the current LOS, plus meeting the future regulatory requirements, plus greater emphasis in asset management and preserving the existing system. For this analysis, a new program area was included, Asset Inventory and Management to reflect a growing need and priority as described above under Section 4.2.

The following table summarizes the general framework for the level of service for each program area. The specific elements within each level of service are discussed in Section 5. Section 5 also considers cost because each level of service has an associated cost, and so requires a unique rate to generate revenues sufficient to cover that cost. Rates for each level of service are discussed in Section 6.

Table 4-2:
Level of Service Alternative Analysis Framework

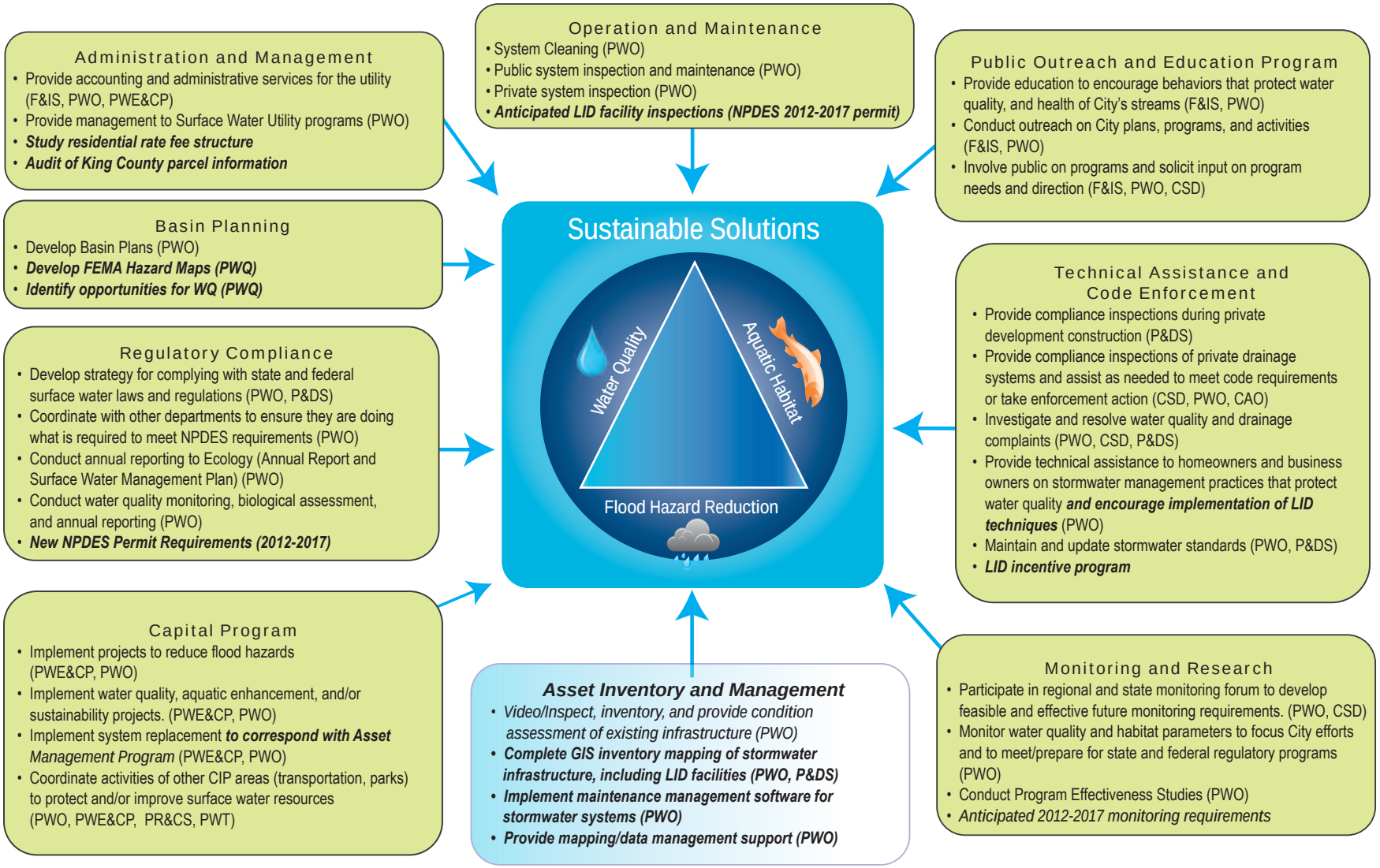
Utility Programs	LOS 1	LOS 2
Operation and Maintenance Public Outreach and Education Technical Assistance and Code Enforcement Monitoring and Research Asset Inventory and Management Capital Program Regulatory Compliance Basin Planning	Current Program Plus Meet Anticipated Future Regulatory Requirements (such as the future anticipated NPDES Phase II permit) and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system and maximize their useful life)	Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service, with particular emphasis in water quality improvement.

4.5 Proposed Relationship Between Goals and Programs

In Section 2, a figure (Figure 2-2) was presented that describes a summary of the current Utility programs and provides examples of activities within each program as well as other City department involved in those activities. Taking into account the proposed program goals and the addition of a new program for Asset Inventory and Management, this figure was updated as Figure 4-1 and reflects these changes and proposed new program elements (highlighted in color). Like Figure 2-2, this figure also indicates which City departments are involved in the various activities.

Figure 4-1

Existing and Proposed Surface Water Relationship Between Utility Goals, Programs, and City Departments



Legend:

CAO – City Attorney's Office
CCO – City Clerk's Office
CMO – City Manager's Office
CSD – Community Service Division
F&IS – Financial and Information Services
PR&CS – Parks Recreation & Cultural Services
P&DS – Planning & Development Services
PWT – Public Works - Transportation
PWE&CP – Public Works – Engineering & Capital Projects
PWO – Public Works – Operations (includes Surface Water Utility, Fleet & Property Management and Roads Maintenance)

• ***Bold - Indicates new proposed programs and/or activities from 2005 plan***

Note: For each activity, contributing departments are shown in parentheses.

CITY OF SHORELINE

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Section 5
PROGRAM LEVEL OF SERVICE ANALYSES TO MEET UTILITY GOALS AND CITY COUNCIL GOALS

5.1 Introduction

This section includes an evaluation of level of service (LOS) alternatives for the Utility's primary activities in order to achieve the Utility's goals for flood hazard reduction, water quality protection/improvement, and stream/wetland aquatic enhancement, as well as to meet the City Council goals described in Section 3. For each of the major program components within the Utility, staff examined two level of service alternatives to be delivered by the Utility. The two levels of service are referred to as Level of Service 1 (LOS 1) and Level of Service 2 (LOS 2).

LOS 1 is generally defined as providing the current LOS, plus meeting the future regulatory requirements and placing a greater emphasis in asset management and maintenance of the existing system. As noted in Section 4, increasing the emphasis on asset management and preserving the existing surface water infrastructure is considered a high priority by Utility staff and the City Council.

LOS 2 is generally defined as exceeding future NPDES Phase II regulatory requirements plus expanding Utility programs to provide a higher level of service, particularly in the area of protection and improvement of water quality.

Since expanding the Utility's program to meet future NPDES requirements is mandatory, having a stand-alone alternative that reflects what the Utility provides now under the current LOS was not considered a viable option.

It is noted that this analysis was conducted based upon the anticipated future NPDES Phase II permit requirements as currently presented in draft form (See Section 3). It is possible that the final permit requirements could vary from this analysis. Should the final permit requirements significantly differ from the current draft form, the Utility should revisit this analysis.

The following sections include the LOS analysis for each of the Utility's major programs. The existing activities under each of the SWM programs are briefly described. Summary tables are used to compare the LOS alternatives for each program. The identification of what each LOS included was developed by Utility staff with input from the consultant team. The cost implications for increasing the LOS are evaluated in Section 6 as a part of the Financial Analysis Section.

5.2 Operations and Maintenance (O&M)

5.2.1 Existing Program

The Utility's current SWM O&M program has been designed to meet the current NPDES permit requirements and to ensure the continuing functionality of the drainage system. The Utility has 4.25 maintenance staff and also contracts out certain maintenance activities, including street sweeping, annual ditch maintenance, annual and emergency catch basin cleaning (vactoring), emergency storm drainage repair, etc. The maintenance staff is part of the Street Maintenance Division.

The maintenance activities that are required by the NPDES permit and provide water quality benefits include vactoring of catch basins, maintenance of stormwater detention and water quality treatment systems. Street sweeping also provides water quality benefit although it is not required by the permit. Some of the other primary activities include ditch reshaping, roadway shoulder reconstruction and maintenance, and dredging of Hidden Lake. In addition, the Utility's maintenance staff provides emergency repairs in such cases as when there is damage from a flood event.

5.2.2 O&M Program Level of Service Alternatives

Table 5-1 summarizes the elements of the two "level of service" alternatives for the O&M program. LOS 1 generally includes the current program plus added elements to meet future NPDES requirements as well as address other program needs. A major change in overall SWM program is an increased emphasis on asset management and maintenance of the existing surface water infrastructure. Section 4 includes a summary of the benefits of an asset management program. LOS 1 for the SWM O&M program includes the following elements that would also support an asset management program:

- Purchase of asset inventory/management software. The cost for the purchase and training of the software is approximately $200,000. However, this cost will be covered by a one-time Ecology Capacity Grant that will be used for this purchase.
- Implementation of real-time telemetry for all of the City's stormwater pump stations to better understand and manage their operation.

In addition, LOS1 would include other O&M elements associated with successful implementation of LID and other sustainability measures such as tree canopy preservation through the Green Works Program. The increase in the program elements can be accommodated at the existing staffing levels for this program area, assuming that there will be added staff time for the new asset inventory and management program (discussed later in this section).

LOS 2 contains the same elements as LOS 1 and also includes increased maintenance frequencies for street sweeping to further improve water quality. More street sweeping would result in additional removal of sediment that accumulates on roads before they enter the drainage system. LOS 2 would also include updating the condition assessment and analysis every 10 years. The Utility currently devotes

approximately 0.6 FTE to street sweeping. Implementation of LOS 2 would increase the street sweeping effort by 0.4 FTE to 1.0 FTE.

Table 5-1:
O&M - Level of Service Summary

LOS 1 - Current Program Plus Meet Anticipated Future Regulatory Requirements and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system)	LOS 2 - Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service
Current Program: Maintain current O&M program including: ■ Annual city owned catch basin inspection & maintenance (approximately 1/3 of system per year) ■ Ditch inspection & maintenance (16,000 lineal feet /year) ■ Street sweeping (about 3,000 lane miles/year) currently 0.6 FTE ■ Water quality facilities: Inspection/maintenance to meet current regulatory requirements ■ Maintain new infrastructure as it is constructed Additional Program Elements: ■ Update maintenance practices/frequencies to meet future NPDES requirements (note that these are not yet fully defined because the permit is in draft language form) ■ Update existing asset inventory software to meet identified conditions assessment and maintenance schedule needs (cost estimated at $200k one-time cost for software purchase and implementation that is paid for by Ecology Capacity Grant) ■ Develop Green Works inspection and maintenance practices to meet new LID facility requirements (vegetation management, soil replacement) ■ Increase efficiency of pipe cleaning program resulting from video inspection program element of Asset Inventory and Management and additional inspection above. ■ Develop sustainable approaches for minimizing maintenance ■ Develop and maintain telemetry for all pump stations (5 new ones for a total of 7 with a one-time cost of $50k) Staffing Summary: No increase in staffing for this program area, however, assumes new FTE supporting Asset Inventory and Management program would provide support to this program.	LOS 1 plus the following elements: ■ Increase street sweeping from 0.6 to 1.0 FTE (add 0.4 FTE, no new equipment) ■ Update condition assessment and analysis every 10 years (average cost of $90k/year) Staffing Summary: Add 0.4 FTE (maintenance staff)

5.2.3 Recommended Program

LOS 1 is recommended for the O&M Program. This option helps achieve both the goals and new directions of the Utility in terms of meeting future regulations, and emphasizes preservation of the existing infrastructure while balancing the desire to keep utility rates low by avoiding new costs.

5.3 Public Outreach and Education

5.3.1 Existing Program

The goals of public outreach and education activities are to address flooding, water quality and/or quantity issues and projects to improve the general environmental quality of life in the community through education or other techniques. In addition to meeting these goals, the existing program was tailored to be in compliance with the current NPDES Phase II permit requirements.

The following table summarizes some of the current public outreach and education programs and lists the goal and/or behaviors promoted.

Table 5-2:
Existing Public Outreach and Education Programs

Item	Goal and/or Behaviors Promoted
Surface Water and Environmental Services Website	Provide for easily accessible information to the citizens of Shoreline about the Utility and its programs (including Green Works) and goals and activities. The educational and informational materials provided are intended to reduce contaminants entering the storm drain system through behavioral changes.
Earth Day Every Day/Natural Yard Care Event	Promotion of natural yard care tools that help maintain lawns and gardens without chemical application and car washing techniques that minimize the amount of pollutants washed down storm drains.
"Environmental Mini-grant" Program	Provides small grants for local non-profits, businesses, youth and community groups that want to implement environmental projects to benefit the Shoreline community.
Storm Drain Stenciling Program	Awareness; prevention of illicit discharges and other non-stormwater materials into the stormwater system; resident participation by involvement of citizen organizations and residents in the storm drain labeling process.
Clean and Green Car Wash Program	Awareness; Reduction of vehicle wash water entering the storm drain system.
NPDES Construction Stormwater General Permit informational Focus Sheet available via the City's stormwater website and through flyers at the Planning and Development front counter	Awareness; Prevention of discharge of sediment laden runoff and non-stormwater materials into the stormwater system.
Private drainage system inspection and technical assistance	Awareness; to educate private property owners that they are responsible for the maintenance of private systems, and reduce discharge of sediment and uncontrolled high flows into the public stormwater system; private flow control and water quality facilities that were required facilities at time of permit are eligible for a SWM fee discount if the systems are maintained based on City inspection.
Source control technical assistance	Work with businesses to develop practical methods of reducing or eliminating illicit discharge and other non-stormwater materials into the stormwater system.
City Hall tour of the facility's Stormwater Low Impact Development facilities	Raise awareness of stormwater impacts and ways that citizens can reduce these impacts.

In addition, the City participates with several other local jurisdictions in efforts to conduct focus group studies aimed at developing stormwater education campaigns and determining the effectiveness of those campaigns. These regional interjurisdictional groups include Salmon Recovery Group (WRIA 8), and the SOGGIES (Stormwater Outreach Group) which aim at developing regional stormwater education campaigns and helping to identify appropriate program evaluation techniques. As part of SOGGIES, the City of Shoreline recently provided funds to support educational advertisements that are displayed on the exterior of local buses. Shoreline has also been an active participant in the STORM (Stormwater Outreach for Regional Municipalities) group.

The City has also recently sent out a water quality survey to those who requested the car wash kits. Results from this survey will be evaluated to determine the benefits of some of the City's educational programs.

The City tracks education and outreach efforts, and informally assesses costs verses benefits. Utility staff conducted a self assessment of their efforts as a part of the SWMP Update. While the City does implement a number of programs listed above and is in compliance with the NDPES permit, areas of improvement have been identified including the storm drain stenciling program and the implementation of an "adopt-a-storm drain" program to have greater linkage between stormwater and its impact on water quality in downstream receiving waters.

5.3.2 Public Outreach and Education Program Level of Service Alternatives

The following table provides a summary of the levels of service for Public Outreach and Education (Table 5-3). LOS 1 includes the existing program plus some enhanced elements, mostly to increase the linkage between stormwater and water quality, including the adopt a storm drain program, commercial outreach program for best management practices and a pet waste program. Utility staff believes that these more focused efforts could be accomplished at existing staffing levels (i.e., no increase in program costs) by being more focused on program efforts.

The LOS 2 option for this program includes the LOS 1 programs plus additional efforts to further expand the efforts on water quality. Table 5-3 lists the various increased elements. LOS 2 would require an estimated 0.35 FTE in resources. Currently, the Utility funds 0.65 FTE for Public Outreach and Education, so that this LOS would result in one full time equivalent funded by the Utility.

Table 5-3:
Public Outreach and Education - Level of Service Summary

LOS 1 - Current Program Plus Meet Anticipated Future Regulatory Requirements and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system)	LOS 2 - Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service
Current program includes several public outreach and education elements that help educate Citizens about stormwater, including; ■ Maintain Surface Water and Environmental Services Website ■ Earth Day Every Day/Natural Yard Care Event ■ "Environmental Mini-grant" Program ($20k SW fund –native replanting, volunteering; $15k General Fund) ■ Storm Drain Stenciling Program ■ Clean and Green Car Wash Program ■ NPDES Construction Stormwater General Permit informational Focus Sheet available via the City's stormwater website and through flyers at the Planning and Development front counter ■ Source control technical assistance booths and displays at various special and on-going events ■ City Hall tour of the facility's Stormwater Low Impact Development facilities Added or enhanced program elements include: ■ Adopt a storm drain program ■ Pet Waste Program ■ Increased program on business outreach on BMPs (mostly source control) ■ Develop program to encourage and promote stewardship along improved rights-of-way ■ Promote tree preservation and retention as stormwater management ■ Collaboration with Shoreline Community College and Shoreline School District related to monitoring on Boeing Creek ■ Green Works Program Outreach to residents Staffing no increase in staffing. Increase program with existing resources.	LOS 1 plus the following additional or enhanced elements: ■ LID Incentive Programs (e.g., pay for permits where applicant wants to implement LID, pay for portion of rain barrels) (need cost of rain barrel program) (estimated at a non-labor limit of $50k) ■ Develop other tours of LID facilities including Green Works, Green Streets, and other City owned facilities (parks, schools, trails). ■ Increase education on tree retention and preservation. Include resources for increasing tree canopy related to stormwater management. ■ Increase outreach of flood risks and flood insurance to flood vulnerable areas ■ Develop basin specific outreach and education programs. These would be implemented as basin plans completed. An example is implementing a "community planting program" where high temperature is a water quality concern and there is a lack of riparian shade. ■ Increase environmental mini-grant annual allocation for water quality and surface water related projects from $20k to $40k. Staffing: Add 0. 35 FTE to make one full time Utility funded staff.

5.3.3 Recommended Program

At a minimum LOS 1 is recommended. To implement a higher level of service the City would require additional staff. While LOS 2 would provide a higher level of service, it would require additional staff resources under this program area. In

comparison with other priority needs of the Utility, LOS 1 is preferred as it reflects the desire to keep utility rates low by avoiding new costs.

5.4 Technical Assistance and Code Enforcement

5.4.1 Existing Program

A primary goal of Utility-provided technical assistance activities is to ensure that appropriate stormwater measures are implemented as part of development, redevelopment, and construction projects or that illegal discharges to the stormwater do not occur. This includes a permitting process to review plans and inspect sites during construction. When measures are not being properly implemented, the City takes corrective action to assist the violator in the resolution of the problem. If the violator does not heed the City's assistance, Shoreline Municipal Code Chapter 13.10 provides for progressive enforcement actions and penalties. This code was updated in 2009 to meet NPDES Permit requirements. The update included the adoption of Department of Ecology's 2005 Stormwater Management Manual for Western Washington. The City provides training and outreach to the public including residents, business owners, engineers and developers on the new codes, processes and procedures.

In addition, the City provides internal training for staff on new revised regulations, standards, processes and procedures to ensure that the permit requirements are being met. It is noted that the majority of these services are currently performed by the City's Planning and Development Services Department using funds from outside the Utility.

5.4.2 Technical Assistance and Code Enforcement Program Level of Service Alternatives

An important consideration in the development of LOS alternatives for this program is the pending update to the NPDES Phase II permit (described in Section 3). A significant change in the permit includes requirements for (and associated inspections) of Low Impact Development (LID) best management practices (BMPs) as a part of new and/or redevelopment. LID BMPs include splash blocks, rain gardens, porous surfacing such as pervious asphalt or concrete, etc. Therefore, LOS 1 was developed with this in mind and includes additional technical training and materials to Planning and Development Services (PADS)/Parks/Transportation on LID and sustainable design, additional staff time for public and private LID inspections/training as more LID systems come on line, and additional staff time to provide technical assistance to citizens/businesses about LID. The anticipated increase in resources for this LOS is 0.5 FTE.

LOS 2 was developed to include enhanced and/or new elements to increase the program and provide further benefit toward water quality. It includes all of the LOS 1 elements plus: increasing inspections for development projects to increase code compliance; providing additional staff resources with GIS expertise to respond to

City/developer requests for information; the development of guidelines to promote the best uses of right-of-way to enhance water quality and habitat; and an incentive program to encourage business to implement maintenance programs (for the ones not currently required). The estimated cost impact of this LOS is 0.75 to 1.0 FTE above current levels plus estimated costs of up to $50k for commercial business incentive programs.

A summary of the LOS alternatives for this program area is provided in Table 5-4.

Table 5-4:
Technical Assistance and Code Enforcement - Level of Service Summary

LOS 1 - Current Program Plus Meet Anticipated Future Regulatory Requirements and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system)	LOS 2 - Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service
Technical Assistance and Code Enforcement	
Maintain current program. Current program contains elements designed to meet NPDES requirements. Some of these elements include: ▪ Adopting updated surface water design standards and general special provisions to meet regulatory requirements ▪ Training and outreach to the public, including engineers and developers on the new codes, processes and procedures ▪ Internal staff training of revised regulations ▪ Code enforcement activities (currently reactive to complaints or problems) ▪ Private drainage system inspection and technical assistance ▪ Plan review of public works projects (with private projects reviewed by PADS) ▪ Responding to questions and providing assistance related to questions on private drainage Note: majority of these services are currently performed by the City's Planning and Development Services Department using funds from outside the SWM Utility. Added or enhanced program elements would include: ▪ Provide technical training and materials to PADS/Parks/Transportation on LID and sustainable design (consultant) ▪ Anticipate additional staff time for public and private LID inspections/training as more LID systems come on line ▪ Additional staff time to provide technical assistance to citizens/businesses about LID ▪ Anticipated additional staff time for code enforcement associated with maintenance inspections/IDDE Staffing: Additional 0.5 FTE (Surface Water Engineer)	LOS 1 plus the following elements: ▪ Strengthen code enforcement (by increasing inspections for development projects and commercial facilities) ▪ Additional staff with GIS expertise to respond to City/developer requests for design guidance ▪ Develop guidelines for best uses of right-of-way to enhance water quality and habitat (including private utilities as franchise agreements renewed) ▪ Incentive program to encourage business to implement maintenance programs (for the ones not currently required)(estimate costs up to $50k in non-labor costs) Staffing: Additional 0.25 to 0.5 FTE (Surface Water Engineer) above LOS1

5.4.3 Recommended Program

The minimum LOS 1 is recommended by staff. While LOS 1 includes an increase in staffing, this recommended increase above the current program will be necessary to comply with the future anticipated NPDES requirements. LOS 1 is considered the minimum level of service needed to meet these requirements. While LOS 2 would provide a higher level of service, it would require additional staff resources under this program area. In comparison with other priority needs of the Utility, LOS 1 reflects the desire to keep utility rates low by keeping the added new costs to a minimum.

5.5 Monitoring and Research

5.5.1 Existing Program

Shoreline currently has monitoring and research activities and programs that were designed to meet the current NPDES Phase II requirements. The current compliance activities include:

- participation in a regional and state monitoring forum to develop feasible and effective future monitoring requirements as an alternative to those proposed in the current (2007-2012) NPDES Permit
- preparation for future comprehensive long-term monitoring of both stormwater and of Stormwater Management Program (SWMP) Effectiveness. Stormwater monitoring is intended to characterize stormwater runoff quantity and quality at a limited number of locations in a manner that allows analysis of loadings and changes in conditions over time and generalization across the permittees' jurisdictions. SWMP effectiveness monitoring is intended to improve stormwater management efforts by evaluating issues that significantly affect the success of, or confidence in, stormwater controls. To comply with this part of the permit, the Utility;
  - Identified two outfalls (representing commercial and high-density residential land uses) where permanent stormwater sampling stations could be established.
  - Documented why these stormwater sampling sites were selected

The Utility's efforts in this area have actually exceeded the permit requirements to include an ongoing sampling program at several locations (See Figure 2-3). In addition to meeting the NPDES requirements, the City implements several programs to monitor the quality of the City's waters. The City monitors basic water quality in streams year round on a monthly basis. During the summer months, approximately May through September, the City participates in three additional monitoring programs.

- King County Swimming Beach Program - A weekly sampling program that alerts the City to any potential health risks associated with swimming at Echo or Hidden Lakes.
- King County Small Lake Stewardship Program - A bi-weekly program that involves collecting and analyzing water quality at Echo Lake.

- Department of Ecology Toxic Algae Monitoring Program – A bi-weekly program designed to alert the City if algae present in Echo Lake is producing microcystin toxins that may be harmful to humans or pets.

If any health risks are determined as a result of these monitoring programs, signs are posted at the site to inform the public.

5.5.2 Monitoring and Research Program Level of Service Alternatives

As previously noted in Section 3, there is a regulatory shift in the philosophy for future water quality monitoring that will be required in the anticipated future NPDES permit. The preliminary draft language proposes a collaborative, regional approach to stormwater monitoring throughout western Washington. The proposed structure includes a coordinated monitoring program based on shared costs among permittees, with Ecology acting as the service provider to administer contracts. This proposed approach removes specific monitoring requirements from the permits and relieves individual permittees of the obligation to individually conduct monitoring activities. Ecology indicates that the benefits for a regional approach are:

- Feedback on improvements in water quality in receiving waters,
- Regionally consistent methods to collect comparable and valid data,
- A repository of information on pollution sources, and
- Transferable studies of the effectiveness of specific stormwater program activities.

Ecology has developed some preliminary cost sharing allocations. On a preliminary basis, the costs to the Utility are estimated at $37,591 per year ($13,327 for status and trends monitoring, $22,205 for effectiveness monitoring, and $2,059 for source identification monitoring). This cost would be paid directly to Ecology.

With this change in the anticipated monitoring requirements, Utility staff proposed that the LOS 1 option include the current monitoring effort plus the required participation in the regional monitoring efforts. Thus, the above costs to Ecology would be the only added cost for this LOS. No additional staffing would be required. It is noted that there may be some opportunities in the future for the Utility's current monitoring program to be eligible to receive funds to conduct parts of the regional monitoring program, but this is uncertain at this time.

LOS 2 was developed to enhance the Utility's monitoring program to provide additional information on water quality and LID. It would include the LOS 1 elements plus, developing a pilot program for LID techniques that are not widely used in the City (such as commercial green roofs and stormwater reuse), coordinating with the Shoreline School District and Shoreline Community College for LID research projects, incorporating a monitoring program for various LID techniques on private and public property, expanding the IDDE source tracking of problems to be more proactive than reactive; installation of flow monitoring gauges of major streams (N Fork Thornton, Boeing, MacAleer, and Ballinger Creeks); and automated water quality monitoring (i.e. temperature, etc) to replace taking field samples. Note that

automated monitoring would be expected to provide additional data for the same amount of effort as field sampling. This level of service would result in the need for an anticipated 0.5 FTE staff over LOS 1.

A summary of the LOS alternatives for this program area is provided in Table 5-5.

Table 5-5:
Monitoring and Research - Level of Service Summary

LOS 1 - Current Program Plus Meet Anticipated Future Regulatory Requirements and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system)	LOS 2 - Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service
Monitoring and Research	
Maintain current program. Elements include: ■ Participation in regional and state monitoring forum to develop feasible and effective future monitoring requirements ■ Identified two outfalls for future monitoring ■ Water quality annual reporting to meet regulatory requirements ■ water quality monitoring of surface waters. ■ Coordination with School District and Shoreline Community College for monitoring programs ■ Conduct Program Effectiveness Studies Added or enhanced program elements would include: ■ NPDES permit required Regional Water Quality Monitoring efforts (estimated at $$37,591 per year thereafter) Staffing: No increase in staffing. Increase program with existing resources.	LOS 1 plus the following elements: ■ Develop pilot program for LID techniques that are not widely used in the City (commercial green roofs, stormwater reuse) ■ Coordinate with School District and Shoreline Community College for LID research projects ■ Incorporate a monitoring program for various LID techniques on private and public property (estimated at $20k/year for consultant costs) ■ Expand IDDE source tracking of problems ■ Flow monitoring gages of major streams (N Fork Thornton, Boeing, MacAleer, and Ballinger Creek) ■ Automated water quality monitoring (i.e. temperature, etc), expected to provide additional data for the same amount of effort Staffing: Additional 0.5 FTE (Surface Water Engineer)

5.5.3 Recommended Program

The minimum LOS 1 is recommended by staff. While LOS 1 includes an increase in program costs for the regional monitoring, this recommended increase above the current program is the minimum necessary to comply with the future anticipated NPDES requirements. While LOS 2 would provide a higher level of service, it would require additional staff resources for this program area. In comparison with other priority needs of the Utility, LOS 1 is preferred as it reflects the desire to keep utility rates low by keeping the added new costs to a minimum.

5.6 Asset Inventory and Management

5.6.1 Existing Program

The Utility's existing asset inventory and management program is described as reactive and/or opportunistic replacement of surface water infrastructure. Reactive replacement occurs as a result of system component failure, such as a culvert failure. Opportunistic replacement occurs during a roadway restoration or other public works project, when the Utility can replace a storm drain during planned construction and avoid (or share) in the cost of restoration. This is referred to as opportunistic because the Utility is able to replace some infrastructure without having to fund the entire project cost.

The current program is not considered viable for managing the stormwater infrastructure into the future. With much of the City's infrastructure nearing the end of its useful life (See Section 4.2), the Utility recognizes the need for implementing an asset inventory and management program.

5.6.2 Asset Inventory and Management Program Level of Service Alternatives

The Utility recognizes the need to move toward more formal and proactive asset management. The initial steps to building a functioning asset management program include data gathering and documentation of an inventory and condition assessment. A condition assessment would be the first "building block" of the future asset management program. The Utility considers this the minimum level of service to build a functioning full fledged asset management program in the future and as such defined it as LOS 1. The objective would be for the Utility to perform inventory and conditions assessment of the entire storm drain system within the next five years. This information would allow the Utility to better proactively schedule repairs and replacements of existing infrastructure. This information would also be of value to determine if replacement should occur as part of other City projects such as a road improvement project. This method of managing an aging infrastructure would allow work to be done in a more cost effective manner.

Under this LOS, the Utility would initiate a data collection program over the next five years as part of the development of surface water basin plans to position the Utility to implement asset management program for the entire trunk drainage system. It would include the following elements; inventory and condition assessment including TV storm drains 12-inches and larger and all pipes arterials; updating GIS inventory mapping including LID facilities; conducting software analysis to select and implement updated maintenance management software (including training); adding staff to focus on updating mapping and asset inventory data base and begin interpreting data; and improving the Utility's system of updating mapping/records from development and capital projects.

The Utility estimates that an added 1.0 FTE is necessary to implement this program. It is noted that it will be important that this FTE have specialized technical background in stormwater engineering and experience that support asset management such as finance, scheduling, GIS mapping, and cost estimating.

For the LOS 2 option, Utility staff did not consider a significant increase in program elements above LOS 1 since this will be a whole new program area for the Utility. The LOS 2 option includes LOS 1 plus maintaining and updating information of the City's tree canopy. Maintaining a tree canopy to the extent possible in urban areas reduces stormwater runoff peaks and volumes.

A summary of the LOS alternatives for this program area is provided in Table 5-6.

Table 5-6:
Asset Inventory and Management - Level of Service Summary

LOS 1 - Current Program Plus Meet Anticipated Future Regulatory Requirements and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system)	LOS 2 - Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service
Current program includes reactive and/or opportunistic replacement of infrastructure (e.g., reactive to failure or opportunistic to replace infrastructure as part of other public works projects) Added or enhanced program elements would include: Initiate a data collection program over next five years as part of basin plans to position the Utility to implement Asset Management program for entire trunk drainage system. Include the following elements: ■ Inventory and condition assessment including TV storm drains 12-inches and larger and all pipes arterials ($800-900K; assume to occur over five-year period) ■ Update GIS inventory mapping including LID facilities ■ Conduct software analysis to select and implement updated maintenance management software (including training) ■ Add staff to focus on updating mapping and asset inventory data base and begin interpreting data (specialized expertise/skill set), including update basin plan hydraulic models ■ Add staff time with specialized expertise in asset management/finance ■ Add GIS mapping expertise associated with any new FTE ■ Improve system of updating mapping/records from development and capital projects ■ Collect and record information about improvements and new facilities beginning in 2012. Staffing: Additional 1.0 FTE (Surface Water Engineer).	LOS 1 plus the following elements: ■ Maintain and update tree canopy information Staffing: No increase above LOS 1. Additional effort would be covered with the 1.0 FTE in LOS

5.6.3 Recommended Program

The minimum LOS 1 is recommended by staff. While LOS 1 includes an increase in staffing, the current program is not considered viable into the future. While LOS 2 would provide a slightly higher level of service, it would add to the responsibilities of initiating a whole new program area. The tree canopy element of LOS 2 is considered a lower priority that could be added to the program in the future as the asset management program is established.

5.7 Capital Program

5.7.1 Existing Program

The existing capital program has made extensive accomplishments since the 2005 Plan, particularly in the area of flood hazard reduction of the critical flooding problems. Completion of these capital improvements that has substantially reduced the number of drainage complaints the City receives. The current program has included an average of $1.5 million per year to solve critical flooding problems since 2005, and to a much lesser extent water quality problems, and stream/wetland enhancements.

5.7.2 Capital Program Level of Service Alternatives

In defining the elements of the LOS 1 for the capital program, Utility staff recognizes the program direction shift by the City Council to emphasize preservation of the existing system through asset management and maintenance over capital construction of new facilities. This shift in emphasis was discussed in Section 4.3. In addition, the pending NPDES Phase II requirements will place increased demands on the Utility as a whole for permit compliance. As a consequence, Utility staff proposes that the LOS 1 include a modest reduction in capital spending in comparison to past years. This could be implemented with a reduced level of spending on major flooding projects and a modest increase in small works projects with an overall result net reduction in spending. In addition, the Utility could maintain the current level of spending on water quality projects as well as maintain the current level of spending on aquatic enhancement projects.

The currently proposed CIP budget adopted by the City Council in early 2011 reflects this level of spending. Table 5-7 shows the adopted 2011 capital program.

Table 5-7:
Surface Water Utility 2012 – 2017 Capital Improvement Plan[1]

Project Estimates	2012	2013	2014	2015	2016	2017	Total
Flood Protection							
Culvert Replacement Near 14849 12th Ave NE	$170,600						$170,600
Pump Station No. 25	$394,625						$394,625
Ronald Bog Flood Plain Project							$0
Meridian Park Wetland Drainage Improvement	$250,390						$250,390
Surface Water Small Projects	$200,000	$200,000	$225,000	$225,000	$275,000	$279,000	$1,404,000
North Fork Thornton Creek LID Stormwater Retrofit	$197,000	$593,000					$790,000
Water Quality Facilities							
Surface Water Management Green Works Projects	$200,000	$200,000	$175,000	$115,000	$125,000	$185,000	$1,000,000
Stream / Wetland Enhancement							
Boeing Creek Reach 1 and 8 - Bank Stabilization			$0	$100,000	$0	$0	$100,000
Green (Shore) Streets Initiative			$0	$0	$0	$0	$0
Stream and Habitat Restoration Program	$100,000	$100,000	$100,000	$100,000	$120,000	$120,000	$640,000
Total Cost	$1,512,615	$1,093,000	$500,000	$540,000	$520,000	$584,000	$4,749,615

[1]These are specifically capital construction projects (and do not include programs/basin plans).

LOS 2 for the capital program was defined as an enhanced capital program to increase the level of service in all areas of flood protection, water quality and stream/wetland enhancement. LOS 2 would include an increase level of funding ($100,000/year) to solve flooding problems, and an increased level of funding for stand-alone water quality, sustainability, and/or aquatic stream/wetland enhancement type projects. Note that since many of the major flooding problems have been addressed, this level of funding to solve flooding could include improvements to address flooding problems that are less severe than the critical projects completed since 2005 (i.e. small drainage projects).

A summary of the LOS alternatives for this program area is provided in Table 5-8.

Table 5-8:
Capital Program - Level of Service Summary

LOS 1 - Current Program Plus Meet Anticipated Future Regulatory Requirements and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system)	LOS 2 - Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service
Capital Program	
Current program has included an average of $1.5 million per year to solve critical flooding problems, and to a much lesser extent water quality problems, and stream/wetland enhancements. The change from the current program would include a reduced annual capital program CIP spending to reflect that many of the major flooding problems have been corrected and future CIPs will not get identified until completion of basin plans. This LOS would include; ▪ Reduced level of spending on major flooding projects and spend more on small works flooding with overall net reduction in spending. ▪ Maintain current level of spending on water quality projects ▪ Maintain current level of spending on aquatic enhancement projects as part of other projects. Staffing: No increase in staffing.	Enhance capital program to increase level of service in all areas of flood protection, water quality and stream/wetland enhancement. This LOS would include; ▪ Increase level of funding to solve flooding problems. Since many of the major flooding problems have been address, this may include improvements to address flooding problems that are less severe ▪ Increased level of funding for stand-alone water quality and/or sustainability type projects (Green Streets/Green Works) ▪ Increased level of funding for stand-alone aquatic stream/wetland enhancement projects where stormwater has impacted stream ▪ Initiate proactive program for loans/grants (additional staff time and training) ▪ Added staff time/skill set (design) for implementing CIPs and LID projects ▪ Increased focus on system replacement to correspond to Asset Management program (until an asset condition assessment is completed) Staffing: No increase in staffing. Utility staff believe the additional elements could be accomplished at existing staffing levels. Increase in capital spending (over LOS1): $100,000/year.

5.7.3 Recommended Program

The minimum LOS 1 is recommended by staff. LOS 1 closely reflects the current capital program recently adopted by the City Council in 2011. It also reflects a modest reduction of capital spending on infrastructure projects compared with years since 2005. However, this is appropriate given the shift in emphasis to preservation of the existing system through asset management and system maintenance. A further reason is that during the next several years, the Utility will gain a much better understanding of the capital infrastructure needs after completion of the basin plans and asset condition assessments. After these studies, the Utility will be in a better position to fully understand system wide needs and priorities.

5.8 Basin Planning

5.8.1 Existing Program

The current program includes conducting basin plans as resources and funds are available, approximately one basin plan every two years. Between 2005 and 2009, the Utility had not placed much emphasis in basin planning. The first basin plan, Thornton Creek Watershed Plan, was completed in late 2009. Even so, the Thornton Creek Watershed Plan did not include an asset inventory, which is currently a high priority of the City. The Utility has recently started the initial investigations of the Boeing Creek/Storm Creek Basins Plan.

5.8.2 Basin Planning Program Levels of Service Alternatives

The 2005 SWMP heavily relied on prior documents and readily available information to identify problems without performing detailed examination of the drainage systems. The Utility has been transitioning to a Basin Plan approach that will provide detailed drainage system assessments, floodplain mapping, and asset inventory about the major drainage basins in the City. The basin plans will look at the portions of each watershed that are located within the city limits as a whole and use an integrated process to evaluate and address problems related to flooding, water quality, and aquatic streams/wetlands.

Utility staff defined LOS 1 option for basin planning as a more aggressive schedule to complete all remaining basin plans during the next 4 year period. In addition, the basin plans shall be conducted more in depth and include: asset inventory and condition assessment (as part of the new asset inventory program); public involvement to identify individual needs within each basin; hydrologic/hydraulic modeling in addition to floodplain modeling of stream reaches where there are potential flood damage risks to structures and/or new developing areas; problem identification (flooding, water quality, aquatic stream/wetland enhancements); identification of locations for Green Works/LID projects, as well as retrofit opportunities and opportunities to improve drainage within Parks and Transportation corridors/projects; and finally a prioritized list of recommended capital projects and programs specific to the basin.

In terms of resource needs for this LOS, Utility staff anticipate that the additional work would be accomplished by the proposed new 1.0 FTE for the proposed new asset inventory and management program area. This 1.0 FTE would initially support the basin plan development in the next few years in addition to the development of the asset management program.

Under the LOS 2 for basin planning, the Utility would conduct all the proposed basin plans over next 4 years as with LOS 1 plus an increased the effort to identify and evaluate sustainability/green opportunities. Utility staff identified the following elements that could be included under the LOS 2 option; tree canopy analysis including inventory in each basin; incorporating LID facilities in basin hydrologic/hydraulic modeling (which would typically include more costly hydrologic modeling analysis than LOS 1); and identifying additional measures to sustain existing resources in each basin (open space, tree canopy, ditch and swale system). In terms of additional resources for LOS 2, Utility staff anticipated that staffing needs would be similar to LOS 1 (since most of the work would contracted to engineering consultants), however, there would be an additional $100,000/basin for the increased technical effort.

A summary of the LOS alternatives for this program area is provided in Table 5-9.

Table 5-9:
Basin Planning - Level of Service Summary

LOS 1 - Current Program Plus Meet Anticipated Future Regulatory Requirements and Increased Emphasis on Asset Management (i.e., take additional steps to preserve investment in existing system)	LOS 2 - Exceed Future Regulatory Requirements and Expand Utility Programs to Provide a Higher Level of Service
Basin Planning	
The current program includes conducting basin plans as resources and funds are available, approximately one basin plan every two years. Change from current program would include completing the basin plans on a more aggressive schedule (remaining basins in 4 years) and expanding the scope of the basin plans. The basin plans should include: ■ Asset inventory (as discussed above) ■ Public involvement ■ Hydrologic/hydraulic modeling ■ FEMA floodplain modeling of select stream reaches ■ Problem identification (flooding, water quality, aquatic habitat) ■ Identify locations for Green Works/LID projects, and retrofit opportunities in all areas of the basin including and opportunities with Parks and Transportation ■ Capital and program identification Staffing: No increase in staffing. The additional work would be accomplished by the proposed new 1.0 FTE for Asset Management. This 1.0 FTE would initially manage basin plan development in next few years then transition to Asset Management in subsequent years.	Under this LOS, Utility would conduct basin plans for all basins over next 4 years as well as increase the effort to identify and evaluate sustainability/Green opportunities: ■ Tree canopy analysis including inventory in each basin ■ Incorporate LID facilities in basin hydrologic/hydraulic modeling ■ Identify measures to sustain existing resources in each basin (open space, tree canopy, ditch and swale system) Staffing: No increase in staffing. Same as LOS 1. Financial Impact: Estimated at $100k/yr basin over LOS 1.

5.8.3 Recommended Program

The minimum LOS 1 is recommended by staff. LOS 1 closely reflects the current capital program (that includes basin plans) recently adopted by the City Council in 2011. It reflects the current priority emphasis to complete basin plans on a more aggressive schedule than the current program without increasing cost compared to LOS 2 in order to keep rates low.

Once completed, the basin plans will provide a higher level of detail on stormwater operational, maintenance, and capital needs within each basin and will provide regulatory, programmatic and capital recommendations to meet these needs. The basin plans will also identify applicable low impact development (LID) and green infrastructure approaches, in addition to conventional approaches, to meet the flooding/drainage, water quality and aquatic stream/wetland needs of the system.

The following table (Table 5-10) provides a listing of priorities for basin plan implementation. Appendix A includes an example scope of work as well as a draft table of contents for the future basin plans. A goal of the Utility is that the basin plans can be conducted in a consistent reporting format to allow easy interpretation as well as easy integration into the next city-wide update to this master plan.

Table 5-10:
Basin Plan Priorities for Implementation

Basin Priority	Basin	Primary Concerns	Rationale
1	Boeing/Storm Creek (begins Fall 2011)	Erosion/Water Quality	Largest basin with complete management within City limits
2	MacAleer Creek	Water Quality	Second largest basin in City and has regional importance to implementation of Lake Ballinger/ McAleer Creek Basin strategy
3	Lyons/Ballinger Creek	Drainage/Water Quality	Smaller drainage in Shoreline with drainage, habitat and water quality issues
4	Middle Puget Sound	Water Quality	Smaller basins that drain directly to Puget Sound

5.9 Administration and Management

5.9.1 Existing Program

Accounting and administrative support services to the SWM program are provided by a number of different City departments, and include budget and financial administration and management, policy development and leadership, administrative support, vehicle maintenance, building maintenance, accounting, purchasing, and human resources, and management of the various Utility programs. SWM fees are collected by King County and remitted to the City.

5.9.2 Recommended Program Service

Utility staff did not conduct a level of service analysis for the Utility's administration and management program area. Rather, Utility staff identified a few specific needs that should be addressed within the next few years and prior to the next surface water master plan update. These are described below.

- Future study of residential rate structure. During a prior presentation to the City Council on September 26, 2011, an issue was raised about whether a fixed ESU (equivalent residential unit) cost was appropriate for all single family residential lots. The issue is that some individual lots are much more highly developed (i.e., greater impervious surfaces that increase runoff rates and volumes) than others, so they would have a corresponding increase in surface water impacts. The question is whether the Utility should consider increasing the fees applied to residential lots that are more highly developed or conversely have a credit to parcels that are less developed. This policy analysis was considered beyond the scope of this master plan update, so Utility staff recommends that this policy be addressed in a future targeted policy study.
- Audit of King County Parcel Information. The City provides all parcel and billing classification to the King County Water and Land Resources Division and the King County Department of Assessments. King County uses this information to collect SWM fees on behalf of the City, but the County does not review or check any of the data supplied. It has been a number of years since the City's information has been checked, and some parcel information changes over time (such as a short plat). Utility staff recommends an audit of parcel and rate classification information to confirm that it is accurate.

5.10 Summary of Recommended Program

The recommended level of service is one that balances SWM Utility needs over the next six years and the desire to minimize the financial impacts to the residents and businesses of Shoreline.

The recommended level of service, LOS 1, reflects the minimum necessary programs to meet future pending NPDES requirements and meet the City Councils direction to

place greater emphasis in the asset management and maintenance of the existing surface water infrastructure.

In defining the LOS 2 option for each program area, Utility staff evaluated an option that would exceed the anticipated regulatory standards and include elements in each program area that would further the improvement of water quality. As shown in Section 6, SWM fee impacts for LOS 2 are significantly higher compared with LOS 1. As a result, Utility staff recommends implementation of LOS1 for all program areas.

Another factor in selecting LOS 1 is that during the next five-year period, the Utility will be collecting significant information about the future needs throughout the City after completing the basin plans and asset condition assessments. After compiling and assessing all of this data, the Utility will have much better information to prioritize needs and reassess SWM fees. In addition to recommending LOS 1 for all of the program areas, the following is a list of other recommendations to guide the Utility during the next five years.

- Continue to support and implement green infrastructure (e.g., Green Works Projects)
- Continue to emphasize practices (both in Utility operations and capital project implementation) to select methods and materials to conserve energy and reduce the carbon footprint
- Consider and implement emerging technologies (particularly those focused on LID) as appropriate and include provisions to assess performance of these technologies
- Develop more formal guidelines on the use of Utility funds for Stream/Wetland enhancement projects (See Section 4)
- Adopt formal decision guidelines regarding the use of Utility funds for work on private property (see recommended draft in Appendix C)
- Continue to pursue grant funds for capital projects and Surface Water Utility programs
- Conduct a future study of the residential SWM fee structure (See discussion above under Section 5.9).
- Conduct an Audit of King County Parcel Information. (See discussion above under Section 5.9).

6.1 Introduction

This section includes a financial analysis for the City's surface water management (SWM) program that consists of:

- A description of Shoreline's existing SWM fee schedule
- The results of a short-range financial projection for the City's SWM program, including the possible financial impacts of two level of service (LOS) alternatives
- A SWM fee comparison with 22 other local jurisdictions

The two LOS alternatives adjustments are described in Sections 4 and 5 and the recommendations for the preferred LOS alternative is described in Section 5.9 . The operation and maintenance (O&M) and Capital program details are found in Section 5.

Appendix E contains more detailed financial information.

6.2 Financial Analysis

6.2.1 Existing Fee Schedule

In 2011, the Shoreline City Council adopted the SWM fee schedule shown in Table 6-1. The SWM fee for single-family residences in the City is $130 per parcel per year. Multifamily and commercial users are charged an annual fee on a per-acre basis that depends on the percentage of impervious surface.

Table 6-1:
2011 Surface Water Management Fees

Category	Annual Fee	Percent Impervious Surface	Revenue
Single-Family Residences	$130/parcel		$2,061,524
Other Customers			
Very Light	$130/parcel	Less than or equal to 10%	$2,346
Light	$302/acre	10% to 20%	$20,843
Moderate	$625/acre	20% to 45%	$164,107
Moderately Heavy	$1,212/acre	45% to 65%	$135,920
Heavy	$1,535/acre	65% to 85%	$250,327
Very Heavy	$2,011/acre	85% to 100%	$564,147
			$3,199,214

The City also charges a six percent utility tax which is in addition to the SWM fees shown in Table 6-1. Exemptions and discounts to the SWM fee are available for several categories of customers. Homes occupied by low-income disabled and low-income senior citizens can qualify for an exemption. Discounts are available for parcels with officially designated open space.

A 50 percent SWM fee discount is available to property owners in the Residential, Light, and Very Light categories that maintain an on-site retention/detention facility. The SWM fees shown in Table 6-1 do not apply to the City's rights-of-way.

Figure 6-1 compares Shoreline's SWM fees with those of 22 other local SWM utilities. The example annual bill is for a single-family residence.

6.2.2 Equivalent Service Units

The equivalent service unit (ESU) concept provides a way to consider the entire drainage system in terms of an equivalent number of single-family residences. In this financial analysis, an ESU is defined as a single-family residence and the number of ESUs is determined in terms of the amount of revenue collected through SWM fees. For 2011, the City has budgeted total revenue from SWM fees to be $3,199,214. The estimated number of ESUs is 24,600, calculated by dividing the total SWM fee revenues by the single-family residential SWM fee ($130 per parcel per year).

Use of ESUs is a way to quickly approximate the financial impacts of proposed expenditures. A $1 per year per ESU SWM fee increase would fund an annual expenditure of $24,600.

6.2.3 Six-Year Financial Projection Model

A revenue and expense financial projection model was developed to provide an accurate six-year projection of the sources and uses of the SWM fund for the two level of service alternatives. The financial model shows how the level of service alternatives would affect the amount of funds available for capital expenditures. Further detail of the financial projection model can be found in Appendix E.

From an accounting perspective, the SWM Utility maintains two funds: the SWM Operations fund (Department 27) and the SWM capital fund (Department 30). Both funds were analyzed as part of this projection.

A number of policy assumptions provide direction in preparing this financial projection model:

- SWM utility fees are required to pay for the recommended level of service
- There should be an increased focus on asset management activities under both LOS alternatives
- Minimum SWM Fund balance is 20 percent of operating expenditures. This means that most of the existing $4,269,000 in SWM Fund balances can be used to pay for capital projects

- Financial policy target: minimum SWM Capital Fund balance is >$0
- All capital is funded from use of the SWM Utility's existing reserves or SWM fees. No additional debt service is projected, although this section contains a discussion of the circumstances under which the City may want to consider issuing debt in the future.

Additional O&M expense assumptions are:

- O&M spending consists of current expenditures (from 2011 budget) plus the O&M adjustments for LOS 1, LOS 2 and the General Fund Cost Allocation expenses. Section 5 contains a summary of the LOS categories and the added staffing levels and costs for each category.
- Most other O&M spending increases with inflation at 2.75 percent per year which factors in estimated future inflation and system growth.

The financial projection model includes a number of other assumptions, which are described below. The assumptions represent the best data currently available, and should be expected to change over time. The projected SWM fees are intended to show the financial consequences of implementing either level of service alternative over the next six years. The projected SWM fees do not represent a commitment by the City to adopt the fees; the City regularly evaluates the financial condition of its SWM utility to make policy decisions regarding services to be provided and the required level of SWM fees.

The financial projection model is a spreadsheet-based model. Revenues, consisting primarily of SWM fees, were projected, as were O&M expenditures. SWM fee revenues were projected to provide revenues sufficient to cover expenses and meet the City's financial policy targets, which are also described below.

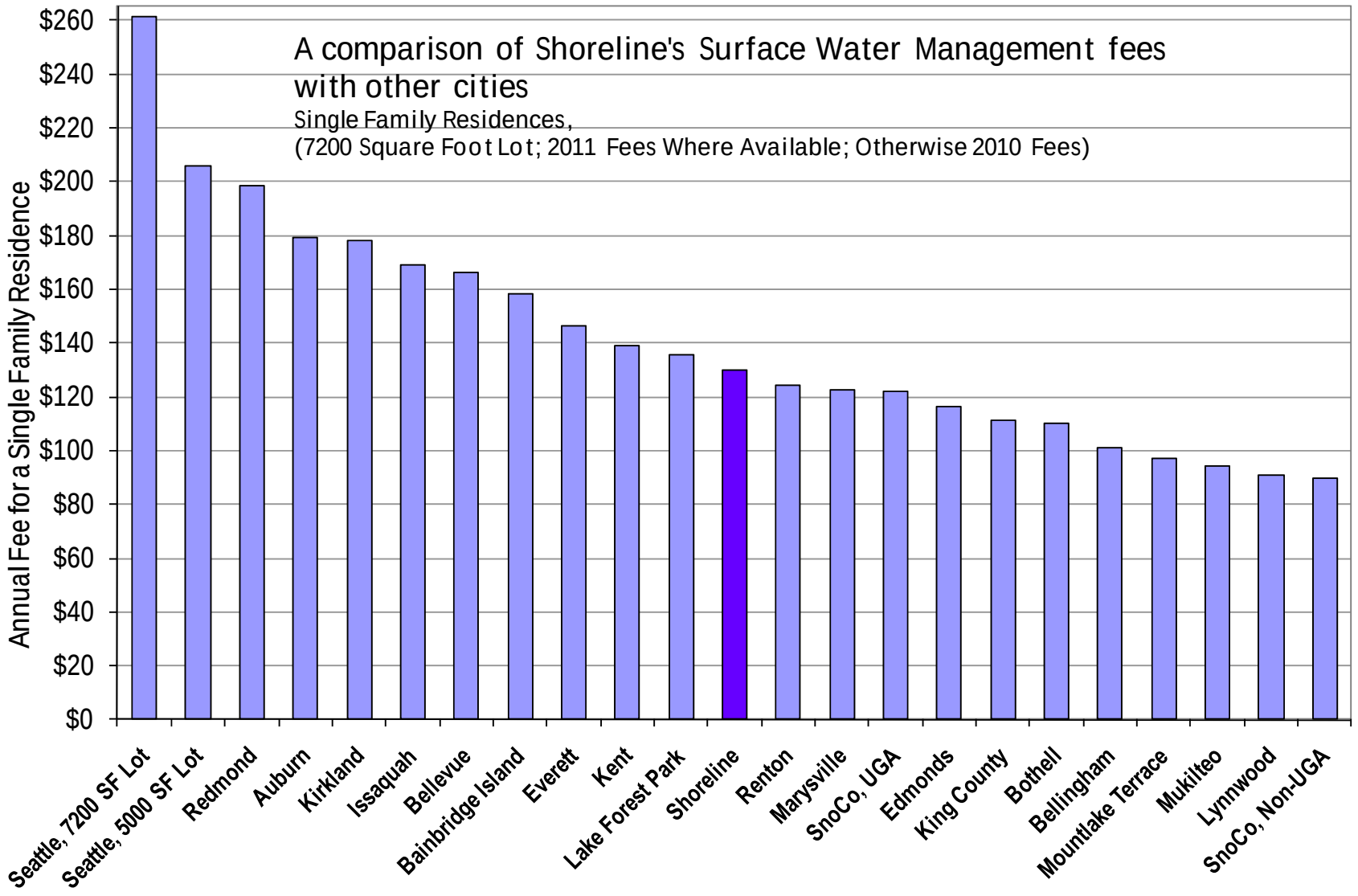

Figure 6-1: Single Family Residential SWM Fee Comparison

Capital Spending Assumptions

- Six-year total, in 2011 Dollars, of $9,622,220 (for LOS 1) and $10,222,220 for (LOS 2) is the amount available for capital projects, as shown in Appendix E.
- The amount available from Capital Projects must cover all Surface Water CIP expenditures (Department 30). This includes:
  - Construction costs
  - Transfers out, which includes the CIP portion of the General Fund Cost Allocation (GFCA)
  - Personnel costs charged to capital projects
  - Capital project formulation costs charged to Surface Water Management
  - Professional Services incurred in the CIP
  - Basin Planning @ $150,000/yr
  - Asset Inventory and Management
- Capital project costs in future years are adjusted for inflation at 2.5 percent per year

Capital Funding Assumptions

- 2.5 percent annual inflation
- No annual system growth
- The additional General Fund Cost Allocation percentage is calculated from the City's 2011 GFCA and O&M Costs and assumed to be 15 percent of LOS categories
- The City is actively pursuing grant funding and is anticipating $640,000 of grant funding over the next six years. Most of this is from the Ecology Stormwater Retrofit Grant.
- Fund balances and debt reserve balances earn 3 percent interest

Other Funding Assumptions

- Section 5 includes other cost increases for both LOS alternatives and program activities (including both staffing increases and annual cost increases). These costs are noted in Tables 5-1, and 5-3 through 5-6, 5-8, and 5-9.
- The anticipated cost to the City for participating in the regional monitoring program was taken from the May 2011 Draft version of the NPDES Phase II Permit language, which included up to $21,000 for the first two years of the permit and up to $54,000 for the remaining years. A new version of the Draft permit was issued in November 2011. The anticipated cost to the City of Shoreline was reduced to $37,591 per year throughout the permit cycle. This change was not made to the Rate Model because it would have a negligible effect on the results.

6.2.4 Projected SWM Fees

The projected SWM fees for the both LOS alternatives are shown in Table 6-2. The table also identifies the percent increase from the previous year's fee and the amount of money that is available to use for capital expenditures. The end of year reserve balance is shown to make aware that the City will be gradually using the balance for various capital projects. This table also compares the SWM fee for LOS 1 and LOS 2 with the six-year projection of SWM fees for a single-family residence using the City's 2012-2017 adopted CIP.

Table 6-2:
Projected SWM Fees and Dollars Available for Capital Expenses

		Projected					
		2012	2013	2014	2015	2016	2017
1	Single Family Residential 2012-2017 Adopted SWM Fee, $/year	$133	$137	$141	$146	$150	$154
2	Single Family Residential SWM Fee, $/year (LOS 1)	133	137	141	146	151	159
3	% Increase/year (LOS 1)	2.50%	3.00%	3.00%	3.00%	4.00%	5.00%
4							
5	$ Available for Capital Expenses	$1,719,208	$1,763,842	$1,816,071	$1,810,150	$1,522,082	$990,868
6							
7	End of Year Reserve Balance	$3,769,640	$3,269,640	$2,269,640	$1,269,640	$619,640	$619,640
		Projected					
		2012	2013	2014	2015	2016	2017
1	Single Family Residential 2012-2017 Adopted SWM Fee, $/year	$133	$137	$141	$146	$150	$154
2	Single Family Residential SWM Fee, $/year (LOS 2)	138	146	155	163	172	172
3	% Increase/year (LOS 2)	6.00%	6.00%	6.00%	5.50%	5.00%	0.00%
4							
5	$ Available for Capital Expenses	$1,819,208	$1,863,842	$1,916,071	$1,910,150	$1,622,082	$1,090,868
6							
7	End of Year Reserve Balance	$3,778,190	$3,272,140	$2,253,920	$1,341,700	$841,930	$703,360

Figure 6-2 also graphically compares the LOS alternatives and LOS SWM Fees with the recently adopted CIP budget. It shows that LOS 1 fees remain the same until 2016, whereas LOS 2 adjustments would begin increasing the SWM fee beginning in 2012 and stabilizing in 2016.

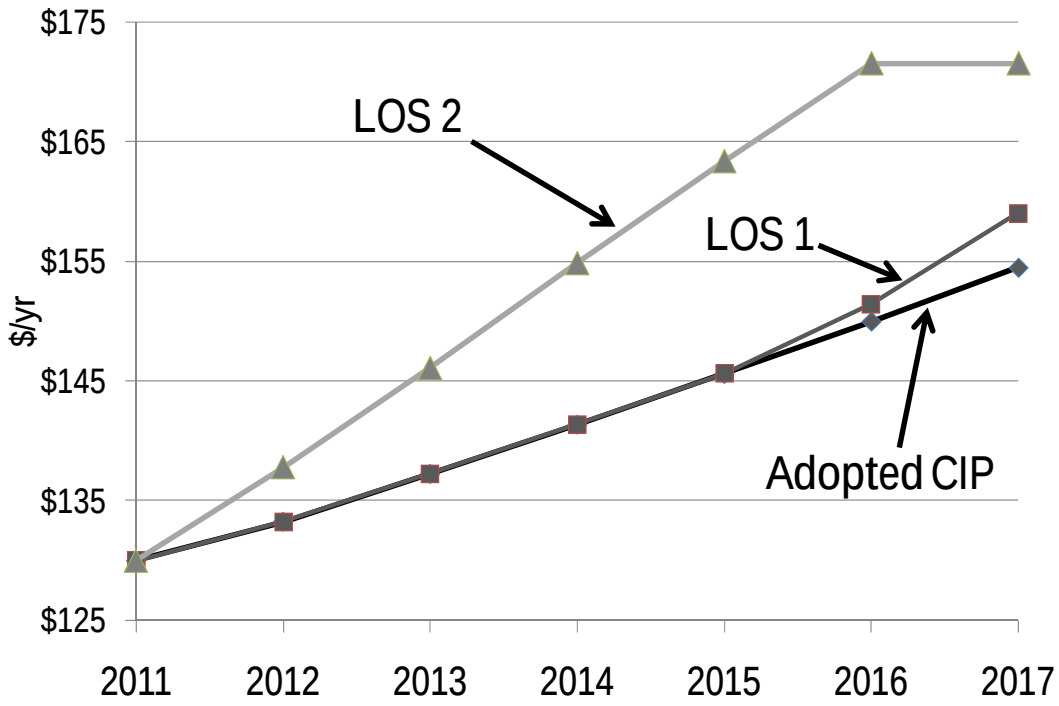

Figure 6-2: Six-year Projection of SWM Fees

The SWM Fees for LOS 2 are significantly higher than LOS 1. For this reason, as discussed in Section 5, Utility staff recommended LOS 1 as the preferred alternative. LOS 1 balances SWM Utility needs over the next six years and the desire to minimize the financial impacts to the residents and businesses of Shoreline.

To further illustrate the recommended level of service (LOS 1), Figures 6-3 and 6-4 on the following page compare the SWM Utility Program with respect to their funding for the current level of service and the recommended level of service, respectively. Comparing both figures together presents a clear picture as to how the SWM Utility programs will change from its current level of service. For example, while the debt remains constant, the capital construction funds will be reduced for LOS 1. In addition, the City recognizes that an Asset Inventory and Management program, further explained in Section 5, should be created to address the City's infrastructure that is nearing the end of its useful life. The Basin Planning program will also have a more aggressive schedule and take on more detail as described in Section 5. The specific changes to O&M are also described in Section 5 and require an increased effort to meet changing regulatory requirements.

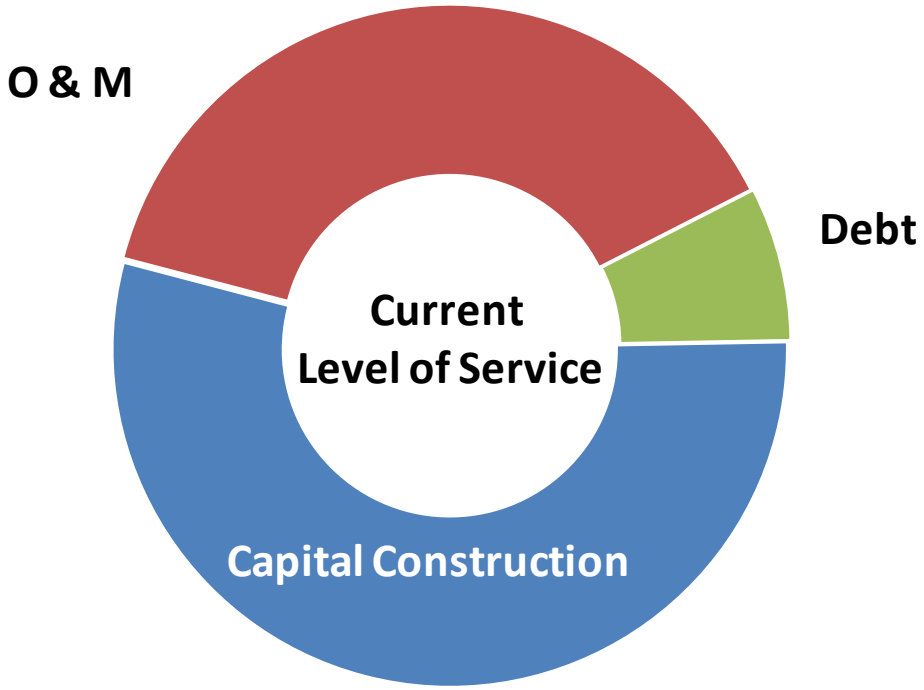

Figure 6-3: Current Level of Service of SWM Utility Program

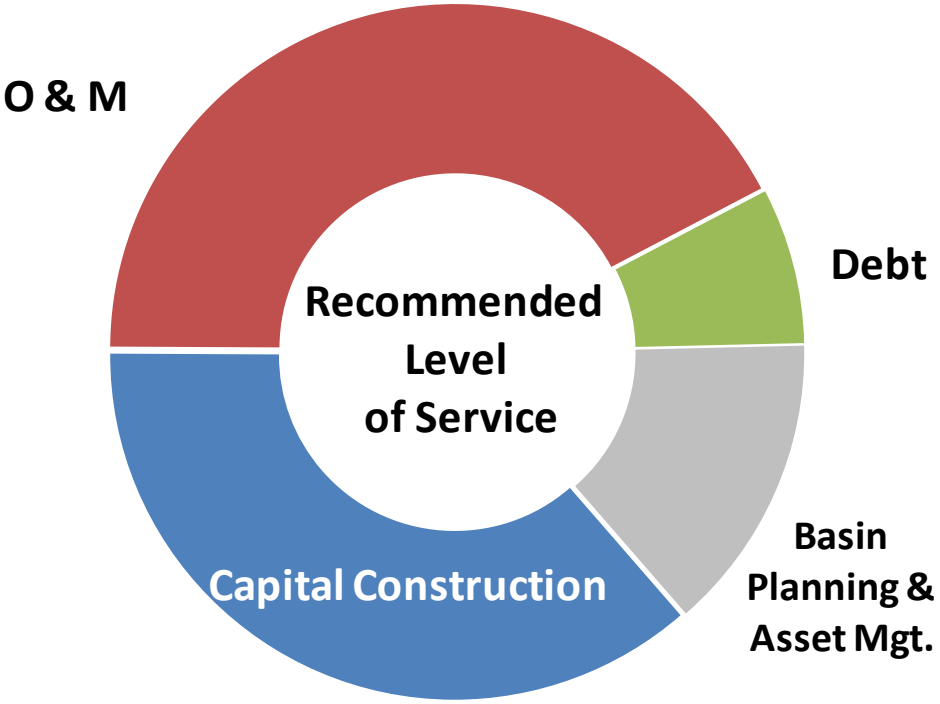

Figure 6-4: Recommended Level of Service for SWM Utility Program

6.2.5 Ongoing Financial Considerations

Use of Debt:

Most utilities use debt as one tool for capital project financing. The SWM Utility is no exception. In 2007, the City obtained a Public Works Trust Fund (PWTF) loan for improvements in the Ronald Bog area. The recommended financial plan in this SWMP Update does not include future use of debt within the next six years. Utility circumstances do change over time, however, and there are some potential circumstances that may warrant future consideration of debt.

- The SWM fee increases described in this SWMP Update are not adopted by the City Council. Concurrent with the adoption of this SWMP Update is the adoption of a 2.5 percent SWM fee effective in 2012. Additional SWM fee increases are proposed each year through 2017, but they require council action to take effect. If they are not adopted, then the Utility must delay capital, cut back on operating expenses and reduce SWM services, or issue debt.
- The basin plans identify the need for substantial capital improvements. The projected rates and capital improvement spending identified in this SWMP Update do not include funding for capital projects that may be identified in the basin plans. Depending on how fast the City wants to complete future capital projects, additional SWM fee increases and/or future use of debt may be required.

If future use of debt is considered, the City would continue to look for low-interest rate loans such as the PWTF, which is currently offering construction loans with interest rates between 0.5 percent and 2.0 percent. If PWTF or other similar loans are not available, the SWM Utility may want to consider revenue bonds, with current interest rates of approximately 6 percent over a 20-year term.

Through 2017, and given the projected SWM rates shown in Table 6-2, the SWM Utility has the capacity to fund an additional $6 million in capital improvements.

Use of debt prior to 2017 means that the SWM utility could pay for more capital in the next six years. However, the ongoing annual debt service (estimated to be approximately $740,000 per year) will continue for 20 years. Using debt means that the Utility can fund additional capital earlier, but won't be able to fund as much capital over the long-term.

When assessing future debt, a parameter called the Debt Service Coverage Ratio (DSCR) is important. The DSCR characterizes the amount of money available to pay debt service. The exact definition can vary, but is generally the ratio of "net revenues" (equal to total revenues less operation and maintenance expenses) divided by revenue bond debt service. This analysis of future debt service is based on a minimum DSCR of 2.0.

Other considerations:

The ability of the SWM program to finance capital improvements depends in part on the level of SWM fees. If SWM fees higher than those described above were implemented, then additional capital improvements could be funded. Conversely, if SWM fees are not raised to the levels described above, fewer capital improvements could be funded.

The following additional factors could also facilitate completion of a greater amount of capital improvements:

- Receipt of additional low interest rate loans (the recommended plan assumes loans would be obtained with a 6.0 percent interest rate)
- Loans with longer payback periods (the recommended plan assumes a 20-year payback period)
- Use of other, non-SWM funding sources such as impact fees, local improvement districts (LIDs) or partnering with other government and non-government entities on projects (the recommended plan assumes no additional funding sources).

Section 7
SURFACE WATER UTILITY PERFORMANCE MEASURES

This section describes performance measures to assess the Surface Water Utility's progress toward meeting the objectives outlined in Section 4 and recommendations in Section 5. Performance measures are organized by the Utility's program area. The purpose of identifying performance measures is to recognize the need to change program direction if performance measures are not being met. The performance measures discussed in this section will be assessed on an annual basis by the Utility, so that program adjustments can be made, if necessary.

The type of performance measure (e.g., quantitative or qualitative) varies between program areas. In some instances, physical measurement can be taken to provide quantitative data. In other instances, performance is evaluated simply by comparing recommended work elements in this plan with the actual work elements completed. In general, performance measures for each program area are divided into either implementation (typically one-time implementation of a new program element) or to more quantitative Key Performance Indicators. Key Performance Indicator (KPI) is an industry term for a type of measure of performance commonly used by an organization to evaluate its success or the success of a particular activity in which it is engaged. Some performance measures have a target deadline (year) within the 6-year planning time frame. It is understood however, that the time scale to achieve progress toward surface water goals can take many years to achieve noticeable improvements to surface water quality or aquatic habitat.

Some of these performance measures will also need to be reported to Ecology in the Annual Report, as required by the NPDES permit.

7.1 Operations and Maintenance (O&M)

The performance measures for the O&M will be largely based on comparing the maintenance activities scheduled for each infrastructure type versus what was accomplished. In particular, the following paragraphs present some of the key performance measures in this program area.

Implementation Measures

- Purchase and implementation including training of asset inventory software (by end of 2012)
- Implement telemetry for all pump stations (by end of 2013)

Annual Key Performance Indicators

- Inspection of 1/3 City-owned catch basins per year and maintaining those exceeding the maintenance threshold. Document sediment levels in order to build a database with which to assess needed frequency of catch basin cleaning. In this way, future maintenance frequencies can be adjusted based on need rather than set by a regulatory standard. This can also be used to identify sources of problems.

- Street sweeping of 3,000 lane miles/year.
- Number of inspections (planned and unplanned) of all City water quality facilities and maintenance of those when the threshold is exceeded (including Green Works and Green Streets facilities).
- Percentage of annually planned inspections completed.
- Ditch maintenance of 16,000 lineal ft/yr.
- Number of inspections of applicable private systems and percent passing maintenance inspections.
- Number of annual maintenance work orders completed.
- Number of drainage work orders completed that were not part of annual maintenance.

Note that maintenance frequencies may need to be adjusted to meet any new frequency requirements in the pending NPDES permit.

7.2 Capital Projects

This program includes capital projects to reduce flood hazards, protect and improve water quality, and enhance aquatic stream/wetland areas that are impacted by surface water runoff. Section 5 includes a CIP summary showing implementation over the six year planning period. The performance measures for the capital projects will be to compare the projects completed versus recommended in this plan. Some shifting of projects from year to year is possible due to a number of factors influencing project implementation. Some examples of these factors include permit acquisition, land or easement acquisition if necessary, and timing projects to be coordinated with other projects. It is also noted that the CIP will likely be updated on the biennial budget process starting in 2012.

Annual Key Performance Indicators

- Number of drainage projects completed.
- Number of water quality projects (including LID/ Green Works) completed.
- Number of stream/wetland enhancement projects completed.

The Utility should keep track of projects that benefit more than one program area. For example, a drainage project may also provide water quality benefits.

7.3 Asset Inventory and Management

The asset inventory and management program will be a new program area within the Utility. The performance measures for the asset inventory and management program will be largely based on comparing the recommended activities in this plan versus what was accomplished. In particular, the following paragraphs present some of the key performance measures:

Implementation Measures

- Development and implementation of asset management software system that meets the needs of the Surface Water Utility.
- Implementation of an inventory and condition assessment program (typically as part of basin plans at roughly 1 basin per year including the Thornton Basin).
- Update GIS inventory mapping including LID facilities (including Green Works and Green Streets Facilities) as a part of basin plans.
- Utility staff have been trained to apply new asset inventory software (by 2012).
- Utility has hired an [1.0] FTE (by 2012).
- Utility has defined a more formal process for updating mapping/records from development and capital projects (by 2013).

Annual Key Performance Indicators

- Lineal feet of storm drain assets inventoried.
- Lineal feet of drainage system updates to the Utility's GIS infrastructure mapping and a comparison with this length to the of overall drainage system infrastructure length.
- Number of facilities including LID/Green Works (treatment/detention) inventoried.

7.4 Public Outreach and Education

The City's public outreach and education programs are somewhat mature in that there are a number of ongoing programs designed to education and foster behaviors that protect the environment. A recommendation of this SWMP Update is to add and/or enhance programs that provide a more direct link between public outreach and education to protection and improvement of water quality. The implementation performance measures for this program are focused on comparing the actual program areas implemented versus recommended. These include:

Implementation Measures

- Adopt a storm drain program
- Pet waste program
- Increased program on business outreach on BMPs
- Program to encourage and promote stewardship along improved rights-of-way
- Program to promote tree preservation and retention
- Development of a LID/Green Works webpage that highlights the LID stormwater facilities in the City

The City should implement these individually throughout the planning period (assuming a target of at least one program per year).

Annual Key Performance Indicators

- Number of "adopt a storm" drain participants.
- Number of car wash permits
- Number of stenciled or "buttoned" catch basins

7.5 Technical Assistance and Code Enforcement

A primary goal of Utility-provided technical assistance activities is to ensure that appropriate stormwater measures are implemented as part of development, redevelopment, and construction projects; illegal discharges to the stormwater system do not occur; and that private stormwater facilities are being maintained. This program area will certainly be impacted during the planning period as a result of the pending update to the NPDES Phase II permit (described in Section 3). A significant change in the permit is greater emphasis in requiring (and inspecting) LID BMPs as a part of new and/or redevelopment. It is noted that many of these services are currently performed by the City's Planning and Development Services Department using funds from outside the SWM Utility.

The implementation performance measures for this program are focused on comparing the actual program element implemented versus recommended. Some of these include:

Implementation Measures

- Adding 0.5 FTE staff to support these program area efforts (by 2014).
- Adopting new surface water design standards to meet regulatory requirements as they become modified, likely in 2012.
- Updating drainage standard plan designs, where necessary to be consistent with new standards.
- Updating the City Engineering Design Guidelines and Special Provisions, where necessary to be consistent with new standards.
- Providing technical training and materials to PADS/Parks/Transportation on LID and sustainable design.
- Implementing training and outreach to the public, including staff, engineers and developers on the new codes, processes and procedures.

Key Performance Indicators

- Number of development projects requiring stormwater review.
- Number of water quality code enforcements.
- Number of service requests where technical assistance is provided.
- Number of investigations (and initial responses) to all non-emergency (i.e., non-spill related) water quality and drainage complaints.

- Number of investigations (and initial responses) to emergency (i.e., spill related) water quality events and documenting the response time to abate the emergency.

7.6 Regulatory Compliance (NPDES Permit)

The regulatory compliance program involves interdepartmental strategies to meet state and federal regulations that affect the City. The primary regulation is the NPDES Phase II regulation which is scheduled to be updated in 2013 (See Section 3). There is a current draft of the permit language and the changes are largely focused on monitoring and low impact development requirements. Since the permit is not finalized, the performance measurements for this program area should include some flexibility to allow for changes in the permit requirements.

The performance measures for this program are focused on comparing the actual program element implemented versus recommended. Some of these are listed below. In addition, the City must perform annual reporting to the Department of Ecology on compliance with the NPDES permit. This will continue to be a requirement in the new permit.

Implementation Measures

- Continuing the City illicit discharge detection and elimination program (IDDE).
- Performing required training for staff in several program areas (IDDE, construction inspection, LID, etc.).
- Reviewing the incorporation of LID into City codes and design standards and begin to address any barriers to LID (e.g., existing codes, lack of design standards, staff resources).
- Coordinating with other City departments to ensure that other departments are meeting NPDES requirements
- Continue to participate in implementation of the WRIA 8 Chinook Salmon Conservation Plan.
- Track changes and modifications to state and/or federal surface water regulations, and evaluate City compliance with such regulations (target compliance timeframe of within 60 days of regulatory changes).

Annual Key Performance Indicators

- Number of implementation deadlines did not meet (specifically according to the questions contained within the annual report to Ecology). The target is zero.
- Number of meetings with other City departments to review permit compliance. The target is 2 per year with each department.

7.7 Monitoring and Research

The recommended elements of the monitoring and research area have largely focused on meeting NDPES requirements as well as monitoring the biological (Benthic Index of Biotic Integrity (B-IBI)) and water quality of the City's streams. These monitoring programs can be implemented over time to assess changes in B-IBI and water quality index scores and determine if conditions are changing. For example, the City's State of the Water Quality in Shoreline Streams, Lakes and Wetlands report (2009, City of Shoreline) (see Section 2) indicated that between 2002 and 2009, there has been modest improvement in water quality and biotic integrity. In addition, the 2007 Bioassessment Report (The Watershed Company, 2009, See Section 2) attempted to document any identifiable positive or negative trends in the ecological health of the City's stream systems between 2003 and 2007, but the survey did not detect any large changes in stream habitat over time.

As noted above, such changes are likely slow to occur over time, however the City should continue these efforts during the next planning period.

As a part of the future NDPES permit modifications, the City will be required to contribute a dollar amount for the regional monitoring effort.

The implementation performance measures for this program include the following:

Implementation Measures

- Continuing participation in regional and state monitoring forum activities.
- Water quality annual reporting to meet regulatory requirements.
- Continued water quality monitoring of surface waters on an annual basis and complete an update to the 2009 Water Quality in Shoreline Streams, Lakes and Wetlands report before the end of the planning period.
- Contribute to Regional Water Quality Monitoring efforts (estimated at $21k for 2013 and 2014 and $52k annually thereafter).

5-year Key Performance Indicators

- B-IBI and water quality index scores and comparison to historical values.

7.8 Basin Planning

The City has been transitioning to a basin plan approach that will provide detailed system assessments, floodplain mapping, and asset inventory. The basin plans will include a comprehensive analysis of existing conditions and focus on flooding, water quality, and stream/wetland enhancement. They will be done to provide a higher level of detail on stormwater operational, maintenance, and capital needs within each basin and will provide regulatory, programmatic and capital recommendations to meet these needs. The basin plans will also identify applicable low impact development and green infrastructure approaches, in addition to conventional approaches, to meet the water quality and habitat needs of the system.

The implementation performance measures for this program include the following:

Implementation Measures

- Complete the Storm Creek/Boeing basin plan (by end of 2012).
- Complete the MacAleer Creek basin plan (by end of 2013).
- Complete the Lyons/Ballinger Creek basin plan (by end of 2014).
- Complete the Middle Puget Sound basin plan (by end of 2015).
- Basin plan documentation is developed in a systematic and consistent way so that the information is more readily usable.
- The basin plans reflect the individuality of each basin and include specific recommendations targeted to the needs of the each basin.
- Basin plans include low impact development analysis.

Section 8
REFERENCES

City of Shoreline, *Bioassessment Report Biological and Habitat Assessment of Shoreline Stream,* 2007.

City of Shoreline, *Comprehensive Plan,* 2005.

City of Shoreline, *Stream Assessment Report,* 2009.

City of Shoreline, information from the City of Shoreline Planning and Development Services website, 2011.

City of Shoreline, personal communication with Jesus Sanchez and Brian Landau of the City of Shoreline, November 8, 2010.

GASB (Governmental Accounting Standards Board), *Statement No. 34, "Basic Financial Statements – and Management's Discussion Analysis – for State and Local Governments,* 1999.

IPCC 2007. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge, United Kingdom, 1000 pp.

R. W. Beck, Inc., *Thornton Creek Watershed Plan,* 2009.

Tetra Tech/KCM, *City of Shoreline Boeing Creek Basin Characterization Report,* 2004.

Tetra Tech/KCM, *City of Shoreline McAleer Creek and Lyon Creek Basin Characterization Report,* 2004.

Tetra Tech/KCM, *City of Shoreline Middle Puget Sound, Seattle Golf Club and Bitter Lake Basins Characterization Report,* 2004.

Tetra Tech/KCM, *City of Shoreline Thornton Creek and West Lake Washington Basins Characterization Report,* 2004.

University of Washington, University of Washington Climate Impacts Group, December webinar, 2010.

USEPA (United States Environmental Protection Agency), *The Clean Water and Drinking Infrastructure Gap Analysis*, 2002.

Appendix A
EXAMPLE BASIN PLAN SCOPE

APPENDIX A

Introduction and Background

This example basin plan scope of work is taken from the actual scope of work between the City of Shoreline and Consultant Consulting for the Storm and Boeing Creek Basin.

The scope of work describes the approach and associated tasks for completing surface water basin plans for Storm and Boeing creeks. The City is interested in completing basin plans for all of the remaining major surface water drainages within Shoreline to develop a comprehensive understanding of infrastructure conditions, programmatic tools for managing stormwater, and capital project needs. These first two basins were selected because of their size (Boeing Creek basin is the largest basin in the City), and/or issues (Storm Creek has ongoing erosion issues at the mouth, and a condition assessment of pipes in both basins is needed).

Goals and Objectives

There are multiple project goals for these basin plans, including the following:

- Updated GIS drainage infrastructure inventory and FEMA floodplain maps;
- Identification and evaluation of management actions to surface water and infrastructure problems (flooding, erosion, water quality);
- Prioritized list of structural and programmatic strategies including repair and replacement schedule; and
- Develop a template for future basin plans.

Project Phases

For scoping purposes, the basin plans are described as two separate phases of this project. However, some of the tasks will be done concurrently to maximize efficiencies gained by completing a similar task simultaneously for two separate projects. For instance, hydrologic modeling, field reconnaissance, and public involvement tasks would likely be conducted simultaneously for both basins.

Phase 1- Storm Creek Surface Water Basin Plan

The Storm Creek basin has experienced ongoing surface water problems over the last few decades, including localizing flooding and erosion. The basin is approximately 513 acres in size, primarily within the City of Shoreline, with approximately 195 acres also in the City of Edmonds. Previous studies including the City of Shoreline Middle Puget Sound, Seattle Golf Club, and Bitter lakes Basins Characterization Report (2004) and King County's Storm Creek Drainage Study (1993) have included all or portions of the Storm Creek Basin.

Task 1.1- Review Existing Information

This task involves reviewing relevant information that will be used to evaluate existing conditions, identify data gaps, inform the field assessment, and develop capital and programmatic solutions.

Assumptions:

The City will provide the Consultant team with the following information for review prior to the start of this task:

- City of Shoreline GIS and CAD layers showing location of stormwater drainage features and attributes (type, diameter, inverts, length, and age).
- City of Shoreline GIS layers for geology or soils, zoning, property types and boundaries, water features (streams, and lakes), and wetlands.
- Digital aerial photographs and LiDAR maps.
- All available water quality monitoring data.
- As-builts or design drawings for stormwater facilities
- Maintenance, flooding, and stormwater complaint records.
- Tetra Tech/KCM, Inc (TT/KCM). 2004. *City of Shoreline Stream Inventory and Assessment*.
- Tetra Tech/KCM, Inc (TT/KCM). 2004. *City of Shoreline Wetland Inventory and Assessment*.
- Tetra Tech/KCM, Inc (TT/KCM). 2004. *Middle Puget Sound Basin Characterization Report*.
- Daley Design. 2004. *Fish Utilization in City of Shoreline Streams*, Appendix C to City of
- Shoreline Stream and Wetland Inventory and Assessment. Prepared for Tetra Tech/KCM, Inc., by Daley Design, Bainbridge, WA.

Consultant will also acquire and review the following publically available information:

- Booth, Derek B., Troost, Kathy Goetz, and Shimel, Scott A. 2005. Geologic Map of Northwestern Seattle (part of the Seattle North 7.5' x 15' quadrangle), King County, Washington: U.S. Geological Survey Scientific Investigations Map 2903, 1:12,000 Available from The Pacific Northwest Center for Geologic Mapping Studies (GeoMapNW) and at http://geomapnw.ess.washington.edu/index.php.
- Geological boring log data available through Washington State Department of Ecology.
- Johannessen, J.W. and A. MacLennan. 2007. *Beaches and Bluffs of Puget Sound.* Puget Sound Nearshore Partnership Report No 2007-4. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.
- United States Department of Agriculture, Soil Conservation Service (USDA SCS). 1973. *King County Soil Survey*.
- United States Department of the Interior (USDI). 1987a. *National Wetlands Inventory,Edmonds West, Washington 7.5-minute USGS Quadrangle*.

- United States Department of the Interior (USDI). 1987b. *National Wetlands Inventory, Seattle North, West, Washington 7.5-minute USGS Quadrangle*.
- Washington State Department of Ecology (Ecology). 2004. *Shoreline Slope Stability in Coastal Zone Atlas*. Washington State Department of Ecology, Shorelands and Coastal Zone Management Program. Olympia, WA.

Deliverables:

There are no deliverables for this task. A summary of background information and document review will be included in the Basin Plan Report, Task 1.7.

Task 1.2- Field Assessment

This task involves a qualitative field assessment of geomorphology, fisheries, aquatic habitat, wetlands and infrastructure conditions and problem identification. A field team consisting of a geomorphologist, fisheries biologist and wetland ecologist will walk the open channel portion of Storm Creek from the mouth in Puget Sound upstream to the headwaters. During the stream walk, physical and biological conditions will be noted in a field notebook and on maps with geographic references, such as road crossings. Erosion processes occurring at the mouth of Storm Creek will also be evaluated by a geologist to assess potential contributing factors. Current conditions will be compared to documented conditions described in previous reports. Results of the field assessment will be used to identify problems and potential solutions and opportunities, and to provide data for the development of a hydrologic and hydraulic model (Task 1.4). The field assessment of in-stream conditions will include:

- General vegetation conditions (type, density, size, width of vegetation corridor adjacent to stream channel)
- In-stream and hillslope erosion processes (incision, aggradation and landslides) and geologic units
- Aquatic habitat conditions (pools, riffles, large woody debris, flow)
- Location of riparian wetlands
- Location of stormwater outfalls, pipes and groundwater seeps
- Pollution sources
- General in-stream sediment distribution throughout stream channel
- Wildlife activity (presence of beaver dams)
- Estimates of Manning's roughness coefficients for the hydraulic model
- Stream channel cross sections for input into the hydraulic model

Overall biological and physical characteristics in the rest of the basin (outside the stream corridor) will be documented through targeted field visits by the team wetland ecologist, stormwater engineer, and/or technical lead to identified wetlands, open spaces, road networks and neighborhoods.

Assumptions:

The following assumptions are associated with this task:

- The City will obtain right-of-entry permission from private property owners for the stream walk and field investigation.
- The City will provide access to stormwater infrastructure as needed.
- The stream walk will take no more than 2 days.
- The erosion assessment at the mouth of Storm Creek will take no more than 1 day.
- Up to 3 cross sections will be measured at stream channel reaches representative of different morphologies, and flow rates will be estimated at each cross section. Subsequently, the cross section locations will be used for estimating base flow rates later in the summer to help evaluate groundwater seepage into the different reaches of Storm Creek.
- Upland field assessment will take no more than 1 day.

Deliverables:

- Draft basin characterization memorandum (up to 15 pages including tables, figures and photos) documenting stream walk methods and results, including photos, maps and tables. The final basin characterization memorandum will be included as an appendix in the Basin Plan Report (Task 1.7).
- Draft erosion process memorandum (up to 6 pages including figures and photos) documenting potential contributing factors of erosion in the lower reach of Storm Creek.

Task 1.3- Pipe Condition Assessment

Stormwater infrastructure will be assessed through a video inspection survey of the publicly owned and maintained piped conveyance system. This includes CCTV inspection of all pipes larger than eight inches in diameter, which is approximately 28,000 linear feet of pipe. Prior to CCTV inspection the consultant team will complete a site visit to confirm location of all stormwater pipes and structures as shown on the City's GIS inventory. The consultant team will update stormwater data in GIS to match current conditions as collected on the site visit. The consultant will provide an updated GIS map and database with City pipe and structure IDs to the vendor identifying all pipes and structures to be inspected. This information will also be used to develop a list of maintenance, repair, and replacement actions.

Assumptions:

The following assumptions are associated with this task.

- Elevation information for infrastructure that needs to be added to the current inventory or is not identified accurately will be determined by LiDAR and measure downs collected in the field by consultant.

- Plan view location information for infrastructure that needs to be added to the current inventory or is not identified accurately will be collected with a hand-held GPS unit.
- Pipes will need to be cleaned and jetted, as needed, prior to CCTV inspection and is included in vendor cost estimate. For budgeting purposes, it was assumed approximately half of the pipes in this basin (~14,000 linear feet) will need to be cleaned.
- Vendor will procure all required City right-of-way use permits and provide traffic control as needed to complete inspections.

Deliverables:

- Map and GIS inventory database of all structures and pipes inspected.
- DVDs and inspection reports for all City-owned structures and pipes 12 inches diameter and greater within Storm Creek Basin.
- Updated GIS stormwater inventory database with industry standard condition or "grade" identified.

Task 1.4- Hydrologic and Hydraulic Modeling

This task involves developing an EPA-SWMM hydrologic model that simulates existing and potential future surface water run-off conditions. The model will be used to test alternative stormwater management scenarios to address existing problems and potential future issues. Additionally, the model may be used to identify the area inundated during a 100-year recurrence interval flow event for the City's critical areas code.

Assumptions:

The following assumptions are included in this task:

- The City will provide GIS layers, including geology, zoning, topography, and stormwater infrastructure necessary to construct a hydrologic and hydraulic model.
- The City will provide a map depicting the basin boundary for Storm Creek basin. The Consultant team will modify the boundary based on information gathered in the field assessment and video inspection.
- Existing and future percent impervious values documented in *City of Shoreline-Middle Puget Sound, Seattle Golf Club and Bitter Lake Basins Characterization Report*, 2004, Tetra Tech/KCM will be used.
- Fifteen minute precipitation data will be obtained from three sources with preference given to the closest gage. Preference will be given to the nearest rain gages (King County Rain Gage 04U and City of Shoreline Rain Gage) for the years where data is available (period of record 2000-2008). Precipitation from the SeaTac gage will be used to supplement the data set (period of record 1949-2000).
- The hydrologic model will be calibrated using the following methods:

    - Peak flows will be compared to flows in nearby gages in similar basins with similar characteristics (such as Boeing Creek).
    - Gage data in Storm Creek (assumes gage is installed by the City).
- The 25-year and 100-year recurrence interval event for Storm Creek will be determined using the log-Pearson Type III method.
- A 100-year floodplain map will be developed for Storm Creek based on the 100-year recurrence interval flow event.
- CIP solutions for up to five problem locations will be modeled and sized to convey the 25-year flow. Hydraulic modeling will be conducted, as necessary to develop CIP solutions.

Deliverables:

- Draft hydrologic modeling memorandum documenting modeling data inputs, assumptions, calibration, and results. The final memorandum will be included as an appendix in the Basin Plan Report (Task 1.7).
- 100-year floodplain map for Storm Creek.
- Electronic copy of modeling files.

Task 1.5- Development of Management Strategies

This task involves the development of alternative management strategies including structural and programmatic solutions to problems identified in Tasks 1.1, 1.2, 1.3 and 1.4. A brainstorming session will be held with members of the consultant team and City staff to discuss problems and potential solutions. Challenges and opportunities for each identified strategy will be assessed, including permitting, community acceptance, cost, funding possibilities, and technical feasibility. Conceptual designs (location, layout and section) of potential structural solutions will be developed along with planning level cost estimates. Identified management strategies will be tested for relative hydrologic or hydraulic benefit using the model developed in Task 1.4.

Assumptions:

- One brainstorming session (up to 6 hours) will be held with up to 5 members of the consultant team, and relevant City personnel including the project manager, and maintenance and operations staff.
- Up to 10 stormwater management alternatives will be developed to address existing problems and potential future issues. Where multiple solutions are possible, up to 2 alternatives will be developed into conceptual designs for each individual problem.
- Up to 5 different stormwater management scenarios will be modeled to determine relative basin-wide benefits.
- Conceptual designs will be approximately 30% design level, including location, general size and layout, and cross sections. Surveyed elevations will not be included in the conceptual design.
- Planning level cost estimates will be provided for each management alternative.

- The hydrologic memorandum will include modeling outputs for the different management scenarios modeled.

Deliverables:

- There are no deliverables associated with this task. The management strategies will be documented in the Basin Plan Report (Task 1.7), and the modeling will be included in the hydrologic modeling memorandum (Task 1.4).

Task 1.6- Strategy Prioritization

This task involves prioritizing identified management strategies based on criteria developed for the City's stormwater comprehensive plan.

Assumptions:

The following assumptions are associated with this task.

- The City's Stormwater Comprehensive Plan will be finalized prior to this task (Strategy Prioritization) occurring.
- Prioritization scheme developed for the City's Stormwater Comprehensive Plan (in progress) will be used to prioritize management scenarios for Storm Creek Basin.
- One meeting will be held with City staff and up to 2 members of the consultant team to discuss the prioritization strategy.

Deliverables:

There are no deliverables associated with this task. The prioritization methods, and list of ranked projects will be documented in the Basin Plan Report (Task 1.7).

Task 1.7- Basin Plan Report

This task involves development of a draft and final Basin Plan Report that includes the following:

- Basin Characterization Memorandum documenting stream walk methods and results and including photos, maps, and tables.
- Field assessment photographic log for use in future comparisons
- Hydrologic and Hydraulic Modeling Memorandum, which will include modeling results and documentation for future use of the model(s).
- Detailed descriptions of surface water management strategies including potential partners, funding mechanisms, challenges and opportunities, and planning level cost estimates.
- Capital improvement project conceptual design sheets.
- Prioritization strategy for surface water management solutions.
- Updated GIS maps with stormwater infrastructure.
- Floodplain delineation and recommendations for FEMA map revisions, if necessary.

A draft of the Basin Plan Report Outline is included as Attachment 1.

Assumptions:
The following assumptions are associated with this task.

- One annotated outline of the basin plan report will be prepared for review and approval prior to report preparation.
- There will be two review cycles for the basin plan report, including a preliminary draft report and final draft report. The draft reports will be submitted electronically.
- The City will provide a consolidated set of review comments to the consultant team for both the preliminary draft and final draft reports.
- Draft deliverables associated with previous tasks (Tasks 1.1, 1.2, 1.3 and 1.4) will be finalized in the basin plan report.
- 5 hard copies of the final report will be produced.

Deliverables:

- One annotated basin plan report outline (electronically submitted).
- One preliminary draft basin plan report (electronically submitted). It is anticipated that this report will be approximately 100 pages, including text, tables, figures and appendices.
- One final draft basin plan report (electronically submitted) that addresses comments made on the preliminary draft report. This report will be submitted in track changes format and as a clean copy so the City can easily see how comments were addressed.
- Final Basin Plan Report incorporating changes requested in previous submittals. This report will be submitted electronically as a pdf and 5 hard copies.

Task 1.8- Public Meetings and Stakeholder Involvement

This task involves the following items:

- Development of a Stakeholder Involvement Plan describing how input will be solicited and information delivered to stakeholders throughout the project
- Development of presentation materials for public meetings
- Participation at public meetings.

Assumptions:
The following assumptions are associated with this task.

- Up to three public meetings will occur.
- Only one member of the consultant team will participate in each public meeting.
- Public meeting presentation materials will include a power-point presentation and one large presentation board per meeting.

- The City will identify key stakeholders who may have an interest in the basin plan outcome.
- The City will provide a consolidated set of review comments to the consultant team for the draft Stakeholder Involvement Plan.

Deliverables:

- Draft Stakeholder Involvement Plan (electronically submitted).
- Final Stakeholder Involvement Plan incorporating changes that address City comments made on the preliminary plan. This plan will be submitted electronically as a pdf.
- Public meeting presentation materials.

Task 1.9- Project Management

Project management will include communications with the City of Shoreline project manager and the Consultant team; scheduling and oversight of the various project activities; and budget tracking and oversight, including preparation of monthly invoices and progress reports.

Assumptions:
The following assumptions are associated with this task.

- The project will be 10 months in duration, from July 2011 through April 2012.

- A brief project management plan will be developed outlining scope, schedule, budget, responsibilities, and communication.

- A project kick-off meeting will be held with key team members and City staff. The meeting will last no more than 2 hours.

Deliverables:
- Ten monthly progress reports and project invoices

Task 1.10- Contingency

This task includes contingency funding for additional tasks or scope items requested during this project.

Assumptions:

The following assumptions are associated with this task.

- The contingency task will not be used without written authorization from the City's project manager.

Phase 2- Boeing Creek Surface Water Basin Plan

The Boeing Creek basin is significantly larger than Storm Creek, and is one of largest drainage basins in the City of Shoreline at approximately 1,600 acres. The open channel portion of Boeing Creek is approximately 1.55 miles long, flowing westerly from the plateau near the intersection of Greenwood Avenue North and Carlyle Road through a steep ravine to Puget Sound. Several stormwater management facilities have been constructed in the Boeing Creek basin over the last decade, solving some of the most problematic issues in this basin. There are still many infrastructure upgrades and stormwater system modifications needed, as the existing infrastructure ages and deteriorates.

Task 2.1- Review Existing Information

This task involves reviewing relevant information that will be used to evaluate existing conditions, identify data gaps, inform the field assessment, and develop capital and programmatic solutions. Much of the information to be reviewed is the same as for Storm Creek basin (Task 1.1), but this task will focus on relevant data pertaining to the Boeing Creek basin.

Assumptions:

The City will provide the Consultant team with the following information, in addition to the Task 1.1 list, for review prior to the start of this task:

- Tetra Tech/KCM, Inc (TT/KCM). 2004. *Boeing Creek Basin Characterization Report.*
- Otak, Inc. 2008. *North Boeing Creek Improvements Project Final Design Report.*

Consultant will review the publically available information listed in Task 1.1 with specific reference to the Boeing Creek basin.

Deliverables:

There are no deliverables for this task. A summary of background information and document review will be included in the Basin Plan Report, Task 2.7.

Task 2.2- Field Assessment

This task involves a qualitative field assessment of geomorphology, fisheries, aquatic habitat, wetlands and infrastructure conditions and problem identification. A field team consisting of a geomorphologist/stormwater engineer, fisheries biologist and wetland ecologist will walk the open channel portion of Boeing Creek from the mouth in Puget Sound upstream to the locations where open channels are piped. During the stream walk, physical and biological conditions will be noted in a field notebook and on maps with geographic references, such as road crossings. Current conditions will be compared to documented conditions described in previous reports. Results of the field

assessment will be used to identify problems and potential solutions and opportunities, and to provide data for the development of a hydrologic and hydraulic model (Task 2.4). The field assessment of in-stream conditions will include:

- General vegetation conditions (type, density, size, width of vegetation corridor adjacent to stream channel)
- In-stream and hillslope erosion processes (incision, aggradation and landslides) and geologic units
- Aquatic habitat conditions (pools, riffles, large woody debris, flow)
- Location of riparian wetlands
- Location of stormwater outfalls, pipes and groundwater seeps
- Pollution sources
- General in-stream sediment distribution throughout stream channel
- Wildlife activity (presence of beaver dams)
- Estimates of Manning's roughness coefficients for the hydraulic model
- Stream channel cross sections for routing in the hydrologic model and input into the hydraulic model for floodplain mapping.

Overall biological and physical characteristics in the rest of the basin (outside the stream corridor) will be documented through targeted field visits by the team wetland ecologist, stormwater engineer, and/or technical lead to identified wetlands, open spaces, road networks and neighborhoods.

Assumptions:
The following assumptions are associated with this task:

- The City will obtain right-of-entry permission from private property owners for the stream walk and field investigation.
- The City will provide access to stormwater infrastructure as needed.
- The stream walk will take no more than 4 days.
- Up to 3 cross sections will be measured at stream channel reaches representative of different morphologies, and flow rates will be estimated at each cross section. Subsequently, the cross section locations will be used for estimating base flow rates later in the summer to help evaluate groundwater seepage into the different reaches of Boeing Creek.
- Upland field assessment will take no more than 2 days.

Deliverables:
- Draft basin characterization memorandum (up to 20 pages including tables, figures and photos) documenting stream walk methods and results, including photos, maps and tables. The final basin characterization memorandum will be included as an appendix in the Basin Plan Report (Task 2.7).

Task 2.3- Pipe Condition Assessment

Stormwater infrastructure will be assessed through a video inspection survey of the publicly owned and maintained piped conveyance system. This includes CCTV inspection of all pipes larger than eight inches in diameter, which is approximately 167,800 linear feet of pipe. Prior to CCTV inspection the consultant team will complete a site visit to confirm location of all stormwater pipes and structures as shown on the City's GIS inventory. The consultant team will update stormwater data in GIS to match current conditions as collected on the site visit. The consultant will provide an updated GIS map and database with City pipe and structure IDs to the vendor identifying all pipes and structures to be inspected. This information will also be used to develop a list of maintenance, repair, and replacement actions.

Assumptions:

The following assumptions are associated with this task.

- Elevation information for infrastructure that needs to be added to the current inventory or is not identified accurately will be determined by LiDAR and measure downs collected in the field by consultant.
- Plan view location information for infrastructure that needs to be added to the current inventory or is not identified accurately will be collected with a hand-held GPS unit.
- Pipes will need to be cleaned and jetted, as needed, prior to CCTV inspection and is included in vendor cost estimate. For budgeting purposes, it was assumed that approximately half of the pipes (83,900 linear feet) will need to be cleaned.
- Vendor will procure all required City right-of-way use permits and provide traffic control as needed to complete inspections.

Deliverables:

- Map and GIS inventory database of all structures and pipes inspected.
- DVDs and inspection reports for all City-owned structures and pipes 12 inches diameter and greater within Boeing Creek Basin.
- Updated GIS stormwater inventory database with industry standard condition or "grade" identified.

Task 2.4- Hydrologic and Hydraulic Modeling

This task involves developing an EPA-SWMM hydrologic model that simulates existing and potential future surface water run-off conditions. The model will be used to test alternative stormwater management scenarios to address existing problems and potential future issues. Additionally, the model may be used to identify the area inundated during a 100-year recurrence interval flow event for the City's critical areas code.

Assumptions:

The following assumptions are included in this task:

- The City will provide GIS layers, including geology, zoning, topography, and stormwater infrastructure necessary to construct a hydrologic and hydraulic model.
- The City will provide a map depicting the basin boundary for Boeing Creek basin. The Consultant team will modify the boundary based on information gathered in the field assessment and video inspection.
- Existing and future percent impervious values documented in *City of Shoreline-Boeing Creek Basin Characterization Report*, 2004, Tetra Tech/KCM will be used.
- Fifteen minute precipitation data will be obtained from three sources with preference given to the closest gage. Preference will be given to the nearest rain gages (King County Rain Gage 04U and City of Shoreline Rain Gage) for the years where data is available (period of record 2000-2008). Precipitation from the SeaTac gage will be used to supplement the data set (period of record 1949-2000).
- The hydrologic model will be calibrated using the following methods:
    - Gage data in Boeing Creek (discontinued gages 04 a-j).
    - Flows in the North Boeing Creek subbasin will be compared to the HSPF flows reported in Otak's *North Boeing Creek Improvements Project Final Design Report* (2008).
- The 25-year and 100-year recurrence interval event for Boeing Creek will be determined using the log-Pearson Type III method.
- A 100-year floodplain map will be developed for Boeing Creek based on the 100-year recurrence interval flow event.
- CIP solutions for up to seven problem locations will be modeled and sized to convey the 25-year flow. Hydraulic modeling will be conducted, as necessary to develop CIP solutions.
- The stream corridor of Boeing Creek is mapped as a 100-year floodplain (FEMA, 1995). Existing FEMA modeling and mapping files will be available for use.

Deliverables:

- Draft hydrologic modeling memorandum documenting modeling data inputs, assumptions, calibration, and results. The final memorandum will be included as an appendix in the Basin Plan Report (Task 2.7).
- 100-year floodplain map for Boeing Creek.
- Electronic copy of modeling files.

Task 2.5- Development of Management Strategies

This task involves the development of alternative management strategies including structural and programmatic solutions to problems identified in Tasks 2.1, 2.2, 2.3 and 2.4. A brainstorming session will be held with members of the consultant team and City staff to discuss problems and potential solutions in both Storm and Boeing creeks, as described in Task 1.5. Challenges and opportunities for each identified strategy will be

assessed, including permitting, community acceptance, cost, funding possibilities, and technical feasibility. Conceptual designs (location, layout and section) of potential structural solutions will be developed along with planning level cost estimates. Identified management strategies will be tested for relative hydrologic or hydraulic benefit using the model developed in Task 2.4.

Assumptions:

- One brainstorming session (up to 6 hours) will be held with up to 5 members of the consultant team, and relevant City personnel including the project manager, and maintenance and operations staff. This budget for this element of Task 2.5 is included in the estimate for Task 1.5.
- Up to 15 stormwater management alternatives will be developed to address existing problems and potential future issues. Where multiple solutions are possible, up to 2 alternatives will be developed into conceptual designs for each individual problem.
- Up to 7 different stormwater management scenarios will be modeled to determine relative basin-wide benefits.
- Conceptual designs will be approximately 30% design level, including location, general size and layout, and cross sections. Surveyed elevations will not be included in the conceptual design.
- Planning level cost estimates will be provided for each management alternative.
- The hydrologic memorandum will include modeling outputs for the different management scenarios modeled.

Deliverables:

- There are no deliverables associated with this task. The management strategies will be documented in the Basin Plan Report (Task 2.7), and the modeling will be included in the hydrologic modeling memorandum (Task 2.4).

Task 2.6- Strategy Prioritization

This task involves prioritizing identified management strategies based on criteria developed for the City's stormwater comprehensive plan.

Assumptions:

The following assumptions are associated with this task.

- The City's Stormwater Comprehensive Plan will be finalized prior to this task (Strategy Prioritization) occurring.
- Prioritization scheme developed for the City's Stormwater Comprehensive Plan (in progress) will be used to prioritize management scenarios for Boeing Creek Basin.
- One meeting will be held with City staff and up to 2 members of the consultant team to discuss the prioritization strategy.

Deliverables:

There are no deliverables associated with this task. The prioritization methods, and list of ranked projects will be documented in the Basin Plan Report (Task 2.7).

Task 2.7- Basin Plan Report

This task involves development of a draft and final Basin Plan Report that includes the following:

- Basin Characterization Memorandum documenting stream walk methods and results and including photos, maps, and tables.
- Field assessment photographic log for use in future comparisons
- Hydrologic and Hydraulic Modeling Memorandum, which will include modeling results and documentation for future use of the model(s).
- Detailed descriptions of surface water management strategies including potential partners, funding mechanisms, challenges and opportunities, and planning level cost estimates.
- Capital improvement project conceptual design sheets.
- Prioritization strategy for surface water management solutions.
- Updated GIS maps with stormwater infrastructure.
- Floodplain delineation and recommendations for FEMA map revisions, if necessary.

A draft of the Basin Plan Report outline is included as Attachment 1.

Assumptions:
The following assumptions are associated with this task.

- The outline developed for the Storm Creek basin plan report will used as a template for the Boeing Creek basin plan.
- There will be two review cycles for the basin plan report, including a preliminary draft report and final draft report. The draft reports will be submitted electronically.
- The City will provide a consolidated set of review comments to the consultant team for both the preliminary draft and final draft reports.
- Draft deliverables associated with previous tasks (Tasks 2.1, 2.2, 2.3 and 2.4) will be finalized in the basin plan report.
- 5 hard copies of the final report will be produced.

Deliverables:

- One preliminary draft basin plan report (electronically submitted). It is anticipated that this report will be approximately 100 pages, including text, tables, figures and appendices.
- One final draft basin plan report (electronically submitted) that addresses comments made on the preliminary draft report. This report will be submitted in

track changes format and as a clean copy so the City can easily see how comments were addressed.
- Final Basin Plan Report incorporating changes requested in previous submittals. This report will be submitted electronically as a pdf and 5 hard copies.

Task 2.8- Public Meetings and Stakeholder Involvement

This task involves the following items:
- Modification of the Stakeholder Involvement Plan developed in Task 1.8 describing how input will be solicited and information delivered to specific stakeholders in the Boeing Creek basin
- Development of presentation materials for public meetings
- Participation at public meetings

Assumptions:
The following assumptions are associated with this task.

- Up to three public meetings will occur. It is expected that at least one of these meeting will be in conjunction with a public meeting for the Storm Creek basin.
- Only one member of the consultant team will participate in each public meeting.
- Public meeting presentation materials will include a power-point presentation and one large presentation board per meeting.
- The City will identify key stakeholders who may have an interest in the basin plan outcome.
- The City will provide a consolidated set of review comments to the consultant team for the draft Stakeholder Involvement Plan.

Deliverables:

- Modified Stakeholder Involvement Plan focusing on Boeing Creek basin. This plan will be submitted electronically as a pdf.
- Public meeting presentation materials.

Task 2.9- Project Management

Project management will include communications with the City of Shoreline project manager and the Consultant team; scheduling and oversight of the various project activities; and budget tracking and oversight, including preparation of monthly invoices and progress reports. Project management of the two basin plans will occur simultaneously, and project management deliverables will cover aspects of both basin plan phases.

Assumptions:
The following assumptions are associated with this task.

- Phase 2 will be 12 months in duration, from July 2011 through June 2012.

- The project management plan developed in Task 1.9 will be inclusive of the Phase 2 work efforts.

Deliverables:

- Two progress reports and project invoices in addition to those described in Task 1.9.

Task 2.10- Contingency

This task includes contingency funding for additional tasks or scope items requested during this project.

Assumptions:

The following assumptions are associated with this task.

- The contingency task will not be used without written authorization from the City's project manager.

Appendix A – Attachment 1
Draft Basin Plan Outline

Example Basin Plan - Table of Contents

1. INTRODUCTION
   - 1.1 Basin planning program description
   - 1.2 Statement of purpose/Goals
     - 1.2.1 Assess current conditions and identify problems within basin
     - 1.2.2 GIS Mapping and condition assessment of surface water infrastructure
     - 1.2.3 Identify and prioritize management strategies to reduce existing and potential future problems
   - 1.3 Report Organization
2. STAKEHOLDER INVOLVEMENT
   - 2.1 Stakeholders and relationship to basin plan
   - 2.2 Roles and responsibilities
3. BASIN CHARACTERIZATION
   - 3.1 Physical and Natural Features
     - 3.1.1 Topography and land forms
     - 3.1.2 Hydrology
     - 3.1.3 Climate/Precipitation
     - 3.1.4 Soils/Surficial Geology
     - 3.1.5 Surface Water Resources
       - 3.1.5.1 Constructed (pipes, ditches)
         - 3.1.5.1.1 Condition assessment of CBs and Main Trunk Lines, and ditches
         - 3.1.5.1.2 Verification of mapped system and GIS mapping of areas not previously identified
       - 3.1.5.2 Natural channels
         - 3.1.5.2.1 Bank/Channel stability
         - 3.1.5.2.2 Aquatic and riparian habitats
     - 3.1.6 Floodplains and/or Other Area Specific Hydraulic Analyses
       - 3.1.6.1 FEMA Hydrologic and Hydraulic Study
       - 3.1.6.2 Other Area Specific Hydrologic/Hydraulic Studies
     - 3.1.7 Vegetation
   - 3.2 Water Quality
     - 3.2.1 Water Quality Standards
     - 3.2.2 Existing WQ Data
     - 3.2.3 Pollutant Sources

3.2.3.1 Point
3.2.3.2 Non-point
3.3 Land Use and Land Cover
3.3.1 Zoning
3.3.2 Impervious Surfaces
3.3.3 Political Boundaries
3.3.4 Future Land Use Considerations
4. IDENTIFICATION OF PROBLEMS/CAUSES/and MANAGEMENT STRATEGIES
4.1 Flooding/Drainage
4.1.1 Problems
4.1.2 Causes
4.1.3 Management Approach
4.1.3.1 Structural controls
4.1.3.1.1 Capital projects
4.1.3.1.2 Repair Projects
4.1.3.2 Non-structural
4.1.3.2.1 Maintenance
4.1.3.2.2 Programs
4.1.3.2.3 Regulatory
4.2 Water Quality Problems
4.2.1 Problems
4.2.2 Causes
4.2.3 Management Approach
4.2.3.1 Structural controls
4.2.3.1.1 Capital projects
4.2.3.1.2 Repair Projects
4.2.3.2 Non-structural
4.2.3.2.1 Maintenance
4.2.3.2.2 Programs
4.2.3.2.3 Regulatory
4.3 Aquatic Habitat Problems
4.3.1 Problems
4.3.2 Causes
4.3.3 Management Approach
4.3.3.1 Structural controls
4.3.3.1.1 Capital projects
4.3.3.1.2 Repair Projects
4.3.3.2 Non-structural
4.3.3.2.1 Maintenance

4.3.3.2.2 Programs
4.3.3.2.3 Regulatory
4.4 Land Use Resource Conflicts

5. Identification of Basin Management Strategies
5.1 Existing Management Strategies
5.1.1 Structural Controls
5.1.2 Nonstructural Controls
5.2 Additional Strategies Needed to Achieve Goals
5.2.1 Structural Controls
5.2.2 Nonstructural Controls

6. BASIN PLAN Implementation
6.1 Preferred Management Approach
6.1.1 Structural (Basin prioritized CIP)
6.1.2 Nonstructural
6.1.2.1 Land use changes
6.1.2.2 Maintenance
6.1.2.3 Outreach
6.1.2.4 Voluntary action by private parties
6.2 Schedule of Activities
6.3 Interim Milestones
6.4 Indicators to Measure Progress
6.5 Estimation of Costs
6.6 Monitoring Component
6.7 Evaluation Framework

APPENDICES
A – FEMA STUDY
B- OTHER AREA SPECIFIC HYDROLOGIC/HYDRAULIC STUDIES

Appendix B
SEPA CHECKLIST

Includes comments and responses.

CITY OF SHORELINE

Planning and CommunityDevelopment

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SEPA THRESHOLD DETERMINATION
DETERMINATION OF NONSIGNIFICANCE (DNS)

2011 Surfacewater Master Plan Update

PROJECT INFORMATION

Proposed Project Description:	The City of Shoreline Surface water Utility is proposing an Update to the Surface water Master Plan (SWMP). The update is intended to guide the Surface water Utility for the next 5 year period including both capital improvement projects and programs.
Project Number:	Not Applicable (Non Project Action)
Date of Issuance:	September 6, 2011
Applicant:	City of Shoreline
Location:	City of Shoreline
Public Hearing Date:	September 26, 2011

The City of Shoreline has determined that the proposal will not have a probable significant adverse impact on the environment. The DNS is issued in accordance with WAC 197-11-340(2). The City will not act on this proposal for at least 14 days from the date below. This decision was made after review of the environmental checklist and other information on file with the City. The information is available to the public upon request at no charge.

APPEAL INFORMATION

There is no administrative appeal available for this decision. The SEPA Threshold Determination may be appealed to superior court. If there is not a statutory time limit in filing a judicial appeal, the appeal must be filed within 21 calendar days following the issuance of the decision on the underlying action in accordance with State law the project file is available for review at the City Hall 17500 Midvale Avenue N. For specific project questions, please Brian Landau, City of Shoreline Public Works at 206-801-1541.

Joseph W. Tovar – FAICP Responsible Official	9/6/11 Date

CITY OF SHORELINE

Planning and Development Services

STATE ENVIRONMENTAL POLICY ACT (SEPA) ENVIRONMENTAL CHECKLIST

Purpose of Checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply". Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Public notice is required for all projects reviewed under SEPA. Please submit current Assessor's Maps/Mailing Labels showing:

- Subject property outlined in red.
- Adjoining properties under the same ownership outlined in yellow.
- All properties within 500' of the subject property, with mailing labels for each owner.

NOTE: King County no longer provides mailing label services. Planning and Development Services can provide this for a fee or provide you instructions on how to obtain this information and create a mail merge document to produce two sets of mailing labels for your application.

Use of Checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply". IN ADDITION complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "propose," and "affected geographic area," respectively.

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Part Eleven – 197-11-960 **SEPA Rules**

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.
Future individual capital projects to reduce flood hazards, improve water quality, and enhance stream/wetlands will be reviewed for consistency with local, state, and federal regulations.

10. List any government approvals or permits that will be needed for your proposal, if known.
The 2005 City of Shoreline's Surface Water Master Plan included SEPA compliance and Determination of Non-Signficance in 2005. This SWMP Update builds on the 2005 Plan and will be a long-range blueprint for surface water management, describing a vision that supports the City's adopted land use plan. The SWMP Update reflects policy direction from the City Council and the Planning Commission and will be adopted by the City Council. Future individual capital projects to reduce flood hazards, improve water quality, and enhance stream/wetlands will be reviewed for consistency with local, state, and federal regulations.

* FOR CAPITAL PROJECTS & PROGRAMS DET 8/26/11

11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description).

The City's original 2005 SWMP included the development of a capital improvement program (CIP), rate study, maintenance program and other elements to support the City's Surface Water Program. It focused on the immediate needs for the City at that time and focused on three primary areas

- Flood Protection
- Water Quality
- Stream/Wetland Aquatic Enhancement

Flood protection involves preventing flood damage to property and disruption of mobility and critical services. This is accomplished primarily through the planning, design, implementation, and maintenance of channels, pipes, roadside ditches, culverts, detention ponds, and natural and manmade open water courses.

The water quality program area involves preventing pollution through public education and involvement, maintenance, and capital projects. This also includes monitoring pollutant levels in water bodies throughout the City, addressing sources of pollution, constructing treatment facilities, and maintaining the City's stormwater drainage systems through street sweeping, catch basin cleaning, and other activities as well as inspections and code

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enforcement of commercial facilities. The elements of the water quaility program were developed to be in compliance with the Phase II NPDES permit requirements.

The stream habitat program area involves identifying and preserving existing habitat, identifying high-quality stream habitat in the City, enforcing development standards that prevent development in critical areas such as stream and wetland buffers, providing public education, and coordinating public efforts to protect or enhance habitat.

The 2005 plan identified projects and activities for each of the three areas and prioritized them as either Priority 1, 2, or 3. The plan recommended that Priority 1 project be implemented in a phased approach over the following 6 year period, with Priority 2 and 3 project considered in following years as funds become available and/or reassessed as part of a future updates to the SWMP.

Since then, most of the 2005 Priority 1 projects have been constructed which has substantially reduced the number of drainage complaints the City receives. The focus of the 2011 SWMP Update are to:

- Continue the efforts to preserve and protect water quality through projects and program and expand them where necessary in order to be in compliance with the anticipated requirements of the new NPDES Phase II permit
- Begin to implement a new Asset Inventory/Management Program that would initially include an inventory and condition assessment as a building block of information that would ultimately be used for a full stormwater infrastructure asset management program. The goal of this program would be to preserve the investment in the drainage infrastructure and maximize its useful life
- Emphasize a basin planning approach over the next 5 year period that includes detailed examination of the basin needs, includes flood hazard mapping where appropriate, and identifies applicable low impact development and green infrastructure approaches
- To incorporate sustainability components into the recommended programs, projects, and regulations, as part of the commitment to create an environmentally sustainable community within the Shoreline Environmental Sustainability Strategy

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The study area for the SWMP Update consists of the incorporated area of the City of Shoreline, Washington. Shoreline is bounded by Puget Sound on the west and by the cities of Edmonds, Woodway, Mountlake Terrace, Lake Forest Park and Seattle. The study area is

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EVALUATION FOR AGENCY USE ONLY

TO BE COMPLETED BY APPLICANT

B. ENVIRONMENTAL ELEMENTS

1. Earth:

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other: The City of Shoreline is located in north King County approximately fifteen miles north of downtown Seattle. The City of Shoreline is characterized by hilly valleys shaped by a number of creeks such as Boeing Creek, Thornton Creek, McAleer Creek and Lyon Creek. Steep slopes and landslide hazard areas exist in isolated locations.

b. What is the steepest slope on the site (approximate percent of slope).
The proposal is a nonproject proposal and does not recommend project action on a specific site.

c. What general types of soils are found on the site (for example clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.
The proposal is a nonproject proposal and does not recommend project action on a specific site.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so describe.
The proposal is a nonproject proposal and does not recommend project action on a specific site. Steep slopes and landslide hazard areas are shown on maps included in the 2005 Comprehensive Plan Update for the entire City.

e. Describe the purpose, type and approximate quantities of any filling or grading proposed. Indicate source of fill.
No filling or grading is expected as a direct result of this action. Development proposals emerging subsequent to the adoption of this master plan update would be evaluated relative to federal, state, and local regulations and standards on an individual project-specific basis.

f. Could erosion occur as a result of clearing construction or use? If so generally describe.
No erosion would directly result from the adoption of the proposal. Future development proposals will be evaluated and subject to the federal, state, and local regulations and standards, as well evaluated for consistency with the goals and policies of the Surface Water Master Plan.

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TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

2. Air:

a. What types of emissions to the air would result from the proposal (i.e. dust, automobile, odors, industrial, wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.
As a nonproject proposal, no specific projects are presented.

b. Are there any off site sources of emissions or odor that may affect your proposal? If so, generally describe.
None Known

c. Proposed measures to reduce or control emissions or other impacts to air if any:
Future specific projects will be conditioned subject to consistency with air protection regulations.

3. Water:

a. Surface:

1. Is there any surface water body on or in the immediate vicinity of the site (including year round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.
The City of Shoreline's shoreline area includes approximately 3.5 miles of marine shorelines within the city limits. The portions of the Puget Sound are located on the western most side of the City. There are numerous small streams and creeks within or adjacent to the City. Many of these streams have been placed in culverts, channels, or otherwise altered or degraded. Boeing Creek flows to the Puget Sound and drains an area which includes Shoreview Park. Thornton Creek originates in Ronald Bog, flows to Twin Ponds, crosses the City limits, and emerges as an open channel in the City of Seattle's Jackson Park Golf Course. McAleer Creek flows in the southeasterly direction and passes through the northeast corner of the City. Lyon Creek flows in a similar direction just outside of the City in Lake Forest Park.

2. Will the project require any work over, in, or adjacent to (within 200') of the described waters? If yes, please describe and attach available plans.
As a nonproject proposal, no specific development conditions are presented. Future specific projects will need to conform to City standards and regulations during project review. In addition, future specific projects affecting streams or wetlands will need to comply with applicable federal, state, and local requirements and permits.

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TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

4. Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities, if known.
   None are specifically proposed.

5. Does the proposal lie within a 100 year floodplain? If so, note location on the site plan.
   Not a project-specific action. Future specific projects within floodplains will be evaluated and subject to City regulations and standards.

6. Does the proposal involve any discharges of waste materials to surface waters? If so describe the type of waste and anticipated volume of discharge.
   N/A

b. Ground:

1. Will ground water be withdrawn or will water be discharged to ground water? Give general description, purpose and approximate quantities if known.
   As a nonproject proposal, no specific development conditions are presented. Future specific projects could potentially included temporary dewatering during construction will need to conform to City standards and regulations during project review.

2. Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals …; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.
   N/A

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base line of water quality conditions
- Expand the Utility's maintenance and operations program (e.g., increased frequencies to improve water quality such as catch basin cleaning and street sweeping).

These goals have been largely achieved. The SWMP Update proposes to continue with the above programs and enhance certain element to further protect and improve water quality. Some of the plan recommendations include:

- Enhance the public involvement program with more direct focus on surface water runoff and water qulaity, such as an adopt a storm drain program, pet waste program, and increasing the program on business outreach on BMPs (mostly source control)
- Provide technical training and materials to PADS/Parks/Transportation on LID and sustainable design
- Anticipate additional staff time for public and private LID inspections/training as more LID systems come on line
- Additional staff time to provide technical assistance to citizens/businesses about LID
- Participate in the Regional Water Quality monitoring program. Develop program to encourage and promote stewardship along improved rights-of-way
- Review ways to further incorporation of LID into City codes and design standards

4. Plants:

a. Check or circle types of vegetation found on the site:

- ☒ deciduous tree: alder, maple, aspen, other
- ☒ evergreen tree: fir, cedar, pine, other
- ☒ shrubs
- ☒ grass
- ☐ pasture
- ☐ crop or grain
- ☒ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- ☒ water plants: water lily, eelgrass, milfoil, other
- ☒ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?
No vegetation will be removed as a result of this proposal for the adoption of this master plan update. The plan includes recommendations to promote tree preservation and retention as well as enhancing stream riparian buffers.

c. List threatened or endangered species known to be on or near the site.
None known

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a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc
N/A

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
Any impacts resulting from specific projects recommended in this nonproject action will be determined at project-level review.

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Part Eleven – 197-11-960 **SEPA Rules**

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

8. Land and Shoreline Use:

a. What is the current use of the site and adjacent properties?
The City's GIS Department has created current land use maps that indicate the City is substantially developed, with only about one percent of the total land area remaining vacant. The current land use map also shows the following information:
☐ Single lots scattered throughout the City (rather than large contiguous tracts of land) primarily characterize the vacant land.
☐ Residential single family development accounts for approximately 51 percent of the land uses in the community.
☐ Multifamily residential development is approximately 3.7 percent of the current land use.
☐ Commercial development accounts for approximately 4 percent of the current land use.
☐ Industrial uses are limited.
☐ Institutional is approximately 3.2%
☐ Public facilities account for 7.4% and Parks and Recreation 7.8%, respectively.

b. Has the site been used for agriculture? If so, describe
N/A

c. Describe any structures on the site.
Within the City of Shoreline, there are buildings and structures associated with the following land uses:

- single family residential
- multi family residential
- commercial
- institution
- parks & recreation
- open space/water
- public facilities and,
- right-of-way

The proposal is for the adoption of an update to the 2005 master plan and is not site specific.

d. Will any structures be demolished? If so, what?
No structures will be demolished as part of this proposal.

e. What is the current zoning classification of the site?
Zoning varies throughout the City. Zoning classifications in Shoreline include seven residential zones (R-4, R-6, R-8, R-12, R-18, R-24 and R-48), an office zone, a neighborhood business zone, a community business zone, a North City Business District, a regional

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EVALUATION FOR AGENCY USE ONLY

k. Proposed measures to avoid or reduce displacement impacts, if any:
Not Applicable

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:
The proposal is to adopt an update to the 2005 Surface Water Master Plan for the City of Shoreline. The 2005 master plan was designed to be consistent with the City's Comprehensive Plan, Countywide Planning Policies and the state Growth Management Act. The SWMP Update builds on the 2005 plan and is also consistent with these plans as well as the City's new and ongoing planning efforts including the Shoreline Environmental Sustainability Strategy.

9. Housing:

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low income housing.
Not Applicable

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low income housing.
This is a proposal to adopt an update to the 2005 citywide Surface Water Master Plan; it does not relate to a specific action. Future specific projects that could affect housing will be evaluated at the project level and any project impacts will be subject to City regulations and standards.

c. Proposed measures to reduce or control housing impacts if any:
This is a proposal to adopt an update to the 2005 citywide Surface Water Master Plan; it does not relate to a specific action. Future specific projects that could affect housing will be evaluated at the project level and any project impacts will be subject to City regulations and standards. Specific measure to reduce housing impacts would be developed at that time.

10. Aesthetics:

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
No buildings or other structures are proposed by this action.

b. What views in the immediate vicinity would be altered or obstructed?
Not Applicable.

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b. Would the proposed project displace any existing recreational uses? If so, please describe.
No. However, there is a recommendation in the SWMP Update that the Utility promote sustainability goals on joint projects with the Parks Department. The Utility will promote beneficial surface water projects in parks for water quality, flood reduction, or habitat preservation, where such projects will not detract from park use or needs.

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heavily traveled east-west corridors.
When I-5 is congested, parallel arterials in Shoreline often receive spillover through traffic: 15th Avenue NE, 5th Avenue NE, 1st Avenue NE and Meridian Avenue N are the streets that pick up the overflow traffic.
In addition, there are numerous other small public streets serving the residents and business of the City.

b. Is site currently served by public transit? If not what is the approximate distance to the nearest transit stop?
Yes, the City of Shoreline is served by three transit agencies: Metro Transit, Community Transit and Sound Transit. Both Metro and Community Transit provide park-and-ride lots, vanpools, paratransit, Dial-A-Ride Transportation (DART) and commuter express bus service. The Aurora Village Transit Center is the major transfer point for both Metro and Community Transit. The I-5/NE 145th freeway station serves the North Jackson park-and-ride lot located within the City. Five Metro Transit lines and two Sound Transit routes use the freeway station.

c. How many parking spaces would the completed project have? How many would the project eliminate?
None, the proposal is a nonproject action. In addition future specific projects are not likely to include or eliminate any public parking spaces.

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EVALUATION FOR AGENCY USE ONLY

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity that might be needed.
The proposal to adopt an update to the 2005 SWMP and is not related to a specific project. Future development proposals may include expansion or modification of the stormwater system either for system replacement or to improve water quality or reduce flood hazards. These systems would be owned by the City and maintained by the Utility.

c. SIGNATURE
The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: B M

Printed Name: Brian Landau

Address 17500 Midvale Avenue North, Shoreline, Washington 98133-4905

Telephone Number: (206)801-2451 Date Submitted 8/24/11

REVIEWED BY [illegible] 8/26/11
PERMIT SERVICES MANAGER PLANNING & COMMUNITY DEV.

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City of Shoreline

2011 Surface Water Master Plan Update

PUPLIC COMMENTS ON PLAN AND SEPA CHECKLIST AND RESPONSES TO COMMENTS

Comments Responses to Public Draft Plan (issued September 2011):

The following includes responses to comments received by the City of Shoreline on the 2011 Surface Water Master Plan Update. Comments are restated in their entirety. Where multiple comments are included, they are numbered. Responses to comments follow the individual comments.

Comments from Muckleshoot Indian Tribe Fisheries Division (MITFD)(email, Karen Walter, 9/20/11). Three comments were received (number 1 through 3 below)

Comment 1. Culvert inventory

As part of this plan update, we expected to find a complete culvert inventory that identifies existing fish passage barriers, but could not find a comprehensive list in the plan. The plan, in Table 3-4, on page 3-24, specifically lists fish passage barriers from the 2005 plan, stating: "*Identify, prioritize, and eliminate barriers to fish passage. Work with citizen volunteers, state and federal agencies, and Indian tribes in these efforts.*" There are some culverts listed in the plan but it is not clear if this is a complete inventory. If not, the plan should be revised to include a culvert inventory plan, including private driveway stream crossings, that would be implemented from 2011-2016. For purposes of assessment, we recommend that the City use WDFW's Fish Barrier Assessment Manual to determine which culverts are fish barriers. This manual can be found at http://wdfw.wa.gov/publications/pub.php?id=00061

Once inventoried, the replacement of known fish barrier culverts should be done in conjunction with the proposed flood control and stream habitat improvement projects to maximize benefits for fisheries resources and create access to restored/improved habitat areas.

Response to Comment 1:

The SWMP Update does not contain a complete listing of fish passage barrier culverts within the City. The SWMP Update recommends that more detailed examinations of the drainage systems, including flooding, water quality, and habitat, be done under future basin plans. The basin plans will look at the portions of each watershed that are located within the city limits as a whole and use an integrated process to evaluate and address problems related to flooding, water quality, and aquatic streams/wetlands. This would include identification of fish barrier culverts.

The Utility would look to enhance such fish barrier culverts on a case by case basis. As described in Section 4.3.2, using Stormwater Utility funds may be used on stream/wetland

enhancement projects where there is a direct linkage to stormwater flooding, water quality, or erosion (i.e., purposes of the utility formation). Utility funds may also be used on a stream/wetland enhancement project when it is for mitigation of a separate project.

Comment 2. Culvert issues with state culverts

Please note that Western Washington Tribes and the Unites States government has sued the State of Washington for existing fish passage barriers on state highways and state owned land in federal court. The first summary judgment was issued in 2007 and was favorable to the Tribes/U.S. regarding barriers impacting tribal treaty fishing rights. The outcome of this case will likely affect existing known fish passage barriers on State land/highways, including those on SR 522 and I-5. Culverts on these roadways are listed under the current fish passage barrier report, which is updated annually. The current report is available at http://www.wsdot.wa.gov/NR/rdonlyres/4DC57252-4EBD-4454-9974-F9B6D41586B3/0/2011FishPassRpt.pdf

A copy of the Federal Court's summary judgment is also attached for your information.

Response to Comment 2: See response to comment 1.

Comment 3. Basin reports, projects, and SEPA notice

The future basin reports should be sent to the MITFD for our review and comments prior to finalization. For example, we did not receive a draft copy of the 2009 Thornton Creek Watershed Plan for our review and comments. Also, we would appreciate early notification of the proposed projects prior to the initiation of SEPA and permitting so that we may provide any comments that we have for early coordination and resolution. We are also having some difficulty receiving SEPA notices timely from the City. Please note that the Muckleshoot Indian Tribe is an affected Tribe under the SEPA WACs for projects in Shoreline and should be receiving checklists and thresholds determinations for all projects undergoing SEPA review. For purposes of evaluating projects for potential impacts to the Tribe's treaty protected fisheries resources, all SEPA documents should be sent to the MITFD at the address below.

Response to Comment 3: The City recognizes the value in obtaining early coordination with the MITFD on projects and will improve the transmittal of SEPA notices. While basin plans typically will not engage the SEPA process, the City will provide draft copies of future basin plans to MITFD for comment.

Comments from Ronald Wastewater District (letter, Michael U. Derrick, General Manager, 9/15/11). Three comments were received (number 4 through 6 below)

Comment 4. Pg 9: 3. Water: a Surface:1 Echo Lake not mentioned as a "surface water body."

Response to Comment 4: Within the report text, Echo Lake is mentioned as a lake in page 2-13 as well as several other locations.

Comment 5. Pg 12: c. Water Runoff :1 Echo Lake not mentioned as a method of collection for runoff.

Response to Comment 5: Within the report text, Echo Lake is mentioned as a lake in page 2-13 as well as several other locations. The drainage upstream and downstream of the lake is discussed in Section 2.

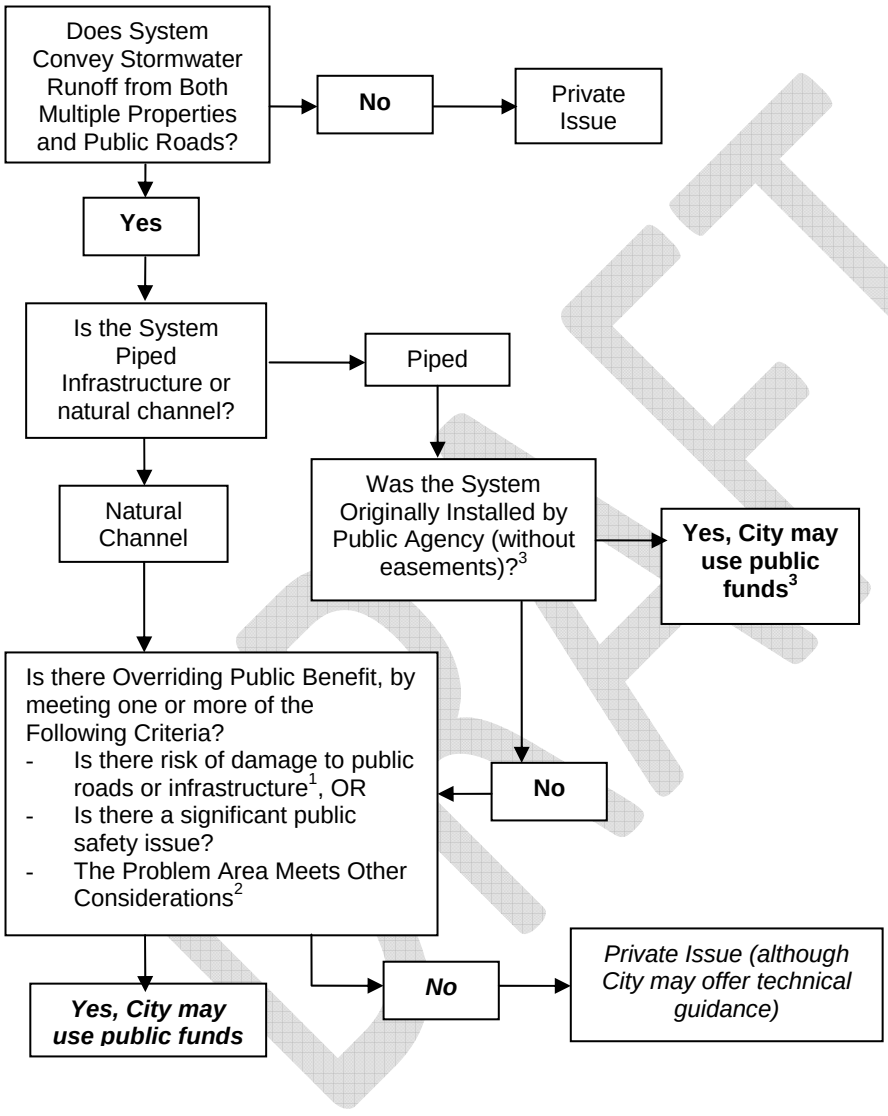
Comment 6. Pg 20: 12. Recreation: a. Echo Lake not mentioned as a City park, yet is mentioned on the City's website.

Response to Comment 6: Within the report text, water quality monitoring of Echo Lake as a swimming beach is mentioned under the King County Swimming Beach program.

Appendix C
DRAFT POLICY ON UTILITY WATER ON PRIVATE PROPERTY

Draft Decision Guidelines for Use of Utility Funds on Private Property.

In an effort to provide consistent guidance on use of public funds to improve and/or maintain drainage systems on private property, the following flow chart was developed to provide a framework for decision making.



Footnotes:

1. Includes flooding or erosion that results in (or could result in future) damage to public roads, infrastructure or structures.
2. There may be other considerations that provide additional justification for overriding public benefit, including: the system is a trunk system where failure of system could result in neighborhood problems; there is an NPDES permit driver to meet water quality standards; the problem is causing significant environmental degradation to a stream or wetland; the project to solve a problem provides significant benefit compared to the cost, and meets objectives stated in the City's Surface Water Master Plan; or the problem lies within jointly owned properties (e.g., native growth protection areas) where it would be very difficult for private parties to implement solutions.
3. In some areas, King County constructed improvements without securing easements. In these cases, there may be a legal justification for the City to secure drainage easements and assume maintenance, particularly if it is a trunk system that serves multiple properties. The City may require that the system be brought up to City standards and that the easement be provided to City at no cost.

Appendix D
PUBLIC MEETING COMMENTS

Why Are We Updating The Plan?

- We have addressed Critical Needs (addressed major flooding problems and complied with new regulations) and now need to set new direction for future

- Greater emphasis on sustainability, water quality, and aquatic restoration

- Construction of additional surface water management infrastructure (e.g., Aurora) requires review of maintenance program needs

- Need to address aging drainage pipes and facilities

- Review financial options to set rates to fund the utility for the next 5 years

CITY OF SHORELINE

What is our Surface Water Utility?

GOALS

- Flood Hazard Reduction
- Water Quality Protection
- Aquatic (Stream/Wetland) Habitat Protection and Enhancement

PROGRAMS

- Capital Projects
- Operations and Maintenance
- Public Outreach and Education
- Technical Assistance and Code Enforcement
- Monitoring and Research
- Asset Inventory and Management
- Regulatory Compliance (NPDES)
- Basin Planning

CITY OF SHORELINE

We Want to Hear From You -
What are your highest priorities?

- Flooding
- Water Quality
- Aging Drainage Pipes/Facilities
- System Maintenance
- Keep Rates Affordable
- Aquatic (Streams/Wetlands) Habitat
- Public Outreach
- Sustainability

(place dots to show your priority)

1st Priority - **Blue**

2nd Priority - **Red**

3rd Priority - **Green**

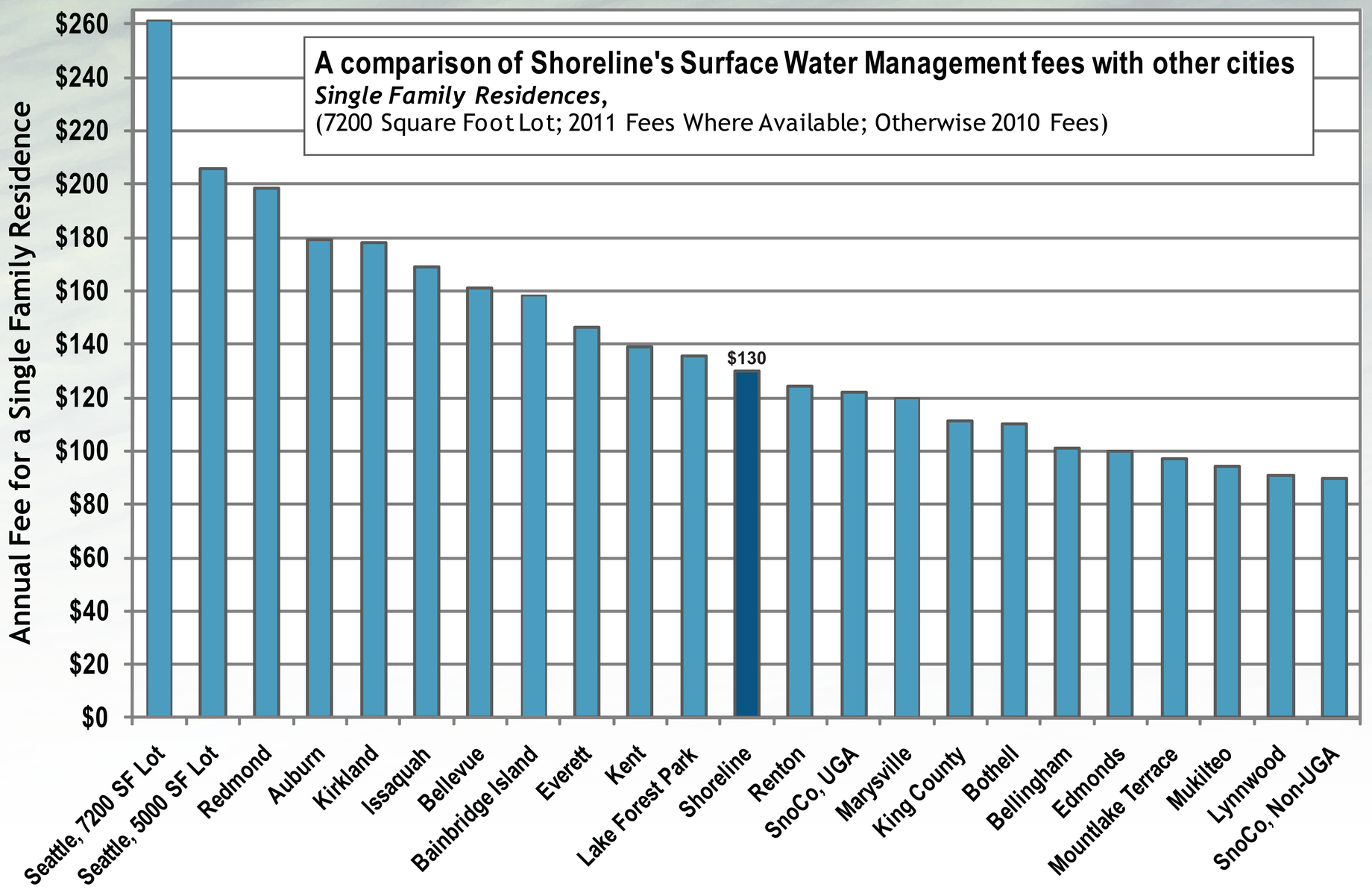
CITY OF SHORELINE

Do You Have Specific Comments?

Name	Address/ Phone/Email	Comment/Issue

CITY OF SHORELINE

How do your fees compare with others?



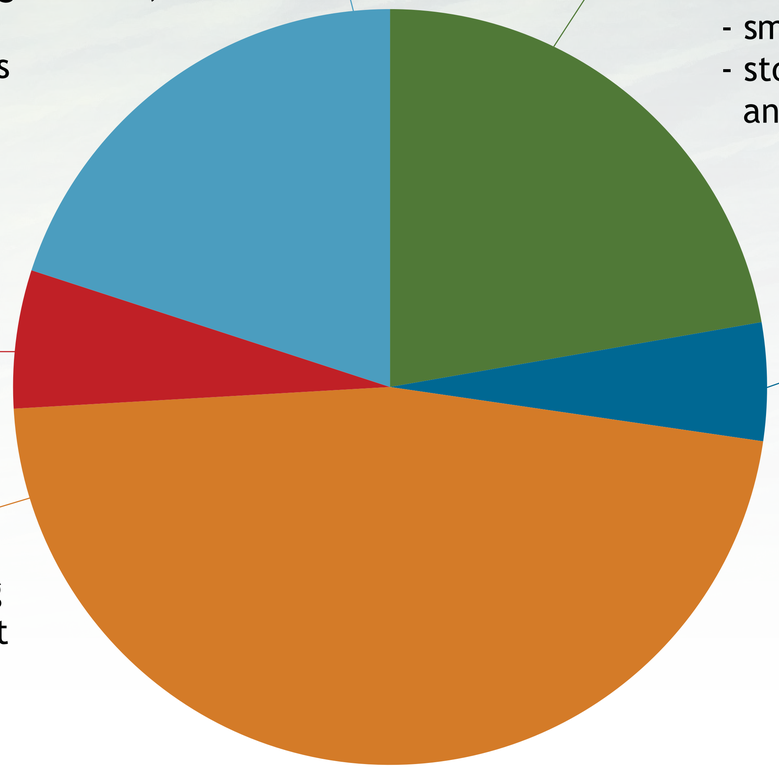
CITY OF SHORELINE

Where does your SWM fee go?

This is how the City's 2011 Surface Water Management Budget of approximately $5 million is spent

Centralized City Services and Administration
- Surface Water Management utility management
- City services such as facilities, building costs,utilities, human resources, accounting and finance
- Payments to King County for billing services, laboratory services
- Stormwater discharge permit costs

Operation and Maintenance
- cleaning catch basins
- cleaning pipes
- street sweeping
- ditch maintenance
- small repairs
- stormwater facilities and pump stations



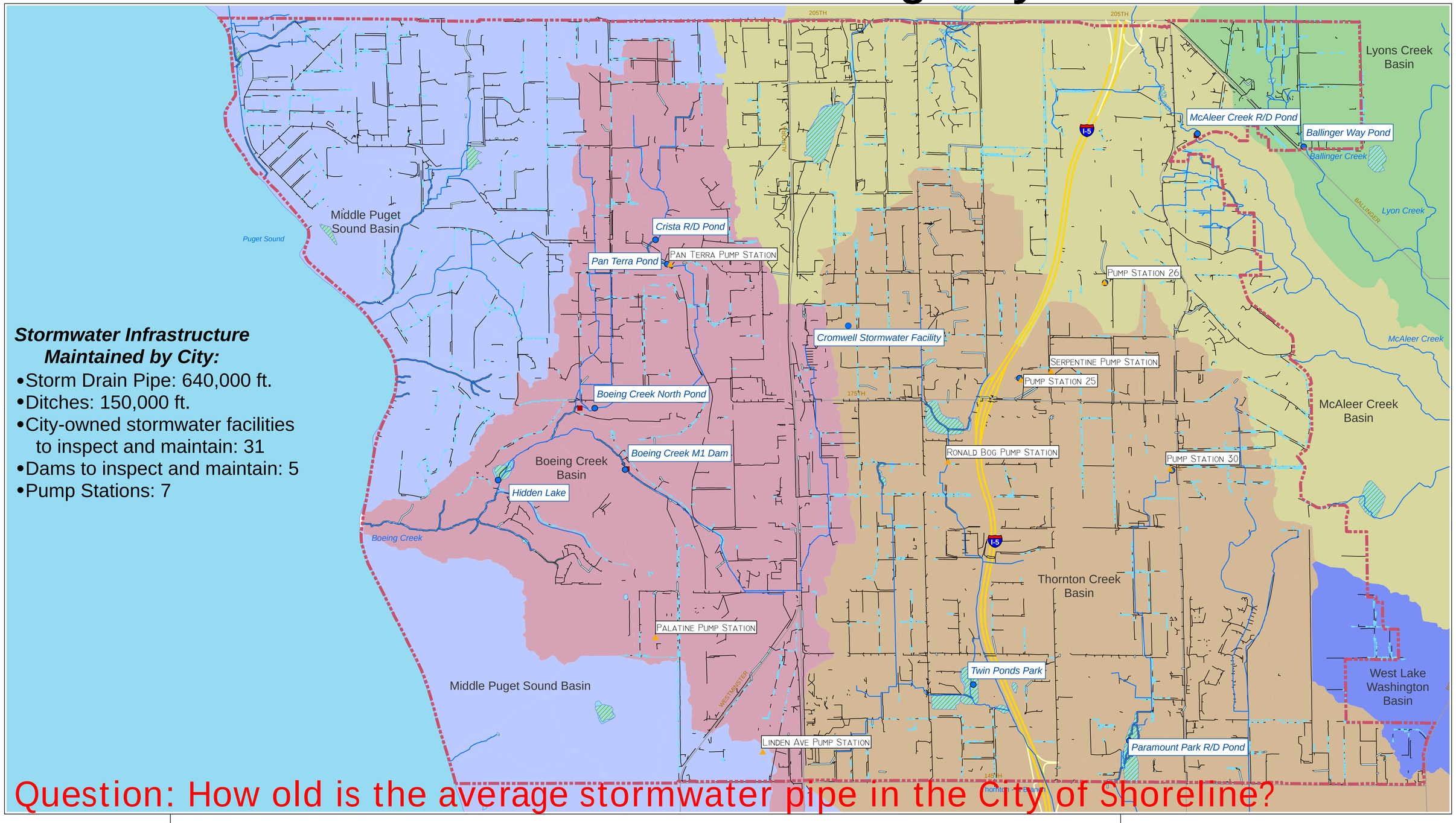
Basin Planning

Other Services
- water quality monitoring
- public outreach and education
- technical assistance to residents and businesses
- code enforcement

Capital Projects
- Construction
- Design and planning
- Debt service on past capital projects

CITY OF SHORELINE

Surface Water Drainage System



Stormwater Infrastructure Maintained by City:

- Storm Drain Pipe: 640,000 ft.
- Ditches: 150,000 ft.
- City-owned stormwater facilities to inspect and maintain: 31
- Dams to inspect and maintain: 5
- Pump Stations: 7

Question: How old is the average stormwater pipe in the City of Shoreline?

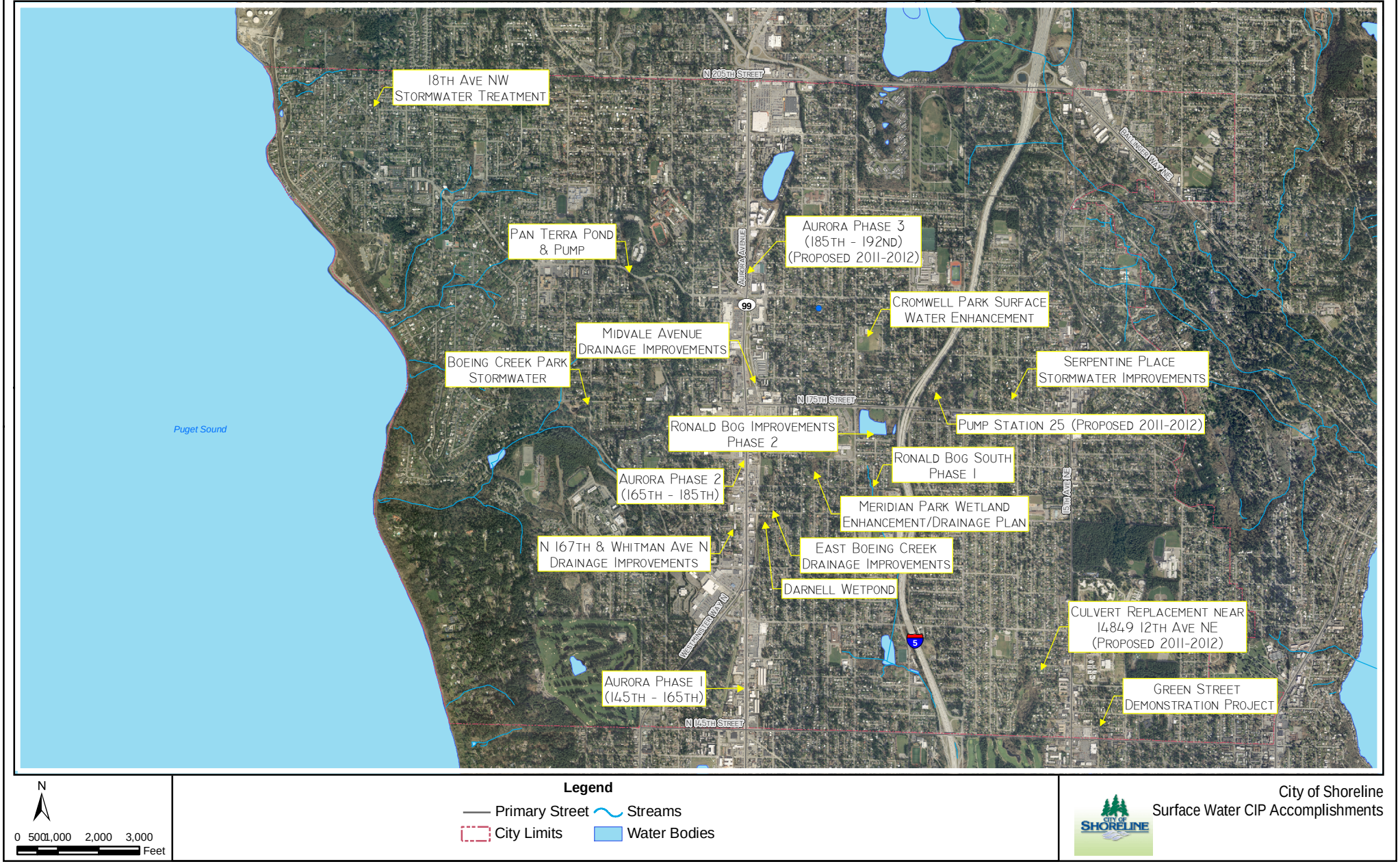
N

0 450 900 1,800 2,700 Feet

Pump Stations
Regional Ponds
Dams
City Limits
Pipe
Open Channel
Ditch
State Route
Interstate
Ramp
Primary Street
Streams
Wetlands
Water Bodies

City of Shoreline
Surface Water Drainage System

Surface Water CIP Accomplishments



The following tables summarize the input provided by the public during the January 19, 2011public meeting.

Board 1

Public provided any comments of concern to them. The comments provided below are verbatim.

Do You Have Specific Comments?

Name	Address/Phone/E-mail	Comments/Issue
Diana Herbst	14705 30th Ave NE Smilesdancing4u@yahoo.com	In southeast area (Lake Washington Basin) – Water pumped into street, high water table, basement flooding, ponding water in yards (at least eight properties Southeast area plan may identify this problem (Randy Holen (sp)) at City may know about problem.
Elizabeth Milburn	Elizabethm@cplinc.com	- Adopt a catch basin program : way to reduce $ - Restore salmon habitat – remove dams/obstructions - Offer incentives to companies (Sears?) to install bioretention facilities.
Patty Hale	165t28 8th Ave NE Patricia_Hale_1@msn.com	- Many drainage ditches in area (over the years) have been filled -→ excess water during storms causing problems. - Seattle City Light is going out to bid to have trees taken out (to the ground) all along 8th Ave NE and points north – see this as potentially causing flooding and excess water on roadway – due to loss of absorption. This is scheduled to be done in the next 3 months. Taking major trees in number, size, and age.
Katherine Hanson	17760 14th Ave NW kjhanson@u.washington.edu	On Dec 12, 2010 basement flooded from uphill water. Hours after rain had stopped, it sounded like 3 faucets were wide open and coursing down the slope in the back yard.
Craig Degginger	16533 Wallingford N craigdes@comcast.net	Drainage system inadequate to handle stormwater runoff. We have had multiple flooded garages and crawlspace N 167th and Wallingford N.
Jim Hutter	jim@salmonsaver.com	Implement solutions, not more bureaucracy

Name	Address/Phone/E-mail	Comments/Issue
Janet Way	940 NE 147th Jaetway@yahoo.com	I will submit comments online. Not enough room here!!!! Locations of concern: - 8th & Paramount Park – make swale fuctional - Join Lake Ballinger Forum (buy-in) - Continue Green Streets City-wide - Delineate small creek in RB Saltwater Park that is unnamed – but thousands of people walk over each day – improve riparian zone - Improve Darnell Park – more native plants – better design & wetland function - Increase wetland size at Ronald Bog - Re-Create wetlands at Aldercrest & Waterbrook - Re-Connect streams (daylight) that run under Burlington Nothern - More pervious pavement in parking areas and driveways - Change rate structure to give people breaks for pervious pavement, green roofs, trees and rain gardens. - Replace culverts with “box culverts”
Jesse Salomon	15521 14th Ave NE	Implement Green Streets and Bioretention Swales
Jim Mosquea	Seattle	Publish SW Engineering STDs to support NPDES

Board 2

Public attendees placed dots to show their priority:

1st priority - Blue (3 points)
2nd priority - Red (2 points)
3rd priority - Green (1 points)

The **Total Points** column provides the priority rating based on the number of dots of each color multiplied by the color's number of points.

We Want to Hear From You –
What are your highest priorities?

	Public Input Columns			Summary	
Items	1st Priority (3 points each)	2nd Priority (2 points each)	3rd Priority (1 point each)	Total Points	Ranking
Flooding	6	1	1	21	2
Water Quality	6	3	1	25	1
Aging Drainage Pipes/Facilities	1	3	2	11	3 (tie)
System Maintenance	1	1	3	8	5
Keep Rates Affordable	1	1	1	6	6
Aquatic (Streams/Wetlands) Habitat	1	3	2	11	3 (tie)
Public Outreach			1	1	7
Sustainability		3	4	10	4

The following surface water management surveys were received during the planning process.

Submission #1

```
----------------------------------------
Submitter DB ID : 1668
Submitter's language : Default language
IP address : 24.18.41.199
Time to take the survey : 8 min. , 29 sec.
Submission recorded on : 3/26/2011 9:10:07 AM

Survey answers
----------------------------------------
Your Neighborhood:
 Ballinger            []
 Briarcrest           []
 Echo Lake            []
 Hillwood             []
 Innis Arden          []
 Highland Terrace     []
 Meridian Park        [x]
 Parkwood             []
 North City           []
 Ridgecrest           []
 Richmond Beach       []
 Richmond Highlands   []
 The Highlands        []
 Westminster Triangle []

Name:
  Craig Degginger
Email:
  craigdeg@comcast.net
```

What are the top three (3) important surface water issues to you? From the following options please rank in the order of highest priority (1 being highest).

Aging drainage pipes/Facilities	2
Aquatic (streams/wetlands) habitats	Not answered
Drainage/Flooding	1
Keeping rates affordable	Not answered
Public outreach	Not answered
Sustainabiliity	Not answered
System maintenance	3
Water quality	Not answered

Additional Comments:
I have lived in the Meridian Park neighborhood for 22 years, and lived through many flooding events due to inadequate infrastructure in our neighborhood at 167th and Wallingford. The problem was noted in the 2005 surface water master plan but to date there has been no improvements made. As the years have gone by the problem has grown steadily worse to the point where even a basic rain can mean a torrent of water through our yards. I realize that there where many surface water problems to be handled during the city's first 15 years of existence. It is now our turn. I will be disappointed if the Wallingford Avenue North/167th to 165th drainage improvements are not identified the the top priority for funding and solutions in the next surface water master plan.

Submission #2

Submitter DB ID : 1620
Submitter's language : Default language
IP address : 24.16.36.78
Time to take the survey : 51 min. , 2 sec.
Submission recorded on : 2/24/2011 8:42:35 PM

Survey answers

Your Neighborhood:

Ballinger	[]
Briarcrest	[]
Echo Lake	[]
Hillwood	[]
Innis Arden	[x]
Highland Terrace	[]

Meridian Park	[]
Parkwood	[]
North City	[]
Ridgecrest	[]
Richmond Beach	[]
Richmond Highlands	[]
The Highlands	[]
Westminster Triangle	[]

Name:
Dennis Aker
Email:
densueaker@comcast.net

What are the top three (3) important surface water issues to you? From the following options please rank in the order of highest priority (1 being highest).

Aging drainage pipes/Facilities	Not answered
Aquatic (streams/wetlands) habitats	3
Drainage/Flooding	1
Keeping rates affordable	Not answered
Public outreach	Not answered
Sustainabiliity	Not answered
System maintenance	2
Water quality	Not answered

Additional Comments:
We live on 17th PL NW by what is now called storm creek, this is a name given this past year or two because of the run off problem.
Our concern, and has been for many years, is the surface water run off coming down the creek by our house. This run off has increased over the years causing erosion to the extent of trees falling into the creek which the city said that we had to leave and could not cut or remove them, this changed the direction of the creek to enter our property and is now taking our land.
When we moved in over 26 years ago there was a cliff at the end of the ravine of about 25 feet. That is all gone and now and the water runs right under the railroad. The mouth of the ravine back then was about 15 to 20 feet across, it has more than doubled. There are places in the creek where it is at least a foot or foot and a half lower just this winter. This is a major problem that the surface water run off is causing and we would like to have it taken seriously and something done before we loose a pool house and possibly the pool.

Sincerely,

Denny and Sue Aker

Submission #3

Submitter DB ID : 1616
Submitter's language : Default language
IP address : 24.18.225.240
Time to take the survey : 2 min. , 14 sec.
Submission recorded on : 2/22/2011 9:11:22 AM

Survey answers

Your Neighborhood:

Ballinger	[]
Briarcrest	[]
Echo Lake	[]
Hillwood	[]
Innis Arden	[]
Highland Terrace	[]
Meridian Park	[]
Parkwood	[]
North City	[]
Ridgecrest	[]
Richmond Beach	[]
Richmond Highlands	[x]
The Highlands	[]
Westminster Triangle	[]

Name:
Diane

Email:
dmkbudget@hotmail.com

What are the top three (3) important surface water issues to you? From the following options please rank in the order of highest priority (1 being highest).

Aging drainage pipes/Facilities	Not answered
Aquatic (streams/wetlands) habitats	Not answered
Drainage/Flooding	Not answered
Keeping rates affordable	Not answered
Public outreach	Not answered
Sustainabiliity	Not answered
System maintenance	Not answered
Water quality	Not answered

Additional Comments:

What are the impacts water contamination from the Aurora Ave N Project. I understand that there are pockets of soil contamination all along that corridor. Is the City cleaning up the contamination? Is it getting into our water systems?

Appendix E
FINANCIAL RATE MODEL INFORMATION

City of Shoreline
Surface Water Management Fund Projected Sources and Uses of Funds
Summary of Results

		Projected - LOS 1					
		2012	2013	2014	2015	2016	2017
1	Single Family Residential 2012-2017 Adopted SWM Fee, $/year	$133	$137	$141	$146	$150	$154
2	Single Family Residential SWM Fee, $/year (LOS 1)	133	137	141	146	151	159
3	% Increase/year (LOS 1)	2.50%	3.00%	3.00%	3.00%	4.00%	5.00%
4							
5	$ Available for Capital Expenses	$1,719,208	$1,763,842	$1,816,071	$1,810,150	$1,522,082	$990,868
6							
7	End of Year Reserve Balance	$3,769,640	$3,269,640	$2,269,640	$1,269,640	$619,640	$619,640

Additional Notes:

six year total $ available for capital projects	$9,622,221
six-year total CIP 2012 - 2017:	$8,354,873
% of CIP funded	115%

The Amount available from Capital Projects must cover all Surface Water CIP expenditures (Department 30). This includes:
- Transfers out, which includes the CIP portion of the GFCA.
- Personnel costs charged to capital projects.
- Capital project formulation costs charged to Surface Water Management.
- Professional Services incurred in the CIP.
- Construction of Fixed Assets.
- Basin Planning @ $150,000/yr.
- Asset Inventory and Management.

This compares with 2010 spending of $2,685,025.

		Projected - LOS 2					
		2012	2013	2014	2015	2016	2017
1	Single Family Residential 2012-2017 Adopted SWM Fee, $/year	$133	$137	$141	$146	$150	$154
2	Single Family Residential SWM Fee, $/year (LOS 2)	138	146	155	163	172	172
3	% Increase/year (LOS 2)	6.00%	6.00%	6.00%	5.50%	5.00%	0.00%
4							
5	$ Available for Capital Expenses	$1,819,208	$1,863,842	$1,916,071	$1,910,150	$1,622,082	$1,090,868
6							
7	End of Year Reserve Balance	$3,778,190	$3,272,140	$2,253,920	$1,341,700	$841,930	$703,360

Additional Notes:

six year total $ available for capital projects	$10,222,221
six-year total CIP 2012 - 2017:	$8,354,873
% of CIP funded	122%

The Amount available from Capital Projects must cover all Surface Water CIP expenditures (Department 30). This includes:
- Transfers out, which includes the CIP portion of the GFCA.
- Personnel costs charged to capital projects.
- Capital project formulation costs charged to Surface Water Management.
- Professional Services incurred in the CIP.
- Construction of Fixed Assets.
- ~~Basin Planning.~~
- Asset Inventory and Management.

This compares with 2010 spending of $2,685,025.

City of Shoreline
Surface Water Management Fee Update
Adjustments for Surface Water Management Utility

Summary of LOS 1 (based on changes from current)

	Level of Service Categories (1)	2012	2013	2014	2015	2016	2017	Notes
1				Change from Current				
2	**FTEs**							
3	O&M	0.00	0.00	0.00	0.00	0.00	0.00	
4	Public Outreach and Education	0.00	0.00	0.00	0.00	0.00	0.00	
5	Technical Assistance and Code Enforcement	0.00	0.00	0.50	0.50	0.50	0.50	
6	Monitoring and Research	0.00	0.00	0.00	0.00	0.00	0.00	
7	Asset Inventory and Management	1.00	1.00	1.00	1.00	1.00	1.00	
8	Capital Improvement	0.00	0.00	0.00	0.00	0.00	0.00	
9	Reg Compliance	0.00	0.00	0.00	0.00	0.00	0.00	
10	Basin Planning	0.00	0.00	0.00	0.00	0.00	0.00	
11	Admin/Management	0.00	0.00	0.00	0.00	0.00	0.00	
12	Total FTEs	1.00	1.00	1.50	1.50	1.50	1.50	
13								
14								
15				Change from Current				
16	**Cost, Labor and Non-Labor**							
17	O&M	$50,000	$0	$0	$0	$0	$0	2
18	Public Outreach and Education	0	0	0	0	0	0	
19	Technical Assistance and Code Enforcement	0	0	49,515	49,515	49,515	49,515	3
20	Monitoring and Research	0	21,000	21,000	52,000	52,000	52,000	4
21	Asset Inventory and Management	279,030	279,030	279,030	279,030	279,030	99,030	5
22	Capital Improvement	N/A	N/A	N/A	N/A	N/A	N/A	9
23	Reg Compliance	0	20,000	0	0	0	0	6
24	Basin Planning	380,000	200,000	150,000	150,000	0	0	10
25	Admin/Management	0	0	0	0	0	0	
26	Total	$726,756	$533,031	$512,034	$543,809	$390,059	$205,559	8
27								
28	Additional General Fund Cost Allocation	$109,013	$79,955	$76,805	$81,571	$58,509	$30,834	7,8

Notes:

(1) Source: "AJG_Shoreline_O&M LOScostAllocation2011Budget.xls"
(2) One time cost of $50k in 2012 to develop and maintain telemetry for all pump stations.
(3) Beginning 2014, additional 0.5 FTE (Surface Water Engineer).
(4) Anticipated Regional Water Quality Monitoring efftorts is estimated at $21k for 2013 and 2014 and $52k annually thereafter.
(5) Includes $900k inventory and condition assessment over 5-year period (2012-2016).
(6) One time cost of $20k in 2013 for consultant to review incorporation of LID into City codes and design standards.
(7) Additional General Fund Cost Allocation percentage calculated from City's 2011 GFCA and O&M Costs. GFCA assumed to be 15% LOS categories.
(8) Amounts adjusted for inflation of 2.5%. Total costs include FTE impact.
(9) Capital Improvement spending is back calculated given proposed rate increases set by policy. The need to pay other expenses and policy decisions not to issue debt spend down utility reserves.
(10) Amounts from City's 2012 - 2017 CIP and 08/15/11 meeting with City. $380k for Boeing Creek in 2012; $200k for MacAleer Creek in 2013; $150k for Ballinger Creek in 2014 and $150k for Puget Sound Drainages in 2015.

Additional Assumptions

SW Operating Avg FTE/Year	$99,030
SW CIP Avg FTE/Year	$111,060

City of Shoreline
Surface Water Management Fee Update
Adjustments for Surface Water Management Utility

Summary of LOS 2 (based on changes from LOS 1)

	Level of Service Categories (1)	2012	2013	2014	2015	2016	2017	Notes
1				Change from LOS 1				
2	**FTEs**							
3	O&M	0.00	0.00	0.40	0.40	0.40	0.40	
4	Public Outreach and Education	0.00	0.35	0.35	0.35	0.35	0.35	
5	Technical Assistance and Code Enforcement	0.00	0.00	0.50	0.50	0.50	0.50	
6	Monitoring and Research	0.00	0.50	0.50	0.50	0.50	0.50	
7	Asset Inventory and Management	0.00	0.00	0.00	0.00	0.00	0.00	
8	Capital Improvement	0.00	0.00	0.00	0.00	0.00	0.00	
9	Reg Compliance	0.00	0.00	0.00	0.00	0.00	0.00	
10	Basin Planning	0.00	0.00	0.00	0.00	0.00	0.00	
11	Admin/Management	0.00	0.00	0.00	0.00	0.00	0.00	
12	Total FTEs	0.00	0.85	1.75	1.75	1.75	1.75	
13	Subtotal - Cost for FTEs	$0	$84,000	$173,000	$173,000	$173,000	$173,000	
14								
15								
16				Change from LOS 1				
17	**Cost - Non-Labor**							
18	O&M	$0	$0	$0	$0	$0	$90,000	2
19	Public Outreach and Education	0	20,000	20,000	20,000	20,000	20,000	3
20	Technical Assistance and Code Enforcement	0	0	0	0	0	0	
21	Monitoring and Research	0	0	20,000	20,000	20,000	20,000	4
22	Asset Inventory and Management	0	0	0	0	0	0	
23	Capital Improvement	N/A	N/A	N/A	N/A	N/A	N/A	
24	Reg Compliance	0	0	0	0	0	0	
25	Basin Planning	100,000	100,000	100,000	100,000	0	0	5
26	Admin/Management	0	0	0	0	0	0	
27	Subtotal, Non-Labor	$103,000	$123,000	$144,000	$144,000	$41,000	$133,000	
28								
29	Total, Labor and Non-Labor	$103,000	$207,000	$317,000	$317,000	$214,000	$306,000	
30								
31	Additional General Fund Cost Allocation (15%)	$15,000	$31,000	$48,000	$48,000	$32,000	$46,000	6,7
32								
33	Total Impact of LOS 2 Compared with LOS 1	$118,000	$238,000	$365,000	$365,000	$246,000	$352,000	

Notes:

(1) Source: "AJG_Shoreline_O&M LOScostAllocation2011Budget.xls"
(2) Update of condition assessment and analysis every 10 years at $90k/year, beginning in year 6 (2017).
(3) An increase of $20k/yr for environmental mini-grant annual allocation for water quality and surface water related projects, beginning in 2013.
(4) Monitoring program for various LID techniques on private and public property, beginning in 2014.
(5) Estimated at $100k/yr for basin planning over LOS 1.
(6) Additional General Fund Cost Allocation percentage calculated from City's 2011 GFCA and O&M Costs. GFCA assumed to be 15% LOS categories.
(7) Amounts adjusted for inflation of 2.5%. Total costs include FTE impact.

City of Shoreline
Surface Water Management Fund Projected Sources and Uses of Funds
LOS 1 Adjustments

			Projected	Projected						
			2011 (1)	2012	2013	2014	2015	2016	2017	Notes
1	**Sources of Funds**									
2	Beginning Fund Balance		$4,269,640	$4,269,640	$3,769,640	$3,269,640	$2,269,640	$1,269,640	$619,640	
3	Charges for Goods and Services									
4										
5	SWM Fees at Existing Rates		$3,199,433	$3,199,000	$3,199,000	$3,199,000	$3,199,000	$3,199,000	$3,199,000	(2)
6										
7	Additional SWM Fee Revenues	% Increase								
8	2011 Rate Increase	0.00%	$0	$0	$0	$0	$0	$0	$0	
9	2012 Rate Increase	2.50%		80,000	80,000	80,000	80,000	80,000	80,000	
9	2013 Rate Increase	3.00%			98,000	98,000	98,000	98,000	98,000	
10	2014 Rate Increase	3.00%				101,310	101,310	101,310	101,310	
11	2015 Rate Increase	3.00%					104,000	104,000	104,000	
12	2016 Rate Increase	4.00%						143,000	143,000	
13	2017 Rate Increase	5.00%							186,000	
14	Total Additional SWM Fee Revenues		$0	$80,000	$178,000	$279,310	$383,310	$526,310	$712,310	
15										
16	Interest Income		30,000	64,000	57,000	49,000	34,000	19,000	9,000	(3)
17	Debt Proceeds		0	0	0	0	0	0	0	
18	Total Revenues		$3,229,433	$3,343,000	$3,434,000	$3,527,310	$3,616,310	$3,744,310	$3,920,310	
19										
20	Department of Ecology Stormwater Retrofit Grant		0	195,000	435,000	0	0	0	0	(1)
21	Software Grant		0	200,000	0	0	0	0	0	(1)
22	King County Flood Zone District Opportunity Fund		165,610	95,404	80,000	80,000	80,000	80,000	80,000	(1)
23	Total Sources of Funds		$7,664,683	$8,103,044	$7,718,640	$6,876,950	$5,965,950	$5,093,950	$4,619,950	

City of Shoreline
Surface Water Management Fund Projected Sources and Uses of Funds
LOS 1 Adjustments

Line No		Projected 2011 (1)	Projected 2012	2013	2014	2015	2016	2017	Notes
24	O&M Costs (SW Roads & SW Operations)								
25	Salaries and Wages	$551,708	$577,000	$598,000	$618,000	$638,000	$659,000	$681,000	(5)
26	Salaries - Extra Help	54,416	57,000	59,000	$61,000	$63,000	$65,000	$67,000	(5)
27	Overtime	7,740	8,000	8,000	$8,000	$8,000	$8,000	$8,000	(5)
28	Overtime - Extra Help	100	0	0	0	0	0	0	(5)
29	Standby Pay	4,018	4,000	4,000	4,000	4,000	4,000	4,000	(5)
30	Callback Pay	3,435	4,000	4,000	4,000	4,000	4,000	4,000	(5)
31	Vacation Buyout	0	0	0	0	0	0	0	(5)
32	Social Security Replace Program	34,206	35,000	36,000	37,000	38,000	39,000	40,000	(5)
33	Soc Sec Replace Pgm - Xtra Help	3,374	3,000	3,000	3,000	3,000	3,000	3,000	(5)
34	PERS	36,767	38,000	39,000	40,000	41,000	42,000	43,000	(5)
35	PERS - Extra Help	2,069	2,000	2,000	2,000	2,000	2,000	2,000	(5)
36	PERS - Back Contrib. Employer	0	0	0	0	0	0	0	(5)
37	PERS - Back Contrib. Employee	0	0	0	0	0	0	0	(5)
38	Insurance Premium Allowance	95,999	98,000	100,000	103,000	106,000	109,000	112,000	(5)
39	Medicare	8,000	8,000	8,000	8,000	8,000	8,000	8,000	(5)
40	Medicare - Extra Help	790	1,000	1,000	1,000	1,000	1,000	1,000	(5)
41	Labor & Industries	10,513	11,000	11,000	11,000	11,000	11,000	11,000	(5)
42	Labor & Industries - Extra Help	2,873	3,000	3,000	3,000	3,000	3,000	3,000	(5)
43	Office Supplies	600	1,000	1,000	1,000	1,000	1,000	1,000	(5)
44	Operating Supplies	62,544	64,000	66,000	68,000	70,000	72,000	74,000	(5)
45	Program Supplies	5,235	5,000	5,000	5,000	5,000	5,000	5,000	(5)
46	Small Tool/Minor Equipment	4,600	5,000	5,000	5,000	5,000	5,000	5,000	(5)
47	Software/Upgrades/Licenses	0	0	0	0	0	0	0	(5)
48	Professional Services	38,000	39,000	40,000	41,000	42,000	43,000	44,000	(5)
49	Telephone	1,300	1,000	1,000	1,000	1,000	1,000	1,000	(5)
50	Postage/Courier	9,901	10,000	10,000	10,000	10,000	10,000	10,000	(5)
51	Travel (Lodge,meals,miles)	1,834	2,000	2,000	2,000	2,000	2,000	2,000	(5)
52	Mileage Reimb. Local Travel	150	0	0	0	0	0	0	(5)
53	Advertising	0	0	0	0	0	0	0	(5)
54	Operating Rentals & Lease	3,758	4,000	4,000	4,000	4,000	4,000	4,000	(5)
55	Utility - Electricity	1,500	2,000	2,000	2,000	2,000	2,000	2,000	(5)
56	Utility - Garbage/Solid Waste	15,364	16,000	16,000	16,000	16,000	16,000	16,000	(5)
57	Repairs & Maintenance	434,742	446,000	457,000	468,000	480,000	492,000	504,000	(5)
58	Dues, Subscriptions	730	1,000	1,000	1,000	1,000	1,000	1,000	(5)
59	Printing & Binding	9,428	10,000	10,000	10,000	10,000	10,000	10,000	(5)
60	Registration/Training/Admissn	6,294	6,000	6,000	6,000	6,000	6,000	6,000	(5)
61	City Grants to Other Agencies	20,000	21,000	22,000	23,000	24,000	25,000	26,000	(5)
62	Intergovt Professional Service	203,808	209,000	214,000	219,000	224,000	230,000	236,000	(5)
63	Other Improvements	0	0	0	0	0	0	0	(5)
64	Interfund Chg - Equip Replacement	41,908	43,000	44,000	45,000	46,000	47,000	48,000	(5)
65	Interfund Vehicle Operat/Maint	59,273	61,000	63,000	65,000	67,000	69,000	71,000	(5)
66	O&M Adjustments for LOS 1 (Excl Asset Management and Basin Plans)	0	67,726	54,001	83,004	114,779	111,029	106,529	(4)
67	Additional LOS 1 General Fund Cost Allocation for O&M Expenses	0	10,159	8,100	12,451	17,217	16,654	15,979	(4)
68	Additional O&M for New Infrastructure	89,577	117,880	147,626	163,354	163,734	173,114	173,503	(10)
69	Subtotal of Direct O&M Costs	$1,826,554	$1,990,765	$2,054,727	$2,153,808	$2,241,729	$2,299,797	$2,349,011	

City of Shoreline
Surface Water Management Fund Projected Sources and Uses of Funds
LOS 1 Adjustments

Line No		Projected 2011 (1)	Projected 2012	2013	2014	2015	2016	2017	Notes
70	**Amount Available for Rate, Grant and Reserve-Funded Capital**	$951,927	$1,719,208	$1,763,842	$1,816,071	$1,810,150	$1,522,082	$990,868	
71	The Amount available from Capital Projects must cover all Surface Water CIP expenditures (Department 30). This includes:								
72	- Transfers out, which includes the CIP portion of the GFCA.								
73	- Personnel costs charged to capital projects.								
74	- Captial project formulation costs charged to Surface Water Management.								
75	- Professional Services incurred in the CIP.								
76	- Construction of Fixed Assets.								
77	- Basin Planning @ $150,000/yr.								
78	- Asset Inventory and Management.								
79	This compares with 2010 spending of $2,685,025.								
80									
81	Reserve Funded	$0	$500,000	$500,000	$1,000,000	$1,000,000	$650,000	$0	(7)
82									
83	Operating Transfers Out								(6)
84	Surface Water Operations	$272,131	$279,000	$286,000	$293,000	$300,000	$308,000	$316,000	
85	Surface Water CIP	0	0	0	0	0	0	0	
86	Less CIP GFCA	0	0	0	0	0	0	0	
87	Subtotal of Operating Transfers Out	$272,131	$279,000	$286,000	$293,000	$300,000	$308,000	$316,000	
88									
89	Debt Service								
90	Existing Debt	$344,431	$344,431	$344,431	$344,431	$344,431	$344,431	$344,431	(1)
91	New Debt Service	0	0	0	0	0	0	0	
92	Total Debt Service	$344,431	$344,431	$344,431	$344,431	$344,431	$344,431	$344,431	
93									
94									
95	Ending Fund Balance	$4,269,640	$3,769,640	$3,269,640	$2,269,640	$1,269,640	$619,640	$619,640	
96	Exceed Minimum Balance Criterion?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	(8)
97	Minimum Balance @20% of Operating Expenditures	$488,600	$522,800	$537,000	$558,200	$577,200	$590,400	$601,900	(8)
98									
99	Debt Service Coverage Ratio	N/A	N/A	N/A	N/A	N/A	N/A	N/A	(9)
100									
101	Cumulative % increase	0.00%	2.50%	5.58%	8.74%	12.00%	16.48%	22.31%	
102	SFR Rate $/yr	$130.00	$133.25	$137.25	$141.36	$145.61	$151.43	$159.00	

Notes:

(1) Based on 2012 - 2017 Capital Improvement Plan. Per the City, Capital Cost amounts account for inflation. Software grant per the City 070711.
(2) 2011 amount from 6/8/11 email from Brian Landou. Projected growth 0.25%/year.
(3) 2012 amount Per 2012-2017 Capital Improvement Plan. Projected interest income = 1.5% of previous years' ending fund balance.
(4) Source: AJG_Shoreline_LOS Cost Allocation2011 Budget.xls. GFCA adjustment is percentage of O&M costs. Additional General Fund Cost Allocation percentage calculated from City's 2011 GFCA and O&M Costs. GFCA assumed to be 15% LOS categories. Adjustment does not included $150k/yr Basin Planning or Asset Inventory and Management.
(5) Source: City of Shoreline 2011 Adopted Budget.pdf pg 436-437. Projected years adjusted for inflation and growth.
(6) 2011 amounts from 2011 Adopted Budget.pdf pg 337-338 less General Fund cost allocation overhead charge. 2012-2017 amounts inflation plus growth.
(7) Per the City 070711, spending down reserves to $600k by 2017 for capital costs.
(8) Based on a Minimum Ending Balance of 20 percent of Operating Expenses, per City policy.
(9) Based on Total Revenues less O&M expenditures divided by New Debt Service (for bonds).
(10) Source; 081511 email from City; accounts for the estimated O&M costs not included in the Adopted Budget.

City of Shoreline
Surface Water Management Fund Projected Sources and Uses of Funds
LOS 2 Adjustments

			Projected						
			2012	2013	2014	2015	2016	2017	Notes
1	**Sources of Funds**								
2	Beginning Fund Balance		$4,269,640	$3,778,190	$3,272,140	$2,253,920	$1,341,700	$841,930	
3	Charges for Goods and Services								
4									
5	SWM Fees at Existing Rates		$3,199,000	$3,199,000	$3,199,000	$3,199,000	$3,199,000	$3,199,000	(2)
6									
7	Additional SWM Fee Revenues	% Increase							
8	2011 Rate Increase	0.00%	$0	$0	$0	$0	$0	$0	
9	2012 Rate Increase	6.00%	192,000	192,000	192,000	192,000	192,000	192,000	
9	2013 Rate Increase	6.00%		203,000	203,000	203,000	203,000	203,000	
10	2014 Rate Increase	6.00%			215,640	215,640	215,640	215,640	
11	2015 Rate Increase	5.50%				210,000	210,000	210,000	
12	2016 Rate Increase	5.00%					201,000	201,000	
13	2017 Rate Increase	0.00%						0	
14	Total Additional SWM Fee Revenues		$192,000	$395,000	$610,640	$820,640	$1,021,640	$1,021,640	
15									
16	Interest Income		64,000	57,000	49,000	34,000	20,000	13,000	(3)
17	Debt Proceeds		0	0	0	0	0	0	
18	Total Revenues		$3,455,000	$3,651,000	$3,858,640	$4,053,640	$4,240,640	$4,233,640	
19									
20	Department of Ecology Stormwater Retrofit Grant		195,000	435,000	0	0	0	0	(1)
21	Software Grant		200,000	0	0	0	0	0	(1)
22	King County Flood Zone District Opportunity Fund		95,404	80,000	80,000	80,000	80,000	80,000	(1)
23	Total Sources of Funds		$8,215,044	$7,944,190	$7,210,780	$6,387,560	$5,662,340	$5,155,570	

City of Shoreline
Surface Water Management Fund Projected Sources and Uses of Funds
LOS 2 Adjustments

Line No		Projected 2012	2013	2014	2015	2016	2017	Notes
24	O&M Costs (SW Roads & SW Operations)							
25	Salaries and Wages	$577,000	$598,000	$618,000	$638,000	$659,000	$681,000	(5)
26	Salaries - Extra Help	57,000	59,000	$61,000	$63,000	$65,000	$67,000	(5)
27	Overtime	8,000	8,000	$8,000	$8,000	$8,000	$8,000	(5)
28	Overtime - Extra Help	0	0	0	0	0	0	(5)
29	Standby Pay	4,000	4,000	4,000	4,000	4,000	4,000	(5)
30	Callback Pay	4,000	4,000	4,000	4,000	4,000	4,000	(5)
31	Vacation Buyout	0	0	0	0	0	0	(5)
32	Social Security Replace Program	35,000	36,000	37,000	38,000	39,000	40,000	(5)
33	Soc Sec Replace Pgm - Xtra Help	3,000	3,000	3,000	3,000	3,000	3,000	(5)
34	PERS	38,000	39,000	40,000	41,000	42,000	43,000	(5)
35	PERS - Extra Help	2,000	2,000	2,000	2,000	2,000	2,000	(5)
36	PERS - Back Contrib. Employer	0	0	0	0	0	0	(5)
37	PERS - Back Contrib. Employee	0	0	0	0	0	0	(5)
38	Insurance Premium Allowance	98,000	100,000	103,000	106,000	109,000	112,000	(5)
39	Medicare	8,000	8,000	8,000	8,000	8,000	8,000	(5)
40	Medicare - Extra Help	1,000	1,000	1,000	1,000	1,000	1,000	(5)
41	Labor & Industries	11,000	11,000	11,000	11,000	11,000	11,000	(5)
42	Labor & Industries - Extra Help	3,000	3,000	3,000	3,000	3,000	3,000	(5)
43	Office Supplies	1,000	1,000	1,000	1,000	1,000	1,000	(5)
44	Operating Supplies	64,000	66,000	68,000	70,000	72,000	74,000	(5)
45	Program Supplies	5,000	5,000	5,000	5,000	5,000	5,000	(5)
46	Small Tool/Minor Equipment	5,000	5,000	5,000	5,000	5,000	5,000	(5)
47	Software/Upgrades/Licenses	0	0	0	0	0	0	(5)
48	Professional Services	39,000	40,000	41,000	42,000	43,000	44,000	(5)
49	Telephone	1,000	1,000	1,000	1,000	1,000	1,000	(5)
50	Postage/Courier	10,000	10,000	10,000	10,000	10,000	10,000	(5)
51	Travel (Lodge,meals,miles)	2,000	2,000	2,000	2,000	2,000	2,000	(5)
52	Mileage Reimb. Local Travel	0	0	0	0	0	0	(5)
53	Advertising	0	0	0	0	0	0	(5)
54	Operating Rentals & Lease	4,000	4,000	4,000	4,000	4,000	4,000	(5)
55	Utility - Electricity	2,000	2,000	2,000	2,000	2,000	2,000	(5)
56	Utility - Garbage/Solid Waste	16,000	16,000	16,000	16,000	16,000	16,000	(5)
57	Repairs & Maintenance	446,000	457,000	468,000	480,000	492,000	504,000	(5)
58	Dues, Subscriptions	1,000	1,000	1,000	1,000	1,000	1,000	(5)
59	Printing & Binding	10,000	10,000	10,000	10,000	10,000	10,000	(5)
60	Registration/Training/Admissn	6,000	6,000	6,000	6,000	6,000	6,000	(5)
61	City Grants to Other Agencies	21,000	22,000	23,000	24,000	25,000	26,000	(5)
62	Intergovt Professional Service	209,000	214,000	219,000	224,000	230,000	236,000	(5)
63	Other Improvements	0	0	0	0	0	0	(5)
64	Interfund Chg - Equip Replacement	43,000	44,000	45,000	46,000	47,000	48,000	(5)
65	Interfund Vehicle Operat/Maint	61,000	63,000	65,000	67,000	69,000	71,000	(5)
66	O&M Adjustments for LOS 1 (Excl Asset Management and Basin Plans)	67,726	54,001	83,004	114,779	111,029	106,529	(4)
67	Additional LOS 1 General Fund Cost Allocation for O&M Expenses	10,159	8,100	12,451	17,217	16,654	15,979	(4)
68	O&M Adjustments for LOS 2 (Excl Basin Plans)	3,000	107,000	217,000	217,000	214,000	306,000	
69	Additional LOS 2 General Fund Cost Allocation for O&M Expenses	450	16,050	32,550	32,550	32,100	45,900	
70	Additional O&M for new infrastructure	117,880	147,626	163,354	163,734	173,114	173,503	(11)
71	Subtotal of Direct O&M Costs	$1,994,215	$2,177,777	$2,403,358	$2,491,279	$2,545,897	$2,700,911	

City of Shoreline
Surface Water Management Fund Projected Sources and Uses of Funds
LOS 2 Adjustments

Line No		Projected 2012	2013	2014	2015	2016	2017	Notes
72	**Amount Available for Rate, Grant and Reserve-Funded Capital**	$1,819,208	$1,863,842	$1,916,071	$1,910,150	$1,622,082	$1,090,868	(10)
73	The Amount available from Capital Projects must cover all Surface Water CIP expenditures (Department 30). This includes:							
74	- Transfers out, which includes the CIP portion of the GFCA.							
75	- Personnel costs charged to capital projects.							
76	- Captial project formulation costs charged to Surface Water Management.							
77	- Professional Services incurred in the CIP.							
78	- Construction of Fixed Assets.							
79	~~- Basin Planning.~~							
80	- Asset Inventory and Management.							
81	This compares with 2010 spending of $2,685,025.							
82								
83	Operating Transfers Out							(6)
84	Surface Water Operations	$279,000	$286,000	$293,000	$300,000	$308,000	$316,000	
85	Surface Water CIP	0	0	0	0	0	0	
86	Less CIP GFCA	0	0	0	0	0	0	
87	Subtotal of Operating Transfers Out	$279,000	$286,000	$293,000	$300,000	$308,000	$316,000	
88								
89	Debt Service							
90	Existing Debt	$344,431	$344,431	$344,431	$344,431	$344,431	$344,431	(1)
91	New Debt Service	0	0	0	0	0	0	
92	Total Debt Service	$344,431	$344,431	$344,431	$344,431	$344,431	$344,431	
93								
93	**Total SWM Utility Expenditures**	**$4,436,854**	**$4,672,050**	**$4,956,860**	**$5,045,860**	**$4,820,410**	**$4,452,210**	
94								
95	Ending Fund Balance	$3,778,190	$3,272,140	$2,253,920	$1,341,700	$841,930	$703,360	(7)
96	Exceed Minimum Balance Criterion?	Yes	Yes	Yes	Yes	Yes	Yes	(8)
97	Minimum Balance @20% of Operating Expenditures	$523,500	$561,600	$608,200	$627,100	$639,700	$672,300	(8)
98								
99	Debt Service Coverage Ratio	N/A	N/A	N/A	N/A	N/A	N/A	(9)
100								
101	Cumulative % increase	6.00%	12.36%	19.10%	25.65%	31.93%	31.93%	
102	SFR Rate $/yr	$137.80	$146.07	$154.83	$163.35	$171.52	$171.52	
		$133.25	$137.25	$141.36	$145.61	$149.97	$154.47	

Notes:

(1) Based on 2012 - 2017 Capital Improvement Plan. Per the City, Capital Cost amounts account for inflation. Software grant per the City 070711.
(2) 2011 amount from 6/8/11 email from Brian Landou. Projected growth 0.25%/year.
(3) 2012 amount Per 2012-2017 Capital Improvement Plan. Projected interest income = 1.5% of previous years' ending fund balance.
(4) Source: AJG_Shoreline_LOS Cost Allocation2011 Budget.xls. GFCA adjustment is percentage of O&M costs. Additional General Fund Cost Allocation percentage calculated from City's 2011 GFCA and O&M Costs. GFCA assumed to be 15% LOS categories. Adjustment does not included $150k/yr Basin Planning or Asset
(5) Source: City of Shoreline 2011 Adopted Budget.pdf pg 436-437. Projected years adjusted for inflation and growth.
(6) 2011 amounts from 2011 Adopted Budget.pdf pg 337-338 less General Fund cost allocation overhead charge. 2012-2017 amounts inflation plus growth.
(7) Per the City 070711, spending down reserves to $600k by 2017 for capital costs.
(8) Based on a Minimum Ending Balance of 20 percent of Operating Expenses, per City policy.
(9) Based on Total Revenues less O&M expenditures divided by New Debt Service (for bonds).
(10) Amount includes $100k for Basin Plans.
(11) Source; 081511 email from City; accounts for the estimated O&M costs not included in the Adopted Budget.