



**CITY OF KIRKLAND**  
Department of Public Works  
123 Fifth Avenue, Kirkland, WA 98033 425.587.3800  
www.kirklandwa.gov

---

## MEMORANDUM

**To:** Kurt Triplett, City Manager

**From:** Jenny Gaus, Surface Water Engineering Supervisor  
Rob Jammerman, Development Engineering Manager  
Marilynne Beard, Interim Public Works Director

**Date:** August 21, 2014

**Subject:** SURFACE WATER MASTER PLAN DRAFT -- EXECUTIVE SUMMARY

### **RECOMMENDATION:**

It is recommended that City Council receives and reviews the attached Executive Summary of the Surface Water Master Plan including recommended program additions and capital projects and provides input concerning the recommended Plan and the specific policy issues that are listed below and described in the attached Executive Summary.

### **BACKGROUND DISCUSSION:**

#### *Purpose of the Plan*

The Surface Water Master Plan serves as the City's "Comprehensive Drainage and Storm Sewer Plan" as required by Chapter 15.52 of the Kirkland Municipal Code. According to Chapter 15.52 KMC, "A comprehensive drainage and storm sewer plan shall be developed by the city for review and adoption by the City Council. Such a plan may include basin-specific or city-wide recommendations for regulations, procedures, and programs. Such regulations, procedures and programs may include but are not limited to capital projects, public education and enforcement activities, operation and maintenance of city storm and surface water facilities, and land use management regulations to be recommended for adoption by ordinance for managing surface and storm water management facilities. Once adopted by the city council, elements of the comprehensive drainage and storm sewer plan pertaining to new development and redevelopment projects shall be incorporated into the standard plans. (Ord. 3711 § 4 (part), 1999)"

#### *Development of the Plan*

There is no set interval for plan renewal or replacement. The last Surface Water Master Plan was updated in 2005. Funding for a new Plan was set aside during the 2011-2012 budget process as one of the needs related to annexation of the Finn Hill, Juanita, and Kingsgate neighborhoods. Work on the plan began in late 2012.

Input from the public was solicited via a meeting/open house in May of 2013, and by participation in three citywide community planning days held between June, 2013 and April, 2014.

#### *Content of the Plan*

The goals of the Surface Water Utility are flood reduction, water quality improvement, infrastructure protection, and aquatic habitat protection and improvement. The attached Executive Summary provides an overview of recommended programs and projects designed to meet these goals given new constraints and opportunities presented by stormwater assets and issues in the annexation area and a new NPDES Phase II Municipal Stormwater Permit.

Programs are sorted into two priorities, **required** and **augmented**, based on whether they meet or augment a basic level of service. Flood prevention is a top priority of the Utility and is largely handled through capital construction rather than through response and management programs. Program recommendations are largely related to maintenance of infrastructure, with TV inspection of pipes and ditch maintenance being the highest-priority items. TV inspection is critical to identifying failing infrastructure that requires repair or replacement before it results in flooding or other system impacts. Other programs such as adoption of updated stormwater design regulations and review of codes for incorporation of low impact development stormwater features are mandatory requirements of the NPDES Phase II Municipal Stormwater Permit. Programs to make progress on water quality and habitat improvement include monitoring of chemistry and habitat in streams and management of streamside vegetation.

An updated geologic map for the annexation area is needed to develop stormwater facility designs that are protective of steep slopes and landslide hazards. Such a map can also be used to assist developers in determining what types of low impact stormwater facilities may be feasible at a given site. This work will be done in concert with update of the Geologic Hazards portion of the Zoning Code (Chapter 85), and would begin in late 2015 or early 2016. The geologic map for pre-annexation Kirkland was updated as a recommendation of the 2005 Surface Water Master Plan. Mapping costs will be shared with other City departments. Kirkland will also be updating the Critical Areas Ordinance in 2015 and 2016 as required by the state. Much of that work benefits the surface water utility and supports key policy initiatives of the surface water master plan such as flood reduction, water quality improvements and aquatic habit protection. During the 2015-2016 budget process staff will include a proposal to fund an appropriate portion of the Critical Areas Ordinance update with stormwater revenues.

Annexation area streams and infrastructure were investigated for capital construction needs. The capital projects list in the Plan includes annexation-area projects alongside newly-identified and identified but unfunded projects in pre-annexation Kirkland. The Plan also designates project priorities and a recommended 10-year implementation schedule. Project priorities were developed using criteria including the severity and impact of the issue and the feasibility of construction. The 10-year implementation schedule was developed based on priority of the project, priority of the goal that it serves (flooding, water quality, infrastructure, or habitat), and opportunities for coordination with other projects. One large project, Regional Detention in the Forbes Creek Basin, was not scheduled, as the \$10 million cost of this project should likely be financed using alternative strategies such as debt or buildup of cash reserves. This project can be programmed into the capital improvement program as other priorities and costs are determined.

The Plan recommends that the following policy issues be brought to Council for consideration (see discussion beginning on page XII in Executive Summary attached):

- A new policy for property acquisition as a strategic initiative
- Water quality treatment for existing development
- Beaver activity
- Stream deltas in Lake Washington
- Criteria for implementation of the Neighborhood Drainage portion of the CIP
- Capital Program financial policies

#### *Cost and Staffing to Implement the Plan*

The Plan recommends the addition of 6.5 full-time staff (FTE's) to the existing pool of 28.04 FTE's. The total cost of recommended programs and projects over the 10-year life of the Plan is \$36.3 million in 2014 dollars, not including the \$10 million Forbes Creek Regional Detention capital project. Financial analysis indicates that the Plan can be fully implemented with moderate rate increases over a 10-year period. Additional sources of funding including King County Flood Control District Sub-Regional Opportunity Fund, King Conservation District funding and Ecology's NPDES Municipal Capacity grants may help to further mitigate rate increases. However,

Surface Water Utility rates and the 2015-2016 Budget will be reviewed through separate processes in fall of this year. Once the Plan is adopted by Council, specific Plan financing options will be presented through service package requests, and the City Council can determine how and when Plan recommendations will be implemented.

*Next Steps & Adoption of the Plan*

Following this Study Session and a public comment period, the comments will be incorporated, and a complete Plan document will be presented to the City Council for discussion and adoption, likely in late October or November.

Attachment A: Surface Water Master Plan Executive Summary



# Draft Executive Summary

# 2014



## Surface Water MASTERPLAN





# City of Kirkland



## Surface Water MASTERPLAN

### City Council

Amy Walen, Mayor

Penny Sweet , Deputy Mayor

Jay Arnold, Council Member

Dave Asher, Council Member

Shelley Kloba, Council Member

Doreen Marchione, Council Member

Toby Nixon, Council Member

### City Manager

Kurt Triplett

### Interim Director of Public Works

Marilynne Beard



September 2014

# Acknowledgements

## PROJECT MANAGER:

**Jenny Gaus**, Surface Water Engineering Supervisor

## PUBLIC WORKS:

**Erin DeVoto**, Maintenance and Operations Superintendent

**Rob Jammerman**, Development and Environmental Services Manager

**Betsy Adams**, Environmental Education and Outreach Specialist

**Wes Ayers**, Surface Water Engineering Analyst

**Juliana Elsom**, Senior Operations and Finance Analyst

**Kelli Jones**, Surface Water Utility Engineer

**Jason Osborn**, Stormwater Maintenance Lead

**Stacey Rush**, Senior Surface Water Utility Engineer

**Seppo Tervo**, Water Quality Specialist

**Ryeann Tuomisto**, Water Quality Program Coordinator

**Dan VanIterson**, Stormwater/Wastewater Maintenance Lead

**Bobbi Wallace**, Surface and Wastewater Maintenance Manager

## INFORMATION TECHNOLOGY:

**Dimitri Ancira**, Senior Design Specialist

**Joe Plattner**, Senior GIS Analyst

**Mel Soares**, GIS Analyst

## FINANCE AND ADMINISTRATION:

**Tracey Dunlap**, Finance and Administration Director

## PLANNING:

**Deb Powers**, Urban Forester

**Paul Stewart**, Deputy Planning Director

## CONSULTANT TEAM

**Erin Nelson**, Project Manager/Technical Lead, Brown and Caldwell (now at Altaterra Consulting)

**Dan Draheim**, Technical Editing, Brown and Caldwell

**Laura Ruppert**, Capital Projects Lead, Osborn Consulting Inc.

**Marie Phelan**, Capital Projects Assistant, Osborn Consulting, Inc.

**Hugh Mortensen**, Natural Resources Lead, The Watershed Company

**Greg Johnston**, Culvert Assessments and Fisheries Lead, The Watershed Company

**Chris Hoffman**, Public Involvement Lead, Stepherson & Associates

**Rafaella Oleler**, Public Involvement, formerly with Stepherson & Associates

**Chad Wiggins**, Operations and Maintenance, Windward Environmental

**John Ghilarducci**, Financial and Rate Analysis, Financial Consulting Solutions Group

**Ryan Bert**, Financial and Rate Analysis, Financial Consulting Solutions Group

## ■ 1. INTRODUCTION AND BACKGROUND

Kirkland is a thriving 18 square mile city of 84,000 people. Located on the eastern shore of Lake Washington, the City has a strong connection to the water and natural environment. The City's Surface Water Utility (Utility) is a steward of these resources with goals to manage surface and stormwater such that:

- Flooding is reduced
- Water quality is improved
- Infrastructure is protected and maintained
- Aquatic habitat conditions are improved

The last Surface Water Master Plan was completed in 2005. Since then, the Utility has:

- Constructed over 20 capital projects to address flooding, water quality and habitat problems
- Continued to inspect, clean and maintain an aging and growing public stormwater system,
- Expanded education and stewardship to encourage behaviors that protect water resources,
- Adopted design regulations to mitigate impacts of new development
- Conducted watershed planning to identify stormwater facilities to mitigate existing development
- Provided spill response, training, investigation, and outreach to reduce stormwater pollution
- Complied with State and Federal water quality, flood protection, and endangered species regulations
- Developed the Urban Forestry Strategic Management Plan

An updated Surface Water Master Plan is needed to reflect (1) the addition of public stormwater infrastructure with the annexation of Finn Hill, Juanita and Kingsgate in 2011, (2) a re-issued NPDES Phase II Municipal Separated Stormwater (MS4) Permit (Permit), and (3) the need to integrate stormwater programs and projects into current City goals and interests. This plan presents a detailed review of these elements, an inventory of the City's surface and stormwater assets, an overview of existing programs, and prioritized capital project and programmatic recommendations. A brief discussion of financial considerations for plan implementation is included in anticipation of the City Council's rate and budget discussions that will occur following plan adoption. Utility performance measures that align with City Council goals and citizen expectations are presented to track progress and accountability. Proposed programs and projects are cross-referenced in this summary by project or program number as shown in the body of the Plan.

Program and capital project recommendations are presented below according to the major goals expected to be achieved.

## ■ 2. FLOODING

Flooding has impacts to Kirkland's economy and public safety. Flood reduction (frequency and severity) and flood preparedness is the top priority for the Utility.

### 2.A Flooding Programs

Construction of flood reduction projects is supported by programs that include maintenance, education, and planning efforts to assist residents by:

- Repairing and rehabilitating pipes and structures to maximize system capacity
- Clearing debris and obstructions from known trouble spots to prevent flooding (Creek and culvert watch list)
- Providing education and outreach to help residents prepare for and respond to flooding
- Investigating or providing referrals or technical assistance for citizen flooding reports or drainage inquiries
- Participating in the King County Flood Control District to manage flooding with regional economic impacts
- Conducting water level monitoring in the Totem Lake area to evaluate effectiveness of flood control and provide early warning to residents of potential flooding

Supplemental programs are recommended to further reduce localized flooding (CW-3, CW-12, CW-34), map floodplains (CW-30), and clarify when City assistance is appropriate to address private property impacts (CW-38). Cleaning and inspection of the stormwater system is also a flood reduction measure, keeping pipes clean to provide adequate capacity when necessary. This is a secondary benefit of maintaining infrastructure for system longevity and functionality (discussed below).

Table E-1 Supplemental Flood Reduction Programs

Recommended Program	Description	Benefits
<b>CW-3: Expand Fall Street Sweeping</b>	Overtime pay for maintenance workers to conduct additional street sweeping in the fall when it is most needed	<ul style="list-style-type: none"> <li>Reduced flooding from clogged catch basins and ditches</li> <li>Use of existing staff to augment current program</li> </ul>
<b>CW-12: Beaver Management Policy</b>	Evaluate the need for a formal policy of how and when to manage beavers that impact public facilities or large numbers of private parcels and how to fund ongoing costs for beaver management	<ul style="list-style-type: none"> <li>Consistent protocol for managing beavers that cause flooding of infrastructure or private property</li> </ul>
<b>CW-30: Juanita Creek Floodplain Mapping</b>	Evaluate the need for and consequences of mapping the Juanita Creek floodplain, including a base cost for obtaining a FEMA map revision	<ul style="list-style-type: none"> <li>A map of the Juanita Creek floodplain would provide clarity for development review staff as to limitations on development within the floodplain and compensatory mitigation for floodplain impacts. However, a floodplain map could affect private property owners' ability to obtain flood insurance and increase the cost of that insurance.</li> </ul>
<b>CW-34: Leaf Pick-up Evaluation</b>	Evaluation of fall leaf pick-up programs used by other jurisdictions and potential for Kirkland to implement a similar program	<ul style="list-style-type: none"> <li>Understanding of the pros and cons of leaf pick-up programs as they relate to Kirkland</li> </ul>
<b>CW-38: Neighborhood Drainage Assistance</b>	Evaluate the current neighborhood drainage assistance program and develop criteria for providing assistance	<ul style="list-style-type: none"> <li>Clarity for when and how neighborhood drainage assistance and how this program should be communicated to the public</li> </ul>

## 2.B Flooding Capital Projects

Street and private property flooding in the Totem Lake area is the largest flooding problem in Kirkland. Several projects have been completed, and more are underway to reduce the frequency and severity of this problem. One additional Totem Lake area flood-reduction capital project (JC-04) is recommended in this Plan. Other capital projects are proposed to address flooding problems in the 2011 annexation area (DE-01, JC-06, JC-07 and JC-08), South Rose Hill (RED-01) and a regional flooding problem at the I-405/NE 116th Street interchange (FO-2). Table E-2 lists recommended flood-reduction capital projects.

Table E-2 Flood Reduction Capital Projects

ID	Project	Primary Goal	Preliminary cost in 2014 dollars
<b>FO-02</b>	Regional detention in Forbes Creek basin	Flood Reduction	\$10,000,000
<b>DE-01</b>	Sediment removal in channel	Flood Reduction	\$136,000
<b>JC-07</b>	Goat Hill stabilize eroding channel	Flood Reduction	\$299,000
<b>JC-08</b>	Goat Hill increase pipe conveyance capacity	Flood Reduction	\$490,000
<b>RED-01</b>	Underground injection control well (infiltration facility)	Flood Reduction	\$65,000
<b>JC-06</b>	Goat Hill route flow away from open channel	Flood Reduction	\$521,000
<b>JC-04</b>	Flow diversion	Flood Reduction	\$266,000
<b>TOTAL</b>	<b>Flood Reduction Capital Projects</b>		<b>\$11,777,000</b>

## ■ 3. WATER QUALITY

Swimmable and fishable waters is the goal of water quality efforts. The Utility supports water quality improvement through educational efforts to reduce pollutants from being discharged into surface water, collecting field measurements to monitor water quality in lakes and streams, constructing capital projects to reduce erosion and sedimentation in streams, and complying with the NPDES Phase II Municipal Stormwater Permit.

### 3.A Phase II NPDES Permit

The Permit became effective on August 1, 2013, and will expire on July 31, 2018. It authorizes the City to discharge stormwater from its public system into Lake Washington and other Kirkland lakes and streams that are considered Waters of the State provided that actions are taken to reduce the discharge of pollutants in stormwater. The Permit requires actions in the following stormwater management areas:

- Public education and outreach
- Public involvement
- Illicit discharge detection and elimination (pollution source control including connections that could convey non-stormwater and instances of dumping)
- Control of runoff from new development and redevelopment and construction sites
- Municipal maintenance and operations (stormwater management at City facilities)
- Monitoring and effectiveness studies

Several major changes in the reissued Permit require program additions for compliance (CW-6, CW-7, CW-8). These are listed in Table E-3. Table E-3 also includes programs that are recommended to assist with Permit implementation (CW-9, CW-11, CW-19). For example, the Permit requires adoption of certain storm drainage design regulations, and programs are recommended to provide education and tools to reduce the impacts of this change on the development community.

Table E-3. Recommended **Permit-driven** Water Quality Program Additions

ID	Why?	Benefit of Recommendation
<b>CW-6: Development Review NPDES Analysis</b>	<ul style="list-style-type: none"> <li>• Permit reduced size threshold for surface water regulatory development review from 1 acre to 2,000 square feet (0.046 acre).</li> </ul>	<ul style="list-style-type: none"> <li>• Plan for how to complete timely review given that the number of permits to be reviewed will increase</li> <li>• Understanding of how NPDES Permit changes may affect resource needs so that adequate time can be budgeted and fees can be recovered, if necessary.</li> </ul>
<b>CW-7: LID Code Review</b>	<ul style="list-style-type: none"> <li>• Permit requires that municipal codes be reviewed and opportunities be identified for incorporating LID principles and best management practices (BMPs) into development code, rules, standards, and other enforceable documents.</li> </ul>	<ul style="list-style-type: none"> <li>• Permit compliance</li> <li>• As City staff go through the process of reviewing and revising codes to incorporate LID, they will be in a better position to relay requirements and develop tools for the Kirkland development community</li> </ul>
<b>CW-8: LID Implementation and Surface Water Manual Adoption</b>	<ul style="list-style-type: none"> <li>• Permit requires adoption of a new Surface Water Design Manual that is equivalent to the 2012 Ecology Manual. Updates codes and policies to match manual and to implement LID.</li> </ul>	<ul style="list-style-type: none"> <li>• Permit compliance</li> </ul>
<b>CW-9: Stormwater Facility Inspection</b>	<ul style="list-style-type: none"> <li>• Additional staff to be shared with Wastewater will allow O&amp;M staff to better inspect facilities that require such inspection after large storm events in the annexation area</li> </ul>	<ul style="list-style-type: none"> <li>• More resources will help ensure that time-critical inspections are completed</li> </ul>
<b>CW-11: Spill Response Vehicle</b>	<ul style="list-style-type: none"> <li>• Service truck dedicated to spill response</li> </ul>	<ul style="list-style-type: none"> <li>• Service truck equipped with proper supplies and gear will be able to respond to emergency spills more quickly, reducing the potential for water quality issues in surface water system</li> </ul>
<b>CW-19: Develop LID Feasibility Tools</b>	<ul style="list-style-type: none"> <li>• Permit requires development projects to use low impact development (LID) facilities or performance standards. Develop tools for evaluating feasibility and implementing LID at the site level</li> </ul>	<ul style="list-style-type: none"> <li>• Development of tools for use by City staff and the development community will provide a framework for consistent interpretation of criteria that can be used to determine when LID BMPs are not feasible</li> <li>• Maps areas where LID is infeasible otherwise already documented (for instance, steep slopes)</li> </ul>

The Permit requires screening for illicit discharges. The City may accomplish illicit discharge screening through TV inspection of pipes, which is already being done as part of an overall asset management strategy. The pace of TV pipe inspection needs to be increased if this approach is to be used to meet the Permit requirement of 12% of the system screened per year. A new TV inspection truck and associated staff is recommended to accomplish this and other asset management goals described below.

### 3.B Supplemental Water Quality Programs (not Permit Driven)

To meet its goal of improving water quality, the Utility conducts a variety of maintenance and outreach programs and other measures to protect and improve Kirkland’s water resources. Some of these actions are a continuation of requirements from the City’s first Permit and others are designed to monitor or prevent future water quality problems, including:

- Conducting stormwater infrastructure cleaning (catch basins and pipes) to reduce delivery of pollutants to streams and lakes (continuation of Permit requirements)
- Inspecting private drainage facilities to ensure adequate maintenance and functionality (continuation of Permit requirements)
- Educating residents about their role in protecting water quality (continuation of Permit requirements)
- Responding to reports of water quality problems, investigation, and follow up with education, cleanup or enforcement actions (continuation of Permit requirements)
- Sponsoring volunteer monitoring of Forbes Lake to measure chemical health and evaluate whether actions are necessary to protect or improve water quality
- Conducting pollution prevention visits to businesses to assist in their pollution prevention efforts

To continue and expand Utility water quality focused efforts, including those listed above, several supplemental programs are recommended (Table E-4), which focus on improving the water in streams and lakes by identifying, quantifying and eliminating sources of bacteria and other pollutants (CW-16, CW-17), and by preparing to provide water quality treatment for runoff from existing development (CW-18, CW-31, CW-33).

Table E-4. Supplemental Water Quality Programs

Recommended Supplemental Water Quality Programs	Description	Benefits
<b>CW-16: Proactively Avoid Total Maximum Daily Load (TMDL)</b>	Implement a program to reduce pollutants of concern in Kirkland’s 303(d) listed streams, including Juanita and Forbes creeks, and monitor progress	<ul style="list-style-type: none"> <li>• Implementing a program before it is required by the State will save costs in the long run, and accelerate water quality improvements</li> </ul>
<b>CW-17: City-Specific Water Quality Monitoring</b>	Expand lake monitoring program to include Totem Lake, and coordinate with King County to collect water quality index parameters in select stream locations to monitor water quality trends	<ul style="list-style-type: none"> <li>• Monitoring data will provide a baseline for understanding the effects of retrofit and other projects to improve water quality conditions in Kirkland’s lakes and streams</li> </ul>
<b>CW-18: Watershed Planning for Retrofit</b>	Evaluate opportunities for stormwater retrofit on a watershed basis, develop a plan to construct regional facilities, and opportunistically treat public stormwater in public/private facilities	<ul style="list-style-type: none"> <li>• Identification of specific projects would facilitate better decision making as opportunities for grant funding or add-ons to other planned projects occur</li> </ul>
<b>CW-31: Map Area of Treatment for Existing Stormwater Facilities</b>	One time project to develop a map of area treated for flow or water quality.	<ul style="list-style-type: none"> <li>• Helps identify areas that currently don’t have treatment in order to effectively identify opportunities for retrofit</li> </ul>
<b>CW-33: Retrofit Opportunities</b>	One-time project to review development projects for potential retrofit opportunities	<ul style="list-style-type: none"> <li>• Allows an opportunity to identify large-scale development projects currently in the works that would be good candidates for retrofit, ahead of future requirements that will not take effect until 2017</li> </ul>
<b>CW-36: Scoop Law Evaluation</b>	Pet Waste Pickup Laws	<ul style="list-style-type: none"> <li>• Raises awareness of the need to properly dispose of pet waste</li> </ul>

Redevelopment projects, which will constitute most development activity in the business districts of the City, will be required to provide stormwater facilities to mitigate the impacts of existing impervious surfaces. In addition, it is anticipated that the City will eventually be required to treat runoff from public streets. Planning for stormwater retrofits that provide regional facilities and that partner with private properties and private development projects may be a way to reduce the economic burden for all parties. A grant project is currently underway to study the retrofit needs and opportunities in the Totem Lake area, one of the City’s most important economic development zones. Additional projects like this will help to position the City to receive grant funding for construction of retrofit projects.

### 3.C Water Quality Capital Projects

Capital projects to address water quality are aimed at leveraging resources by retrofitting public roads with water quality treatment where none currently exists (CH-03), constructing water quality treatment in coordination with transportation projects (FO-13), reducing erosion and sedimentation in stream channels (CA-01, JC-01, EC-01), and managing channel down-cutting in Forbes Creek (FO-07).

Table E-5. Water Quality Capital Projects and Cost

ID	Project	Primary goal	Preliminary cost
CH-03	Rain garden and bioretention retrofit	Water quality	\$85,000
FO-07	Channel grade control	Water quality	\$165,000
CA-01	Erosion control measures	Water quality	\$550,000
FO-13	Pilot LID water quality project associated with planned transportation project	Water quality	\$65,000
JC-01	Sediment removal	Water quality	\$194,000
EC-01	Ravine stabilization	Water quality	\$830,000
<b>TOTAL</b>	<b>Water Quality Capital Projects</b>		<b>\$1,889,000</b>

## 4. INFRASTRUCTURE

The Utility is responsible for operations and maintenance of stormwater infrastructure in order to achieve optimal performance and extend the useful life of the City’s assets. Many of the programs and projects recommended in this Plan support infrastructure protection and maintenance.

### 4.A Infrastructure Programs

The Utility’s Operation and Maintenance (O&M) Group provides protection and maintenance of the City’s stormwater infrastructure, including

- Inspection and cleaning of catch basins, pipes, vaults, ponds, tanks and other stormwater treatment facilities
- Maintenance of drainage ditches
- Repair and rehabilitation of pipes and structures
- Vegetation management for stormwater ponds and other above-ground facilities

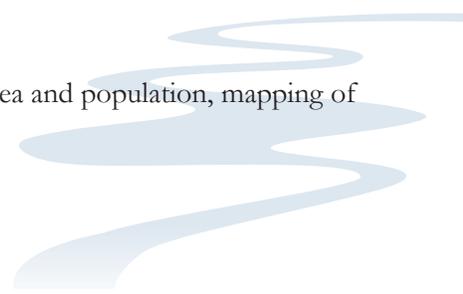
Staff and equipment for the Operation and Maintenance Group constitutes the majority of the current operating budget for the Utility.

#### 4.A.1 Annexation and New Facilities

Annexation and acquisition of the Cross Kirkland Corridor resulted in a significant increase in the number of stormwater conveyance and treatment facilities including:

- 61% increase (98 miles) in the length of pipe,
- 129% increase (31 facilities) in number of open stormwater ponds
- 126% increase (21 miles) in the length of ditches and swales

Although staff and equipment were added when annexation occurred based on ratios of area and population, mapping of assets and several years of experience with the area have revealed additional needs.



An updated geologic map for the annexation area is needed to develop stormwater facility designs that are protective of steep slopes and landslide hazards. Such a map can also be used to assist developers in determining what types of low impact stormwater facilities may be feasible at a given site. This work will be done in concert with update of the Geologic Hazards portion of the Zoning Code (Chapter 85), and will begin in late 2015 or early 2016. The geologic map for pre-annexation Kirkland was updated as a recommendation of the 2005 Surface Water Master Plan.

Maintenance of ditches takes a different and more intensive type of work than cleaning pipes, including four crew members instead of 2 and a backhoe and service truck instead of an eductor truck. The addition of a crew and equipment for ditching (CW-4) is the most costly and most-needed recommendation in this plan. Specialized maintenance equipment is needed to clean structures on Goat Hill because the roads are too steep to be accessible to traditional equipment (CW-5). An additional service truck and equipment are recommended to improve the efficiency of maintenance activities (CW-10). There is a backlog of rehabilitation needs in the annexation area, and a project is recommended to address those needs using temporary staffing (CW-32).

The number of low impact development (LID) stormwater facilities, such as rain gardens and permeable pavement, is increasing in the city as such facilities are now required as stormwater mitigation for development. Maintenance of these facilities requires landscaping and horticulture skills as well as traditional utility worker skills in construction. Additional funds for training and labor associated with LID facilities (CW-2) will ensure that they are an aesthetic asset to the community as well as providing a stormwater function.

Streams are part of the stormwater system in Kirkland, and maintenance of facilities that are in-line with streams requires permits and approvals from the City, the State Department of Fish and Wildlife and in some cases, the US Army Corps of Engineers. Permitting associated with maintenance activities has become increasingly complex and additional staff and/or consulting time is recommended (CW-23) to ensure that permits are obtained in a timely manner.

#### **4.A.2 Aging Infrastructure and Asset Management**

Repair and replacement of aging and failing infrastructure is important to prevent catastrophic failures that may cause flooding or public safety hazards such as sinkholes in streets. TV inspection of underground systems is vital to maintain an accurate condition rating that is needed to prioritize repair and replacement. A pipe TV inspection program was started in 2006 with 1 camera truck that is currently shared with the Wastewater Utility. To date, approximately 20% of publicly-owned stormwater pipes have been TV inspected and rated. Condition rating information shows that 20% of the pipes inspected were in need of repair (condition rated as “poor” or “fair”). Inspection data should be updated on an approximate 10 year cycle to ensure pipes have not deteriorated to a point where repair or replacement is necessary. In order to collect data usable for asset management purposes, as well as to conduct screening for illicit discharges (see above) it is recommended that the City fund a new TV inspection truck and associated staff (CW-1). The cost of these items would be shared with the Wastewater Utility.

*Table E-6. Recommended Infrastructure Programs and Equipment*

<b>Recommended Infrastructure Program Addition</b>	<b>Description</b>	<b>Benefits</b>
<b>CW-1: TV Inspection of Pipes</b>	Two additional staff and an additional CCTV inspection truck to be shared between Wastewater and Surface Water	<ul style="list-style-type: none"> <li>• Ability to meet the pavement overlay schedule, while still conducting other important O&amp;M functions</li> <li>• Additional CCTV truck will help accelerate the pipe inspection program, which is useful for better understanding condition of the system and potential replacement needs</li> <li>• Pipe inspection can be used to meet NPDES requirements for IDDE</li> </ul>
<b>CW-2: LID Maintenance</b>	Additional grounds crew laborers, training, and equipment to maintain LID sites as they become more prevalent	<ul style="list-style-type: none"> <li>• Staff with skills in landscape maintenance will be better able to maintain LID facilities</li> </ul>

Table E-6. Recommended Infrastructure Programs and Equipment Cont.

Recommended Infrastructure Program Addition	Description	Benefits
<b>CW-4: Ditch Maintenance</b>	Hire additional staff, and acquire an additional multi-purpose dump truck, backhoe, and trailer in future years to effectively maintain Kirkland's ditches	<ul style="list-style-type: none"> <li>• Maintained ditches are better able to convey water and reduce flooding, contribute to better water quality, and result in fewer citizen complaints</li> <li>• Contract workers will help O&amp;M staff catch up with ditch cleaning, particularly in the annexation area where there are a greater number of open ditches</li> <li>• Eventual staff and equipment purchases will allow for better and more consistent long-term ditch maintenance</li> </ul>
<b>CW-5: Maintenance on Goat Hill</b>	Rent equipment so that City staff can access Goat Hill and conduct necessary infrastructure maintenance	<ul style="list-style-type: none"> <li>• Appropriately sized equipment will allow for more frequent infrastructure maintenance that may help alleviate ongoing erosion problems on Goat Hill</li> </ul>
<b>CW-10: Service Truck</b>	Additional service truck to haul heavy gear, including a small crane	<ul style="list-style-type: none"> <li>• Additional equipment will help staff fulfill NPDES requirements and manage increased workload associated with annexation area</li> </ul>
<b>CW-15: Utility Rate Study</b>	Conduct a rate study to assess short-term and long-term program revenue needs and evaluate partitioning of funds between operations and capital projects	<ul style="list-style-type: none"> <li>• An evaluation of revenue needs in order to support program operation will facilitate decisions on how and when to implement projects based on City priorities</li> </ul>
<b>CW-20: Incorporation of LID into City Capital Projects</b>	Develop a preliminary policy to support capital project engineers in the use of LID on City projects	<ul style="list-style-type: none"> <li>• Demonstration to the community that the City leads by example and follows a protocol that is encouraged of developers</li> </ul>
<b>CW-22: Operations and Maintenance CIP Consultation</b>	Time for O&M staff to coordinate more effectively with capital projects engineers to design projects with long-term maintenance in mind	<ul style="list-style-type: none"> <li>• Timely coordination during the project design phase will result in better projects and less O&amp;M time and money once the project is constructed</li> </ul>
<b>CW-23: Environmental Permitting for Maintenance</b>	Time for City staff or a consultant to obtain environmental permits for maintenance projects, and follow up on reporting requirements once permits are obtained	<ul style="list-style-type: none"> <li>• Dedicated staff time will result in better permit planning and coordination of work efforts that require environmental permits, particularly in the annexation area where infrastructure maintenance could have impacts to natural resources</li> <li>• Dedicated staff will result in more consistency in identification of when permits are required and how they are obtained</li> </ul>
<b>CW-25: Evaluation of Stream Deltas in Lake Washington</b>	Evaluate whether a policy is needed to direct the Surface Water Utility in decisions related to if or when it would conduct dredging to maintain functionality of marinas or boat launches	<ul style="list-style-type: none"> <li>• A policy, if needed, would provide clarity for whether the City views potential dredging projects as a public benefit and whether City funds should be used for such activities</li> </ul>
<b>CW-27: Climate Change Evaluation</b>	Evaluate potential future effects of climate change and develop a policy that addresses future infrastructure needs, planning, and adaptive management	<ul style="list-style-type: none"> <li>• Consideration of potential climate impacts will facilitate better project designs and implementation, especially for those projects or infrastructure that have an anticipated project life cycle that extends into predicted climate change scenario time frames (50 to 100 years)</li> </ul>
<b>CW-28: Streamside Restoration Maintenance</b>	Evaluation of responsibility for maintaining stream capital projects, and funding to increase maintenance on stream restoration sites	<ul style="list-style-type: none"> <li>• Clarity of responsibility, including time frames, easements, and maintenance obligations</li> <li>• Streamside maintenance protects investment in clearing and planting of native vegetation. Long-term health of streamside areas improves water quality and habitat</li> </ul>
<b>CW-32: Stormwater System Rehabilitation Catch-up</b>	Temporary maintenance workers (6-month time frame) and equipment rental to conduct system rehabilitation	<ul style="list-style-type: none"> <li>• Reduce system rehabilitation backlog</li> </ul>

Table E-6. Recommended Infrastructure Programs and Equipment Cont.

Recommended Infrastructure Program Addition	Description	Benefits
<b>CW-39 Residential Stormwater Audit Program</b>	The Stormwater Audit Pilot Program, currently under way via King Conservation District and NPDES Municipal Stormwater Capacity grants, seeks to work with homeowners to identify simple and low-cost ways that they can absorb and filter more stormwater on their property.	<ul style="list-style-type: none"> <li>Evaluation of this program will help determine if future funding should be sought through grant funding or if the Utility should allocate funds for future implementation</li> </ul>
<b>CW-40 Neighborhood Rain Garden Program</b>	The Neighborhood Rain Garden Program identifies a neighborhood champion who recruits six to eight neighbors who will have rain gardens constructed in their front yards. Following construction of the gardens by a City contractor, neighbors gather to plant vegetation in each of the gardens. This program helps to reduce volume of runoff to the stormwater system.	<ul style="list-style-type: none"> <li>Depending on the success of this program, the City may consider expansion and re-allocation of City resources for funds and staff to support this program</li> </ul>

### 4.A.3 Utility Programs that Promote Protection of Infrastructure

Indirectly there are a number of other programs recommended in this Plan that will help protect infrastructure and extend the useful life of the City’s assets (Table E-6). Evaluation of the Utility rate structure and potential incentives and rebates (such as a “Treebate” program) can help to encourage residents to manage stormwater on their property rather than relying on the capacity of the public system (CW-14, CW-15). Increased consultation between the Capital Projects Group

Table E-7. List of Recommended Capital Infrastructure Projects

ID	Project	Primary goal	Preliminary cost
<b>CH-04</b>	Groundwater seepage and road stability	Infrastructure	\$126,000
<b>CH-01</b>	Undersized pipe to be replaced	Infrastructure	\$219,000
<b>CW-INF-02</b>	Pipe repair and replacement	Infrastructure	\$3,025,000
<b>CW-INF-01</b>	Pipe repair and replacement	Infrastructure	\$769,000
<b>JC-05</b>	NE 141st Street/111th Avenue NE culvert replacement	Infrastructure	\$765,000
<b>MB-01</b>	Replace stormwater pipes	Infrastructure	\$680,000
<b>HAS-01</b>	Pipe replacement, improved hydraulics	Infrastructure	\$2,369,000
<b>JC-02</b>	Infrastructure/conveyance	Infrastructure	\$874,000
<b>TOTAL</b>	<b>Infrastructure Capital Projects</b>		<b>\$8,827,000</b>

and the Operations and Maintenance Groups (CW-22), as well as development of a policy for incorporating LID into city projects (CW-20) will help with successful construction and maintenance of LID facilities that use soils and vegetation to slow stormwater, thus reducing capacity needs for the public system. Review of big picture issues such as the interaction between climate change and Utility activities (CW-27) would help to position the Utility to respond to changing conditions.

### 4.B Infrastructure Capital Projects

Capital projects to support stormwater infrastructure include pipe repair and replacement projects identified through TV inspection or failures, and projects that protect other City assets such as roads. Table E-7 lists the capital infrastructure projects recommended in this Plan.



## ■ 5. HABITAT

The Utility, having primary responsibility for surface and stormwater management in Kirkland, also is largely responsible for aquatic habitat conditions because they are dependent on one another. The Utility has a goal of improving overall aquatic habitat conditions and protecting those natural resources that are already in good condition and provide valuable benefits to the Utility, particularly flood reduction and water quality improvement.

Table E-8. Recommended List of Supplemental Habitat Programs

Habitat Programs	Description	Benefits
<b>CW-13: Address Prioritized Fish Passage Barriers</b>	Implement a fish barrier removal program and conduct an internal informational campaign	<ul style="list-style-type: none"> <li>• Systematic removal of priority fish barriers addresses regional and tribal fish passage concerns</li> <li>• Opportunities for incorporating fish barrier removal on City-led or permitted projects will not be missed</li> </ul>
<b>CW-21: Stream Habitat and Fish Monitoring</b>	Perform habitat surveys on three stream channel reaches and annual fish surveys to monitor habitat quality and fish population trends	<ul style="list-style-type: none"> <li>• Monitoring data will provide a baseline for understanding the effects of retrofit and other projects to improve aquatic habitat conditions that support fish populations in Kirkland's streams</li> </ul>
<b>CW-24: Property Acquisition Priority Map</b>	Develop a map (for internal use) of priority parcels for acquisition based on Utility goals	<ul style="list-style-type: none"> <li>• Identification of desirable properties for acquisition would facilitate decision making as properties become available for transfer</li> </ul>
<b>CW-26: Urban Forestry and Tree Inventory</b>	Update citywide public right-of-way tree inventory, develop the framework for a treebate program	<ul style="list-style-type: none"> <li>• Previously completed tree inventory has not been maintained and does not contain the level of detail needed for effective management</li> <li>• Updated tree inventory would allow for a better understanding of the type, location, and age of trees that provide surface water and stormwater environmental functions (temperature moderation, water uptake, detritus, food sources for bugs, etc.) in public right-of-way</li> <li>• Treebate program would provide funds for residents to plant new trees that provide surface water functions on private property</li> <li>• Cost-sharing with other departments that utilize urban forester for benefits beyond surface water</li> <li>• Eco-benefits analysis</li> </ul>
<b>CW-29: Noxious Weeds and Invasive Plants</b>	Review noxious weed programs implemented by other jurisdictions and develop a Kirkland-specific program to be implemented across departments, and use volunteers to the extent feasible	<ul style="list-style-type: none"> <li>• Citywide control of noxious weeds will benefit the Surface Water Utility through decreased time spent on control of noxious weeds at surface water facilities, and better success rates for stream and wetland restoration projects</li> <li>• A noxious weed program will be very important as LID facilities are constructed throughout the city, as these facilities are typically vegetated and compost-amended soils provide an excellent growing medium for all plants including noxious weeds that get imported to the site in one manner or another</li> </ul>
<b>CW-35: Private Streambank Stabilization Program</b>	Evaluate the existing private streambank stabilization program and provide recommendations for future continuation and project criteria	<ul style="list-style-type: none"> <li>• The program will be more effective with clarity on how and when funds should be used</li> </ul>
<b>CW-37: Volunteer Involvement</b>	Evaluate the use of volunteers for surface water program activities and recommend whether the program should be expanded, diminished, or abandoned based on benefits and costs	<ul style="list-style-type: none"> <li>• The results of this evaluation will help utilize volunteers more effectively</li> </ul>

## 5.A Habitat Programs

The Utility manages and conducts the following activities in support of habitat improvement:

- Education and outreach to streamside property owners
- Salmon watch program
- Benthic Index of Biotic Integrity (B-IBI) monitoring (measures the number and diversity of bugs in different stream as an indicator of water quality and habitat conditions)
- Participation in Water Resource Inventory Area (WRIA) 8 (Cedar/Lake Washington/Lake Sammamish) Salmon Recovery Council to plan for restoration and de-listing of Chinook Salmon populations as threatened species under the Federal Endangered Species Act

Recommended program additions are intended to ensure that the City continues to make progress on removal of fish passage barriers (CW-13), to protect trees and streamside habitat through inventory acquisition, monitoring and management (CW-21, CW-24, CW-26, CW-29), and to clarify the criteria and goals for habitat-related volunteer projects and construction projects (CW-35, CW-37).

## 5.B Habitat Capital Projects

A habitat inventory was conducted for the 2005 Surface Water Master Plan Update. New natural resources, including several stream channels were added with the 2011 annexation, and surveyed for overall condition and habitat issues for this Plan. Champagne Creek and Denny Creek, the two largest streams in the annexation area exhibit physical conditions that were likely caused by a combination of high stormwater flows that contributed to bank erosion, landslides, and subsequent sedimentation that results in poor habitat conditions for fish. Information from review of streams in pre-annexation Kirkland collected during the 2005 Surface Water Master Plan and the Juanita Creek Retrofit Project remains

*Table E-9. Recommended Habitat Capital Projects*

ID	Project	Primary goal	Preliminary cost
<b>CDE-01</b>	Culvert replacement to improve fish passage	Habitat	\$615,000
<b>FO-08</b>	Forbes Creek/BNSF Fish Passage Improvements	Habitat	\$424,000
<b>CH-02</b>	Channel reconstruction	Habitat	\$690,000
<b>FO-05</b>	Culvert replacement	Habitat	\$1,058,000
<b>EC-02</b>	Everest Park channel and riparian restoration	Habitat	\$1,096,000
<b>FO-01</b>	Fish passage	Habitat	\$333,000
<b>CJC-9</b>	Culvert replacement to improve fish passage	Habitat	\$613,000
<b>JC-03</b>	Juanita Creek floodplain creation	Habitat	\$533,000
<b>TOTAL</b>	<b>Habitat Capital Projects</b>		<b>\$5,362,000</b>

valid: high stream flows from stormwater runoff impacts water quality and fish habitat. Capital projects have been built, and programs developed as a result of the previous plan continue, though progress is challenging to measure given the long timeframe required to measure noticeable changes in these systems. This plan includes a prioritized list of capital projects to continue making progress on stream and habitat issues.

Public culverts (pipes that carry streams beneath public roadways or other structures) were inventoried and ranked according to whether they present a barrier to fish passage. There are five publicly-owned culverts that represent significant barriers to fish passage. Addressing fish passage barriers through culvert alteration or replacement would open new areas of physical habitat for fish, though this must be combined with flow control and water quality improvements to fully restore fish habitat.

Stream habitat conditions in urban areas is largely determined by stormwater flow (and control of those flows) and by water quality. Physical habitat is an important element, and must be managed in conjunction with these two elements. It is recommended that fish passage barrier removal projects be constructed, and that physical habitat projects be prioritized to take place after flow control and water quality retrofits are in place upstream of the proposed in-stream habitat projects.

Table E-9 lists recommended habitat-related capital projects.

## ■ 6. POLICY ISSUES AND RECOMMENDATIONS

The Plan outlines a number of policy decisions that require input from City Council, including how or whether or not the Utility should conduct certain activities and how and when stormwater rates should be used or divided amongst programs. The policy questions and discussion items in this Plan are summarized below.

### 6.A Property Acquisition

The Utility does not currently set aside CIP funds for property acquisition and there has not been a formal policy regarding property acquisition specifically for the purpose of preserving natural resources that influence the quality and quantity of stormwater runoff.

Preservation of wetlands and stream corridors is the least expensive and most efficient way to control the quantity and quality of stormwater runoff. Although sensitive area regulations in Kirkland's Zoning Code control development in these areas, reasonable use provisions still allow impacts. Thus there are instances where City ownership of property can help to prevent impacts to these crucial areas.

Although there are no regulatory requirements for the Utility or the City to use property acquisition as a surface water management technique, property acquisition is justifiable in instances where acquisition reduces or eliminates the need for stormwater treatment or flow control facilities. Acquisition prevents creation of new impervious surfaces, and thus protects the existing stormwater system.

The Parks Department has historically been the primary City entity that acquired and managed property. Acquisitions within Parks are driven by the desired level of service, which is often focused on active parks and additions to existing natural areas parks. The surface water benefits of acquisition are certainly considered but are not the main interest in Parks acquisitions.

The following could constitute a policy for acquisition:

- Review City land base to identify stream corridors and wetlands that have potential for development
- Acquire lands that are directly linked to surface waters (study on programmatic side or in CIP) as opportunities arise
- Conduct restoration of acquired areas through capital programs and programmatic actions
- Coordinate with the Parks Department on acquisition of upland forested areas that contribute to watershed health

The City Council could choose either to create an opportunity fund within the CIP for acquisition, or to draw from reserves for occasional purchases. Funds would also need to be budgeted for maintenance of acquired areas to reduce City liability and/or to enhance their features and benefits.

### 6.B Water Quality Policies

The current policy for water quality CIP projects includes:

- Retrofit existing public infrastructure for water quality treatment by adding treatment facilities to transportation projects above and beyond what is required as mitigation for the project (be opportunistic)
- Conduct watershed-scale planning for retrofit of existing public streets in order to position the City to take advantage of grants for construction of retrofit projects

Several state and federal laws require that Kirkland take action to improve water quality. Currently, none of these laws specifically require capital projects to improve the quality of stormwater, but these are likely coming in the future. The Permit currently requires agencies to prioritize retrofit projects and may in the near future require construction of these projects. The Puget Sound Partnership has noted that stormwater is the largest source of pollutants to Puget Sound, and thus state interest and grant funding for water quality retrofit projects has increased. In addition, water quality is one of the factors that heavily influence fish habitat.

Input on current policy for water quality treatment CIPs would provide clarity for the long-term strategy for retrofitting Kirkland with current stormwater treatment facilities.

### 6.C Beaver Activity

Crews respond to citizen complaints about beaver activity, and provide assistance when water impounded by beaver dams impacts a public facility. The City may wish to consider formalizing policy direction as to when property flooding due to beavers constitutes a public benefit, and whether hand removal of dams should be conducted where the City has obtained a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW).

## 6.D Stream Deltas in Lake Washington

Shoreline conditions are linked with upstream hydrologic conditions, as stream channels deliver water and sediment to Lake Washington. Whereas the Utility's goals are mostly environment- and infrastructure-oriented, the Shoreline Management Program requires consideration of recreational uses, such as boat launches and marinas. Sometimes local sediment deposition in these areas can temporarily limit accessibility for recreational functions that require deeper marinas to accommodate boats. The City may wish to consider ways to either warn boaters of hazards near stormwater outfalls, or remove those hazards by either dredging or extending stormwater outfalls. King County Water and Land Resources Wastewater Division will be contributing funds toward conducting a bathymetric survey of the stormwater outfall near the boat launch at Marina Park to determine the magnitude of sediment buildup and potential impacts on boat launch operations.

## 6.E Neighborhood Drainage Assistance Program

The Neighborhood Drainage Assistance Program (SD-0081) was created during the development of the 2013–18 CIP to assist with problems for which the City is not liable but for which a fix would be relatively inexpensive and would benefit several property owners. The program is funded at \$50,000 every second (odd) year. Frequently projects constructed under this program cost less than \$50,000 and can be constructed by City maintenance crews. It is recommended that staff refine and bring to Council criteria for use of these funds.

## 6.F Capital Program Policy Direction

In addition to capital projects recommended in this Plan, the Utility supports transportation-oriented projects through the allocation of funds for the surface water portion of those projects. This money is used for installation or replacement of pipes, catch basins, and flow-control and water quality treatment facilities associated with transportation projects. Currently, \$950,000 annually has been transferred to this fund; however, only about \$500,000 per year has been spent, resulting in accumulation of reserves. It is recommended that the funding be more closely matched with the anticipated transportation CIP needs. Review of the transfer amount during development of the 6-year Capital Improvement Program is recommended to more efficiently allocate surface water funds.

## ■ 7. PROGRAMS SUMMARY

Recommended program additions are described above according to the particular Utility goal that is met by implementation of the program. Table E-10 provides a full list of recommended programs with funding requirements and priority (required vs. augmentation of an existing program) of the recommended program additions.

Table E-11 presents a summary of programs by goal. The largest percentage of recommended costs are due to infrastructure needs (68%), and the lowest percentage are due to flooding needs (3%). This is because infrastructure requires a high level of on-going maintenance (with associated staff and equipment) while flooding is primarily addressed through capital projects. The highest cost programs in the plan are TV Inspection (CW-1) and Ditch Maintenance (CW-4), which are both associated with the infrastructure goal.

Table E-12 presents a summary of projects by priority (required or augmented). Items are placed in the required priority based on the fact that they are needed for meeting basic maintenance standards, and/or because they are associated with requirements in the Permit. Items in the required category constitute 65% of total recommended costs.

## ■ 8. CAPITAL PROJECT SUMMARY

A full summary of capital projects recommended in this Plan is listed in is Table E-13 and Figure E-1. Table E-14 presents a summary of project costs by goal. The largest proportion of funding (42%) is dedicated to flood reduction projects, though the majority of this cost is due to one large project. The next largest proportion (32%) is dedicated to infrastructure projects, followed by habitat (19%), and then by water quality (7%). It is recommended that the project list be constructed within 10 years as shown in Figure E-2, with the exception of the regional detention project recommended to resolve flooding issues at the interchange of I-405 and NE 116th Street (project FO-02), which is recommended for future construction once a funding strategy is evaluated and identified. Due to the size of the project, it is assumed that revenue bond financing or buildup of cash reserves may be necessary in order to mitigate potential rate increases.

Table E-10. Programmatic Recommendations and Costs (continued)

ID	Name	Program priority		Staffing needs	Average Annual cost (\$1,000s)	One-time costs (\$1,000s)	Primary Goal
		Required	Augmentation				
CW-1	TV Inspection of Pipes	✓		✓	\$152.0		Infrastructure
CW-2	LID Maintenance	✓		✓	\$11.0		Infrastructure
CW-3	Street Sweeping	✓			\$25.0		Flooding
CW-4	Ditch Maintenance	✓		✓	\$355.0		Infrastructure
CW-5	Maintenance on Goat Hill: Equipment Rental	✓			\$3.0		Infrastructure
CW-6	Development Review Evaluation	✓				\$4.0	WQ-Permit
CW-7	LID Code Review	✓				\$45.0	WQ-Permit
CW-8	LID Implementation and Manual Adoption	✓			\$18.0		WQ-Permit
CW-9	Stormwater Facility Inspection	✓		✓	\$40.0		WQ-Permit
CW-19	Develop LID Feasibility Tools	✓				\$68.0	WQ-Permit
<b>Subtotal Required Strategies</b>					<b>\$604.00</b>	<b>\$117.0</b>	
CW-10	Service Truck		✓		\$36.0		Infrastructure
CW-11	Spill Response Truck		✓		\$29.0		WQ-Permit
CW-12	Beaver Management Policy		✓		\$5.0		Flooding
CW-13	Address Prioritized Fish Passage Barriers		✓		\$1.0		Habitat
CW-14	Evaluation of Incentives and Rebate Programs		✓		\$1.4		Infrastructure
CW-15	Utility Rate Study		✓			\$36.0	Infrastructure
CW-16	Proactively Avoid TMDL		✓		\$26.0		Water Quality
CW-17	City-specific Water Quality Monitoring		✓		\$9.7		Water Quality
CW-18	Watershed Planning		✓			\$44.0	Water Quality
CW-20	Incorporation of LID into City Capital Projects		✓			\$2.7	Infrastructure
CW-21	Stream Habitat and Fish Monitoring		✓		\$48.0		Habitat
CW-22	O&M CIP Consultation		✓		\$1.3		Infrastructure
CW-23	Environmental Permitting for Maintenance		✓		\$18.0		Infrastructure
CW-24	Property Acquisition Policy and Priority Areas		✓			\$37.0	Habitat
CW-25	Evaluation of Stream Deltas in Lake Washington		✓			\$7.0	Infrastructure
CW-26	Urban Forestry and Tree Inventory		✓		\$10.0		Habitat
CW-27	Climate Change Evaluation		✓			\$55.0	Infrastructure
CW-28	Streamside Restoration Maintenance		✓		\$30.0		Infrastructure
CW-29	Noxious Weeds and Invasive Plants		✓		\$4.0		Infrastructure
CW-30	Juanita Creek Floodplain Mapping		✓			\$11.0	Flooding
CW-31	Map Areas of Treatment for Existing Stormwater Facilities		✓		\$65.1		Water Quality
CW-32	Stormwater System Rehabilitation Catch-up		✓		\$24.0		Infrastructure
CW-33	Retrofit Opportunities		✓			\$6.0	Water Quality
CW-34	Leaf Pick-up Program		✓			\$11.0	Flooding
CW-35	Private Streambank Stabilization Program		✓			\$5.7	Habitat
CW-36	Scoop Law Evaluation		✓			\$6.5	Water Quality
CW-37	Volunteer Involvement		✓			\$4.3	Habitat
CW-38	Neighborhood Drainage Assistance		✓			\$4.2	Flooding
CW-39	Residential Stormwater Audit Program		✓	✓	\$0		Infrastructure
CW-40	Neighborhood Rain Garden Program		✓	✓	\$0		Infrastructure
<b>Subtotal Required Programs</b>					<b>\$564.0</b>	<b>\$117.0</b>	
<b>Total: All Programs</b>					<b>\$912.5</b>	<b>\$347.4</b>	

Table E-11. Summary of Programmatic Recommendations by Goal

Program Goal	Number of Programs	On-Going Average Annual Cost (\$1,000s)	One-Time Cost (\$1,000s)	Total Cost Over 10 Years (\$1,000s)*
Flood Reduction	5	\$30.0	\$26.2	\$326.2
Water Quality - Permit	6	\$87.0	\$117.0	\$987.0
Water Quality	6	\$100.8	\$56.5	\$1,064.5
Infrastructure	17	\$635.7	\$100.7	\$6,457.7
Habitat	6	\$59.0	\$47.0	\$637.0
<b>TOTAL</b>	<b>40</b>	<b>\$912.5</b>	<b>\$347.4</b>	<b>\$9,472.4</b>

\* Total Cost Over 10 Years = (Average Annual Cost X 10) + One-Time Costs

Table E-12. Summary of Programmatic Recommendations by Priority

Priority	Number of Programs	Cost of Programs (\$1000s)		Total Cost Over 10 Years (\$1000s)*
		On-Going Average Annual Cost	One-Time Cost	
Required	10	\$604.0	\$117.0	\$6,157.0
Augmented	30	\$308.5	\$230.4	\$3,315.4
<b>Total</b>	<b>40</b>	<b>\$912.5</b>	<b>\$347.4</b>	<b>\$9,472.4</b>

\* Total Cost Over 10 Years = (Average Annual Cost X 10) + One-Time Costs

## ■ 9. RESOURCES NEEDS AND FUNDING

Program and project recommendations in this Plan must be supported by adequate resources in order to be successful. Staffing and budget were considered in development of the Plan

### 9.A Staffing Needs for Plan Implementation

The Utility currently supports 28.04 full-time equivalent staff (FTEs). Implementation of programs and projects recommended in this Plan results in the need for 6.5 additional FTEs in the Operation and Maintenance Group and 1 FTE in the Engineering, Stewardship and Environmental Group. Table E-15 lists the specific staffing needs and the programmatic elements of the Plan that require additional staff.

### 9.B Financial Considerations

Current Utility revenue is approximately \$8.5 million and is supplemented by other funding sources including:

- King Conservation District: approximately \$55,000 per year, often shared with the Green Kirkland Partnership
- King County Flood Control District Sub-Regional Opportunity Fund: approximately \$238,000 per year that in 2014 will be dedicated to Totem Lake flood reduction projects,
- Washington State Department of Ecology NPDES Municipal Capacity Grants: \$120,000 for 2014-2015 for NPDES Permit implementation and water quality retrofit planning (future allocations are likely)
- One-time grants for both capital construction and studies. To provide just a few examples, the City was awarded \$739,236 for the stormwater portion of the Park Lane project in 2012, and was awarded \$247,100 for the Totem Lake/Juanita Creek Basin Stormwater Retrofit Conceptual Design project in 2013.

The 2014 rate for a single-family residence is \$15.60 per month. Commercial and multi-family surface water charges are based on the number of “equivalent services units” (ESU) of impervious surface on the property, where one ESU equals 2,600 square feet. Single-family residences pay a flat fee, or 1 ESU. There is currently a total of about 45,500 ESU of impervious surface in billing records.

The potential rate impacts of the Plan’s recommendations were an important consideration in development of the Plan with the goal of minimizing the need for rate increases over the ten-year life of the Plan. Costs for programs and projects presented in the Plan are estimated in 2014 dollars.

Table E- 13 Recommended Capital Projects

ID	Project	Primary goal	Preliminary cost
FO-02	Regional detention in Forbes Creek basin	Flooding	\$10,000,000
DE-01	Sediment removal in channel	Flooding	\$136,000
JC-07	Goat Hill stabilize eroding channel	Flooding	\$299,000
JC-08	Goat Hill increase pipe conveyance capacity	Flooding	\$490,000
RED-01	Underground injection control well (infiltration facility)	Flooding	\$65,000
JC-06	Goat Hill route flow away from open channel	Flooding	\$521,000
JC-04	Flow diversion	Flooding	\$266,000
CH-03	Rain garden and bioretention retrofit	Water quality	\$85,000
FO-07	Channel grade control	Water quality	\$165,000
CA-1	Erosion control measures	Water quality	\$550,000
FO-13	Pilot LID water quality project associated with planned transportation project	Water quality	\$65,000
JC-01	Sediment removal	Water quality	\$194,000
EC-01	Ravine stabilization	Water quality	\$830,000
CDE-01	Culvert replacement to improve fish passage	Habitat	\$615,000
FO-08	Forbes Creek/BNSF Fish Passage Improvements	Habitat	\$424,000
CH-02	Channel reconstruction	Habitat	\$690,000
FO-05	Culvert replacement	Habitat	\$1,058,000
EC-02	Everest Park channel and riparian restoration	Habitat	\$1,096,000
FO-01	Fish passage	Habitat	\$333,000
CJC-9	Culvert replacement to improve fish passage	Habitat	\$613,000
JC-03	Juanita Creek floodplain creation	Habitat	\$533,000
CH-04	Groundwater seepage and road stability	Infrastructure	\$126,000
CH-01	Undersized pipe to be replaced	Infrastructure	\$219,000
CW-INF-02	Pipe repair and replacement	Infrastructure	\$3,025,000
CW-INF-01	Pipe repair and replacement	Infrastructure	\$769,000
JC-05	NE 141st Street/111th Avenue NE culvert replacement	Infrastructure	\$765,000
MB-01	Replace stormwater pipes	Infrastructure	\$680,000
HAS-01	Pipe replacement, improved hydraulics	Infrastructure	\$2,369,000
JC-02	Infrastructure/conveyance	Infrastructure	\$874,000
<b>Total cost</b>			<b>\$27,855,000</b>

Table E- 14 Summary of Recommended Capital Projects

Program Goal	Number of Projects	Cost of Projects in 2014 Dollars
Flood Reduction	7	\$11,777,000
Water Quality	6	\$1,889,000
Infrastructure	8	\$8,827,000
Habitat	8	\$5,362,000
<b>TOTAL</b>	<b>29</b>	<b>\$27,855,000</b>

A financial analysis was conducted by an outside consultant. The financial analysis incorporates factors including estimated inflation rates, the need to maintain sufficient reserves, options for smoothing potential rate increases, and shifting or reduction of set annual allocations (such as the funding of the surface water portion of transportation projects). A Utility Rate recommendation for the coming biennium will be presented later, however, the financial analysis indicates that the Plan recommendations can be implemented alongside existing programs and projects over a 10-year timeframe with moderate additions to current Utility revenue.

# Figure E-1 Recommended Capital Improvement Projects



Produced by the City of Kirkland. © 2013, the City of Kirkland, all rights reserved. No warranties of any sort, including but not limited to accuracy, fitness or merchantability, accompany this product.

Figure E-2 Suggested schedule for capital project construction

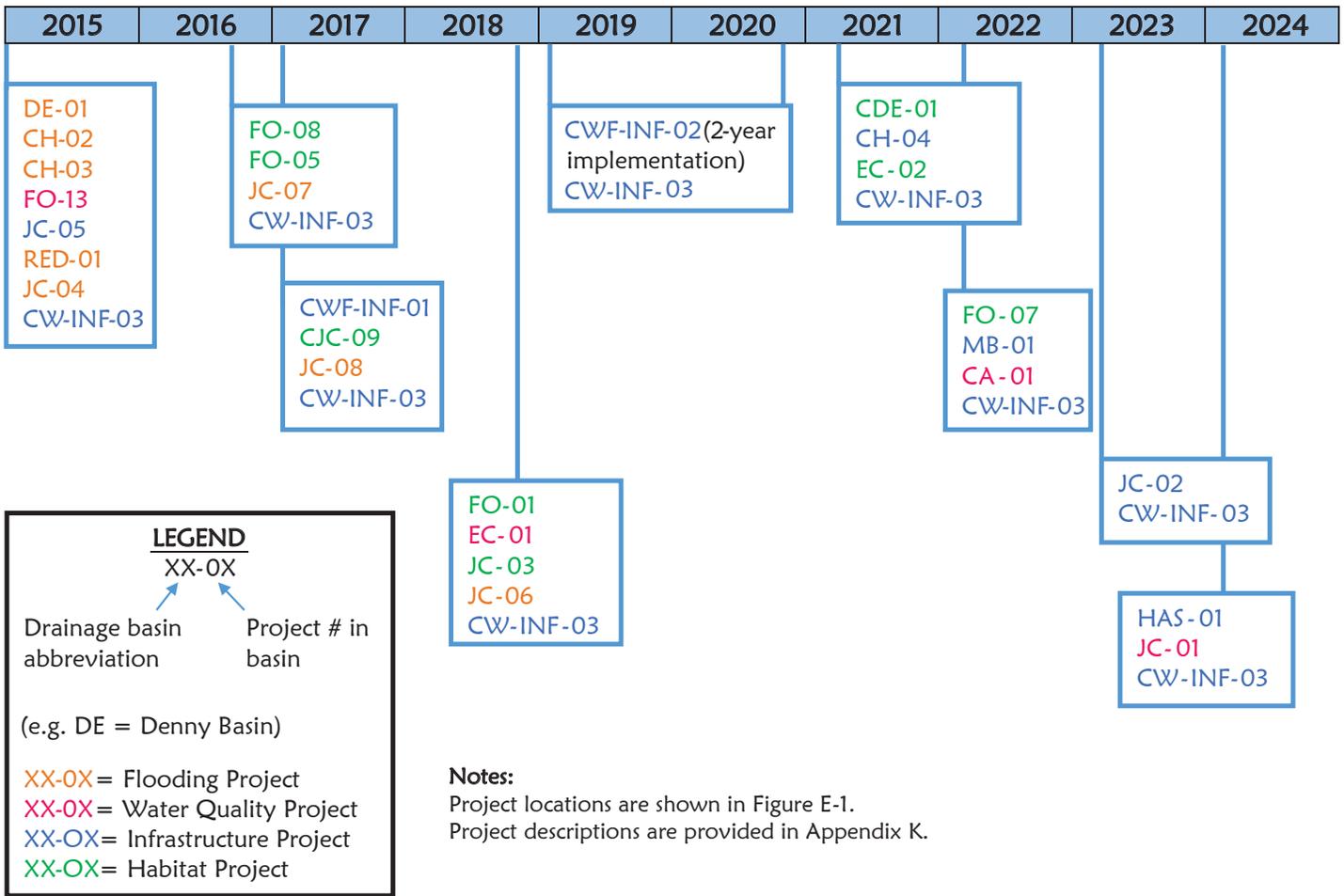


Table E-15 Summary of Staffing Needs

Position	Staffing (FTE)	Programmatic element
<b>Required</b>		
Senior Maintenance Worker	0.5	TV Inspection of Pipes (CW-1)
Utility Worker	0.5	TV Inspection of Pipes (CW-1)
Senior Maintenance Worker	1.0	Ditch Maintenance (CW-4)
Utility Person (3)	3.0	Ditch Maintenance (CW-4)
Senior Maintenance Worker	0.5	Stormwater Facility Inspection (CW-9)
<b>Subtotal</b>	<b>5.5</b>	
<b>Augmented</b>		
Surface Water Engineer	1.0	Various infrastructure, water quality and habitat-related programs (CW-6-8, CW-12-14, CW-16-25, CW-27, CW-31, CW-33-36, CW-38-40)
<b>Subtotal</b>	<b>1.0</b>	
<b>Grand total</b>	<b>6.5</b>	

## ■ 10. PERFORMANCE MEASURES

Performance measures are presented as a way to help the Utility accountable to the City Council and to the citizens of Kirkland. Following on the City Council's approach to measuring and reporting progress for City-wide goals, proposed Utility performance measurements that specifically address Utility goals and relevant elements of City-wide goals were developed. Many of these items are already tracked as part of required reporting on the NPDES Phase II Permit. Performance measures include implementation (how much and when), effectiveness (how well), and community metrics (value to the residents) for each of the Utility's four goals. For overall performance, it is recommended that one implementation measure and one effectiveness measure be tracked for each Utility goal:

### Flooding

- Flood reduction projects constructed within 5 years of problem identification (implementation)
- Number of flood-related road closures. Goal: 0 for up to a 50-year event (effectiveness)

### Water Quality

- Compliance with NPDES Phase II Permit. Goal: 100% compliance (implementation)
- Number of stream reaches on the Department of Ecology's list of water-quality-impaired waters (the 303(d) list): Goal = 0 (effectiveness)

### Infrastructure

- Percentage of pipes TV inspected per year. Goal: 10% of total length per year inspected and/or cleaned (implementation)
- Number of calls regarding infrastructure-related flooding. Goal: trend downwards (effectiveness)

### Habitat

- Area retrofit with stormwater treatment and flow control facilities. Goal: develop percentage upon completion of map showing areas already treated (implementation)
- Benthic Index of Biotic Integrity (BIBI) Improvement. Goal: bring all Kirkland stream reaches up to fair (BIBI of 35) condition in 20 years (effectiveness)

The following performance measures can be used in the Environmental portion of the City's Annual Performance Report:

- **Compliance with NPDES Phase II Permit (goal is 100% compliance).** Achievement of this goal indicates that the City is taking important steps to protect and improve water quality.
- **Percent of impervious surface for which flow control and water quality treatment is provided.** This indicates how much stormwater in Kirkland is cleaned and slowed. Treatment includes both constructed facilities and dispersion of stormwater into the ground.

## ■ 11. SUMMARY

This Surface Water Master Plan presents an overview of accomplishments since the last Plan was completed in 2005, as well as constraints and opportunities that shape this Plan. The programs and projects recommended are aimed at achieving Utility goals of flood reduction, water quality improvement, infrastructure protection, and habitat improvement using cost-effective strategies.

Flood reduction needs consist of minor program additions, and a list of flood reduction capital projects that is dominated by one large project (regional detention in the Forbes Creek basin) for which Council may wish to explore alternatives to financing via current rates. Water quality improvement needs are driven by the NPDES Phase II Municipal Stormwater Permit and the need to clean up streams that are on the State listed of impaired waters, and are aimed at controlling pollutants at their source, and at treating stormwater runoff from existing development including city streets. The largest proportion of the cost of the recommendations stems from infrastructure needs, including TV inspection of pipes and ditch maintenance as well as capital projects to repair and replace aging stormwater systems. Habitat needs include removing fish passage barriers, restoring streamside vegetation, and reconstructing stream channels.

Program recommendations are divided into two categories: required to meet basic maintenance standards and/or regulations, and augmented to meet community interests and prepare the Utility for the future. The cost of programs in the required category over 10 years in 2014 dollars is \$6.1 million, and the cost of required plus augmented programs over 10 years is approximately \$9.1 million.

The total cost of recommended capital projects is approximately \$27.9 million in 2014 dollars, with \$10 million of this due to one project that would address regional flooding. It is recommended that the list of projects be constructed within 10 years.

Implementation of the Plan would result in addition of 6.5 full-time equivalent staff (FTE) to a current staff total of 28.04 FTE. Current annual Utility revenue is approximately \$8.5 million, and the 2014 Utility rate is \$15.60 per month for a single-family residence. Financial analysis of the recommendations suggests that they can be accommodated alongside existing efforts with a relatively low rate increase.

This Draft Plan will be presented to the City Council and the public for consideration in early fall of 2014. A final Plan will then be developed based on Council and public comment, and Council adoption is anticipated in fall of 2014. Following adoption, reports on Plan implementation and program performance will be presented to Council once each year. Surface Water Utility rates and budget to support Plan implementation will be developed via separate processes. Implementation of this Plan will result in measurable progress on Utility goals that serve community interests.