Storm and Surface Water Management Comprehensive Plan

City of Sammamish Washington

Draft July 2016

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EXECUTIVE SUMMARY

Executive summary will be completed upon incorporation of comments on the Draft Plan.

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SECTION 1 – INTRODUCTION

Why is a Stormwater Management Comprehensive Plan important?

The City of Sammamish (City) is a desirable suburban community located on the outskirts of the Seattle and Bellevue metropolitan areas (Figure 1-1). The rapid growth that occurred on the Sammamish Plateau in the 1980s and 1990s (Figure 1-2), and that continues today, contributes to changes in hydrologic characteristics that can lead to surface and stormwater impacts.

Bird's eye view of Lake Sammamish

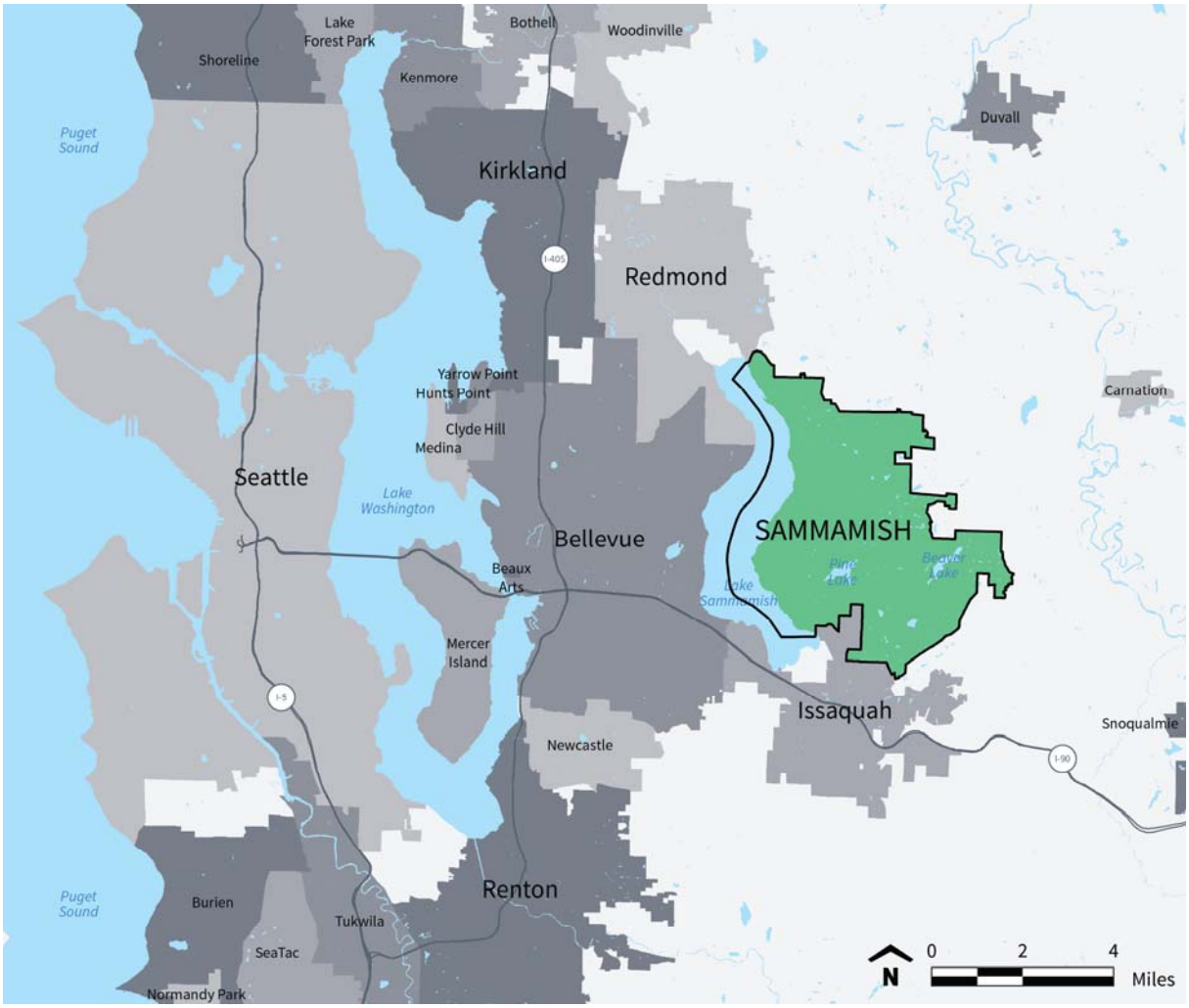
Shortly after incorporation in 1999, the City formed a surface water management program to ensure a stable source of funding to provide stormwater-related services, projects, and programs that promote public health, safety, and welfare; and to protect and enhance the environment. It is intended that establishing and implementing a comprehensive stormwater management program to address common surface water-related issues such as-flooding, erosion, habitat loss, and water quality degradation-will allow the City to allocate its resources to address its highest priorities.

This Stormwater Management Comprehensive Plan (Plan) is a guide and a tool to be used by City staff to define capital projects, work programs, and strategies for meeting current and future surface and stormwater management needs. The City's first Plan was prepared in 2001 (CH2MHill 2001) and describes the drainage system that was largely inherited from King County and the existing issues and alternatives for meeting the immediate surface and stormwater needs at the time. This Plan update builds on information presented in the original plan, incorporating elements related to current City goals, projects, and future plans, as well as new regulatory requirements and current stormwater management techniques.

Allen Lake from 224th Avenue

The City's Community Development Department is responsible for enforcing city, state, and federal regulations that support the City's ability to manage stormwater. The Parks and Recreation Department manages the City's forested open space, and provides volunteer opportunities that help further the City's goals of environmental sustainability.

Figure 1-1 Vicinity map



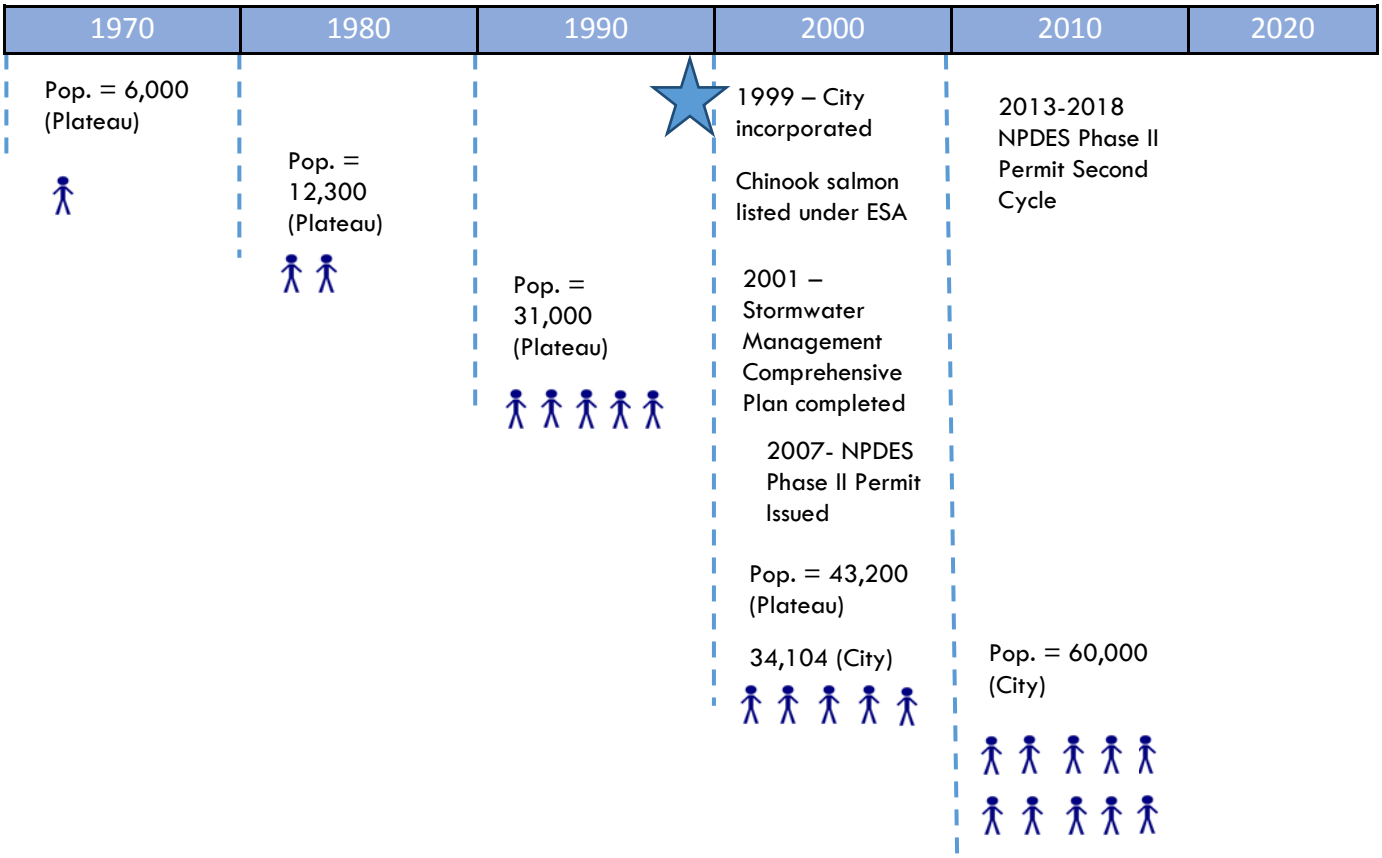


Figure 1-2 Timeline of population growth on Sammamish Plateau, City incorporation, and stormwater-related events

How is the stormwater program staffed?

The City implements the majority of the Stormwater Management Program components within the Public Works Department, which is "committed to providing quality service to the community by building, maintaining and overseeing a growing infrastructure." (City of Sammamish Public Works webpage, accessed April 16, 2016). Three permanent Public Works staff are assigned to the stormwater program, including a Senior Stormwater Program Manager, a Stormwater Technician, and a Stormwater Inspector (Figure 1-3). Additional program support is provided by Public Works' Operations and Maintenance personnel, Development Review Engineers, and Construction Inspectors. Some maintenance activities, such as mowing and vegetation control are contracted to private vendors.

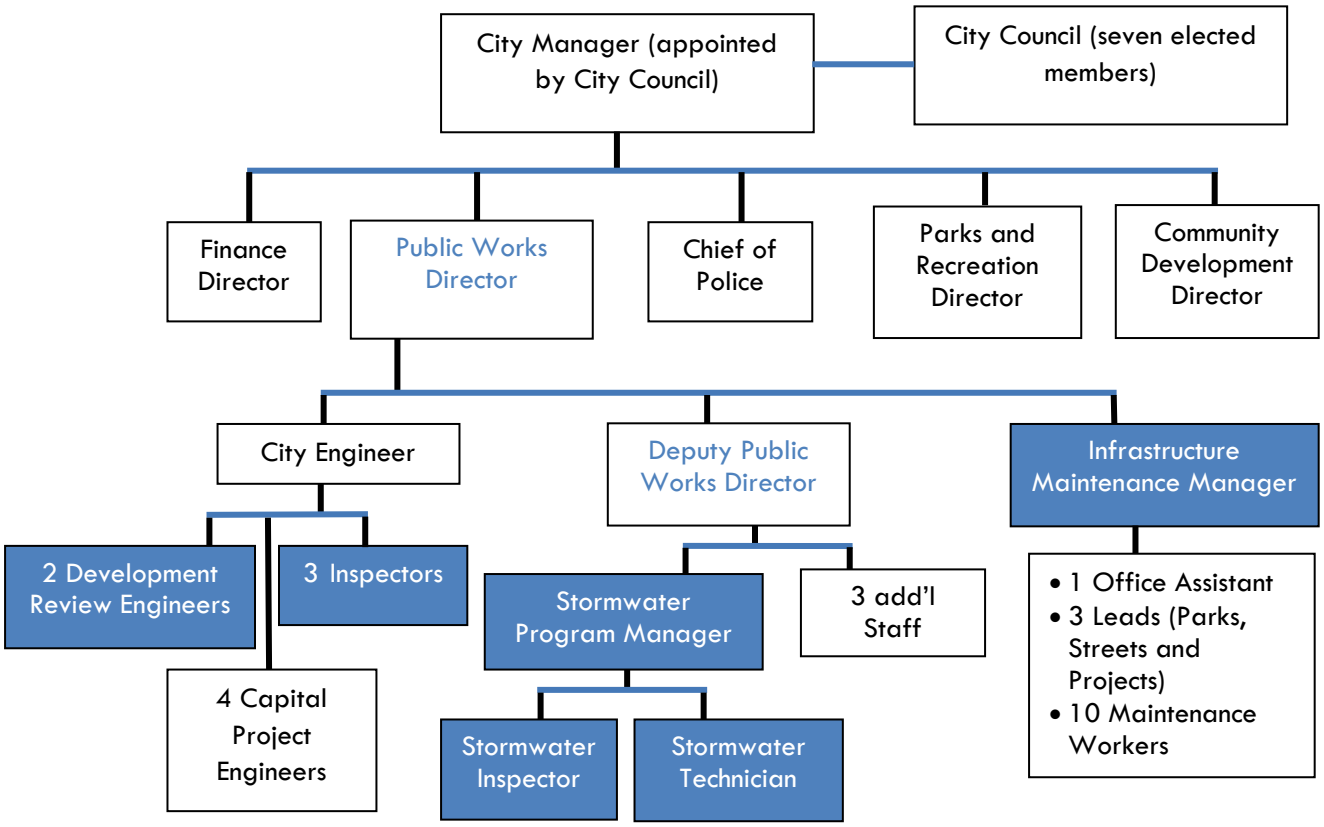


Figure 1-3 Simplified organizational structure showing stormwater management program staff

What City-sponsored commissions work with stormwater staff?

In addition to City staff in the stormwater management program and other departments that work closely with stormwater staff, there are public-oriented commissions and groups that provide input and support for surface and stormwater issues. These include:

- Beaver Lake Management District

  Mission: To track environmental conditions at Beaver Lake and to promote actions and behaviors among area residents that will minimize negative impacts on the lake and its surrounding ecosystems.

- Planning Commission

  Mission: To make planning policy recommendations to the City Council and offer advice on development regulations. The commissioners will also make recommendations on periodic adjustments to the City's comprehensive plan.

How is the stormwater program funded?

The City's Enterprise Fund consists of two funds whose revenue sources are based on property characteristics that contribute to the quantity and quality of stormwater runoff. The Surface Water Management Fund is a self-supporting fund that primarily comes from fees charged to customers and provides for the operation and maintenance of publically-owned stormwater conveyance, detention and treatment facilities, and to meet the National Pollutant Discharge Elimination System Permit requirements.

The Surface Water Capital Improvement Program was established to finance capital projects for the surface water utility system. Revenues are derived from the system development fees, transfers from the Surface Water Management Fund, state and federal grants/loans, Real Estate Excise Taxes and contributions.

The City's Surface Water Management Fund is $3.6 million annually, and is generated by stormwater fees.

The overall goals of the City's stormwater program is to be in alignment with overall City goals, comply with state and federal regulations, and be responsive to citizen concerns.

What are the City goals?

In the City's 2015 Comprehensive Plan (City of Sammamish 2015), there are a number of elements, goals, and policies that relate to storm and surface water management. The City prioritized sustainability and health as the overriding goals in the Comprehensive Plan. It is the intent of this Plan and the City's Stormwater Management Program to be consistent with goals and policies outlined in the Comprehensive Plan.

The sustainability and health goals that relate to storm and surface water management are listed below:

- Goal EC.2 Protect people, property, and the environment in areas of natural hazards.
- Goal EC.3 Protect wetlands and other water resources from encroachment and degradation and encourage restoration of such resources.
- Goal EC.5 Maintain and protect surface water and groundwater resources that serve the community and enhance the quality of life.
- Goal UT.6 Encourage conservation of water and protect water quality.
- Goal CF.4 Design and locate capital facilities with features and characteristics that support the environment, energy efficiency, aesthetics, technological innovation, cost effectiveness, and sustainability.

Additionally, shoreline goals and policies that address the following topics are listed in the City's Comprehensive Plan:

- Conservation
- Shoreline Restoration and Enhancement
- Critical Areas and Environmental Protection
- Flood Hazard Reduction
- Restoration and Enhancement
- Shoreline Vegetation Conservation
- Site Planning
- Water Quality
- Stormwater and Nonpoint Pollution

Program and project recommendations that support 2015 Comprehensive Plan policies for the goals listed above are noted in this Plan.

Why is an updated plan needed?

There are several reasons for updating the City's Stormwater Comprehensive Plan now. It has been more than a decade since the last plan was completed in 2001, and there have been several regulatory changes and new directions in stormwater management since then. In addition a number of new stormwater technologies: materials, operational improvements, and design approaches have been developed since 2001, and the City wants to position itself to take advantage of these changes.

In addition, the City has grown and continues to expand in both population (Figure 1-2) and area. Most recently, the City annexed the Klahanie neighborhood, adding approximately 1,200 acres to the City's geographic footprint and approximately 11,000 new residents. As the City is maturing, so is its stormwater infrastructure, much of which was constructed prior to incorporation. These are some of the challenges and opportunities that will be addressed in subsequent sections.

The City's Vision Statement (2015 Comprehensive Plan) is:

Sammamish is a vibrant bedroom community blessed with a well-preserved natural environment, a family-friendly, kid-safe culture, and unrivaled connectedness. From its expanding tree canopy, to its peaceful neighborhoods, to its multi-modal transportation resources, Sammamish captures the best of the past even as it embraces a burgeoning digital future and meets housing affordability through balanced, sustainable housing. It is a state-of-the-art community—engaged, responsive, and generous in its support for the full range of human endeavor.

What has been accomplished?

In the intervening years since completion of the last Plan in 2001, the City has accomplished a multitude of surface and storm water improvements, including those listed in Table 1-1.

Table 1-1 Summary of major surface and stormwater improvements

Category	Then (pre-2001)	Now (2016)
Personnel	No dedicated stormwater staff	3 full time stormwater staff
Aerial mapping	1996 – 1997 LandSat images	Participation in regional aerial mapping program for 5 years, including impervious surface mapping; will receive new LiDAR maps in 2016.
Stormwater system mapping	Incomplete record	Mapped more than half the system in GIS
Ownership of public stormwater facilities	Most owned and operated by King County	Ownership and maintenance responsibilities and facilities transferred to the City
Codes and ordinances	King County's Surface Water Management Code was adopted and enforced	Adoption of the City's Title 13 Surface Water Management Municipal Code, (SMC 21A.50) Critical Areas Update
Maintenance	Contracted with King County for inspection and maintenance	City staff conducts inspections and ensures maintenance of stormwater assets
Watershed planning	Reliance on 1990s-era King County basin plans	Updated 2009 Thompson and Inglewood sub-basin plans in 2011 for Town Center
Capital Improvement Projects	Stormwater projects associated with development and transportation projects	Capital projects to improve capacity, water quality, and salmon recovery
Protection of natural resources	Staff resources not available for education and outreach; salmon recovery efforts; and collaboration with City, community and regional partners to protect natural resources	Extensive public education and outreach program, including participation in regional efforts
		Land acquisitions in environmentally sensitive areas, such as the Pickett property that was gifted to the City
		Participation in regional salmon recovery efforts
		New open space parks (including Evans Creek Preserve, Sammamish Landing, and Big Rock Park) with significant natural resources established, protecting valuable resources for the future

SECTION 2– REGULATORY AND COMMUNITY FRAMEWORK

How does this Plan fit in with other plans and regulations?

The City's Stormwater Management Program is guided by the community's vision and goals and the regulatory framework imposed by federal, state, and local regulations and requirements. This section describes the input from the community in the development of this Plan, as well as the regulatory framework under which stormwater management is accomplished in Sammamish.

What is the regulatory framework within Sammamish?

Sammamish must comply with a variety of federal, state, and municipal laws and regulations in the management of surface and stormwater. The intent of these regulations is to protect the public, natural resources, and infrastructure from direct and indirect stormwater impacts, including flooding, pollution, erosion, and landslides.

Many of the City's codes and municipal requirements are the result of state and federal conditions for compliance with broader state and federal laws. Table 2-1 summarizes applicable regulations and permits that relate to surface and stormwater management, and their relevance to Sammamish. Figure 2-1 shows general departmental responsibilities for implementation of codes and regulations in Sammamish. Recent revisions or planned future changes to permits or regulations are highlighted in bold with key provisions summarized in Table 2-1.

In the development of this Plan, the following outreach events were held:

- *Planning Commission Public Hearings (April 7, May 5, and May 19, 2016)*
- *City Council Meetings (June - July 2016)*

Specific comments related to the Plan content and suggestions will be included in Appendix A.

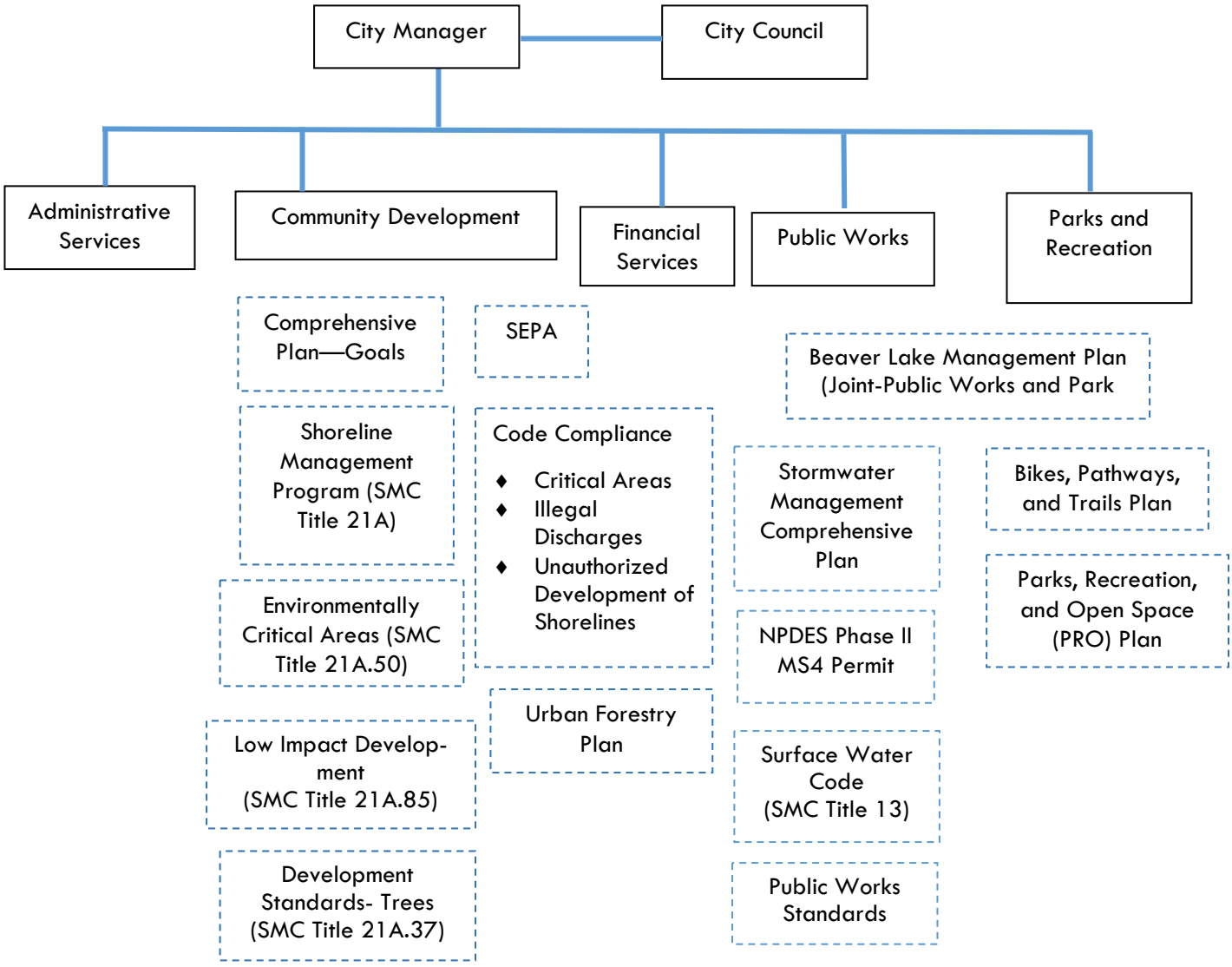


Figure 2-1 Schematic of Sammamish departmental regulatory responsibilities and surface- and stormwater-related plans

Table 2-1 Summary of regulations

Regulation	Program	Intent	Relevance to Sammamish
Federal regulations and tribal agreements			
Clean Water Act (CWA)	National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Stormwater Sewer Systems Permit (MS4)	Eliminate discharge of pollutants to nation's water, and achieve water quality that supports beneficial uses (fishable and swimmable).	NPDES permit delegates to Sammamish the responsibility for quality of water leaving the City's system. **A new NPDES permit became effective August 1, 2013, with new requirements that will be phased in over the 5-year permit window.**
	Other NPDES Permits (Industrial, Sand and Gravel, Boatyard, Construction, etc.)		Requires entities in Sammamish that conduct certain pollutant-generating activities to obtain a permit to discharge and to implement a plan to minimize discharge of pollutants to Sammamish receiving waters.
	Water quality standards (303(d) list)	Describe status of water quality in state's water bodies.	Requires development of a Total Maximum Daily Load (TMDL) for each pollutant documented to be in water bodies at levels greater than the water quality standards. Sammamish has several streams and lakes on the state's 303(d) list that may require a TMDL.
	Sections 401 and 404	Protect water resources from alterations that could occur with dredging and/or filling in or adjacent to water bodies.	Requires a permit for activities that discharge or dredge fill material to or from waters of the United States.
Tribal Agreements and Related Case Law	"Culvert Case"- March 29, 2013 US District Court ruled that the State of Washington must replace culverts that impede the passage of fish to their spawning grounds	Protect fish populations in traditional fishing grounds of Indian Tribes.	Muckleshoot Indian Tribes are party to State Environmental Policy Act (SEPA) review of development proposals and programs. **March 29, 2013 US District Court ruling could lead to future implications for counties and cities with culverts that impede fish passage.**
National Flood Insurance Act, Flood Disaster Protection Act	National Flood Insurance Program (NFIP)	Reduce property damage and public safety threats from flooding.	City enacts restrictions/requirements on development in floodplain and residents get reduced flood insurance rates in return. **The National Marine Fisheries Service issues a biological opinion requiring changes to the NFIP to comply with ESA.**
Endangered Species Act (ESA)	Listing of Chinook salmon as a threatened species	Prevent further decline of Chinook salmon populations through prohibition on "take" of the fish or their habitat.	City participates in Water Resource Inventory Area (WRIA) 8 Salmon Conservation Planning. Chinook salmon are present in Lake Sammamish.

Table 2- 1 Summary of regulations (continued)

Law	Program	Intent	Relevance to Sammamish
State and local regulations			
State Environmental Policy Act (SEPA)	City of Sammamish reviews proposals and issues SEPA determinations	Identify and require mitigation for the environmental impacts or proposals and programs.	SEPA is used to address impacts that are not covered in other City requirements.
Shoreline Management Act (SMA)	City of Sammamish Shoreline Master Plan	Protect use and functions (economic, ecological, aesthetics) of shoreline areas; implemented by Title 25 of Sammamish Municipal Code	Shoreline Master Program was updated in 2011.
Hydraulic Code	Revised Code of Washington	Set requirements for placement of culverts and other hydraulic devices that may impact fish use.	Project proposing work within the wetted perimeter of a stream must obtain Hydraulic Project Approval (HPA).
Growth Management Act (GMA)	City Comprehensive Plan, City zoning and critical areas regulations	Regulate land use to meet growth targets while providing necessary services and protecting sensitive environmental resources.	City of Sammamish Comprehensive Plan was recently updated (2015-2035). The Environmentally Critical Areas code (Title 21A) was recently updated in 2013. Surface Water Management is implemented under Title 13 of Sammamish Municipal Code.
Water Rights-Environment	Puget Sound Water Quality Protection	Restore the health of Puget Sound by 2020.	Sammamish is in the Sammamish and Cedar River Watershed, which makes up WRIA 8 and is part of the greater Puget Sound Basin.

NPDES Phase II Permit

The most recent NPDES Phase II Municipal Separate Storm Sewer (MS4) permit (Phase II Permit), effective August 1, 2013, has a number of modifications that need to be implemented by Sammamish. The primary changes are:

Monitoring—The Phase II Permit includes monitoring and assessment requirements that allow permittees to conduct individual monitoring or pay into a Regional Stormwater Management Program (RSMP) fund that is used for (1) status and trends monitoring data, (2) stormwater program effectiveness studies, and (3) source identification and diagnostic monitoring. Sammamish has opted to pay into the RSMP fund.

Low Impact Development (LID)—The Phase II Permit requires permittees to adopt LID site-scale standards and update development-related codes, as well as to adopt Ecology's 2014 Stormwater Management Manual for Western Washington (2014 Ecology Manual) or an equivalent manual that emphasizes the incorporation of LID standards and has a new LID performance standard for flow control. Sammamish currently uses the 2009 King County Surface Water Design Manual (SWDM) and can choose to adopt the 2014 Ecology Manual or a manual that has been deemed equivalent.

Operations and maintenance—The Phase II Permit has new inspection and maintenance frequencies, increasing catch basin inspections from once a permit cycle to every two years and maintenance within 6 months of inspection.

Threshold for sites requiring flow control—The Phase II Permit changes the site size threshold for controlling runoff from new development, redevelopment, and construction from 1 acre to all sites regardless of size.

Illicit discharge detection and elimination—The Phase II permit requires 40% of the MS4 to be field screened by December 31, 2017, and 12% of the MS4 to be screened each year thereafter.

Education and outreach—Requires measureable behavior changes and modifications to outreach program.

"Culvert case" and fish passage

In March 2013, the U.S. District Court ruled that Washington State was not fulfilling its obligations to remove barriers that impede fish movement. This ruling, has become known as the "culvert case," requires the state to accelerate its program to upgrade and replace state-owned culverts. The ruling is under appeal, but nonetheless many jurisdictions around the state are assessing their culverts in anticipation of future rulings.

What is NPDES and why does it matter to Sammamish?

The National Pollutant Discharge Elimination System (NPDES) Phase II Permit is the permit that allows Sammamish to discharge stormwater from its stormwater system to receiving waters such as Lake Sammamish and other natural water bodies if the City follows the conditions of the permit. NPDES permit conditions are comprehensive and have largely shaped jurisdictional stormwater management programs in the region.

The City should begin prioritizing culverts for removal and replacement for fish passage, and to benefit Lake Sammamish kokanee salmon in anticipation of future rulings.

In March 2014, the Washington State Senate passed a bill (2SHB 2251) that requires all fish barrier removal projects sponsored by local governments to use a streamlined permit review process in RCW 77.55.181. The bill also establishes a fish barrier removal board to coordinate efforts to identify and prioritize fish barrier removals. Several Sammamish streams, including Ebright , Pine Lake , Zackuse , George Davis , and Laughing Jacobs Creeks, may have historically supported spawning for Lake Washington kokanee salmon. Currently, kokanee have only been observed in Ebright and Pine Lake Creeks, and the mouth of George Davis Creek.

A high-priority barrier on Ebright Creek was replaced in 2012, opening up new habitat. A recent report by the Kokanee Work Group, *Blue Print for the Restoration and Enhancement of Lake Sammamish Kokanee Tributaries* (Lake Sammamish Kokanee Work Group, 2014), identified three other culvert replacement opportunities on Ebright Creek, two culvert modification or replacement opportunities on Pine Lake Creek, and three culvert replacement opportunities on Zackuse Creek to support fish passage.

Other related regulations

In addition to directly related regulations, such as NPDES, which is a program under the Clean Water Act (CWA), the Growth Management Act (GMA) (Chapter 36.70A RCW), and the Shoreline Management Act (SMA) have significant overlap with surface and stormwater management programs. The GMA requires jurisdictions within urban growth areas, such as Sammamish, to conduct comprehensive City planning, and develop policies and regulations that protect the functions and values of critical areas (Chapter 36.70A.172 RCW). The SMA of 1971 (Chapter 90.58 RCW) requires local governments to develop shoreline management programs that protect the public interest associated with shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest.

Growth Management Act and environmentally critical areas

Wetland in Sammamish

The City regulates environmentally critical areas under Sammamish Municipal Code 21A.50, as required by the Washington State GMA (Chapter 36.70A.172 RCW). These include erosion hazard areas, erosion hazard near sensitive water body overlay areas, frequently flooded areas, landslide hazard areas, seismic hazard areas, critical aquifer recharge areas, wetlands, fish and wildlife habitat conservation areas, fish and wildlife habitat corridors, streams, and lake management areas. These critical areas are, more often than not, linked to the built and natural surface and stormwater system. The City's wetlands, streams, and critical aquifer recharge areas provide beneficial surface water functions, and stormwater regulations are designed to protect these important functions.

Shoreline Management Act

Beaver Lake shoreline

The western boundary of Sammamish abuts Lake Sammamish, and all of the Lake Sammamish, Beaver Lake and Pine Lake shorelines are designated shorelines of the state within the SMA. The City's Shoreline Management Program was updated in 2011 (City of Sammamish 2011). Conservation goals listed in the Shoreline Management Program that are directly or tangentially related to surface and stormwater management include:

- Preserve, enhance, and/or protect shoreline resources (i.e., wetlands and other fish/wildlife habitats) for their ecological functions and values and aesthetic and scenic qualities.
- Maintain natural dynamic processes of shoreline formation and sustainability through effective stewardship, management, and use of shorelines.
- Where feasible, enhance or restore areas that are biologically and/or aesthetically degraded while maintaining appropriate use of the shoreline.

- Maintain or enhance shoreline vegetation to protect water quality, fish and wildlife habitat, and other ecological functions and processes.
- Implement policies that can help reverse impacts caused by existing or past development activities, such as untreated stormwater discharges, that adversely affect ecological or shoreline functions.
- Manage the City's programs, services, and operational infrastructure in a manner that achieves no net loss of ecological or shoreline functions.
- Achieve no net loss of ecological functions of Sammamish shorelines.

The City's environmental principles are evident in the goals outlined in its Shoreline Management Program. Effective stormwater management helps achieve these goals.

Development code

Land use and activities conducted in Sammamish directly affect surface and stormwater management through the creation of impervious surfaces and pollution-generating activities. The City's development code is designed to ensure that development is carried out in locations and using methods that are safe, do not negatively impact public resources, and fit within the overall context of the City's neighborhoods. The City's comprehensive plan lays out goals and policies related to development activities, and the development code outlines how the goals and policies are to be met. Surface water management is included in Chapter 13 of the Sammamish Municipal Code.

Low Impact Development

The Phase II Permit requires the City to review, revise, and make effective its local development-related codes, rules, standards, or other enforceable documents to incorporate and require low LID principles and LID best management practices (BMPs). In addition to the Phase II Permit, the City's 2015 Comprehensive Plan provides the foundation and policies to support updates to the Sammamish Municipal Code. Relevant LID policies in the 2015 Comprehensive Plan are listed below:

Policy EC.5.42 Promote low impact development (LID) measures that preserve natural discharge patterns.

Policy CF.4.1 Design natural infrastructure into projects whenever feasible to mimic ecological processes and minimize the need for built infrastructure.

Policy CF.4.5 Use environmentally sensitive building techniques and low impact surface water methods.

Policy CF.4.10 Promote water reuse and water conservation opportunities that diminish impacts on water, wastewater, and surface water systems.

Policy T.4.2 Require where feasible the use of rain gardens and other techniques to reduce pollutants in storm drains.

Policy T.4.5 Design and operate transportation facilities in a manner that is compatible with and integrated into the natural and built environment including features, such as natural drainage, native plantings, and local design themes.

Cartoon schematic of community with LID facilities

Sammamish Community and Aquatic Center green roof

SECTION 3– NATURAL RESOURCES AND EXISTING INFRASTRUCTURE

This section describes the current conditions of the natural and constructed surface and stormwater system within Sammamish, as well as the characteristics that influence surface and stormwater runoff.

The City is 24 square miles in size and ranges in elevation from about 500 feet above mean sea level (MSL) in the eastern part of the City, to about 50 feet above MSL at Lake Sammamish, which forms the western City border. The physical, biological, and built environment all affect and are affected by surface and stormwater runoff, and are important considerations in how stormwater is managed in Sammamish.

Over 95% of Sammamish is zoned residential. Rooftops and roads are the primary impervious surfaces that contribute to stormwater runoff.

The City includes several small drainage basins, most of which drain to Lake Sammamish (Figure 3-1). A small area on the north side of the City flows to Evans Creek and then to the Sammamish River downstream of Lake Sammamish. The north and southeastern edges of the City flow to Patterson Creek and then to the Snoqualmie River.

How does land cover and zoning affect surface and stormwater?

Land cover and zoning conditions in Sammamish relate directly to surface and stormwater runoff characteristics, as impervious surfaces like roads, roofs, and parking lots change hydrologic conditions. These changes in land cover result in more surface water runoff than is generated under Pacific Northwest pre-development conditions, wherein infiltration and shallow in-flow are more typical. In order to prevent flooding and other drainage problems, the runoff is conveyed away from the built environment to constructed drainage systems, which are managed and maintained. In newer developments, stormwater management facilities are part of the constructed drainage system, and are designed to mimic existing runoff peaks and durations and remove pollutants before the stormwater discharges to streams or other water bodies.

Placeholder for Figure 3-1

The City is primarily residential (more than 95%) and is zoned in that regard (Table 3-1 and Figure 3-2). Rooftops and roads are the primary impervious surfaces that contribute to stormwater runoff. Over 75% of the City is zoned for four units or fewer per acre. Over 19% of the City is zoned between six and eighteen units per acre. Only about 2% of the City is zoned commercial, office, or Town Center (land uses that typically have higher percentages of impervious surfaces) and 2% is zoned for Parks (Special Districts).

Table 3-1 Summary of land area by zoning classification

Comprehensive Plan Description	Acres	Percent of City
Residential- 1 units/acre	2,460	21
Residential- 4 unit/acre	6,287	54
Residential- 6 units/acre	2,117	18
Residential- 8 units/acre	91	<1
Residential- 12 units/acre	65	<1
Residential- 18 units/acre	140	1
Commercial	60	<1
Office	12	<1
Town Center B	76	<1
Town Center C	37	<1
Town Center A-1	27	<1
Town Center A-2	19	<1
Town Center A-3	10	<1
Town Center A-4	7	<1
Town Center A-5	2	<1
Town Center D	39	<1
Town Center E	13	<1
Neighborhood	2	<1
Parks (Special Districts)	226	2
Total	~11,690	100

Placeholder For Figure 3-2

Sammamish has made efforts to develop and preserve open space and parks for its residents. The City owns and operates a variety of open space and park properties that provide over 200 acres of outdoor recreational opportunities for residents, and that preserve natural areas that enhance aquatic habitat and provide surface water management functions such as flow attenuation (wetlands), temperature regulation (riparian vegetation), and water quality treatment (filtration of pollutants through vegetation). Additionally, protected wetlands both inside and outside City boundaries provide surface water management benefits. Table 3-2 lists the parks and open space in the City and bordering areas, and the surface water connection.

Table 3-2 Summary of parks and open space properties

Park or Open Space	Surface Water Connection	Size (acres)
Beaver Lake Preserve	Headwaters of Beaver Lake and Laughing Jacobs Creek	72.4
Ebright Creek Park	Upland adjacent to Ebright Creek	12.3
Big Rock Park	Headwaters of Ebright Creek	15.9
Sammamish Commons	Headwaters of Ebright Creek	38.9
Pine Lake Park	Headwaters of Pine Lake and Pine Lake Creek	18.9
Beaver Lake Park	Headwaters of Beaver Lake and Laughing Jacobs Creek	79.2
Hazel Wolf Wetlands*	Headwaters of Beaver Lake and Laughing Jacobs Creek	115.9
Evans Creek Preserve	Evans Creek	179.1 (Borders Sammamish' northern boundary in unincorporated King County)
Bill Reams E. Sammamish Park	None	19.3
NE Sammamish Neighborhood Park	Critical aquifer recharge	4.2
Sammamish Landing	Lake Sammamish	5.2
	Total	~561 acres

*Hazel Wolf Wetlands are located in unincorporated King County.

What are the geologic conditions in Sammamish?

Geologic conditions in Sammamish influence how surface water is naturally conveyed across the landscape, and also influence stormwater management alternatives and stormwater impacts. Geologic features of the East Lake Sammamish Plateau have been mapped by Derek B. Booth and others at the U.S. Geological Survey (Booth et.al. 2012). A simplified surficial geologic map compiled from Washington Department of Natural Resources (DNR) on-line 1:24,000 scale surface geology (Washington DNR 2016) is shown in Figure 3-3. The geology of the Puget Sound region is influenced by its glacial history; the Fraser Glaciation reached its maximum extent approximately 15,000 years ago covering Puget Sound and Sammamish. Most of the geologic features in Sammamish are a result of the Vashon Stade of the Fraser Glaciation. The upland areas of the Sammamish Plateau are mantled by Vashon Till, a densely compacted, poorly sorted mixture of boulders, cobbles, gravel, and sand in a matrix of silt and clay, often identified in drillers' logs as "hardpan." The till is as thick as 150 to 200 feet thick in some upland areas of the Sammamish Plateau; the presence of till is an important consideration for stormwater management techniques because it is more difficult, though not impossible, to infiltrate stormwater in these areas due to the compact nature and low permeability of the till.

The Vashon Till is locally overlain by Vashon Recessional Outwash deposits; a poorly to well-sorted, light gray, stratified gravel and sand with minor amounts of silt and clay deposited behind the receding glacier.

Why does geology matter for stormwater management?

Geologic conditions influence infiltration, erosion, and hillslope and stream processes that can be affected by or affect surface water runoff.

Interflow and lateral groundwater seepage should be considered in areas where Infiltration occurs in recessional or advance outwash, especially in erosion and landslide hazard areas.

Placeholder for Figure 3-3

Underlying the Vashon Till is Vashon Advance Outwash that consists of variably compacted sand and gravel deposited by streams and rivers ahead of the advancing glacier. Vashon Advance Outwash is typically variable in grain size, fluctuating from silt to gravel and from well sorted to unsorted. The Vashon Advance Outwash is generally more compacted than the recessional outwash due to the pressure of overriding glaciers.

Pre-Vashon glacial deposits, including both glacial and non-glacial units, underlie the Vashon Advance Outwash. These units are generally finer grained, and this is commonly where groundwater seepage is observed: at the interface between the overlying advance outwash and the finer-grained older deposits.

Other surficial units include alluvium, wetland deposits, and mass-wastage deposits that result from landslide activity.

Landslide adjacent to George Davis Creek

Landslide Hazards and Landslide Hazard Drainage Areas

Landslide hazard areas in Sammamish are present along most of the western flank of the plateau adjacent to Lake Sammamish, predominately in the steep ravines that carry stream channels from their points of origin on top of the plateau to Lake Sammamish. Erosive advance outwash is exposed in the ravines and contributes to landslide activity, especially under saturated conditions or where surface water discharges have been directed to these slopes. Most commonly, landslides occur where there is a veneer of looser soils (advance outwash) overlying the denser soils (pre-glacial fine, denser materials) on steeply inclined hillsides. Slide hazard areas are shown on Figure 3-4. Sammamish protects landslide hazard areas by establishing buffers and restricting activities within the buffers, and current stormwater management manuals outline guidelines for stormwater drainage near landslide hazard areas and landslide hazard drainage areas.

What types of drainage impacts do landslides cause?

In addition to property hazards, landslides contribute sediment and debris to stream channels, clogging culverts and pipes, and blocking drainage pathways, resulting in flooding.

Placeholder for Figure 3-4

Erosion Hazards and Erosion Hazards near Sensitive Water Bodies

Erosion is linked to a variety of characteristics including surface water runoff, geology, and topography. Erosion is often attributed to surface and stormwater runoff, and it has implications for stormwater managers. Sediment eroded and deposited in stream channels or stormwater infrastructure can reduce conveyance capacity and lead to flooding, degrade habitat, and degrade water quality conditions. Because erosion is linked to stormwater management and land development activities, stormwater management manuals include prescriptions for temporary erosion and sediment control plans for new construction, and stormwater management BMPs are often designed to remove sediment. Geologic conditions make many areas of the City susceptible to erosion because of steep slopes and erodible soils. Erosion hazard maps have been prepared for the environmentally critical areas code, and development standards have been established for erosion hazards near sensitive water bodies (SMC 21A.50.225(3)(a) (Figure 3-4). The code restricts development in a no-disturbance area to prevent sediment transport from sites with highly erodible soils to sensitive receiving waters. The erosion overlay includes most of the steep slopes on the western border of the City. Erosion hazards near sensitive receiving waters overlay is also shown in Figure 3-4.

What is the erosion hazard near sensitive waterbody overlay?

This critical areas overlay is specific to sensitive lakes that could be damaged by erosion hazards in areas that drain directly to these water bodies.

How do natural resources connect the City's surface and stormwater system?

Sammamish is fortunate to have high-quality natural resources, including over 800 acres of wetlands, 10 sphagnum bogs, 30 miles of streams (5 streams support kokanee spawning), and 3 large lakes.

The City Comprehensive Plan reflects a strong emphasis on the value of and need to protect environmentally sensitive areas as discussed in Section 1. Natural resources, particularly aquatic natural resources, are part of the City's surface and stormwater systems, as flows from the built systems ultimately end up in the natural systems, whether through outfalls to the City's streams, wetlands, or lakes or through groundwater connections to these same water bodies. The riparian, shoreline, and upland areas adjacent to the aquatic natural resources are also important contributors to water quality and habitat conditions. In addition to flood prevention, surface and stormwater regulations are designed to protect ecological functions that support beneficial uses for both aquatic life and humankind.

The City of Sammamish has high-quality natural resources, including over 800 acres of wetlands and over 30 miles of stream corridor.

Allen Lake

Lakes and Shorelines

Sammamish is bounded to the west by Lake Sammamish, one of the region's largest freshwater lakes, which is also the ultimate receiving water for approximately 2/3 of the entire City area. Other lakes in Sammamish include Beaver and Pine Lakes. Laughing Jacobs, Yellow, and Mystic Lakes are large wetlands that are commonly referred to as lakes. Shorelines for most of these lakes are dotted with homes and private parcels. Table 3-3 lists the lakes in Sammamish and special considerations with regard to water quality or stormwater management.

The two largest lakes fully contained within Sammamish, Beaver Lake and Pine Lake, have established lake management areas under the environmentally critical areas code (Section 21A.50.355). The edges of these lakes are also considered shorelines of the state, and as such are managed under the City's Shoreline Master Program which was approved by Ecology in 2011 (City of Sammamish 2011). Plans have been developed for both Beaver Lake and Pine Lake to manage water quality, particularly phosphorus inputs that contribute to algal blooms and consequent lake eutrophication. Stormwater BMPs that can achieve 80% reduction in phosphorus are among the recommended methods for controlling phosphorus inputs to these sensitive lakes, along with source control methods.

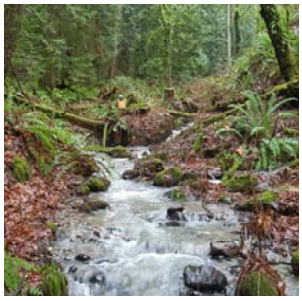
Are there any mapped flood-plains in Sammamish?

The only designated 100-year floodplain in Sammamish is Lake Sammamish. Localized flooding has been reported in wetlands and streams in the City.

Table 3-3 Lakes in Sammamish

Lake	Area (acres)	Special Considerations
Lake Sammamish	4,849	Phosphorus sensitive and listed on 2012 303(d) for Category 5 impairment by fecal coliform and phosphorus
Beaver Lake	71.2	Phosphorus sensitive
Pine Lake	85.7	Phosphorus sensitive and listed on 2012 303 (d) for Category 5 impairment by fecal coliform
Laughing Jacobs Lake*	7.7	Phosphorus sensitive
Yellow Lake*	8.8	To be determined; recently annexed
Mystic Lake*	10.9	To be determined; recently annexed

*Technically a wetland, but more commonly referred to as a lake.



George Davis Creek

The City's Final Shoreline Restoration Plan, completed as part of the Shoreline Master Program update (ESA Adolfson 2008), recommends several stormwater management programmatic alternatives and restoration projects to meet program goals, including:

- Implementation of City-wide LID BMPs
- Implementation of BMPs to reduce erosion and sediment inputs
- Retrofit existing roads to provide water quality treatment
- Protect and restore wetlands in upper watershed to provide water quality benefits

Streams

There are 19 mapped stream channels that enter Lake Sammamish, draining the upland Sammamish plateau. Flow in some of these stream channels is supplied by large wetlands located near the headwaters. Table 3-4 lists streams and lengths that are in open channel or pipes; these are also shown in Figure 3-5.

Table 3-4 Summary of streams and pipe/open channel lengths

Stream Name	Length (miles)	
	Pipe	Open Channel
Trib 145	0.04	0.77
Trib 163		0.67
George Davis Creek	0.02	3.01
Ebright Creek		2.33
Kanim Creek		1.31
Laughing Jacobs Creek		3.14
Many Springs Creek		0.65
North Fork Issaquah Creek		1.16
Pine Lake Creek		1.86
Zackuse Creek		0.84
Un-named Channels	0.29	18.58
Total Lengths	0.35	34.33

Wetlands

There are over 160 mapped wetlands in Sammamish, ranging from less than 1 acre in size to over 100 acres. Over ten of the City's wetlands have been mapped to include sphagnum bog ecosystems, and two additional bogs are located outside of the City limits within the City's urban growth boundaries (AMEC 2012a). Bogs are recognized for their unique characteristics that require hundreds to thousands of years to form (U.S. EPA 2012), and as such are irreplaceable within the average human lifespan.

Wetland 61—view from above

Bogs are also very sensitive to changes in water chemistry that can result from stormwater inputs (Horner et al. 1997). Wetlands in Sammamish support a variety of wildlife, including amphibians, deer, small mammals, songbirds, woodpeckers, waterfowl, and mammals. Table 3-5 lists the acreage of wetlands in each drainage basin, and Figure 3-5 shows the wetland locations and identification numbers (King County ID).

Table 3-5 Summary of wetland acreage in Sammamish

Basin	Total Wetland Acreage
Allen Lake	47.6
Beaver Lake	132.7
Evans Creek	68.2
Thompson (Ebright)	49.8
Inglewood (George Davis)	136.5
Laughing Jacob's	126.2
Monohon-North	8.4
Monohon-South	5.9
Mystic Lake	12.5
North Fork Issaquah Creeek	45.9
Panhandle	8.6
Patterson Creek	40.2
Pine Lake	155.4
Total	837.9

Placeholder for Figure 3.5

Critical Aquifer Recharge Areas

Critical aquifer recharge areas (CARA) are areas in Sammamish where groundwater could be most vulnerable to contamination from surface activities due to specific aquifer characteristics. There are several deep municipal water wells in Sammamish that provide drinking water to Sammamish Plateau Water and District and Northeast Sammamish Sewer and Water District customers. Wellhead protection zones have been formed around these municipal wells. The wellhead protection zones correlate with critical aquifer recharge classes identified in the City's environmentally critical areas code. Some domestic wells are also completed in the shallower aquifer that is present in the advance outwash.

The City's environmentally critical areas code designates the area with surficial geology mapped as advance outwash as a category 3 CARA (Figure 3-6). On-site infiltration of 75% of all stormwater generated on-site for new developments is required in all CARAs in order to replenish aquifers, unless it is shown that water quality will be diminished or other consequences of infiltration may arise. However, deep injection of stormwater is not allowed in class 1 and 2 CARAs, rather only in class 3 CARAs where appropriate water quality BMPs are in place.

Why do critical aquifer recharge areas matter for stormwater management?

Surface water is connected to ground water through infiltration and groundwater seepage; it is important to understand these connections and linkages when developing stormwater management alternatives.

Placeholder for Figure 3-6

What fish species do the City's water bodies support?

Kokanee salmon spawning in Ebright Creek

Lake Sammamish and the surrounding watershed is home to a unique population of kokanee salmon (Lake Sammamish kokanee), and streams within Sammamish, including Ebright Creek, Pine Lake Creek, Zackuse Creek, George Davis Creek, and Laughing Jacobs Creek, provide important spawning habitat.

Other fish species known to be present in Sammamish streams include coho salmon, sockeye salmon, cutthroat trout (AMEC 2012b), and pea-mouths (observed).

Puget Sound Chinook salmon were listed as threatened under the federal Endangered Species Act. Although not known to spawn in Sammamish stream channels, Chinook salmon are present in Lake Sammamish and do migrate through the lake to reach spawning habitat in Issaquah Creek. Therefore, the shoreline of Lake Sammamish is

What are the water quality conditions of the City's water bodies?

The State of Washington lists the water quality status of water bodies in Washington to meet the federal requirements of Sections 303(d) and 305(b) of the Clean Water Act. Water quality is assessed to determine attainment of state surface water quality standards (WAC 173-201A) and sediment management standards (WAC 173-204). The State's most recent water quality assessment was reported in 2012.

What is the quality of water in Sammamish streams?

Generally speaking, the quality of water in Sammamish streams is typical of urban and suburban areas, with the primary concerns being fecal coliform bacteria, elevated temperature, and low dissolved oxygen.

Draft listings are reported for 2014 but have not been finalized. The water bodies are classified into categories ranging from 1 to 5, based on data collected. Category 1 waters meet tested standards for water quality; Category 2 indicates waters of concern; Category 3 indicates insufficient data; and Category 4 waters are of concern, but do not require a total maximum daily load (TMDL) because one is already in place, another pollution control program is in place, or a TMDL is not appropriate for the type of impairment (i.e., dams, low flow). Waters on the 303(d) Category 5 list require a cleanup plan such as a TMDL, which identifies how much pollutants need to be reduced to achieve surface water quality standards. Ecology is the lead entity in the development of TMDL cleanup plans. If a plan were to be developed for one of the water bodies in Sammamish, Ecology would work with the City, other local jurisdictions, and the community to develop an appropriate implementation plan to achieve water quality improvement and meet water quality standards.

Three streams (Ebright, George Davis, and Pine Lake Creeks) that are entirely within Sammamish's jurisdiction are on the 2012 Ecology 303(d) Category 5 list for water quality impairment by bacteria and/or dissolved oxygen. However, the state's candidate 2014 list recommends Ebright Creek be moved to Category 1 for bacteria because of improving conditions based on more recent data. Additionally, Laughing Jacobs Creek is on the Category 5 303(d) list for bacteria and dissolved oxygen. The 2014 candidate listings include bioassessment data from the benthic index of biologic integrity (B-IBI) data collected by King County. Ebright, George Davis, Laughing Jacobs, and Pine Lake Creeks, as well as a tributary to Evans Creek are also listed as candidate Category 5 streams for poor B-IBI scores, which is indicative of water quality. Table 3-6 lists the stream reach, pollutant, and category of impairment. Common sources of bacteria are fecal matter from wildlife, domestic pets, and sewage.

Table 3-6 Summary of stream reaches on 2012 Ecology 303(d) list and 2014 candidate listings

Stream	Reach	Category (2014 Candidate Category)	On the List Since:	Type of impairment								
				T	Hg	FC	pH	DO	NH3	B-IBI	P	Oth-er
Ebright Creek		1	2004				X		X			
Ebright Creek		5 (1)	2004			X						
Ebright Creek		2	2004					X				
Ebright Creek		(5)	new							X		
Tributary to Evans Creek		(5)	2004							X		
George Davis Creek		5	1996			X						
George Davis Creek		2	2004				X					
George Davis Creek		(5)	new	X						X		
George Davis Creek		(2)	new					X				
Pine Lake Creek		1	2004				X		X			
Pine Lake Creek		5	1996			X						
Pine Lake Creek		5	2004					X				
Pine Lake Creek		(5)	new	X						X		
Pine Lake		2*	2004			X						
Pine Lake		5 (1)	2004								X	
Laughing Jacobs Creek		5	2004					X				
Laughing Jacobs Creek		(5)	new	X						X		
North Fork Issaquah Creek		2 (5)	2004	X								
North Fork Issaquah Creek		1 (5)	2004					X				
North Fork Issaquah Creek		4A	2004			X						
Lake Sammamish		5	2004			X						
Lake Sammamish		5	2004									X**
Lake Sammamish		2	2004								X	

Notes: T = temperature, Hg = mercury, FC = fecal coliform bacteria, DO = dissolved oxygen, NH3 = ammonia, B-IBI = benthic index of biologic integrity, P = phosphorus

*Was Category 5 in 2004, downgraded to Category 2 in 2008.

**Tissue – PCB

Erosion control features to prevent water quality issues during construction of the Sammamish Community and Aquatic Center

Water Quality and NPDES Permit Holders

The Ecology Permit Reporting and Information System (PARIS) database was reviewed for a list of NPDES permit holders within Sammamish. In addition to the City's Phase II NPDES MS4 permit, there are 39 sites that have active Construction Stormwater General Permits (CSGP) in 2016. These would include Site Development Permits that have site disturbances greater than 1 acre.

The PARIS database provides information regarding each site's permit, discharge monitoring reports (DMRs), permit violations, inspections, and enforcements. Permit violations include administrative violations such as failure to submit timely DMRs and benchmark exceedances for pollutants of concern. Only 8 of the 39 sites with active CSGPs had no permit violations, and the remaining 31 sites had between 1 and 54 violations. In many cases, the violations were administrative, but benchmark exceedances were also reported for turbidity and pH, common construction site stormwater issues that are attributed to earth and cement work. This information illustrates how it is not uncommon for construction sites to discharge pollutants to receiving waters in Sammamish, and that there is a need for enforcement and other mechanisms to ensure that the construction industry follows through on permit conditions.

What are some of the threats to natural resources?

Noxious Weeds

King County's noxious weed program conducted an assessment of noxious weeds in Sammamish in 2012. Results were mapped in the County GIS system (King County 2013). There are nine Class B designated noxious weeds identified in Sammamish are listed in Table 3-7. Class B noxious weeds are non-native species whose distribution is limited to portions of Washington State. The Washington State Noxious Weed Board or a County Noxious Weed Board can designate a Class B noxious weed for mandatory control (Washington State Noxious Weed Control Board 2016). As shown in Table 3-7, noxious weeds are commonly found associated with aquatic resources (wetlands, lakes, and streams) and constructed stormwater drainage facilities. Operations and maintenance of facilities with open water or open space require the management of noxious weeds, and as LID facilities are constructed more frequently on a City-wide basis, the need for noxious weed management may need to be part of the long -term maintenance of these vegetated stormwater facilities.

Noxious Weed Management

The King County Noxious Weed Control Board requires control of garden loosestrife (Class B noxious weed in Washington). The Board reports that small areas of garden loosestrife seedlings can be dug up, and larger isolated plants can be removed by hand if care is taken to remove all rhizomes.

Why should noxious weeds be considered in a stormwater management program?

Noxious weeds are commonly found in stormwater management facilities and noxious weed management needs to be part of long-term maintenance of vegetated facilities so that these weeds don't spread and impact other natural ecosystems.

The Board does not recommend only pulling this plant because it breaks off easily, leaving rhizomes behind to regrow. Garden loosestrife has been covered with black plastic on at least one site on Lake Sammamish. This can be effective for controlling seedlings or on very small populations. It can also serve as a suppression tool where herbicides are not desired. King County reports that the aquatic formulations of glyphosate, triclopyr, and imazapyr are effective on garden loosestrife. No biological control agents are presently known and no research to discover biological control agents is currently being conducted.

Table 3-7 Summary of noxious weed inventory in Sammamish

Noxious Weed	Area (acres)	Locations Identified in Sammamish
Brazilian elodea	0.05	Shorelines
Garden loosestrife	6.16	Shorelines, streams, wetlands
Meadow knapweed	<0.01	Parks
Orange hawkweed	<0.01	Road right-of-way
Policeman's helmet	2.12	Forest lands, residential, streams
Purple loosestrife	1.46	Drainage ponds, lakes, light industrial, open space, residential, road right-of-way, shorelines, streams, wetlands
Spotted knapweed	0.12	Parks, road right-of-way
Tansy ragwort	3.11	Drainage ponds, lakes, land under development, open space, parks, pastures, residential, road right-of-way, streams
Yellow hawkweed	0.33	Parks, road right-of-way
Grand Total	**13.35**	

Mud Snails

New Zealand mud snails have been identified in several Puget Sound area streams, however, they have not been found in Sammamish stream channels yet. New Zealand mud snails are an invasive species that can dominate river and lakebed habitat, outcompeting native aquatic snails and insects, leading to implications for fish and other species that rely on these insects as their food source. Regional efforts are being made to stop the spread of mud snails.

What types of stormwater infrastructure does the City own and operate?

The built infrastructure that conveys and treats surface and stormwater runoff in Sammamish is a mix of open ditches, closed pipes, culverts, streams, and a variety of stormwater facilities that have been installed prior to and post-Sammamish incorporation. Stormwater conveyance facilities including catch basins, manholes, and ditches. The City's stormwater system was inventoried and mapped in GIS in 2014, and a summary of the data is provided below. Known system components include approximately:

- 427 publicly owned stormwater facilities (detention and water quality facilities)
- 120 privately owned stormwater facilities
- 218 miles of stormwater conveyance pipe
- 8,120 structures (e.g. catch basins)

Evans Creek HDPE pipe outfall energy dissipation

244th Avenue NE stormwater facility

Stormwater Facilities

According to Sammamish GIS records, at least 174 of the City's stormwater ponds were built in 2000 or before, and 52% of those were constructed prior to 1990 (Figure 3-7). Rapid growth in Sammamish occurred in the 1990s prior to incorporation, about the same time that stormwater management regulations were rapidly changing to address stormwater impacts on small stream channels and aquatic habitat conditions. As stormwater management techniques have evolved, so have the stormwater BMPs implemented in Sammamish. Figure 3-7 shows the types and numbers of stormwater facilities in Sammamish and the period of installation. Facility locations are shown in Figure 3-8.

As the City's stormwater treatment facilities age, there could be a greater need for additional maintenance. Additionally, these facilities could be potentially retrofitted to achieve enhanced stormwater benefits that are in line with current regulations that require improved design standards. These retrofits would include using continuous flow modeling and/or all known available and reasonable technology (AKART) standards for water quality treatment. An appearance to mimic more natural open water bodies and wetland conditions could also be considered.

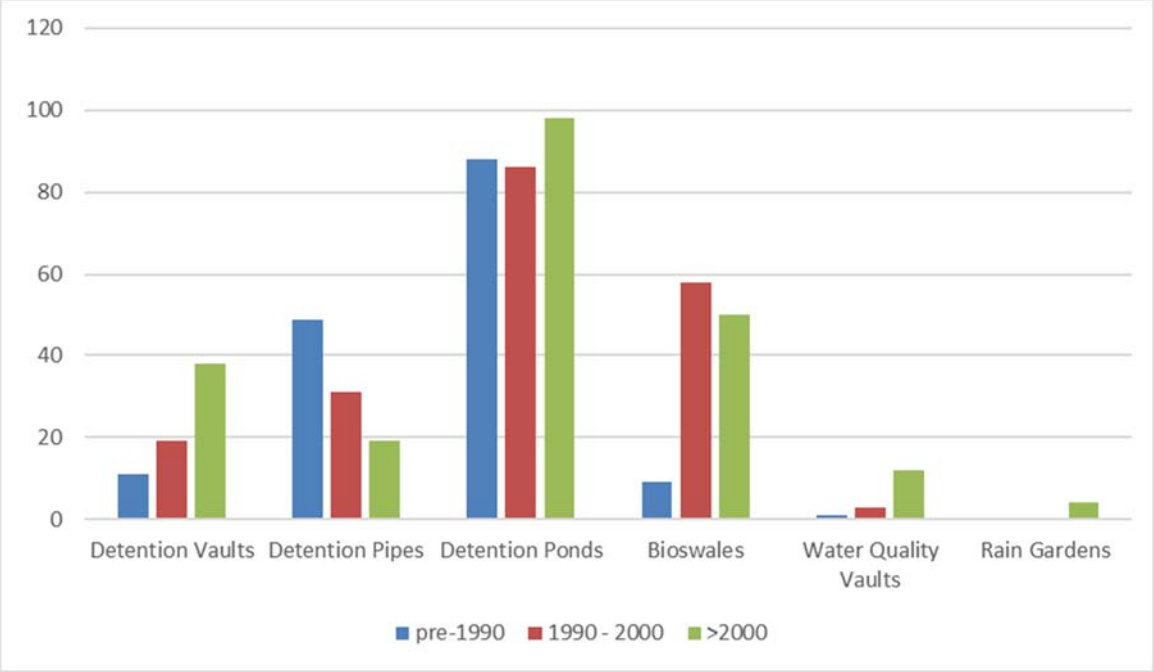


Figure 3-7 Types and numbers of stormwater treatment facilities in Sammamish and time period of installation

Placeholder for Figure 3-8

Example of ditch and culvert stormwater conveyance in Sammamish

Stormwater Conveyance

The type of conveyance infrastructure generally matches the level of development in Sammamish. Rural areas primarily still have ditch systems to convey roadway runoff, whereas newer developments have curb, gutter and sidewalk, and stormwater pipe systems that convey stormwater. The types of pipe material used in Sammamish and the general date of installation is shown in Figure 3-9. Figure 3-10 shows locations and types of Sammamish stormwater conveyance infrastructure recently inventoried. In the past decade, there has been a shift toward synthetic-based materials, rather than metal and concrete as shown in Figure 3-9. Corrugated metal pipes (CMP) are known to have corrosion issues under certain conditions, and the condition of old pipes constructed with this material is often poor. Over 75% of the CMP pipes in Sammamish were installed prior to 1990.

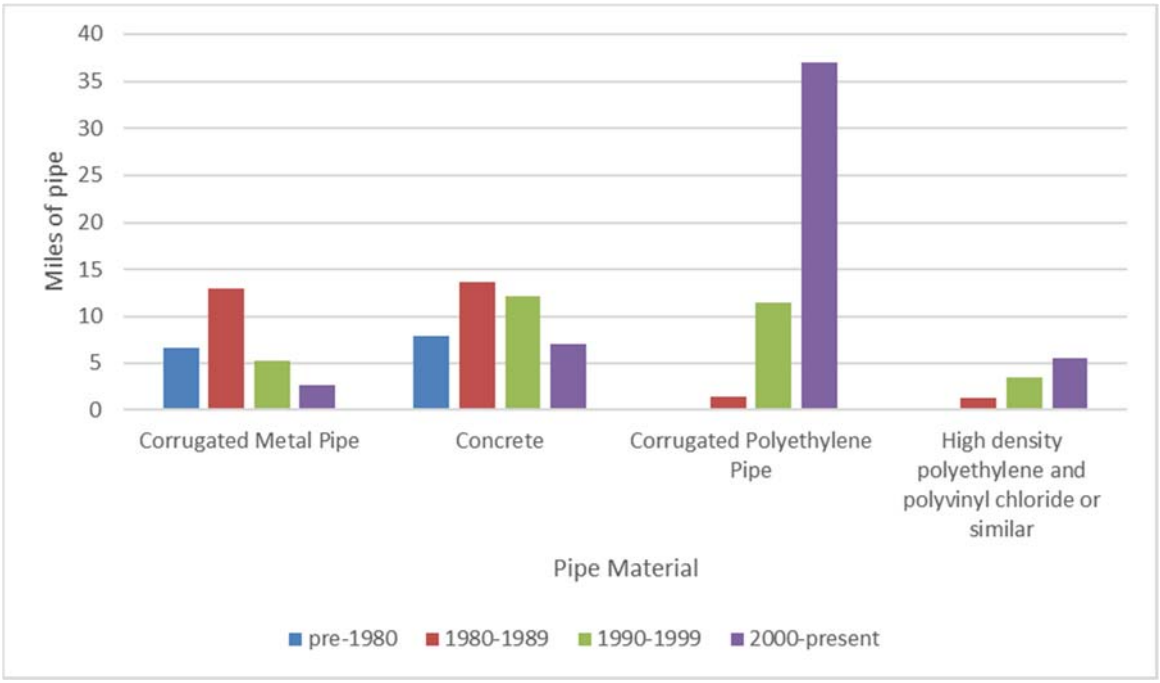


Figure 3-9 Lengths of pipe material and decade installed

Placeholder for Figure 3.10

SECTION 4– EXISTING STORMWATER MANAGEMENT PROGRAM

The City's maintenance and operations center incorporated many LID features including a green roof (above) and infiltration pond (below)

Stormwater management in Sammamish is accomplished through the planning and implementation of multiple program efforts that involve coordination with staff in most other areas of City government as well as neighboring jurisdictions. It also involves management of outside resources such as grants and volunteers that help meet the City's stormwater goals.

In its mission to promote public health, safety, and welfare, and to protect the environment by managing surface and stormwater to reduce negative impacts, the Sammamish stormwater management program implements the following program elements:

- Customer Service and Public Involvement
- Stormwater-related Code Development
- Stormwater Development Review and Code Compliance
- Construction Inspection
- Infrastructure Inspection
- Operations and Maintenance
- IDDE
- Water Quality Monitoring
- Education and Outreach
- Local and Regional Coordination
- Capital Drainage Improvement Projects

How is customer service and public involvement accomplished?

City staff respond to an average of over 100 inquiries from customers per year not related to the review of new development projects. Inquiries range from site-specific drainage issues that are sometimes private issues, to questions about the application of individual surface water fees.

City staff respond to stormwater-related inquiries from customers every year. Many of these inquiries trigger stormwater improvements.

What types of surface water or drainage problems have been reported?

An evaluation of drainage inquiries, or "Citizen Action Requests," received in Sammamish between 2001 and 2015 shows the range of issues reported by citizens (Table 4-1). Figures 4-1 and 4-2 show the number of inquiries by year and month to show seasonality and annual variability.

Table 4-1 Range of drainage citizen action requests

Type of Complaint	Number of Complaints
Beavers	11
Drainage	151
Erosion	7
Facility maintenance	54
Flooding	24
Other	98
Water Quality	14
Grand Total	**369**

Example of dead trees in a wetland that has been impacted by beaver activity

Drainage inquiries in the "other" category were primarily associated with inquiries related to stormwater rates or land classifications. In general, the drainage requests received were relatively minor. Storm-water facility maintenance calls included calls about facility fences, animals in the enclosures, or too little or too much vegetation (in the opinion of the caller).

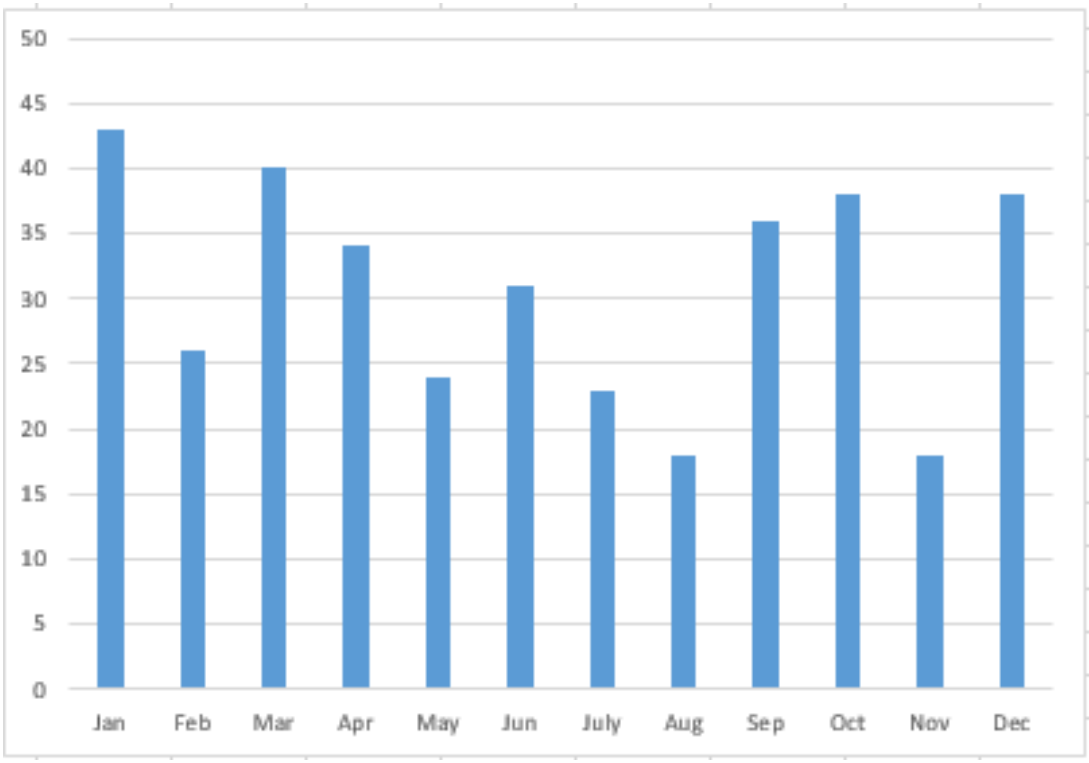


Figure 4-1 Summary total of drainage citizen action requests received each month between 2001 and 2015

Calls also included reports on sediment and erosion control at new developments and groundwater seepage concerns. Beavers were a problem at several stormwater pond facilities, and other locations where residents often took care of the situation themselves but called to report the problem. In a review of the inquiries, drainage ditches are a common topic. Some callers have had concerns over maintenance or flooding, and others have wanted permission to fill in the ditches to gain parking space or other property amenities.

Example of groundwater seepage

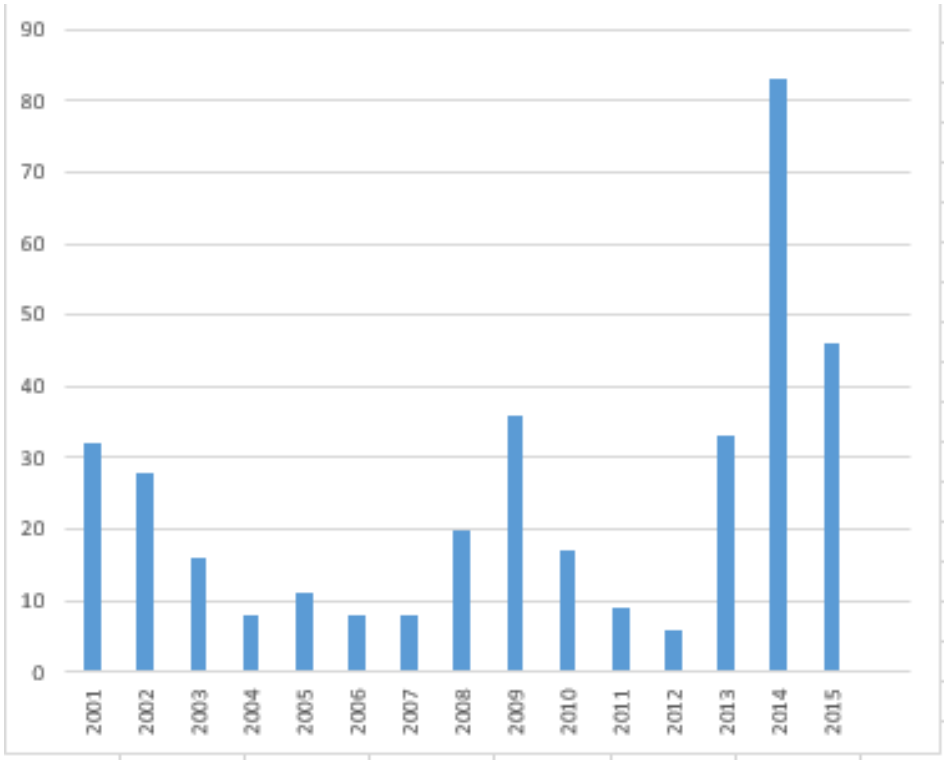


Figure 4-2 Summary of drainage citizen action requests between 2001 and 2015

How does the City comply with and implement stormwater regulations?

The City will adopt a new Stormwater Management Manual in 2016. This is one way it implements stormwater regulations.

As outlined in Section 2, there are a variety of regulations and permits under which the City stormwater program both enforces and fulfills compliance obligations. The NPDES Phase II Permit guides much of the City's stormwater program, because it is an all-encompassing permit that touches all aspects of stormwater management. Some permit requirements are passed on to residents and businesses within the City through stormwater development standards and permit-driven ordinances.

The first NPDES Phase II Permit (effective 2007 through 2012) resulted in significant changes in how the City conducted its stormwater management program. The current permit has additional requirements, as well as modifications to previous requirements and a phased implementation period. The City has been actively participating in the review process, both through to the effective date of the current permit and the recent permit appeal. The primary approaches and modifications to the current NPDES Phase II Permit are the requirements for low impact development (LID) for new development, and redevelopment, monitoring, and area thresholds for which stormwater controls are required.

The permit requires adoption of a new stormwater management manual by December 31, 2016, that is equivalent to Ecology's 2014 Stormwater Management Manual for Western Washington (Ecology Manual). The Ecology Manual incorporates LID standards and criteria. The City will also need to review and update development-related codes to allow for and be consistent with LID principles and BMPs. This will require a city-wide code review and update effort. Additionally, it may be necessary to develop tools that developers and city reviewers can use to efficiently determine when and where LID is not appropriate.

Rain garden at King County Library, Sammamish Branch

The City has opted to pay into the regional monitoring fund, rather than develop its own monitoring program. The result is a budgetary increase for water quality monitoring, but no labor resources needed to implement a city-specific program.

There are many other regulations that City stormwater staff deal with in the management of surface and stormwater, including those discussed in Section 2.

Example of new development under construction. City staff review permits for compliance with stormwater codes and standards, and conduct construction site inspections.

How does the City implement stormwater development review and code compliance?

City stormwater staff review development permits for compliance with stormwater codes and standards. Currently the City uses a bifurcated approach, with the 2009 King County Surface Water Design Manual (2009 KCSWDM) and the City of Sammamish Surface Water Design Manual Addendum, which outlines minor changes that the City opted to make when adopting the 2009 KCSWDM. For site development that disturbs 1 acre or more, the 2009 KCSMDM design standards are applied. For site development that disturbs less than 1 acre, the 1998 KCSWDM design standards are applied as outlined in the addendum.

In addition to the 2009 KCSWDM, the City has prepared flow control and water quality applications maps that depict the types of treatment standards that apply in different areas of the City. For instance, in frequently flooded areas, more stringent flow control standards are required from new developments. Likewise, areas that discharge to phosphorus-sensitive lakes require additional water quality controls and considerations. The flow control and water quality applications maps are shown in Figures 4-3 and 4-4.

Placeholder for Figure 4-3

Placeholder for Figure 4.4

SE 8th Street stormwater pond

Manhole with cover removed

Roadside ditch in need of maintenance. Vegetation is blocking inlet to pipe.

What are the primary operations and maintenance functions?

Operations and maintenance of City-owned stormwater facilities is overseen jointly by the Operation and Maintenance Manager and the Senior Stormwater Program Manager. It is accomplished by City inspectors, maintenance crews, and contractors.

The types of stormwater facilities and infrastructure inspected and maintained include:

- Stormwater ponds (retention/detention and water quality)
- Stormwater tanks and vaults (typically underground)
- Vegetated swales (bioswales and bioinfiltration facilities)
- Roadside ditches
- Stormwater conveyance pipes
- Catch basins and manholes
- Stormfilters (catch basin and manhole cartridges)
- Sand filters
- Infiltration facilities
- Sedimentation ponds
- Bioretention systems

Maintenance activities at these facilities include (1) vegetation management, (2) sediment and debris removal, (3) cartridge replacement, (4) filtration material replacement (sand filters, bioswales), (5) infrastructure replacement (structures such as catch basins, manholes, inlets, and outlets), and (6) grading and stabilization to repair erosion.

Construction Site Inspection

In addition to stormwater site plan review for proposed development activities, City staff inspect sites that have a high probability of sediment transport off-site prior to clearing and construction. During construction, City inspectors verify proper erosion and sediment control BMPs, and following completion of construction, inspectors ensure proper installation of permanent stormwater controls.

The City uses a progressive enforcement procedure for non-compliance. The current NPDES Phase II Permit requires that inspection of permanent stormwater facilities continue every 6 months until 90% of the lots associated with a single development are constructed.

Example of energy dissipation to prevent erosion. This technique is used for both construction and permanent stormwater controls

City-owned Facility Routine Inspection and Maintenance

Sammamish owns and operates over 427 stormwater facilities. The City contracts some of the maintenance work to a private contractor. All of the inspections are conducted by the City's Stormwater Inspector, and the majority of maintenance is conducted by the City crews.

The City has over 8,000 structures that require inspection and cleaning, if deemed necessary. The current Phase II NPDES Permit requires that all City-owned catch basins, manholes, and inlets be inspected prior to August 1, 2017, and every two years thereafter. The City has a contract with a vactor company to inspect and clean catch basins, manholes, and structures associated with other stormwater facilities. The budget for this contract will need to be augmented in order to meet increased inspection and vactor cleaning frequency required by the NPDES permit and future annexations.

Example birdcage structure used to prevent large debris from getting into and clogging stormwater pipes. City crews inspect and maintain these facilities

Private Facility Inspection

There are 120 privately owned stormwater facilities (i.e., ponds, tanks, and associated infrastructure) associated with commercial, educational, and recreational entities in Sammamish. City staff inspect these facilities on an annual basis, and if deficiencies are identified, owners/operators are informed of the deficiencies in writing and given a timeframe to correct the issues and provide evidence that they were corrected.

Stormwater fee discounts are provided to entities that properly maintain their facilities.

Non-routine Facility Operations and Maintenance

Extreme weather events and unanticipated flow conditions can result in the need for emergency repairs or cleaning to prevent flooding or damage to infrastructure or private property. The City conducts spot checks of facilities and problem areas after major storm events (greater than 24-hour, 10-year recurrence interval rainfall). If spot checks indicate the need for emergency repairs, appropriate action is taken. The City maintains an emergency on-call contract with a vactor company to provide emergency vactor services as needed.

Street Sweeping

Sammamish hires a contractor to conduct street sweeping at a frequent interval between October and December (three times/week), and less frequently the rest of the year. Street sweeping removes debris (leaves and sediment) from the road that could otherwise end up in catch basins and stormwater infrastructure, increasing the need for structure cleaning. Currently, the streets that are swept include arterials and streets with curb and gutters.

How does street sweeping benefit stormwater management?

Street sweeping helps reduce the amount of pollutants that get into the stormwater system and keeps pipes and catch basins cleaner and able to convey flow.

Vegetation Management

Many stormwater facilities and open conveyance systems have a vegetated component that is either purposeful (grass or other vegetation that has a specific filtering or pollutant uptake function), or accidental (plants take root in exposed soil).

LID facilities may require a greater degree of landscaping skills to maintain the vegetated components than is typically needed for traditional stormwater facilities.

In either case, functionality can be impaired by lack of maintenance. The City manages vegetation at stormwater ponds through annual mowing (some of this is performed by a private contractor). Roadside ditches that convey stormwater runoff also require vegetation maintenance and trash removal. City street crews are responsible for maintenance of road-side ditches.

LID BMPs, such as rain gardens, Filterra™ tree boxes, and bioinfiltration swales, are constructed with a variety of plants that require differing maintenance techniques and in some cases, irrigation. Currently, vegetation in LID facilities owned by the City are maintained by a contractor.

The current NPDES Phase II Permit emphasizes the use of LID techniques unless proven to be infeasible. As more LID facilities are constructed in Sammamish, a different approach to operations and maintenance will be required, because these facilities generally require a greater degree of landscaping skills than is typically needed for traditional stormwater facilities.

IDDE

The City implements an IDDE program that includes procedures for responding to spills and illicit discharges, locating and removing illicit connections, and assessing potential public or environmental threats posed by illicit discharges to the stormwater system. A hotline is published for residents to report spills or water quality concerns.

What types of water quality monitoring does the City conduct?

The City conducts a variety of water quality and flow monitoring activities of its natural resources and receiving waters for the purposes of (1) establishing baseline conditions to measure improvements, (2) ensuring safe swimming beaches, and (3) monitoring ecological changes.

The City just finished its first year of water quality, ecological, and flow monitoring on Ebright Creek to better understand the relationship between ecological health in Ebright Creek and upstream development activities (48North Solutions 2015). Monitoring included the following parameters:

- B-IBI
- Water levels
- Flow
- Temperature
- Turbidity

King County, through its Lakes and Streams Monitoring Group, works with volunteers to collect water quality data at Beaver and Pine Lakes. Physical parameters such as water level, precipitation, temperature, and water clarity have been collected at frequencies ranging from daily to bi-weekly since about 1995. Water samples are also collected between May and October (the growing season) for analysis of phosphorus, nitrogen, chlorophyll, and other parameters to evaluate productivity and indicators of trophic state or potential for algal blooms. Sammamish provides monetary support to King County for this program.

Water level gauge

Why monitor water quality?

The primary reason to monitor water quality is to measure changes that help to explain the effects of particular actions, such as treatment technologies, development, or land management practices.

Collecting macroinvertebrate samples

King County also monitors water quality at local swimming beaches during the summer months for fecal coliform bacteria. Beaver Lake, Pine Lake, and Sammamish Landing beaches are all monitored approximately every other week during the summer months. If results exceed certain criteria, beaches are posted for closure until water quality improves.

The City also contributes to Ecology's Regional Stormwater Monitoring Program (RSMP) through its NPDES Phase II Permit and participates in a municipal caucus related to the program. The amount Sammamish contributes is based on population, so with the increase in population due to annexation, this contribution is expected to increase in the future. The water quality monitoring fund is used for status and trends monitoring to evaluate water quality in small streams and nearshore marine areas, stormwater program effectiveness monitoring, and implementation of the Source Identification Information Repository (SIDIR) program. The City does not have any streams or stormwater facilities included in the regional water quality monitoring program.

What does the City get out of Ecology's RSMP?

By contributing to the RSMP, the City avoids having to implement a costly monitoring program itself, and benefits from the data collected by the program that will help further the understanding of regional stormwater practices.

How is stormwater education and outreach implemented?

The behavior of residents and businesses can greatly affect stormwater conveyance and water quality in Sammamish. The stormwater system is a mix of private and public infrastructure that is both above and below ground. The actions taken on private property and bordering City rights -of-way can greatly affect runoff characteristics. For this reason, education and outreach is a very important component of the City's stormwater program. It is also required to be in compliance with the NPDES Phase II Permit.

The City conducts a variety of targeted public education events, ranging from posting educational material and helpful advice on the City's website to public outreach events at the local farmer's market and other City events. In 2014 and 2015, the City conducted over 60 public education and outreach activities. Sammamish also participates in the regional Stormwater Outreach for Regional Municipalities (STORM) group, a collective group of NPDES Phase I and II cities and counties that share education and outreach resources, including implementation of the Puget Sound Starts Here (www.pugetsoundstartshere.org) campaign.

Watershed education outreach event

The types of education and outreach activities currently being conducted and offered by Sammamish include:

- Web-based outreach materials for pollution source control (e.g., car care, yard care, waste disposal, pet waste disposal, pool and spa care, and drainage)
- The *Kokanee Classroom Challenge,* a program teaching elementary students pollution prevention with an emphasis on saving the Lake Sammamish kokanee. Over 759 elementary school students participated in 2015.
- Car wash kits
- Opportunities to volunteer (such as storm drain marking)
- Information on LID
- Stormwater protection articles in the City's monthly newsletter
- Site visits to investigate citizen action requests frequently include on-site education of local residents.

Does the City coordinate with other jurisdictions on stormwater-related issues?

Watersheds cross jurisdictional boundaries, so comprehensive management of water resources within those drainage basins requires cross-jurisdictional coordination and outreach. Sammamish is located at the headwaters of several small drainage basins whose boundaries extend to other jurisdictions. Examples are Laughing Jacobs and North Fork Issaquah Creeks, for which the outlets are in Issaquah, or tributaries to Patterson and Evans Creeks in unincorporated King County.

City staff participate in regional forums to stay current on innovative techniques, learn approaches of other jurisdictions, and collaborate on topics of joint interest.

The Kokanee Work Group, which consists of regional representatives from King County and cities that border Lake Sammamish, is an example of regional coordination in order to fulfill a common goal of preserving and enhancing habitat for Lake Sammamish kokanee salmon.

City stormwater staff participate in other regional stormwater and watershed forums, including:

- Watershed Resource Inventory #8 (WRIA 8) Planning
- Stormwater Outreach for Regional Municipalities (STORM)
- NPDES Permit Coordinators Group
- Local Jurisdiction Stormwater Monitoring Caucus
- Regional Operations and Maintenance Program (ROADMAP)
- Kokanee Work Group

Participation in these groups is a very effective means to learn how other jurisdictions are managing stormwater and NDPES Phase II Permit requirements, new and innovative stormwater BMPs, mistakes that are avoidable, and future permit or regulatory requirements that could affect Sammamish.

How are stormwater capital projects funded and implemented?

Stormwater staff recommend and implement elements of the city-wide capital improvement program (CIP) that deal with stormwater issues. Potential projects are identified by the City council, City staff, or residents. Projects are evaluated and may be recommended for inclusion in the CIP depending on specific criteria, including availability of funds, cost, severity of problem, or opportunities for capitalizing on external partnerships.

Approximately $1.3M is allocated annually to stormwater CIPs as well as stormwater components of transportation projects. System development charges (SDC's) are applied toward new stormwater infrastructure and facilities.

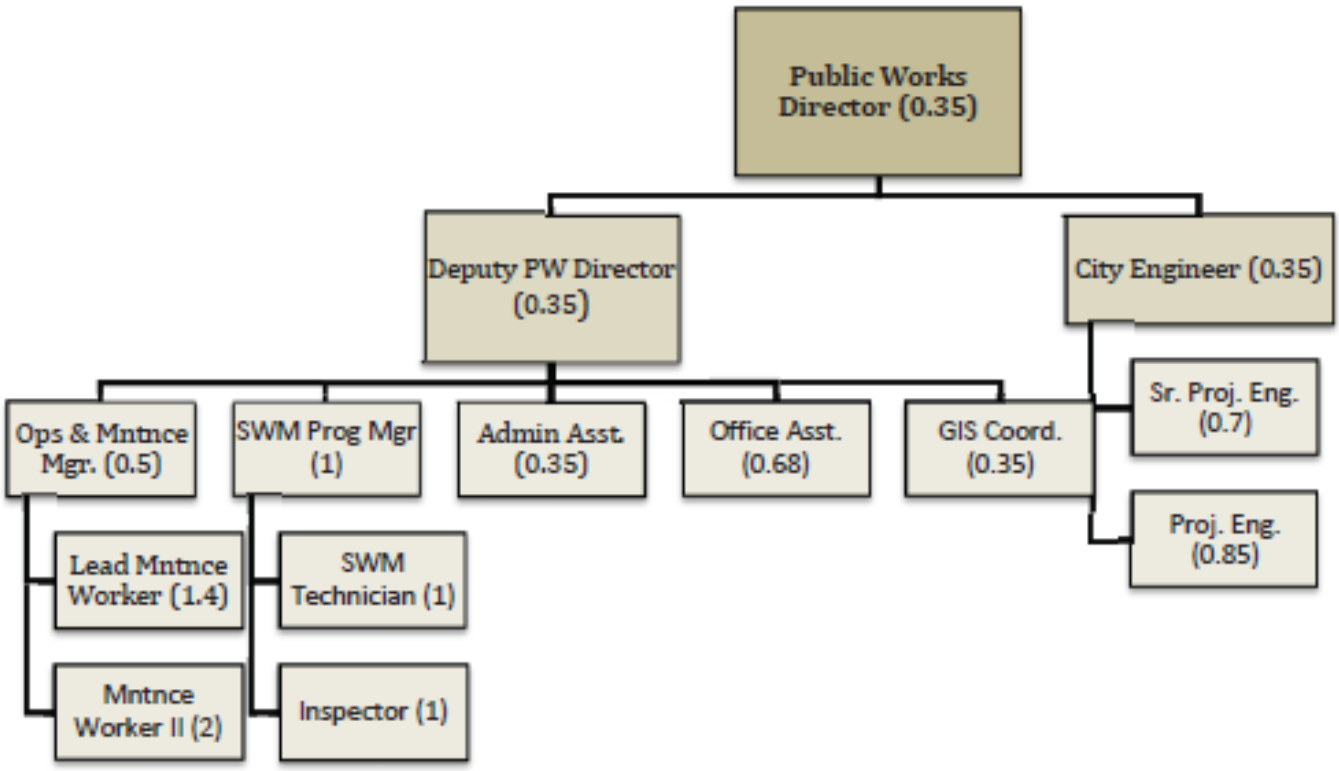
$1.3M is allocated annually for stormwater CIPs.

What are the stormwater staffing levels?

The Surface Water Management Fund Organization Chart (Fig. 4-5) shows positions within the Public Works Department that are supported by the Surface Water Management Budget. From 2013 to 2016 full-time equivalent (FTE) employees increased slightly from 10.18 FTE to 10.88 FTE . Within these positions, three full-time positions provide one hundred percent service to the Stormwater Management Program. They include the Sr. Stormwater Program Manager, the Stormwater Technician, and the Stormwater Inspector. Other staff funded under the Surface Water Management Fund provide stormwater program related work as directed by their managers.

Current population in Sammamish is nearly 60,000. Other similarly sized cities maintain larger staffing ratios to meet their stormwater management needs. For non-maintenance-oriented job functions, Shoreline (population 55,000) has seven full-time equivalent staff, Marysville (population 63,000) has four full-time equivalent staff, Kirkland (population 84,000) has eight full-time equivalent staff, and Puyallup (population 39,000) has three full-time equivalent staff.

A comprehensive comparison of staffing levels in other jurisdictions should include a review of overall Surface Water Management budget, jurisdictional population, and number and type of infrastructure.



Position History	2013 Actual	2014 Actual	2015	2016
Public Works Dir./Asst. City Mgr.	0.35	0.35	0.35	0.35
Deputy Public Works Director	0	0.35	0.35	0.35
Oper & Maint. Mgr	0.5	0.5	0.5	0.5
Lead Maintenance Worker	1.4	1.4	1.4	1.4
Maintenance Worker II	2	2	2	2
Administrative Assistant	0.35	0.35	0.35	0.35
City Engineer	0.35	0.35	0.35	0.35
Sr. Project Engineer	0.7	0.7	0.7	0.7
Project Eng. - Dev. Review	0.5	0.5	0.5	0.5
Project Engineer	0	0	0.35	0.35
Surface Water Program Manager	1	1	1	1
Surface Water Technician	1	1	1	1
GIS Coordinator	0.35	0.35	0.35	0.35
Inspector	1	1	1	1
Office Assistant	0.68	0.68	0.68	0.68
TOTAL	10.18	10.53	10.88	10.88

Figure 4-5 Surface Water Management Fund Organizational Chart

SECTION 5 – ANTICIPATED FUTURE CONDITIONS

This Plan in expected to be implemented over the next six to 10 years, through the current NPDES Phase II Permit, and to extend into the next permit cycle. Citywide changes-including new development within the existing City boundary, annexations that increase the City in both land area and population, and changing demographics will affect the stormwater program. Additionally, as stormwater infrastructure ages, more resources will need to be put into repair and replacement.

Expected NPDES permit modifications in the next Phase II permit cycle can be anticipated from the current Phase I permit requirements. Additionally, as new facilities are designed and constructed, implications of potential changes to weather patterns resulting from climate change should be factored into design considerations. These are all considerations that should be addressed to position the Stormwater Management Program to adjust to future conditions.

Trees in Sammamish

Where is development occurring?

Development is occurring throughout Sammamish on undeveloped parcels that allow for greater zoning than what is currently there. Some of these areas do not have formal stormwater infrastructure or adequate conveyance systems in place. For instance, development is currently occurring in the Inglewood Hill and Tamarack neighborhoods, and formal or updated conveyance infrastructure is being planned for these areas using a comprehensive, rather than piecemeal, approach.

As cities grow, the more difficult parcels are the last to be developed. This is true of Sammamish, and future new development will likely occur on more challenging sites that are steep, small, or have other less desirable traits. Stormwater management approaches will require innovative techniques, and more variances to standards will probably be requested. The City should identify approaches to handle these situations.

Sammamish is expected to grow in population and area, potentially increasing the City's operation and maintenance needs.

Is population expected to increase in Sammamish?

Annexations could result in an area increase of approximately 10% and a population increase of 20%. The Klahanie annexation on January 1, 2016, increased the City's population to approximately 60,000 people.

With annexation and new development, the population in Sammamish will grow, and the impact on the existing stormwater program is not known. It is certain that increased development means more impervious surface, which translates into greater and more intense stormwater runoff and potentially greater pollutant discharges to surrounding waterbodies. The City will need to increase its resources to continue to meet the NPDES permit requirements.

Parking lot runoff

Greater operations and maintenance resources will be needed, but there should also be a commensurate increase in revenue to partially off -set costs. The City should assess the future impacts of an aging infrastructure, the unknown condition of existing infrastructure in the newly annexed areas, and on-going surface and stormwater problems.

What are the expected regulatory changes?

Example of curb cuts and porous concrete stormwater retrofit on 233rd Avenue NE

As discussed elsewhere in this Plan, regulatory changes will undoubtedly occur over the implementation period of this Plan. In the previous two decades, stormwater management approaches have changed significantly in the Puget Sound region, and can be expected to continue changing as more is learned about current LID techniques, and new technologies are identified. Regulatory requirements tend to become more onerous, not less, and it is likely that the next NPDES Phase II Permit will follow the NPDES Phase I Permit; it could require that permittees begin to retrofit existing impervious surfaces for which no stormwater treatment currently exists. The current NPDES Phase I Permit, for which larger cities and counties are permittees, requires that Phase I permittees implement structural stormwater controls that prevent or reduce impacts on waters of the state.

The current permit has taken a first step in this direction by establishing lower thresholds for which redevelopment projects must add stormwater treatment for new and existing impervious surfaces. Additionally, Ecology has been encouraging stormwater retrofit through grant awards to jurisdictions that propose stormwater retrofit projects, particularly projects that incorporate LID techniques. It would be worthwhile for the City to identify a stormwater retrofit strategy ahead of requirements, and potentially take advantage of grant-funded opportunities as they arise.

What about the City's stormwater infrastructure?

Sammamish is now 16 years old, having inherited much of its stormwater infrastructure and system from King County in 2000. In 2013, over 350 stormwater facility signs were purchased and installed to clearly identify the City as a contact should there

be a problem with the facility. Much of the major development on the Sammamish plateau occurred in the early to late 1990s, and stormwater infrastructure that was put in place at the time is approaching an age of 20 to 30 years. Other jurisdictions are starting to evaluate the condition of stormwater pipes through closed circuit television (CCTV) video inspection. This can be a very useful tool to not only identify pipe conditions, but also to identify improper connections or sources of illicit discharges. Pipe condition rating systems are used to schedule immediate repairs or follow-up evaluations as far out as 10 years. This information is being used in the overall management of stormwater assets, and helps program budgetary needs in the future. The City should consider conducting pipe condition assessments on its pipes. Pipe cleaning and illicit discharge detection and elimination tasks could be coordinated with the overall assessment.

The City has purchased a new asset management software program, City Works™. This tool will be very useful to track stormwater system assets and develop an asset management plan for how and when the assets will be repaired or replaced in the future.

Are there new technologies, equipment, or approaches that could be employed in Sammamish?

Just as stormwater management has evolved over the last 20 years, new stormwater treatment technologies are being developed and tested in order to meet regulatory requirements. The City should keep abreast of technological development through ongoing participation in regional stormwater work groups, attending conferences, and subscribing to technical journals. The Department of Ecology administers the Technical Assessment protocol-Ecology (TAPE) program that evaluates and certifies new stormwater treatment technologies. The City should be aware of new certified technologies and evaluate long term maintenance needs before allowing use within the City.

What is CCTV inspection?

CCTV (closed circuit television) inspection is a method used to evaluate underground pipes. It involves using a camera mounted on a remotely operated tractor. Video footage is collected that is reviewed by a qualified inspector for defects.

How might climate change affect stormwater management in Sammamish?

Climate changes that could affect Sammamish are related to the predicted increase in the frequency and intensity of precipitation events. In the Pacific Northwest, heavy rainfall events are projected to become more severe (Snover et al. 2013). This could lead to increased periods of flooding in lowland areas, or in the vicinity of wetlands or constructed ponds that are designed to store water. Stormwater infrastructure designed to convey water from a certain size storm event may not be adequate if more frequent, high-intensity or longer-duration, storms become commonplace. Additionally, unstable slopes may experience more frequent slope failures due to prolonged saturated conditions. As the City upgrades its piped infrastructure and replaces culverts, there are opportunities to upsize systems to accommodate predicted future flow increases.

SECTION 6 – GOALS, OBJECTIVES, AND ACTIONS

This section discusses a set of overarching storm and surface water goals, objectives and actions that together will help ensure accomplishment of the City's vision, goals and outcomes described in the 2015 Comprehensive Plan, policies, and regulations as well as meeting the NPDES permit requirements.

Goal 1 (G.1) – Comprehensively manage storm and surface water systems to ensure longevity of assets and proactively address problems related to development

The storm and surface water systems consist of a complex set of natural and constructed features and processes. Part of the complexity is due to the fact that parts of the system are constantly changing, either due to natural processes beyond our control such as the weather, or because of human activity (e.g. construction, channeling water through pipes or along roadways, and increasing impervious surfaces). Anticipating and effectively managing those complexities requires an understanding of their interrelationships and what can reasonably be done to protect our natural resources and mitigate the negative impacts while ensuring that human activity can safely occur.

For example, development often results in increased stormwater runoff and pollution, and creates or exacerbates other problems such as flooding or degradation of water quality and habitat. Mitigating problems associated with development requires a comprehensive approach that includes education and outreach; adequate development review, inspection and approvals; construction of capital projects; operations and maintenance of facilities; and interdepartmental and interjurisdictional coordination to effectively reduce impacts.

Objective G.1.1 Provide guidance to address persistent problems in the natural surface water environment.

Action G.1.1.A Develop a beaver management strategy that includes guidance and criteria for passive versus active management.

Action G.1.1.B Develop a groundwater seepage strategy that focuses on management of ongoing seepage-related drainage issues that impact public assets to minimize maintenance requirements, protect the safety of motorized and nonmotorized traveling public, and prevent future problems.

Objective G.1.2 Provide opportunities to retrofit existing stormwater facilities to enhance their effectiveness and/or aesthetics.

Action G.1.2.A Develop City-wide stormwater retrofit strategies to implement water quality and/or flow control treatment where none currently exists and to retrofit existing facilities encourage for better functionality and aesthetics.

Action G.1.2.B Support partnerships with interested stakeholders such as Sammamish Stormwater Stewards to enhance and restore the functionality or aesthetics of existing stormwater facilities.

Objective G.1.3 Revise and update the City's policies, regulations, and development standards as appropriate.

Action G.1.3.A The City should keep abreast of the latest research on storm and surface water Best Management Practices and consider revising development-related policies, standards and codes to reflect the most current and best available science.

Objective G.1.4 Participate in regional research activities in the treatment of stormwater runoff, development of new Best Management Practices, and protection of natural resources.

Action G.1.4.A Conduct water quality monitoring, including providing funds for Ecology's regional water quality monitoring program as an alternative to conducting an individual water quality monitoring program in accordance with the City's NPDES Phase II Permit.

Goal 2 (G.2) - Use drainage basin planning to allocate limited resources to address priority problems and opportunities

Comprehensive basin planning is essential to assess current conditions, identify problems and opportunities related to maintenance, operations, preservation and restoration of natural resources, and development of integrated strategies for surface and stormwater management within the basin. This work will also identify potential capital investments the City may wish to fund in the future.

Objective G.2.1 Use basin planning as the primary tool to identify, prioritize and schedule surface water capital projects and identify surface water management strategies that support protection and/or restoration of the City's natural resources.

Action G.2.1.A Conduct basin planning on one or more of the City's drainage basins including condition assessment of pipes, hydrologic analysis of flow conditions in stream channels, biological and geomorphic assessment of natural resources, and identification of capital projects and maintenance management strategies.

Action G.2.1.B Establish criteria to help guide land use acquisition to facilitate the City's storm and surface water program goals or to meet regulatory requirements. Criteria should include alignment with the City's priorities, mission and vision; and cost benefit analysis for leveraging other resources, costs of development, operation and maintenance, and benefit to the environment.

Action G.2.1.C Establish a fund to be used to purchase property that meet the City's criteria.

Goal 3 (G.3) - Promote surface and stormwater education and outreach

Technical assistance and community education regarding environmental, storm and surface water stewardship enables the City to protect its quality of life and natural water resources, and enables its residents and businesses to comply with related federal, state, and local mandates. The promotion of stewardship is an integral part of a comprehensive storm and surface water management program and is required by the City's NPDES Phase II Permit.

Objective G.3.1 Provide education and outreach opportunities that support the City's stormwater management goals.

Action G.3.1.A Continue to conduct education and outreach as required by the City's NPDES Phase II Permit, and expand the program by offering different types of events across multiple sectors, such as educational opportunities for homeowners and developers.

Action G.3.1.B Provide leadership in a regional stormwater outreach group such as the Stormwater Outreach Group (SOGGIES) regional forum.

Action G.3.1.C Update the City's stormwater webpage to include new information on Low Impact Development code updates and revised drainage standards.

Action G.3.1.D Update educational brochures and handouts on changes to Low Impact Development codes and revised stormwater standards.

Objective G.3.2 Work with community members to promote stewardship of local storm and surface water resources

Goal 4 (G.4) - Promote the recovery of Lake Sammamish kokanee and other threatened or endangered salmonids

Under the federal Endangered Species Act, Chinook salmon were listed as a threatened species in March 1999, and bull trout were listed as a threatened species in November 1999. Additionally, Lake Sammamish kokanee are a species of high importance to the City and region. These fish and listings emphasize the need for continued focus on effectively managing storm and surface water through the City's regulations, policies, projects and programs.

Objective G.4.1 Preserve and protect habitat that supports Lake Sammamish kokanee salmon and other threatened salmonid species.

- **Action G.4.1.A** Provide active staff membership to support the Kokanee Work Group (KWG) in its efforts to improve habitat and remove fish passage barriers for Lake Sammamish kokanee salmon.
- **Action G.4.1.B** Provide active staff membership to support the WRIA 8 in its efforts to improve habitat for Chinook salmon.

Objective G.4.2 Conduct habitat improvement projects that support salmon recovery.

- **Action G.4.2.A** Review and map culverts for fish passage on fish-bearing streams and prioritize culverts for repair and replacement.
- **Action G.4.2.B** Support Kokanee Work Group Blueprint and WRIA 8 Implementation Plan projects in the storm and surface water program.

Goal 5 (G.5) – Prepare a multiyear list of Capital Improvement Projects that address the City's storm and surface water priorities

Developing a multiyear list of storm and surface water Capital Improvement Projects (CIP) will provide a blueprint for moving forward to address priority issues and problems. The City's stormwater capital assets will be planned and financed to ensure that the benefits of the facilities and their costs are balanced over time.

Objective G.5.1 Identify opportunities and needs for surface and storm water capital improvements that address the City's priorities.

- **Action G.5.1.A** Identify grant-eligible capital projects and pursue grants and other partnerships as a source of funding.
- **Action G.5.1.B** Finance an ongoing Water Quality Opportunity Fund to implement water quality improvements beyond what is required in partnership with other city projects, other agency-sponsored projects or with special interest groups.

Objective G.5.2 Identify maintenance projects that improve the functionality of the surface and stormwater system.

- **Action G.5.2.A** Conduct ditch and culvert maintenance on up to 2 miles of the City's ditch system per year.

Goal 6 (G.6) - Promote City-wide compliance with storm and surface water regulations

The Federal Clean Water Act, implemented through the municipal stormwater National Pollutant Discharge Elimination System (NPDES) permit, mandates a wide variety of local programs to manage surface and storm water and improve water quality. Compliance is measured by the effectiveness of the City's surface water and water quality programs, which impact operations in Parks, Public Works, and other departments.

Objective G.6.1 Educate, implement and enforce City storm and surface water codes and standards in accordance with applicable local, Federal and State laws and permits.

Action G.6.1.A Adopt a new Stormwater Design Manual in accordance with the City's NPDES Phase II Permit.

Action G.6.1.B Conduct a City-wide review of development codes, standards and guidance documents and revise as needed to incorporate and require Low Impact Development (LID) principles and LID BMPs in accordance with the City's NPDES Phase II Permit.

Action G.6.1.C Develop and implement a policy requiring privately-owned stormwater facilities that drain to the City's storm system be properly maintained. This will help ensure that they continue to function as designed and not become an eyesore to the surrounding community.

Goal 7 (G.7) - Coordinate surface and stormwater management services with neighboring jurisdictions

Many of the City's drainage basins cross jurisdictional boundaries, including Evans, Laughing Jacobs, and North Fork Issaquah Creeks. In order to achieve a comprehensive approach to surface and stormwater management, the City should coordinate surface and stormwater management services with neighboring jurisdictions.

Objective G.7.1 Coordinate with other jurisdictions to discuss regionally significant topics and cross-watershed issues.

Action G.7.1.A Regularly meet with staff from King County, City of Issaquah, City of Redmond, Sammamish Plateau Water, NE Sammamish Plateau Sewer and Water District and other organizations to coordinate development projects, capital improvement projects, maintenance issues, and basin plans and studies related to storm and surface water.

Action G.7.1.B Participate in regional work groups such as Lake Washington/ Cedar/ Sammamish Watershed Water Resource Inventory Area (WRIA) 8, American Public Works Association Stormwater Manager's Group, Local Jurisdictional Stormwater Monitoring Caucus, NPDES Permit Coordinators Group, Regional Operations and Maintenance Program (*ROADMAP), Stormwater Outreach for Regional Municipalities (STORM), and Kokanee Work Group (KWG)*.

Goal 8 (G.8) - Develop storm and surface water rates and charges based on present and future revenue needs

Comprehensive management of storm and surface water should include anticipation of future growth, maintenance, operations and changing requirements of the system. Cost estimates should be based upon the present and future requirements of the system and should be one of the main sources for determining the rates and charges of the program.

Objective G.8.1 Assess condition of storm and surface water systems, operating and capital needs to maintain functionality and meet regulatory and discretionary requirements.

Action G.8.1.A Develop stormwater asset management program to inventory publically-owned storm and surface water assets; establish appropriate levels of service for maintenance, repair and replacement.

Objective G.8.2 Plan, prioritize and implement capital projects and programs to meet the goals and objectives of this Comprehensive Plan.

Action G.8.2.A Conduct stormwater rate study and adjust rates or system development charges, as necessary, to meet current and projected revenue needs.

SECTION 7 – RECOMMENDATIONS FOR MOVING FORWARD

This section provides information about the recommended programmatic work elements to be implemented in the context of Levels of Service (LOS). It also describes the available funding sources and mechanisms to carry out the required and discretionary storm and surface water related capital projects, and maintenance and operational activities.

The following high level program work elements make up the City's stormwater management program:

- Operations and Maintenance
- Development
- Capital Projects
- Public Education and Outreach
- Local and Regional Coordination

The NPDES Permit has minimum requirements in each program work element. Other programs are implemented because the City Council has deemed them to be important as they provide value to the residents of Sammamish in other ways, such as supporting the City's environmental goals.

Additional activities are proposed for each work element that are not required under the City's NPDES permit, but would further accelerate progress towards the City's environmental goals as outlined in the City's Comprehensive Plan. These constitute the Enhanced Levels of Service.

What are levels of service?

NPDES Permit requirements are the minimum levels of service needed to maintain the public stormwater infrastructure; promote public health, safety, and welfare by reducing negative stormwater impacts; and comply with relevant regulations. The City's existing LOS provides work elements that go beyond the minimum level of service to meet other City established goals and objectives. This comprises the Basic LOS.

Each work element also has a set of Enhanced LOS and estimated annual costs that are proposed for consideration. The Enhanced LOS goes even further than the Basic LOS activities by targeting problems and opportunities specific to current Sammamish storm and surface water issues. Table 7.1 through Table 7.5 summarize the Minimum/ Existing LOS, Enhanced LOS and estimated planning level budgets for each of the stormwater program work elements.

What are the recommendations for moving forward?

The recommended levels of service for each work element is to fund and implement the Enhanced LOS. This includes continuation of the existing programs which meet the NPDES permit requirements and other priority storm and surface water management needs.

Following is a summary of each work element. For more details and the basis for annual planning-level cost estimates, see Appendix B.

Table 7.1 Operations and Maintenance Levels of Service

NPDES Permit Required	Existing Levels of Service	Enhanced Levels of Services	Annual Estimated Budget	Assumptions
CB inspections and maintenance	CB inspections and maintenance	Same	$172,000	All City owned catch basins are inspected every two years and cleaned at time of inspection. CBs on arterials are inspected and cleaned annually. Assume 5,000 catch basins cleaned.
Stormwater facility inspection	Stormwater facility inspection	Same	in house staff	Annually performed by one in house full time stormwater inspector. Assume 427 stormwater facilities
Illicit Discharge, Detection, and Elimination Program	Illicit Discharge, Detection, and Elimination Program	Same	in house staff	Investigated by stormwater inspector and stormwater technician. Maintenance crew performs clean-up when needed. Training is provided by Stormwater Program Manager. Responded to 24 complaints in 2015. See Section 4 for more information.
	Emergency response	Same	$6,000	Some work performed by in house maintenance crew and stormwater inspector.
	Street sweeping	Same	$55,000	See Section 4 for more information.
	Pond mowing	Same	$220,000	Each pond is mowed once per year. 291 mowed in 2015.
	Inspection of privately owned stormwater facilities	Same	in house staff	Performed by one in house full time stormwater inspector.
	Respond to citizen action requests	Same	in house staff	Performed by one in house full time stormwater inspector, one stormwater technician, and maintenance crew as needed.
		Action G.1.1.A: Beaver Management Strategy and implementation	$15,000 one time cost + $15K annually	See Appendix B
		Action G.5.2.A: Ditch maintenance	$100,000	See Appendix B
		Action G.6.1.C: Enforcement policy for commercial properties and implementation	$20,000 one time cost + $30K annually	See Appendix B
		Action G.8.1.A: Stormwater Asset Management Program	$25,000 one time cost	See Appendix B

Table 7.2 Development Levels of Service

NPDES Permit Requirement	Existing Levels of Service	Enhanced Levels of Services	Annual Estimated Budget	Assumptions
Review all stormwater site plans for proposed development activity	Review all stormwater site plans for proposed development activity	Same	In house staff	Two full time in house development reviewers plus professional services support by contract
Inspect construction sites all permitted development sites during construction for TESC and permanent stormwater facilities	Inspect all permitted development sites during construction for TESC and permanent stormwater facilities	Same	In house staff	Two full time in house Public Works construction inspectors plus 9 month seasonal employee
Adopt new design manual	Action G.6.1.A: Adopt new design manual	Same	$45,000, one time cost	See Appendix B
Update LID code	Action G.6.1.B: Update LID code	Same	$50,000, one time cost	See Appendix B
	Action G.1.3.A: Keep abreast of latest research	Same	In house staff	See Appendix B
		Action G.3.1.D: Develop LID and design manual educational material	$15,000, one time cost	See Appendix B

Table 7.3 Capital Improvement Program Levels of Service

NPDES Permit Requirement	Existing Levels of Service	Enhanced Levels of Services	Annual Estimated Budget	Assumptions
Provide water quality treatment in accordance to standards for all CIP projects.	Provide water quality treatment in accordance to standards for all CIP projects.	Same	Varies	CIP program as approved by City Council
	Design and construction of Inglewood Stormwater Retrofit and stormwater componet of several motorized and nonmotorized transportation projects including Sahalee, SE 4th and IFCR.	Continue to onboard new projects as current ones are completed	Varies	Based on total project costs including design, construction and construction management.
	Action G.2.1.A: Basin Planning	Same	$150,000 - $400,000 per plan	See Appendix B
	Action G.5.1.A: Pursue Grants	Same	$5,000 -$10,000	See Appendix B
		Action G.1.1.B: Groundwater seepage strategy and implementation	$40,000, one time cost + $50K annually	See Appendix B
		Action G.1.2.A: Stormwater Retrofit strategy and implementation	$50,000 one time cost + $50K annually	See Appendix B
		Action G.2.1.B: Establish criteria for land acquisition	In house staff	See Appendix B
		Action G.2.1.C: Property acquisition fund	$250,000 - $1,000,000 per biannual	See Appendix B
		Action G.4.2.A: Map and prioritize fish passage culverts and implementation	$54,000, one time cost + $500,000 to $1,000,000 annually	See Appendix B
		Action G.4.2.B: Support KWG Blueprint and WRIA 8 projects	varies	See Appendix B
		Action G.5.1.B: Stormwater Opportunity Fund	$250,000 - $500,000 per biannual	See Appendix B
		Action G.8.2.A: Stormwater Rate Study	$83,000 one time cost	See Appendix B

Table 7.4 Education and Outreach Levels of Service

NPDES Permit Requirement	Existing Levels of Service	Enhanced Levels of Services	Annual Estimated Budget	Assumptions
Education and Outreach to target audiences such as K-12 and track behavior changes	Action G.3.1.A: Education and Outreach	same	$30,000	One target audience K-12 has been identified and provide watershed and surface water education. Metrics are documented to determine behavior changes as a result of program. In 2015 and 2016, the City received grants from King Conservation District for program. See Appendix B for information.
	Action G.3.2.A: Provide education and outreach to support community volunteer groups such as Drain Rangers	Increase level of support to volunteer groups	In house staff	See Appendix B
		Action G.1.2.B Support partnerships with interested stakeholders such as Sammamish Stewards	In house staff	See Appendix B
		Action G.3.1.C: Update Storm water Webpage	$10,000 one time cost	See Appendix B

Table 7.5 Local and Regional Coordination Levels of Service

NPDES Permit Requirement	Existing Levels of Service	Enhanced Levels of Services	Annual Estimated Budget	Assumptions
Water quality monitoring	Action G.1.4.A: Water quality monitoring	Same	$170,000	See Appendix B
	Action G.4.1.A: Support Kokanee Work Group	Same	In house staff	See Appendix B
	Action G.4.1.B: Support WRIA 8	Same	In house staff	See Appendix B
	Action G.7.1.A: Regularly meet and coordinate with staff from Local Jurisdictions	Same	In house staff	See Appendix B
	Action G.7.1.B: Participate in Regional Work Groups	Same	In house staff	See Appendix B
		Action G.3.1.B: Leadership role in stormwater regional outreach program	In house staff	See Appendix B

Operations and Maintenance

Much of the City's routine operations and maintenance activities on publically owned storm and surface water infrastructure assets are largely dictated by the NPDES Phase II Permit and associated maintenance standards referenced in the *Ecology 2014 Stormwater Management Manual for Western Washington* and the *Guidance Document for Western Washington Low Impact Development Operation and Maintenance* (Herrera Environmental Consultants Inc. and Washington Stormwater Center 2013).

Condition assessment of pipes would help "see" what's inside and help guide maintenance crews for better asset management

The City currently uses a combination of City crews and contractors to complete stormwater infrastructure inspection and maintenance. This approach should be evaluated on a regular basis to ensure it is the most cost effective, meets permit requirements and minimizes risk to the City. It is working well at the time of this writing and utilizing contractors should be continued.

See Appendix B for more detailed information on each identified ACTION.

<u>Existing LOS work elements:</u>

A. NPDES Permit Requirements

- Annual inspection of all stormwater treatment and flow control Best Management Practices (BMP) facilities. Provide maintenance of all publically owned and operated facilities within one year of inspection as needed.
- Inspect all catch basins every two years. Provide maintenance of catch basins within six months of inspection as needed.
- Implement an Illicit Discharge, Detection and Elimination Program to respond to illicit discharges to the publically-owned stormwater system.

B. Other Programs

- Emergency Response
- Street sweeping
- Pond mowing
- Inspection of privately-owned stormwater facilities
- Respond to storm and surface water-related complaints

Enhanced LOS work elements:

There are several ongoing operational problems that the City has historically dealt with on an individual basis. However, these issues continue to pose an uncertain amount of risk to public and private infrastructure, public health and safety. The City may want to assess the magnitude and frequency with which the problems continue to arise and develop strategies to address the priority ones. There are also opportunities to expand existing operational efforts on which the City should take advantage.

- Action G.1.1.A: Develop a Beaver Management Strategy
  Flooding problems caused by beaver dams are a persistent problem in Sammamish. Staff have resorted to installing beaver deceivers, and trapping and relocating the beavers as needed. There are several very large dams in the City that are cause for concern about public safety and risks to public infrastructure or private property if they should fail.

- Action G.5.2.A: Perform proactive ditch maintenance

  Much of the drainage system in the City consists of ditches and culverts. These get filled with sediment and vegetation over time due to natural processes or improper erosion and sediment control on construction sites. This significantly reduces their capacity and can result in flooding of property, roadway or shoulder damage.

- Action G.6.1.C: Develop an enforcement policy for privately-owned stormwater facilities

  The City is responsible for ensuring that the entire stormwater system is inspected and properly maintained. Many businesses do not follow through on the necessary maintenance of their facilities to ensure they continue to function as designed and therefore may be contributing pollutants to receiving water bodies.

- Action G.8.1.A: Develop storm and surface water Asset Management Program

  The City recently purchased and implemented the Cityworks™, a GIS-based asset management program which tracks labor, equipment and material costs. Creating customized reports and analyzing the data will help maximize efficient deployment of limited resources and create a database of historical costs.

Development Review

The City is responsible for establishing, reviewing and enforcing development policies, codes, standards and processes to meet local, State and Federal regulations, as well as the vision that the Council adopted for the community described in the City's Comprehensive Plan.

See Appendix B for more detailed information on each identified Action.

Existing LOS work elements:

A. NPDES Permit Requirements

- Review stormwater site plans for all proposed developments
- Inspect all permitted development sites during construction for compliance with approved temporary erosion and sediment control plans
- Action G.6.1.A: Update Stormwater Design Manual
- Action G.6.1.B: Update relevant codes to require implementation of Low Impact Development (LID) on new construction projects

B. Other Programs

- Action G.1.3.A: Keep abreast of latest research

Enhanced LOS work element:

The NPDES permit requires the City to make significant changes to its codes and design manual. It is important to provide assistance to the development and engineering community on how to be in compliance with the new requirements.

- Action G.3.1.D: Update educational and technical material explaining the changes to LID and Stormwater Design Manual requirements

Capital Improvement Projects

The City designs and constructs Capital Improvement Projects (CIP) to protect public health and safety, enhance the environment and facilitate the movement of people and commerce. The Surface Water Capital Fund includes drainage projects as well as the stormwater components of transportation CIP projects.

See Appendix B for more detailed information on each identified Action.

Stormwater detention vault at Sammamish Community and Aquatic Center

<u>Existing LOS work elements:</u>

A. NPDES Permit requirement

- Ensure the required minimum water quality treatment components are included in CIP projects

B. Other Activities

- Construct CIP projects currently funded in the 2015-2016 Surface Water CIP
- Action G.2.1.A: Conduct basin planning on priority basins
- Action G.5.1.A: Continue to pursue grants and other sources to help fund the stormwater CIP

<u>Enhanced LOS work elements:</u>

The City infrastructure is aging, significant development and infill is taking place. Water resource practitioners are taking a quite different approach than what was thought to be state-of-the-art best practices in the past due to more thorough research and new available data. All of this has created a need to assess existing facilities and retrofit selected stormwater assets to ensure their continued functionality and efficiency either per their original design or to bring them up to current design and regulatory standards.

- Action G.1.1.B: Develop and implement groundwater seepage management strategy

  Groundwater seeps are very prevalent in the City even during the summer due to the topography and geology of the plateau. These often are just nuisance problems until they emerge onto the roadway or sidewalk and cause a hazard to drivers, pedestrians and bicyclists.

- Action G.1.2.A: Stormwater Retrofit strategy and implementation

  It is well-documented that urban stormwater runoff is a significant source of nonpoint pollution to the surrounding waterbodies. There are older, fairly built out areas in the City that have inadequate to no stormwater treatment facilities which are potentially a source of pollutants. The City should conduct an assessment of these areas, field verify and implement priority retrofits as funds are made available.

- Action G.2.1.B: Establish criteria for land acquisition
- Action G.2.1.C: Property acquisition fund

  The City is experiencing rapid development with significantly greater densities than in the past. Several residents have expressed a strong desire to encourage design and construction of open, more natural-looking stormwater treatment facilities.

  These typically require appreciably more land than an underground tank so the City should create a fund to purchase property for future stormwater treatment facilities as funds allow.

- Action G.4.2.A: Map and prioritize fish passage culverts and implementation

  The US District Court recently ruled that Washington State was to accelerate their program to replace culverts that are fish barriers with ones that are fish-passable. As a result, jurisdictions around the state anticipate future rulings targeted towards local agencies so it is recommended that the City fund an ongoing program to inventory, plan and replace priority culverts to make them fish-passable.

- Action G.4.2.B: Support Kokanee Work Group Blueprint and WRIA 8 Implementation Plan projects

- Action G.5.1.B - Stormwater Opportunity Fund

  One of the key values articulated in the City's Comprehensive Plan is one of environmental awareness, enhancement and protection. As funds are available, the City should set aside monies to do more than the minimum water quality treatment requirements on its capital projects, use it to leverage regional or community partnerships on storm and surface water projects, or as matching funds for grant opportunities.

- Action G.8.2.A - Stormwater Rate Study

  The Stormwater Capital Plan proposes several capital projects to be implemented over the next 6 to 10 years. In addition, the City's NPDES Phase II Permit requires inspection and maintenance of the City's catch basins and stormwater facilities, education and outreach and other expenditures that go toward operating and maintaining the City's surface and stormwater system. This project is to conduct a surface water rate study to determine if the existing surface water fees and system development charges are appropriate to cover the current and projected revenue needs.

Education and Outreach

With the adoption of a new stormwater manual by December 31, 2016, City staff and developers alike will need to become familiar with new requirements and development standards.

Educational materials should be created for use by developers and City staff to more efficiently process development applications according to new requirements and standards. These resources should be made available on-line on the City's website.

See Appendix B for more detailed information on each identified ACTION.

Education and outreach should be expanded to reach more residents

<u>Existing LOS work element:</u>

A. NPDES Permit requirement:

- Develop education and outreach materials that are targeted towards specific groups, including K-12, developers and the general public and track behavior changes

B. Other Activities

- Action G.3.1.A: Education and Outreach targeted at elementary school children.
- Action G.3.2.A: Provide education and outreach to support community volunteer groups such as the Drain Rangers.

<u>Enhanced LOS work element:</u>

- Action G.1.2.B: Support partnerships with interested stakeholders such as Sammamish Stormwater Stewards
- Action G.3.1.C: Update City's stormwater webpage. There are a number of changes to the City's regulations, processes, codes and standards which must be made readily available to the public on the City's webpage. Posting materials on line is an effective way to education individuals about ways they can make a positive impact on the environment.

Local and Regional Coordination

The City should continue to coordinate with WRIA 8, NPDES permit managers, and other governmental and non-governmental organizations to explore local government roles in (1) protecting and enhancing ecological and biological processes related to storm and surface water runoff, (2) protecting and restoring aquatic habitat to support kokanee and threatened or endangered salmonid species , (3) promoting storm and surface water Best Management Practices for operations and maintenance.

See Appendix B for more detailed information on each identified ACTION.

Existing LOS work elements:

A. NPDES Permit requirements

- Water Quality Monitoring—The City is required to contribute to Ecology's Regional Stormwater Monitoring Program (RSMP). The water quality monitoring fund is used for status and trends monitoring to evaluate water quality in small streams and nearshore marine areas, stormwater program effectiveness monitoring, and implementation of the Source Identification Information Repository (SIDIR) program.

B. Other activities

- Action G.1.4.A: Conduct water quality monitoring
- Action G.4.1.A: Support Kokanee Work Group
- Action G.4.1.B Support WRIA 8
- Action G.7.1.A: Coordinate with local jurisdictions
- Action G.7.1.B: Participate in Regional Work Groups

Enhanced LOS work element:

The Storm water Outreach Group (SOGGIES) is a regional forum comprised of storm water managers and technical staff from over 80 Puget Sound public agencies. Their purpose is to work together to meet the challenges of managing storm water and its impacts in an effective, consistent and cost effective manner. The City has been an active participant for several years.

- Action G.3.1.B: Take a more prominent leadership role

  The annual Storm water Symposium brings storm water educators together to share lessons learned from local and regional education and outreach efforts. Helping to organize and run the conference will provide leadership skills and experience for staff and more visibility for the City's storm and surface water programs and activities.

Where does the money come from?

The City's storm and surface water capital improvement projects and operational activities are primarily funded through the Stormwater Utility. The revenue sources are based on the extent of property characteristics that contribute to the quantity and quality of stormwater runoff. The Utility consists of the Surface Water Management Fund, which covers operational programs and services, and the Surface Water Capital Improvement Program Fund.

Operation and Maintenance

The Surface Water Management Fund is a self-supporting fund that primarily comes from fees charged to customers. It provides for the operation and maintenance of publically-owned stormwater conveyance, detention and treatment facilities, and to meet the National Pollutant Discharge Elimination System Permit requirements. Other sources of funding for these activities includes the City's General Fund, a minor amount of investment interest, grants, and contributions through private sources and partnerships.

Capital Improvement Projects

The Surface Water Capital Improvement Program (CIP) allocates funds for the renewal and replacement of the publically-owned storm drain system, stormwater-related elements of the Transportation Improvement Plan projects, and projects that construct new stormwater assets. Sources of revenue come from one-time system development fees, stormwater rates, transfers from the Surface Water Management Fund, state and federal grants and loans, Real Estate Excise Taxes or private contributions/partnerships.

Other possible sources of revenue for the CIP include bond financing, Councilmanic (Limited Tax) bonds, and special assessments.

System Development Charge

The system development charge (SDC) is a one-time charge imposed on new development. The rapid increase in the number of customers has increased the City's burden to provide adequate storm and surface water infrastructure to support this growth. To mitigate the cost of financing these new facilities, the City has implemented SDCs to provide a way to balance the cost requirements for new utility infrastructure to meet customer growth between existing and new customers. New utility connections, under SDCs, are required to "buy-in" to the system in terms of both existing capacity and future capacity in order to bear their equitable share of the cost of such systems.

The City adopts a schedule of fees during adoption of the budget which includes the current SDC of $1,491 per dwelling unit or commercial building that has less than 2,500 sf of impervious surfaces. Additional charges are imposed for buildings with 2,500 sf or more of impervious coverage.

Surface Water Management Fund Transfers

The City routinely transfers monies from the Surface Water Management fund to help pay for CIP projects and varies from year to year.

Grants

The City has obtained grants from King County, the State and Federal Government to design and construct storm and surface water projects.

Real Estate Excise Tax (REET)

REET is collected from the sale of all real estate in the city and is based on the full selling price including the amount of any liens, mortgages and other debts used to secure the purchase. Cities are authorized to impose this local tax of 0.5 percent on property sales. The funds collected may be spent on local capital improvements that are identified in the capital facilities plan element of the City's Comprehensive Plan as identified by State law.

Private contributions/partnerships

Partnerships with public, private or nonprofit entities can stretch the City's dollars for construction of new storm and surface water infrastructure, operations and maintenance or acquisition. Examples include providing property for free or minimal cost to construct a habitat improvement project.

Bond Financing

There are several bond mechanisms available to pay for storm and surface water improvements. The creation and payment of bond revenues involve public debt financing and in some instances require legal approval, voter approval or both.

Councilmanic (Limited Tax) Bonds

The council can vote to issue limited tax bonds. These bonds do not need a dedicated source of payment but is secured by pledge of the city to pay debt service from existing revenues. State law limits the amount of limited tax bonds that a city can issue up to 1.5 percent of the city's assessed value.

Special Assessment

The City may establish Local Improvement Districts which is a financing mechanism to enable private property owners to help fund their share of new drainage infrastructure as long as a public benefit can be clearly defined and the total assessment does not exceed the cost of the improvement and related bond financing.

SECTION 8 – REFERENCES

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APPENDIX A– PUBLIC AND PLANNING COMMISSION COMMENTS ON DRAFT PLAN