Table 3-1
Surface Water Program Requirements

Stormwater Program Activity	Requirements				City Status	Plan of Action
	Ecology's Basic and Comprehensive Stormwater Program [a]	NPDES Phase II Final Federal Rule [b]	Endangered Species Act 4(d) Rule [c]	Other Regulatory Programs		
A. Develop Needed Regulations: **A.1. Develop Stormwater Design and Construction Standards for New Development and Redevelopment**	• Adopt a Stormwater Management Ordinance that includes minimum requirements defined by the Department of Ecology (Ecology) for new development and redevelopment. • In a Stormwater Management Ordinance, either: (1) adopt a Technical Manual equivalent to Ecology's *Stormwater Management Manual for the Puget Sound Basin* (the Ecology Manual) that contains the minimum requirements, or (2) refer to a Technical Manual as guidance only to be used to meet Ecology's minimum requirements. In the latter case, the minimum requirements must be contained in the ordinance. [d] • The Stormwater Management Ordinance and/or Technical Manual must include thresholds and definitions of new development, redevelopment, land disturbing activities, and existing conditions that are substantially equivalent to Ecology's minimum requirements. • The Stormwater Management Ordinance must include or adopt a Technical Manual that presents best management practices (BMPs) that are equivalent to those contained in the Ecology Manual. Include a BMP selection and site planning process equivalent to the process in the Ecology Manual. • Include an exceptions or variance process in the Stormwater Management Ordinance and/or Technical Manual that is similar in content to that contained in the Ecology Manual. • Incorporate provisions for stormwater management into local growth management regulatory actions implemented under the Growth Management Act.	**The requirements listed here are based on the Final Federal Rule and are subject to change once the Department of Ecology issues the General Permit for the state.** Construction Site Stormwater Runoff Control Design and Construction Standard Requirements are as follows: • The owner or operator of a regulated small municipal separate storm sewer system (MS4) must develop, implement, and enforce a program to reduce nonpoint source pollution from construction sites of more than 1 acre. • A regulatory mechanism must be used to control erosion and sediment to the maximum extent practicable and allowable under state, tribal, or local law. • Existing erosion and sediment control ordinances may suffice, if approved by the National Pollutant Discharge Elimination System (NPDES) permitting authority. • Procedures must be included for site inspection and enforcement of control measures. • Procedures must be implemented to obtain input from the public. • Water quality impacts must be addressed through site plan review processes. • Construction site operators must control wastes generated on-site. Post-Construction Stormwater Management in New Development and Redevelopment Design and Construction Standard Requirements are as follows: • Owners or operators of regulated small MS4s must develop, implement, and enforce a program that addresses stormwater runoff from new development and redevelopment projects that result in land disturbances of at least 1 acre and that discharge to their MS4. • Appropriate structural and non-structural BMPs must be used.	The 4(d) Rule provides a list of activities that have a high risk of resulting in a "take" of the listed threatened or endangered salmonids. The following list includes items that could be included in design standards that would prohibit activities that the 4(d) rule has determined are likely to result in injury or harm to listed salmonids. Design standards should prohibit: • Construction of structures like culverts, berms, or dams that eliminate or impede a listed species' ability to migrate or gain access to habitat. • Removal, addition, or alteration of rocks, soil, gravel, vegetation, or other physical structures that are essential to the integrity and function of a listed species' habitat. • Removal of water or otherwise altering streamflow in a manner that significantly impairs spawning, migration, feeding, or other essential behavioral patterns. • Construction of dams or water diversion structures with inadequate fish screens or passage facilities. • Construction of inadequate bridges, roads, or trails on stream banks or unstable hill slopes adjacent to or above a listed species' habitat. • Operations that substantially disturb soil and increase the amount of sediment entering streams.		Under Chapter 13.10 of the Shoreline Municipal Code (SMC), the City has adopted Title 9, Surface Water Management, of the King County Code and the 1998 *King County Surface Water Design Manual* (KCSWDM), including an addendum to modify its requirements to fit the City's needs. The addendum, titled "City of Shoreline Surface Water Design Manual," is published in the City's June 2000 Engineering Development Guide. The City has also adopted by reference "Volume IV: Source Control BMPs" of Ecology's 2001 *Stormwater Management Manual for Western Washington.* The City has completed and submitted an NPDES Phase II MS4 permit application to Ecology. The City's NPDES Phase II permit application references Ecology's 1992 "Urban Land Use BMPs, Volume IV" for source control measures, and not the 2001 "Volume IV: Source Control BMPs."	The current KCSWDM does not meet the minimum requirements defined by Ecology's Basic and Comprehensive Program under the Puget Sound Plan for drainage review thresholds, flow control requirements, water quality requirements, erosion and sediment control, and other special requirements. Changes are currently proposed to the KCSWDM which, once adopted, would meet the minimum requirements not met by the 1998 KCSWDM. The City should monitor the process and enforce the amended KCSWDM when it is updated. In addition, the City should update its Surface Water Design Manual to directly reference Ecology's "Volume IV: Source Control BMPs" in lieu of Ecology's 1992 "Urban Land Use BMPs, Volume IV" and to remove the word "draft" that precedes "1998 King County Surface Water Design Manual." The City will reduce its liability under Section 9 of the Endangered Species Act (ESA) by reducing impacts to water quality, preventing further degradation to habitat, and increasing overall regulatory compliance. The projects and programs developed under this Surface Water Master Plan will accomplish these goals. The City may also rely on local projects that have federal permitting or funding to obtain an incidental take statement (ITS) from the Section 7 ESA consultation process with other federal agencies. Entities complying with the terms and conditions of an ITS are protected from ESA "take" liability.

Stormwater Program Activity	Requirements				City Status	Plan of Action
	Ecology's Basic and Comprehensive Stormwater Program [a]	**NPDES Phase II Final Federal Rule** [b]	**Endangered Species Act 4(d) Rule** [c]	**Other Regulatory Programs**		
A.1. Develop Stormwater Design and Construction Standards for New Development and Redevelopment (cont'd)		• Controls must ensure that water quality impacts are minimized. • Adequate long-term operation and maintenance of BMPs connected to a regulated MS4 must be addressed. • The goal, at a minimum, should be to maintain pre-development runoff conditions. • EPA encourages the use of preventive measures, including non-structural BMPs, which are usually thought to be more cost-effective.		**NPDES Industrial Storm Water Permit —** Operators of industrial facilities that discharge stormwater to an MS4 or directly into waters of the United States require authorization under an NPDES Industrial Storm Water Permit.	The City does not own or operate any facilities that require an industrial permit.	No action required.
A.2. Regulations to Prevent Illicit Discharges	• Through an ongoing assessment program, identify and rank significant pollutant sources and determine their relationship to the drainage system and water bodies. • Investigate and take corrective actions for problem storm drains, including sampling. • Implement a water quality response program to investigate sources of pollutants, spills, fish kills, illegal hookups, dumping, and other water quality problems. These investigations should be used to support compliance/enforcement efforts.	To prevent illicit discharges, the following Detection and Elimination activities are required: • The owner or operator of a regulated small MS4 must demonstrate awareness of their system, using maps or other existing documents. • They also must develop a storm sewer system map that shows all outfalls, and the location/name of all waters of the United States that receive discharges. • A Phase II community must effectively prohibit illicit discharges into the separate storm sewer system. • Appropriate enforcement procedures must be implemented. • A Phase II community must develop and implement a plan to detect and address illicit discharges (including illegal dumping) to the system. • Public employees, businesses, and the general public must be informed of the hazards associated with illegal discharges and improper disposal of waste.	The following list includes items that could be included in City regulations that would prevent activities that the 4(d) rule has determined are likely to result in injury or harm to listed salmonids. • Standards shall prohibit discharge of pollutants, such as oil, toxic chemicals, radioactivity, carcinogens, mutagens, teratogens, or organic nutrient-laden water (including sewage water) into a listed species' habitat. • Standards shall prohibit release of non-indigenous or artificially propagated species into a listed species' habitat or into areas where they may gain access to that habitat.		Chapter 20.60.120 SMC prohibits illicit discharges into its storm sewer system. The City investigates illicit discharges identified by customer reports and by routine City field operations. The City presently monitors water quality and habitat in several locations. The City has a partial inventory (approximately 98 percent complete) of its storm sewer system, but it does not include information on water quality.	No action required. The City is not currently required to perform water quality monitoring by regulation, but the City chooses to continue to do so to collect data, identify problem areas, and to prepare for what is likely to be required in Ecology's Phase II General Permit. The City should complete the inventory of the drainage infrastructure system.

Stormwater Program Activity	Requirements				City Status	Plan of Action
	Ecology's Basic and Comprehensive Stormwater Program [a]	NPDES Phase II Final Federal Rule [b]	Endangered Species Act 4(d) Rule [c]	Other Regulatory Programs		
A.3. Other Regulations				**State Growth Management Act (GMA)** requires permits for activities in environmentally "critical areas" and for activities that would affect "critical areas."	The City has these regulations in place. Critical Areas regulations (Chapter 20.80 SMC) provide protection measures, including buffers, for critical areas. The City is reviewing and if necessary, updating the critical areas regulations in accordance with the GMA, which requires review to be completed by December 2004.	The City is in the process of completing the updates and adopting an updated ordinance.
				State Shoreline Management Act requires permits for activities along shorelines of the state.	Chapter 16.10 SMC adopts Title 25 of the King County Code by reference as the interim shoreline management regulations. Updates to the shoreline master program and related regulations are currently underway.	The City is in the process of completing the updates and adopting an updated ordinance.
				State Hydraulic Project Approval (HPA) — The Washington Department of Fish and Wildlife issues Hydraulic Project Approvals for construction activities that affect streams.	The City does not issue these permits. They are issued by the Washington Department of Fish and Wildlife.	Action is required to obtain this permit when the City engages in construction activities that need to obtain an HPA.
				State Aquatic Land Leases - The Washington State Department of Natural Resources (DNR) negotiates leases and other authorizations for use of state-owned aquatic lands.	The City does not issue these permits. They are issued by the Department of Natural Resources.	Action is required to obtain a lease when the City engages in activities that require the use of aquatic lands (usually for a storm drain outfall).
				State Floodplain Regulations — The National Flood Insurance Program has requirements for state and local governments to administer development in floodplains in order to continue participating in the federal flood insurance program. The Federal Emergency Management Agency (FEMA) administers the federal program and this authority is given to the Ecology in Washington State. The state, in turn, requires jurisdictions within the state that want to participate in the National Flood Insurance Program to implement their own regulations for development in flood plains that comply with the state and federal requirements.	The City requires compliance with the state Flood Control Act in its Storm Drain Utility Ordinance. The City also regulates activities and development in floodplains through Chapter 16.12 SMC, Flood Damage Prevention, and Chapter 20.80 SMC, Subchapter 5, Flood Hazard Areas.	No action is required.

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A.3. Other Regulations (cont'd)				**Section 404 of the Clean Water Act** requires a permit for activities classified by the U.S. Army Corps of Engineers as fill in wetlands. At the federal level, the Corps of Engineers regulates the discharge of dredged or fill material into waters of the United States, including wetlands.	Section 404 permits are issued by the Corps of Engineers and not the City. However, the City's Critical Areas ordinance regulates development in and near wetlands in support of this federal program (Chapter 20.80 SMC, Subchapter 4).	No action is required.
				Section 303 of the Clean Water Act, TMDL Plans — The federal Clean Water Act requires NPDES-authorized states, such as Washington, to list water quality–impaired water bodies on the 303(d) list and to prepare total maximum daily load (TMDL) plans for water bodies that do not meet state water quality standards. These plans set total maximum limits on point and nonpoint source pollutants that can be discharged to each water body without exceeding state water quality standards. Local entities are responsible for implementing programs to address the water quality problems.	Lyon, McAleer, and Thornton Creeks are listed as water quality–impaired water bodies on the 303(d) list for fecal coliform. TMDLs have not been established.	No state-sponsored TMDL plans are currently in place or are being developed. Until such time as the state completes these plans, no action is required.
B. Maintenance & Operations **B.1. Maintenance of Public Facilities** **B.2. Maintenance of Private Facilities**	• Develop and enforce an operation and maintenance program and ordinance for new and existing public and private stormwater systems.	Develop a Pollution Prevention/Good Housekeeping program for Municipal Operations that accomplishes the following: • Owners or operators of small MS4s must develop and implement a cost-effective operation and maintenance program as well as an employee training program with the goal of preventing or reducing pollutant runoff resulting from municipal operations.	The following list of items should be included in a maintenance plan to prevent activities that the 4(d) rule has determined are likely to result in injury or harm to listed salmon. Maintenance plan shall prohibit: • Maintenance of structures like culverts, berms, or dams if maintenance eliminates or impedes a listed species' ability to migrate or gain access to habitat. • Removing, poisoning, or contaminating plants, fish, wildlife, or other biota that the listed species requires for feeding, sheltering, or other essential behavioral patterns. • Removal, addition, or alteration of rocks, soil, gravel, vegetation, or other physical structures that are essential to the integrity and function of a listed species' habitat. • Removal of water or otherwise altering streamflow in a manner that significantly impairs spawning, migration, feeding, or other essential behavioral patterns.		The City's drainage facility maintenance program includes the adopted Chapter 9.4.120 from the King County Code, as well as Chapter 13.10 SMC, which includes requirements for annual inspection of commercial facilities. The program also includes annual inspection and maintenance of public retention systems as well as scheduled vactoring of public conveyance systems. The City also has an ordinance in place that requires commercial (private) property owners to maintain private systems.	The City has reviewed its adopted maintenance program to determine whether it meets the requirements of the federal NPDES rule as well as the anticipated Ecology General Permit. This review was conducted as part of this plan and is described in Chapter 8.

Stormwater Program Activity	Requirements				City Status	Plan of Action
	Ecology's Basic and Comprehensive Stormwater Program [a]	**NPDES Phase II Final Federal Rule [b]**	**Endangered Species Act 4(d) Rule [c]**	**Other Regulatory Programs**		
			• Operation of dams or water diversion structures with inadequate fish screens or passage facilities. • Maintenance or operation of inadequate bridges, roads, or trails on stream banks or unstable hill slopes adjacent to or above a listed species' habitat.			
C. Public Education	• Implement education programs to inform citizens and businesses about stormwater and its effects on water quality, flooding, and fish and wildlife habitat, and to discourage dumping of waste material or pollutants into storm drains. • Develop and implement a stormwater public education program aimed at residents, businesses, and industries in the urban area.	Develop a Public Education and Outreach Program on Stormwater Impacts that accomplishes the following: • A public education program must be implemented to distribute educational materials to the community. • The community should be made aware about the impacts of stormwater discharges to water bodies and the steps needed to decrease stormwater pollution. • Municipalities are encouraged to work with their state and Phase I communities to develop an education/outreach program more efficiently. Involve public participation by accomplishing the following: • The public must be involved in developing the municipality's stormwater program by following state, tribal, and local public notice requirements. • All economic and ethnic groups should be included. • Examples of public involvement/participation that should be considered include public hearings, citizen advisory boards, and working citizen volunteers.			The City currently conducts limited public education of citizens and businesses on stormwater quality.	The City should continue to review its public education and public involvement program to determine whether it meets the requirements of the federal NPDES rule as well as the anticipated Ecology General Permit.
D. Program Funding	• Assure adequate local funding for the stormwater program through surface water utilities, sewer charges, fees, or other revenue-generating sources.				The City currently funds its stormwater program through its Storm Drain Utility.	The City has evaluated the adequacy of existing rate revenues to fund a program that complies with applicable regulations. This review was conducted as part of this plan and is described in Chapter 9.

Stormwater Program Activity	Requirements				City Status	Plan of Action
	Ecology's Basic and Comprehensive Stormwater Program [a]	NPDES Phase II Final Federal Rule [b]	Endangered Species Act 4(d) Rule [c]	Other Regulatory Programs		
E. Interlocal Coordination	• Complete local coordination arrangements such as interlocal agreements, joint programs, consistent standards, or regional boards or committees.				The City of Shoreline participates in Regional Water Quality, King County Interagency Regional Analysis, Regional Funding Advisory Committees, Cedar/Lake WA and Central Puget Sound Watershed Forums, WRIA 8 Steering Committee, Thornton Creek Watershed Management Committee, WRIA 8 Regional Salmon Issues, Regional Road Maintenance, and WRIA 8 Public Outreach.	No action required.
F. Implementation	• Implement inspection, compliance, and enforcement measures. • Prepare an implementation schedule for the comprehensive stormwater program.				The City currently performs inspection and enforcement to a limited extent. One of the City's main priorities is for the Stormwater Environmental Services Division to have more authority to participate in the permit and review process. The City would also like to have investigative authority for commercial facilities. This would include having one staff person in each department who is responsible for determining what to investigate, to investigate problems, and to monitor commercial properties on an annual basis.	The City has adopted a Comprehensive Plan that includes code enforcement and investigative activities. The City should consider City inspection of private residential facilities in addition to its current activities.

a. Ecology's Basic program requirements were originally defined in the 1994 Puget Sound Water Quality Management Plan. Basic program requirements are from a list of Ecology equivalency review criteria in *Guidance for Local Governments when Submitting Manuals and Associated Ordinances for Equivalency Review* (Ecology 1994) and from *Stormwater Program Guidance Manual for the Puget Sound Basin* (Ecology 1992). Comprehensive program requirements are from *Stormwater Program Guidance Manual for the Puget Sound Basin* (Ecology 1992). **Many of these requirements will likely get incorporated into Ecology's NPDES Phase II stormwater general permit.**

b. Final Federal Rule and all other applicable state regulations will be the basis for the Phase II NPDES General Permit to be issued by Ecology, which is the NPDES Permitting Authority in Washington State. Ecology's Phase II NPDES General Permit has not yet been promulgated and may differ from the Final Federal Rule. As mentioned in note a., Ecology's regulations will most likely contain many of the same requirements as those in Ecology's Basic and Comprehensive Stormwater Programs.

c. Requirements summarized from *A Citizen's Guide to the 4(d) Rule for Threatened Salmon and Steelhead on the West Coast*, prepared by the National Marine Fisheries Service, Northwest and Southwest Regions, June 20, 2000.

d. Ecology indicates the following advantages and disadvantages in the different approaches (Ecology 1994):

If the entire manual (either Ecology's manual or one written by a local government) is incorporated into the ordinance by reference, all the information contained in the manual becomes part of the local government code.

The advantage of this method is that there are no questions about what is and is not an enforceable part of the local government code. One disadvantage is that if a local government wishes to change something in the manual, the ordinance may have to undergo revision as well. Additionally, the Plan requires that the ordinance and/or the manual adopted be revised within a year following any Ecology update of the technical manual.

If only parts of the manual (or only the Minimum Requirements themselves) are adopted in an ordinance, those parts are then enforceable. The other parts of the manual serve as additional guidance. If this method is chosen, only revisions to those parts of the manual adopted in the ordinance require revision of the ordinance. Updates can easily be made to the parts of the manual not adopted in the ordinance.

Table 5-3
Flood Protection Priority Level 1 Projects and Programs

ID	Basin	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost[a]
Projects						
F-1	Boeing Creek	3rd Ave NW Drainage Improvements	Construction of new conveyance system down 3rd Ave NW and construction of pump station at Dayton Ave N and NW 185th St near Pan Terra Pond, which will collect runoff from north of NW Richmond Beach Rd and pump it back to the 3rd Ave NW system.	Promotes public safety and mobility by alleviating roadway flooding. Reduces property damage by alleviating structure flooding. Also reduces yard, driveway, and residential roadway flooding.	1, 11, 12	$3,670,451
F-2a	Thornton Creek	Thornton Creek Corridor (Ronald Bog Improvements)[b]	Construction of a new conveyance system or stream channel between the Ronald Bog and the 170th St right-of-way (would remove and replace existing 60-inch-diameter storm drain pipe). Would also likely upgrade existing open channel between the 170th St right-of-way and NE 167th St. The preliminary plans for this project were taken from "Ronald Bog Drainage Improvements, Phase 1: Thornton Creek Tributary Flood Reduction Study," (Otak 2001). In the past 2½ years since completion of this study the City has completed several capital and maintenance projects in the Ronald Bog/Thornton Creek drainage basin which necessitate a reevaluation of the alternatives for the corridor between the outlet from Ronald Bog and N 167th St, including additional modeling of the basin.	Reduces property damage by alleviating structure flooding. Also reduces yard, driveway, and residential roadway flooding. Provides water quality and habitat benefit by daylighting the channel.	4	$1,227,000
F-2b	Thornton Creek	Ronald Bog Park (Ronald Bog Improvements)[b]	Regrade existing wetland to enhance wetland and increase flood storage.	Detains flows to mitigate for development and reduces local flooding of multiple structures, yards, driveways, and roadways to reduce property damage and promote public mobility. Increases wetland habitat.	4	$288,380
F-2c	Thornton Creek	Cromwell Park Wetland (Ronald Bog Improvements)[b]	Expand wetland in Cromwell Park to enhance wetland and increase flood storage.	Provides detention of flows to mitigate for other related projects and reduces local flooding of multiple structures, yards, driveways, and roadways to reduce property damage and promote public mobility. Increases wetland habitat.	NA	$222,427
F-2d	Thornton Creek	Cromwell Park Pond (Ronald Bog Improvements)[b]	Modify detention at Cromwell Park by creating additional detention pond storage and creating an athletic field that provides overflow flood storage.	Provides detention of flows to mitigate for other related projects and reduces local flooding of multiple structures, yards, driveways, and roadways to reduce property damage and promote public mobility.	NA	$243,607
F-2e	Thornton Creek	Pump Station No. 25 (Ronald Bog Improvements)[b]	Replace pump and force main to provide additional pumping capacity.	Promotes public safety and mobility by alleviating roadway flooding. Reduces property damage by alleviating structure, yard, driveway, and roadway flooding.	5	$142,855

Table 5-3
Flood Protection Priority Level 1 Projects and Programs

ID	Basin	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost[a]
F-2f	Thornton Creek	Serpentine Place Storm Drainage Improvements (Ronald Bog Improvements)[b]	Construction for this project is nearly complete as of Nov. 1, 2004. This is a revised version of the solution recommended in a previous study (Otak 2001e). The project includes 2,500 feet of 16-inch to 24-inch storm drainage piping and structures on Serpentine Place from NE 175th St to 5th Ave NE, on 10th Ave NE from NE 175th St to approximately 600 feet north of 175th, and on NE 175th St from 10th Ave NE to 12th Ave NE. The project also includes a new pump station on 5th Ave NE and NE 178th St that will collect the overflow from existing Pump Station No. 25 and pump it back into the system that flows to the new line on Serpentine Place.	Promotes public safety and mobility and reduces property damage. City staff expect this piece of the Ronald Bog project to reduce the existing flooding of 5 homes, 9 yards, and the roadways at the NE 175th St and 10th Ave NE intersection and at the 5th Ave NE and NE 180th St intersection at the 2-year and 25-year events. With these improvements in place, only 4 yards would flood and homes and roadways would not flood during the 2-year event. With the improvements in place, 3 homes, 7 yards, and the two roadway intersections would still flood. At some point, the City may consider buying homes that experience flooding as part of the Ronald Bog Improvements work. These improvements are also expected to provide relief to flooding on 11th and 12th Aves NE.	2,3,5	$656,170
F-3	Boeing Creek	Midvale Ave N Drainage	It is assumed that no land is available for a detention pond. Therefore, the proposed solution involves a conveyance upgrade. The cost estimate assumes that 770 linear feet of existing pipe will be upsized to 18-inch-diameter (390 LF) and 24-inch-diameter (390 LF) corrugated polyethylene pipe from N 178th St down to N 175th St adjacent to Midvale Ave N. This pipe would be installed across several private properties.	Provides increased conveyance capacity to reduce local flooding of property and roadways to mitigate for development. Promotes public safety and mobility and reduces property damage.	6	$415,000

Table 5-3
Flood Protection Priority Level 1 Projects and Programs

ID	Basin	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost[a]
F-4	Boeing Creek	Darnell Park Neighborhood Drainage	The proposed solution in this area incorporates three recommendations from a previous study (Otak 2001c) that were recommended for further study. This problem was studied as part of the Small Projects Program, but was determined to be out of the scope of that program. The first recommendation in the proposed solution assumes that the pipe downstream of Darnell Park would be upsized to 24 inches in diameter and a flow-control device would be installed to limit downstream flows. The second recommendation in the proposed project includes excavating Darnell Pond by approximately 3 feet to increase the storage capacity and water quality potential. This could provide approximately 1700 cubic yards of storage. The third recommendation is to replace and upsize the pipe system under N 165th St near Stone Ave N to a 36-inch-diameter corrugated polyethylene pipe, and to lower the discharge elevation into the pond. This work would be constructed partially on private property. (If any part of these recommendations are determined to be infeasible based on further study, there may still be a possibility to purchase undeveloped property near Stone Ave N and N 167th St for a detention facility.)	Provides increased detention and conveyance capacity to promote public safety and mobility and reduce property damage by alleviating structure, yard, driveway, and residential roadway flooding. Water quality benefits for this project could also benefit the Aurora Corridor Project.	7	$749,000
F-9	Boeing Creek	Hillwood Park Emergency Bypass	Construction of a new conveyance system along 3rd Ave NW that will serve as an emergency overflow bypass during high-flow events and direct flow into Hillwood Park. This project also includes excavation of a section of Hillwood Park to provide detention.	Provides increased detention and conveyance capacity to reduce property damage by alleviating structure, yard, driveway, and residential roadway flooding.	16	$250,000
F-13	Thornton Creek	Ridgecrest Drainage at 10th Ave NE	Property acquisition and water quality/detention pond design and construction.	Detains flows to mitigate for development and reduces local flooding of multiple structures, yards, driveways, and roadways to reduce property damage and promote public mobility. Provides water quality benefits.	15	$600,000
F-14[c]	Various	SWM CIP Formulation (years 1–6)	As CIPs rise in their level of priority and imminent implementation, this funding provides for initial engineering conceptualization.	Benefits will be specific to each project.	Various (including 17)	$240,000
F-15[c]	Various	Surface Water Small Projects (years 1–6)	Provides funding for small community projects that become a high priority as localized infrastructure fails, causing flooding and property damage. Projects will be developed in response to problems reported by residents and businesses.	Benefits will be specific to each project.	Various (including 17)	$900,000

Table 5-3
Flood Protection Priority Level 1 Projects and Programs

ID	Basin	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost[a]
F-16	Various	Park Projects – Priority Level 1	Stormwater components of miscellaneous parks projects. Details of the projects to be determined during design of parks projects. See Parks Master Plan for additional information.	Benefits will be specific to each project.	Various	$100,000
F-17	Various	Transportation Projects – Priority Level 1	Stormwater components of miscellaneous transportation projects. Details of the projects to be determined during design of transportation projects. See Transportation Master Plan for additional information.	Benefits will be specific to each project.	Various	$2,080,000
					Total Capital Project Costs	**$11,784,890**
Programs						
See Chapter 8.						

a. Cost estimate provided from another source for project F-1 was adjusted according to ENR Construction Cost Index in order to present the cost in 2004 dollars. The ENR index for June 2003 was 6694 and for January 2004 is 6825, so the cost was multiplied by a factor of 1.0196. Costs for F-2 were likewise adjusted. The ENR index for December 2001 was 6390. These costs were multiplied by a factor of 1.0681.
b. Ronald Bog Improvements are summarized from *Ronald Bog Drainage Improvements, Phase I - Thornton Creek Tributary Flood Reduction Study,* prepared by Otak, Inc., December 2001. Cost estimates presented on this table are the high-end estimates from the report adjusted as noted. (With the exception of Serpentine Place Storm Drainage Improvements, which is under construction.)
c. Cost is the total cost over the 6-year period.

Table 5-4
Flood Protection Priority Level 2 Projects and Programs

ID	Basin	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost
Projects						
F-6a	Thornton Creek	Ridgecrest Drainage at 12th Ave NE	Two alternatives are presented in this table for this problem area. It is assumed that the solution to this problem will only address the local issue and will not address a basinwide solution in the area. The first solution is based on the high-flow bypass option presented in a previous study (Otak 2001a). Several alternatives were briefly presented in the Otak study as part of the Surface Water Small Projects Program, but this project was later determined to be out of the scope of that program. It is assumed that this solution would include the installation of 820 linear feet of 24-inch-diameter corrugated polyethylene pipe to serve as a high-flow bypass from the flooded property downstream to the existing surface water management facility in the park. This pipe would be installed across several private properties along NE 150th Court and then adjacent to 12th Ave NE.	Provides increased conveyance capacity for high flows to mitigate for development. Promotes public safety and mobility and reduces property damage.	9	$436,000
F-6b	Thornton Creek	Ridgecrest Drainage at 12th Ave NE (Alternative 2 cost is not included in total)	The second proposed alternative for this problem involves purchasing the flooded property on 12th Ave NE. This solution could include creation of a water quality pond. There is not enough headroom to create a detention facility on this site.	Eliminates property and building flooding problem. Provides water quality benefits.	9	$325,000
F-7	Thornton Creek	N 167th St and Wallingford Ave N Drainage	This solution assumes replacement of 750 linear feet of existing pipe with 18-inch-diameter corrugated polyethylene pipe. This pipe would be installed across several private properties adjacent to Wallingford Ave N from N 167th St to N 165th St.	Provides increased conveyance capacity for high flows to mitigate for development. Promotes public safety and mobility and reduces property damage.	10	$326,000
F-8	Boeing Creek	N 167th St and Whitman Ave N Drainage	City staff generally consider this problem to be a private property issue. A remedy to the problem may include following up on code enforcement under the Small Projects Program. However, for planning purposes, it is assumed that the City would install 780 linear feet of 12-inch-diameter (630 LF) and 18-inch-diameter (150 LF) corrugated polyethylene pipe. This pipe would be installed across several private properties from N 167th St to N 165th St.	Provides increased conveyance capacity of flows to reduce yard, driveway, and residential roadway flooding.	13	$242,000
F-14[a]	Various	SWM CIP Formulation (years 7–12)	As CIPs rise in their level of priority and imminent implementation, this funding provides for initial engineering conceptualization.	Benefits will be specific to each project.	Various (including 17)	$240,000

Table 5-4
Flood Protection Priority Level 2 Projects and Programs

ID	Basin	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost
F-15[a]	Various	Surface Water Small Projects (years 7–12)	Funding for small community projects that become a high priority as localized infrastructure fails, causing flooding and property damage. Projects will be developed in response to problems reported by residents and businesses.	Benefits will be specific to each project.	Various (including 17)	$900,000
F-18	Various	Park Projects – Priority Level 2	Stormwater components of miscellaneous parks projects. Details of the projects to be determined during design of parks projects. See Parks Master Plan for additional information.	Benefits will be specific to each project.	Various	$350,000
F-19	Various	Transportation Projects – Priority Level 2	Stormwater components of miscellaneous transportation projects. Details of the projects to be determined during design of transportation projects. See Transportation Master Plan for additional information.	Benefits will be specific to each project.	Various	$5,950,000
					Total Capital Project Costs	**$8,444,000**
Programs						
See Chapter 8.						

a. Cost is the total cost allocated for miscellaneous projects over years 7 to 20 of the 20-year planning period.

Table 5-5
Flood Protection Priority Level 3 Projects and Programs

ID	Basin	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost
Projects						
F-5	North Middle Puget Sound	Meadowbrook Neighborhood Drainage	According to the City, this problem is primarily a private property issue at the apartment complex. However, for planning purposes, it is assumed that the City would construct a bypass pipeline along NW Richmond Beach Rd and then south down 15th Ave NW as suggested in a previous study (Foley 1993). The cost estimate includes costs for 1850 linear feet of 36-inch-diameter pipe to serve as a high-flow bypass. This solution is conservative, as it assumes that downstream channel upgrades (a less costly fix) would not be sufficient to handle any flow increases resulting from conveyance improvements made on the private property in the future. It is also assumed that the City would not further evaluate the possibility of buying the O'Neil property, which is located upstream of the problem area, as was recommended in the 1993 study, due to the steep slope of the property and its proximity to a wetland.	Provides increased conveyance capacity for high flows to mitigate for development. Promotes public safety and mobility and reduces property damage.	8	$1,257,000
F-14[a]	Various	SWM CIP Formulation (years 13–20)	As CIPs rise in their level of priority and imminent implementation, this funding provides for initial engineering conceptualization.	Benefits will be specific to each project.	Various (including 17)	$320,000
F-15[a]	Various	Surface Water Small Projects (Years 13–20)	Funding for small community projects that become a high priority as localized infrastructure fails, causing flooding and property damage. Projects will be developed in response to problems reported by residents and businesses.	Benefits will be specific to each project.	Various (including 17)	$1,200,000
F-20	Various	Park Projects – Priority Level 3	Stormwater components of miscellaneous parks projects. Details of the projects to be determined during design of parks projects. See Parks Master Plan for additional information.	Benefits will be specific to each project.	Various	$170,000
F-21	Various	Transportation Projects – Priority Level 3	Stormwater components of miscellaneous transportation projects. Details of the projects to be determined during design of transportation projects. See Transportation Master Plan for additional information.	Benefits will be specific to each project.	Various	$2,650,000
					Total Capital Project Costs	**$5,597,000**
Programs						
See Chapter 8.						

a. Cost is the total cost allocated for miscellaneous projects beyond the 20-year planning period.

Table 6-2
Water Quality Priority Level 1 Projects and Programs

ID	Title	Description	Benefits Provided	Estimated Cost
Projects				
WQ-1	Third Ave Biofiltration Swales	Inclusion of biofiltration swales along Third Ave drainage system.	Improvement of water quality.	$100,000
WQ-2	Wetpond addition to Darnell Park Detention Pond	Provide wetpond volume for water quality treatment by overexcavating proposed detention pond constructed to minimize flooding in the vicinity of N 165th St and Stone Ave N.	Wetpond will provide some level of treatment to surface water collected from road prior to discharge into Boeing Creek.	$96,000
WQ-3	Wetpond addition to detention pond in the Ridgecrest neighborhood in vicinity of 10th Ave NE	Provide wetpond volume for water quality treatment by overexcavating proposed detention pond constructed to minimize flooding in the Ridgecrest Neighborhood in the vicinity of 10th Ave NE.	Wetpond will provide some level of treatment to surface water collected from road prior to discharge into Thornton Creek.	$96,000
WQ-4	Wetpond addition to Cromwell Park Detention Pond	Provide wetpond volume for water quality treatment by overexcavating proposed 0.5-acre detention pond to be constructed to alleviate flooding in the Thornton Creek Basin in the vicinity of Ronald Bog.	Wetpond will provide some level of treatment to surface water collected from road prior to discharge into Thornton Creek.	$96,000
			Total Capital Project Costs	**$388,000**
Programs				
	Operation and Maintenance (O&M)	O&M such as catch basin cleaning and street sweeping to remove pollutants before they are allowed to enter surface waters.	Reduces the amount of pollutants entering surface waters by removing them from catch basins and road surfaces before they can get washed into the drainage system.	See Chapter 8
	No-Spray Zone Project	Training and materials to teach right-of-way plant eradication. This project is currently being done in the Richmond Beach area in response to a neighborhood request.	Improves water quality by reducing runoff containing pesticides and herbicides.	See Chapter 8
	Clean Car Wash Program	Efforts are currently limited and are incidental to other activities listed in this table.	Improves water quality by reducing discharge of soaps and metals and by reducing turbidity.	See Chapter 8
	Natural Lawn and Garden Care	Coordinate an annual event containing incentive tools and products; coordinate three annual training workshops for residents. Funded 75% by grant using City funds as local match.	Improves water quality by reducing runoff containing pesticides and herbicides.	See Chapter 8
	Storm Drain Stenciling Program	Support for use of stencil kit loaned to residents. Provide resource and training support for teachers. Most storm drain stenciling is currently done by student volunteers.	Improves water quality by reducing illegal dumping to the drainage system.	See Chapter 8
	Community Involvement Restoration Program	Co-lead Earth Day activities in Boeing Creek Park; train teachers and lead student groups in watershed analysis and restoration; educate/train residents to improve lake and stream water quality.	Provides public education on a variety of issues related to surface water management.	See Chapter 8
	Compost Facility	Coordinate compost O&M; maintain records; write reports.	Improves water quality by offering residents alternatives for natural lawn and garden care.	See Chapter 8
	Regional Road Maintenance/ESA/ NPDES Program	Train staff; participate in Regional Forum; maintain road maintenance BMP records; submit quarterly reports.	Improves water quality by reducing discharge of pollutants through road maintenance; ensures continued regulatory compliance.	See Chapter 8
	Water Quality Monitoring	Collect field measurements of parameters such as dissolved oxygen, pH, TSS, salinity, turbidity, and temperature.	Characterizes water quality of Shoreline's water courses and helps identify pollutant sources.	See Chapter 8

Table 6-2
Water Quality Priority Level 1 Projects and Programs

ID	Title	Description	Benefits Provided	Estimated Cost
	Participation in Regional Committees	WRIA 8 activities (forum, steering committee, and public outreach).	Ensures the City participates in and is informed of ongoing regional planning and regulatory compliance efforts.	See Chapter 8
	Surface Water Monitoring and Source Control Program	Investigate water quality complaints; provide spill response; provide public outreach on various source control issues.	Improves water quality by reducing discharge of pollutants.	See Chapter 8
	Retention and Detention (R/D) Facility Inspection	Inspect City-maintained facilities to define required maintenance activities. Inspect privately maintained facilities to enforce maintenance requirements.	Improves flood protection by ensuring proper O&M of R/D facilities; improves water quality by ensuring proper O&M of treatment aspects of R/D facilities.	See Chapter 8

Table 6-3
Water Quality Priority Level 2 Projects and Programs

ID	Title	Description	Benefits Provided	Estimated Cost
Projects				
WQ-5[a]	Miscellaneous Priority 2 Water Quality Projects	May include such stand-alone projects as vault treatment systems, engineering studies, wetponds, and construction of biofiltration swales.	Improves water quality in surface waters in the City based on the location of the projects identified with additional engineering.	$2,020,000
			Total Capital Project Costs	**$2,020,000**
Programs				
See Chapter 8.				

a. Cost is the total cost allocated for miscellaneous projects over years 7 to 20 of the 20-year planning period.

Table 6-4
Water Quality Priority Level 3 Projects and Programs

ID	Title	Description	Benefits Provided	Estimated Cost
Projects				
WQ-6[a]	Miscellaneous Priority 3 Water Quality Projects	May include such stand-alone projects as vault treatment systems, engineering studies, wetponds, and construction of biofiltration swales.	Improves water quality in surface waters in the City based on the location of the projects identified with additional engineering.	$4,040,000
			Total Capital Project Costs	**$4,040,000**
Programs				
See Chapter 8.				

a. Cost is the total cost allocated for miscellaneous projects beyond the 20-year planning period.

Table 7-3
Stream Habitat Priority Level 1 Projects and Programs

ID	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost
Projects					
H-1	Boeing Creek Reach 1 – Streambank Restoration	Stabilize streambanks, improve creek buffer vegetation, and introduce woody debris into the lower reach of Boeing Creek, an area that provides viable salmonid habitat.	Increases and improves habitat for salmonids.	2	$2,417,000
H-2	Boeing Creek Reach 8 – Streambank Restoration	Stabilize streambanks, improve creek buffer vegetation, and introduce woody debris into the upper reach of Boeing Creek, an area that provides viable salmonid habitat.	Increases and improves habitat for salmonids. Decreases sediment loading to Hidden Lake. The City identifies this problem as the largest sediment contributor to Hidden Lake.	3	$1,179,000
H-3[a]	Stream Rehabilitation/ Habitat Enhancement Program (years 1–6)	Miscellaneous projects to enhance stream habitat.	Improves stream habitat.	Various	$300,000
H-4[a]	Advanced Surface Water Right-of-Way Acquisition (years 1–6)	Miscellaneous projects to acquire surface water systems on private property.	Improves habitat, reduces erosion, improves water quality.	Various	$120,000
				Total Capital Project Costs	**$4,016,000**
Programs					
	Water Resource Inventory Area (WRIA) Coordination	Coordination with other jurisdictions in WRIA 8.	Watershed-level approach to fisheries issues.	Regulatory	See Chapter 8
	Consultant Services	Consultant services related to ESA compliance and biological resource issues in the City.	Aids in compliance with federal ESA and state Growth Management Act; provides for protection of anadromous fish habitat.	Regulatory	See Chapter 8
	Meet Regulatory Requirements	Conduct review of plans to ensure that design standards are being met.	Prevents encroachment into sensitive areas.	Regulatory	See Chapter 8
	Thornton Creek Reach 14 – Maintenance to Remove Invasive Species	Invasive plant species are invading the restoration project in Paramount Park. Includes five years of maintenance and monitoring. After five years, funds can be used to address invasive plant species in other priority areas.	Increases the success of the restoration project through greater survival of native species.	1	See Chapter 8

a. Cost is the total cost over the 6-year period.

Table 7-4
Stream Habitat Priority Level 2 Projects and Programs

ID	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost
Projects					
H-3[a]	Stream Rehabilitation/ Habitat Enhancement Program (years 7–12)	Miscellaneous projects to enhance stream habitat.	Improves stream habitat.	Various	$300,000
H-4[a]	Advanced Surface Water Right-of-Way Acquisition (years 7–12)	Miscellaneous projects to acquire surface water systems on private property.	Improves habitat, reduces erosion, improves water quality.	Various	$120,000
H-5	McAleer Creek – Culvert Replacement	Replace 48-inch box culvert beneath 15th Ave NE with a fish-passable culvert.	Improves passage for salmonids at various flows.	4	$78,000
H-6	Miscellaneous Priority 2 Stream Habitat Enhancement Projects	May include such projects as bank stabilization.	Improves habitat, reduces erosion, improves water quality.	Various	$1,029,000
				Total Capital Project Costs	**$1,527,000**
Programs					
See Chapter 8.					

a. Cost is the total cost allocated for miscellaneous projects over years 7 to 20 of the 20-year planning period.

Table 7-5
Stream Habitat Priority Level 3 Projects and Programs

ID	Title	Description	Benefits Provided	Problems Addressed	Estimated Cost
Projects					
H-3[a]	Stream Rehabilitation/ Habitat Enhancement Program (years 13–20)	Miscellaneous projects to enhance stream habitat.	Improves stream habitat.	Various	$400,000
H-4[a]	Advanced Surface Water Right-of-Way Acquisition (years 13–20)	Miscellaneous projects to acquire surface water systems on private property.	Improves habitat, reduces erosion, improves water quality.	Various	$160,000
H-7	Miscellaneous Priority 3 Stream Habitat Enhancement Projects	May include such projects as bank stabilization.	Improves habitat, reduces erosion, improves water quality.	Various	$2,058,000
				Total Capital Project Costs	**$2,618,000**
Programs					
See Chapter 8.					

a. Cost is the total cost allocated for miscellaneous projects beyond the 20-year planning period.