

## Executive Summary



## Background

Incorporated in 1993, the City of Woodinville (City) is a young, growing city faced with the challenges of balancing continuing economic development with environmental protection, and host of local, state and federal regulations. The City's existing stormwater management program is currently providing public education, maintaining its drainage system, approving new development/redevelopment, controlling pollution sources, monitoring water quality, protecting salmon habitat, constructing capital improvement projects (CIPs), and complying with various regulatory requirements, including the federal Clean Water Act (CWA) through the City's 2007 National Pollution Discharge Elimination System (NPDES) Phase II Municipal Stormwater Permit (Phase II Permit). Figure ES-1 shows a vicinity map of the City.

The intent of this Comprehensive Stormwater Management (CSWM) Plan is to create a vision for the City to ensure its stormwater infrastructure and program planning occurs in a manner that is consistent with the expectations and priorities of the City, its citizens and the Washington State Department of Ecology (Ecology).

## Purpose of the Study

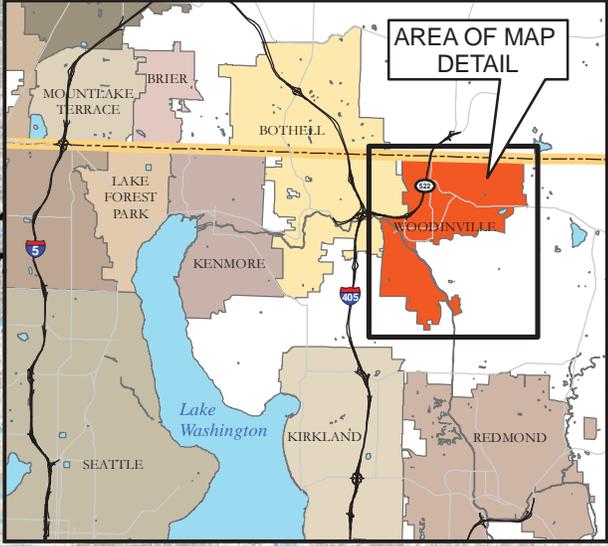
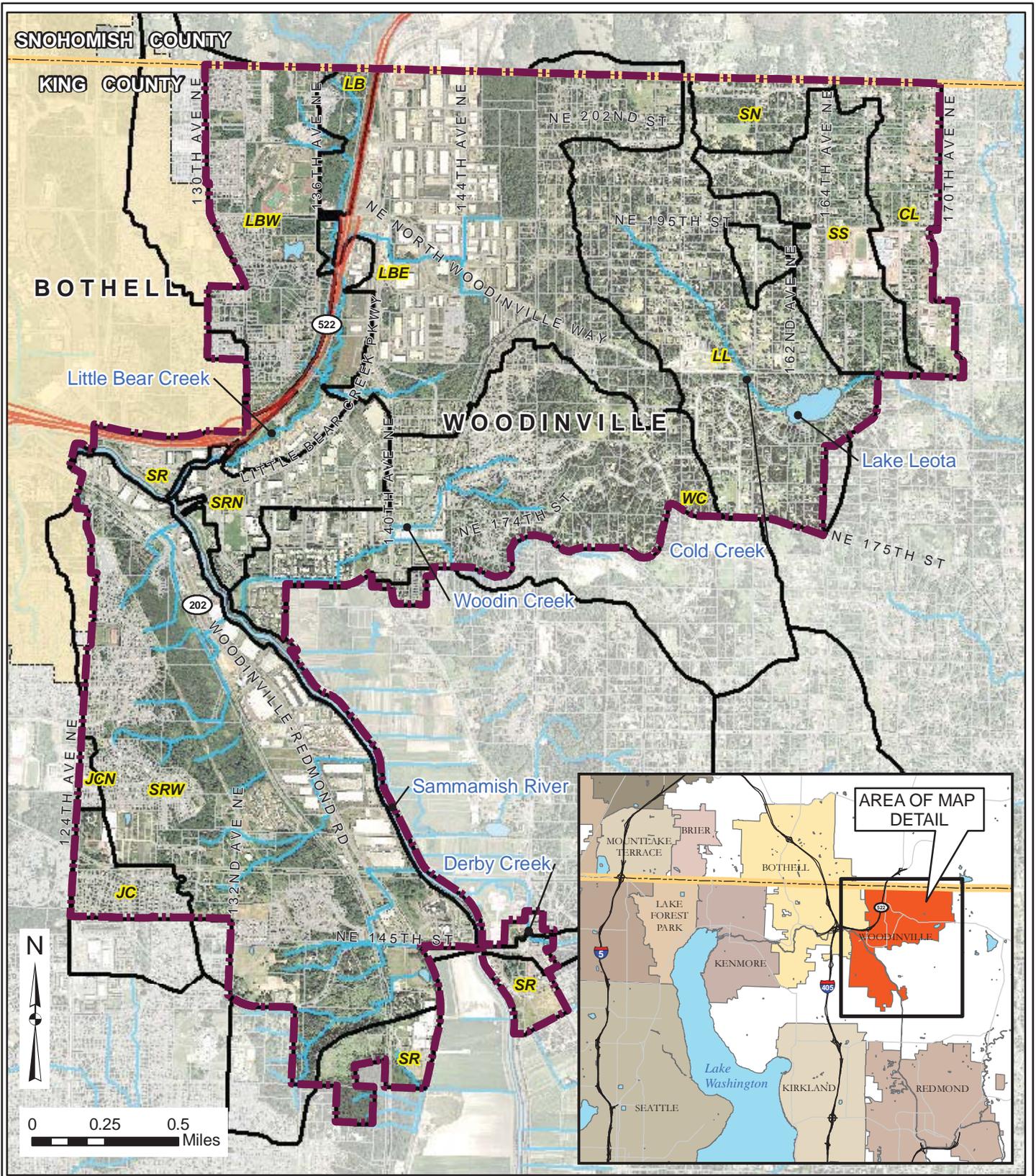
In May 2009, the City initiated the development of its first CSWM Plan, building upon an earlier internal draft plan developed by City staff. The intent of this plan was to update the list, priorities, and costs of the City's stormwater management (SWM) capital projects, document the status of the City's current SWM Program and compare it to regulatory requirements, estimate future capital and regulatory compliance (regulatory gap analysis) requirements, and review staffing and revenue levels to ensure adequate resources for implementation.



*City of Woodinville City Hall*

The City's SWM Program is built upon the Phase II Permit as issued by Ecology in 2007; it gives the City five years (2007-2011) to comply. Thus, the Phase II Permit requires the City to update and expand its SWM Program by the end of 2011. In addition, the City needs to be in compliance with a number of other local, regional and state requirements including the Puget Sound Partnership Action Agenda (Action Agenda) for cleaning up Puget Sound, the State's Underground

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**LEGEND**

- City Limits
- County Boundary
- Parcel Boundary
- Subbasin Boundary
- Lake
- Streams
- Highway

Disclaimer: The information shown in this map is assembled GIS data created and acquired by Otak Inc., from the City of Woodinville (city limits, hydrology, parcel boundaries, streets), King County (county boundary) and Aerial from Aerials express 2005. This data is not to survey accuracy and is meant for planning purposes only.

**STORMWATER MANAGEMENT PLAN**  
**FIGURE ES-1**  
**VICINITY MAP**




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Injection Control (UIC) Rule that governs stormwater infiltration, the Endangered Species Act (ESA), and the regional Watershed Resource Inventory Area (WRIA) habitat enhancement plan for the Lake Washington Watershed. These regulations will be integrated with the City’s CIP needs and basin planning priorities as the CSWM Plan is developed.

## Approach

The approach used in developing this CSWM Plan is to document and evaluate drainage problems, address local capital needs, list activities and resources required for Phase II Permit compliance, and operate within the annual revenues of the City’s SWM Fund, as shown in Figure ES-2.

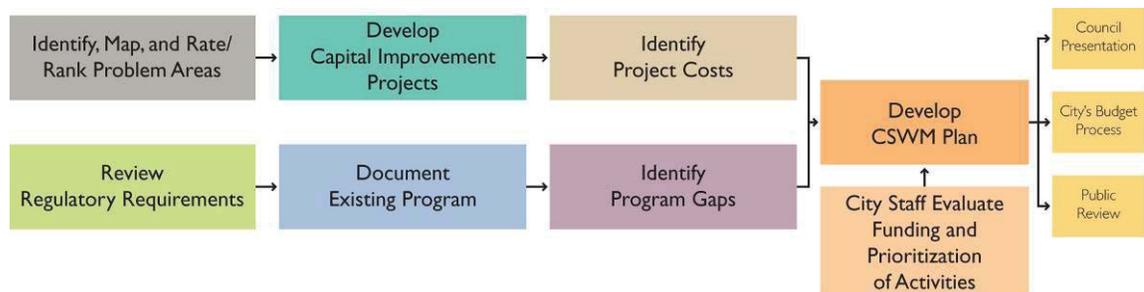


Figure ES-2 – CSWM Planning Process

## SWM Plan Adoption Process

The SWM Plan Adoption Process will happen in phases with some overlap between the phases:

- Phase I: State Environmental Policy Act (SEPA) Process
- Phase II: Public Review Process
- Phase III: City Council and Planning Commission Review and Approval Process

The City will conduct Phase I: SEPA Process while beginning the public review process. Phase I will consist of drafting the Non-Project SEPA Checklist, filing the Checklist with the City, and a 30 day comment period. After the 30 day comment period, the City will issue a “Determination of Non-Significance” on the SEPA Checklist with an additional 15 day comment period.

Phase II: Public review process will be done in conjunction with Phase I: SEPA Process. Phase II will include posting the Draft SWM Plan on the City’s website, and making it available at City Hall on compact disk (no charge) or hard copies available for purchase. The City will also conduct an Open House or Public Meeting to conduct discussions with the public and receive public comments on the Draft SWM Plan.

Phase III: City Council and Planning Commission Review and Approval Process will include a Public Hearing and Study Session with the City Council, along with a Public Hearing with the Planning Commission. The City Council will issue a decision on the adoption of the SWM Plan.

## 1.0 Introduction

This CSWM Plan consists of the following Sections:

- Executive Summary
- Section 1: Introduction
- Section 2: Characterization of the Study Area
- Section 3: City's Stormwater Management Plan
- Section 4: SWM Facilities and Maintenance
- Section 5: SWM Capital Needs
  - 5.1: City-Wide Hydraulic Analysis
  - 5.2: Problem Ranking and CIP Development
  - 5.3: Capital Improvement Implementation Plan
- Section 6: Regulatory Compliance
- Section 7: SWM Program Summary and Implementation

Also included in the CSWM Plan are several technical appendices that provide details on the Phase II Permit, the CIP development process, maintenance standards, and the City's Water Quality Monitoring Program.

## 2.0 Characterization of the Study Area

Section 2 provides a general description of the major watersheds and drainage basins in the City based on topography, soils, hydrologic conditions, natural drainage features, and major stormwater facilities. Appendix A provides drainage basin maps within the City.

For the purpose of this study, the City's drainage area was divided into major watersheds and adjacent drainage areas, as shown in Figure ES-3. As the study progressed, these watersheds were further defined into major drainage basins. The study area has been characterized by drainage basin boundaries, hydrologic characteristics (including climate, soils, topography, sensitive areas, steep slopes and floodplains), drainage basins and streams, and existing zoning and future impervious percent area.

## 3.0 Overview of City's SWM Program

Section 3 provides an overview of the Purpose and Mission of the City's SWM Program, together with a summary of current organization, staffing, utility rates and annual revenues, activities and services.



The City's SWM Program is primarily funded through utility fees, with the revenue being collected and distributed annually from the City's Surface Water Management Fund. To date, utility fees, along with periodic grants and a small amount of investment income, have been used to cover the annual costs of the various SWM Program activities and capital projects. Initial utility rates were established in 1993 and have been increased once by 2.5% in 2006. Current single family residential rates are \$87.15/parcel/year (\$7.26/month). Parcels other than single family are charged a rate based on percent impervious area and acreage. In 2010, total SWM Fund revenues are projected to be \$915K. Since 2008, the City has also received a total of \$275,000 in grant funding from Ecology for Phase II Permit implementation.

The City's SWM Program includes a number of activities and services that are organized into the following services and activities:

- *Capital Improvement Program*
- *Stormwater System Maintenance*
  - Complaint Response
  - Catch Basin Cleaning
  - Minor Surface Water Improvements
- *Phase II Permit Compliance, which includes:*
  - Public Education and Outreach
  - Public Involvement and Participation
  - Illicit Discharge Detection and Elimination
  - Controlling Runoff from New Development, Redevelopment and Construction Sites
  - Pollution Prevention and Operations and Maintenance for Municipal Operations
- *Other regulatory compliance activities associated with ESA, WRLA, and the Action Agenda*
- *Water Quality Monitoring*
- *Program Management and Administration*

## 4.0 SWM Facilities and Maintenance

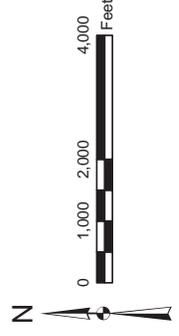
Section 4 provides a summary of the City's stormwater inventory, including the existing status of the City's Geographic Information system (GIS)-based mapping, and the additional activities needed to ensure the City is in compliance with the regulatory obligations of Phase II Permit. (Inventory and mapping of the City's drainage facilities are required under Permit requirement #3, to create and operate an Illicit Discharge Detection and Elimination (IDDE) Program.)

The City's stormwater system mapping and inventory as shown in Figure ES-4 currently includes the following (February 16, 2010 data):

- 3,260 catch basins/manholes
- 20 pond/tanks
- 37.6 miles of open ditches/swales
- 60 miles of streets
- 1,958 outfalls/major culverts
- 12 public vaults
- 53.1 miles of pipes

**Legend**

- Woodinville City Limits
- County Boundary
- City of Woodinville Stormwater Pipes
- Date: 02/16/10
- Stormwater Open Channel
- Stream
- 5ft Contour (King Co. LIDAR)
- Waterbody
- Basin Boundary



Disclaimer: The information shown in this map is assembled GIS data created and maintained by the City of Woodinville. It is not intended to be used for legal purposes. Woodinville (city limits, hydrological boundaries, streets), King County GIS (county boundaries, water bodies, topography using LIDAR) and other data are used for planning purposes only. City of Woodinville data received Feb. 16, 2010.

**STORMWATER MANAGEMENT PLAN**

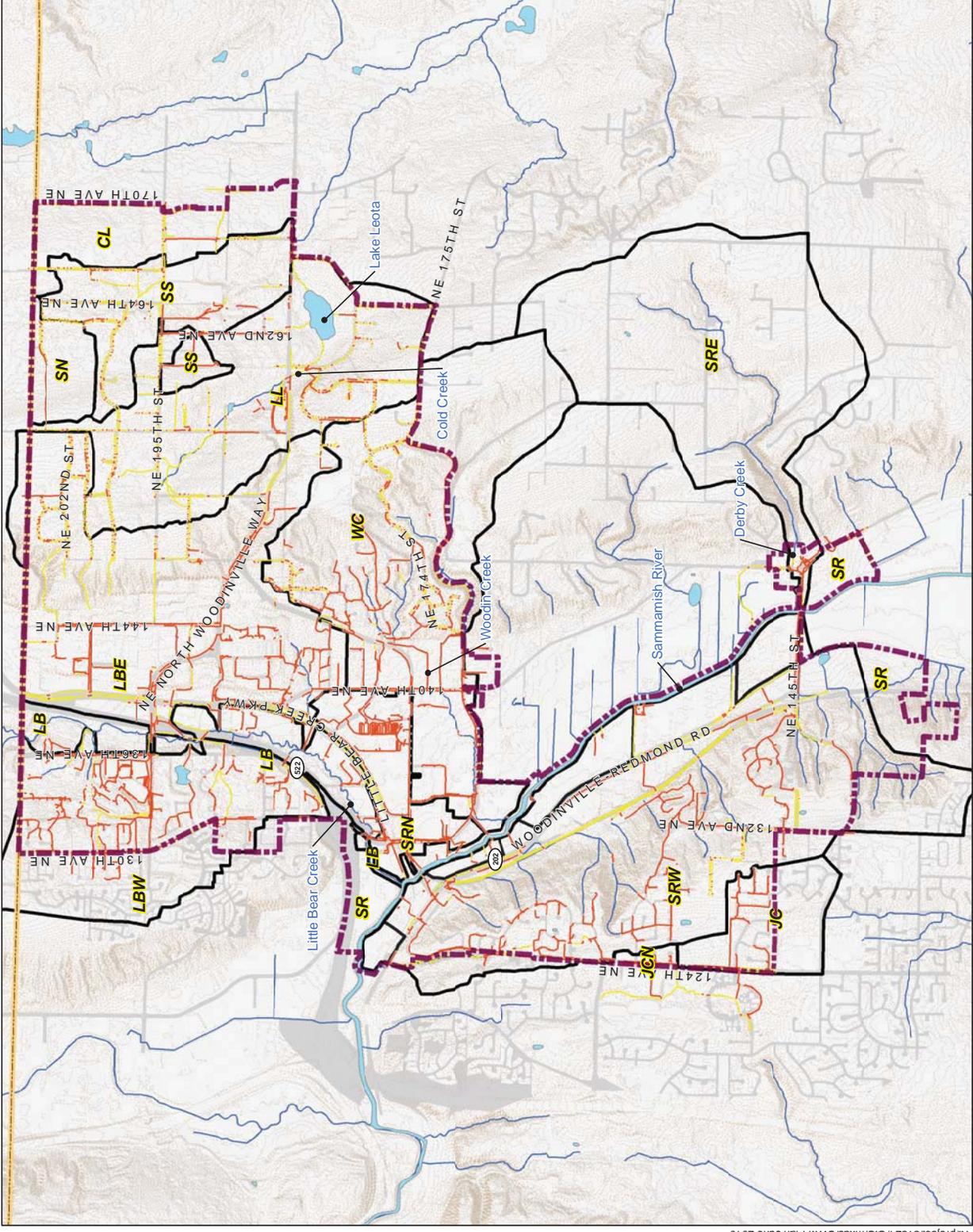
FIGURE ES-4

**DRAINAGE SYSTEM MAP**

CITY OF WOODINVILLE



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Stormwater facilities require regular inspection, cleaning, and repair to ensure that they are functioning as intended in order to provide the required flow control, treatment, detention, and conveyance. The City's Operations and Maintenance Program aims to protect public health and safety, maintain drainage system integrity and function, reduce infrastructure repair and life cycle costs, enhance water quality, and achieve regulatory compliance.

Section 4 summarizes the City's SWM Operations and Maintenance activities, including staffing and organization and activities. This section continues with an assessment of how well the City is meeting its minimum Phase II Permit requirements, and provides conclusions and recommendations to ensure future compliance.

### Maintenance Activities

The maintenance staff performs most of the maintenance activities required to support the City's Operations and Maintenance Program. However, the City does contract out a few services such as annual public and private facility inspections, vector services, and major repair work. King County performs the facility inspections and generates work orders for the public facilities that are sent to the City. The County also mails out maintenance correction lists for the private facilities that are maintained by private property owners and provides follow up education and inspection services.

The City's maintenance staff provides the following surface water maintenance activities:

- Street and drainage system cleaning
- Drainage conveyance system repair and construction
- Open channel and ditch maintenance
- Public retention/detention facility maintenance
- Citizen service request response
- Emergency response
- Miscellaneous service programs

### Organization and Staffing

Since January 2003, the City's Public Works maintenance staff has consisted of a supervisor, a lead worker, and a three-person crew, supported by seasonal staff during the summer. Collectively, the maintenance staff share the responsibility of maintaining the streets, stormwater infrastructure, publicly owned parking lots, repairs of all fleet vehicles and equipment, and responding to citizen inquiries and complaints. The City's parks and public buildings are maintained by other crews.

## 5.0 SWM Capital Needs

Section 5 describes the Capital Improvement Project development methodologies, including information sources, stormwater hydrologic and hydraulic modeling and results, rating and

ranking criteria for drainage concerns. It concludes with the presentation of an updated Capital Improvement Program for the City with project descriptions, costs and implementation priorities.

## City-Wide Hydraulic Analysis

The City requested that an initial analysis be performed of major portions of the City's stormwater conveyance system to assess current capacity. This information is needed by the City to determine if the system has adequate capacity for the additional runoff from new development and redevelopment. If additional capacity is not available, then the City would request that the developer perform a detailed downstream analysis to more accurately assess current capacity and/or size and locate additional detention/infiltration facilities onsite.

The city-wide hydraulic analysis shows that approximately 75% of the analyzed pipes have sufficient capacity for the 24-hour, 25-year rainfall event (3.1 inches) and 63% of the City's pipes have enough capacity for the 24-hour, 100-year rainfall event (3.7 inches). The areas of insufficient capacity are located throughout the City. Some of the more significant problem areas are within the Woodin Creek basin and in areas upstream of Lake Leota. Figures 5 through 11 in Appendix B show the areas where existing pipes are under capacity.



*Flooding at 131<sup>st</sup> Avenue NE  
near the Railroad Trestle*

The hydrologic and hydraulic modeling methodology, supporting calculations, and detailed modeling results are included in the Citywide Hydraulic Analysis Technical Memorandum in Appendix B.

## Problem Identification and Ranking: Development of CIPs

The planning process used to develop the City's CIP Plan consisted of the following four steps as shown in Figure ES-5:

- Step 1: Locating, documenting and mapping drainage problems areas.
- Step 2: Rating and ranking problems areas and setting priorities for new projects.
- Step 3: Analyzing drainage concerns and evaluating feasibility of potential CIP approaches and designs.
- Step 4: Selecting priority problems and identifying designs and costs for recommended CIP projects.

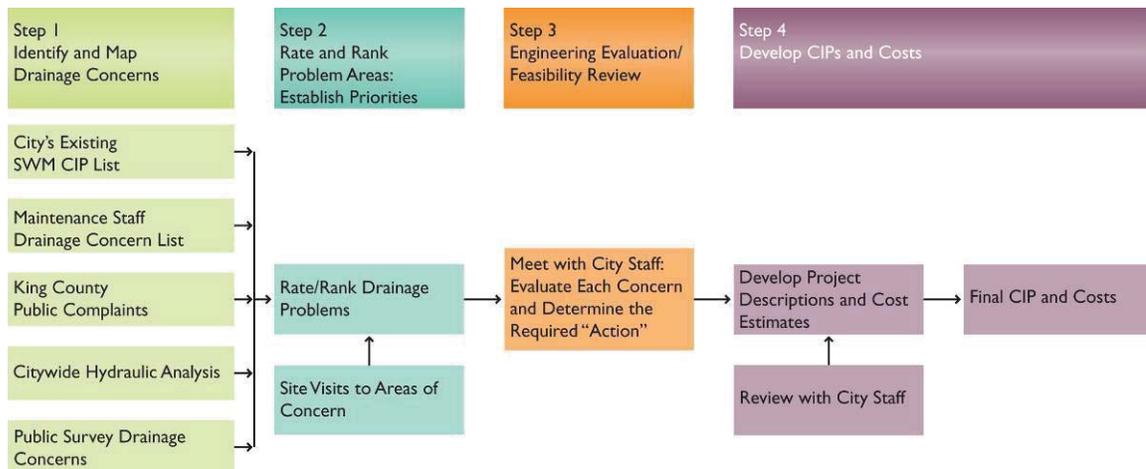


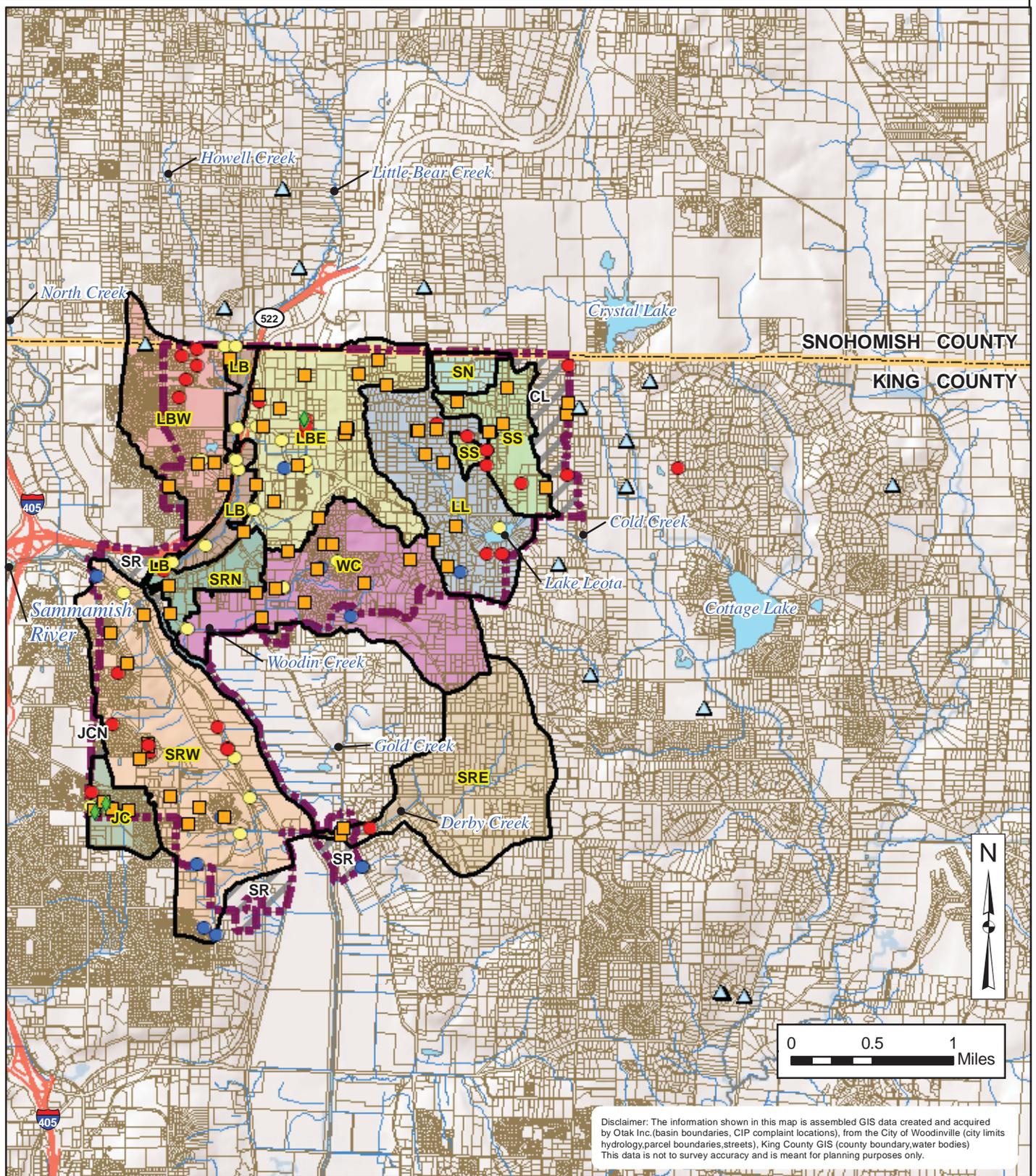
Figure ES-5 – CIP Development Process

**Step 1**—The first step in developing the CIP projects was to identify existing drainage concerns and problem areas throughout the City. Data was collected from the five different sources listed above in Figure ES-5. Identified drainage concerns ranged from minor flooding problems due to clogged structures to more serious capacity issues involving sedimentation and/or culvert and stream channel capacity. In total, compiling and reviewing the drainage complaints from the five sources resulted in the identification of 104 drainage problem areas located in various areas throughout the City as shown in Figure ES-6. (See Appendix C for the listing and ranking of identified drainage problem areas.)

**Step 2**—After compiling these drainage concerns into a database, developing the location map, and completing the site reconnaissance, each drainage problem area/concern was evaluated for severity using a weighted scoring system. Each drainage problem was given a score of 0 to 5 for each criterion with a total possible weighted score of 115. The top scoring drainage concerns were visited in the field to visually inspect the nature of the problem and its severity, estimate its cause and develop an initial assessment of the type of problem and type of solution that may be needed and considered in Step 3.

**Step 3**—Conceptual solutions were developed for the top scoring problem areas. A meeting was held with City staff to review the proposed solutions. Using the experience of staff and knowledge of the City’s drainage infrastructure and reoccurring problem areas, the scoring and ranking was finalized.

**Step 4**—In the final step of the CIP development, the top 24 priority drainage concerns were further developed into CIP projects. Many of the reported concerns were related to similar issues or problem areas in a manner such that the resulting ten recommended CIP projects addressed the top 24 ranked drainage problems/concerns.



**LEGEND**

**CITY OF WOODINVILLE PUBLIC SURVEY COMPLAINTS**

- |                            |   |                   |
|----------------------------|---|-------------------|
| ◆ City Response Completed  | ● King County Drainage Complaints(2001 to 2008) | ▭ City Limits     |
| ■ Maintenance Needed       | ● City of Woodinville Public Works Complaints   | ▭ County Boundary |
| ▲ Outside City Limits      | ▭ LL Basin Boundary in Hydraulic Analysis       | ▭ Parcel Boundary |
| ● Potential Project Needed | ▨ Area Not Draining to City's Storm System      | — Streams         |

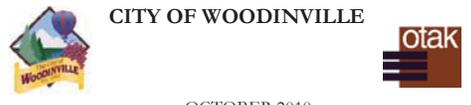
**STORMWATER MANAGEMENT PLAN**

**FIGURE ES-6**

**DRAINAGE COMPLAINTS LOCATION MAP**

**CITY OF WOODINVILLE**

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Ten projects were developed to a preliminary engineering level of design to address each of the problem areas and to estimate costs. Project sketches and planning level quantity/cost estimates were developed using available GIS data, existing as-builts, and information documented during the field visits. The descriptions, sketches and preliminary cost opinions are presented in Appendix D.

### Resulting Capital Improvement Program

The updated Capital Improvement Program includes drainage problem and project descriptions, planning level cost estimates, and implementation priorities for each of the ten new CIP projects identified in the CIP development planning process. These new projects were prioritized based on the categories of flood hazard, community considerations and environmental impacts. The total cost of the ten new CIP projects is \$6.4M as shown in Table ES-1. Figure ES-7 shows CIP project locations.

Table ES-1 Summary of CIP Projects		
Problem Areas	Project ID	Cost (1)
1	Woodin Creek CIP	\$2,633,000
2	Chateau Reach CIP	\$608,000
3	Lake Leota and NE 180th Street CIP	\$947,000
4	NE Woodinville Duvall Road Stormwater Conveyance CIP	\$102,000
5	147th PL NE CIP	\$40,000
6	Cottonwood Trees at 14300 NE Wood-Duvall Road CIP	\$57,000
7	Little Bear Creek Culvert at 134th Ave NE CIP	\$1,619,155
8	144th Ave NE CIP	\$153,000
9	136th Ave NE and NE 205th Street CIP	\$153,000
10	137th PL NE CIP	\$48,000
	<b>Total</b>	<b>\$6,432,155</b>

(1) Based on 2010 dollars and planning level cost estimates. See Appendix D for cost estimate backup.

## 6.0 Regulatory Compliance

Section 6 outlines the City’s regulatory requirements and other stormwater-related obligations, including the UIC Rule, the Action Agenda, ESA, and WRIA activities and improvements. The set of regulatory requirement that guide the development and implementation of the City’s SWM Program are those associated with the Phase II Permit as summarized below.



## NPDES Phase II Municipal Stormwater Permit

The City of Woodinville has been identified by Ecology as a National Pollutant Discharge Elimination System Phase II community. As such, the City needs to comply with the requirements of its *National Pollutant Discharge Elimination System and State Waste Discharge General Permit for Discharges from Small Municipal Separate Storm Sewers in Western Washington*.

The Phase II Permit applies to cities with populations less than 100,000 located within, or partially within an urbanized area, and that are operating a municipal separate storm sewer system which discharges to a water of Washington State. The Phase II Permit outlines stormwater program activities and implementation milestones that the City must follow over a five-year timeframe, beginning February 16, 2007, in order to comply with federal law. All Phase II communities are expected to develop a stormwater program that includes the required activities, implement those activities within the required timeframes over the term of the Phase II Permit (i.e. 2008–2011), and submit annual reports to Ecology to document progress toward complete program implementation.

The major program elements required by the Phase II Permit together with the associated Phase II Permit conditions are listed below, with a copy of the Permit presented in Appendix E:

- Public Education and Outreach (Special Condition S5.C.1)
- Public Involvement and Participation (Special Condition S5.C.2)
- Illicit Discharge Detection and Elimination (Special Condition S5.C.3)
- Controlling Runoff from New Development, Redevelopment, and Construction Sites (Special Condition S5.C.4)
- Pollution Prevention and Operation and Maintenance for Municipal Operations (Special Condition S5.C.5)
- Total Maximum Daily Load Requirements (Special Condition S7)
- Monitoring (Special Condition S8)
- Reporting (Special Condition S9)

Figure ES-8 shows the Phase II Permit requirements and milestones.

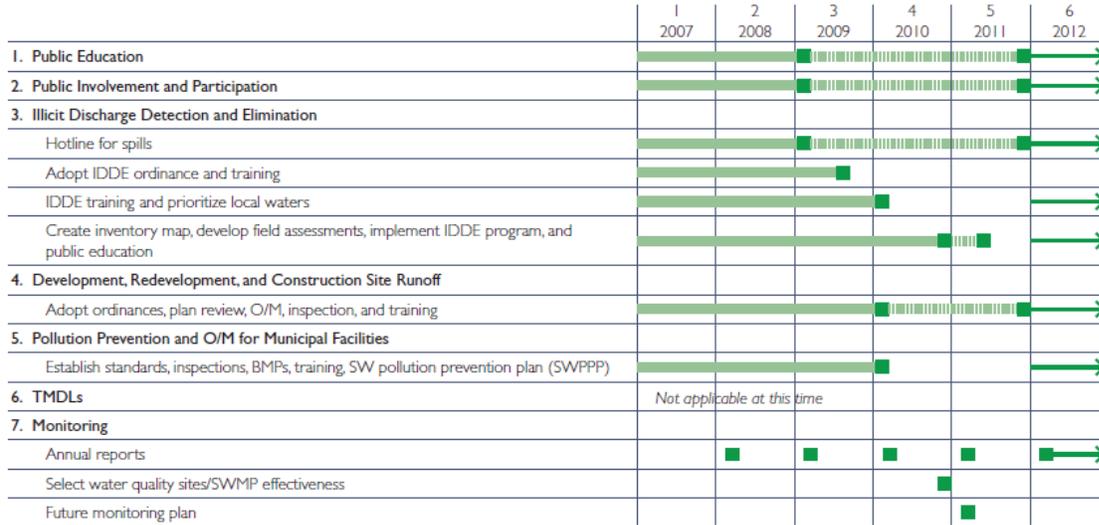


Figure ES-8 – Phase II Permit Requirements and Milestones

## 7.0 SWM Program Summary and Implementation

The City’s future SWM Program needs to maintain regulatory compliance, fulfill its other stormwater-related obligations and address local SWM Program priorities. The City’s future SWM Program also needs to include the recommended maintenance and capital activities presented in Sections 4 and 5, respectively. By integrating, prioritizing and funding the proposed activities for regulatory compliance with the proposed capital projects, the City’s updated CSWM Plan will be effectively implemented.

### Regulatory Compliance

#### NPDES Phase II Municipal Stormwater Permit

Documentation of the City’s compliance activities is organized in accordance with the five components enumerated below. Current and past compliance activities are summarized in its 2007, 2008, and 2009 Annual Reports, which are posted on the City website and are available for review at City Hall. For each of the five regulatory compliance elements, planned future compliance activities are outlined in the City’s 2009 Stormwater Management Program and summarized in Section 6 together with future requirements for Total Maximum Daily Loads (TMDLs), Monitoring, and Reporting.

#### Permit Compliance Activities

##### I. Public Education and Outreach

The City will continue the development and implementation of its public education and outreach program by refining education activities based on survey results. The emphasis of

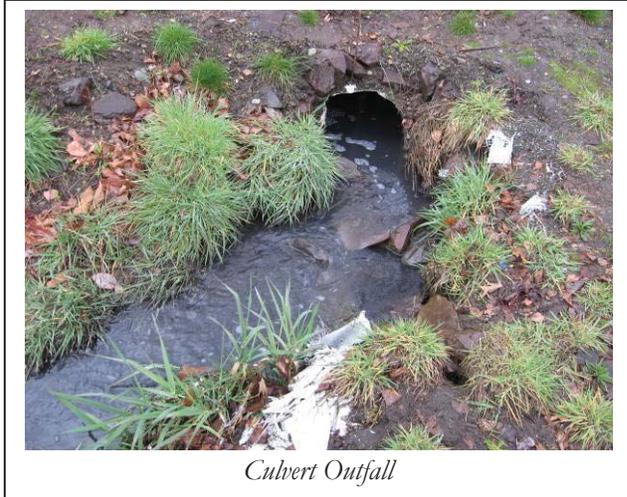
the City's educational activities will be proper vehicle washing, conducting a follow up survey to measure program effectiveness, continuing to offer rain barrels and compost bins at the Spring Garden Fair, and recordkeeping of activities for the purposes of annual reporting.

### **2. Public Involvement and Participation**

The City plans to continue its ongoing public involvement and participation strategies, including creating opportunities for public involvement and community feedback, and posting and responding to comments on the CSWM Plan.

### **3. Illicit Discharge Detection and Elimination**

The City intends to build upon existing IDDE activities by updating its code to modify allowable and conditional discharges, developing procedures, conducting field assessments of high priority receiving waters, tracing and removing sources as identified in the field, continuing to update the stormwater system map, conducting staff training, providing public education, and developing activity tracking procedures.



*Culvert Outfall*

### **4. Controlling Runoff from New Development, Redevelopment and Construction Sites**

The City will need to continue and update its ongoing development review/inspection program that includes consistent application of development standards, conducting permitting processes, ensuring long-term operations and maintenance of facilities, providing construction inspection/enforcement, as well as staff training, recordkeeping and reporting. The City will need to update its code to adopt either the 2005 Ecology Stormwater Management Manual for Western Washington (2005 Ecology Manual) or the 2009 King County Surface Water Design Manual (KCSWDM) and its associated maintenance standards, and low impact development (LID) requirements.

### **5. Pollution Prevention and Operations and Maintenance for Municipal Operations**

The City will continue to emphasize maintenance of its infrastructure by building upon and expanding its prior accomplishments including facility and catch basin inspections and facility maintenance in accordance with the updated maintenance standards required in the Phase II Permit. Other areas that the City will focus on for 2010 include reducing stormwater impacts from municipal operations, developing and implementing a Stormwater Pollution Prevention Plan (SWPPP) for its maintenance facility, and enhancing staff training, recordkeeping and cost tracking.

## 6. Preparing for Future Monitoring

Under the existing Phase II Permit, the City is required to prepare for future stormwater outfall and program effectiveness monitoring. It is likely in the next permit term (beginning in 2012), that the City will be required to implement a new outfall monitoring program. (These monitoring requirements will likely be similar to those already in place for NPDES Phase I permittees with the exception of Best Management Practices (BMPs) effectiveness monitoring.) It is anticipated that this monitoring program will involve an increase in the City's investment in staff time and resources for equipment purchase, installation, sample collection and lab analyses, data analysis, recordkeeping, and annual reporting.

## 7. Annual Reporting and Status of LID

Under the City's existing Phase II Permit, annual reports must be submitted by March 31<sup>st</sup> each year for compliance activities occurring in the previous calendar year.

Pursuant to the Permit Modification issued June 17, 2009, no later than March 31, 2011, the City will also need to conduct an evaluation and submit a summary of identified barriers to the use of LID and measures to address barriers. This report is to include currently available LID practices that can be reasonably implemented within the Permit term, and a list of potential or planned non-structural SWM actions and/or LID techniques that the City will undertake to prevent stormwater impacts, with schedules, goals and metrics to identify, promote, and measure LID use.

### *Compliance with Phase II Permit Requirements for SWM Maintenance*

The City's existing Operations and Maintenance Program addresses many of the requirements of the Permit and is close to meeting its Phase II Permit compliance goals. In some cases, small changes are necessary to update existing standards or activities. In a few areas, there are new activities that the City will need to perform to fully address the requirements and targeted due dates required for compliance with the Phase II Permit.

Specific areas needing attention for regulatory compliance include:

- Adopting and implementing updated maintenance standards consistent with the 2005 Ecology Manual.
- Developing and implementing a nutrient and integrated pest management plan and facilities maintenance manual.
- Developing and implementing on-going staff training program.
- Developing and implementing a SWPPP for the City's maintenance facility.
- Developing and implementing a private facility maintenance enforcement program.

### *Water Quality Monitoring*

The City's SWM Program also includes an ambient Water Quality Monitoring Program that has been in place since 2000. This is a discretionary activity that supports the City's efforts to gain a better understanding of current conditions and to track changes in its natural drainage systems. The City's existing Water Quality Monitoring Program is presented in Appendix F.

## Low Impact Development and Sustainability

In July 2007, the City was actively working on updating and completing their sustainability study with involvement from the Citizen Advisory Panel. The City gathered information on implementing LID standards, by looking at LID examples from other municipalities throughout the Pacific Northwest. The City is strongly interested in, and actively pursuing, the creation of sustainable land-use standards and LID drainage design standards. These are likely to be implemented in the near future by updating their zoning codes and design standards.



*Little Bear Creek near the 134<sup>th</sup> Street Culvert*

## Capital Improvement Plan

The City's recommended capital projects have an estimated cost of \$6.4M. The top ranked project addressed the flooding on Woodin Creek with a cost estimate of \$2.6M. The nine other capital projects total \$3.8M, with an average cost of about \$643K. Priorities for funding and construction will be determined by the City Council.

## Conclusion

This updated Comprehensive Stormwater Management Plan for the City of Woodinville provides an assessment of existing drainage conditions within the City, lists activities needed for regulatory compliance and presents an updated, prioritized list of capital projects and costs for future funding and implementation.

Areas within the City's SWM Program that need enhancement have been identified, including activities to achieve regulatory compliance by the end of 2011. An updated CIP plan presents prioritized CIP projects and associated costs for future funding and implementation. Sections 1 through 7 that follow present the detailed analysis and recommendations of the updated Comprehensive Stormwater Management Plan, with its associated technical appendices.

