STORM AND SURFACE WATER MANAGEMENT COMPREHENSIVE PLAN

City of Edmonds

City of Edmonds
Public Works Department/Engineering Division

Approved by City Council on
July 6, 2010

October 2010

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ES.1.0 Introduction

This report presents a plan to guide the City of Edmonds' Stormwater Management Utility programs and projects for years to come. It represents a major update to the City's Stormwater Comprehensive Plan produced in 2003. Section 1 of this report describes the challenges the City faces in managing stormwater runoff and protecting receiving water bodies along with detail on the purpose of this document, goals, how this plan was developed, a summary of past accomplishments, and the public involvement process that was followed as this plan came together.

ES.1.1 Challenges

The City of Edmonds (City) owns and operates an extensive system of drainage pipes, ditches, and other assets to convey stormwater runoff into streams, lakes, and Puget Sound to prevent and minimize damage to private property, streets, and other infrastructure. The City is faced with the challenge of conveying this runoff safely and cost-effectively while preventing or minimizing the adverse impacts of high flows (erosion, flooding, and sediment deposition) and of stormwater pollutants on water quality and aquatic habitat. In addition, recent state and federal stormwater regulations make it technically and financially challenging to address these issues while balancing utility ratepayer costs.

To proactively address these challenges and remain in compliance with the State-mandated National Pollutant Discharge Elimination System Western Washington Phase II Municipal Stormwater Permit (NPDES Phase II permit) and other increasing regulatory requirements, the City is updating its current comprehensive storm and surface water management plan. This permit has and will continue to have a significant impact on the workload and operational budget of the both the Engineering Division and the Storm Crews within the Public Works Department. Currently, about 2/3 of the stormwater operational budget is spent on permit compliance tasks.

ES.1.2 Purpose of this Plan

The purpose of this plan is to guide the City's Stormwater Management Utility (Utility) programs in a manner consistent with applicable local, state, and federal regulations while providing rate payers with an appropriate level of service. The plan includes:

- Identification of and proposed solutions to known flooding, water quality, and habitat problems
- Actions necessary to ensure compliance with applicable federal, state, and local requirements, especially the NPDES Phase II Permit (Appendix A)

- Development of an operations and maintenance plan, capital improvement plan, and financial plan to address the first two items

Since the City is primarily built out, most of the identified issues are a result of:

- Uncontrolled runoff from past development prior to the implementation of a stormwater code in mid-1977 (including from areas annexed by the City from Snohomish County that were developed prior to County stormwater regulation)
- Aging infrastructure
- Regulatory mandates
- Sub-standard stormwater infrastructure acquired in areas annexed from Snohomish County

ES.1.3 Plan Goals

Four goals have been developed by the City for this plan:

- **Goal A:** Manage the storm and surface water system by combining preservation of natural systems and engineered solutions
- **Goal B:** To preserve, protect, and (where feasible) restore surface water resources to provide beneficial uses to humans, fish, and wildlife
- **Goal C:** Use public education to increase understanding of sustainability and other environmental values to help protect surface water resources
- **Goal D:** Provide adequate funding through an equitable stormwater utility rate structure and outside funding sources to support necessary programs that meet goals A, B, and C

To accomplish these goals, the City developed guiding policies for the flood protection, water quality, aquatic habitat, and stormwater utility funding program areas.

ES.1.4 How This Plan Was Developed

City staff and consultants conducted detailed analyses to support the conclusions and recommendations in this plan. This analyses included interviews with City staff, field reconnaissance, a staffing needs evaluation, hydrologic modeling to develop a simplified sizing tool for stormwater flow control facilities on smaller sites, an alternatives analysis for potential

capital improvement program (CIP) projects, and calculation of funding needs to implement the plan.

Past studies and plans were reviewed for information on drainage, water quality, and aquatic habitat problems, and to evaluate the existing stormwater management program. To supplement existing drainage and water quality problem information and recent documentation of the status of the City's stormwater management program, Herrera Environmental Consultants (Herrera) conducted workshops with City staff.

ES 1.5 Summary of Stormwater Program Accomplishments

- **1965:** The City's 1965 comprehensive sewerage plan (Reid, Middleton, & Associates 1965) recommended separation of storm and sanitary sewer systems (where combined) and provided cost estimates for the design and construction of the recommended surface water runoff system.

- **1977:** Reid Middleton produced the *Updated Comprehensive Plan for Control of Surface Water Runoff* (Reid, Middleton, & Associates 1977) for the City, recommending use of various detention and retention systems and maintaining natural drainage courses in their native state as much as possible.

- **July 1977:** Based on recommendations in the 1977 plan, the City passed its first drainage ordinance (No. 1924) regulating runoff from private development. This ordinance required no increase in peak discharge from a property for the 10-year recurrence storm event for proposed development projects with 5,000 square feet or more of impervious surface area. In 1981, the City's first development code (Ordinance 2182) lowered this threshold for peak discharge control to 2,000 square feet of impervious surface.

- **1987-1991:** From 1987 to 1991, the City commissioned a series of basin analysis studies that documented flooding and other drainage-related problems throughout the City, forming the basis for various capital improvement project plans (URS Corporation 1987a, 1987b, 1989; R.W. Beck 1991). In 1988, the City set up a Stormwater Utility to assist with funding stormwater improvements (see Section 2.5).

- **1991:** The 1991 stormwater comprehensive plan (R.W. Beck 1991) specified 27 capital projects to address drainage concerns. The 1991 plan also recommended the City follow the Puget Sound Water Quality Authority's (PSWQA) proposed rules for regulating development and preserving wetland and stream buffers as non-structural solutions to stormwater runoff issues. In 1995, Ordinance 3013 modified the stormwater code to require the use of the 1992 Department of Ecology

Stormwater Management Manual for the Puget Sound Basin (Ecology 1992), as recommended by PSWQA.

- **2001:** The City commissioned a drainage study for a 300-acre area of southwest Edmonds that was annexed from Snohomish County between 1983 and 1995. This area had not been included in previous studies. The result of the study was the *Southwest Edmonds Drainage Plan* (Earth Tech 2002). This plan recommended a series of capital improvement projects to solve identified flooding and drainage-related problems in the area.

- **2003:** The 2003 *Stormwater Comprehensive Plan* (City of Edmonds 2003) detailed accomplished projects from the 1991 plan and recommended additional capital projects to solve existing drainage problems. The plan also described a compliance strategy for forthcoming requirements of the City's NPDES Phase II municipal stormwater permit that was expected to vastly increase City staff workload. In May 2003, the City filed the required Notice of Intent with the Department of Ecology (Ecology) to comply with the forthcoming permit.

- **2005:** The City's Engineering Division created the position of Stormwater Engineer to manage the increasing workload in the area of stormwater management (previously managed by the Hydraulic Engineer).

- **2007:** The NPDES Phase II permit was issued by Ecology in January 2007 (modified in 2009).

In the time period between late summer 2008 and April 2010, the stormwater program has brought the City into compliance with the requirements of the NPDES Permit. In 2009, the City Council passed Ordinance No. 3751 to update the City's illicit discharge regulation (ECC Chapter 7.200) to comply with NPDES Phase II permit requirement S5.C.3. In 2010, Council passed Ordinance No. 3792 updating the City's stormwater management code (ECDC 18.30) to meet permit requirement S5.C.4 for controlling runoff from development, redevelopment, and construction sites.

ES.1.6 Public Involvement

Resolution No. 1220 (passed January 12, 2010) specified a public participation plan for the *Storm and Surface Water Management Comprehensive Plan* and other utility plans being developed concurrently by the Engineering Division.

The *Storm and Surface Water Management Comprehensive Plan* was presented to the Edmonds Planning Board on May 26, 2010, and again during a Public Hearing on June 2, 2010. An introductory presentation of this plan was given to the City Council on June 22, 2010, and a public hearing was held before the Council on July 6, 2010. The Council approved this plan

following the public hearing that same evening, subject to some minor changes in capital improvement project planning that are reflected herein.

ES.2.0 Background

Section 2 of this report discusses the City's drainage basin characteristics, the existing stormwater system, flooding, erosion, water quality, and aquatic habitat issues, and discusses the history and operation of the Stormwater Management Utility.

ES.2.1 Drainage Basins

The City can be divided into two major drainage basins (or watersheds), those that that drain to or can overflow into Puget Sound (approximately 86 percent of the City land area) and those that drain to Lake Ballinger. The northern portion of Edmonds is made up of number of small drainage basins that either discharge into steep-gradient small streams or discharge directly to Puget Sound via a piped system or by sheet flow. Traveling further south, the drainage basins form larger Creeks and at the southern border with the City of Shoreline end with the Southwest Edmonds basin. Basins located within the City limits that drain to Lake Ballinger the include Chase Lake and Hall Creek basins. Approximately 14 percent of the total land area in Edmonds drains to Lake Ballinger, which in turn drains to Lake Washington via McAleer Creek.

ES.2.2 City Stormwater System

The City's Stormwater Management Utility manages a large and complex storm drainage system in the public right of way, and also addresses flooding, water quality, and aquatic habitat issues in streams and lakes that lie beyond the limits of the public right of way.

ES.2.3 Flooding, Erosion, Water Quality, and Habitat Issues

Flooding issues include problems where deteriorated or undersized infrastructure or areas with no infrastructure at all, that is causing or increasing the risk of flooding of public or private property. This section also addresses erosion problems in surface water bodies within the City. These major issues are for each basin in the city where flooding and erosion issues were identified by City staff or through field reconnaissance.

Upland development draining to the City's streams results in a variety of pollutants entering the streams with stormwater runoff, including petroleum products, heavy metals, and other toxic organic chemicals from roads and driveways, fertilizers and pesticides used in lawn and landscaping areas, and illicit discharges (inadvertent or purposeful dumping and spills) to migrate into the streams.

Degradation of aquatic habitat has resulted from development constructed prior to regulations that limited the quantity and quality of stormwater runoff as well as those designed to protect stream buffer areas. Illicit discharges into receiving waters have also degraded aquatic habitat.

ES.2.4 The Stormwater Management Utility

A stormwater utility is based on the premise that the City-owned drainage system serves the public by providing services, similar to sewage or water supply systems. "Demand" is placed on a stormwater utility whenever a vegetated area is converted to impervious since it generates increased runoff from private property and/or the public right of way. The collected fees are used to ensure adequate capacity of the City-owned stormwater system that serves private property and conveys runoff from public roads and facilities. In addition, fees are used to operate and maintain the system, provide for system repair costs and, more recently, to comply with federal and state water quality mandates under the NPDES Phase II permit.

The City formed its Stormwater Management Utility on May 13, 1988 under Ordinance 2670 that created ECC Chapter 7.50. Over the years, the fees collected for the stormwater utility have been used for an increasing number of items. This expansion in the service demands on the stormwater utility has been driven by:

- Increased population growth and accompanying development
- Annexing areas from Snohomish County with inadequate drainage systems
- Increasing regulatory mandates for improving water quality and aquatic habitat in the surface waters that receive the City's stormwater runoff

In February 2007, Ecology issued the NPDES Phase II permit to the City and over 80 other jurisdictions in the state. The NPDES Phase II permit outlines stormwater program activities and implementation milestones that the City must follow through February 2012 in order to comply with federal law. The NPDES Phase II permit primarily deals with reducing the pollutants discharged from the City's stormwater system into receiving waters such as Lake Ballinger and numerous creeks in the City that discharge into Puget Sound.

The two most resource-intensive elements of complying with the NPDES Phase II permit are the IDD&E program and Pollution Prevention for Municipal Operations. An illicit discharge detection and elimination (IDD&E) program needs to be established within the City of Edmonds to identify and eliminate significant sources of pollutants to the City's storm drainage systems and receiving waters that are associated with non-stormwater discharges. Major components of the IDD&E program include:

- Develop a detailed storm sewer system map
- Have a proactive detection and elimination program
- Provide public education and spill reporting

- Develop an enforcement and tracking system

Pollution Prevention for Municipal Operations includes:

- Annual inspections of hundreds of public and private water quality and flow control facilities
- Catch basin inspections and cleaning
- Regular street sweeping
- Managing the waste collected from the catch basin, pipe, and facility cleaning and street sweeping
- Stormwater Pollution Prevention Plans (SWPPPs) for maintenance yards

ES.3.0 Problem Identification and Solution Development

Section 3 of this report presents the identified Citywide and site-specific problems addressed by this plan. It also presents a capital improvement project plan to solve identified flooding, water quality and habitat problems.

Citywide problems result from local or regional trends in development and behavior. The primary citywide drainage problems are flooding and stream channel erosion, and the primary citywide water quality problems are nonpoint source pollution from older development, including residential and commercial development and from vehicle use in the City-owned rights-of-way, and potentially illicit discharges and illicit connections to the storm drainage system.

Several site-specific problems were evaluated to develop planning level solutions and cost estimates for use in establishing the City's storm and surface water capital improvement program (CIP) plan for 2010-2016. Problems were identified by conducting interviews with City staff, performing field reconnaissance, and reviewing references discussed in Section 2 of this plan. Solutions were updated and in some cases developed anew by the City's consultants based on field reconnaissance and input from City staff, and were prioritized and ranked by City staff based on several criteria.

ES.4.0 Programmatic Evaluation and Recommendations

Section 4 of this report provides an evaluation of the City's current programs to meet the requirements of the Phase II Permit and provides recommendations to ensure compliance.

A thorough "gap analysis" was conducted in 2009 to evaluate specific components of the City's stormwater management program with respect to NPDES Phase II permit requirements. This analysis lists specific program accomplishments and recommendations for each of these five major NPDES Phase II permit components.

The City's stormwater management program must change and grow to meet the current and likely future requirements of the NPDES Phase II permit, with expectation that permit requirements will evolve in future years. The NPDES Phase II permit currently includes requirements related to five major stormwater program components. A sixth program component related to monitoring is expected in the revised permit in 2012. The six components are:

- 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 operation and maintenance for municipal operations
- Monitoring discharges to provide a feedback loop (or adaptive management) on the effectiveness of these programs for protecting and improving water quality.

ES.5.0 Plan Implementation

Section 5 of this report presents detailed information on implementation of the entire contents of this plan. The major components of plan implementation include operations and maintenance of the City's storm and surface water infrastructure, allocation of appropriate program resources, and completion of capital projects that solve existing flooding, erosion, water quality, and/or habitat problems.

ES.5.1 Operations and Maintenance

While the City has been able to maintain its stormwater infrastructure adequately in the past, the Phase II NPDES permit requires greater maintenance attention and frequency for some of the infrastructure, as well as for the City's Public Works Yard and Parks Department maintenance facility. City staff has also identified several aspects of the maintenance program that will require additional resources to ensure understanding of and proper functioning of all of the City's stormwater facilities.

Inspections and maintenance will need to be documented to a much greater extent than has been done in the past per NPDES Phase II permit requirements; therefore, the stormwater program will need to develop a tracking system to manage this additional data.

ES.5.2 Program Resources (Staffing and Other)

To meet the City's obligations under the NPDES Phase II permit, more resources are needed. Within the Engineering Division of the Public Works Department, there is a demonstrated need for an additional full-time staff person to support compliance with the NPDES Phase II permit. Similarly, there is a demonstrated need for an additional full-time staff person in the Public Works Strom Crew that operates and maintains a storm drainage and surface water infrastructure throughout the city. To support tracking and documentation of NPDES permit compliance activities, and implementation of the revised stormwater code, the Public Works Department needs the equivalent of one-third full time equivalent staff person with expertise in geographic information systems (GIS).

Aside from the need for additional staffing resources short-term needs include a new vehicle wash station and stockpile covers, at the Public Works Yard and Parks Yard facility. These are included in the CIP plan. In the mid-to long-term, an expanded vactor waste decant station will likely be needed at the Public Works Yard to handle additional wastes obtained by more frequent cleaning of water quality treatment facilities or from additional facilities (not included in CIP at this time).

ES.5.3 Capital Projects

The recommended storm and surface water CIP project plan for 2011 through 2016 is summarized in Table ES-1. Due to a backlog of problems to be addressed, reduced City budget that in turn stalled implementation of several CIP projects during the economic downturn that began in 2008, and increasing regulatory drivers, the funding needed to implement storm and surface water CIP projects in this time horizon must increase compared to existing stormwater utility revenue.

ES.6.0 Funding Strategy

ES.6.1 Use of Stormwater Utility Funds

Funds collected in the Stormwater Management Utility fund will be used in the following order:

1. To meet on-going debt obligations from previously obtained bonds or loans

2. To complete any emergency projects that may arise

3. To implement programs and CIP projects that keep the City in compliance with local, state, and Federal regulations especially related to the NPDES Phase II permit

4. To complete projects that address long-standing, re-occurring flooding issues such as in southwest Edmonds and around lower Perrinville Creek

5. To complete City-wide drainage replacement projects (CIP project number 6, see Table 3-2 for current project prioritization)

ES.6.2 Equivalent Service Units

The stormwater utility rate paid by an individual landowner is based on the number of Equivalent Service Units (ESU) on each parcel. The rate applied on an ESU basis is critical to define accurately in relation to the City's utility needs for programs and capital projects as the total funding that it yields must be sufficient to meet those needs in the years ahead.

An analysis of the appropriate stormwater utility rate to charge per ESU for the years 2010 through 2016, to address funding needs for ongoing storm and surface water management programs and the CIP planning horizon described in Sections 3 and 5 of this plan, was performed to support implementation of the full plan. This analysis captured the program resource needs described in Sections 5.2, 5.3 and 5.4 of this plan, and was also based on the existing financial status, population forecasting, and debt obligations of the City's stormwater utility. Details of this analysis are presented in Appendix H. A summary of the financial plan recommendations for the stormwater utility is provided below.

ES.6.3 Six-Year Financial Plan

The funding analysis performed for this plan focused on two levels of service, termed "Tier 1" and "Tier 2". Tier 1 represents the base level of funding that is needed to provide fundamental utility services, such as constructing essential capital projects, responding adequately to flooding events, assisting in review of development projects, and cleaning of catch basins throughout the city to maintain conveyance of storm runoff. Tier 1 funding also enables compliance with applicable permit requirements. Tier 2 represents a greater level of funding to position the City to implement additional CIP projects that support the stormwater utility's mission and improve the aquatic environment in and near Edmonds. Appendix H presents the analysis of stormwater utility funding to meet these two levels of service for the years of 2010 through 2016.

On July 6, 2010, the City Council approved utility rate increases for a 2-year period to meet the Tier 2 funding needs. The Council further decided that subsequent rate increases would be revisited in 2012. It is assumed that the City's stormwater utility would provide 25 percent of the funding needed for Tier 2 projects. The remaining 75 percent of the necessary funds for those projects would have to come from other sources. Additional sources of funding that could be pursued to enable these projects to be fully implemented include state and federal grants, project

Table ES-1. Storm and Surface Water CIP Project Plan, 2011-2016.

ID #	Project Name	Year[1] 2011	2012	2013	2014	2015	2016	Total Project Cost
Tier 1 Projects[2]								
1A	Southwest Edmonds Basin Study Project 1 - Replace Infiltration Pipe (near 107th Pl W.)	$ -	$ 27,000	$ 45,000	$ -	$ -	$ -	$ 72,000
1B	Southwest Edmonds Basin Study Project 2 - Connect Sumps near Robin Hood Drive	$ -	$ -	$ -	$ -	$ 105,000	$ 441,000	$ 546,000
1C	Southwest Edmonds Basin Study Project 3 - Connect Sumps on 238th St SW to Hickman Park Infiltration System	$ -	$ 105,000	$ 448,000	$ -	$ -	$ -	$ 553,000
1D	Southwest Edmonds Basin Study Project 4 – Connect Sumps on 105th and 106th Ave W	$ 106,000	$ 341,000	$ -	$ -	$ -	$ -	$ 447,000
2A	Shellabarger Creek/Willow Creek/Edmonds Marsh 100-yr Flood Plain delineation	$ 239,000	$	$ -	$ -	$ -	$ -	$ 239,000
2B	Willow Creek Pipe Rehabilitation (current Port of Edmonds portion)[3]	$ -	$ -	$ -	$ 519,000	$ -	$ -	$ 519,000
3A	Northstream Storm Repair and Abandonment South of Puget Drive	$ -	$ -	$ 46,000	$ 172,000	$ -	$ -	$ 218,000
3B	Northstream Pipe Culvert Rehabilitation	$ -	$ -	$ -	$ 29,000	$ 54,000	$ -	$ 83,000
4A	Talbot Road / Perrinville Creek Drainage Improvement and Habitat Enhancement Project	$ 522,000	$ -	$ -	$ -	$ -	$ -	$ 522,000
4B	Talbot Road / Perrinville Creek Culvert Replacement	$ -	$ 436,000	$ 876,000	$ -	$ -	$ -	$ 1,312,000
5	95th/93rd Place project	$ -	$ 72,000	$ 696,000	$ -	$ -	$ -	$ 768,000
6	City-wide Drainage Replacement Projects	$ 140,000	$ 143,000	$ 149,000	$ 154,000	$ 161,000	$ 167,000	$ 914,000
7	Lake Ballinger Associated Projects	$ 100,000	$ 102,000	$ 106,000	$ 110,000	$ 115,000	$ 119,000	$ 652,000
8	North Talbot Rd. Drainage Improvement Project	$ -	$ 180,000	$ -	$ -	$ -	$ -	$ 180,000
9	Public Facilities Water Quality Upgrades	$ 55,000	$ 317,000	$ -	$ -	$ -	$ -	$ 372,000
10	Shell Valley Emergency Access Rd, Drainage Portion	$ 195,000	$ -	$ -	$ -	$ -	$ -	$ 195,000
11	Stormwater Utility Contribution for Transportation Projects	$ 50,000	$ 51,000	$ 53,000	$ 55,000	$ 57,000	$ 60,000	$ 326,000
	Tier 1 Subtotals	$ 1,407,000	$ 1,774,000	$ 2,419,000	$ 1,039,000	$ 492,000	$ 787,000	$ 7,918,000
Tier 2 Projects[4]								
12	Edmonds Marsh Restoration	$ -	$ -	$ -	$ 396,000	$ 1,109,000	$ 1,731,000	$ 3,236,000
13	Daylight Willow Creek in Marina Beach Park[3]	$ -	$ -	$ -	$ 546,000	$ 1,272,000	$ 1,969,000	$ 3,787,000
14	Shell Creek Channel Restoration in Yost Park	$ -	$ -	$ -	$ 178,000	$ -	$ -	$ 178,000
15	Perrinville Creek High Flow Diversion and Habitat Restoration	$ -	$ -	$ -	$ 3,199,000	$ 2,868,000	$ 2,839,000	$ 8,906,000
	Tier 2 Subtotals	**$ -**	**$ -**	**$ -**	**$ 4,319,000**	**$ 5,249,000**	**$ 6,539,000**	**$ 16,107,000**
Total Expenditures (Tier 1 + Tier 2)		**$ 1,407,000**	**$ 1,774,000**	**$ 2,419,000**	**$ 5,358,000**	**$ 5,741,000**	**$ 7,326,000**	**$ 24,025,000**

[1] Future expenditures reflect the following annual inflation rates: 2011 0%; 2012 2%; 2013 4%; 2014 4%; 2015 4%; 2016 4%.
[2] Revenues for all Tier 1 projects are assumed to be 100 percent rate funded, including revenue bond payments (See Appendix H)
[3] Either Project 2B or Project 13 will be constructed based on a variety of factors including rate of degradation of existing pipe and availability of funding for daylighting the stream. Both projects will not be built. Any savings will be reflected in stormwater utility rate adjustments after 2013.
[4] Revenues for all Tier 2 projects are assumed to be 25 percent rate funded, including revenue bond payments, and 75 percent funded from outside sources (currently unsecured) such as grants, loans, and/or other agency contributions (See Appendix H)

partners such as the Port of Edmonds and/or the Washington State Department of Transportation, and private landowners with a vested interest in the project. It is uncertain at this time whether any of those sources of external funds can realistically be obtained to enable some or all of the Tier 2 projects to be fully funded.

ES.6.4 Recommended Stormwater Utility Rates

The stormwater utility rate should be gradually adjusted in the years ahead to adequately fund implementation of programmatic work and CIP projects, as follows:

Table ES-2. Recommended stormwater utility rates for years 2010-2016.

	Monthly Rate per ESU[5] With Tier 2 CIP		
Year	Rate ($)	$ Increase	% Increase
2010	$8.97	0.66	8.0%
2011	$9.69	0.72	8.0%
2012	$10.47	0.78	8.0%
2013	$11.36	0.89	8.5%
2014	$12.32	0.97	8.5%
2015	$13.37	1.05	8.5%
2016	$13.37	--	0.0%

Although the Tier 2 projects are prioritized for design and construction in the latter half of this 6-year planning horizon (see Table 3-2 and Appendix H), the 2 funding for those projects will begin building in 2010-2012 to create the balance that is needed to leverage "local matching" dollars in seeking external sources of funding for those projects.

This progression of rate adjustments is based on the best possible forecast that can be done at this time. The City should revisit this schedule of rate adjustments in 2012 to determine if it is adequate as presented here, or if it should be modified, and proceed with City Council approval of rate adjustments (if needed) in 2-year increments. The assumptions and data used in the rate analysis (Appendix H) will form the basis of information to be reviewed to determine if adjustments to the rates presented above are warranted.

[5] Currently $8.31 per ESU

1.0 Introduction

The purpose of this plan is to guide the City's Stormwater Management Utility (Utility) programs in a manner consistent with applicable local, state, and federal regulations while providing rate payers with an appropriate level of service. The plan includes:

- Identification of and proposed solutions to identified flooding, water quality, and habitat problems
- Actions necessary to ensure compliance with applicable federal, state, and local requirements, especially the National Pollutant Discharge Elimination System Western Washington Phase II Municipal Stormwater Permit (NPDES Phase II permit) (Appendix A)
- Development of an operations and maintenance plan, capital improvement plan, and financial plan to address the first two items

Since the City is primarily built-out, most of the identified issues are a result of:

- Uncontrolled runoff from past development prior to the implementation of a stormwater code in mid-1977 (including from areas annexed by the City from Snohomish County that were developed prior to County stormwater regulation)
- Aging infrastructure
- Regulatory mandates
- Sub-standard stormwater infrastructure acquired in areas annexed from Snohomish County

This plan updates the City's current stormwater comprehensive plan to address the following issues:

1. Control erosion and manage the quantity and quality of stormwater runoff from public and private activities.
2. Protect stream channels, aquatic habitat, wetlands, fish, shellfish, and other aquatic resources.
3. Protect private and public property and City streets and right-of-ways from flooding or erosion.
4. Reduce pollutant discharges and their harm to the environment.

5. Preserve and enhance the suitability of all bodies of water for contact recreation, fishing, and a wide diversity of wildlife habitat.

6. Achieve purposes 1 through 5 in a manner that makes efficient use of limited resources to address the most critical problems first.

7. Identify and plan implementation of capital improvement projects (CIP) necessary to meet overall surface water management objectives.

8. Ensure that the City is supporting the Puget Sound Partnership's Action Agenda and complying with applicable state and federal storm and surface water management requirements, including the Growth Management Act (GMA), Endangered Species Act (ESA), National Pollutant Discharge Elimination System (NPDES), and Shoreline Management Act (SMA) Master Program.

Recent state and federal stormwater regulations have made it technically and financially challenging to address these issues while balancing utility ratepayer costs. Because of the many stormwater challenges facing the City, it must implement and continually improve upon a comprehensive plan for stormwater management.

This plan addresses current and anticipated regulatory requirements, future land use designations, emerging stormwater management technologies, existing flooding problems, and the resources needed for the City to fully implement the plan.

1.1 How This Plan is Organized

- **1.0 Introduction**
  Explains the purpose of the City's *Storm and Surface Water Management Comprehensive Plan* (the Plan), identifies City goals and policies driving this plan, information used to develop the plan, and briefly summarizes the accomplishments of the City's Stormwater Management Program (SWMP) and public participation efforts.

- **2.0 Background**
  Characterizes the affected area and includes a map of drainage basins within the City. Summarizes applicable policies, regulations, relevant storm and surface water issues, and the City's stormwater utility fund.

- **3.0 Known Problems and Possible Solutions**
  Describes the City's storm and surface water problems related to flooding, erosion, water quality, and aquatic habitat. This includes a discussion of citywide problems and site specific problems.

- **4.0 Stormwater Management Program Evaluation and Recommendations**
  Compares the City's existing stormwater management program to regulatory requirements. Also describes stormwater management program needs identified during preparation of this plan.

- **5.0 Plan Implementation**
  Provides guidance on how to implement the key recommendations of this Plan.

- **6.0 Recommended Funding Strategy**
  Summarizes the results of a stormwater utility rate study conducted in concurrently with this Plan. Also includes the 6-year capital improvement program (CIP) plan for storm and surface water management improvements, and stormwater utility rate recommendations to accomplish those improvements and provide sufficient staffing to implement this plan.

Herrera Environmental Consultants (Herrera) assisted the City with several aspects of this plan, and FCS Group led the analysis of the funding strategy to implement the plan. Herrera conducted detailed analysis to support the conclusions and recommendations in this plan. This analysis included interviews with City staff, field reconnaissance, a detailed staffing needs evaluation, hydrologic modeling to develop a simplified sizing tool for stormwater flow control facilities on smaller sites, and an alternatives analysis for potential CIP projects. This document briefly summarizes the methods and results of this analysis. More detailed information about methods and results of technical analyses is provided in the appendices of this document.

1.2 Stormwater Runoff Challenges

The City owns and operates an extensive system of drainage pipes and ditches to convey stormwater runoff to streams, lakes, and Puget Sound that are designed to prevent and minimize damage to private property, streets, and other infrastructure. Due to extensive alteration of the natural landscape in most areas of the City from development, the amount of stormwater that runs off the land in larger storm events is substantial, and runoff in all storm events carries a variety of pollutants that wash off of their source areas into receiving waters. The City is faced with the challenge of conveying stormwater runoff safely and cost-effectively while preventing or minimizing adverse high flow impacts (erosion, flooding, and sediment deposition), water quality degradation in lakes and streams receiving runoff, and degradation of aquatic habitat caused by high flows and water quality degradation.

The NPDES Phase II permit has and will continue to have a significant impact on the workload and operational budget of the both the Engineering Division and the Storm Crews within the Public Works Department. Approximately 2/3 or more of the total stormwater operational budget is spent on permit-related compliance programs (2010 total budget $1.58 Million). Section 4 of

this plan details the specific permit requirements and their impact on the City's stormwater management program.

1.3 Plan Goals and Policies

Goal and policies have been developed to guide the Utility to tackle the issues at hand. These goals and polices, once approved by the City Council, will replace those in the listed in the "Water Resources and Drainage Management" land use element of the City's current Comprehensive Plan (Edmonds 2009). These current goals and policies were first approved in 1985. Over the past 25 years, the practice of stormwater management has changed significantly. These new goals and policies reflect that change. Once this plan is approved by Council, it will be incorporated by reference in the Utility Element section of the City's Comprehensive Plan.

Four goals have been developed by the City for this plan:

1. **Goal A:** Manage the storm and surface water system by combining preservation of natural systems and engineered solutions to:

   - Provide for public safety
   - Minimize property damage
   - Preserve and enhance critical areas
   - Promote sustainability
   - Comply with applicable local, state, and Federal regulations

2. **Goal B:** To preserve, protect, and (where feasible) restore surface water resources to provide beneficial uses to humans, fish, and wildlife.

3. **Goal C:** Use public education to increase understanding of sustainability and other environmental values to help protect surface water resources.

4. **Goal D:** Provide adequate funding through an equitable stormwater utility rate structure and outside funding sources to support necessary programs that meet goals A, B, and C.

To accomplish these goals, the City developed guiding policies for the flood protection, water quality, aquatic habitat, and stormwater utility funding service areas. Guiding policies for each service area are described below.

1.3.1 Service Area 1: Flood Protection

The flood protection (FP) service area is designed to meet Goals A and C by establishing the following policies:

- **FP-1:** Comply with all applicable, relevant, and appropriate requirements from the Federal, state, and local governments related to flood protection.

- **FP-2:** Preserve and protect natural surface water storage sites, such as wetlands, aquifers, streams, and water bodies that help regulate surface flows and recharge groundwater.

- **FP-3:** Resolve long-standing flooding issues and minimize new flooding impacts to homes, businesses, and other facilities. Ensure adequate stormwater conveyance for existing and anticipated development for the 50-year recurrence event.

- **FP-4:** Restrict the water runoff rate from new development to a rate that does not damage downstream resources (usually the same rate as predevelopment conditions). More restrictive requirements may apply to substantial redevelopment of parcels that were originally developed under nonexistent or outdated stormwater control standards and contain large areas of impervious surfaces, have a high percentage of total impervious surfaces, or have identified drainage or water quality problems.

- **FP-5:** Work with the City's Development Services Department to promote use of low impact development (LID) techniques and other sustainable elements in site designs. These LID techniques promote minimization of runoff rate and volume by limiting the size of the building footprint and total site coverage, thereby reducing impervious surfaces, maximizing the protection of permeable soils and native vegetation, and encouraging use of permeable pavements and surfaces where appropriate.

- **FP-6:** Allow and encourage the use of LID stormwater best management practices (BMPs) for flow control to mitigate increases in runoff rates created by development and redevelopment, where feasible.

- **FP-7:** Property owners shall be responsible for the maintenance of stormwater flow control facilities located within the boundaries of their property. The City shall monitor and enforce this requirement and shall be responsible for the maintenance of facilities within City owned property and public right-of-ways. The City will work with property owners and maintenance providers to see that the waste due to maintenance of these facilities and structures is disposed of properly.

- **FP-8:** Where feasible, stormwater flow control facilities, such as retention and detention ponds, should be designed to provide supplemental benefits, such as wildlife habitat, water quality treatment, and passive recreation.

- **FP-9:** Increase public knowledge of stormwater runoff issues and support public involvement in the City's stormwater management program.

- **FP-10:** Cooperate with the Washington State Department of Ecology (Ecology) and neighboring jurisdictions, including participation in regional forums and committees, to improve regional surface water management and resolve related inter-jurisdictional flooding concerns.

1.3.2 Service Area 2: Water Quality

The water quality (WQ) service area is designed to meet Goals A and C by establishing the following policies:

- **WQ-1**: Implement the required provisions of Ecology's NPDES Phase II permit to protect receiving water quality from degradation caused by runoff from the City's municipal stormwater system.

- **WQ-2:** Comply with other all applicable, relevant, and appropriates requirements from the Federal, state, and local governments related to water quality.

- **WQ-3:** Protect water quality by requiring BMPs for runoff treatment for new development and redevelopment projects. More restrictive requirements may apply to substantial redevelopment of parcels that were originally developed under nonexistent or outdated stormwater control standards and contain large areas of impervious surfaces, have a high percentage of total impervious surfaces, or have identified drainage or water quality problems.

- **WQ-4:** Work with the City's Development Services Department to promote use of LID techniques in site designs. These LID techniques and other sustainable elements promote minimization of runoff rate and volume, thereby reducing pollutant loading to receiving waters. This can be accomplished by limiting the size of the building footprint and total site coverage, minimizing impervious surfaces, maximizing the protection of permeable soils and native vegetation, and encouraging use of permeable pavements and surfaces, where appropriate.

- **WQ-5:** Allow and a encourage the use of LID stormwater BMPs for stormwater quality treatment to mitigate for potential increased pollutant loading to receiving waters created by development and redevelopment

- **WQ-6:** Protect water quality through the continuation and possible expansion of the street sweeping program.

- **WQ-7:** Protect water quality by educating citizens about proper waste disposal and eliminating pollutants that enter the stormwater system as a result of lawn and garden maintenance, car cleaning or maintenance, roof cleaning or maintenance, or direct disposal into storm drains.

- **WQ-8:** Property owners shall be responsible for the maintenance of stormwater flow control facilities located within the boundaries of their property. The City shall monitor and enforce this requirement and shall be responsible for the maintenance of facilities within City owned property and public right-of-ways. The City will work with property owners and maintenance providers to see that the waste material that is generated and collected in maintenance of these facilities and structures is disposed of properly.

- **WQ-9:** Cooperate with Ecology and neighboring jurisdictions, including participation in regional forums and committees, to improve regional surface water quality issues solve related inter-jurisdictional concerns.

1.3.3 Service Area 3: Aquatic Habitat

The aquatic habitat (AH) service area is designed to meet Goals A, B, and C by establishing the following policies:

- **AH-1:** Comply with all applicable, relevant, and appropriate aquatic habitat requirements from the Federal, state, and local governments.

- **AH-2**: Actively participate in regional species protection efforts, including salmon habitat protection and restoration.

- **AH-3:** Protect critical wildlife habitat, such as wetlands, from the negative effects of uncontrolled stormwater runoff form development and redevelopment. This protection includes habitats or species that have been identified as priority species or priority habitats by the Washington Department of Fish and Wildlife (WDFW). Habitats and species of local importance will also be protected.

- **AH-4:** If wetlands are used as part of a storm drainage system, ensure that water level fluctuations are similar to fluctuations in natural conditions, and that water quality standards are met before discharging stormwater into a wetland.

- **AH-5:** Habitat restoration efforts should focus on areas that will result in the greatest benefit to the resource, and that have been identified by the City as a priority for restoration. The restoration of the Edmonds Marsh shall be one of the highest priority aquatic habitat projects.

- **AH-6:** Develop basin stewardship and education programs to prevent surface water impacts and identify opportunities for restoration. The following issues should be considered when formulating plans and implementing projects which have the potential to impact stream basins: public access, respect for private property, restoration of the feature to a more natural state, retention of native vegetation, improvement of surface water management in the basin, improvement of fish habitat and channel substrate, and streambank stabilization.

- **AH-7:** Identify surface water features with restoration potential and attempt to involve citizens and obtain community consensus on any future attempt to restore altered features. Restoration efforts may include the daylighting of streams which have been diverted into underground pipes or culverts.

- **AH-8:** Solutions to stream habitat problems should first protect and preserve existing habitat, then enhance and expand habitat in areas where wild anadromous fish are present, and lastly enhance and expand habitat in areas where other wild fish are present.

- **AH-9:** The City shall work with citizens and watershed interest groups and cooperate with King County, Snohomish County, and other local governments, regional governments, state agencies, and Indian tribes in developing and implementing watershed action plans and other types of basin plans for basins which include or are upstream or downstream of the City.

1.3.4 Service Area 4: Stormwater Utility Funding

The Stormwater Utility Funding (SWUF) service area is designed to meet Goals A, B, C, and D by setting forth the following policies:

- **SWUF-1:** The Stormwater Utility will have primary authority and responsibility for funding the implementation of this plan, including:

- Responsibilities for planning, design, construction, maintenance, administration, and operation of all city storm and surface water facilities.

- Establishing standards for design, construction, and maintenance of improvements on private property where these may affect storm and surface water management.

- Implementation of water quality and aquatic habitat policies.

- **SWUF-2:** All parcels in the City will be charged a fee—set by the City Council—that will be used to fund stormwater programs detailed in this plan. The rate will be based on the number of Equivalent Service Units (ESU) on each parcel. One ESU shall represent 3,000 square feet of impervious area. All zoning types except single family residential shall be charged based on the actual impervious surface area on the parcel at the rate defined by City Council per one ESU. The minimum charge shall be one ESU.

- **SWUF-3:** Each single family parcel shall be charged the rate for one ESU, regardless of the actual impervious surface area on the parcel. The Public Works Director may impose a fee larger than one ESU on any single family parcel causing an unreasonable burden on the storm or surface water system.

- **SWUF-4**: Acknowledge that all residents benefit from using the paved (impervious) surfaces within the City's right-of-ways, and that these impervious surfaces create a significant burden and cost to the City's stormwater system and must be adequately funded to maintain them and comply with applicable federal, state and local water quality regulations.

- **SWUF-5:** In addition to any other charge prescribed by this utility, a stormwater management system development charge shall be paid prior to the issuance of any building permit or development permit issued under the Edmonds Community Development Code (ECDC) by the owner of any property, residential dwelling unit, or other structure that may hereafter be constructed in the city which benefits from the stormwater utility system constructed by the city. The stormwater management system development charge shall be set by City Council based on the number of ESU added to or created by the permit.

- **SWUF-6:** The Public Works Director shall make adjustments to utility rates in accordance with the following provisions:

- Upon written application, a customer may request review of the utility fee. The applicant shall state the specific conditions and/or facilities on the site which the applicant feels warrants adjustment of the rate as applied to the property.

- The Public Works Director shall have the authority to increase or decrease rates up to 50 percent of the level set by City Council. Factors personal to the property owner, such as ability to pay, shall not be considered. The sole criteria for rate adjustment shall be a determination that the physical characteristics of the site and in particular the stormwater detention, retention or treatment facilities as installed thereon by the owners, or lack

thereof, have significantly either increased the burden which the property places upon the City's stormwater utility (in the event of an increase) or decreased the burden (in the event of a decrease) by providing additional benefits over and above those which the average property places upon the utility through onsite improvements including but not limited to onsite pollution control mechanisms or water quality technologies and the property's impact upon the city's stormwater management system.

- **SWUF-7:** If the owner of a single family parcel qualifies for a "low income senior citizen exemption" as determined by the County Assessor under RCW 84.36.381, they are exempt paying from a utility fee as long as the owner remains a "low income senior citizen." It shall be the responsibility of the property owner to demonstrate qualifications for this fee exemption.

- **SWUF-8:** Acknowledge that any new or replaced City-owned transportation project will be required to comply with all stormwater management requirements in ECDC 18.30. In meeting these requirements, the transportation projects will incur significant costs. To offset these costs, a fixed amount each year would be funded though the stormwater utility and reflected in the rate structure. Any unused portion at the end of a given year would rollover to be combined with the next year's fixed amount.

- **SWUF-9:** The City shall actively seek outside funding to leverage or complement utility funds in order to implement this Plan such as:

  - Local, state and federal grants
  - Loans such as from the Public Works Trust Fund
  - Future bond measures
  - Other cross-jurisdictional funding mechanisms

1.4 Information Sources

Significant research was conducted to develop this Plan. Past studies were reviewed for information on drainage, water quality, and aquatic habitat problems, and to evaluate the existing surface water management program. To supplement existing drainage and water quality problem information and recent documentation of the status of the City's stormwater program, Herrera Environmental Consultants (Herrera) conducted workshops with City staff on January 20, 2009 at the Public Works facility and February 2, 2009 at City Hall to discuss the plan. A stormwater management program (SWMP) status survey was used to facilitate the workshop. A copy of the status survey and a list of workshop attendees are included in the "gap analysis" documentation in Appendix B.

Several follow-up meetings, telephone conversations, and field reconnaissance trips were held with City staff after the workshops. In addition, several technical meetings were held by Herrera with City staff to discuss specific SWMP elements, such as the simplified sizing tool, code development, and the stormwater code supplement.

The following subsections describe City staff contributors, pertinent City programs, City code, the City stormwater system, and studies conducted on streams and surface water bodies within the City.

1.4.1 City Staff

Table 1-1 identifies City staff that provided important contributions to the development of this plan.

Table 1-1. City contributors to the plan.

Contributor	Department	Title
Noel Miller, P.E.	Public Works	Public Works Director
Jerry Shuster, P.E.	Engineering Division	Stormwater Engineering Program Manager
Rob English, P.E.	Engineering Division	City Engineer
Joanne Zulauf	Engineering Division	Engineering Technician
Ed Sibrel	Engineering Division	Engineering Technician
Jeanie McConnell	Engineering Division	Engineering Program Manager
Mike Johnson	Public Works	Storm Lead Worker
Tod Moles	Public Works	Street/Storm Manager
Steve Fisher	Public Works	Recycling Coordinator
Rob Chave	Development Services	Planning Division Manager
Michael Clugston	Development Services	Planner
Duane Bowman	Development Services	Former Development Services Director (retired)
Jen Machuga	Development Services	Planner
Sally Lider	Parks, Recreation, and Cultural Services	Environmental Education Coordinator

1.4.2 Relevant City Documents

Table 1-2 lists recent City-produced planning and regulatory compliance documents that are directly relevant to the plan and were used in preparing it.

Table 1-2. Relevant city documents.

Title	Author	Year
City of Edmonds Stormwater Comprehensive Plan	City of Edmonds	2003
City of Edmonds Comprehensive Plan (including the Community Sustainability Element)	City of Edmonds	2009
City of Edmonds Surface Water Management Program (SWMP) Document	City of Edmonds	2008
City of Edmonds Stormwater Management Program (SWMP) Document	City of Edmonds	2009
City of Edmonds Stormwater Management Program (SWMP) Documentation	City of Edmonds	2010

1.4.3 Edmonds Municipal Code

Specific sections of City code that set forth requirements for storm and surface water management are:

- Edmonds Community Development Code (ECDC) Chapter 18.00 Public Works Requirements, General Requirements
- ECDC Chapter 18.30 Stormwater Management
- ECDC Chapter 23.40 Environmentally Critical Areas General Provisions
- Edmonds City Code (ECC) Section 7.200 Illicit Discharges

ECDC Chapter 18.30 and ECC Section 7.200 were updated in 2010 to address many of the issues described in this plan.

1.4.4 City Storm Drainage GIS Data

Information on the existing storm drainage system infrastructure throughout Edmonds was derived mostly from geographic information system (GIS) data furnished by the City (Edmonds 2010a). The GIS information was supplemented in some local areas where capital improvement projects are planned with knowledge from City staff.

1.4.5 City Drainage Basin and Surface Water Studies

Table 1-3 lists previous drainage basin studies performed for the City that were referenced when preparing this plan. Collectively, these studies provide extensive information to help characterize receiving water conditions, problems, and possible corrective actions.

Table 1-3. Relevant drainage basin and surface water studies.

Report Title	Author	Year
Chase Lake/Lake Ballinger Sub Basin Study	URS Corporation	1987
Shell Creek Basin Study	URS Corporation	1987
Edmonds Drainage Basin Studies (Shellabarger, Five Corners, Northstream, and Talbot Park Basins)	URS Corporation	1989
Edmonds Drainage Basin Studies (Edmonds Way, Perrinville, and Meadowdale Basins)	R.W. Beck	1991
Critical Areas Inventory	Sheldon and Associates	1992
Perrinville Creek Streambank Stabilization Final Report	Pentec Environmental	1998
Edmonds Stream Inventory and Assessment	Pentec Environmental	2002
Southwest Edmonds Drainage Plan	Earth Tech	2002
Lake Ballinger Total Phosphorus Total Maximum Daily Load Water Quality Attainment Monitoring Report	WA Dept. of Ecology	2008
Greater Lake Ballinger/McAleer Creek Watershed Study Strategic Action Plan	Otak et al.	2009

1.5 Surface Water Management Program History and Accomplishments

This section details the history and accomplishments of the City's surface water management programs.

1.5.1 Initial Approaches to Comprehensive Stormwater Management

The City's 1965 comprehensive sewerage plan (Reid, Middleton, & Associates 1965) contained a chapter entitled *Comprehensive Plan for Control of Surface Water Runoff*. This chapter contained an analysis of the major surface water drainage basins in the City and detailed the "….necessary drainage routes and pipe and culvert sizes required for calculated stormwater runoff, based on the ultimate development of the area." This plan also recommended separation of storm and sanitary sewer systems (where combined) and provided cost estimates for the design and construction of the recommended surface water runoff system.

In 1977, Reid Middleton produced the *Updated Comprehensive Plan for Control of Surface Water Runoff* (Reid, Middleton, & Associates 1977) for the City. This document described the extent of the stormwater system installed since 1965 and described changing concepts in the planning and design of surface water management facilities since the 1965 plan. The plan documented flooding, erosion, and degraded water quality in many parts of the City resulting from the previous concept of surface water management. Recommendations in the 1977 plan included the use of various detention and retention systems and maintaining natural drainage courses in their native state, as much as possible. The plan re-evaluated the drainage basins from the 1965 plan and developed a series of capital improvement projects to address drainage and erosion problems.

Based on the recommendations in the 1977 plan, the City passed its first drainage ordinance (No. 1924) regulating runoff from private development in July of that year. This ordinance required no increase in the 10-year recurrence event peak discharge for proposed development projects with 5,000 square feet of impervious surface area. This threshold for peak discharge control was lowered to 2,000 square feet of impervious surface in 1981, with the publishing of the City's first development code (Ordinance 2182).

1.5.2 The Basin Planning Approach to Stormwater Management

From 1987 to 1991, the City commissioned a series of basin analysis studies that documented flooding and other drainage-related problems throughout the City, forming the basis for various capital improvement project plans (URS Corporation 1987a, 1987b, 1989; RW Beck 1991). In 1988, the City set up a Stormwater Utility to assist with funding stormwater improvements (see Section 2.5). The 1991 stormwater comprehensive plan (R.W. Beck 1991) specified 27 capital projects to address drainage concerns. The 1991 plan also recommended the City follow the Puget Sound Water Quality Authority's (PSWQA) proposed rules for regulating development and preserving wetland and stream buffers as non-structural solutions to stormwater runoff issues. In 1995, the City Council passed Ordinance 3013, modifying the stormwater code to require the use of the 1992 Department of Ecology *Stormwater Management Manual for the Puget Sound* Basin (Ecology 1992), as recommended by PSWQA.

In 2001, the City commissioned a drainage study for a 300-acre area of southwest Edmonds that was annexed from Snohomish County between 1983 and 1995. This area had not been included in previous studies. The result of the study was the *Southwest Edmonds Drainage Plan* (Earth Tech, Inc. 2002). This plan recommended a series of capital improvement projects to solve identified flooding and drainage-related problems in the area.

The 2003 *Stormwater Comprehensive Plan* (City of Edmonds 2003) detailed the accomplished projects from the 1991 plan and recommended additional capital projects to solve existing drainage problems. Table 1-4 lists the capital projects in the 2003 Plan and their current status, including additional emergency projects that were not in the 2003 Plan. Table 1-5 lists smaller projects completed as part of the "Citywide Drainage Replacement and Extension" project.

The 2003 plan also described a compliance strategy for forthcoming requirements of the City's NPDES Phase II permit from Ecology that was expected to vastly increase the workload of City staff responsible for stormwater management. In May 2003, the City filed the required Notice of Intent to comply with the forthcoming permit.

In 2005, the City's Engineering Division created the position of Stormwater Engineer to manage the increasing workload in the area of stormwater management. Previously, the Hydraulic Engineer, also responsible for the implementation of the water and sewer comprehensive plan, managed the day-to-day stormwater workload. This workload consisted of managing stormwater capital projects (designing the smaller ones) and reviewing development permit applications for compliance with the stormwater code.

Table 1-4. Current status of capital improvement projects presented in the 2003 *Stormwater Comprehensive Plan* and additional emergency projects.

From 2003 Plan			
Number	Rank	Problem Description	Status
4	1	Willow Creek Outfall Extension	Completed
6	2	Southwest Edmonds Basin Study Projects [a]	Partially Completed
18	3	Meadowdale Drainage Investigation Problems	Partially Completed
5	4	Dayton Street Outfall Extension	Completed
9	5	Meadowdale – 171st St. / Talbot Rd.	Not Completed
17	6	220th Street Storm Improvements	Completed
2	7	Talbot Road Culvert	Not Completed
7	8	Shell Creek Stream Bank Erosion	Partially Completed
15	9	Union Oil (Edmonds) Marsh Channel Improvements	Not Completed
1	10	Perrinville Creek Diversion	Not Completed
19	11	Citywide Drainage Replacement and Extension	Partially Completed
3	12	93rd Ave. West Storm System	Partially Completed
8	13	232nd St. Storm Improvements	Not Completed
14	14	Olympic Ave. Phase 1 Solution	Partially Completed
14	15	Olympic Ave. Phase 2 Solution	Not Completed
10	16	80th Ave West	Not Completed
11	17	Alder St.	Not Completed
12	18	Birch St.	Partially Completed
13	19	Edmonds Way Trunk Line	Not Completed
16	20	88th Ave. West	Not Completed
Emergency Project [b]		Northstream Culvert Replacement near Puget Dr.	Completed
Emergency Project [b]		76th Ave. N. /Perrinville Emergency Repair Project	Completed
Emergency Project [c]		Terrace Creek Culvert under Talbot Rd.	Completed

[a] Includes infiltration system installation in Hickman Park

[b] As a result of damage from the large storm event on December 3, 2007

[c] Due to impending failure of the road embankment above the creek ravine

Table 1-5. Completed major citywide drainage replacement and extension projects, 2003-2009.

Year	Location/Project
2003	232nd St. SW & 96th Ave. W infiltration system installation
2003	93rd Ave. W & 224th St. SW infiltration system installation
2004	Southwest Edmonds Friar Tuck Lane & Nottingham Rd. infiltration system rehabilitation
2005	235th Pl. off Robin Hood Dr. infiltration system installation
2006	241st St. SW near Firdale Ave. drainage extension
2007	832 Pine St. Alley drainage extension
2008	Humber Lane drainage extension
2008	Upper Edmonds St. drainage extension
2008	Mt. Lane 9th to 10th Ave. drainage extension
2009	226th St. SW& Edmonds Way drainage extension

1.5.3 Current Stormwater Management Program

The NPDES Phase II permit was issued by Ecology in January 2007, with an effective date of February 16, 2007. At that time, the City Stormwater Engineer led the program for compliance with the various deadlines for the requirements of the permit. During 2008, the City of Edmonds had a large turnover in its Engineering Division. The City's Stormwater Engineering Program Manager position (formerly called Stormwater Engineer) was unfilled from January through July 2008. For part of that time, the Assistant City Engineer (formerly the Hydraulics Engineer) assumed the stormwater management activities until his resignation in April 2008. A new Stormwater Engineering Program Manager was hired in July 2008, and restarted the effort for permit compliance.

Since the NPDES Phase II permit became effective in February 2007, the stormwater program has brought the City into compliance with the requirements of the permit including the two requirements that involve the passage of new ordinances. In 2009, Council passed Ordinance No. 3751 updating the City's illicit discharge regulation (ECC Chapter 7.200) to comply with the Permit requirement S5.C.3. In 2010, Council passed Ordinance No. 3792 updating the City's stormwater management code (ECDC 18.30) to meet the permit requirement S5.C.4 for controlling runoff from development, redevelopment, and construction sites for requirement.

1.6 Public Participation

On January 12, 2010, the Edmonds City Council passed Resolution No. 1220 that specified a public participation plan for the *Storm and Surface Water Comprehensive Plan* and other utility plans being developed by the Engineering Division. The public participation plan can be found in Appendix C. Public participation methods to provide early and ongoing public notice of the proposed Plan are summarized as follows:

- Publish notice of public meeting (including public hearings) in the Everett Herald, a newspaper of general circulation in the City
- Advertise public meetings and hearings on the local public access television channel, Channel 21
- Place notices in the City newsletter, available on the City website
- Compiling a list of all interested parties and sending notices of meetings and hearings to all those on the mailing list
- Using the City's website to track progress, provide draft documents and plans, and to provide information on how to comment or be added to a mailing list

The *Storm and Surface Water Management Comprehensive Plan* was presented to the Edmonds Planning Board on May 26, 2010, and again during a Public Hearing on June 2, 2010. An introductory presentation of this plan was given to the City Council on June 22, 2010, and a public hearing was held before the Council on July 6, 2010. The Council approved this plan following the public hearing that same evening, subject to some minor changes in capital improvement project planning that are reflected herein.

2.0 Background

This section provides background information on:

- The physical environment in the City that affects stormwater management
- Drainage basins in the City that drain to Puget Sound and Lake Ballinger
- A description of the City stormwater system
- A list of applicable regulations
- A description of flooding, water quality, and habitat issues in various drainage basins
- A brief history of the stormwater utility fund

2.1 The Physical Environment

The City is located in south Snohomish County on the western shores of Puget Sound approximately 14 miles north of Seattle. Situated within the urbanized Puget Sound region, the City encompasses approximately 8.9 square miles (5,700 acres) in area, including 5 lineal miles (26,240 feet) of marine shoreline. The current population is approximately 40,000. The City is approximately 94 percent built out. Figure 2-1 summarizes existing land uses in the City (Edmonds 2009a).

Numerous small streams within Edmonds drain east to west into Puget Sound. Much of the area in the southeast portion of the City drains into Lake Ballinger and Hall Creek (a tributary to Lake Ballinger). Other relevant statistics about the physical setting of the City include (Edmonds 2010a):

- 90 percent of privately-owned parcels in the City are less than 1 acre in size
- 23 percent of the City land area has slopes that are 15 percent or greater
- Soil types in the City include:
  - 81.7 percent - Alderwood series (glacial till)
  - 12.2 percent - Everett gravelly, sandy loam (approximately 2 inches/hour or greater, good for infiltration)
  - 6.1 percent - other (peat, open water, other)

2.2 Drainage Basin Characteristics

Basin studies were incorporated into the previous version of the stormwater comprehensive plan (Edmonds 2003). Additional studies providing drainage basin and habitat information include the *Critical Areas Inventory* (Sheldon and Associates 1992) and the *Edmonds Stream Inventory and Assessment* (Pentec Environmental 2002). The City can be divided into two major drainage basins (or watersheds): those that that drain to or can overflow into Puget Sound and those that drain to Lake Ballinger. Since the 2003 comprehensive plan was written, more accurate mapping of the City has resulted in slight modifications to boundaries and names of some of the drainage basins. Drawing from the basin studies and updated GIS analyses, the following sections briefly summarize the drainage basins in the City (Figure 2-2).

2.2.1 Puget Sound Basins

Basins located within the City limits that drain to, or can overflow into, Puget Sound make up approximately 86 percent of the City land area. The northern portion of Edmonds is made up of number of small drainage basins that either discharge into steep-gradient, small streams or discharge directly to Puget Sound via a piped system or by sheet flow. These basins are briefly described in this section, beginning with the northernmost basin (Meadowdale[6]) and continuing to the south to the Terrace Creek basin. Further south in the City, the drainage basins form larger creeks. Edmonds shares its southern border with the City of Shoreline in the Southwest Edmonds basin.

Meadowdale

The "Meadowdale Basin" listed in the 1991 report (R.W. Beck 1991) comprises approximately 552 acres, a portion of which lies in the City of Lynnwood. The 2003 Comprehensive Plan listed four major subbasins within the City: Meadowdale A subbasin (126 acres), Meadowdale-B subbasin (145 acres), Meadowdale C subbasin (57 acres), and Meadowdale-D subbasin (131 acres) (Edmonds 2003). Seven outfalls from City systems are located in this basin (Edmonds 2003).

The subbasin boundaries have been slightly adjusted and renamed as follows (north to south): Meadowdale A (84 acres), Meadowdale B (13 acres), Stilthouse Creek (126 acres), Outfall Creek (64 acres), and Terrace Creek (122 acres). These revised subbasin areas also includes areas that are directly piped or otherwise directly discharge to Puget Sound (Figure 2-2).

This drainage basin also contains the Meadowdale landslide complex. This is a hydrogeologic problem area where the groundwater level within the slide mass is a primary factor affecting stability within the area. This large land mass along 75th Place West has experienced slide movements, documented since the late 1940s. The nature of this landslide area affects stormwater management policies for the area. Normally, stormwater management policies

[6] The very northern portion of the City is located in the Lund's Gulch watershed that is predominantly (90 percent of the area) located in the City of Lynnwood.

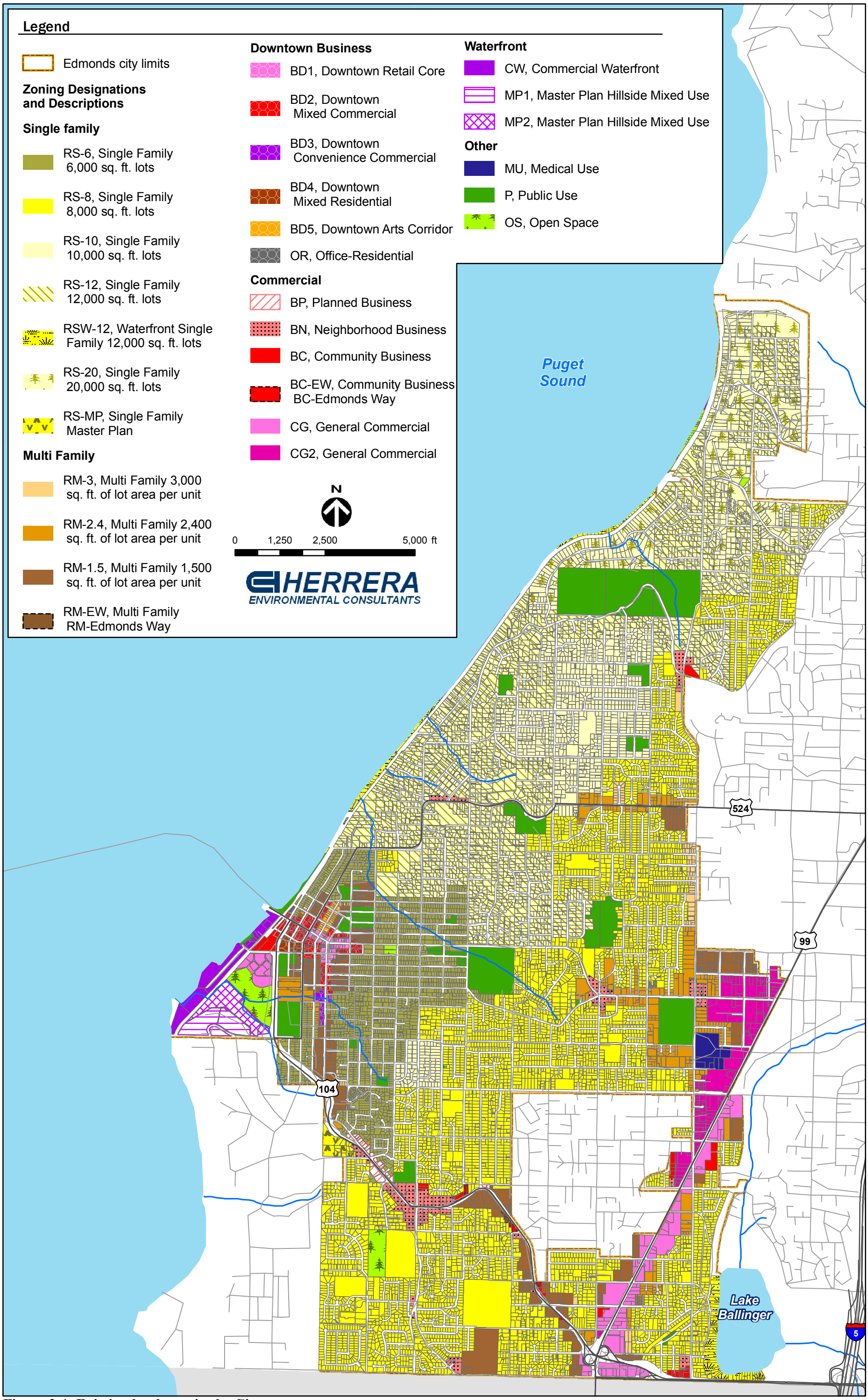
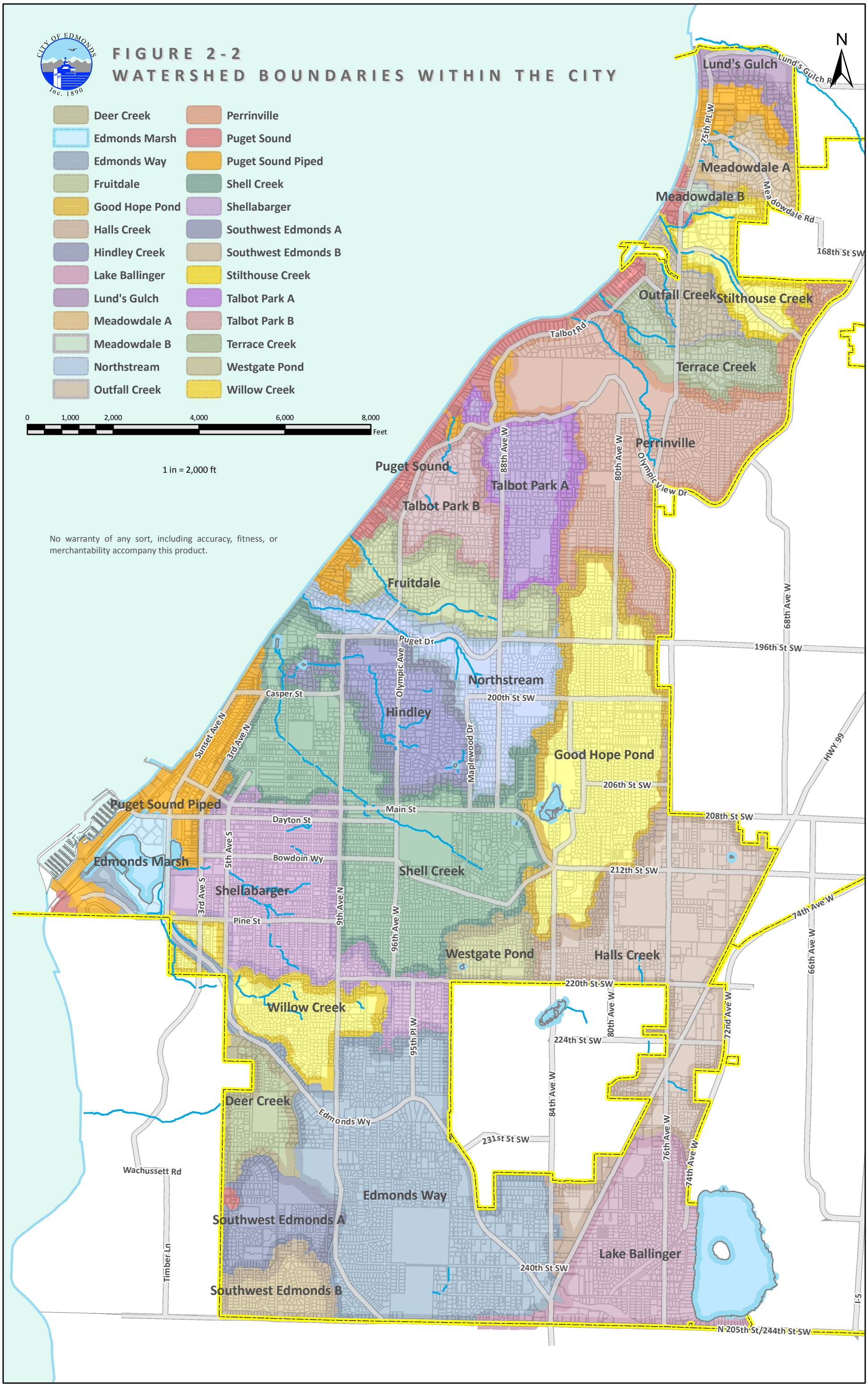


Figure 2-1. Existing land uses in the City.

FIGURE 2-2
WATERSHED BOUNDARIES WITHIN THE CITY



No warranty of any sort, including accuracy, fitness, or merchantability accompany this product.

encourage groundwater recharge to maintain stream base flows. However, in the Meadowdale landslide complex and the area that drains to it, the City has a policy of discouraging groundwater recharge in an effort to lower the groundwater table to minimize further slope instability (Edmonds 2003). In the mid-1980s as part of Local Improvement District 210, the residents in this area funded a stormwater drainage system that facilitates lowering of the groundwater level to attempt to decrease the potential for further slope instability and enable additional development.

Perrinville Creek

The Perrinville Creek drainage area comprises 920 acres, which includes approximately 523 acres that lie within the City. The remainder of the basin lies within City of Lynnwood jurisdiction. Perrinville Creek discharges to Puget Sound after flowing through a steep ravine in Southwest County Park. In 1994, the City installed high flow bypass diversion structures in Perrinville Creek just north of Talbot Road. These diversion structures empty into a 42-inch diameter pipe that discharges directly to Puget Sound.

Talbot Park

The Talbot Park basins (A and B) comprise a drainage area of 309 acres. The drainage basin includes a mix of ditches and pipes for stormwater conveyance, and in many places the natural watercourse has been altered by development. In the study of several drainage basins performed by URS Corporation (1989), this basin included the Fruitdale-on-the-Sound Creek basin and part of the Perrinville Creek basin. Adjacent to this basin are areas that are directly piped or otherwise directly discharge to Puget Sound.

Fruitdale-on-the-Sound Creek

Fruitdale-on-the-Sound Creek drains a 167-acre basin area and discharges to Puget Sound west of Sound View Place (south of Lindsay Place and north of Water Street) (Edmonds 2003). The main creek channel is approximately 0.75 miles in length and drops about 400 feet in elevation (Pentec Environmental 2002). The creek has suffered many problems due to urbanization and is characterized by many manmade landscaping features, and ponds (Edmonds 2003). This basin was included in the Talbot Park Watershed in the Edmonds Drainage Basin Studies (Shellabarger, Five Corners, Northstream, and Talbot Park Basins) (URS Corporation 1989). Adjacent to this basin are areas that are directly piped or otherwise directly discharge to Puget Sound.

Northstream

Northstream drains a 227-acre basin area and discharges to Puget Sound west of Northstream Lane. The main creek channel is approximately 0.75 miles in length and drops about 400 feet in elevation (Pentec Environmental 2002). The creek has suffered many problems due to urbanization, and is characterized by many manmade landscaping features and ponds. Adjacent to this basin are areas that are directly piped or otherwise directly discharge to Puget Sound.

Shell Creek

The Shell Creek basin comprises a drainage area of 821 acres, which includes the 178-acre Hindley Creek subbasin. Hindley Creek empties into Shell Creek west of Brookmere Drive (URS Corporation 1987). In the winter months, the Goodhope Pond (454 acres) subbasin and Westgate Pond (61 acres) subbasin overflow to the Shell Creek system.

Both Shell Creek and Hindley Creek have diversion structures that convey high flows directly into Puget Sound via a pipe system. The Shell Creek diversion structure and fish ladder is located on Daley Street between 7th Avenue N and 8th Avenue N. The bypass pipe runs north approximately along the 8th Avenue N right-of-way for about 2,500 feet to Melody Lane, and then travels west though private property out to Puget Sound. The Hindley Creek bypass begins at 9th Avenue N and Hindley Lane, where it enters the same pipe used for the Shell Creek bypass.

Hindley Creek

Hindley Creek drains a 178-acre area that is predominately urban/residential (Pentec Environmental 2002). Hindley Creek discharges to Shell Creek 1,100 feet upstream from the mouth and is the primary tributary.

Goodhope Pond

Goodhope Pond is located in a 454-acre subbasin area. The pond is located primarily in Pine Ridge Park, but the southern portion of the pond is located on private property. The system overflows in the winter months to the Shell Creek basin through a storm drain system. The surface area of the pond ranges from approximately 1 acre in late summer to 6 acres during the winter months. A settling basin was constructed upstream of the pond inlet in 1994 to minimize sedimentation impacts. This basin was included in the Five Corners watershed in the Edmonds Drainage Basin Studies (Shellabarger, Five Corners, Northstream, and Talbot Park Basins) (URS Corporation 1989).

Westgate Pond

Westgate Pond is located in a 61-acre subbasin. The pond is located entirely within private property. Right-of-way drainage is connected to the pond by a storm drain system located within public easements. The overflow outflow from the pond, which was constructed as part of a capital improvement project in 1997, operates in the winter months and drains to the Shell Creek system at 220th Street SW. The pond contains water most of the year, but can dry up during the summer months.

Puget Sound Direct Discharges

This “basin” is comprised of several individual drainage areas that discharge directly to Puget Sound, via a pipe, sheet flow, or ditch, and that are not associated with a creek. The largest of these drainages is the 150-acre “Lower Bowl” area north of Edmonds Marsh. This basin also

includes the Point Edwards subbasin southwest of the marsh. The other drainages in this basin are further north of the Lower Bowl along the shoreline (labeled as "Puget Sound Piped" in Figure 2-2). These direct discharge areas were not included in previous basin studies performed in the City.

Edmonds Marsh (Union Oil Marsh)

The Edmonds Marsh (formally known as the Union Oil Marsh) receives drainage from the following areas within the City of Edmonds: Shellabarger Creek Basin (378 acres), the Willow Creek Basin (183 acres), and another 61 acres of local area that discharges directly to the marsh. The Town of Woodway also contributes drainage to the marsh via Willow Creek. The outlet for the marsh is a 48-inch diameter outfall pipe that terminates in Puget Sound off the south side of Edmonds Marina. This outfall is sometimes referred to as the "Willow Creek Outfall."

Shellabarger Creek

Shellabarger Creek drains a 378-acre basin area and discharges to the Edmonds Marsh on the east side of State Route (SR) 104. The Shellabarger Creek corridor is heavily developed. The stream passes through culverts in many locations and most of the open reaches are located in landscaped residential areas.

Willow Creek

Willow Creek drains a 393-acre basin area and discharges to the Edmonds Marsh on the west side of SR 104. A privately-run fish hatchery is located near where the creek discharges to Edmonds Marsh.

Edmonds Way

The Edmonds Way drainage basin comprises 870 acres and drains directly to Puget Sound, of which approximately 683 acres is located with the City limits (this basin also drains portions of Esperance and Shoreline). The primary conveyance for this system is the SR 104 storm drain piping from Highway 99 to the southeast, along SR 104 to the northwest, through the former Union Oil property and the Edmonds Marina Beach site, and out to Puget Sound.

Deer Creek

The Deer Creek basin comprises a drainage area of 224 acres, approximately 95 acres of which is located within the City limits. The remainder of this basin area is within the Town of Woodway's jurisdiction. This basin was not included in previous basin studies performed in the City.

Southwest Edmonds

The Southwest Edmonds basins (A and B) comprise 216 acres (91 percent within the City limits) of mostly residential area. Most of this area, which was annexed into the City in the mid and late

1990's, had a large amount of drainage problems and associated complaints lodged by the land owners. Several projects were constructed following annexation; however, many problems remain. A basin study was initiated in 2001 and completed in 2002 (Earth Tech 2002). The area is dominated by Type A (highly permeable) hydrologic soils, and many of the drainage problem solutions have involved the construction of infiltration systems that are suited to the highly permeable soil characteristics. Parts of this basin are in the groundwater recharge area for Deer Creek, a water supply system for the Town of Woodway and operated by Olympic View Water District. Parts of the more southerly basin (B) drain into the City of Shoreline's Storm Creek basin.

2.2.2 Lake Ballinger Basins

Basins located within the City limits that drain to Lake Ballinger are briefly described in this section and include Chase Lake and Hall Creek. Approximately 14 percent of the total land area in Edmonds drains to Lake Ballinger, which in turn drains to Lake Washington via McAleer Creek.

Lake Ballinger Direct Discharge

Approximately 300 acres of the City directly discharge into Lake Ballinger either by sheet flow or through piped conveyances. Lake Ballinger has a history of flow control that goes back to a 1942 Superior Court Order calling for installation of a weir to set lake levels to preserve access to the open water by lakeside residents in the summer and to control shoreline flooding in the winter. In 1982, the Superior Court Order was re-adjudicated and a lake restoration plan was developed to address ongoing lakeshore flooding issues, as well as water quality issues related to 40 years of development in the lake basin. However, flooding has continued to be a problem for a number of lakeside property owners during large storm events. In 2009, the six jurisdictions within the greater Lake Ballinger / McAleer Creek watershed[7] banded together to create a watershed action plan to initially address concerns from flooding caused by the December 2007 storm event. Currently, this interjurisdictional watershed forum is seeking funding to implement capital projects recommended in the action plan.

Chase Lake

Chase Lake, located in the Esperance area of unincorporated Snohomish County, has a drainage area of approximately 100 acres. The area within the City draining to Chase Lake is only approximately 2 acres. The lake outlet flows through a stormwater drainage system and discharges to the Hall Creek basin within the City near 78th Avenue W and 225th Place SW. In 1989 and 1990, a regional detention facility was completed at Chase Lake, led by Snohomish County.

[7] Edmonds, Lynnwood, Mountlake Terrace, Shoreline, Lake Forest Park, and Snohomish County.

Hall Creek

Although a significant area of the City (over 488 acres) drains to Hall Creek, the creek lies outside of the City limits and entirely within Lynnwood and Mountlake Terrace jurisdictions. The creek discharges into the north end of Lake Ballinger in Mountlake Terrace. Jones and Stokes performed a biological assessment (in association with the Interurban Pedestrian Underpass project) in 2000 for the City of Mountlake Terrace (Jones and Stokes 2000a), and a stream habitat analysis for the creek in 2000 for the City of Lynnwood (Jones and Stokes 2000b).

In these studies, the creek is characterized as highly urbanized. Jones and Stokes (2000a) note that "urbanization has significantly deteriorated Hall Creek through altered flow regime (increased peak flows and reduced summer low flows), elevated temperature, habitat loss, sedimentation, erosion, channelization, bank reinforcement, and pollutant loading."

2.3 City Storm and Surface Water System

The City's Stormwater Management Utility manages a large and complex storm drainage system in the public right-of-way and also addresses flooding, water quality, and aquatic habitat issues in streams and lakes that lie beyond that right-of-way. Table 2-1 summarizes the City storm and surface water systems.

Table 2-1. Summary of City of Edmonds storm and surface water facilities.

Item	Quantity	Units
City of Edmonds Storm and Surface Water Facilities [a]		
Catch Basins	6,600	each
Manholes (junctions)	1,325	each
Flow Control Manholes	103	each
Stormwater Pipe	728,308 (138)	LF (miles)
Open Ditches	79,850 (15.1)	LF (miles)
Creeks (includes portions on private property)	71,710 (13.6)	LF (miles)
Creek Overflow Structures	4	each
Culvert Inlet Trash Racks	47	each
Detention Ponds	5	each
Detention/Water Quality Vaults	9	each
Water Quality Facilities		
Stormceptors®	5	each
Coalescing plate oil/water separator	1	each
Decant Facility (at Public Works Yard)	1	each
Street Sweeping (annually)[c]	2,040	lane miles
City of Edmonds Storm and Surface Water Facts		
Impervious Surface Area Coverage in the City of Edmonds[b]	35.5	%
Drainage Basins	17	each
City of Edmonds Surface Water Utility Figures		
Number of Stormwater Management Program Staff	1.625	FTE
Number of Stormwater Operations and Maintenance Staff	5.1	FTE

LF = lineal feet
FTE = Full time equivalent staff
[a] Source: Edmonds (2010a)
[b] Impervious area calculated using information from MRLC (2001).
[c] All of the curbed streets with high traffic volumes are swept once per week; all other curbed streets are swept twice per month.

2.4 Applicable Regulations and Other Requirements

The City of Edmonds storm and surface water management program supports efforts to comply with several local, state, and federal regulations and other requirements:

- Ecology's NPDES Phase II permit (Appendix A), originally issued in February 2007 and modified on June 17, 2009. The NPDES Phase II permit requires cities and counties that manage small municipal separate storm sewer systems to develop a stormwater management program focused on reducing discharge of pollutants to the maximum extent practicable and protecting water quality. The 2009 NPDES Phase II permit modifications include the extension of some permit compliance deadlines and requirements for the City to identify barriers to low impact development and develop a plan for implementing LID more broadly in the future. Ecology plans to issue a revised NPDES Phase II permit in 2012.

- Ecology's total maximum daily load (TMDL) actions for phosphorus reduction in Lake Ballinger (Ecology 1993), which stem from Section 303(d) of the federal Clean Water Act. Lake Ballinger is currently in compliance with the TMDL, though municipalities within its watershed are required to regulate development in the watershed with an eye toward reducing phosphorus loading to the lake.

- The Lake Ballinger/McAleer Creek Watershed Forum (Edmonds, Lake Forest Park, Lynnwood, Mountlake Terrace, Shoreline, and Snohomish County) was formed in 2008 and subsequently developed a strategic action plan for the watershed with a consultant team (Otak et al. 2009). This plan will require the Forum to focus on four key issues: Lake Ballinger/Hall Creek flooding, Lake Ballinger water quality/habitat, McAleer Creek downstream flooding, and McAleer Creek downstream water quality/habitat.

- The Puget Sound Partnership (PSP), formerly the Puget Sound Action Team, is the regional organization that the governor has charged with restoring the health of the Puget Sound by 2020 (PSP 2009). The City's surface water management program will need to focus on the major stormwater related issues that PSP highlights for action to assist in this critically important regional effort.

The storm and surface water management program assists the City agency (Planning Division) on the following compliance issues:

- The federal Endangered Species Act (ESA), specifically in relation to listings of Puget Sound Chinook salmon, Puget Sound steelhead, Coastal-

Puget Sound bull trout, and Southern Resident killer whale in the immediate vicinity of the City. The ESA prohibits the *take* of all listed species, including a take that could result from the City's stormwater facility operations or private development stormwater management activities that are permitted by the City.

- The Washington State Growth Management Act (GMA) requires the City to inventory and protect environmentally critical areas (such as steep slopes, wetlands, and streams) (Chapter 36.70A of the Revised Code of Washington). The GMA also requires Edmonds and many other cities to develop comprehensive plans in order to ensure environmentally responsible and economically sustainable development, including planning for stormwater related capital facilities.

- The City adopted a new Critical Areas Ordinance in 2004 (No. 3527) that established ECDC Chapter 23.40. A primary purpose of this ordinance was to establish special standards for the protection of critical areas in compliance with the GMA. The ordinance establishes buffers, protection, mitigation, and best management practices aimed at protecting wetlands, streams and other aquatic resources.

Several sections of the Edmonds Municipal Code govern aspects of stormwater management on new development and redevelopment project sites (see the *Introduction* section of this document).

Appendix D provides more detailed information on stormwater-related regulations and municipal code requirements.

2.5 Flooding and Erosion Issues

Flooding issues include problems where there is deteriorated or undersized drainage infrastructure, or there is no infrastructure at all, that causes or increases the risk of flooding of public or private property. This section addresses these flooding issues, as well as erosion problems in surface water bodies within the City. These major issues are summarized below for each basin in the city where flooding and erosion issues were identified by City staff or through field reconnaissance. Only those basins with major flooding issues are discussed below.

2.5.1 Meadowdale

The City installed a hillside water collection system in the Meadowdale basin as part of Local Improvement District 210 in the early-to-mid 1980s on private property to protect City infrastructure. Maintenance of this system currently includes weekly inspections of trash racks and manholes for plugging and more rigorous maintenance after large storms. A new maintenance strategy is currently being considered for this system.

2.5.2 Perrinville Creek

Development in the upper portions of the basin in the City and Lynnwood, most of which occurred prior to the required use of flow control strategies, has contributed to increased flows in Perrinville Creek. These high flows have led to bank erosion and incision of the Perrinville Creek channel and sedimentation in the low gradient reach near the outlet of the basin. As a result of the high flows and sedimentation, flooding problems have been frequent in the reach of the creek between Talbot Road and the culvert under the Burlington Northern Santa Fe Railway tracks and the surrounding areas. The City constructed a high flow bypass on this reach in the mid-1990s to reduce flooding problems. There are currently plans to modify the bypass structure and the creek channel to further alleviate these problems. The City of Lynnwood recently constructed a large infiltration facility near the intersection of Olympic View Drive and 76th Ave W that will also help alleviate some of these problems.

2.5.3 Northstream

In 2008, an emergency repair project was performed in the North Stream basin to replace a failing storm drain pipe in the vicinity of Puget Drive and 11th Place N. The City is currently planning additional repairs on the pipe that was abandoned and for a downstream pipe under Puget Drive.

Based on analysis performed in an earlier basin study (URS 1989), there are also two culverts near Olympic Avenue that are currently considered undersized. However, no flooding problems related to these culverts have been observed or reported.

2.5.4 Shell Creek

Development in Edmonds has contributed to increased flows in the Shell Creek basin. These high flows have led to bank erosion and incision of the creek channel, especially in the reach that flows through Yost Park. The City plans a CIP project to address this problem.

Goodhope Pond

During the extraordinarily large storm event in early December 2007, this pond overflowed onto adjacent private properties. No major changes to the pond are proposed at this time. The sediment forebay at the north end of the pond was cleaned out in 2009 and will continue to be regularly maintained to improve water quality and prevent further “silting in” of the pond.

2.5.5 Edmonds Marsh

Development in the City prior to the required use of flow control strategies has contributed to increased flows in the Edmonds Marsh basin, resulting in erosion in the headwaters of this basin and sedimentation in the marsh. The man-made outlet of the marsh has reduced sediment transport capacity through the marsh. The combination of high flows and sedimentation has

increased the flooding risk to properties that surround the marsh, including properties in Harbor Square. Additionally, the marsh is a "highly impaired remnant ecosystem struggling to function within an urbanized waterfront community" (People for Puget Sound 2009). The City plans to delineate the floodplain in this area to support assessment and management of flood risks. The City is also planning a project to restore outlet capacity and improve habitat in the Willow Creek channel at the outlet of the marsh.

2.5.6 Deer Creek

A failing infiltration system on 106th Avenue W needs to be replaced to reduce the frequency of area flooding during large or intense storm events. This project is included in the recommended CIP project list presented in Section 5 of this plan.

2.5.7 Southwest Edmonds

Existing drainage facilities in the Southwest Edmonds basin consist mostly of catch basins and infiltration sumps linked together by short sections of pipe or ditches. Infiltration is the primary method for disposal of stormwater runoff. These facilities were installed incrementally without an overall plan as the area developed. In general, there are few major pipelines to convey stormwater out of the basin in larger storm events that exceed the collective infiltration capacity of the various small infiltration facilities.

The *Southwest Edmonds Drainage Plan* (Earth Tech 2002) identified sixteen drainage problem locations based on input from City staff and residents during public meetings. The basin study examined an area that extends outside of the Southwest Edmonds drainage basin limits. The study concluded that soils in the area have adequate permeability to continue using infiltration as the primary means of stormwater disposal. However, recent flooding problems indicate that many of the facilities are in need of repair or upgrades to improve performance. The City currently plans several projects to address flooding problems in the basin.

2.5.8 Hall Creek

This basin is part of the greater Lake Ballinger and McAleer Creek basin. Flooding problems occur on properties surrounding Lake Ballinger and downstream along McAleer Creek during large storm events. McAleer Creek has also been impacted by scouring flows during large flood events. These problems were recently evaluated as part of the Lake Ballinger / McAleer Creek Watershed Forum strategic action plan (Otak et al. 2009) and a prioritized list of projects, and associated cost estimates, has been identified to address these problems. As a member of the Forum, the City is committed to assisting in implementation of a range of projects and other actions to address flooding problems occurring at and downstream of the lake.

2.6 Water Quality Issues

Water quality sampling has not been conducted on a majority of the streams in the City. Because of the lack of water quality information for most of the City's streams, the discussion below does not focus on individual stream systems as done for the flooding and erosion problems described in the previous section.

Many streams are affected by sediment loading due to erosion during and following storm events. Upland development draining to the City's streams results in a variety of pollutants entering the streams with stormwater runoff, including petroleum products, heavy metals, and other toxic organic chemicals from roads and driveways, fertilizers and pesticides used in lawn and landscaping areas, and illicit discharges (inadvertent or purposeful dumping and spills) to migrate into the streams. Sparse riparian canopy coverage over portions of the Talbot Park basin streams, Shell Creek, Hindley Creek, Shellabarger Creek, and Willow Creek may lead to elevated water temperatures during the summer; however, these impacts have not been verified (Pentec Environmental 2002).

Water quality in Perrinville Creek is primarily affected by sediment loading from bank erosion and undercutting in and near the Southwest County Park area (Pentec Environmental 2002). High levels of turbidity commonly occur in Perrinville Creek during and following storm events and can lead to smothering and suffocation of incubating fish eggs and clogging of the gills of juvenile and adult fish (Pentec Environmental 2002).

As stated previously, a TMDL for phosphorus has been established for Lake Ballinger. Recent monitoring in the lake has shown that the lake is currently in compliance with the TMDL. The City should continue its efforts to reduce nutrient input to the lake by educating watershed residents and businesses about the proper use of fertilizers and other activities which can contribute nutrients to the lake (Ecology 2008).

High fecal coliform bacteria concentrations have also been measured in portions of North Central Puget Sound near the City; however, a TMDL implementation plan has not yet been developed for these areas (Ecology 2010). The City should prioritize public education efforts regarding pet waste disposal, septic tank management, and other activities which can lead to elevated fecal coliform bacteria levels in the drainage basins that lead to Puget Sound.

2.7 Aquatic Habitat Issues

This section summarizes aquatic habitat issues, presence/absence of fish, and potential for suitable spawning and rearing habitat noted in the Edmonds Stream Inventory and Assessment (Pentec Environmental 2002).

2.7.1 Meadowdale

None of the streams in the Meadowdale basin have significant habitat characteristics or potential for fish.

2.7.2 Perrinville Creek

Perrinville Creek contains a significant amount of fair to good spawning and rearing habitat potential; however, that the quality of the creek habitat is reduced by extensive gravel compaction due to substantial sediment deposition (R.W. Beck 1991, Pentec Environmental 1998). The creek has several fish passage barriers including the Talbot Road culvert crossing. Several log jams are also present upstream, between the culvert and the Southwest County Park property.

Cutthroat trout have been observed in the upper reaches of the creek, upstream of Southwest County Park. According to the R.W. Beck (1991) study and Washington Department of Fish and Wildlife representatives, the stream could offer relatively good habitat for fish, should the City remove fish passage problems and reduce the sediment loading. Reducing water velocities would also be beneficial for fish habitat.

2.7.3 Fruitdale-on-the-Sound Creek

According to a Fruitdale-on-the-Sound Creek fish habitat survey conducted in 1985 (URS Corporation 1989) and stream reconnaissance for the Pentec Environmental (2002) study, little diversity or abundance of instream habitat was identified in the creek and no fish were seen. No major fish passage improvements were recommended for the creek due to the limited ability of the stream to support anadromous fish runs (Pentec Environmental 2002).

2.7.4 Northstream

According to a fish habitat survey conducted in 1985 (URS Corporation 1989), the lower portion of Northstream has potential for fish habitat if channel restoration and protection features are provided. The downstream creek channel is lined with concrete and riprap in the Northstream Lane area. Fish (assumed to be cutthroat trout) have been sighted in the lower reaches of the creek; however, no spawning activity was observed (Pentec Environmental 2002).

2.7.5 Shell Creek

There is suitable spawning gravel and riparian buffer in the downstream segment of Shell Creek within 500 feet of Puget Sound (Pentec Environmental 2002). Spawning gravels are plentiful, and there is a well-established riparian buffer. Upstream of this 500-foot segment, the buffer is reduced considerably and the creek is bordered by single-family residences.

Upstream of Caspers Street, there is suitable spawning and rearing habitat and property owners have attested to sighting salmon upstream of Caspers Street in recent years (Pentec Environmental 2002). Dead salmon carcasses (believed to be either coho or chum salmon) have been sighted by Pentec Environmental and City staff downstream of the Caspers Street culvert.

There are no reports of salmon being sighted upstream of Daley Street in recent years. The culvert below Ninth Avenue North presents a major barrier to fish migration. Cutthroat trout are likely distributed throughout many sections of Shell Creek according to the Pentec Environmental (2002) study. Public Works Department personnel have sighted trout in the reach of the creek between Ninth Avenue North and Main Street. There is no historical evidence, however, to suggest that Chinook salmon spawned in Shell Creek.

Hindley Creek

Man-made dams and the stripping of native streamside vegetation in Hindley Creek have reduced the potential of this creek for fish habitat. However, just upstream of the confluence with Shell Creek, fish (believed to be cutthroat trout) have been observed in a large pool at the outlet of a culvert at Brookmere Drive.

Goodhope Pond

The wetland area around Goodhope Pond has an abundance of wildlife; however, there are not believed to be any fish present in the pond.

2.7.6 Edmonds Marsh

The Edmonds Marsh provides significant habitat for many wildlife species, and coho salmon and cutthroat trout have been identified in the marsh as well. The privately-run Deer Creek Fish Hatchery produces coho salmon, which are reared for release elsewhere. It appears that despite the challenge of a 1,300 foot long culvert outlet from Puget Sound (downstream) to the marsh (upstream), coho salmon that were accidentally released from the hatchery have returned there (Pentec Environmental 2002).

Shellabarger Creek

Resident cutthroat trout are believed to inhabit some portions of Shellabarger Creek (Edmonds 2003). Coho salmon and sea-run cutthroat have access to the lower reaches of the creek up to the culvert at Third Avenue South. There is, however, a general lack of suitable spawning and rearing habitat within the marsh reach from the confluence with the Willow Creek channel in Edmonds Marsh and extending upstream to the point where the channel exits the marsh on the east side of SR104 (Edmonds 2003). Farther upstream, there is some suitable rearing and spawning habitat between Third Avenue South and Fifth Avenue South. The culverts beneath Third Avenue South and Fifth Avenue South (550 feet long) are likely impassable barriers to salmonids (Edmonds 2003).

Willow Creek

Willow Creek is channelized throughout most of Edmonds Marsh, and there is generally insufficient vegetation in the lower segments to provide adequate shading for proper fish habitat (R.W. Beck 1991). The channel becomes highly braided a short distance below the confluence in the marsh with Shellabarger Creek. Although riparian cover is abundant in this section and there is good vegetative cover, there is minimal large woody debris to provide desirable habitat complexity.

Upstream of the marsh, the gradient increases and there is a more defined channel that contains medium wood debris and a dense overstory of alder, cedar, and maple trees that provides good shading of the creek (R.W. Beck 1991). An impassable waterfall is located about 400 feet upstream of Pine Street. Upstream from there, the creek displays similar characteristics as it continues uphill through a wooded area past Elm Street and Woodway Park Road.

The Edmonds Drainage Basin Studies (Edmonds Way, Perrinville, and Meadowdale Basins) state that, while some suitable spawning and rearing habitat presently exists in Willow Creek, the amount is limited to short reaches and is generally of poor quality (R.W. Beck 1991). Lack of suitable gravels, low pool to riffle ratio, and shallow water are contributing factors. The study also states that improvements to fish passage would probably not result in significant increases in fish production habitat and points out that excavating a channel through the marsh to enhance the fish habitat likely is an unacceptable alternative to environmental agencies.

Resident cutthroat trout have been reported in Willow Creek, according to the R.W. Beck (1991) report and a stream habitat survey in 1998 above Pine Street (Edmonds 2003); however, the Pentec Environmental (2002) study cites that the creek does not contain suitable spawning and rearing habitat for Chinook salmon or bull trout.

2.7.7 Hall Creek

Jones and Stokes (2000a, 2000b) mention that urbanization in the Hall Creek basin has significantly reduced suitable habitat for Chinook and coho salmon and bull trout during all life stages and that there is very little spawning and rearing habitat remaining in the creek. Remaining habitats are fragmented, widely separated, and in poor condition.

Although there is no indication of historical presence of either Chinook salmon or bull trout mentioned in the study, the biological assessment mentions that there are coho salmon known to occur in the Hall Creek drainage (Pentec Environmental 2002). However, the study does not indicate their specific location.

2.7.8 Regional Issues

The City is currently involved in several regional surface water forums and ad hoc professional groups. These include the Lake Ballinger/McAleer Creek Watershed Forum, the Watershed

Resource Inventory Area (WRIA) 8 Forum[8], the stormwater outreach for municipalities (STORM) group, the Western Washington Phase II Municipal Stormwater Permit (Phase II Permit) group, and the Stormwater Managers Committee of the Washington branch of the American Public Works Association (APWA). The activities of each of these groups are described briefly below.

The Lake Ballinger/McAleer Creek Watershed Forum (Forum) was formed in 2008 in response to flooding in the basin that occurred during the extreme storm event on December 3, 2007. Snohomish County and the cities of Edmonds, Shoreline, Mountlake Terrace, Lynnwood, and Lake Forest Park banded together to primarily address flooding concerns but also to discuss water quality and aquatic habitat concerns. In 2009, with the help of a $200,000 grant from Ecology, the Forum developed a Strategic Action Plan (Otak et al. 2009). Staff from the six jurisdictions then developed a CIP plan that was approved by the Forum members. As of April 2010, the Forum was seeking additional funding to begin implementing the approved CIP plan.

The WRIA 8 Forum is made up of citizens, scientists, businesses, environmentalists, and governments who are cooperating on protection and restoration projects. The forum has developed a science-based plan to conserve salmon today and for future generations. Funding for the salmon conservation plan is provided by 27 local governments in the watershed, including Edmonds.

The STORM group is a coalition of cities and counties in the Puget Sound region working together to address nonpoint source pollution by advancing broad-scale behavior change among Puget Sound residents. These jurisdictions, including Edmonds, all operate under, and work to meet, the requirements of the Federal Clean Water Act and Washington State stormwater discharge permits. The most recent campaign was entitled “Puget Sound Starts Here” and consisted of a multimedia approach to educate residents and business in the area of the effects of their activities (such as car washing, landscape practices, and pet ownership) on the water quality of Puget Sound.

The two professional organizations noted above (Phase II permit and APWA groups) primarily focus on funding and implementation issues of the NPDES Phase II permit. The Phase II permit group is made up of permit compliance coordinators from King and Snohomish county cities, while the APWA group includes permit coordinators from the entire Puget Sound region.

2.8 Stormwater Utility Fund

A stormwater utility is based on the premise that the City-owned drainage system serves the public by providing services similar to sewage or water supply systems. “Demand” is placed on a stormwater utility whenever a vegetated area is converted to impervious surface, since it generates increased runoff. The collected fees are used to ensure adequate capacity of the City-owned stormwater system that serves private property and conveys runoff from public roads and

[8] Implements the Puget Sound Salmon Recovery Plan in the Lake Washington/Cedar River/Sammamish Watershed

facilities through capital improvement projects. Fees are also used to operate and maintain the system, provide for system repair costs and, more recently, to comply with federal and state water quality mandates under the NPDES Phase II permit.

Only part of the service to residents from a stormwater utility comes from "accepting" the drainage off individual parcels to prevent these private parcels from flooding. Residents and business also benefit from the City-owned stormwater system managing runoff of public streets (keeping them dry and safe) and other publicly-owned properties. Approximately 24 percent of the land area in the City consists of City-owned right-of-way or public facilities (parks, recreation centers, and other City-owned facilities).

2.8.1 History and Purpose

The City formed a Stormwater Management Utility on May 13, 1988 under Ordinance 2670 that created ECC Chapter 7.50. This utility was formed to: "...carry out the City's comprehensive drainage and storm sewer plan, including maintenance, administration, and operation of the City storm and surface water facilities…"

For approximately 10 years, the Stormwater Management Utility (hereafter called the stormwater utility) was combined with the sewer utility and had no separate user fee. Ordinance 3195, approved by Council March 17, 1998, defined one equivalent service unit (ESU) for the stormwater management utility as 3,000 square feet of impervious surface area, equal to the average impervious surface area for a single-family residential parcel at that time. It also set rates at $3.70 per month per ESU effective March 27, 1998.

In June 1999, Ordinance 3294 established administrative rate adjustment procedures for the stormwater utility, giving the Public Works Director authority to make adjustments to rates based on special circumstances (ECC 7.50.050). Ordinance 3450 established stormwater system development charges in 2003. These fees are for any development that "hooks up" to an existing City-owned stormwater system. The fee was set at $428 per ESU and remains at that level as of April 2010. Table 2-2 shows the changes in the stormwater utility fee from inception to present. As of the end of 2009, the City draws stormwater utility funding from approximately 21,200 ESUs.

Table 2-2. City stormwater utility charge per ESU, 1998 to present.

Effective Date	Monthly Charge per ESU	Ordinance No.
March 27, 1998	$3.70	3195
July 1, 2002	$5.30	3400
January 1, 2003	$6.41	3400
January 1, 2004	$6.73	3400
March 1, 2005	$7.20	3538
January 1, 2006	$7.78	3570
July 3, 2009	$8.31	3744

ESU = equivalent service unit.

2.8.2 Past and Current Use of Funds

Over the years, stormwater utility fees collected by the City have been used for an increasing number of purposes as stormwater problems and regulatory requirements have grown. This expansion in the service demands on the stormwater utility has been driven by:

- Population growth and accompanying development
- Annexed areas from Snohomish County with inadequate drainage systems
- Increasing regulatory mandates for improving water quality and aquatic habitat in the surface waters that receive the City's stormwater runoff

Population Growth

Between 1980 and 1990, the population of the City increased by approximately 11 percent and by approximately 32 percent between 1990 and 2010 (Edmonds 2009a). With this increase in population came accompanying development, the need for new stormwater conveyance facilities, and the need to operate and maintain those facilities.

Snohomish County Annexation

Between 1987 and 1999, the City annexed approximately 1,053 acres of land from Snohomish County (approximately 17 percent of current City land area), mostly in the south and southwest portions of the City (Edmonds 2010a). Compared to other parts of the City, southwest Edmonds has a disproportional share of the more frequently reoccurring drainage problems. By annexing these areas, the amount of pipes and other stormwater infrastructure operated and maintained by City crews increased and the need for capital and small works construction projects to address the inadequacies of the inherited system.

Regulatory Mandates

In February 2007, Ecology issued the NPDES Phase II permit to the City and over 80 other jurisdictions in the state. The NPDES Phase II permit outlines stormwater program activities and implementation milestones that the City must follow through February 2012 in order to comply with federal law. All Phase II communities are expected to develop a stormwater program that includes all the required activities, implement those activities within the required periods over the permit term, and submit annual reports to Ecology to document progress toward complete permit compliance and program implementation.

The NPDES Phase II permit primarily deals with reducing pollutants discharged from the City's stormwater system into receiving waters like Lake Ballinger and numerous creeks in the City that discharge into Puget Sound. The major elements of NPDES Phase II permit compliance that require funding from the stormwater utility are as follows:

- Public Education and Outreach

- Public Involvement and Participation
- Illicit Discharge Detection and Elimination (IDD&E)
- Controlling Runoff from New Development, Redevelopment, and Construction Sites
- Pollution Prevention for Municipal Operations

The two most resource-intensive elements of complying with the NPDES Phase II permit are the Illicit Discharge Detection and Elimination (IDD&E) program and Pollution Prevention for Municipal Operations. An IDD&E program needs to be established within the City to identify and eliminate significant sources of pollutants to the City's storm drainage systems and receiving waters that are associated with non-stormwater discharges. Major components of the IDD&E program include:

- Developing a detailed storm sewer system map
- Having a proactive detection and elimination program
- Providing public education and spill reporting
- Developing an enforcement and tracking system

Pollution Prevention for Municipal Operations includes:

- Annual inspections of hundreds of public and private water quality and flow control facilities
- Catch basin inspections and cleaning
- Regular street sweeping
- Managing the waste collected from the catch basin, pipe, and facility cleaning and street sweeping
- Stormwater Pollution Prevention Plans (SWPPPs) for maintenance yards

3.0 Known Problems and Possible Solutions

This plan builds upon the problem lists that were developed in previous comprehensive plans, based upon interviews with City staff and field reconnaissance. The following sections summarize existing citywide and site-specific problems and possible solutions to these problems. Summary sheets for capital improvement project solutions to site-specific problems are provided in Appendix E. Itemized cost estimates for the recommended projects are provided in Appendix F.

3.1 Citywide Problems and Solutions

Citywide problems result from local or regional trends in development and behavior. For example, conversion of forest land to residential development is a regional development trend that has caused increases in stormwater quantity, flooding of the public right-of-way and private property, and stream erosion and sedimentation problems. This discussion of citywide problems was developed by reviewing previous basin studies and planning documents cited in Section 2, and conducting interviews with City staff. Solutions were developed based on field reconnaissance, the *Stormwater Management Manual for Western Washington* (Ecology 2005), and assessment of realistic funding resources.

The primary citywide drainage problems are flooding and stream channel erosion. The primary citywide water quality problems are nonpoint source pollution from older development, including residential and commercial development and City-owned rights-of-way and facilities, and potentially illicit discharges and illicit connections to the storm drainage system. These citywide flooding and water quality problems also lead to negative impacts on aquatic habitat. The causes and possible solutions to the citywide flooding and water quality problems are described below and summarized in Table 3-1.

3.1.1 Citywide Flooding Problems

Increased impervious surfaces are the result of urbanization in the City over the past century. Conventional development disrupts the natural hydrology of the landscape by converting natural, permeable surfaces (e.g., forests) into impermeable surfaces (e.g., streets). Impervious surfaces can deliver precipitation directly to the stormwater system and the stream channel rather than allowing it to be collected by vegetation and infiltrate into the soil. Therefore, increased impervious surfaces cause higher peak flow rates in the stormwater system and stream channels to which the stormwater system discharges, resulting in flooding, erosion, and sedimentation downstream.

Residential development in the Puget Lowland has been shown to increase peak flow rates by as much as 10 times compared to forested conditions (Burges et. al. 1998). Peak runoff flows can be expected to increase even more for commercial or industrial development areas where a

Table 3-1. Causes of Citywide drainage and water quality problems and possible solutions.

Problem	Cause(s)	Possible Solution(s)
Flooding and stream channel erosion	Increased impervious surfaces	▪ Implement and enforce more stringent stormwater flow control requirements for new development and redevelopment projects on private property and for the City's own projects. ▪ Retrofit or expand existing stormwater flow control facilities. ▪ Implement a LID program to encourage the use of natural drainage systems to slow the delivery of stormwater to the municipal system.
Flooding	Several sumps (dry wells) in Southwest Edmonds overflow during large storm events. Over time, they have become clogged and may cause flooding.	▪ Connect the sumps to the storm drain system. ▪ Replace or modify the sumps. ▪ Install LID stormwater BMPs to increase upstream infiltration and reduce the flow to the sumps.
	Undersized municipal stormwater pipes and culverts	Conduct additional system evaluation to identify undersized pipes. Replace pipes as part of ongoing system maintenance or as CIP projects.
	Improperly maintained private stormwater facilities	▪ Adopt and enforce the operations and maintenance standards of the *Stormwater Management Manual for Western Washington*, or an approved equivalent manual. ▪ Develop an outreach and inspection program to evaluate and enforce the maintenance of private stormwater facilities.
Nonpoint source pollution	Improper pesticide and fertilizer use	▪ Provide citywide public education on pesticide and fertilizer use ▪ Restrict use of phosphorus-containing fertilizers in the Lake Ballinger drainage basin
	Runoff from commercial areas and roadways	▪ Encourage the use of LID and other stormwater treatment BMPs ▪ Continue catch basin cleaning program ▪ Routine maintenance of the public and private stormwater ponds located throughout the City
	Stream bank erosion	Vegetate buffers along stream edges, stream restoration projects, and habitat enhancement projects on both public and private property.
	Sediment transport from construction sites	Enforce City requirements for effective erosion and sediment control at construction sites
Illicit discharges and illicit connections	▪ Illegal dumping, leaks and spills, unregulated discharges, and disposal of pollutants directly into storm drains. ▪ Sanitary sewer connections incorrectly plumbed to the separate storm drainage system.	▪ Perform business inspections and educate business owners and operators on proper source control BMPs ▪ Develop and adopt ordinances to implement a business inspection program and address certain illicit discharges ▪ Develop an IDD&E program to locate and fix illicit connections

greater proportion of the landscape is converted to impervious surfaces or otherwise compacted, reducing infiltration of stormwater into the natural soil.

The science of stormwater management has evolved significantly in the Puget Sound region. Local stormwater facility designs frequently employ computer modeling software to simulate existing and proposed site conditions, and stormwater management solutions are commonly integrated into the development site planning process. Effective stormwater management can control runoff to make a developed landscape behave more like a forest by retaining runoff with flow control facilities (e.g., LID natural drainage systems, storage pipes, detention vaults, detention ponds, and infiltration facilities). Unfortunately, concentrated urban development occurred in much of the City before strict stormwater management standards were put in place, so a large percentage of the land area in the City sheds rainfall runoff quickly to pipes, ditches, and streams. Urbanization is identified as one of the primary causes for degradation of streams in the City (Edmonds 2003).

The effects of urbanization patterns on the physical processes of Puget Sound lowland creeks have been well documented (Booth and Henshaw 2001, Castro 2002, Konrad 2000, Moscrip and Montgomery 1997). The physical character of the City's creeks is largely the result of such development-induced impacts to the drainage network and land cover. However, studies have also shown that urban creek channels can restabilize after extensive development has occurred (Booth and Henshaw 2000, Finkenbine et al. 2000), though native aquatic biota are not likely to adapt to these new flow conditions (Hartley et al. 2001). The City may consider performing further drainage basin level analysis of land use development and geomorphic processes to evaluate creek restabilization, and adjusting its stormwater control measures accordingly.

3.1.2 Citywide Water Quality Problems

Nonpoint source pollution is a common water quality issue in developed urban settings, and one of the main water quality issues in the State and the country (Ecology 2008). Some nonpoint sources of pollution in the City include:

- Pesticides and fertilizers from residential and commercial property landscaping
- Oil, grease, metals, and toxic organic pollutants from industrial/commercial areas and roadways
- Sediment transport from eroding stream banks
- Sediment transport from construction sites
- Bacteria from pet waste

Illicit discharges and illicit connections to the stormwater system have been identified as a primary concern in the NPDES Phase II permit. Within the City, examples of illicit discharges include illegal dumping of engine oil by residents and businesses, illegal dumping of cooking oil and other wastes by restaurants, inadvertent connections of sanitary sewer pipes to the storm drainage system, leaks and spills at commercial storage and maintenance facilities, and unregulated discharges of washwater from mobile businesses such as carpet cleaners. Illicit connections include internal building drains, sump overflows, process wastewater discharges, or sanitary sewer pipes (i.e., toilets, sinks, appliances, showers, bathtubs) that are incorrectly plumbed to the separate storm drainage system.

A TMDL for phosphorus was established for Lake Ballinger in 1993. In 2008, Ecology published a Water Quality Attainment Monitoring Report stating that the Lake Ballinger TMDL of 30 micrograms per liter (µg/L) was currently being met and that restoration and protection efforts have been successful (Ecology 2008). However, concern for the long-term health of the lake remains, and the City must continue to educate residents and businesses to minimize the presence of phosphorus in site runoff to assure that the lake water quality does not degrade.

Portions of North Central Puget Sound near the City are on Ecology's Section 303(d) list of impaired waters for fecal coliform bacteria (Ecology 2010); however, a TMDL implementation plan has not yet been developed for these areas. As in other urban areas of western Washington, it is likely that the City's creeks exhibit high concentrations of fecal coliform bacteria during storm events and in the low flow summer months. Pet wastes are a common source of bacteria in residential settings, such as much of Edmonds' neighborhoods.

3.2 Site-Specific Problems and Solutions

Several site-specific problems were evaluated to develop planning level solutions and cost estimates for use in establishing the City's stormwater Capital Improvement Program (CIP) plan for 2011-2016. Problems were identified by conducting interviews with City staff, performing field reconnaissance, and reviewing references discussed in Section 2 of this plan. Solutions were developed based on field reconnaissance and input from City staff, and were prioritized based on several criteria (described below). A prioritized list of CIP projects is provided in Table 3-2. CIP project summary sheets and itemized planning level cost estimates for the proposed solutions are provided in Appendices E and F, respectively. Tier 1 projects will address the basic stormwater needs of the public and provide for necessary public safety and infrastructure protection, while Tier 2 projects will address significant water quality and aquatic habitat issues but are not required for public safety and infrastructure protection. A map of the problem locations is provided in Figure 3-1.

3.2.1 Project Prioritization

Capital improvement projects in Tier 1 and 2 were prioritized based on the risk related to each surface water problem (risk includes consideration of frequency and potential losses), the basin-

Table 3-2. Storm and Surface Water CIP Project Plan, 2011-2016.

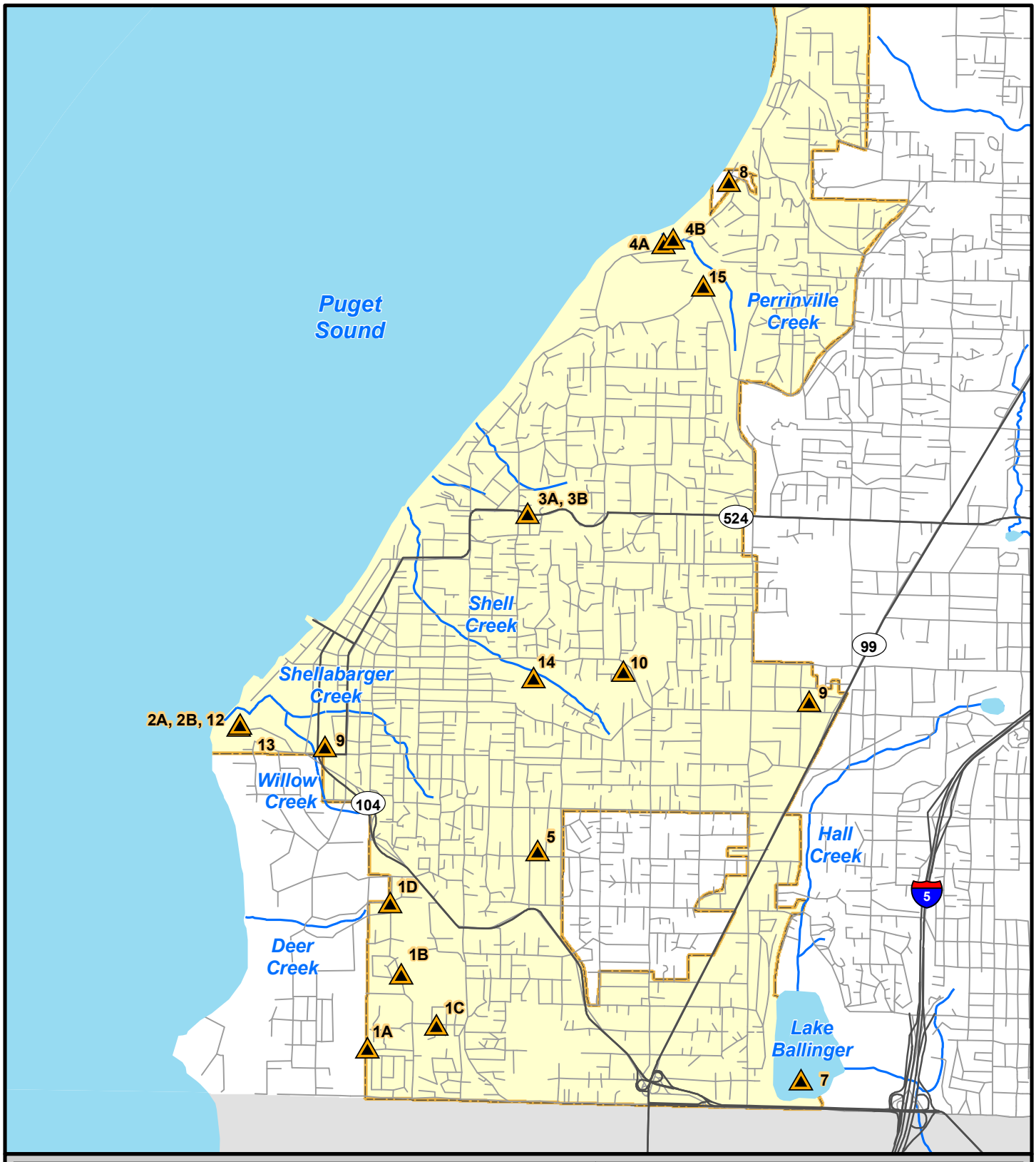
ID #	Project Name	Year[1] 2011	2012	2013	2014	2015	2016	Total Project Cost
Tier 1 Projects[2]								
1A	Southwest Edmonds Basin Study Project 1 - Replace Infiltration Pipe (near 107th Pl W.)	$ -	$ 27,000	$ 45,000	$ -	$ -	$ -	$ 72,000
1B	Southwest Edmonds Basin Study Project 2 - Connect Sumps near Robin Hood Drive	$ -	$ -	$ -	$ -	$ 105,000	$ 441,000	$ 546,000
1C	Southwest Edmonds Basin Study Project 3 - Connect Sumps on 238th St SW to Hickman Park Infiltration System	$ -	$ 105,000	$ 448,000	$ -	$ -	$ -	$ 553,000
1D	Southwest Edmonds Basin Study Project 4 – Connect Sumps on 105th and 106th Ave W	$ 106,000	$ 341,000	$ -	$ -	$ -	$ -	$ 447,000
2A	Shellabarger Creek/Willow Creek/Edmonds Marsh 100-yr Flood Plain delineation	$ 239,000	$ -	$ -	$ -	$ -	$ -	$ 239,000
2B	Willow Creek Pipe Rehabilitation (current Port of Edmonds portion)[3]	$ -	$ -	$ -	$ 519,000	$ -	$ -	$ 519,000
3A	Northstream Storm Repair and Abandonment South of Puget Drive	$ -	$ -	$ 46,000	$ 172,000	$ -	$ -	$ 218,000
3B	Northstream Pipe Culvert Rehabilitation	$ -	$ -	$ -	$ 29,000	$ 54,000	$ -	$ 83,000
4A	Talbot Road / Perrinville Creek Drainage Improvement and Habitat Enhancement Project	$ 522,000	$ -	$ -	$ -	$ -	$ -	$ 522,000
4B	Talbot Road / Perrinville Creek Culvert Replacement	$ -	$ 436,000	$ 876,000	$ -	$ -	$ -	$ 1,312,000
5	95th/93rd Place project	$ -	$ 72,000	$ 696,000	$ -	$ -	$ -	$ 768,000
6	City-wide Drainage Replacement Projects	$ 140,000	$ 143,000	$ 149,000	$ 154,000	$ 161,000	$ 167,000	$ 914,000
7	Lake Ballinger Associated Projects	$ 100,000	$ 102,000	$ 106,000	$ 110,000	$ 115,000	$ 119,000	$ 652,000
8	North Talbot Rd. Drainage Improvement Project	$ -	$ 180,000	$ -	$ -	$ -	$ -	$ 180,000
9	Public Facilities Water Quality Upgrades	$ 55,000	$ 317,000	$ -	$ -	$ -	$ -	$ 372,000
10	Shell Valley Emergency Access Rd, Drainage Portion	$ 195,000	$ -	$ -	$ -	$ -	$ -	$ 195,000
11	Stormwater Utility Contribution for Transportation Projects	$ 50,000	$ 51,000	$ 53,000	$ 55,000	$ 57,000	$ 60,000	$ 326,000
	Tier 1 Subtotals	$ 1,407,000	$ 1,774,000	$ 2,419,000	$ 1,039,000	$ 492,000	$ 787,000	$ 7,918,000
Tier 2 Projects[4]								
12	Edmonds Marsh Restoration	$ -	$ -	$ -	$ 396,000	$ 1,109,000	$ 1,731,000	$ 3,236,000
13	Daylight Willow Creek in Marina Beach Park[3]	$ -	$ -	$ -	$ 546,000	$ 1,272,000	$ 1,969,000	$ 3,787,000
14	Shell Creek Channel Restoration in Yost Park	$ -	$ -	$ -	$ 178,000	$ -	$ -	$ 178,000
15	Perrinville Creek High Flow Diversion and Habitat Restoration	$ -	$ -	$ -	$ 3,199,000	$ 2,868,000	$ 2,839,000	$ 8,906,000
	Tier 2 Subtotals	**$ -**	**$ -**	**$ -**	**$ 4,319,000**	**$ 5,249,000**	**$ 6,539,000**	**$ 16,107,000**
Total Expenditures (Tier 1 + Tier 2)		**$ 1,407,000**	**$ 1,774,000**	**$ 2,419,000**	**$ 5,358,000**	**$ 5,741,000**	**$ 7,326,000**	**$ 24,025,000**

[1] Future expenditures reflect the following annual inflation rates: 2011 0%; 2012 2%; 2013 4%; 2014 4%; 2015 4%; 2016 4%.

[2] Revenues for all Tier 1 projects are assumed to be 100 percent rate funded, including revenue bond payments (See Appendix H)

[3] Either Project 2B or Project 13 will be constructed based on a variety of factors including rate of degradation of existing pipe and availability of funding for daylighting the stream. Both projects will not be built. Any savings will be reflected in stormwater utility rate adjustments after 2013.

[4] Revenues for all Tier 2 projects are assumed to be 25 percent rate funded, including revenue bond payments, and 75 percent funded from outside sources (currently unsecured) such as grants, loans, and/or other agency contributions (See Appendix H)



Legend

- CIP project location
- Edmonds city limits
- Stream
- Highway
- Road

Note: Projects 6 and 11 are city wide projects and not displayed on this figure.

Figure 3-1. Capital improvement program project locations.

N

0 1,850 3,700 7,400 Feet

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specific priority for each project, potential opportunities related to the solution, and other factors. Each of these prioritization factors is described in more detail below. Information used to evaluate prioritization factors included findings from field reconnaissance, review of GIS data, and discussions with City staff. In addition, projects that are required by the NPDES Phase II permit to ensure that municipal operations remain in compliance, as well as long-standing re-occurring flooding issues, were ranked higher than all other projects. Projects that would provide multiple benefits, such as flood reduction and habitat restoration, were ranked higher than projects with a singular benefit.

Risk

The assessment of risk associated with problems includes consideration of the frequency of the problem and the potential losses resulting from the problem. Problems that occur frequently and have major potential losses have higher risk, and thus a higher priority. Problems that occur infrequently with minor potential losses have a less risk, and thus a lower priority. Frequency and potential losses are discussed individually below.

- **Frequency.** Frequency was evaluated qualitatively, based on the perceptions of City staff. Problems that occur more frequently were given higher priority.

- **Potential Losses.** The potential losses of surface water problems can vary greatly. For example, some problems may result in flooding of a major intersection or a business park, causing hazardous conditions and costly damage. Other problems may only affect minor streets or single parcels, resulting in a public nuisance, but no major economic losses and minimal loss of use. Problems that had greater potential losses (i.e. greater hazards or more costly damage) were assigned higher priority. Other examples include problems that affect roads and housing. Problems that cause flooding of major roads receive a higher priority than problems on minor roads because of the greater hazard to the public (potential loss of life) and the possibility of high economic losses from damage to major infrastructure. Problems that affect a greater number of residences were generally assigned a higher priority than those that affect only one home because of greater potential for loss of use or loss of property in those situations.

Basin-specific Priority

Projects were also prioritized based on the logical order for project scheduling within each individual basin. In cases where multiple pipes need replacement within the basin, the furthest downstream pipe capacity improvements were typically given higher priority, because replacing the upstream pipe to increase conveyance capacity could exacerbate existing problems downstream. Performing downstream projects first minimizes the potential to exacerbate problems downstream.

Opportunity

There are often opportunities to reduce costs or increase efficiency by implementing multiple projects at once. Replacing a storm drain under a roadway surface that is already scheduled to be replaced can save significant costs since the cost of surface removal, surface preparation, and re-surfacing are already scheduled to be incurred. Similar costs can be considered by evaluating lost services. For example, coupling a storm drain replacement project with a road resurfacing project can reduce the amount of time that traffic is disrupted and that the road is out of service.

Other Factors

Other factors are also taken into consideration in the prioritization process. The visibility of the flooding problem to the general public can play a deciding role on project prioritization. Funding avenues for the project can also play a role. Projects can be more appealing if there are opportunities for cost sharing with surrounding jurisdictions or if they are eligible for grant funding from federal or state agencies. Public sentiment and political will are often difficult to quantify but can play an important role in prioritizing one CIP project over another. All of the other factors listed above were taken into account, to the extent feasible, when prioritizing the list of CIP projects.

Summary

The prioritization process accounted for information collected during field reconnaissance and input from City staff. The project priorities are reflected in the project scheduling shown in the CIP plan in Table 3-2. High priority projects are scheduled to occur sooner than low priority projects.

3.2.2 CIP Projects by Service Area

The CIP plan addresses three stormwater utility service areas:

1. **Flood protection projects** reduce flooding by repairing or replacing existing undersized or failing storm drain infrastructure or constructing new infrastructure to meet new system demands.

2. **Water quality improvement projects** reduce the amount of pollutants entering the City's storm drain system and receiving waters from stormwater discharges.

3. **Aquatic habitat improvement projects** improve habitat by introducing new structures (such as large woody debris) into surface water bodies, or by addressing erosion problems that are resulting in incision and sedimentation of the stream bed.

Table 3-3 provides a list of planned CIP projects, including the service area(s) that are addressed by each project.

Projects may be reevaluated in the future as additional information becomes available for each problem. Some of flood prevention CIP projects may be modified in the future to include water quality improvements. For example, projects 1A through 1D in Southwest Edmonds may be modified to incorporate LID approaches that could have both water quality benefits and flood protection benefits.

Table 3-3. List of CIP projects and utility service areas.[1]

Project No.	Project Name	Service Area[2]
1A	Southwest Edmonds Basin Study Project 1 - Replace Infiltration Pipe (near 107th Pl W.)	Flood protection. Relieves surface ponding.
1B	Southwest Edmonds Basin Study Project 2 - Connect Sumps near Robin Hood Drive	
1C	Southwest Edmonds Basin Study Project 3 - Connect Sumps on 238th St SW	
1D	Southwest Edmonds Basin Study Project 4 – Connect Sumps on 105th and 106th Ave W	
2A	Shellabarger Creek/Willow Creek/Edmonds Marsh 100-yr Flood Plain delineation	Flood protection. Accurately defines flood plain to protect structures constructed during future development.
2B	Willow Creek Pipe Rehabilitation (current Port of Edmonds portion)	Flood protection. Protects properties surrounding the marsh. Aquatic habitat improvement.
3A	Northstream Storm Repair and Abandonment South of Puget Drive	Flood protection. Protects home from potential pipe collapse.
3B	Northstream Pipe Culvert Rehabilitation	Flood protection. Prevents the pipe from collapsing.
4A	Talbot Road / Perrinville Creek Drainage Improvement Project - Phase 2	▪ Flood protection. Reduces flood risk by replacing an undersized storm drain pipe with a larger pipe. ▪ Aquatic habitat improvement. Removes sediment that has accumulated in the creek channel and increases habitat complexity through the installation of large woody debris in check dams.
4B	Talbot Road / Perrinville Creek Culvert Replacement	▪ Aquatic habitat improvement. Enhances fish passage from the Puget Sound into Perrinville Creek. ▪ Flood protection. Increases conveyance by replacing an undersized culvert with a larger fish passable culvert.
5	95th/93rd Place project	Flood protection. Relieves flooding problems by installing new storm drain pipe and catch basins.
6	City-wide Drainage Replacement Projects	Flood protection. Replacement and repair of existing infrastructure to prevent flooding.
7	Lake Ballinger Associated Projects	To be determined

Project No.	Project Name	Service Area[2]
8	Tightline Storm Drain on Steep Slope near City of Lynnwood Wastewater Treatment Plant	Flood protection. Reduces flooding caused by the City of Edmonds temporary storm drain pipe by replacing it with a new permanent storm drain pipe.
9	Public Works Yard Water Quality Upgrades (Vehicle Wash Station and Cover for Material Piles)	Water quality. Prevents pollutants from entering storm drain.
10	Shell Valley Emergency Access Rd, Drainage Portion	▪ Flood protection. Infiltrates and conveys stormwater. ▪ Water quality. Pervious pavement reduces pollutants. ▪ Aquatic habitat improvement. Wetland restoration.
11	Stormwater Utility Contribution for Transportation Projects	▪ Water quality ▪ Flood protection ▪ Aquatic habitat.
12	Edmonds Marsh Restoration	Flood protection. Protects properties surrounding the marsh. Aquatic habitat improvement.
13	Daylight Willow Creek	▪ Aquatic habitat improvement. Enhances fish passage from the Puget Sound into Edmonds Marsh, Willow Creek, and Shellabarger Creek. ▪ Flood protection. Increases conveyance by replacing an aging pipe with an open channel, thereby reducing flooding risks surrounding Edmonds Marsh.
14	Shell Creek Channel Restoration	▪ Aquatic habitat improvement; reduces downstream sedimentation.
15	Perrinville Creek High Flow Diversion and Habitat Restoration	▪ Flood protection. Reduces flows in the downstream reaches of Perrinville Creek, thereby reducing flooding, erosion, and sedimentation problems. ▪ Aquatic habitat improvement. Stabilizes the stream channel and increases habitat complexity in Perrinville Creek through installation of large woody debris.

Notes.

1. Project summaries and cost estimates are provided in Appendices E and F, respectively.

2. For a project supporting more than one service area, the primary program area is listed first and other program areas are listed in order of importance.

4.0 Stormwater Management Program Evaluation and Recommendations

The City's stormwater management program must change to meet the current requirements and grow to meet the anticipated future requirements of the NPDES Phase II permit (Appendix A), with expectation that permit requirements will evolve in future years. The NPDES Phase II permit includes requirements related to five major stormwater program components:

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination (IDD&E)
- Controlling runoff from new development, redevelopment, and construction sites
- Pollution prevention and operation and maintenance for municipal operations

Key stormwater program accomplishments and recommendations are summarized below for each of these five components. A thorough "gap analysis" was conducted in 2009 to evaluate specific components of the City's stormwater management program with respect to NPDES Phase II permit requirements. This analysis (see Appendix B) lists specific program accomplishments and recommendations for each component.

4.1 Public Education and Outreach

The City of Edmonds has an extensive public education and outreach program addressing water resources protection. The City currently provides educational materials and public outreach activities though the Engineering Division, Public Works Crews, and the Parks Department. These public education and outreach activities include:

- Brochures, booklets, fact sheets and other written material
- Self-guided interpretive tours
- Classroom presentations and curriculums
- Classes and seminars

Specific permit requirements for public education and outreach are listed in Appendix B.

4.1.1 Accomplishments

The City has met the following NPDES Phase II permit requirements for public education and outreach:

- **Provide an education and outreach program**: The City has provided many opportunities to the general public, students, businesses, and property managers regarding the importance of proper stormwater management. The public education outreach accomplishments are summarized each year in the City's SWMP documentation report posted on the Engineering Division website: http://www.ci.edmonds.wa.us/CityDepartments/EngrDept/Edmonds_SWMP.pdf.

- **Measure the understanding and adoption of target behaviors**: In 2009, the City sanctioned a survey of its residents to measure the public's knowledge and practices regarding stormwater quality issues. This study will be used as a baseline for targeting future public education and outreach activities. It will also serve as a baseline for comparison for measuring any change in target behaviors from future public education and outreach activities.

- **Track and maintain records**: The City maintains a list of all public education and outreach activities and summarizes them in the SWMP on an annual basis.

4.1.2 Recommendations

The City plans on continuing all of the public education and outreach activities described in the 2009 SWMP (Edmonds 2010b). Additional public education and outreach activities associated with NPDES Phase II permit provisions S5.C.4 (Controlling Runoff from New Development, Redevelopment, and Construction Sites) and S5.C.5 (Pollution Prevention in Municipal Operations) will be part of the roll-out of these programs required for 2010 and beyond including the following:

- **Provide an education and outreach program**: The City plans on continuing all of the public education and outreach activities described in the 2009 SWMP (Edmonds 2010b). Additional education and outreach is needed, especially in the area of pollution prevention for businesses. This will require additional staff time to remain in compliance with the NPDES Phase II permit.

- **Measure the understanding and adoption of target behaviors**: At the end of the current NPDES Phase II permit cycle (February 2012) the city

plans a follow up survey to measure any change in target behaviors and to adjust its public education and outreach programs accordingly

- **Track and maintain records**: The City will continue to maintain a list of all public education and outreach activities and summarize them in the SWMP on an annual basis.

4.2 Public Involvement and Participation

Public involvement and participation is an important component of the City's SWMP. Many opportunities for the public to provide input are provided throughout the year via website postings, Council Committee meetings, Council Public Hearings, and general Council meetings. Specific permit requirements for public involvement and participation are listed in Appendix B.

4.2.1 Accomplishments

The City has met the following NPDES Phase II permit requirements for public involvement and participation:

- **Create opportunities for the public to participate** – The multiple components of the SWMP are being assembled into complete program that meets all of the NPDES Phase II permit requirements. Components that require changes to the City Code (IDD&E program and Controlling Runoff from Development, Redevelopment, and Construction sites) have undergone extensive public scrutiny through website postings, Council Committee meetings, and Council Public Hearings.

- **Develop and implement a process for public comments** – Public comments on the SWMP are accepted throughout the year and suggestions are incorporated into the annul update of the document.

- **Make the SWMP document and annual report available to the public** - The most recent SWMP document and annual report submitted to Ecology is available on the City website: <http://www.ci.edmonds.wa.us/strm_wtr_mgmt.stm>.

4.2.2 Recommendations

In 2010, the City will be completing the revisions to the Stormwater Management Code (ECDC 18.30) and initiating its implementation of this plan. Opportunities for public involvement and participation in the City's stormwater program should include the following:

- **Create opportunities for the public to participate**: As the multiple components of the SWMP are being assembled into complete program that meets all of the NPDES Phase II permit requirements, the public will be notified of specific participation opportunities involving the development, implementation, and update of the SWMP. This includes participation in the formation of this plan.

- **Develop and implement a process for public comments**: Public comments on the SWMP will continue to be accepted throughout the year.

- **Make the SWMP document and annual report available to the public** – The most recent SWMP document and annual report submitted to Ecology will be available on the City website: <http://www.ci.edmonds.wa.us/strm_wtr_mgmt.stm>.

4.3 Illicit Discharge Detection and Elimination

The City's current stormwater management program takes a reactionary approach to identifying illicit discharges; however, the NPDES Phase II permit requires a more proactive approach. Detecting and eliminating illicit discharges is important, because the municipal stormwater system in Edmonds is connected to local lakes and streams and can adversely affect the health of these receiving waters, and Lake Washington and Puget Sound further downstream. Over the next few years, the IDD&E component of the City's stormwater program must be expanded so City staff can effectively and efficiently detect and eliminate illicit discharges to comply with the NPDES Phase II permit. Specific permit requirements for Illicit Discharge Detection and Elimination (IDD&E) are listed in Appendix B. A summary of the accomplishments and recommendations of the IDD&E program are provided below.

4.3.1 Accomplishments

The City has met the following NPDES Phase II permit IDD&E requirements:

- **Storm sewer map:** The City has developed a storm sewer map using AutoCAD and Geographic Information System (GIS) software.

- **Illicit discharge ordinance:** The City had an ordinance (ECC Section 7.200) prohibiting illegal discharges prior to the effective date of the NPDES Phase II permit. On August 17, 2009, the City Council passed Ordinance No. 3751 which updated the illicit discharge code for consistency with Ecology's guidance for NPDES Phase II permit compliance.

- **Business education:** In August 2007, the City mailed information on BMPs and illegal discharges to food service businesses, auto repair facilities, auto sales businesses, and concrete contractors. The City also distributes information to known violators of the IDD&E ordinance.

- **Illicit discharge hotline:** There are phone numbers on the *Streams, Lakes, Wetlands, and Critical Areas* page of the City's website for use by any citizen who sees signs of pollutant spills near or in a storm drain or water body.

- **Illicit discharge implementation plan:** The City has developed an outline for the Illicit Discharge Detection and Elimination Program Implementation Plan.

- **Illicit discharge tracking:** The City's Stormwater Engineering Program Manager and Public Works crews respond to incidents, take photos, document the details of the incident and how it was dealt with, and log this information in a tracking spreadsheet.

- **Staff training:** On July 15, 2009, the City conducted "Awareness" level and "Response and Enforcement" level training for 14 municipal staff members who are responsible for identification, investigation, termination, cleanup, and reporting illicit discharges.

4.3.2 Recommendations

Ongoing work related to IDD&E requirements in the NPDES Phase II permit will include the following:

- **Storm sewer map**: The City will compile the entire storm sewer map in GIS. The permit deadline for the completion of the storm sewer map is February 15, 2011.

- **Public education:** The City will develop ongoing public education materials and programs to inform public employees, businesses, and the general public of the hazards associated with illegal discharges and improper disposal of waste

- **Priority water body identification:** The City is required to identify and evaluate illicit discharges to three high priority water bodies by February 15, 2011. Dry weather inspections were conducted in September 2010 for storm drainage outfalls in the Hall Creek/Ballinger, Willow Creek, and Shellabarger Creek drainage basins. The findings from those inspections will inform next steps to be taken in these three high priority

drainage basins. One water body is required to be evaluated each year after February 15, 2011.

- **IDD&E implementation plan:** The City will complete development of an ongoing program to detect and address illicit discharges, spills, illicit connections, and illegal dumping. The permit deadline for the completion of the implementation plan is August 19, 2011. The City will thereafter implement the plan with involvement from staff in several departments, with the Public Works Department as the lead.

- **Program evaluation**: The City will develop procedures for IDD&E program evaluation and assessment.

- **Staff training**: The City will host additional "awareness" level training as necessary for all municipal staff who might come in contact with or observe an illicit discharge or connection.

To remain in compliance with the illicit discharge detection and elimination provisions of the NPDES Phase II permit, additional staff resources are needed.

4.4 Controlling Runoff from New Development, Redevelopment, and Construction Sites

The City currently has a well-developed permitting process that requires plan review and site inspections for new development and redevelopment projects. Specific permit requirements for new development, redevelopment, and construction sites are listed in Appendix B. A summary of the accomplishments and recommendations for controlling runoff from new development, redevelopment, and construction sites is provided below.

4.4.1 Accomplishments

The City has met the following NPDES Phase II permit requirements for new development, redevelopment, and construction sites:

- **Stormwater management ordinance:** The City developed a revised stormwater management ordinance (ECDC Chapter 18.30) to both update requirements and standards and to comply with the NPDES Phase II permit requirements. A Public Open House was held on November 19, 2009 to solicit input on the proposed revisions. The revised stormwater ordinance was presented to the City Council and adopted on April 20, 2010 (effective date June 1, 2010).

- **Stormwater management guidance:** The City also developed a Stormwater Code Supplement to ECDC Chapter 18.30 that provides more detailed requirements and guidance for planning, design, and maintenance of stormwater management facilities than provided in the stormwater code for minor sites, small sites, large sites, and construction sites. The stormwater supplement was presented to the City Council on April 20, 2010.

- **Small site tools:** A simplified sizing tool was developed that provides simple mathematical relationships to allow sizing of LID (bioretention), infiltration (drywell, infiltration trench, gravelless chamber), and detention (detention pipe) BMPs as a function of contributing impervious surface area and site infiltration rate. Flow control credits (runoff reduction credits) were also developed for trees, dispersion, vegetated roofs, and permeable pavement. These tools will be used by developers and City staff alike to streamline design and approval of stormwater flow control facilities.

- **Private stormwater facility inspections:** The City has legal authority, through the maintenance inspection program, to inspect private stormwater facilities that discharge to the City's storm sewer system. The City's engineering technicians currently inspect new flow control and water quality treatment facilities.

- **Stormwater site plan review**: The City Engineering Division (Public Works Department) requires all development and construction projects with more than 1 acre of disturbed soils to develop a stormwater pollution prevention plan that is reviewed by the City Development Services Department.

- **Construction site inspections:** The City Engineering Division inspects all known permitted development sites before clearing (pre-construction inspection), during construction ("TESC" inspection), and upon completion of construction (to ensure proper installation of permanent stormwater facilities and structural BMPs).

- **Enforcement**: The City Engineering Division has an enforcement strategy to respond to issues of noncompliance (ECDC Section 18.30.080).

- **Long-term O&M:** The City has ordinances that identify ownership, maintenance, repairs, operation, and inspection of private stormwater systems (ECDC Sections 18.30.100, 18.30.120, and 18.30.130).

- **Record-keeping:** The City uses PermitTrax software to keep records of inspections and enforcement actions by staff related to development

projects that require a building permit. For those sites that do not require a building permit, other electronic tracking means are used. In all cases the following are tracked: inspection reports, warning letters, notices of violations, and other enforcement records.

- **Staff training**: City engineering inspectors have attended formal workshops and training courses regarding erosion and sediment control practices and inspections. Five Engineering staff members are Certified Erosion and Sediment Control Leads (CESCLs). New inspectors and plan reviewers receive on-the-job training regarding inspection practices, review of erosion and sediment control practices, and review of permanent stormwater facilities.

4.4.2 Recommendations

Ongoing work related to new development, redevelopment, and construction site requirements in the NPDES Phase II permit include the following recommendations:

- **Site planning process**: The City should refine and expand upon the site planning process and selection and design criteria for BMPs presented in the Stormwater Code Supplement over time to improve overall effectiveness.

- **LID provisions**: The City should encourage LID techniques and other sustainable elements in site design that account for site conditions, access, and long-term maintenance, and continue to remove administrative barriers to LID implementation.

- **Inspection frequency**: The City should increase the inspection frequency of stormwater treatment and flow control facility inspections to an annual basis and flow control and water quality treatment facility inspections for new residential developments (that are part of a larger common plan of development or sale) to once every 6 months during the period of heaviest construction.

- **Maintenance plans**: The City should require formal maintenance plans upon completion of construction for permanent stormwater controls such as stormwater treatment and detention facilities and other structural BMPs.

- **Staff training**: The City should ensure training is provided to all City staff who are responsible for implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including staff involved with permitting, plan review, construction site inspections, and enforcement.

To remain in compliance with the provisions of the NPDES Phase II permit, additional staff resources are needed in the areas of post-construction inspection and enforcement.

4.5 Pollution Prevention and Operation and Maintenance for Municipal Operations

The City currently conducts O&M activities at City-owned facilities and in rights-of-way across the City, but does not have a formal O&M plan containing practices, policies, and procedures discussed in the NPDES Phase II permit. Specific permit requirements for pollution prevention and O&M are listed in Appendix B. A summary of the accomplishments and recommendations for pollution prevention and O&M are provided below.

4.5.1 Accomplishments

The City has met the following pollution prevention and O&M NPDES Phase II permit requirements:

- **Maintenance standards**: The City has established maintenance standards in the revised stormwater management ordinance (ECDC Chapter 18.30) and Stormwater Code Supplement. The revised stormwater ordinance and supplement were presented to, and adopted by, the City Council on April 20, 2010. The City will look for opportunities for recycling and reusing materials in its maintenance activities within the bounds of environmental regulations, where feasible.

- **Post-storm spot checks:** The City storm crew does spot checks of some potentially damaged permanent stormwater treatment and flow control facilities after major storm events. The City conducts repairs to systems immediately if necessary to protect the public health, safety, welfare, or public resources.

- **Stormwater practices**: The City currently has established practices to reduce stormwater impacts due to runoff from streets, parking lots, and other facilities owned or maintained by the City and road maintenance activities conducted by the City, but it needs to formalize these practices to meet the requirements of the Phase II permit.

- **Stormwater policies and procedures**: The City has established and implemented many policies and procedures to reduce pollutants in discharges from lands owned and maintained by the City, but further work is needed to meet this requirement.

- **Stormwater pollution prevention plan (SWPPP):** The City developed a municipal SWPPP for the Public Works and the Parks departments covering heavy equipment maintenance or storage yards and material storage facilities owned or operated by the City before the February 15, 2010 permit deadline. The City also provided SWPPP training to staff at the Public Works and Parks facilities in March 2010.

4.5.2 Recommendations

In order to reliably meet the NPDES Phase II Permit requirements for stormwater system O&M, the City should develop a Stormwater Facilities O&M Plan that defines (1) inspection and maintenance frequencies, (2) maintenance standards, (3) procedures for inspection, maintenance, and tracking, and (4) training requirements. In addition to the O&M plan, ongoing work related to pollution prevention and O&M in the NPDES Phase II permit includes continuation of the following items that the City has been effectively doing to date:

- **Inspections**: Conduct annual inspections of stormwater treatment and flow control facilities.

- **Tracking**: Establish and implement a system to track inspection and maintenance related to the NPDES Phase II permit requirements.

- **Stormwater practices**: Formalize established practices to reduce stormwater impacts due to runoff from streets, parking lots, and highways owned or maintained by the City and road maintenance activities conducted by the City.

- **Stormwater policies and procedures**: Formalize established policies and procedures to reduce pollutants in discharges from lands owned and maintained by the City.

- **Staff training**: Develop and implement a training program for construction and operation and maintenance staff.

Additional staff resources are needed to implement NPDES Phase II Permit required maintenance standards for City-owned and operated flow control and water quality treatment facilities.

4.6 Monitoring

The NPDES Phase II permit requires the City to participate in and implement a comprehensive long-term monitoring program to evaluate stormwater management program effectiveness. The monitoring program is to include two components: monitoring of stormwater discharges and a targeted effort to assess the effectiveness of the stormwater management programs.

Stormwater discharge monitoring is intended to characterize stormwater runoff quality and quantity at a limited number of locations in a manner that allows for the analysis of pollutant loading and changes overtime. Stormwater program effectiveness monitoring is intended to inform improved stormwater management efforts by evaluating issues that significantly affect the success of, or the confidence in, stormwater controls. The results of the monitoring program will be used to support an adaptive management process and lead to refinements in the City's stormwater management programs.

4.6.1 Accomplishments/Recommendations

By the end of the current permit term (February 2012) the City needs to develop a monitoring program plan. The monitoring will then need to be implemented during the next permit cycle (2012-2017).

5.0 Plan Implementation

This section discusses plan implementation, focusing specifically on operation and maintenance, staffing and other resources required to implement this plan, a summary of the recommended storm and surface water capital improvement project plan, and interdepartmental and external collaboration.

5.1 Operation and Maintenance

The City operates and maintains an extensive system of storm drainage infrastructure that includes catch basins, manholes (junction and flow control), stormwater pipes, detention ponds, detention vaults, water quality facilities (Stormceptors® and oil/water separators), ditches and other infrastructure (Table 2-1). Catch basins are cleaned on a 12- to 18-month cycle, which meets O&M requirements specified in the NPDES Phase II permit.

The SWPPPs prepared for the Public Works and Parks departments also recommended specific O&M frequencies for the Public Works, Old Public Works, and Parks Maintenance facilities consistent with the NPDES Phase II permit. The 12- to 18-month catch basin cleaning cycle should be sufficient for these facilities; however, the City should clean catch basins at these facilities when they are more than half full or when sediment is within 18 inches of the bottom of the outlet pipe. Inspections of the oil/water separator and the wet pond at the Public Works facility should be conducted annually, and spot checks should also be performed after major (greater than 24-hour 10-year recurrence interval rainfall) storm events.

The City is also required to develop an O&M program for all stormwater facilities. Maintenance frequencies for many types of stormwater facilities will need to increase to meet NPDES Phase II permit requirements. City staff has also identified several aspects of the maintenance program that will require additional resources to ensure understanding of and proper functioning of all of the City's stormwater facilities. City staff will need to start formally inspecting each City-owned stormwater facility as part of routine O&M activities. Inspections and maintenance will need to be documented per NPDES Phase II permit requirements; therefore, the stormwater program will need to develop a tracking system to manage this additional data.

In order to reliably meet NPDES Phase II permit requirements for stormwater system O&M, the stormwater utility should develop a Stormwater Facilities O&M Plan that defines four important components of stormwater operations and maintenance:

1. Inspection and maintenance frequencies
2. Maintenance standards
3. Procedures for inspection, maintenance, and tracking

4. Training requirements

Maintenance standards should be based upon Volume V, Section 4.6 of the *Stormwater Management Manual for Western Washington* (Ecology 2005), or an approved equivalent manual, with updates as appropriate as the manual evolves.

5.2 Staffing Needs

Staffing needs were calculated as the number of full-time-equivalent personnel (FTE) required to complete NPDES Phase II permit-related work (Appendix G). It was assumed that 15 percent of staff time in each year is used for vacation, holidays, sick days, training, and other administrative duties (e.g., 1 FTE is calculated as 52 weeks per year times 40 hours per week times 85 percent). Staffing needs were evaluated on a quarterly basis and summarized on an annual basis for a three-year period. Table 5-1 summarizes the estimated Engineering and Public Works crew staff labor hours needed through 2012 to meet the program needs identified in the gap analysis (Appendix B).

Table 5-1. City staffing resources required to meet day-to-day NPDES Phase II permit requirements, 2010-2012.

	Year			
	Available	Required		
	2010	2010	2011	2012
Total Engineering Hours	1,945	3,900	4,100	4,100
Total Engineering FTE	1.1	2.2	2.3	2.3
Total Public Works Crew Hours	9,500	9,500	11,500	11,500
Total Public Works Crew FTE	5.4	5.4	6.5	6.5
Grand Total FTE	**6.5**	**7.6**	**8.8**	**8.8**

FTE = full-time equivalent.

Currently, 2.2 FTE of Engineering staff time is needed for day-to-day fulfillment of NPDES Phase II permit requirements. However, only 1.1 FTE of Engineering staff are currently available to support permit requirements. Additional Engineering staff time is currently being utilized to assist with development of the new City codes and programs necessary for NPDES Phase II permit compliance. Once these activities are completed in 2010, the staff time that is being dedicated to developing new codes and programs must be reallocated to other tasks, such as management of CIP projects and assisting in development project review (projects not covered by the NPDES Phase II permit). Therefore, it is estimated that Engineering staff resources should be increased by approximately 1.2 FTE in 2011 to meet the NPDES Phase II permit requirements through 2012. This estimate includes approximately 1 FTE that will be needed for stormwater program management, especially in post-construction inspection and illicit discharge programs set up in the new City codes, and approximately 0.2 FTE needed for GIS support of the stormwater program. The NPDES Phase II permit requirements are expected to become more

rigorous under an updated permit scheduled to take effect in 2012, which could further increase Engineering staffing needs.

Currently, 5.4 FTE of Public Works crew time is available to fulfill NPDES Phase II permit requirements. Public Works crew resources currently dedicated to NPDES Phase II permit compliance are expected to be adequate during 2010. It is estimated that public works crew staffing must increase by 1 FTE in 2011 to meet NPDES Phase II permit requirements through 2011 and 2012 primarily in the areas of assisting Engineering with the illicit discharge program and NPDES Phase II permit required maintenance standards for City-owned and operated flow control and water quality treatment facilities. The NPDES Phase II permit requirements are expected to become more rigorous in an updated permit that is scheduled to take effect in 2012, which could further increase Public Works crew staffing needs.

5.3 Additional Resource Needs

The NPDES Phase II permit requires the City to maintain its stormwater infrastructure to prevent the release of pollutants into receiving waters. Compliance with this requirement dictates routine removal of sediment and other waste material from catch basins, manholes, vaults, and other structures. This cleaning generates large amounts of waste that need to be properly managed.

Currently, the Public Works Department has a decant facility that separates the liquid waste from the solid waste removed from drainage structures during cleaning. The liquid waste is diverted into the City's sanitary sewer system, where it receives treatment prior to discharging into Puget Sound. The solid portion is stockpiled and once the moisture content has reached the desired level, is sent to a proper disposal or reuse facility.

The decant facility and solids stockpile area are reaching maximum capacity and additional capacity or an alternate decant/disposal arrangement will need to be created in the future to properly handle the increased waste load from NPDES Phase II permit-required maintenance.

5.4 Capital Improvement Projects

The recommended storm and surface water CIP project plan for 2011 through 2016 is summarized in Table 3-2. Due to a backlog of problems to be addressed, reduced City budget that in turn stalled implementation of several CIP projects during the economic downturn that began in 2008, and increasing regulatory drivers, the funding needed to implement storm and surface water CIP projects in this time horizon must increase compared to existing stormwater utility revenue. Storm and surface water CIP program funding is discussed in Section 7 of this Plan.

CIP project number 6, "Citywide Drainage Replacement Projects" covers smaller-scale projects that can sometimes be constructed by City forces. A partial list of these projects is provided in Table 5-2.

Table 5-2. Citywide drainage replacement project priorities.

Priority	Problem/Location
1	Poplar Trees Impacting Storm System – 194th St. SW and 88th Ave. W
2	Infiltration Sump Failing – 174th St. SW and 71st Ave. W
3	Infiltration Sump Failing – Near 9510 232nd St. SW
4	No Outlet – Near 18505 83rd Ave. W
5	Undersized System – 3rd Ave. N and Main St.

5.5 Interdepartmental Collaboration

The City is committed to both meeting compliance requirements and deadlines of the NPDES Phase II permit and providing its citizens with exemplary stormwater management services. The stormwater management program is led by the City's Stormwater Engineering Program Manager in the Public Works Department, Engineering Division. The Stormwater Engineering Program Manager works closely with other City departments and divisions to implement activities in the program areas of flood and erosion protection, water quality, and aquatic habitat. Table 5-3 summarizes the roles and responsibilities of the various City agencies.

5.6 Interagency Collaboration

The City works closely with other agencies, especially during the planning and implementation of CIP projects, to obtain the proper environmental permits. For projects that involve work within an aquatic environment or where endangered species may be present, the City works with the WDFW and the United States Army Corps of Engineers.

Other agencies that may be involved in capital projects include the Washington State Department of Transportation (including Washington State Ferries), Burlington Northern Santa Fe Railway, various utility providers (such as Puget Sound Energy and Verizon), and the neighboring jurisdictions of Lynnwood, Mountlake Terrace, Woodway, Shoreline, and unincorporated Snohomish County. Collaboration on regional stormwater issues is discussed in Section 2.4.4.

Table 5-3. Responsibilities of City departments and divisions for NPDES Phase II permit compliance.

Department	Division	Responsibilities
Public Works	Engineering	▪ Overall stormwater management planning and NPDES Phase II permit compliance responsibilities ▪ IDD&E program management ▪ Review of plans for development, redevelopment, and construction sites ▪ Public participation ▪ Public education and outreach on water quality issues such as car washing, pet waste, and general illicit discharge prohibitions ▪ Stormwater Comprehensive Plan development and implementation ▪ CIP project planning, design, and, construction.
	Street/Storm	▪ Operation and maintenance of City-owned stormwater infrastructure ▪ Pollution prevention in municipal operations ▪ Public education ▪ Review of plans for development, redevelopment, and construction sites ▪ Illicit discharge reporting and response ▪ Inspection of public and privately-owned stormwater quality and quantity BMPs.
Parks, Recreational, and Cultural Services	Parks	▪ Public education on watershed scale issues, aquatic habitat, and proper handling of pet wastes.
Development Services	Planning	▪ Wetland and other critical areas issues ▪ Administers SEPA review of City CIP projects.
	Building	▪ Floodplain management issues

NPDES = National Pollutant Discharge Elimination System

IDD&E = Illicit discharge detection and elimination

CIP = Capital improvement program

BMPs = Best management practices

SEPA = State Environmental Policy Act

6.0 Recommended Funding Strategy

6.1 Use of Stormwater Utility Funds

Funds collected in the Stormwater Management Utility fund will be used in the following order:

1. To meet on-going debt obligations from previously obtained bonds or loans
2. To complete any emergency projects that may arise
3. To implement programs and CIP projects that keep the City in compliance with local, state, and Federal regulations especially related to the NPDES Phase II permit
4. To complete projects that address long-standing, re-occurring flooding issues such as in southwest Edmonds and around lower Perrinville Creek
5. To complete City-wide drainage replacement projects (CIP project number 6, see Table 3-2 for current project prioritization)

The projects included in the "Tier 1" grouping in Table 3-2 represent those that meet the above criteria (except number 2). These projects provide a basic level of service from the stormwater utility. Further discussed of tiered funding analysis is presented in section 6.3 below.

"Tier 2" projects are those that are largely directly beneficial to aquatic habitat and provide an enhanced level of utility service. It is assumed that these Tier 2 projects will be funded 25 percent by the City's stormwater utility and 75 percent by outside sources such as grants, loans, and possibly funding help from other agencies (i.e., Port of Edmonds and Washington State Department of Transportation) and/or other City departments (i.e., Parks).

6.2 Equivalent Service Units

The stormwater utility rate paid by an individual landowner is based on the number of Equivalent Service Units (ESU) on each parcel. The rate applied on an ESU basis is critical to define accurately in relation to the City's utility needs for programs and capital projects as the total funding that it yields must be sufficient to meet those needs in the years ahead.

As described in policies SWUF-2 and SWUF-3 in Section 1.3.4 of this plan, one ESU shall represent 3,000 square feet of impervious area. All zoning types except single family residential shall be charged based on the actual impervious surface area on the parcel at the rate defined by City Council per one ESU. The minimum charge shall be one ESU. Each single family parcel

shall be charged the rate for one ESU, regardless of the actual impervious surface area on the parcel. The Public Works Director may impose a fee corresponding to greater than one ESU on any single family parcel if it is found that runoff from the parcel is causing an unreasonable burden on the City's storm or surface water system.

An analysis of the appropriate stormwater utility rate to charge per ESU for the years 2010 through 2016, to support ongoing storm and surface water management program efforts and corresponding to the CIP planning horizon described in Sections 3 and 5 of this plan, was performed to support implementation of the full plan. This analysis captured the program resource needs described in Sections 5.2, 5.3 and 5.4 of this plan, and was also based on the existing financial status, population forecasting, and debt obligations of the City's stormwater utility. Details of this analysis are presented in Appendix H. A summary of the financial plan recommendations for the stormwater utility is provided below.

6.3 Six-Year Financial Plan

6.3.1 Program Areas/Projects Funded by Utility Rates

The funding analysis performed for this plan focused on two levels of service, termed Tier 1 and Tier 2. Tier 1 represents the base level of funding that is needed to provide fundamental utility services, such as constructing essential capital projects, responding adequately to flooding events, assisting in review of development projects, and cleaning of catch basins throughout the city to maintain conveyance of storm runoff. Tier 1 funding also enables compliance with applicable permit requirements. Tier 2 represents a greater level of funding to position the City to implement additional CIP projects that support the stormwater utility's mission and improve the aquatic environment in and near Edmonds. The additional projects that can be partially funded in the Tier 2 scenario are:

- Edmonds Marsh Restoration
- Daylight Willow Creek in Marina Beach Park[9]
- Shell Creek Channel Restoration in Yost Park
- Perrinville Creek High Flow Diversion and Habitat Restoration

Appendix H presents the analysis of stormwater utility funding to meet these two levels of service for the years of 2010 through 2016.

[9] As noted in Table 3-2, either the Willow Creek Pipe Rehabilitation or Daylighting of Willow Creek project will be constructed based on a variety of factors including rate of degradation of the existing pipe and availability of funding for stream daylighting. Both projects will not be built. Any savings will be reflected in stormwater utility rate adjustments after 2013.

6.3.2 Program Areas/Projects Funded by Other Means

On July 6, 2010, the City Council approved utility rate increases for a 2-year period to meet the Tier 2 funding needs. The Council further decided that subsequent rate increases would be revisited in 2012. It is assumed that the City's stormwater utility would provide 25 percent of the funding needed for Tier 2 projects. The remaining 75 percent of the necessary funds for those projects would have to come from other sources. Additional sources of funding that could be pursued to enable these projects to be fully implemented include state and federal grants, project partners such as the Port of Edmonds and/or the Washington State Department of Transportation, and private landowners with a vested interest in the project. It is uncertain at this time whether any of those sources of external funds can realistically be obtained to enable some or all of the Tier 2 projects to be fully funded. With the Tier 2 utility funding, the City will have some matching funds in place to leverage in pursuing additional funding from external sources, which should improve the likelihood of the Tier 2 projects being implemented in part or in full.

6.4 Recommended Stormwater Utility Rates

The stormwater utility rate should be gradually adjusted in the years ahead to adequately fund implementation of programmatic work and CIP projects, as follows:

Table 6-1. Recommended stormwater utility rates for years 2010-2016.

	Monthly Rate per ESU[10] With Tier 2 CIP		
Year	Rate ($)	$ Increase	% Increase
2010	$8.97	0.66	8.0%
2011	$9.69	0.72	8.0%
2012	$10.47	0.78	8.0%
2013	$11.36	0.89	8.5%
2014	$12.32	0.97	8.5%
2015	$13.37	1.05	8.5%
2016	$13.37	--	0.0%

Although the Tier 2 projects are prioritized for design and construction in the latter half of this 6-year planning horizon (see Table 3-2 and Appendix H), the funding for those projects will begin building in 2010-2012 to create the balance that is needed to leverage "local matching" dollars in seeking external sources of funding for those projects.

This progression of rate adjustments is based on the best possible forecast that can be done at this time. The City should revisit this schedule of rate adjustments every two years to determine if it is adequate as presented here, or if it should be modified, and proceed with City Council

[10] Currently $8.31 per ESU

approval of rate adjustments (if needed) in 2-year increments. The assumptions and data used in the rate analysis (Appendix H) will form the basis of information to be reviewed to determine if adjustments to the rates presented above are warranted.

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