

2008 Final Stormwater Management Plan

City of Poulsbo



September 2008

Parametrix

2008 Final Stormwater Management Plan

Prepared for

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D	2007 Stormwater Management Program Report
E	Preventative Maintenance Procedures
F	Capital Improvement Plan Worksheets

ACRONYMS

BMPs	Best Management Practices
CIP	Capital Improvement Plan
City	City of Poulsbo
CKWWTP	Central Kitsap Wastewater Treatment Plant
Ecology	Washington State Department of Ecology
EES	Economic and Engineering Services
EPA	Environmental Protection Agency
ERU	Equivalent Residential Unit
FTE	Full-Time Equivalent
GMA	Growth Management Act
gpd	Gallons per Day
I&I	Inflow and Infiltration
KCHD	Kitsap County Health District
KCPUD	Kitsap County Public Utility District
KHBA	Kitsap Home Builders Association
KPCRC	Kitsap Peninsula Clear Runoff Collaborative
LID	Low Impact Development
MS4s	Municipal Separate Stormwater Sewer Systems
NKHS	North Kitsap High School
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
PMPs	Preventative Maintenance Procedures
SEPA	State Environmental Policy Act
UGA	Urban Growth Area

EXECUTIVE SUMMARY

PURPOSE AND OBJECTIVES

The City of Poulsbo (City) owns, operates and maintains a stormwater collection, conveyance, and treatment system that serves approximately 2.5 square miles. The City's stormwater system has evolved over time to meet development needs and regulatory requirements. More stringent requirements associated with new federal and state stormwater management regulations have placed additional requirements on the City's stormwater management program. In response to both existing and future needs, the City retained Parametrix, Inc. to prepare an update to the 1993 Comprehensive Surface Water Management Plan and an associated 1998 update.

The goal of the 2008 plan is to identify the general status of the stormwater system, system deficiencies, and actions needed to comply with applicable regulatory requirements. The objective of this plan is to provide information that will aid in providing an affordable and acceptable level of service to the residents of Poulsbo and the community.

STUDY AREA AND POPULATION

Under the Growth Management Act (GMA), the City's service area is defined as the Urban Growth Area (UGA) boundary. The UGA as accepted by the City of Poulsbo and Kitsap County is shown in Figure ES-1.

Population data for the study area is shown in Table ES-1. The City's 2005 population of 7,450 residents is expected to increase to 10,552 residents by 2025. Total UGA population is projected to increase to 14,808 in 2025 with an annual growth rate of 2.7 percent.

Table ES-1. Poulsbo Population Forecast

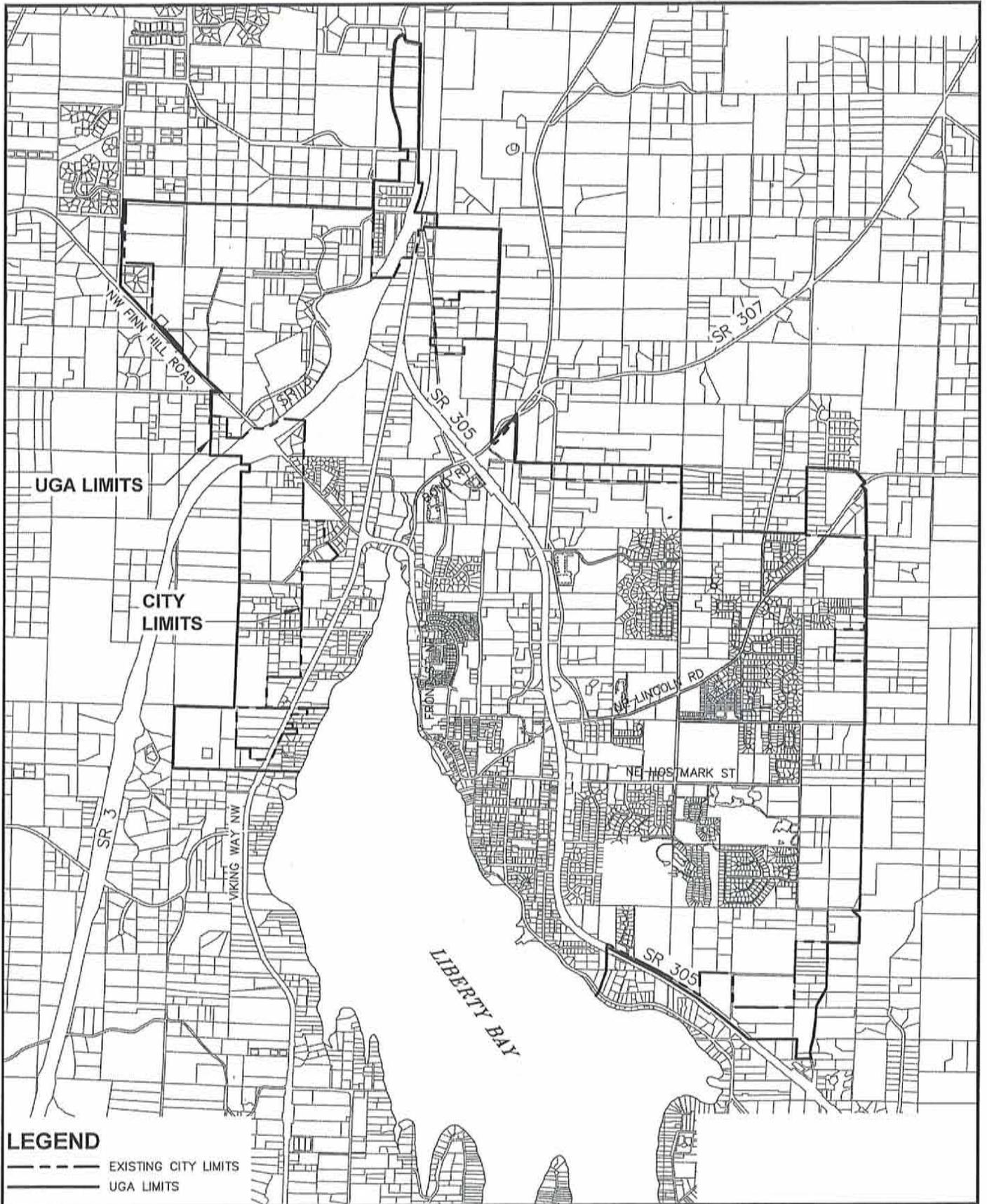
Population Distribution	Year			Annual Growth Rate
	2000	2005	2025	
City Limits	6,813	7,450	10,552	1.8%
UGA	901	1,230	4,256	6.4%
Total	7,714	8,680	14,808	2.7%

Source: Kitsap County Comprehensive Plan 10 Year Update 2006.

EXISTING STORMWATER MANAGEMENT PROGRAM

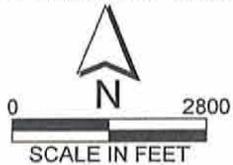
The City of Poulsbo established its stormwater utility program in 1981 in response to increasing levels of urban development. The City established a dedicated funding mechanism for stormwater management and located the new function within the City's Public Works Department. The City uses the 1992 Stormwater Management Manual for the Puget Sound Basin, published by the Washington State Department of Ecology (Ecology), and the 1997 Kitsap County Stormwater Management Manual as the technical basis for managing stormwater from new development within the City.

The City's stormwater program is currently staffed by two full-time equivalent (FTE) operation and maintenance (O&M) positions. The Director of Public Works provides program management and technical direction.



LEGEND
 - - - - - EXISTING CITY LIMITS
 _____ UGA LIMITS

Parametrix DATE: Jun 09, 2008 FILE: BR2237020P01T01F-02



**Figure Figure ES-1
 City of Poulsbo
 Study Area**

Existing Drainage System and Facilities

The natural drainage system consists of the Dogfish, Lemolo, Johnson and Bjorgen Creek basins, as well as several smaller basins that discharge directly to Liberty Bay. The collection system consists of approximately nineteen (19) miles of collection system mains and approximately four (4) miles of open drainage ditches, as well as approximately 1,270 catch basins that provide for the collection and conveyance of storm and surface water runoff. A total of 51 stormwater discharge points (outfalls) have been identified. The treatment system includes the operation and maintenance of more than 40 detention systems and more than 20 water quality treatment facilities.

Water Quality

A preliminary assessment of stormwater quality was conducted by the Kitsap County Health District (KCHD) in 2003 and 2004. Sampling events were performed during both dry and wet weather and generally showed that contaminant concentrations in City stormwater are typical of the range found in stormwater from other local studies such as those conducted in neighboring Dyes and Sinclair Inlet watersheds. A water quality assessment by the KCHD of the Poulsbo area in 2006 found stream water quality to generally be poor due to fecal coliform contamination.

REGULATORY REQUIREMENTS

The National Pollutant Discharge Elimination System (NPDES) permit program is designed to reduce or eliminate the discharge of pollutants to surface water. The NPDES Phase II Stormwater Permit for "small" municipal separate stormwater sewer systems was finalized by Ecology in January 2007. A permit application and Notice of Intent for Stormwater Discharge was submitted by the City to Ecology, per Phase II requirements, in October 2002.

Minimum Control Measures

The following six control measures must be implemented as part of the stormwater management program under the NPDES Phase II permit:

- Public education programs and outreach activities about the impacts of stormwater
- Public involvement/participation in the development, implementation and review of the stormwater program
- Program to detect and eliminate illicit discharges to the City owned storm drain system
- Program to reduce pollutants in stormwater runoff associated with construction, new development and redevelopment projects
- O&M program to prevent or reduce pollutant runoff from municipal facilities
- Develop and implement a stormwater management program and maintenance manual for City stormwater facilities and roads
- Establish a spill prevention and control program for each of the City's maintenance facilities

A summary of NPDES permit compliance status, schedule and implementation cost is shown in Table ES-2.

LOW IMPACT DEVELOPMENT

The City is participating, along with other Kitsap County jurisdictions, in development of technical design standards to aid in implementing Low Impact Development (LID) techniques. These LID techniques emphasize storm water management methods that reduce impervious areas, retain vegetation and maximize on-site infiltration. The Kitsap Home Builders Association (KHBA) is currently leading the LID standard development process, under a grant agreement with Ecology. The City intends to begin implementing LID regulations following completion of the LID technical standards in 2008 and subsequent adoption by Kitsap County.

OPERATION AND MAINTENANCE PROGRAM

The purpose of the O&M program is to establish the minimum requirements for inspection, operation and maintenance of City-owned and private stormwater facilities. The existing stormwater O&M program consists of periodic maintenance of City owned stormwater facilities including routine inspection, response to requests for assistance (customer service) from City residents, and routine administration including record keeping, contract services, supplies, tax and insurance.

Costs for the City's O&M program have increased from \$165,900 in 2000, to approximately \$587,000 in 2007. The largest increase has been for administrative costs, which include interfund services, public works administration, taxes, insurance, and depreciation.

Typical annual costs to meet basic facility O&M requirements are estimated at \$179,000. Administrative costs for operation and maintenance include supervision and management, record keeping, professional services, insurance and tax. Administrative labor costs may need to be increased to reflect NPDES permit requirements, including record keeping requirements and increased stormwater system operation and maintenance data needs.

CAPITAL IMPROVEMENT PLAN

The purpose of the Capital Improvement Plan (CIP) is to identify facilities needed to improve stormwater collection, conveyance, quantity control and quality control. Projects identified for the CIP were developed from City personnel based on their experience with the system, review of previous City Stormwater Management Plans, and inspection and evaluation of existing City facilities. A total of 17 projects were evaluated as part of the CIP analysis. Each project included a description of the purpose and need, schematic design, prioritized rank, and planning level cost estimates for each project. Table ES-3 presents a summary of the six-year CIP.



Table ES-2. Summary of NPDES Permit Compliance Schedule, Status and Estimated Implementation Costs

Permit Element	Year Required						Element of Current City Program?	Estimated Annual Labor Hours				
	2007	2008	2009	2010	2011	2012		2013	Manager	Engineer	Technician	Maintenance
STORMWATER MANAGEMENT PROGRAM (SWMP)												
Cost Tracking			X				No	24	40	40	40	48
Inspection and Enforcement Tracking			X				No	12	24			
Full development and implementation					X		No					
Description of Program Elements					X		Yes					
SWMP ELEMENTS												
Education and Outreach Program												
Public Outreach Program			X				No	8	24	40		
Business Outreach Program			X				No	8	24	40		
Staff and development industry education			X				No	12	24	40		
Public Involvement and Participation												
Advisory Council (Quarterly Mtgs)		X					No	12	24			
Annual Report available to public via website		X					No	2	4			8
Illicit Discharge Detection and Elimination												
Stormsewer system map					X		Yes ¹	8	8	40		
Hotline for spill and illicit discharge reports		X					No	4	4	4		8
Ordinance prohibiting non-stormwater discharges			X				No	8	40			
Staff training program			X				No	8	40	16		
Detection program					X		No	4	24	40	40	
Full program implementation					X		No					
Control of Run-off From New Development												
Ordinance controlling run-off from new development			X				Yes ¹	8	40			
BMP selection and design criteria			X				No	8	40			
Stormwater Permitting and Inspection Process			X				Yes ¹	8	40	40		
O&M compliance program and maintenance standards			X				No	8	40	40	See Note 2	
Annual facility inspections			X				No	8	8	80	See Note 2	
Recordkeeping procedures			X				No	8	8	80		40
Staff training							Yes ¹	8	16	16	16	8
Pollution Prevention and O&M Program for Municipal Operations												
O&M Pollution Prevention Training Program			X				Yes ¹	4	8	8	8	8
Maintenance Standards			X				Yes ¹	8	24			
Annual facility inspections			X				Yes ¹	4	8	40		
Establish maintenance BMPs			X				Yes ¹	4	24			
Staff training			X				Yes ¹	8	8	8	16	8
SWPPPs for maintenance and storage facilities			X				No	4	8	80		
ANNUAL REPORTS												
Program implementation status		X					No	2	8			
Description of compliance activities		X					No	2	8	16		
Evaluation of SWMP		X					No	4	8	16		
Description of Any Monitoring Conducted		X					No	2	8			
Monitoring Plan			X				No	2	8			
Effectiveness Monitoring Plan			X				No	4	8			
Total Hours								214	600	684	120	128
Total Hours as Percent Full Time (2080 hrs/year)								10%	29%	33%	6%	6%
Estimated Annual Cost By Staff Position								\$19,260	\$45,000	\$34,200	\$4,800	\$5,120
Total Estimated Annual Program Staff Cost								\$108,380				

Notes:

1. Current City program partially addresses requirement. Additional costs for monitoring compliance with new standards, record keeping and enforcement.
2. Costs assumes all inspections are conducted by Technician and not Maintenance staff.



City of Poulsbo

Table ES-3. Stormwater Capital Improvement Plan

PROJECT	Year Scheduled						Not Scheduled	Total Cost
	2008	2009	2010	2011	2012	2013		
South Fork Dogfish Creek Restoration	\$ 50,000	\$ 50,000	\$ 350,000					\$ 450,000
New Conveyance East of Viking Avenue	\$ 44,000							\$ 44,000
Fjord Drive Drainage Improvements		\$ 44,000						\$ 44,000
Replace Wendy Way Storm Drain			\$ 83,000					\$ 83,000
Noorland Drainage Ditch				\$ 57,000				\$ 57,000
Replace Storm Drain W of 10th Avenue				\$ 32,000				\$ 32,000
American Legion Park Outfall Repair					\$ 94,000			\$ 94,000
Subtotal 6 Year CIP	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -	\$ -	\$ 804,000
South Fork Dogfish Creek - Regional Detention, Phase 2							\$ 823,000	\$ 823,000
South Fork Dogfish Creek Restoration 7th Ave to Liberty Road							\$ 763,000	\$ 763,000
South Fork Dogfish Creek Restoration Wilderness Park Segment							\$ 251,000	\$ 251,000
North Viking Way Regional Facility							\$ 926,000	\$ 926,000
South Viking Way Regional Facility							\$ 434,000	\$ 434,000
Noll Road Regional Detention Facility							\$ 1,052,000	\$ 1,052,000
Fjord Drive Shoreline Stabilization							\$ 548,000	\$ 548,000
Fjord Drive/Lemolo Drive Drainage and Shoreline Stabilization							\$ 155,000	\$ 155,000
Bjorgen Creek Culvert Replacement							\$ 158,000	\$ 158,000
Haugen Street Storm Drainage System							\$ 158,000	\$ 158,000
Subtotal Not Scheduled	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,268,000	\$ 5,268,000
TOTAL CIP	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -	\$ 5,268,000	\$ 6,072,000

SUMMARY OF SYSTEM DEFICIENCIES

Evaluation of the existing system consisted of interviewing City engineering staff, field review of existing facilities with maintenance staff, review of previous reports, and evaluation of regulatory requirements.

Primary deficiencies consist of localized flooding problems and compliance with NPDES Phase II permit record keeping and program administration requirements. Capital improvement projects and programmatic changes have been identified as part of this stormwater plan update to address these deficiencies. With these improvements, the City's stormwater system appears sufficient to support growth that would occur over the next 20 years.

FINANCIAL PLAN

The purpose of the financial plan is to evaluate current and recent historical costs and revenues and determine, based on reasonable assumptions, whether the City can implement the recommended O&M and CIP while maintaining the stormwater user rates at existing levels. The fiscal planning period for this analysis is the six years from 2008 through 2013.

Existing Revenues and Costs

The primary source of revenue is the collection of the monthly user fee which is assessed based on an Equivalent Residential Unit (ERU). The fee is currently \$7.50 per ERU per month. Monthly user fees account for about 92 percent of revenue. Investment interest, building permits, fines, and other revenues account for the remaining eight percent of the annual revenue. Total revenue in 2007 from all sources was \$699,000.

Expenditures in 2007 were \$753,000, with administration costs accounting for about 50 percent of the total expenditures. On average, capital expenditures accounted for about 30 percent of the total annual expenditures during the 2000-2007 period.

Estimated Future Revenue and Costs

Costs associated with the stormwater program are expected to increase during the next six years in order to comply with NPDES permit requirements, as well as implement planned capital improvement projects. Cost increases are associated with additional O&M, labor, equipment and supplies, as well as administrative costs to better manage and maintain the existing systems. Between 2008 and 2013, annual costs are expected to range between approximately \$700,000 and \$1,000,000. Table ES-4 summarizes costs, revenues and overall financial status.

Table ES-4 shows annual costs exceeding revenues and declining capital reserves over the 6 year CIP schedule. NPDES permit compliance requirements obligate the City to implement expanded operations, maintenance and education elements, which are likely to further increase costs and further decrease revenue that could be available for capital projects.

Given existing capital and operating fund reserves, existing rates and future revenues appear adequate to support development and implementation of the O&M and administrative program required under the NPDES permit, as well as implement a baseline 6-year CIP of approximately \$804,000. Under the baseline CIP, revenues are sufficient to cover expected costs during the 2008 through 2013 period, and no increase in rates appears necessary.

RECOMMENDATIONS

The following recommendations summarize the key findings and recommendations associated with this plan update:

- Develop a stormwater maintenance manual for City stormwater facilities and roads, as well as a Stormwater Pollution Prevention Plan for each of the City's maintenance facilities.
- Continue to participate in the Kitsap Peninsula Clear Water Cooperative to develop a public education and information program.
- Continue to work with the KCHD to develop and implement an on-going program to monitor and identify illicit connections to the stormwater system.
- Complete an update to the stormwater facility inventory and update the inspection record database by the end of 2009.
- Develop and implement an electronic database to track maintenance activities and requirements.
- Revisit the six-year CIP no less than every two years to reassess priorities and monitor implementation status.
- Establish a 0.5 FTE engineering position within the stormwater program that would be responsible for ensuring the City meets requirements required by Ecology and the NPDES permit program.
- Reassess program financial status in 2012 after full implementation of the NPDES permit to determine costs and revenue requirements.



Table ES-4. City of Poulsbo Stormwater Utility Fund Financial Summary

Fund Element				Projected					
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Capital									
Capital Projects ¹	\$ 323,800	\$ 977,000	\$ 157,000	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -
Total Capital Costs	\$ 323,800	\$ 977,000	\$ 157,000	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -
Fund Balances									
Operating Fund	\$ 1,086,829	\$ 1,222,200	\$ 1,526,200 ⁵	\$ 526,000	\$ 526,000	\$ 526,000	\$ 526,000	\$ 226,000 ⁶	\$ 226,000
Capital Reserve	\$ 526,600	\$ 369,900	\$ 100,000	\$ 1,006,000	\$ 912,000	\$ 479,000	\$ 390,000	\$ 596,000	\$ 596,000
Total Fund Balance	\$ 1,613,429	\$ 1,592,100	\$ 1,626,200	\$ 1,532,000	\$ 1,438,000	\$ 1,005,000	\$ 916,000	\$ 822,000	\$ 822,000
Revenues									
Service Charges ²	\$ 562,800	\$ 655,800	\$ 699,000	\$ 650,000	\$ 700,000	\$ 733,978	\$ 769,605	\$ 806,962	\$ 846,132
Restricted Revenues	\$ 18,500	\$ 41,562	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Total Revenues	\$ 581,300	\$ 697,362	\$ 704,000	\$ 655,000	\$ 705,000	\$ 738,978	\$ 774,605	\$ 811,962	\$ 851,132
Expenses									
Operation & Maintenance ³	\$ 286,600	\$ 739,000	\$ 682,000	\$ 716,100	\$ 751,905	\$ 789,500	\$ 828,975	\$ 870,424	\$ 913,945
NPDES Permit Implementation ⁴	\$ -	\$ -	\$ -	\$ 25,000	\$ 50,000	\$ 108,000	\$ 113,400	\$ 119,070	\$ 125,024
Total Expenses	\$ 286,600	\$ 739,000	\$ 682,000	\$ 741,100	\$ 801,905	\$ 897,500	\$ 942,375	\$ 989,494	\$ 1,038,969
TOTAL STORMWATER UTILITY BALANCE	\$ 1,584,329	\$ 573,462	\$ 1,491,200	\$ 1,445,900	\$ 1,341,095	\$ 846,478	\$ 748,230	\$ 644,468	\$ 634,163

Notes

1. Refer to Table ES-3 for breakdown of CIP costs and schedule.
2. Service charges for period 2008 through 2013 based on average 1.8% growth per year, and 3.0% CPI adjustment per year.
3. Operation and maintenance costs estimated to increase 5 percent per year.
4. NPDES permit related costs reflect phased implementation, and 5% increase per year after full program implementation.
5. Transfer \$1,000,000 from Operating Fund to Capital Fund in 2008.
6. Transfer \$300,000 from Operating Fund to Capital Fund in 2012.

1. INTRODUCTION

1.1 PURPOSE AND SCOPE

The City of Poulsbo (City) owns, operates and maintains a stormwater collection, conveyance, and treatment system that serves approximately 2.5 square miles within the city limits (Figure 1-1). The system consists of gravity collection ditches and pipelines that collect stormwater primarily from impervious surfaces such as roads, parking lots, and buildings, and conveys it to natural drainage features such as streams and creeks, which eventually discharge to Liberty Bay. Water quality treatment and water quantity detention structures are interspersed throughout the system, many of which are privately owned and maintained.

The City's stormwater system has evolved over time to meet development needs and regulatory requirements. More stringent requirements associated with new federal and state stormwater management regulations have placed additional requirements on the City's stormwater management program. In response to both existing and future needs, the City retained Parametrix, Inc. to prepare an update to the 1993 Comprehensive Surface Water Management Plan and an associated 1998 update.

1.2 GOALS AND OBJECTIVES

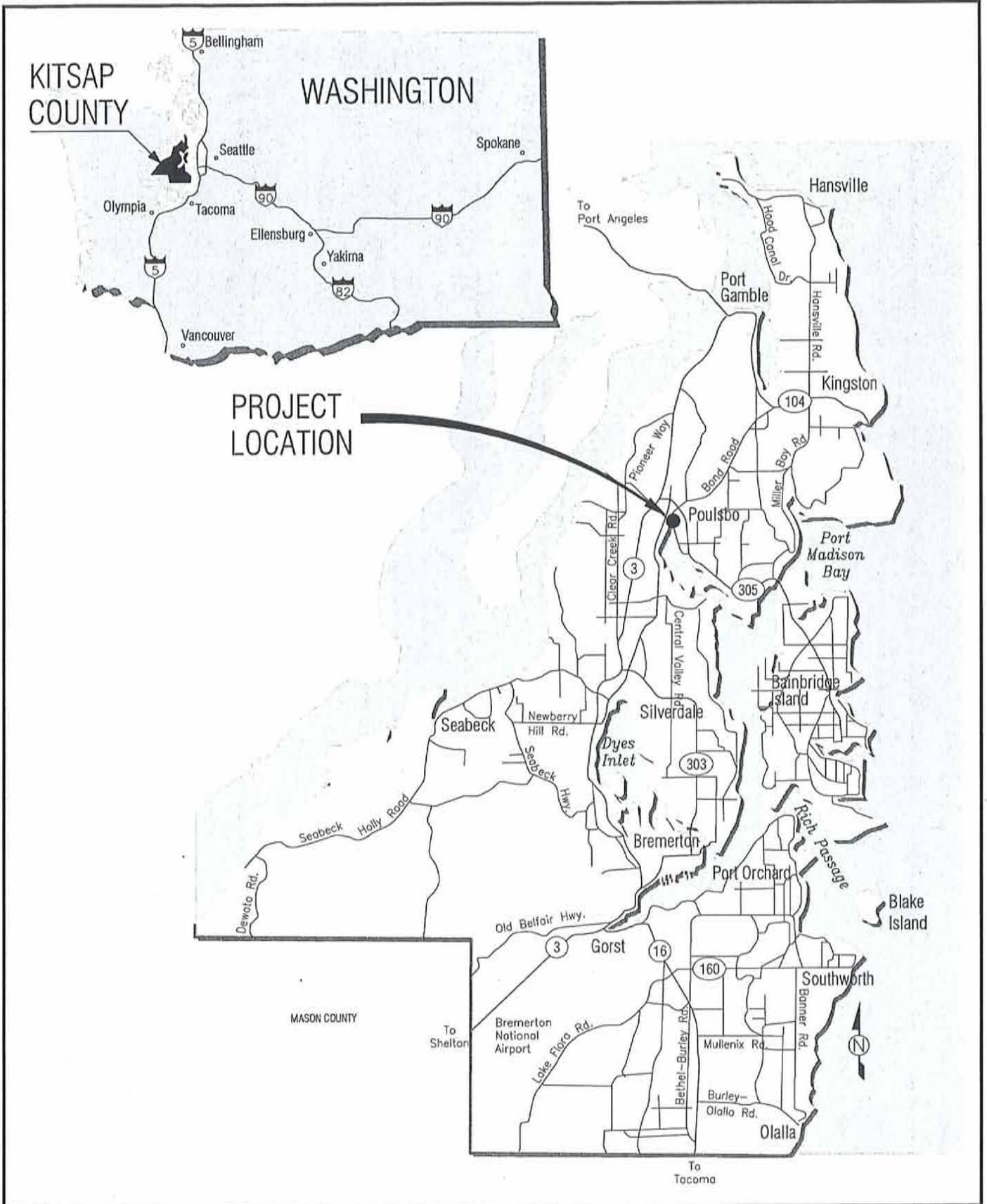
The goal of the 2008 plan update is to identify the general status of the stormwater system, system deficiencies, and actions needed to comply with applicable regulatory requirements. Specific objectives of the plan consist of the following:

- Identify flooding, water quality and erosion control problems, and recommend capital projects to address these problems.
- Evaluate requirements and compliance strategies necessary to meet conditions of the Phase II National Pollutant Discharge Elimination System (NPDES) Stormwater Permit.
- Evaluate operations and maintenance (O&M) needs and recommend a long-term O&M program.
- Evaluate financial status of the stormwater utility and recommend capital improvements, maintenance, and operation plans obtainable under the present financial rate system.

The objective of this plan update is to provide information that will help to provide an affordable and acceptable level of service to the residents of Poulsbo and the community.

1.3 PREVIOUS STORMWATER MANAGEMENT PLANS

Two previous documents have been prepared that address stormwater management in the City of Poulsbo. They are the Comprehensive Surface Water Management Plan, prepared by R. W. Beck in 1993, and the Comprehensive Stormwater Management Plan Update, prepared by Economic and Engineering Services, Inc. in October 1998. Each of these documents is briefly discussed below.



**Figure 1-1
City of Poulsbo
Location Map**

1.3.1 1993 Comprehensive Surface Water Management Plan

This plan was funded by the City and by the Washington State Department of Ecology (Ecology) under the Flood Control Assistance Account program. The plan examined the existing surface water management system with primary focus on water quantity and quality control as well as the preservation and enhancement of environmental resources such as wetlands, riparian corridors, and fisheries. The plan identified existing problems and deficiencies and recommended a combination of policies, ordinances, regulations, public education, increased maintenance activities and capital improvements to help solve the identified problems. It established a Citizen Advisory Committee, developed a drainage system inventory, prepared a hydrologic and hydraulic analysis of the South Fork of Dogfish Creek, developed public education programs to increase the understanding and awareness of citizens and business owners, developed a Capital Improvement Program, a Maintenance and Operations Plan, and a financial strategy to support the recommended surface water management program. It also reviewed local, state and federal policies, regulations, and programs relevant to surface water management.

1.3.2 1998 Comprehensive Stormwater Management Plan Update

This plan update was prepared by Economic and Engineering Services, Inc. in October 1998 and reviewed the authority, funding, activities, and regulatory compliance issues associated with the City's stormwater program. It summarized the stormwater program and recommended program refinements to meet minimum regulatory and local responsibilities. Staffing and funding levels were developed to meet the City's growing stormwater, water quality, and water resource obligations and responsibilities.

1.3.3 1980 Comprehensive Storm Drain Plan

This plan, prepared by Roats Engineering in 1980, was the City's first comprehensive planning effort and included an inventory of the City's drainage system, delineation of drainage basin boundaries and flow patterns, development of storm drain design criteria, development of runoff estimates for selected City outfalls, development of a capital improvement program and development of a financial plan.

2. EXISTING STORMWATER MANAGEMENT PROGRAM

2.1 INTRODUCTION

The City of Poulsbo established its stormwater utility program in 1981 in response to the increasing impacts of urban development. The City established a dedicated funding mechanism for stormwater management and located the new function within the City's Public Works Department.

The stormwater utility provides the citizens of Poulsbo and the surrounding community with collection, conveyance, and treatment services in compliance with federal, state and local regulatory requirements. Associated responsibilities include the planning, design and expansion of the utility in support of the short and long term goals of the City, as well as the maintenance, replacement and upgrade of stormwater infrastructure.

The stormwater utility is responsible for the upkeep of drainage conveyances that collect and discharge surface and storm water. This includes cleaning ditches, cleaning culverts, catch basin and storm detention pond inspection/cleaning, shoulder grading, and addressing localized flooding problems of the public street system.

These services require an adequate, stable funding program. The City has established the basis for such a program, and continued involvement by the public, City Council, and City staff will be required to update and maintain the program. It is the intent of this plan to assist the City in the process of evaluating the effectiveness of the current stormwater management program, and to recommend improvements needed to address regulatory requirements and/or system deficiencies.

2.2 OPERATION AND MAINTENANCE

The City's stormwater program is staffed by two full-time equivalent (FTE) O&M positions. Support from within the City, including the Director of Public Works for management and technical direction, and administrative support, amounts to the equivalent of another 0.25 FTE. Policy, planning, capital and technical decisions are made by the Director of Public Works.

Stormwater maintenance is provided by the City's Utility Maintenance Crew. Annual stormwater maintenance has historically consisted primarily of ditch cleaning, inlet cleaning, and culvert repair, using equipment and vehicles from the Street Department.

2.3 CAPITAL IMPROVEMENTS

Capital improvements over the 1998 to 2005 period have generally focused on smaller infrastructure replacement and upgrades, and equipment purchases. More recent significant capital improvement projects included purchase of a new vector truck for system maintenance in 2006, and construction of the new Caldart Regional Detention Facility in 2006. A primary objective of this plan update is to prepare an updated capital improvement plan (CIP) that will guide implementation of new stormwater capital facilities.

2.4 EXISTING POLICIES, REGULATIONS AND ORDINANCES

The City of Poulsbo currently uses the 1992 Stormwater Management Manual for the Puget Sound Basin, published by Ecology, and the 1997 Kitsap County Stormwater Management Manual as the technical basis for managing stormwater from new development within the

City. In the case of conflict between these two technical documents, the more stringent applies.

3. EXISTING CONDITIONS AND FACILITIES

3.1 INTRODUCTION

The existing drainage system consists of a network of natural features and constructed facilities that collect, convey, treat and discharge surface water. The natural drainage features include streams, wetlands, and Liberty Bay. These features provide valuable environmental resources including fish and wildlife habitat and recreational and commercial opportunities. The constructed facilities include pipe systems, culverts, ditches, bioswales, underground detention vaults, and other quantity and quality control facilities.

3.2 STUDY AREA DESCRIPTION

The Growth Management Act (GMA) requires, among other things, consistency between land use and utility plans and their implementation. This chapter demonstrates the compatibility of the Stormwater Management Plan with other plans, identifies the designated land uses within the existing and future service area, and identifies population projections within the planning area.

3.2.1 Service Area

The City of Poulsbo is located adjacent to Liberty Bay, which is a portion of Puget Sound in central Kitsap County. Figure 3-1 shows the City limits and the urban growth area (UGA) approved by Kitsap County and Poulsbo. The Poulsbo stormwater utility service area generally coincides with the UGA. The City and County, through the comprehensive planning process completed by Kitsap County in 2006, have designated the Poulsbo UGA as shown in Figure 3-1.

Most of the land area within the City limits and UGA is designated for residential use. Approximately 65 percent of the land area within the City limits and approximately 93 percent of the land area within the UGA is designated for residential use. Commercial use accounts for approximately 22 percent of the land area within the City limits and less than 2 percent of the land area within the UGA. The remaining land area is designated for business park, light industrial, open space, parks, conservation (environmentally sensitive areas), and public schools uses. There are no significant industrial or manufacturing uses in the Poulsbo area.

3.2.2 Climate

The average annual precipitation for Poulsbo is about 37 inches and the average annual temperature is approximately 60°F. The climate is heavily influenced by Poulsbo's proximity to the Pacific Ocean. Maritime air has a moderating influence on landward temperature in both winter and summer. The prevailing wind is from the south or southwest in fall and winter, gradually shifting to west or northwest in late spring and summer. There is a well-defined dry season in summer and a rainy season in winter characterized by prolonged periods of moderate rainfall and cloudiness.

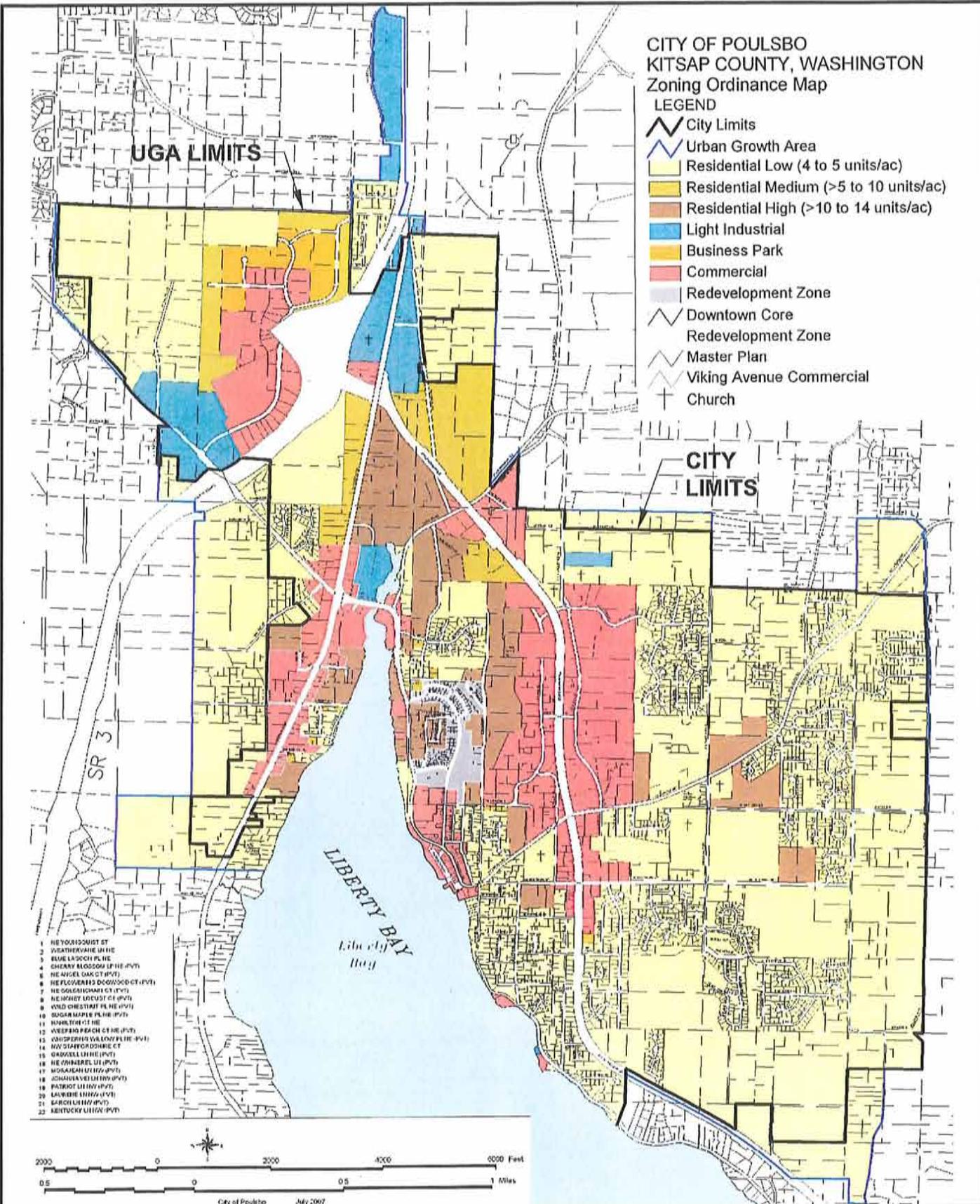
3.2.3 Topography, Geology, and Critical Environmental Areas

Poulsbo is typical of Kitsap County, with numerous hills and valleys, streams, and marine waterfront (Figure 3-2). Elevations range from sea level to 440 feet, with moderate to steep slopes prevalent. Two ridges run along each side of Liberty Bay and gradually rise in elevation to the north, accentuating the general topographical trend within Poulsbo.

**CITY OF POULSBO
KITSAP COUNTY, WASHINGTON
Zoning Ordinance Map**

LEGEND

- City Limits
- Urban Growth Area
- Residential Low (4 to 5 units/ac)
- Residential Medium (>5 to 10 units/ac)
- Residential High (>10 to 14 units/ac)
- Light Industrial
- Business Park
- Commercial
- Redevelopment Zone
- Downtown Core Redevelopment Zone
- Master Plan
- Viking Avenue Commercial
- Church



UGA LIMITS

CITY LIMITS

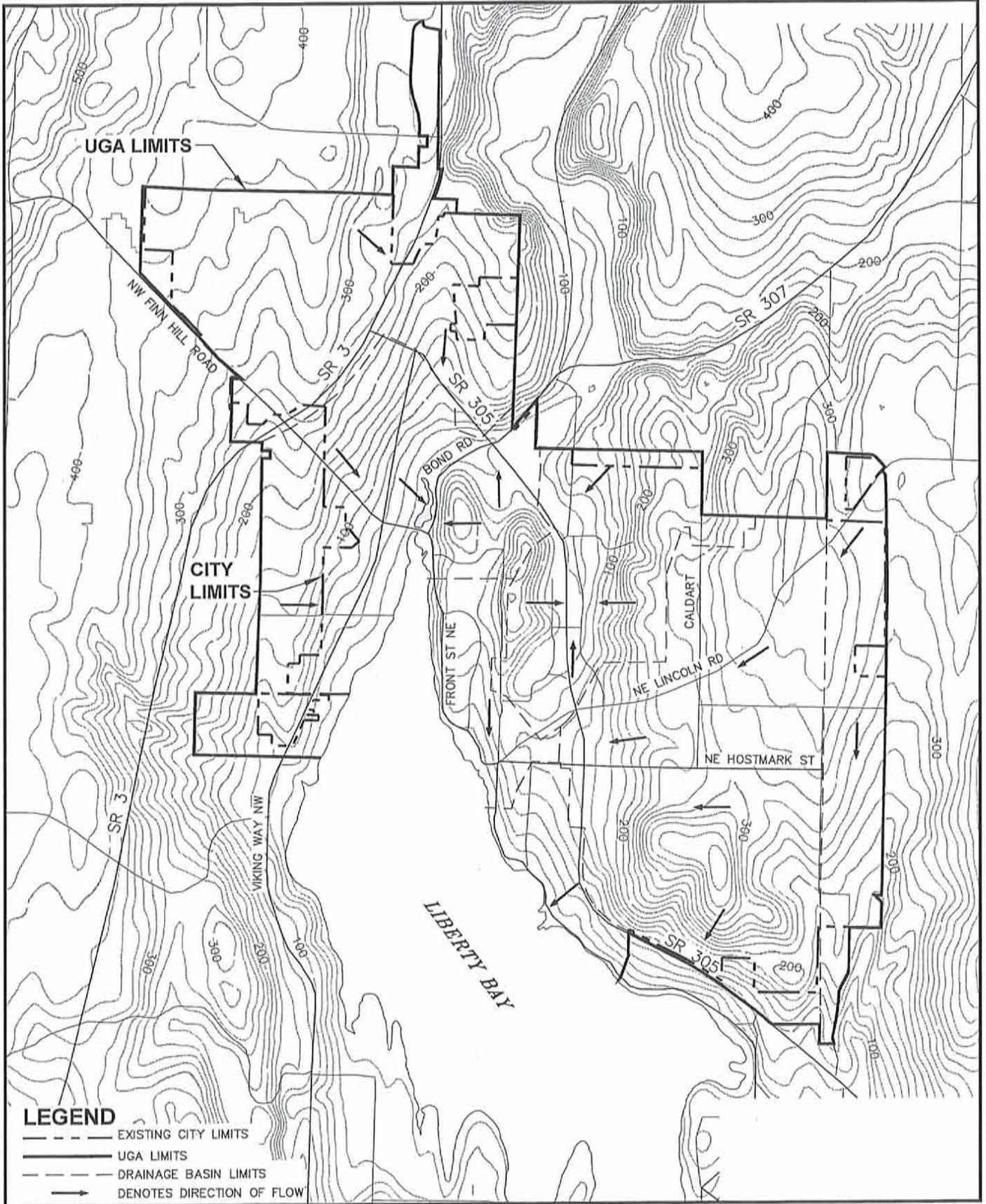
- 1 NE YOURIQUIST ST
- 2 WETHERBURN LN NE
- 3 BLUE LARCH PL NE
- 4 CHERRY BLOSSOM LP NE (PVT)
- 5 NE ANGEL OAK CT (PVT)
- 6 NE FLORENCE DOGWOOD CT (PVT)
- 7 NE GOLDENHORN CT (PVT)
- 8 NE HONEY LUCIST CT (PVT)
- 9 WIND CHESTNUT PL NE (PVT)
- 10 SUGAR MAPLE PL NE (PVT)
- 11 HUNTERTON CT NE
- 12 WEEPING BEACH CT NE (PVT)
- 13 WINDSPRING VALLEY DR NE (PVT)
- 14 NW STAFFORDSHIRE CT
- 15 GRAYGULL LN NE (PVT)
- 16 NE CRIMMEL LN (PVT)
- 17 WOODBARK LN (PVT)
- 18 JOHNSON AVE LN (PVT)
- 19 PATRIOT LN NW (PVT)
- 20 LAUREN HILLS LN (PVT)
- 21 GARDEN LN (PVT)
- 22 KENTUCKY LN (PVT)

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DATE: Jun 08, 2008 -- 4:22pm PLOTTED BY: fromkaat
IMAGES: poulsbozoningmap2.jul07
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Parametrix DATE: Jun 08, 2008 FILE: BR2237026P01T01F-3

**Figure 3-1
City of Poulsbo
Land Use Map**

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 DATE: Jun 08, 2008 - 4:46pm PLOTTED BY: frankset
 IMAGES: FINN HILL SS AS-BULK-1 | XBR2237RD | XBR2237-Design hatch
 XREF'S: XBR2237-topo | XBR2237RD



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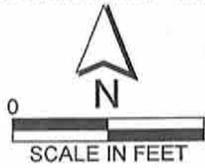


Figure 3-2
City of Poulsbo
Topography and
Drainage Basins

Surface soils in the Poulsbo area consist of Vashon Till (hardpan) with a depth ranging from 20 to 40 inches. The majority of soil within the UGA is composed of the Poulsbo-Ragnar unit, which is composed of a gravelly sandy loam. The soil profile is nearly level to moderately steep, moderately deep, and moderately well drained on broad uplands.

Geologically critical areas are places highly susceptible to erosion, landslides, earthquakes, or other geologic events. In Poulsbo, the most hazardous of these areas is typically found along the marine shoreline and stream ravines. In many cases, these areas may be extremely desirable for development because of their scenic views or water and beach access, but their development may endanger people, property, and surface water resources.

Environmental critical areas within the study area include the Liberty Bay marine shoreline; Dogfish Creek, which drains into Liberty Bay at the northern end of the bay; the wetlands along the South Fork of Dogfish Creek, which follows SR 305 from Bond Road south, and steep slopes adjacent to Liberty Bay.

The GMA requires that critical areas be designated and protected. Critical areas include aquifer recharge areas, wetlands, and steep slopes. Appendix A contains the State Environmental Policy Act (SEPA) checklist that addresses critical areas.

3.2.4 Flood Areas

Areas designated as 100-year and 500 year flood zones are located along the western and eastern sides of Liberty Bay and along Dogfish Creek, as shown on Figure 3-3. A 100-year storm event has a one percent chance of occurring each year, although this type of storm may occur more frequently. The areas portrayed in Figure 3-3 were identified by FEMA from aerial photos and topographic maps.

3.2.5 Water Utility

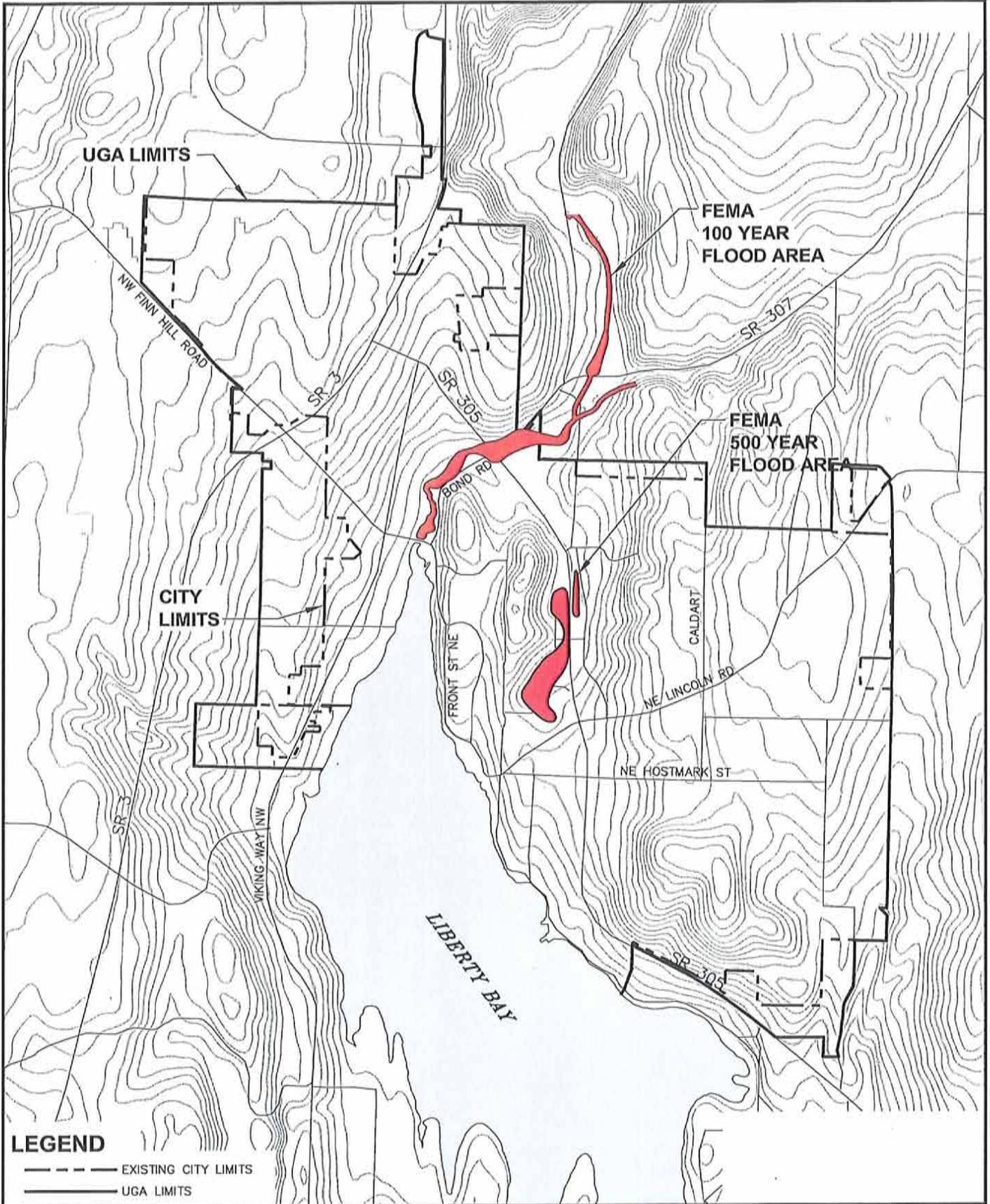
The City of Poulsbo owns and operates the water utility, as well as a sewer utility. The City's Comprehensive Water Plan was completed in 2007. Water service is provided to essentially the same customer base and area as stormwater service. Poulsbo has an intertie at Finn Hill Road to the Kitsap County Public Utility District (KCPUD) No. 1 System. The City has five deep wells, and all are chlorinated and fluoridated. Table 3-1 summarizes the five wells.

Table 3-1. Poulsbo Water Supply Wells

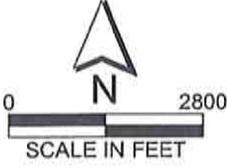
Well	Average Production (gpd*) for 2005
Big Valley Well No. 1	148,200
Big Valley Well No. 2	357,600
Pugh Well	216,300
Lincoln Well	171,300
Westside Well	Online in 2006. No data available

* gpd = gallons per day

Source: City of Poulsbo Water Plan (2007)



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**Figure 3-3
City of Poulsbo
Fema 500 and 100 Year
Flood Areas**

3.2.6 Sanitary Sewer Utility

The City of Poulsbo Comprehensive Sanitary Sewer Plan was completed in 2008 (Parametrix, 2008). The City's sewer collection system was initially constructed during the 1930s and 1940s. In 1942, a primary wastewater treatment plant was constructed near the City's business district. The City-owned treatment plant discharged to Liberty Bay until the late 1970s. In 1978, the Central Interceptor was constructed along SR 305 to transport flows to facilities owned by Kitsap County. The County facilities transport wastewater from Lemolo to the Central Kitsap Wastewater Treatment Plant (CKWWTP) in Brownsville. The flow crosses Liberty Bay via two 12-inch gravity siphons and is routed south to the CKWWTP.

The collection system contains a variety of pipe materials including concrete, PVC, and ductile iron. Over time, sewers in the oldest part of the City have been replaced, which has reduced infiltration/inflow. Eight pump stations transport flow throughout the collection system. The existing system transports flow to the Kitsap County Metering Station at Johnson Road and Peterson Way. From that point, flow is directed to the CKWWTP through County conveyance facilities.

Primary deficiencies consist of high inflow and infiltration (I&I), and potential capacity constraints in the downstream conveyance system owned by Kitsap County. Capital improvement projects have been identified to address deficiencies, including the Central Poulsbo I&I Reduction project, a new inflow reduction program, and increasing the capacity of the Lemolo pipeline that conveys flow under Liberty Bay to the CKWWTP.

3.3 EXISTING DRAINAGE SYSTEM

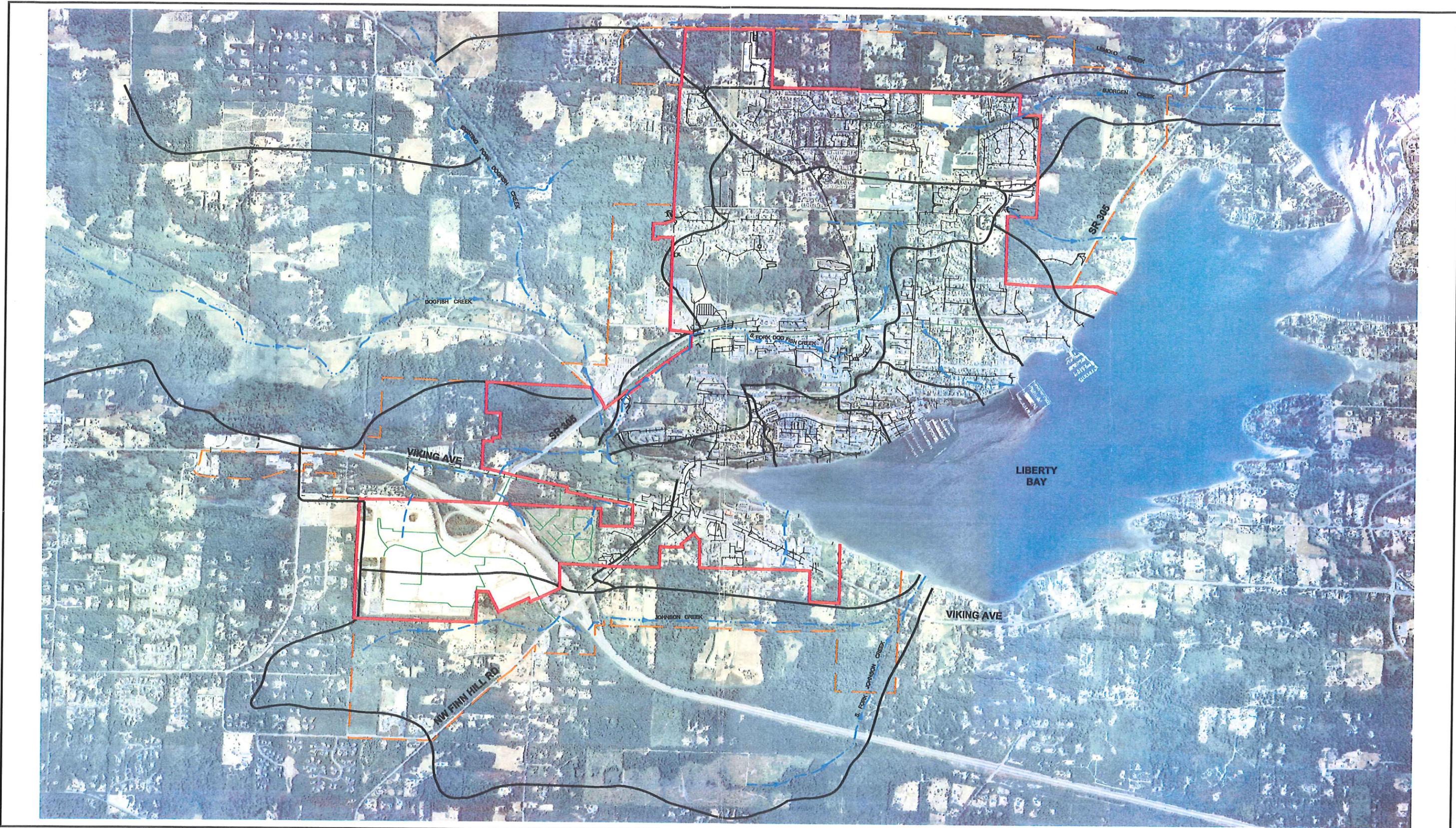
3.3.1 Natural System

The natural drainage system consists of the Dogfish, Lemolo, Johnson and Bjorgen Creek basins, as well as several smaller basins that discharge directly to Liberty Bay. Existing drainage conditions and basin limits are shown in Figure 3-4.

The Dogfish Creek basin, which comprises a 4,700-acre watershed, flows through Poulsbo. The main channel flows in a southerly direction draining the Big Valley area. The East Fork flows in a southwesterly direction draining the Lincoln Hill and Bond Road areas. The South Fork flows north and northwest along and adjacent to State Highway 305. The South Fork is located entirely within the City limits and, even though the smallest of the branches, is therefore the most significant natural drainage feature with respect to this plan. Since it drains a developed and urbanized area, it is subject to erosion, periodic flooding, and water quality concerns.

The headwaters of the South Fork begin at the North Kitsap High School (NKHS) east of Caldart Avenue. Flow is concentrated in a deep and eroded channel near the intersection of Caldart Avenue and Hostmark. The stream flows west to State Highway 305 where it crosses the highway, Lincoln Road, and 8th Avenue in culverts. It then flows north along Highway 305, crossing it several times, until it joins the main Dogfish Creel channel near Bond Road, just prior to discharging into Liberty Bay.

The southeastern corner of the City of Poulsbo, located approximately between Noll Road and Caldart Avenue, drains to the south into Bjorgen Creek, which flows south across Highway 305 and discharges into Ne Si Ka Bay. The western portion of the City, including most of the Olhava development, generally drains south to Johnson Creek.



Parametrix DATE: Jun 08, 2008 FILE: BR2237026P01T01F-06

LEGEND:

- | | | | |
|---|-----------------------------------|---|--------------------------------|
|  | CITY LIMITS |  | PERENNIAL STREAM |
|  | URBAN GROWTH AREA |  | INTERMITTENT STREAM/OPEN DITCH |
|  | EXISTING STORM DRAINAGE UTILITIES |  | BASIN BOUNDARY |

Figure 3-4
City of Poulsbo
Existing Drainage Conditions

3.3.2 Constructed System

The City maintains a Comprehensive Stormwater Map of the entire constructed system. This map shows lengths and sizes of many of the more recently installed systems. As new developments are planned and constructed, the stormwater map is updated.

The collection system consists of approximately 19 miles of collection system mains and approximately four miles of open drainage ditches, and 1,270 catch basins that provide for the collection and conveyance of storm and surface water runoff. The KCHD has identified 51 stormwater discharge points.

The treatment system includes the operation and maintenance of more than 40 detention systems and more than 20 treatment facilities. Examples of water quality treatment facilities are wet ponds, oil water separators, and bioswales. Examples of water quantity detention structures are detention ponds and underground vaults.

Public and private stormwater facilities are summarized in Table 3-2. A listing of specific facilities is provided in Appendix B.

Table 3-2. Summary of Stormwater Facilities, City of Poulsbo

Facility Type	No. City Owned Facilities	No. Privately Owned Facilities	Total No. Facilities
Above Ground Detention	12	17	29
Underground Detention	10	9	19
Bioswale	17	10	27
Oil water Separator	1	5	6
Control Structure	31	42	73
Totals	71	83	154

The City is currently in the process of updating the stormwater facility inventory. This update is expected to be complete in late 2008 or 2009.

3.4 STREAM AND MARINE WATER QUALITY

A report on stream and marine water quality in the Liberty Bay watershed was prepared by the KCHD in 2006 (Appendix C). Stream water sampling was performed at Johnson, Dogfish, SFDC and Bjorgen Creeks, and at four location in Liberty Bay. Monitoring parameters consisted of fecal coliform bacteria, pH, dissolved oxygen and temperature. Monitoring results and conclusions are provided in the report contained in Appendix C. In general, the KCHD concluded that stream water quality was typically poor, primarily due to violations of the fecal coliform water quality standard. Marine water quality near Poulsbo was also moderate to poor, primarily due to the effect of stream water discharges.

3.5 OUTFALLS AND STORMWATER WATER QUALITY

The City contracted with the KCHD in 2002 through 2005 for stormwater outfall inventory, stormwater system dry and wet weather water quality monitoring, and detection and elimination of illicit discharges to the stormwater system. The report City of Poulsbo Nonpoint Pollution Impacts to South Fork of Dogfish Creek (July 2002) describes the first phase of meeting the NPDES elements for the Dogfish Creek Drainage Basin. The City of

Poulsbo Stormwater Outfall Inventory and Illicit Discharge Detection and Elimination Program report summarizes the second phase of meeting the NPDES elements, expanding into the Bjorgen Creek basin and Liberty Bay shoreline, along with additional work in the Dogfish Creek Basin. This report is provided in Appendix C.

3.5.1 Outfall Inventory

A total of 51 stormwater discharge points were identified by the KCHD in the City stormwater drainage system. Twenty-three outfalls discharge to the main stem of Dogfish Creek and the South Fork of Dogfish Creek, 19 outfalls discharge to Liberty Bay, six outfalls discharge to Bjorgen Creek and three outfalls discharge to Johnson Creek.

The outfall designations, location descriptions, water body impacted by the discharge and latitude/longitude, and outfall diameter/material are shown in Appendix C. Maps of the stormwater outfall location are also shown in Appendix C.

3.5.2 Dry Weather Stormwater Monitoring

Stormwater outfalls were sampled by the KCHD during the dry weather survey if flow was present. Samples were analyzed for parameters indicative of car or laundry washing (surfactants), industrial or commercial waste water (pH, hardness, copper, and zinc), poor construction erosion control (turbidity), excessive fertilizers (nitrates and phosphorus) and human or animal sewage (fecal coliform bacteria and ammonia). Flows were present at 15 of 51 (29 percent) stormwater discharge points. All were sampled and analyzed. Complete water quality results are shown in Appendix C and are summarized as follows:

- Seven of 15 (47 percent) flows were positive for detergents. All were traced to car washing from residential and commercial areas.
- Indicators for industrial or commercial waste water were present at two sites. Elevated zinc was detected at PSW01 and PSW36. These two stormwater systems were inspected visually and no unusual discharges were observed.
- Nitrate-nitrogen concentrations were elevated at outfall PSW 24 which collects drainage from a residential neighborhood located near the Poulsbo Yacht Club. Results are likely linked to use of soluble garden fertilizer.

Four discharge points had high fecal coliform and were visually inspected and sampled for indications of a sanitary sewer connection.

3.5.3 Wet Weather Stormwater Monitoring

A preliminary assessment of stormwater fecal coliform pollution was conducted by the KCHD at stormwater outfalls during storm events in fall of 2003 and 2004. Three sampling events were performed during storm events of greater than 0.5 inch rainfall for the 24-hour period during the sampling event. The preliminary assessment found that fecal coliform concentrations in City stormwater are typical of the range found in stormwater from other local studies such as the Fecal Coliform Total Maximum Daily Load study from the Dyes and Sinclair Inlet watersheds. Appendix C shows the results for wet weather sampling of stormwater outfalls.

3.5.4 Pollution Identification and Control

Fecal coliform bacteria are an indicator of human and animal waste. Dogfish Creek and Liberty Bay are listed on the Washington State list of Impaired Water Bodies (303d) for fecal

coliform bacteria. The majority of Liberty Bay is classified by the Washington State Department of Health as prohibited to shellfish harvest due to fecal pollution.

Fecal pollution sources include failing onsite sewage systems, wild, domestic and agricultural animal waste, inadequate sanitary sewer infrastructure, illegal dumping, and stormwater. City stormwater discharges to Liberty Bay, the South Fork of Dogfish Creek and Bjorgen Creek are contributors of fecal pollution.

In response to the fecal pollution problem, the KCHD completed the Dogfish Creek Restoration Project in 2004. The project included surveying for animal waste and failing onsite sewage systems. A majority of the project was located in unincorporated Kitsap County. However, the South Fork of Dogfish Creek is located in the City. The City funded surveying the remaining septic systems located in the City limits which may contribute fecal pollution to South Fork Dogfish Creek. Pollution source correction performed by the residents of the Dogfish Creek basins has resulted in significant reductions in fecal coliform levels, in both the main stem and the South Fork of Dogfish Creek.

4. REGULATORY REQUIREMENTS

This chapter describes the requirements of the NPDES Phase II Stormwater Regulations, and the general status of the City's compliance with program requirements.

4.1 INTRODUCTION

The Environmental Protection Agency (EPA) NPDES program was developed to help reduce or eliminate the discharge of pollutants from point sources such as industries, large municipalities, and other facilities that discharge directly to surface water. The NPDES Phase II Regulation extended coverage of the NPDES program to certain "small" municipal separate stormwater sewer systems (MS4s). Phase II communities are identified under the rules as jurisdictions that:

- Own and operate a storm drain system
- Discharge to surface waters
- Are located in urbanized areas
- Have a population greater than 1,000 people

The focus of these requirements is to develop, implement, and enforce a stormwater management program designed to reduce the discharge of pollutants from the stormwater system to surface water or groundwater sources.

Ecology, who is responsible for compliance with NPDES requirements in Washington State, has determined that the City of Poulsbo operates a MS4. A permit application and Notice of Intent for Stormwater Discharge was submitted to Ecology in October 2002. Ecology finalized the NPDES Phase II permit in January 2007. A copy of the City's 2007 Stormwater Management Program report for the NPDES Permit is provided in Appendix D.

4.2 MINIMUM CONTROL MEASURE REQUIREMENTS

The NPDES permit includes five control measures that communities with MS4s must implement as part of their stormwater management program under the NPDES Phase II permit program.

The following sections discuss the general requirements of each of these six minimum control measures, status of the City's compliance with the existing minimum control measures, and additional measures that should be completed by the City to meet Phase II permit requirements. The 2007 Stormwater Management Program Report (Appendix D) provides additional detail on the status of the City's compliance with specific permit requirements.

4.2.1 Public Education and Outreach on Stormwater Impacts

The NPDES permit requires public education programs to distribute educational literature to the community and conduct outreach activities about the impacts of stormwater discharges on water bodies and how the public can help reduce pollutants in stormwater. The public education program must inform citizens, business, technical staff and developers about steps to be taken to help reduce stormwater pollution including proper use and disposal of garden chemicals (fertilizers, pesticides, etc.), protecting and restoring riparian (river bank, stream bank) vegetation, low impact development techniques and proper disposal of oil or household hazardous waste (cleaning chemicals, paints, solvents, etc.).

Methods to inform and educate the public regarding stormwater may include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, grade school educational programs, and community-based project relating to stormwater protection.

4.2.1.1 Current Status

The City has entered into an Interlocal Agreement with the Kitsap Peninsula Clear Runoff Collaborative (KPCRC) to develop a public education plan that will meet NPDES permit requirements. The agreement is for a four year period, and will enable the City to pool resources with other Kitsap County jurisdictions in developing and implementing a public education and outreach plan. The plan will identify preferred public information methods, frequency, implementation schedule, and costs.

4.2.2 Public Involvement/Participation

The permit requires that the public be included in the development, implementation, and review of the stormwater program. Public involvement/participation may include serving as a citizen representative on a stormwater management panel, attending public hearings, working as a citizen volunteer to educate other individuals about the program, or participating in volunteer monitoring efforts. Annual reports describing status of the City's program are a required element. The City's 2007 Annual Report is included in Appendix D.

4.2.2.1 Current Status

The City periodically holds public meetings to gather input relating to the existing stormwater program and proposed upgrades and/or revisions to the program that could affect the general public. These meetings include City Council hearings and workshops for review and comment on Stormwater Comprehensive Plan updates and NPDES Annual Reports. The City supports volunteer and community service group activities design to protect the environment. This support includes labor, equipment, and materials. The City's participation in the KPCRC will also ensure compliance with this requirement.

4.2.3 Illicit Discharge Detection and Elimination

The permit requires the City to develop, implement, and enforce a program to detect and eliminate illicit discharges to City owned storm drain system. The program must include, at a minimum, the following:

- Develop a storm sewer system map including all outfall locations and names/location of all water bodies where discharge from outfalls occurs.
- Develop and adopt an ordinance that, to the extent allowable by law, effectively prohibits non-stormwater discharges into the storm sewer system and implements appropriate enforcement action when necessary.
- Develop and implement a plan to detect and address non-stormwater discharges, including illegal dumping, to the storm sewer system.
- Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

To detect and address illicit discharges, the permit also requires that the following be included in the program:

- Procedures for locating priority areas likely to have illicit discharges. This could include visually screening outfalls during dry weather and sampling for select pollutants as part of procedures for identifying priority areas.
- Procedures for tracing the source of illicit discharge. This may include a program to promote, publicize, and facilitate public reporting of illegal connections or discharges.
- Procedures for removing the source of the discharge.
- Procedures for staff training, program evaluation and assessment.

4.2.3.1 Current Status

The City contracted with the KCHD in 2005 to complete a stormwater outfall inventory, conduct a dry and wet weather water quality screening, and survey to detect and eliminate illicit discharges to the stormwater system. The results of these activities are documented in the City of Poulsbo Stormwater Outfall Inventory and Illicit Discharge Detection and Elimination Program report provided in Appendix C.

As part of a regional grant-supported program in 2008, the City has partnered with the KCHD to proceed with the second phase of this investigation. This will include establishing priorities for visual inspection of receiving waters prior to February 15, 2010, and field assessments for three high priority water bodies by February 15, 2011.

Through another regional grant-supported program in 2008, the City has also partnered with the Kitsap County Solid Waste Division to conduct site visits whereby businesses in Poulsbo can better understand how their activities impact stormwater quality, and to provide technical assistance to these businesses for better control of stormwater runoff.

4.2.4 Control Runoff from New Development, Redevelopment and Construction Sites

This control measure includes development, implementation, and enforcement of a program to reduce pollutants in stormwater runoff associated with new development, re-development and construction activities. In general, this program must include:

- An ordinance or regulatory mechanism to require runoff control as well as sanctions to ensure compliance.
- Requirements for selection and implementation of best management practices (BMPs).
- Requirements for construction site to control waste such as discarded materials, concrete truck washout, chemicals, litter, and sanitary waste that may impact water quality.
- Procedures for site plan review, which incorporate considerations of potential water quality impacts and use of LID techniques.
- Procedures for receipt and consideration of information submitted by the public.
- Procedures for site inspection, operation and maintenance, and enforcement.

4.2.4.1 Current Status

Through Ordinance No. 96-08, the City of Poulsbo imposes requirements for stormwater management, including development, redevelopment, and construction sites. As a basis for

these requirements, the City follows the design standards adopted by Kitsap County. As Kitsap County adjusts and updates their standards, the City of Poulsbo adjusts and updates accordingly. This helps to ensure a high level of stormwater management, as well as consistency and continuity of performance among jurisdictions in this region. In 2008, it is anticipated that standards for LID techniques will be established to encourage source reduction and help minimize disturbance of native soils and vegetation.

The City has a permitting process which includes plan review, inspection and enforcement. The City's Planning, Building, Engineering and Public Works Departments are involved in the review process. Once a project has been approved, field inspections are conducted during construction. If stormwater management standards are not met, enforcement actions such as stop work orders and compliance schedules are imposed. Final approval is not granted unless all applicable conditions of approval have been satisfied. Refinements to the City's review, inspection, enforcement and tracking activities will be made, to assure full compliance with the NPDES permit prior to August 15, 2009.

The City annually inspects City-owned stormwater facilities, and also has a program for scheduled cleaning of catch basins. Other operations and maintenance activities are conducted on an as needed basis. To fully comply with the August 15, 2009, permit requirement the City will increase its efforts in terms of inspecting privately owned stormwater controls (including BMPs) and documenting maintenance activities. In addition, the City will establish standards regarding required maintenance, and will also establish a regulatory mechanism to identify maintenance responsibilities and enforcement procedures.

4.2.5 Pollution Prevention/Good Housekeeping for Municipal Operations

This requirement is to develop and implement an O&M program that has the ultimate goal of preventing or reducing pollutant runoff from municipal facilities. The program must include employee training to reduce stormwater pollution of maintenance and other facility activities. At a minimum, the following must be considered in program development:

- Maintenance standards activities, schedule, and long-term inspection procedures for all system components and BMPs to reduce pollutants discharges relating to municipal operations.
- Controls for eliminating or reducing the discharge of pollutants from streets, municipal parking areas, maintenance and storage yards and other facilities.
- Procedures for proper waste disposal.
- Methods and procedures to reduce pollutants from lands owned and maintained by the City.

O&M must be an integral part of the stormwater maintenance program, since O&M reduces the risk of water quality issues.

4.2.5.1 Current Status

The City intends to develop an O&M Plan that details operation, maintenance, and inspection protocols for City and private stormwater facilities. Annual inspections of system components are currently conducted by the City. A computerized maintenance management program is being considered to provide for regular inspection and maintenance of the City's storm drain system. Municipal employees responsible for the maintenance of the City's public facilities receive periodic training relating to stormwater pollution prevention.

Currently, documentation of O&M activities is decentralized and incomplete. Prior to February 15, 2010, record keeping for the City's inspections, maintenance and repair activities will be formalized in accordance with permit requirements.

4.3 SUMMARY OF NPDES COMPLIANCE STATUS

The City is in compliance with NPDES requirements and timelines. Table 4-1 summarizes NPDES compliance requirements, schedules and potential implementation costs. The 2007 Stormwater Management Program report (Appendix D) provides detailed descriptions of the City's compliance status and action plan.

Based on the implementation costs identified in Table 4-1, it is likely that the City will need to expand the stormwater program to include a Stormwater Engineer or equivalent by no later than 2009. This staff person would be responsible for ensuring compliance with NPDES permit requirements. Current revenues appear sufficient to fund this position at 0.5 FTE through 2012 or 2013. Refer to Chapter 8 for additional detail on program financial analysis.

4.4 LOW IMPACT DEVELOPMENT

Education regarding the benefits of LID is a requirement of the NPDES permit. Use of LID is also encouraged by Ecology's Stormwater Management Manual. The City is participating, along with other Kitsap County jurisdictions, in development of technical design standards to aid in implementing LID techniques. These LID techniques emphasize storm water management methods that reduce impervious areas, retain vegetation and maximize on-site infiltration. The KHBA is currently leading the LID standard development process, under a grant agreement with Ecology. The City intends to begin implementing LID regulations following completion of the LID technical standards in 2008, and subsequent adoption by Kitsap County.



Table 4-1. Summary of NPDES Permit Compliance Schedule, Status and Estimated Implementation Costs

Permit Element	Year Required					Element of Current City Program?	Estimated Annual Labor Hours					
	2007	2008	2009	2010	2011		2012	2013	Manager	Engineer	Technician	Maintenance
STORMWATER MANAGEMENT PROGRAM (SWMP)												
Cost Tracking		X				No	24	40	40	40		48
Inspection and Enforcement Tracking		X				No	12	24				
Full development and implementation					X	No						
Description of Program Elements					X	Yes						
SWMP ELEMENTS												
Education and Outreach Program												
Public Outreach Program		X				No	8	24	40			
Business Outreach Program		X				No	8	24	40			
Staff and development industry education		X				No	12	24	40			
Public Involvement and Participation												
Advisory Council (Quarterly Mtgs)		X				No	12	24				
Annual Report available to public via website		X				No	2	4				8
Illicit Discharge Detection and Elimination												
Stormsewer system map					X	Yes ¹	8	8	40			
Hotline for spill and illicit discharge reports		X				No	4	4	4			8
Ordinance prohibiting non-stormwater discharges				X		No	8	40				
Staff training program				X		No	8	40	16			
Detection program					X	No	4	24	40		40	
Full program implementation					X	No						
Control of Run-off From New Development												
Ordinance controlling run-off from new development				X		Yes ¹	8	40				
BMP selection and design criteria				X		No	8	40				
Stormwater Permitting and Inspection Process				X		Yes ¹	8	40	40			
O&M compliance program and maintenance standards				X		No	8	40	40		See Note 2	
Annual facility inspections				X		No	8	8	80		See Note 2	
Recordkeeping procedures				X		No	8	8	80			40
Staff training						Yes ¹	8	16	16		16	8
Pollution Prevention and O&M Program for Municipal Operations												
O&M Pollution Prevention Training Program				X		Yes ¹	4	8	8		8	8
Maintenance Standards				X		Yes ¹	8	24				
Annual facility inspections				X		Yes ¹	4	8	40			
Establish maintenance BMPs				X		Yes ¹	4	24				
Staff training				X		Yes ¹	8	8	8		16	8
SWPPPs for maintenance and storage facilities				X		No	4	8	80			
ANNUAL REPORTS												
Program implementation status		X				No	2	8				
Description of compliance activities		X				No	2	8	16			
Evaluation of SWMP		X				No	4	8	16			
Description of Any Monitoring Conducted		X				No	2	8				
Monitoring Plan				X		No	2	8				
Effectiveness Monitoring Plan				X		No	4	8				
Total Hours							214	600	684	120	128	
Total Hours as Percent Full Time (2080 hrs/year)							10%	29%	33%	6%	6%	
Estimated Annual Cost By Staff Position							\$19,260	\$45,000	\$34,200	\$4,800	\$5,120	
Total Estimated Annual Program Staff Cost							\$108,380					

Notes:

1. Current City program partially addresses requirement. Additional costs for monitoring compliance with new standards, record keeping and enforcement.
2. Costs assumes all inspections are conducted by Technician and not Maintenance staff.

5. OPERATION AND MAINTENANCE

5.1 PURPOSE AND SCOPE

This chapter describes the purpose, objectives, and procedures associated with the City stormwater O&M program. The purpose of the O&M program is to establish the minimum requirements for inspection, operation and maintenance of City-owned and private stormwater facilities.

The following are components of the City's stormwater O&M program:

- Inventory of existing City owned and privately owned stormwater facilities
- Description of Preventative Maintenance Procedures (PMPs) that are consistent with current regulatory guidance
- Estimates of O&M costs required to meet minimum recommended O&M requirements

The following sections provide a summary of regulatory considerations, a description of current stormwater facilities, recommended maintenance procedures and schedules, administrative requirements, and the estimated yearly cost for implementing the O&M Plan.

5.2 O&M REGULATORY CONSIDERATIONS

One of the five control measures of the Phase II NPDES permit consists of pollution prevention and good housekeeping, which includes requirements for establishment of a maintenance program and development of stormwater inspection procedures. This chapter describes procedures for meeting the requirements of this minimum control measure.

In addition, stormwater facility maintenance standards have been developed by Ecology and are presented in the Stormwater Management Manual for Western Washington (August 2005). These standards describe procedures for assessing if maintenance is required for stormwater facilities based on the results of periodic inspection. The PMPs included in Appendix E reflect these standards.

5.3 EXISTING O&M PROGRAM

The existing stormwater O&M program consists of the following general elements:

- Periodic maintenance of City owned stormwater facilities including routine inspection
- Response to requests for assistance (customer service) from City residents
- Routine administration including record keeping, contract services, supplies, tax and insurance
- Combined labor of approximately 4,000 hours, or 2 FTE employees
- Annual costs (2007) of approximately \$587,000

Staffing levels and costs have increased significantly since the last Stormwater Comprehensive Plan Update in 1998 (EES 1998). Annual stormwater O&M costs over the 2000 to 2007 period are summarized in Table 5-1.

Table 5-1. Summary of Stormwater O&M Costs, 2000 to 2007

Year	Staffing Level (FTEs)	Administration ¹	Maintenance	Customer Service	Operations	Total Cost
2000	1.5	\$118,700	\$23,600	--	\$23,600	\$165,900
2001	1.5	\$112,300	\$21,000	\$2,000	\$18,900	\$154,200
2002	1.5	\$122,000	\$29,300	\$6,400	\$12,700	\$174,000
2003	2	\$215,300	\$34,600	\$3,200	\$21,000	\$274,100
2004	2	\$240,400	\$12,900	\$4,700	\$57,200	\$315,200
2005	2	\$289,674	\$54,956	\$7,593	\$52,314	\$406,537
2006	2	\$317,407	\$28,724	\$5,516	\$99,483	\$451,130
2007	2	\$375,964	\$13,765	\$500	\$197,283	\$587,512

¹ Includes interfund services, taxes, and depreciation

Table 5-1 shows O&M costs increasing by 90 percent between 2000 and 2004, and increasing by 86 percent between 2004 and 2007. The largest increase has been for administrative costs, which include interfund services, public works administration, taxes, insurance, and depreciation.

The City does not currently have a formal stormwater O&M program that includes routine record keeping of maintenance activities and costs, or an O&M Manual.

5.4 INSPECTION PROGRAM

Stormwater facilities must be routinely inspected to insure proper operation. Routine inspection is needed for both City-owned and private facilities that discharge to the City storm drain system. The list of existing facilities including both City-owned and privately owned facilities are included in Appendix B. This list of facilities is several years old and likely under estimates the total number of facilities. The inventory will be updated based on the inspection program currently planned to be completed in 2008 or 2009.

Inspections of stormwater facilities should be conducted at least semi-annually to insure proper operation and to determine if any problems or potential problem exist. Additional inspections should be conducted following extreme storm events were precipitation exceeds 1-inch of rainfall over a 24-hour period. The need for more frequent inspection of problem facilities will be determined based on the results of the initial two or three inspection rounds.

5.5 OPERATION AND MAINTENANCE PROCEDURES

Preventive maintenance should be conducted to reduce the potential for failure of a stormwater facility. Results of periodic inspections should also be used to assess the need for maintenance. PMPs have been developed for stormwater facilities that are presently operated and maintained within the City of Poulsbo or may be constructed in the near future. These PMPs include inspection as well as physical maintenance components. The following PMPs are included in Appendix E and have been developed for stormwater facilities that are presently operated and maintained within the City of Poulsbo or may be constructed in the near future.

- PMP #1 – Detention Pond
- PMP #2 – Detention Tank and Vault

- PMP #3 – Infiltration/Retention Pond
- PMP #4 – Biofiltration Swale
- PMP #5 – Control Structure
- PMP #6 – Oil / Water Separator
- PMP #7 – Catch Basin
- PMP #8 – Stormwater Filter
- PMP #9 – Drainage Channel and Culvert

These PMPs provide general guidelines consistent with NPDES Phase II requirements and Ecology stormwater management recommendations. They should be routinely reviewed and updated to reflect needs and requirements that are specific to the City of Poulsbo.

5.5.1 O&M Frequency

General maintenance, such as cleaning of catch basin, manholes, control structures and oil/water separators, should be conducted annually at a minimum. Vegetation control in drainage channels/ditches may require a minimum frequency of once per year, or as needed based on inspection results. Vegetation and sediment removal from drainage channels/ditches and bioswales should occur at least once per year, or as need based on inspection results. Cleaning (sediment removal) of storm drain pipes and detention facilities should occur every three years at a minimum.

Additional maintenance activities such as repair or replacement should be scheduled as needed based on the results of inspection. Maintenance should be completed in a timely manner to prevent potential non-compliance with local and state stormwater quality requirements. The City should consider developing a system to monitor and track inspection and maintenance results and requirements.

Operation and maintenance of private stormwater facilities is monitored by the City on an “as-necessary” basis in response to public requests for assistance or observed deficiencies.

5.6 ESTIMATED ANNUAL O&M COSTS

The estimated annual cost to conduct inspection and maintenance of stormwater facilities is a function of the type and number of stormwater facilities, the recommended maintenance procedures and intervals, and labor and equipment costs specific to the City of Poulsbo. Table 5-2 shows typical estimated City labor and equipment costs for routine operation and maintenance.

Table 5-2. Summary of Operation and Maintenance Unit Costs, City of Poulsville

Item	Description	Cost
Labor, maintenance	Typical maintenance worker salary and benefits	\$35/Hr
Vehicle	Light duty truck	\$20/Day
Vactor truck	Vactor Truck	\$100/Day
Dump truck	10 cubic yard capacity	\$100/Day
Backhoe tractor	Including mowing attachment	\$100/Day
Other equipment	Power tools, hand tools, etc.	\$10/Day
Other materials	Routine repairs requiring pipe, catch basins, etc.	\$10,000/Yr
Other direct costs	Waste disposal fees, permits, etc.	\$5,000/Yr

Daily production rates for O&M activities, and required crew sizes to complete inspection and maintenance tasks were based on the City of Poulsville Comprehensive Surface Water Management Plan (R.W. Beck and Associates, 1993) or were estimated based on professional experience.

5.7 ROUTINE FACILITY O&M COSTS

Typical annual costs to meet recommended facility O&M requirements are estimated at \$179,000 and are shown in detail in Table 5-3. Costs are based on recommended inspection and maintenance frequencies, and the unit costs shown in Table 5-2. The primary cost components are summarized as follows:

- Labor requirements for routine inspection and maintenance are 2.0 FTEs at a total cost of \$140,000 per year.
- Equipment requirements and direct costs are based on routine (non-capital) maintenance and operation requirements and are estimated at \$39,000 per year.

It should be noted that the facility inventory update would likely increase these costs due to the additional stormwater facilities that would be added to the list of City maintained facilities.

Costs for operation and maintenance were \$99,483 and \$197,000 in 2006 and 2007, respectively. These actual costs and the current 2.0 FTE employees allocated to the stormwater utility are consistent with the estimates shown in Table 5.3.

5.8 ADMINISTRATIVE O&M COSTS

Administrative costs for operation and maintenance include supervision and management, record keeping, professional services, insurance and tax. Annual administrative labor costs were approximately \$119,000 in 2000 and included non-labor costs for tax and interfund services. Administration costs in 2007 were approximately \$376,000.

Administrative labor costs may need to be increased to reflect regulatory record keeping requirements, and increased stormwater system operation and maintenance data needs associated with NPDES permit compliance. These requirements are detailed in Table 5-3.

5.9 OPERATION AND MAINTENANCE SUMMARY AND CONCLUSIONS

In summary, total annual stormwater O&M costs based on system needs and compliance with NPDES permit requirements, are estimated at approximately \$287,000, not including interfund transfers, tax and depreciation. Current O&M funding and staffing appear sufficient to address O&M program requirements over the 2008-2013 period.

Based on the above operation and maintenance assessment, the City should consider the following actions:

- Complete the stormwater facility inventory and update the inspection record by the end of 2008.
- Develop and implement an electronic database to track maintenance activities and requirements.
- Develop a Stormwater Operation and Maintenance Manual based on the PMPs provided in Appendix C, and the requirements of the electronic database system.

Additional staff resources above the 2.0 FTEs required for O&M of the existing system may be needed for full compliance with NPDES permit requirements. O&M requirements should be reevaluated in 2012 after full implementation of NPDES permit requirements to determine whether additional O&M resources are necessary.



Table 5-3. Estimated Annual Operation and Maintenance Costs

Activity	Quantity, Activity, No/Yr			Labor							Equipment and Materials				Total Cost
	Total Quantity	Description	No. Year	Crew Size	Daily Production Rate	FTE Days	Hours/Day	Total Hrs	Cost Hr.	Subtotal Labor	Item	Cost/Day	No. Days	Total Equip and Materials	
Facility Inspections - City	63	City facilities inspected twice per year	126	1	4	31.5	8	252.0	\$ 35	\$ 8,820	Vehicle	\$20	31.5	\$630	\$ 9,450
Facility Inspections - Private	83	Every private facility inspected once per year	83	1	4	20.8	8	166.0	\$ 35	\$ 5,810	Vehicle	\$20	20.8	\$415	\$ 6,225
Catch Basin Cleaning	700	10% of catch basins cleaned per year	70	2	6	23.3	8	373.3	\$ 35	\$ 13,067	Vac Truck	\$100	11.7	\$1,167	\$ 14,233
Catch Basin Repair or Replace		2% of catch basins repaired or replaced per year	15	2	2	15.0	8	240.0	\$ 35	\$ 8,400	Truck	\$100	7.5	\$750	\$ 9,150
											Backhoe	\$100	7.5	\$750	\$ 750
											Materials			\$5,000	\$5,000
Pipe Cleaning (ft)	90,000	10% of total pipes cleaned per year	9,000	2	500	36.0	8	576.0	\$ 35	\$ 20,160	Vac Truck	\$100	18.0	\$1,800	\$ 21,960
Pipe Repair or Replace (ft)		2% of total pipes repaired or replaced per year	1,800	2	100	36.0	8	576.0	\$ 35	\$ 20,160	Backhoe	\$100	18.0	\$1,800	\$ 21,960
											Truck	\$100	18.0	\$1,800	\$ 1,800
											Materials			\$5,000	\$ 5,000
Control Structure Cleaning	28	Solids removal once per year	28	2	4	14.0	8	224.0	\$ 35	\$ 7,840	Vac Truck	\$100	7.0	\$700	\$ 8,540
Oil Water Separator Cleaning	2	Oil and solids removal once per year	2	2	2	2.0	8	32.0	\$ 35	\$ 1,120	Vac Truck	\$100	1.0	\$100	\$ 1,220
											Disposal			\$1,000	\$ 1,000
Ditches and Drainage Channels (ft)	30,000	50 % mowed and cleaned per year	15,000	2	1,000	30.0	8	480.0	\$ 35	\$ 16,800	Mower	\$100	15.0	\$1,500	\$ 18,300
											Truck	\$100	15.0	\$1,500	\$ 1,500
Above Ground Detention Facilities	12	Every facility mowed and maintained once per year	12	2	1	24.0	8	384.0	\$ 35	\$ 13,440	Mower	\$100	12.0	\$1,200	\$ 14,640
											Truck	\$100	12.0	\$1,200	\$ 1,200
Underground Detention Facilities	9	Solids removal once per year	9	2	2	9.0	8	144.0	\$ 35	\$ 5,040	Vac Truck	\$100	4.5	\$450	\$ 5,490
Bioswales	13	Every facility mowed and cleaned once per year	13	2	2	13.0	8	208.0	\$ 35	\$ 7,280	Backhoe	\$100	6.5	\$650	\$ 7,930
											Truck	\$100	6.5	\$650	\$ 650
Miscellaneous Repairs and Small Works	10	Repair and replacement	5	3	1	15.0	8	360.0	\$ 35	\$ 12,600	Backhoe	\$100	5.0	\$500	\$ 13,100
											Truck	\$100	5.0	\$500	\$ 500
											Materials			\$10,000	\$ 10,000
Totals per Year						269.6		4,015.3		\$140,537				\$39,062	\$ 179,598
FTEs								2.0							

Notes:

1. Inspections include both City owned and privately owned facilities. Maintenance activities are for City owned facilities only.
2. Costs are for operation and maintenance only and do not include management and administration.

6. PUBLIC INVOLVEMENT AND EDUCATION

6.1 INTRODUCTION

Public involvement and participation in the City's stormwater program can involve citizens serving as representatives on a stormwater management panel, attending public hearings, working as a citizen volunteer to educate other individuals, or participating in volunteer monitoring efforts. Public involvement and education is an important and effective program element to help reduce pollutant discharge to stormwater and help inform City officials of potential impacts to water quality, as well as potential system deficiencies requiring maintenance.

6.2 REGULATORY REQUIREMENTS

The NPDES permit requires public education programs to distribute educational literature to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and how the public can help reduce pollutants in stormwater. The public education program should inform citizens about steps to be taken to help reduce stormwater pollution including proper use and disposal of garden chemicals (fertilizers, pesticides, etc.), protecting and restoring riparian (river bank, stream bank) vegetation, and proper disposal of oil or household hazardous waste (cleaning chemicals, paints, solvents, etc.). Methods to inform and educate the public regarding stormwater may include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, and providing public service announcements, grade school educational programs, and community-based projects relating to stormwater protection. The public education program should also include targeting commercial and industrial groups that could potentially have significant impacts of stormwater.

The NPDES permit requires that the public be included in the development, implementation, and review of the stormwater program. Public involvement/participation may include serving as a citizen representative on a stormwater management panel, attending public hearings, working as a citizen volunteer to educate other individuals about the program, or participating in volunteer monitoring efforts. When implementing a public involvement program, the City will comply with all State, Tribal, and local public notice requirements

6.3 CURRENT CITY PROGRAM

The City is currently working with the KPCWC to develop a public education and awareness program that includes publication and distribution of public education materials relating to stormwater. This includes educating the general community, developers, and private property owners regarding future stormwater quality requirements.

The City holds public meetings to gather input relating to the existing stormwater program and proposed upgrades and/or revisions to the program. The City also supports volunteer and community service group activities designed to protect the environment. This support includes labor, equipment, and materials.

7. CAPITAL IMPROVEMENT PLAN

7.1 INTRODUCTION

The purpose of the CIP is to identify new stormwater infrastructure and facilities to improve stormwater collection, conveyance, quantity control and quality control. Improving collection and conveyance generally means constructing new pipes or replacing existing structures or ditches with larger pipes or culverts. Improving stormwater quantity control typically means constructing new detention or retention facilities. Improving stormwater quality generally consists of constructing wet ponds, biofilters or mechanical structures to filter or otherwise remove sediments, oils and other potential contaminants prior to discharge.

Projects identified in the CIP were developed from the following sources:

- City Public Works Department personnel based on their experience with the system
- Previous City of Poulsbo Stormwater Management Plans
- Assessment of the City system conducted as part of this plan update

7.2 COST ESTIMATING METHODOLOGY

Estimated project costs are based on conceptual designs and typical unit costs. Table 7-1 describes typical unit costs used in this analysis. Costs assume private contractors construct projects as an individual project. Combining several small projects, or construction by City personnel could result in lower costs. Pending further field investigation and final determination of project scope, these preliminary costs should be considered within the range of plus or minus 50 percent of actual final costs. Cost estimates for each project are provided in Appendix F. A 15 percent contingency has been added to each project to account for miscellaneous unlisted item.

Table 7-1. Basis for Cost Estimating

Item	Description	Unit	Unit Cost	Comment
1	Mobilization	LS		Site Dependent
2	Temporary Erosion Control Measures	LS		Site Dependent
3	12" PVC Storm	LF	\$35.00	
4	18" PVC Storm	LF	\$41.00	
5	24" PVC Storm	LF	\$50.00	
6	30" PVC Storm	LF	\$60.00	
7	48" PVC Storm	LF	\$150.00	
8	Catch Basin Type 1	EA	\$1,000.00	
9	Catch Basin Type 2	EA	\$3,000.00	
10	Saw cut Pavement	LF	\$2.50	Per LF of trench. 2 cuts
11	Trench Excavation and Shoring	LF	\$16.00	
12	Landscape Repair	LS		Site Dependent
13	Traffic Control	LS		Site Dependent
14	Asphalt Pavement	LF	\$8.00	6' width; \$90/Ton
15	Cleanup and Restoration	LS		Site Dependent
16	Contingency	LS		15% of Construction
17	Final Design	LS		10-20% of Construction

7.3 PROJECT IDENTIFICATION AND DESCRIPTION

A total of 17 projects were identified and evaluated as part of the CIP analysis. Each project is described in the following sections. Individual project sheets are provided in Appendix F and include the following information:

- Description of the purpose and need of the project
- Schematic design of proposed improvements
- Planning level cost estimates for each project

Table 7-2 presents a summary of the CIP. Figure 7-1 shows the location of each project. Individual project summaries, ranking forms, schematic design details and costs are provided in Appendix F.

7.3.1 Restore South Fork of Dogfish Creek Near 8th Avenue

The South Fork of Dogfish Creek downstream of 8th Avenue frequently floods, causing water to flow across private property and the Public Works maintenance yard. Attempts to control the flooding with sandbags have not been successful. Upstream erosion has resulted in channel aggradation, which creates a shallow and flat channel that is not able to convey peak flows. Both stream channel re-grading and construction of side berms will be required to control peak flows. This project consists of re-construction of the stream channel to its original location away from the edge of the maintenance building, and replacement of the undersized culvert under 8th Avenue to prevent flooding of the street. The estimated cost for this project is \$474,000.

7.3.2 New 18 Inch Storm Drain East Side of Viking Way

A storm drain discharges water to a ditch behind Shoomadoggie's business on the east side of Viking Avenue. The ditch runs about 90 feet and then enters a storm drain through a trash barrier. This barrier and storm drain becomes easily plugged, causing flooding on the Liberty Bay Condominium property below. This project consists of replacing the open ditch with a new 18-in PVC storm drain and two new catch basins, connecting one existing catch basin in the adjoining parking lot to the new catch basin and storm drain, and connecting the other drains to the second new catch basin. The estimated cost for this project is \$44,000.

7.3.3 Fjord Drive Bank Repair – Phase 1

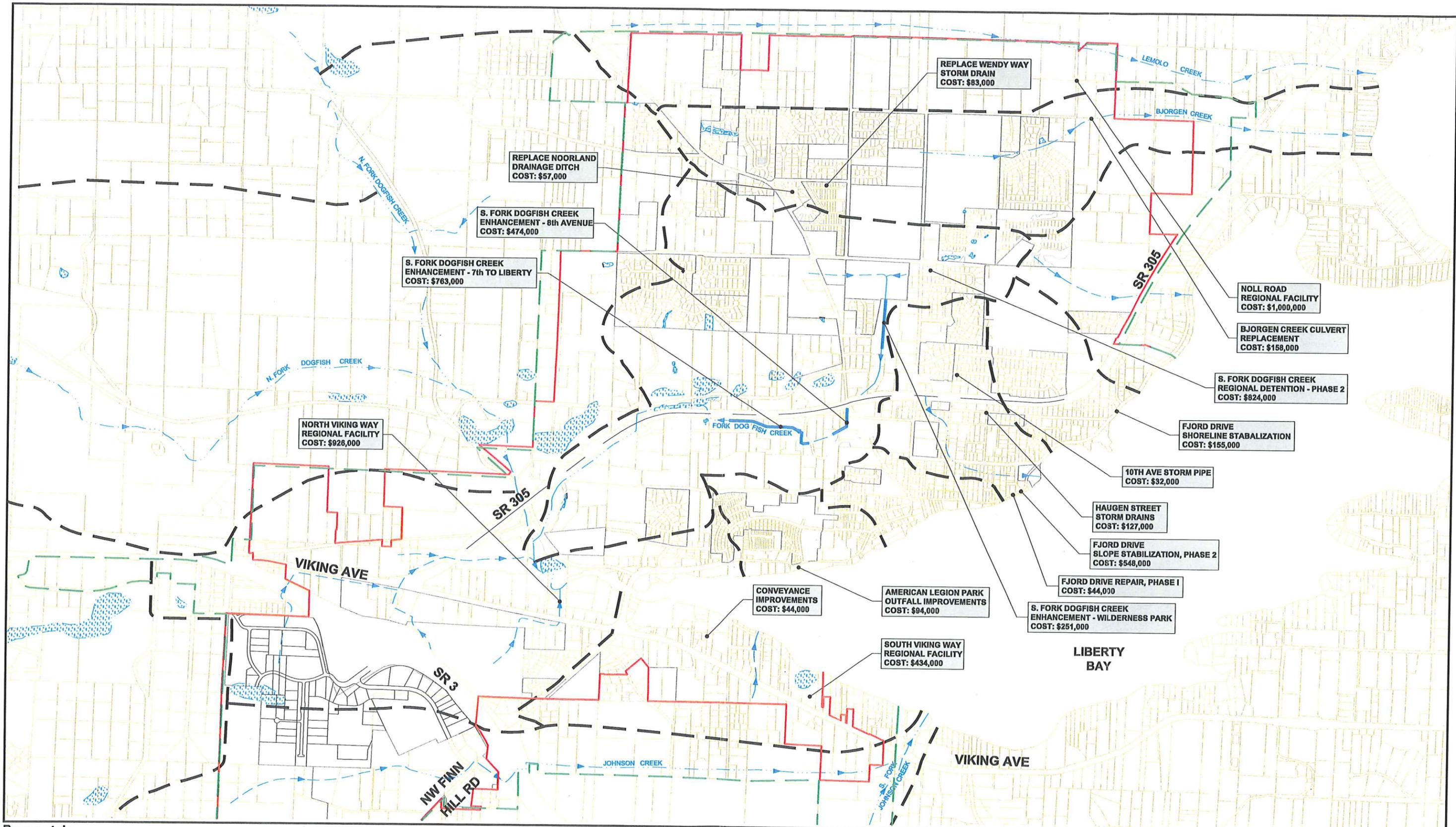
Stormwater has sheet-flowed off the edge of Fjord Drive north of the Poulsbo Yacht Club, which has contributed to failure of the steep slope up to the edge of the paved roadway. This project would install a curb to prevent sheet flow and soil saturation, and would include erosion control mats and planting to stabilize eroded soil. This project would provide a minimum repair pending a more permanent solution. The estimated cost of this project is \$44,000.



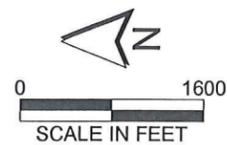
City of Poulsbo

Table 7-2. Stormwater Capital Improvement Plan

PROJECT	Year Scheduled						Not Scheduled	Total Cost
	2008	2009	2010	2011	2012	2013		
South Fork Dogfish Creek Restoration	\$ 50,000	\$ 50,000	\$ 350,000					\$ 450,000
New Conveyance East of Viking Avenue	\$ 44,000							\$ 44,000
Fjord Drive Drainage Improvements		\$ 44,000						\$ 44,000
Replace Wendy Way Storm Drain			\$ 83,000					\$ 83,000
Noorland Drainage Ditch				\$ 57,000				\$ 57,000
Replace Storm Drain W of 10th Avenue				\$ 32,000				\$ 32,000
American Legion Park Outfall Repair					\$ 94,000			\$ 94,000
Subtotal 6 Year CIP	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -	\$ -	\$ 804,000
South Fork Dogfish Creek - Regional Detention, Phase 2							\$ 823,000	\$ 823,000
South Fork Dogfish Creek Restoration 7th Ave to Liberty Road							\$ 763,000	\$ 763,000
South Fork Dogfish Creek Restoration Wilderness Park Segment							\$ 251,000	\$ 251,000
North Viking Way Regional Facility							\$ 926,000	\$ 926,000
South Viking Way Regional Facility							\$ 434,000	\$ 434,000
Noll Road Regional Detention Facility							\$ 1,052,000	\$ 1,052,000
Fjord Drive Shoreline Stabilization							\$ 548,000	\$ 548,000
Fjord Drive/Lemolo Drive Drainage and Shoreline Stabilization							\$ 155,000	\$ 155,000
Bjorgen Creek Culvert Replacement							\$ 158,000	\$ 158,000
Haugen Street Storm Drainage System							\$ 158,000	\$ 158,000
Subtotal Not Scheduled	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,268,000	\$ 5,268,000
TOTAL CIP	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -	\$ 5,268,000	\$ 6,072,000



Parametrix DATE: Jun 09, 2008 FILE: BR2237026P01T01F-07



LEGEND:

- | | | | |
|--|-------------------|--|--------------------------------|
| | CITY LIMITS | | PERENNIAL STREAM |
| | URBAN GROWTH AREA | | INTERMITTENT STREAM/OPEN DITCH |
| | PARCEL BOUNDARY | | BASIN BOUNDARY |
| | | | WETLANDS |

Figure 7-1
City of Poulsbo
Proposed Stormwater
Capital Improvements

7.3.4 Replace Storm Drain in Wendy Way

The existing 12-inch storm drain through the Royal Viking Mobile Home Park does not have sufficient capacity to convey storm flows from the housing areas located to the north. During heavy storm events, water floods private property and travels as sheet flow down Wendy Way. This project consists of replacing 700 feet of 12-inch storm pipe with new 18-inch pipe. Replacement of the catch basins is likely not required. This project must be accomplished prior to replacing the drainage ditch in the three yards of the homes located on Norrland Lane (see project below). The estimated cost for this project is \$83,000.

7.3.5 Replace Norrland Lane Drainage Ditch

Storm water from Lincoln Road and a drainage system north of Lincoln Road both discharge to a ditch located behind three homes on Norrland Lane. This 90-foot ditch enters an 18-inch storm drain and then flows through Norrland Lane to Wendy Way in the Royal Viking Mobile Home Park. The installation of the detention structure in Lincoln Road and the associated discharge to this ditch exceeds its original design capacity. Flooding of one of the home's crawl space has occurred on occasion. This project consists of increasing the drainage capacity by installing 90-feet of 18-inch diameter PVC pipe. This project cannot be accomplished until the Wendy Way storm drain is increased to 18 inch. The estimated cost for this project is \$57,000.

7.3.6 Replace Storm Drain West of 10th Avenue

The existing storm main that runs across the private property located at 1858 110th Ave NE is undersized and needs to be replaced. An attempted repair was made in 2001; however, flooding problems persist due to inadequately sized pipes or blockage. Camera inspection is not possible due to access constraints. This project would replace the existing storm drain with a new large capacity pipe. The estimated cost for this project is \$32,000.

7.3.7 Repair American Legion Park Outfall

The outfall structure at the north end of the American Legion Park is in jeopardy of collapsing into Liberty Bay. Further erosion of the steep bank will result in risk to the outfall structure and additional erosion of park property. This project will stabilize the bank and replace the outfall pipe. The estimated cost for this project is \$94,000.

7.3.8 South Fork of Dogfish Creek Regional Detention Facility, Phase 2

Undetained run off from impervious surfaces in the upper South Fork of Dogfish Creek has contributed to stream erosion, water quality degradation and downstream flooding. Phase 1 of the regional detention project was implemented in 2006, with construction of a 60,000 cubic feet underground detention structure on the NKHS property. Phase 2 of the regional detention facility would consist of collection system improvements detention in the vicinity of Hostmark Street and Caldart Avenue. The estimated cost for this project is \$823,000.

7.3.9 South Fork Dogfish Creek Enhancement, 7th to Liberty

The South Fork of Dogfish Creek passes through a degraded channel and two metal culverts, which do not adequately carry the peak storm flows of the creek and contribute to flooding and present a barrier to fish passage. This project consists of replacing the two culverts with larger culverts that will convey peak flows and be more conducive to fish passage. This project would also restore the degraded channel between 7th and Liberty by removing

invasive vegetation and providing habitat structures. The estimated cost for this project is \$763,000.

7.3.10 South Fork of Dogfish Creek Enhancement, Wilderness Park

This project consists of stabilizing and restoring the incised stream channel within the City's Wilderness Park. Undetained flows have created head cutting in the channel, resulting in a stream channel that is heavily eroded in places. This project would consist of installing grade control weirs and vegetation in eroded bank areas. The estimated cost for this project is \$251,000.

7.3.11 Viking Way Regional Detention Facility

Stormwater from the Viking Avenue area north of Finn Hill Road discharges untreated to Dogfish Creek. This project consists of constructing a water quality and retention/detention system, using LID techniques. The estimated cost for this project is \$926,000.

7.3.12 South Viking Way Regional Detention Facility

Stormwater from the Viking Avenue area north of Finn Hill Road discharges untreated to Liberty Bay. This project consists of constructing a water quality and retention/detention system, using LID techniques. The estimated cost for this project is \$434,000.

7.3.13 Noll Road Regional Water Quality and Detention Facility

Stormwater from Noll Road and other adjacent impervious areas currently flows untreated and undetained, and discharges to Bjorgen Creek. This contributes to potential release of sediments and contaminants. This project would construct a two cell wet pond for water quality improvements, and a detention pond to reduce the rate of discharge. Both facilities are assumed to be located in the south Noll Road area. The estimated cost for this project is \$1,000,000.

7.3.14 Fjord Drive Repair and Stormwater Treatment, Phase 2

This project would route stormwater from the slope failure area to a new treatment facility prior to discharge to Fjord Drive. A new retaining wall would also be constructed to stabilize the failed high bank slope. The estimated cost for this project is \$548,000.

7.3.15 Fjord Drive Shoreline and Drainage Repair

Portions of the shoreline along Fjord Drive between 6th and the city limits have eroded and threaten the street. This project consists of constructing new storm drains, installing curbs and catch basins, and planting vegetation to stabilize eroded areas. The estimated cost for this project is \$155,000.

7.3.16 Replace Bjorgen Creek Culvert

The existing culvert, under an easement south of Noll Road, is undersized and creates a fish passage barrier due to elevation drop at the downstream end of the culvert. This project would replace the existing 36-in culvert with a 10 foot wide bottomless arch-type culvert. The estimated cost for this project is \$158,000.

7.3.17 Haugen Street Storm Drainage System

Due to a lack of a storm collection system, flooding occurs during heavy storms near Haugen Street in the vicinity of 8th Avenue, 9th Avenue, and Torgeson Avenue. This project would

install new collection pipes to intercept runoff and convey flows to the 6th Avenue storm sewer. A control structure to bypass high volume storms would also be required. The estimated cost for this project is \$127,000.

7.4 EXPANDED CIP PROGRAM

The CIP shown in Table 7-2 includes approximately \$5.2 million in unscheduled projects. These unscheduled projects generally consist of regional facilities designed to alleviate flooding and/or to provide improved detention and water quality treatment in areas where no or little stormwater controls currently exist. Implementation of these projects would be subject to available funding, including potential grants. Expanding the 6 year CIP to include specific scheduling of these projects would exceed existing funding capacity. For example, assuming an average project cost of \$526,000, one project could be implemented approximately every five to six years at existing funding levels. Implementing additional projects at more frequent intervals would require a rate increase.

8. FINANCIAL PLAN

8.1 INTRODUCTION

The purpose of the financial plan is to evaluate current and recent historical costs and revenues and determine, based on reasonable assumptions, whether the City can implement the O&M and CIP recommended in Chapter 6 and 7 while maintaining the stormwater user rates at existing levels. The fiscal planning period for this analysis is the six years from 2008 through 2013.

The 1993 Surface Water Management Plan developed a program for funding the stormwater utility. The plan recommended that a Surface Water Utility Charge serve as the primary funding source. It proposed gradually raising the ERU fee from \$5.00 per month in 1994 to \$7.50 per month in 2000. An ERU is defined as 3,000 square feet of impervious surface area.

The 1998 Update to the Stormwater Management Plan also recommended raising the monthly storm water utility charge from \$5.50 per month in 1999 to \$7.50 per month in 2003. This rate structure was enacted by the City Council in June 1999 under Ordinance No. 99-16. The rate currently remains at \$7.50 per ERU per month.

8.2 STORMWATER UTILITY REVENUES

The primary source of revenue is the collection of the monthly user fee which is assessed based on an ERU. The fee is currently \$7.50 per ERU per month. A single occupancy home is considered one ERU, so the annual revenue for one residence is \$90.00. Commercial property is assessed a monthly user fee based on the number of ERU's associated with its impervious area. The number of ERU's for commercial property is determined by dividing the total impervious area by 3,000 square feet. Monthly user fees account for approximately 92 percent of revenue. Investment interest, building permits, fines, and other revenues account for the remaining eight percent of the annual revenue. Total revenue in 2007 from all sources was \$699,000.

Table 8-1 summarizes revenue for the years 2000 through 2007. The rate charged per ERU, which is the main influence on Service Charge revenue, is also shown in Table 8-1. The largest rent payer is the Olhava development. The full development of Olhava is expected to increase stormwater program revenues by about \$45,000 annually.

Table 8-1. Summary of Annual Stormwater Fund Revenue, 2000 to 2007

Year	ERU Rate	Total Annual Revenue
2000	\$6.00	\$322,500
2001	\$6.50	\$418,825
2002	\$7.00	\$489,196
2003	\$7.50	\$545,719
2004	\$7.50	\$560,361
2005	\$7.50	\$554,000
2006	\$7.50	\$650,384
2007	\$7.50	\$699,000

8.3 EXPENDITURES

Expenditures cover all costs associated with operating and maintaining the stormwater utility. This includes program administration, as well as the repair and maintenance of the system components. It also includes the costs for capital expenditures, which can include the purchase of equipment to maintain the system; costs to replace deteriorated pipes, culverts, or other components; and costs to install new components to better manage stormwater (detention ponds or underground vaults), or to meet new environmental requirements. Table 8-2 summarizes stormwater utility costs for the 2000 through 2007 period.

Table 8-2. Summary of Annual Stormwater Utility Costs, 2000 to 2007

Year	Administratio n	Maintenanc e	Customer Service	Operation	Capital Expenditures	Total Annual Expenditures
2000	\$163,404	\$1,569	\$312,500	\$1,367	\$40	\$166,380
2001	\$112,267	\$20,994	\$2,023	\$18,887	\$0	\$154,171
2002	\$122,047	\$29,309	\$6,370	\$12,686	\$24,668	\$195,080
2003	\$215,312	\$34,619	\$3,171	\$20,983	\$26,754	\$300,839
2004	\$240,380	\$12,944	\$4,728	\$57,183	\$41,580	\$356,815
2005	\$289,674	\$56,956	\$7,593	\$52,314	\$450,500	\$857,037
2006	\$317,407	\$28,724	\$5,516	\$99,483	\$925,000	\$1,376,130
2007	\$375,964	\$13,765	\$500	\$197,283	\$166,000	\$753,512

For the years 2000 through 2007, administration costs account for about 60 percent of the total expenditures. On average, capital expenditures accounted for about 25 percent and O&M about 15 percent of total annual expenditures during the 2000-2007 period.

8.4 ESTIMATED FUTURE COSTS AND POTENTIAL RATE IMPACTS

Costs associated with the stormwater program are expected to increase during the next six years in order to comply with NPDES permit requirements, as well as implement planned capital improvement projects. Cost increases are associated with additional O&M, labor, equipment and supplies, as well as administrative costs to better manage and maintain the existing systems.

Table 8-3 shows annual costs exceeding revenues as well as declining capital reserves over the 6 year CIP schedule. NPDES permit compliance requirements obligate the City to implement expanded operations, maintenance and education elements, which may further decrease revenue that could be available for capital projects.

Given the available balances within the operating and capital reserve funds, existing rates and future revenues appear adequate to support development and implementation of the O&M and administrative program required under the NPDES permit, as well as implement a baseline 6-year CIP of approximately \$804,000. Under the baseline CIP, revenues are sufficient to cover expected costs during the 2008 through 2013 period and no increase in utility rates appears necessary. Implementation of an expanded 6-year CIP that includes one or more of the unscheduled CIP projects every 3 to 5 years would exceed available revenue, and would likely require a rate increase.



Table 8-3. City of Poulsbo Stormwater Utility Fund Financial Summary

Fund Element				Projected					
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Capital									
Capital Projects ¹	\$ 323,800	\$ 977,000	\$ 157,000	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -
Total Capital Costs	\$ 323,800	\$ 977,000	\$ 157,000	\$ 94,000	\$ 94,000	\$ 433,000	\$ 89,000	\$ 94,000	\$ -
Fund Balances									
Operating Fund	\$ 1,086,829	\$ 1,222,200	\$ 1,526,200 ⁵	\$ 526,000	\$ 526,000	\$ 526,000	\$ 526,000	\$ 226,000 ⁶	\$ 226,000
Capital Reserve	\$ 526,600	\$ 369,900	\$ 100,000	\$ 1,006,000	\$ 912,000	\$ 479,000	\$ 390,000	\$ 596,000	\$ 596,000
Total Fund Balance	\$ 1,613,429	\$ 1,592,100	\$ 1,626,200	\$ 1,532,000	\$ 1,438,000	\$ 1,005,000	\$ 916,000	\$ 822,000	\$ 822,000
Revenues									
Service Charges ²	\$ 562,800	\$ 655,800	\$ 699,000	\$ 650,000	\$ 700,000	\$ 733,978	\$ 769,605	\$ 806,962	\$ 846,132
Restricted Revenues	\$ 18,500	\$ 41,562	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Total Revenues	\$ 581,300	\$ 697,362	\$ 704,000	\$ 655,000	\$ 705,000	\$ 738,978	\$ 774,605	\$ 811,962	\$ 851,132
Expenses									
Operation & Maintenance ³	\$ 286,600	\$ 739,000	\$ 682,000	\$ 716,100	\$ 751,905	\$ 789,500	\$ 828,975	\$ 870,424	\$ 913,945
NPDES Permit Implementation ⁴	\$ -	\$ -	\$ -	\$ 25,000	\$ 50,000	\$ 108,000	\$ 113,400	\$ 119,070	\$ 125,024
Total Expenses	\$ 286,600	\$ 739,000	\$ 682,000	\$ 741,100	\$ 801,905	\$ 897,500	\$ 942,375	\$ 989,494	\$ 1,038,969
TOTAL STORMWATER UTILITY BALANCE	\$ 1,584,329	\$ 573,462	\$ 1,491,200	\$ 1,445,900	\$ 1,341,095	\$ 846,478	\$ 748,230	\$ 644,468	\$ 634,163

Notes

1. Refer to Table 7-2 for breakdown of CIP costs and schedule.
2. Service charges for period 2008 through 2013 based on average 1.8% growth per year, and 3.0% CPI adjustment per year.
3. Operation and maintenance costs estimated to increase 5 percent per year.
4. NPDES permit related costs reflect phased implementation, and 5% increase per year after full program implementation.
5. Transfer \$1,000,000 from Operating Fund to Capital Fund in 2008.
6. Transfer \$300,000 from Operating Fund to Capital Fund in 2012.

9. RECOMMENDATIONS

The following recommendations summarize the primary findings and proposed action items associated with this plan update.

9.1 REGULATORY COMPLIANCE

Additional measures needed to meet Phase II NPDES permit requirements are summarized as follows:

- Develop a stormwater maintenance manual for City stormwater facilities and roads.
- Establish a Stormwater Pollution Prevention plan and a spill prevention and control program for each of the City's maintenance facilities.
- Continue to work with the Kitsap Peninsula Clear Water Cooperative to develop a public information program.
- Continue to work with the KCHD to develop an on-going program to monitor for and identify illicit connections to the stormwater system.
- Establish a 0.5 FTE engineering position within the stormwater program to meet requirements of the NPDES permit.

9.2 OPERATION AND MAINTENANCE

Based on the operation and maintenance assessment presented in Chapter 5, the City should consider the following actions:

- Complete a stormwater facility inventory and update the inspection record in 2008 or 2009.
- Develop and implement an electronic database to track maintenance activities and requirements.
- Develop a Stormwater Operation and Maintenance Manual based on the PMPs provided in this plan update, and the requirements of the electronic database system.

9.3 CAPITAL IMPROVEMENTS

The six-year CIP should be revisited no less than every two years to assess priorities and monitor implementation status.

9.4 FINANCIAL PLAN AND RATES

Existing rates and future revenues appear adequate to support development and implementation of the O&M and administrative program required under the NPDES permit, as well as implement a six-year baseline CIP of approximately \$804,000. Following full implementation of the NPDES permit in 2012, financial status of the stormwater program should be reassessed.

10. REFERENCES

Economic and Engineering Services (EES), 1998. Comprehensive Stormwater Management Plan Update. Final Report. October 1998.

Gray and Osborne, 2007. City of Poulsbo Comprehensive Water System Plan.

Kitsap County, 2006. 10 Year Update – Comprehensive Plan. Prepared by Kitsap County Department of Community Development.

Parametrix, 2008. City of Poulsbo Comprehensive Sanitary Sewer Plan.

R.W. Beck and Associates, 1993. City of Poulsbo Comprehensive Surface Water Management Plan. July 1993.

Washington Department of Ecology (Ecology), 2001. Stormwater Management Manual for Western Washington. August 2001.

APPENDIX A
SEPA Checklist

City of Poulsbo

PLANNING DEPARTMENT

P.O. Box 98, 19050 Jensen Way NE, Poulsbo, WA 98370

(360) 779-3006

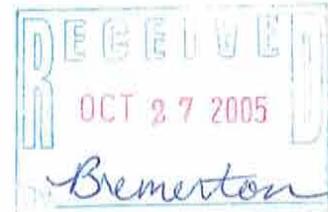
fax (360) 697-8269

planning@cityofpoulsbo.com



October 26, 2005

Parametrix
Attn: Phil Struck
5700 Kitsap Way, Suite 202
Bremerton, WA 98312-2234



Re: City of Poulsbo August 2005 Stormwater Management Plan Update – Completed State Environmental Policy Act (SEPA) Review

Dear Mr. Struck:

This letter will serve to notify you that the Poulsbo Planning Department has completed the State Environmental Policy Act (SEPA) review for the City of Poulsbo August 2005 *Stormwater Management Plan Update*. The comment period ended on October 24, 2005 and no comments were received.

I have enclosed the following documents for your use during the update adoption process:

- A copy of the Determination of Nonsignificance (DNS) issued October 8, 2005;
- A copy of your reviewed SEPA Environmental Checklist;
- And an affidavit of publication providing evidence of the public notice process that occurred.

Thank you for your attention in this matter. If you have any questions, feel free to contact me at (360) 779-3006.

Sincerely,

A handwritten signature in black ink, appearing to read 'Randy Kline'.

Randy Kline, Associate Planner

Cc: Barry Berezowsy, Planning Director
Jeffrey A. Lincoln, Public Works Director
Andrzej Kasiniak, Project Engineer
File

CITY OF POULSBO
DETERMINATION OF NONSIGNIFICANCE (DNS)
WAC 197-11-970

Description of proposal: The August 2005 *Stormwater Management Plan* (SWMP) updates the existing SWMP last prepared in 1998. The goal of the SWMP is to identify the general status of the existing stormwater system, facility deficiencies, and actions needed to comply with applicable state and federal regulatory requirements. The actions and projects identified in the August 2005 SWMP update will replace the previous SWMP and will be used to guide stormwater management activities within the City of Poulsbo for the next six years. This proposal is considered a "non-project" action under the State Environmental Policy Act (SEPA).

File: 10-03-05-1

Proponent: City of Poulsbo
Jeff Lincoln, Director of Public Works

Location of Proposal: The project site is located in Sections 13, 14, 15, 23 and 24 of Township 26 North, Range 1 East, WM. The entire project lies within the City of Poulsbo's adopted Urban Growth Area (UGA).

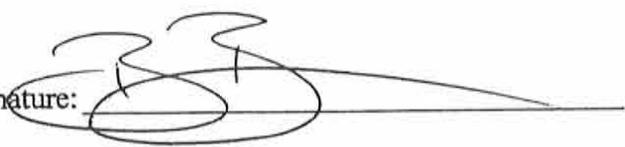
Lead Agency: City of Poulsbo

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

This DNS is issued under 197-11-340(2), the lead agency will not act on this proposal for 14 days from the date below. **Comments must be submitted by October 24, 2005.**

Responsible official: Barry Berezowsky
Position/Title: Planning Director
Address: City of Poulsbo Phone: 779-3006
P. O. Box 98
Poulsbo, WA 98370

Date: October 8, 2005

Signature: 

You may appeal this determination in writing to the responsible official listed above no later than 10 working days from the date of this notice.

You should be prepared to make specific factual objections. Contact the responsible official to read or ask about the procedure for SEPA appeals.

ENVIRONMENTAL CHECKLIST
CITY OF POULSBO STORMWATER MANAGEMENT PLAN UPDATE

A. BACKGROUND

1. Name of proposed project, if applicable:

City of Poulsbo, Stormwater Management Plan Update

2. Name of applicant:

City of Poulsbo

3. Address and phone number of applicant and contact person:

Jeff Lincoln
City of Poulsbo, Director of Public Works
19050 Jensen Way NE
P.O. Box 98
Poulsbo, WA 98370
(360) 779-5111

Reviewed by
Randy Kline, Associate
Planner
on October 3, 2005

4. Date checklist prepared:

September 22, 2005

5. Agency requesting checklist:

City of Poulsbo

6. Proposed timing or schedule (including phasing, if applicable):

Implementation to begin in late 2005 and to continue through approximately 2012.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Yes. The Stormwater Management Plan Update (SWMP) provides the framework for future capital improvements and management activities to manage surface and stormwater within the City of Poulsbo. This includes activities that may potentially affect land use, open space, transportation, historic/cultural sites, utilities, capital facilities, and the environment. Potential impacts and associated mitigation measures would be addressed during project-specific environmental review that will be conducted at the time specific projects are proposed for development and implementation.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

City of Poulsbo Draft Stormwater Management Plan Update, August 2005 ✓

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

Not Applicable (NA) ✓

10. List any government approvals or permits that will be needed for your proposal, if known.

The SWMP will require approval and adoption by the Poulsbo City Council. ✓

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

This document is a programmatic (non-project) environmental review of the proposed SWMP. The SWMP has been developed to update the existing plan last prepared in 1998. The actions and projects identified in the new update would replace the previous SWMP, and would be used to guide stormwater management activities within the City of Poulsbo for approximately the next six years.

This programmatic environmental checklist evaluates the SWMP, and the proposed action is to adopt the City of Poulsbo Stormwater Management Plan Update.

The boundaries of the study area for the SWMP are the currently adopted limits of the Growth Management Area of the City of Poulsbo. Generally, the SWMP does the following:

- Recommends operation and maintenance activities to ensure effective operation of the stormwater collection, conveyance and treatment system.
- Recommends capital improvement projects to alleviate existing drainage and water quality concerns.
- Recommends management actions to address regulatory compliance, public education/involvement and plan implementation.
- Addresses current and future financial conditions and associated funding requirements.

The goal of the SWMP is to identify the general status of the existing stormwater system, facility deficiencies, and actions needed to comply with applicable regulatory requirements. Specific objectives of the SWMP consist of:

- Promote the safety and security of the public and built environment
- Protect, preserve and enhance the aesthetic character of the City
- Reduce the impacts of storm water drainage systems on natural habitats and water quality

The SWMP is intended to provide guidance that will help the City to continue to provide affordable and quality stormwater management services to the residents of Poulsbo and the growing community. ✓

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The project site is located in Sections 13, 14, 15, 23 and 24 of Township 26 North, Range 1 East, Willamette Meridian. The entire project lies within the currently adopted Growth Management Area of the City of Poulsbo. ✓

B. ENVIRONMENTAL ELEMENTS

1. Earth

- a. **General description of the site (circle one):** Flat, rolling, hilly, steep slopes, mountainous, other

The majority of the City is generally hilly to moderately sloped, with areas of steep slopes located primarily on the north and east sides of the City. ✓

- b. **What is the steepest slope on the site (approximate percent slope)?** ✓

The steepest slopes in the City are approximately 50 percent. ✓

- c. **What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.**

Soils in the City are largely composed of Poulsbo and Ragner series, which are moderately well drained. ✓

- d. **Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

There are likely areas within the City that have history of unstable soils. This proposal is a non-project action and therefore no unstable slopes will be affected. ✓

- e. **Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.**

Capital improvement projects identified in the SWMP would involve earth movement. Grading and/or fill would be necessary to achieve desired landscape contours. Fill, topsoil or soil amendments would be purchased from local landscape suppliers. ✓

- f. **Could erosion occur as a result of clearing, construction, or use? If so, generally describe.**

This non-project action would not directly cause erosion. However, excavation work conducted under the SWMP would disturb earth and, consequently, there would be a potential for erosion to occur during rainfall. ✓

- g. **About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?**

This non-project action would not increase impervious surfaces. ✓

- h. **Proposed measures to reduce or control erosion, or other impacts to the earth if any:**

Best Management Practices (BMPs) would be utilized for specific projects consistent with City and State stormwater regulations. These BMPs typically include a combination of the following measures and are used as needed:

- Minimize the amount of exposed soil and the duration of soil exposure to storm water runoff
 - Divert storm water runoff away from exposed soil areas
 - Cover stockpiled soil materials with plastic
 - Re-vegetate disturbed areas as soon as practical
 - Use temporary erosion control devices such as filter fabric fences, sediment traps, or sedimentation ponds.
- ✓

2. Air

- a. **What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.**

This non-project action would not directly cause any emissions to air. However, construction and

RK
10/3/05

maintenance activities could result in dust generation from earth movement and exhaust emissions from equipment and vehicles. ✓

- b. **Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.**

There are no off-site sources of emissions or odor that would affect this non-project action. ✓

- c. **Proposed measures to reduce or control emissions or other impacts to air, if any:**

Specific measures to control emissions would be developed on a project-by-project basis. ✓

3. Water

a. Surface

- 1) **Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

The natural drainage system consists of the Dogfish, Lemolo, Johnson and Bjorgen Creek basins, as well as several smaller basins that discharge directly to Liberty Bay. ✓

- 2) **Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

This non-project action would not directly affect any of the described waters. ✓

- 3) **Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

No fill or dredge material would be placed in or removed from water or wetlands under this non-project action. ✓

- 4) **Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.**

This non-project action would not require surface water withdrawals or diversion. ✓

- 5) **Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

Portions of the City are located in the 100-yr floodplain of Dogfish Creek. ✓

- 6) **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

This non-project action would have no discharges to surface waters. ✓

b. Ground:

- 1) **Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.**

No ground water would be withdrawn and no water would be discharged to ground water under this non-project action. ✓

- 2) **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

No waste material would be discharged to the ground from any source under this non-project action. ✓

c. Water Runoff (including storm water):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

There would be no increase in runoff from this non-project action. ✓

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

This non-project action would have no impact on ground or surface water. ✓

- d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

See Supplemental Sheet for non-project actions. ✓

4. Plants

- a. Check or circle types of vegetation found on the site:

- deciduous tree: alder, maple, aspen, other
 evergreen tree: fir, cedar, pine, other
 shrubs
 grass
 pasture
 crop or grain
 wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
 water plants: water lily, eelgrass, milfoil, other
 other types of vegetation

- b. What kind and amount of vegetation will be removed or altered?

This non-project action would not directly result in removal or alteration of vegetation. However work performed under the Capital Improvement Plan (CIP) would include removing and adding vegetation at specific project sites. ✓

- c. List threatened or endangered species known to be on or near the site.

There are no known threatened or endangered plant species within the City. ✓

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

No landscaping is associated with this non-project action. Specific projects would include requirements for landscaping activities, including the use of native plants and the enhancement and preservation of vegetation. These requirements would be consistent with City development standards, as applicable. ✓

5. Animals

- a. Circle (underline) any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other: ducks and geese

mammals: deer, bear, elk, beaver, other: small mammals

fish: bass, salmon, trout, herring, shellfish, other:

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b. List any threatened or endangered species known to be on or near the site.

Bull trout (*Salvelinus confluentus*), Puget Sound chinook salmon (*Oncorhynchus tshawytscha*), Hood Canal summer chum salmon (*O. keta*), nesting and wintering bald eagles (*Haliaeetus leucocephalus*), and foraging marbled murrelets (*Brachyramphus marmoratus*) are the listed threatened or endangered species that the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) have identified in the project vicinity. The proposed action (adoption of the SWMP) would have no effect on threatened or endangered species.

Candidate species that could occur in the area include the northern red-legged frog, bull trout, black tern, mountain quail, northwestern pond turtle, and spotted frog.

c. Is the site part of a migration route? If so, explain.

Various waterfowl and other birds migrate through the general region.

d. Proposed measures to preserve or enhance wildlife, if any:

The proposed non-project action does not directly affect wildlife. However, work performed under the CIP could affect habitat for some wildlife. Project specific impacts would be evaluated at the time a specific project is proposed.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

No energy would be used under this non-project action.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

The proposal will not affect the potential use of solar energy by adjacent properties.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

No measures are proposed.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

There are no environmental health hazards associated with the non-project proposal. However, operation/maintenance work and implementation of the CIP could include the use of herbicides, pesticides, and fertilizers.

1) Describe special emergency services that might be required.

No special emergency services would be required for this non-project action.

2) Proposed measures to reduce or control environmental health hazards, if any:

Chemical use would occur in a manner to avoid their entry into waterways and storm drain. Chemicals would be applied in accordance with label recommendations, state and local ordinances, and the Washington Department of Agriculture orders.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic equipment, operation, other)?

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No noise exists in the area that will affect this proposal. ✓

- 2) **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.**

No noise is associated with this non-project action. ✓

- 3) **Proposed measures to reduce or control noise impacts, if any:**

No measures are proposed. ✓

8. Land and Shoreline Use

- a. **What is the current use of the site and adjacent properties?**

The City supports a variety of residential, commercial, industrial and recreational uses. ✓

- b. **Has the site been used for agriculture? If so, describe.**

Small agricultural users exist with the City limits. ✓

- c. **Describe any structures on the site.**

Structures within the City are typically one- to two-story brick, masonry, or wood buildings. Structures include commercial, retail, and residential units. ✓

- d. **Will any structures be demolished? If so, what?**

Not applicable. ✓

- e. **What is the current zoning classification of the site?**

Not applicable. ✓

- f. **What is the current comprehensive plan designation of the site?**

Not applicable. ✓

- g. **If applicable, what is the current shoreline master program designation of the site?**

Not applicable. ✓

- h. **Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.**

The City contains streams, wetlands, shorelines and geologic hazard areas. ✓

- i. **Approximately how many people would reside or work in the completed project?**

Not applicable. ✓

- j. **Approximately how many people would the completed project displace?**

Not applicable. ✓

- k. **Proposed measures to avoid or reduce displacement impacts, if any:**

Not applicable. ✓

- l. **Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:**

The Poulosbo Planning Department and City Council will consider the Stormwater Management Plan Update's consistency with the Poulosbo Comprehensive Plan in their adoption proceedings. ✓

9. Housing

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- a. **Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.**
Not applicable. ✓
- b. **Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.**
Not applicable. ✓
- c. **Proposed measures to reduce or control housing impacts, if any:**
Not applicable. ✓

10. Aesthetics

- a. **What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**
Not applicable. ✓
- b. **What views in the immediate vicinity would be altered or obstructed?**
Not applicable. ✓
- c. **Proposed measures to reduce or control aesthetic impacts, if any:**
Not applicable. ✓

11. Light and Glare

- a. **What type of light or glare will the proposal produce? What time of day would it mainly occur?**
No light or glare would directly be produced by this non-project action. ✓
- b. **Could light or glare from the finished project be a safety hazard or interfere with views?**
No light or glare would be produced by this non-project action. ✓
- c. **What existing off-site sources of light or glare may affect your proposal?**
No existing off-site sources of light or glare will affect this proposal. ✓
- d. **Proposed measures to reduce or control light and glare impacts, if any:**
No measures are proposed. ✓

12. Recreation

- a. **What designated and informal recreational opportunities are in the immediate vicinity?**
The City supports parks, trails, and other designated and informal recreation opportunities. ✓
- b. **Would the proposed project displace any existing recreational uses? If so, describe.**
This non-project action would not displace any existing recreational uses. ✓
- c. **Proposed measures to reduce or control impacts, if any:**
No measures are proposed. ✓

13. Historic and Cultural Preservation

- a. **Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.**
There are several known historic structures located in the City. ✓

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- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

There are no known archaeological sites in the City. However, there is the potential for undiscovered/unknown archaeological resources to be present. Adoption of the plan would not affect any unknown archaeological resources.

- c. Proposed measures to reduce or control impacts, if any:

No measures are proposed.

14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

The City is served by several state highways and a variety of local streets.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The City is served by Kitsap Transit which operates the local bus service.

- c. How many parking spaces would the completed project have? How many would the project eliminate?

This non-project action would have no impact on parking.

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

This non-project action would have no impact on roads or streets.

- e. Will the project use (or occur in immediate vicinity of) water, rail, or air transportation? If so, generally describe.

Not applicable.

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

Not applicable.

- g. Proposed measures to reduce or control transportation impacts, if any:

Not applicable.

15. Public Services

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

This non-project action would not increase the need for public services.

- b. Proposed measures to reduce or control direct impacts on public services, if any.

No measures are proposed.

16. Utilities

- a. Circle (underline) utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

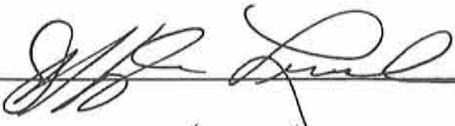
- b. Describe the utilities that are proposed for the project, the utility providing the service, and the

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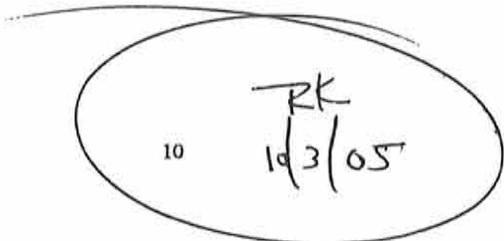
general construction activities on the site or in the immediate vicinity which might be needed.
No utilities would be affected by this non-project action. ✓

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Date Submitted: 9/26/05


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D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

The proposal is to adopt an update to the City of Poulsbo Stormwater Management Plan (SWMP). The SWMP will not, in and of itself, result in any significant or adverse impacts. The following information is provided to address the issues and impacts that may be associated with implementation of the SWMP. The following is a list of potential actions and impacts on the environment that may be generally anticipated from implementing the plan, depending upon approval by decision-makers and available funding:

- Construction of regional stormwater detention facilities near North Kitsap High School (Caldart Avenue and Hostmark Street), and Viking Crest.
- Installation of new drainage collection and conveyance pipes in the Mesford Street and Viking Way areas.
- Replacement of culverts that block fish passage on South Fork Dogfish Creek.
- Construction of water quality treatment facilities at Anderson Park and potentially at the existing City Public Works facility.
- Construction of new or replacement segments of the stormwater system in various locations, as required.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Discharge to Water

The SWMP is likely to result in projects that decrease the amount of stormwater runoff, as well as the quantity of sediment or other water quality contaminants into surface waters. Stormwater runoff during facility construction could cause short-term increases in discharges of sediment to water as a result of erosion caused by earth disturbance during clearing and grading.

Air

Short-term increases in the emissions of dust from clearing and grading and exhaust from construction vehicles and equipment could occur during construction activities. Construction would result in soil disturbance, and vehicle movement and wind during dry weather could generate dust.

Production, Storage, or Release of Toxic and Hazardous Substances

No change in storage of hazardous materials would occur due to the SWMP. Projects resulting from SWMP implementation are unlikely to involve releases of toxic or hazardous substances. Pesticides, herbicides, and fertilizers may be used as part of normal maintenance and could enter waterways if applied at uncontrolled rates.

Noise

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Short-term increases in noise could be caused by construction activities and equipment and would be generated by small trucks, backhoes, and other digging or material moving equipment. Construction noise sources typically produce noise levels in the range from 70-98 decibels at a distance of 50 feet. The proposal would not result in any long-term increases in noise.

Proposed measures to avoid or reduce such increases are:

Discharge to Water

Potential measures to avoid sediment impacts during construction include the use of construction best management practices (BMPs). These BMPs are aimed at preventing uncontrolled storm water runoff from disturbed soil areas during construction and potential silt and sediment impacts to surface water. Potential mitigation measures for water may include the following BMPs:

- Clear and grub only those areas where construction or excavation is necessary
- Preserve vegetation where possible and minimize soil disturbance
- Use temporary cover practices over disturbed soil areas or soil stockpiles such as temporary seeding, straw mulch, plastic, or erosion netting
- Use temporary sediment control devices, such as filter fabric fences, sediment traps, and sedimentation ponds
- Protect storm drain catch basins with sediments traps (such as hay bales) and filter fabric
- Schedule earthwork to occur during drier periods
- Use straw, jutte matting, or plastic sheeting over disturbed earth areas

A temporary erosion and sediment control plan would be prepared and implemented prior to construction taking place on a site.

Air

Potential mitigation for controlling dust during construction could include the following measures:

- Covering trucks that haul earth materials to prevent material from blowing off
- Spraying water over disturbed soil areas during dry weather being careful not to use excessive amounts of water, which may entrain sediments and carry them off site
- Constructing rock spall entrance/exit pads at the construction site
- Using a street sweeper to keep dirt cleaned off the roadway
- Wash construction vehicle tires prior to their leaving the construction site.

Production, Storage, or Release of Toxic and Hazardous Substances

Under the proposal, all fertilizer, pesticide, and herbicide applications will be made in a manner that will avoid their entry into waterways or the storm drainage system.

Noise

Potential mitigation for noise produced during construction could include the following measures:

- Limit construction to daylight work hours
- Locate construction equipment as far away as possible from sensitive receptors
- Do not leave equipment idling when not in use
- Install and maintain mufflers and sound attenuation devices on all equipment

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- Schedule operations to keep average sound levels as low as possible
- Use only well maintained and properly functioning equipment
- Noisiest operations will be scheduled to coincide with the highest ambient noise levels, such as during peak traffic hours, and curtailed during periods when the impact on nearby residential areas would be most severe.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Potential projects resulting from implementing the SWMP could affect fish or marine life, largely due to potential impact from sediment or other contaminants in water carried into streams or marine waters by construction site storm water runoff. This is unlikely to occur if construction BMPs are employed during construction. Water quantity and quality controls implemented as part of the SWMP would improve freshwater and marine habitat compared to existing conditions.

Wildlife is also not expected to be significantly impacted by any projects. Wildlife in the City is generally adapted to urban conditions (e.g., birds, small mammals, rodents, moles, etc.). Construction activities would likely cause wildlife in the immediate vicinity to relocate (some wildlife could be lost during construction such as moles).

There would be loss of vegetation during construction and development of CIP projects. However, the proposal would include projects that result in planting trees, shrubs, and other ornamental vegetation. This is likely to have a beneficial impact on birds and small mammals by providing additional habitat.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

Fish and marine life would be protected by implementing construction BMPs to control silt or sediment from entering wetlands (see mitigation measures under Section 1 above), and by restoring riparian vegetation where feasible.

Potential measures to protect plants or wildlife include minimizing the amount of vegetative disturbance, replacing vegetation lost to construction as much as practical.

The removal of plant life would only occur in those areas being developed. Wetlands would be protected by avoiding development in the wetlands, designating wetland buffers, and implementing construction BMPs to control silt or sediment from entering wetlands (see mitigation measures under Section 1 above).

3. How would the proposal be likely to deplete energy or natural resources?

All of the potential CIP projects resulting from the SWMP would require energy and resources for construction, such as electricity and fuel for machinery. The proposal is not likely to significantly deplete energy or natural resources.

Proposed measures to protect or conserve energy and natural resources are:

None proposed.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

The projects resulting from the plan are not expected to impact any parks, wilderness areas, wild and scenic rivers, threatened and endangered species habitat, wetlands, floodplains, or prime farmland. Projects resulting from the plan may potentially have a positive impact on environmentally sensitive areas by improving stormwater quantity and quality controls.

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The proposal would not affect known archaeological/cultural sites. However, there is the potential for undiscovered archaeological artifacts to be located within the City.

Proposed measures to protect such resources or to avoid or reduce impacts are:

As implementation of the SWMP takes place, specific project designs will be developed to provide direction to encourage the creation of new facilities that reflect aesthetic and historic character.

If archaeological remains of any kind are encountered during any project resulting from the SWMP, work would be halted in the immediate vicinity until the significance of the resource could be evaluated by a qualified archaeologist. The Washington State Office of Archaeology and Historic Preservation and local tribal officials (Suquamish) would be consulted to determine an appropriate course of action.

Implementation of CIP projects would be designed to avoid or mitigate impacts to environmentally sensitive areas such as steep slopes and wetlands. The project would not affect parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, floodplains, or prime farmlands.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Land and shoreline use would not be significantly affected by the proposal. Regional detention systems would be located on appropriately zoned property and designed to be compatible with surrounding land use.

Proposed measures to avoid or reduce shoreline and land use impacts are:

City staff would review design of specific CIP projects to ensure compliance with the City's Comprehensive Land Use Plan, Zoning Code, and existing land uses.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

The proposal is not likely to increase demands for transportation or public services and utilities.

Proposed measures to reduce or respond to such demand(s) are:

No measures are proposed.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

Potential projects resulting from the adoption of the Stormwater Management Plan Update would be required to comply with local, state, and/or federal laws and requirements for environmental protection. Therefore, it is unlikely that these projects would conflict with laws or requirements for protection of the environment.

RK
10/3/05

APPENDIX B

Stormwater Facility Inventory and Inspection Results

Table A-1. Summary of City of Poulsbo owned stormwater flow control facilities.

Description	Location	Inspection Results
1 cell wet detention pond	Bond Rd at Liberty Ridge	Vegetation removal needed
2 cell wet detention pond	10th Ave. at Central Market	Vegetation removal needed
1 cell dry detention pond	Forest Rock at 12th and Garnet	Vegetation removal needed
1 cell dry detention pond	Forest Rock at Lena Place	Vegetation removal needed
1 cell dry detention pond	Forest Rock at N. end Caldart	Vegetation removal needed
1 cell dry detention pond	Kevo's Pond at Blue Lagoon Place	Debris removal needed
1 cell dry detention pond	Applewood at Spartan St.	Vegetation removal needed
1 cell dry detention pond	Fjellvue at Laura Vei Loop	No maintenance needed
1 cell dry detention pond	Wilderness View at 12th off Lincoln	No maintenance needed
1 cell dry detention pond	Deer Run	No maintenance needed
1 cell dry detention pond	Austerbruin at Vaughn Milton Loop	No maintenance needed
1 cell dry detention pond	Austerbruin at Caldart	No maintenance needed
Under Ground Vault	Liberty Rd NE at Fire Station	Regular maintenance required
Under Ground Vault	7th Avenue at Burger King	No maintenance needed
Under Ground Vault	Liberty Rd NE at Mitzels	Debris removal needed
Under Ground Vault	Lincoln Rd at Caldart	Debris removal needed
Under Ground Vault	Lincoln Rd at 20th and Larsen Crt	Debris removal needed
Under Ground Vault	Mesford St. at Mariners Landing	Regular maintenance required
Under Ground Vault	Forest Rock Lane	Debris removal needed
Under Ground Vault	Lincoln Rd at Hwy 305	No maintenance needed
Under Ground Vault	Hostmark at Prouddential Bldg	Debris removal needed
Under Ground Vault	15th Loop near Hostmark	Recently cleaned
Note: All inspections conducted in December 2003 through March 2004.		

Table A-2. City of Poulsbo owned stormwater water quality facilities.		
Description	Location	Inspection Results
Bioswale. West to east along north prop. line	Viking Ave. North of Campanas	No maintenance needed
Bioswale. Between house and bay	Lindvig Way at Lindvig Park	No maintenance needed
Bioswale. Winds through property to bay	Edvard Street, north of Hidden Cove	Vegatation removal needed
Bioswale. From Texaco to Taco Time	Little Valley Rd., west of Texaco	No maintenance needed
Bioswale. Feeds detention pond	Forest Rock at 12th and Garnet	No maintenance needed
Bioswale. Feeds detention pond	Forest Rock at Lena Pl.	Vegatation removal needed
Bioswale. Feeds detention pond	Forest Rock at 12th Ave., by park	Vegatation removal needed
Bioswale. Feeds detention pond	Forest Rock at the north end of Caldart Ave.	Vegatation removal needed
Bioswale. Feeds detention pond	Fjellvue at Laurie Vei Loop	Debris removal at inlet needed
Bioswale. Feeds detention tanks	Mariners Landing	No maintenance needed
Bioswale. Leaves pond and feeds creek	Deer Run	No maintenance needed
Bioswale. Feeds detention pond	Austerbruin, off Vaughn Milton Loop	No maintenance needed
Bioswale. Feeds detention pond	Austerbruin, off Curt Rudolph Rd.	No maintenance needed
Bioswale. Feeds detention pond	Kevo Pond at Blue Lagoon Place	No maintenance needed
Bioswale. After detention pond	Applewood at Spartan Street	No maintenance needed
Bioswale. No detention	Nelson Park	No maintenance needed
Bioswale. No detention	Poulsbo Gardens	No maintenance needed
Note: All inspections conducted in December 2003 through March 2004.		

Table A-3. City of Poulsbo owned stormwater control structure facilities.

Description	Location	Inspection Results
48" diameter 8' deep	Lindvig Park at Bio-swale	No maintenance needed
54" diameter 8' deep	Edvard St., by Windsong Apartments	No maintenance needed
54" diameter 13' deep	Finn Hill at entrance to Staffordshire	Oil and sediment removal needed
54" diameter 8' deep	1st Ave. at Bond Road	No maintenance needed
54" diameter 9' deep	Little Valley at 10th Ave.	Sediment removal needed
54" diameter 11' deep	Liberty Road NE at Mitzels	No maintenance needed
54" diameter 15' deep	7th Ave. at Liquor Store	No maintenance needed
54" diameter 9' deep	7th Ave. at Northsound Bank	No maintenance needed
No Data	Liberty Road NE by fire station	No maintenance needed
54" diameter 8' deep	Forest Rock Lane, North side of road	No maintenance needed
54" diameter 15' deep	Forest Rock at 12th Ave. and Garnet	No maintenance needed
54" diameter 8' deep	Forest Rock at Lena Pl.	No maintenance needed
54" diameter 8' deep	Forest Rock at the north end of 12th Ave.	No maintenance needed
54" diameter 8' deep	Forest Rock at the north end of Caldart Ave.	No maintenance needed
54" diameter 8' deep	Poulsbo Gardens at south end of loop	Sediment removal needed
54" diameter 8' deep	Lincoln Road below Caldart Ave.	Sediment removal needed
54" diameter 8' deep	Lincoln Rd. between 20th Ave. and Larson Ct.	No maintenance needed
48" diameter 8' deep	Mesford St. at Mariners Landing	Clean twice per year
48" diameter 10' deep	Ridgewood at Norland Pl.	No maintenance needed
48" diameter 8' deep	Fjellvue at south end	Replace manhole cover
48" diameter 8' deep	Applewood at Spartan Ct.	No maintenance needed
No Data	Lincoln Rd. at Hwy 305	No maintenance needed
54" diameter 16' deep	12th Ave. at Wilderness View	No maintenance needed
54" diameter 10' deep	Skog Ct. off 13th Ave. & Hostmark	Sediment removal needed
48" diameter 10' deep	15th Loop off Hostmark	No maintenance needed
48" diameter 12' deep	Austerbruin off Vaughn Milton Loop	No maintenance needed
54" diameter 12' deep	Deer Run at pond outfall	Oil and sediment removal needed
48" diameter 7' deep	Hostmark at the Marine Science Center	Oil and sediment removal needed
48" diameter 20' deep	Nelson Park	Sediment removal needed
48" diameter 12' deep	Norrlund Lane	Sediment removal needed
48" diameter 7' deep	Legion Park	Sediment removal needed
Note: All inspections conducted in December 2003 through March 2004.		

Table A-4. Privately owned stormwater flow control facilities, City of Poulsbo.			
Owner	Description	Location	Inspection Results
Not determined	Above Ground Detention	Viking Avenue at Winton Woods I	Not completed
Not determined	Above Ground Detention	Viking Avenue at Winton Woods II	Not completed
Not determined	Above Ground Detention	Viking Avenue at Poulsbo Cinema	Not completed
Not determined	Above Ground Detention	Viking Avenue at Poulsbo RV	Not completed
Not determined	Above Ground Detention	Viking Avenue at Bovela (Stimac)	Not completed
Not determined	Above Ground Detention	4th Ave at Iverson	Not completed
Not determined	Above Ground Detention	7th Ave at Drs Clinic	Not completed
Not determined	Above Ground Detention	7th Ave at Kitsap Bank	Not completed
Not determined	Above Ground Detention	7th Ave at Holiday Inn	Not completed
Not determined	Above Ground Detention	7th Ave at Northsound Bank	Not completed
Not determined	Above Ground Detention	7th Ave at Group Health	Not completed
Not determined	Above Ground Detention	8th Ave at Terhune Homes	Not completed
Not determined	Above Ground Detention	8th Ave at EDS Bldg	Not completed
Not determined	Above Ground Detention	8th Ave at Ryan Construction	Not completed
Not determined	Above Ground Detention	8th Ave at Dairy Queen	Not completed
Not determined	Above Ground Detention	10th Ave at Texaco	Not completed
Not determined	Above Ground Detention	10th Ave vacant lot at Central Market	Not completed
Not determined	Under Ground Detention	10th Ave at Hollywood Video	Not completed
Not determined	Under Ground Detention	10th Ave at John L. Scott	Not completed
Not determined	Under Ground Detention	10th Ave at Vet clinic	Not completed
Not determined	Under Ground Detention	Hostmark St at LDS	Not completed
Not determined	Under Ground Detention	Hostmark St at Olympic Place (west)	Not completed
Not determined	Under Ground Detention	Hostmark St at Olympic Place (east)	Not completed
Not determined	Under Ground Detention	Hostmark St at Woodcreek Apts	Not completed
Not determined	Under Ground Detention	Lincoln Rd at Christ MC	Not completed
Not determined	Under Ground Detention	Mesford St at LDS	Not completed

Note: All inspections conducted in December 2003 through March 2004.

Table A-5. Privately owned stormwater flow control facilities, City of Poulsbo.		
Owner	Description	Inspection Results
Bioswale. Viking Ave. at Poulsbo Cinemas	East and west along S prop. line	Not completed
Bioswale. Viking Ave. at Liberty Shores	Northern property line	Not completed
Bioswale. Bond Rd., at the medical center	Runs along Bond Road	Not completed
Bioswale. Front Street at Martha and Mary	Runs along Front Street	Not completed
Bioswale. Front Street at Martha and Mary	At south parking lot	Not completed
Offices	North and south along the W prop. line	Not completed
Bioswale. Little Valley by Texaco	Runs along Little Valley Road	Not completed
Bioswale. 10th Ave. by Central Market	Runs along pond on west side of 10th Ave.	Not completed
Bioswale. 10th Ave. at Boxlight	Next to pond	Not completed
Bioswale. 7th Ave. by North Sound Bank	Between bank and hwy 305	Not completed
O/W Separator. Viking Way and Finn Hill Professional Building	Type I CB with PVC elbow	Not completed
O/W Separator. Courtesy Auto Group Ford Dealer	Type II CB with PVC elbow	Not completed
O/W Separator. Front Street at Fjord Manor Apartments	Type I CB with PVC "T"	Not completed
Apartments	Type I CB with PVC elbow	Not completed
Church	Type II CB with PVC "T"	Not completed
Note: All inspections conducted in December 2003 through March 2004.		

Description	Location	Inspection Results
48" diameter - 8' deep	Viking Ave. at McDonalds	Not completed
54" diameter - 19' deep	Viking Ave. at Winton Woods II	Not completed
54" diameter - 11' deep	Viking Ave. at Winton Woods I	Not completed
54" diameter - 14' deep	Viking Ave. at Poulsbo Cinemas	Not completed
54" diameter - 10' deep	Viking Ave. west at Poulsbo RV	Not completed
54" diameter - 9' deep	Viking Ave. east at Poulsbo RV	Not completed
54" diameter - 10' deep	Viking Ave. at Bovelva, Stimac Building	Not completed
48" diameter - 8; deep	Front Street at Poulsbo Athletic Club	Not completed
48" diameter - 10' deep	Poulsbo Village at Dr. Rhineharts	Not completed
54" diameter - 11' deep	Poulsbo Village west of Group Health	Not completed
48" diameter - 8' deep	Poulsbo Village NW corner of Group Health	Not completed
54: diameter - 10' deep	7th Ave., SE corner of liquor store	Not completed
54" diameter - 13' deep	7th Ave., S end of lot north of NS Bank	Not completed
54" diameter - 12' deep	7th Ave., N end of lot north of NS Bank	Not completed
54" diameter - 12' deep	7th Ave., N end of lot north of NS Bank (#2)	Not completed
54" diameter - 9' deep	7th Ave., NE corner, Navy Building	Not completed
54" diameter - 9' deep	7th Ave., Holiday Inn, NE corner	Not completed
54" diameter - 9'deep	7th Ave., Kitsap Bank, NE Corner	Not completed
54" diameter - 12' deep	10th Ave., NE Powder Hill, General Construction	Not completed
54" diameter - 10' deep	10th Ave., NE Powder Hill, Paladin	Not completed
54" diameter - 6' deep	10th Ave. 19570 Pet Clinic	Not completed
54" diameter - 10' deep	10th Ave. 19570 Pet Clinic	Not completed
54" diameter - 8' deep	10th Ave., John L Scott (lower)	Not completed
54" diameter - 10' deep	10th Ave., Hollywood Video	Not completed
54" diameter - 11' deep	10th Ave., South of Central Market, N. End	Not completed
54" diameter - 13 deep	10th Ave., M&M Deli	Not completed
54" diameter - 11' deep	10th Ave., Taco Time	Not completed
54" diameter - 12' deep	19307 8th Ave., (Phillips Atty)	Not completed
48" diameter - 11' deep	19351 8th Ave., (EDS Building)	Not completed
48" diameter - 11' deep	Iverson & 4th Ave., Ebenezer (upper)	Not completed
54" diameter - 12' deep	8th Ave., Terhune Homes	Not completed
54" diameter - 13' deep	7th Ave., & Iverson, Dr. Clinic	Not completed
48" diameter - 10' deep	Back Engrance to Martha & Mary	Not completed
54" diameter - 9' deep	Bond Road, Medical Center	Not completed
54" diameter - 9' deep	LDS Church, Mesford	Not completed
54" diameter - 9' deep	Hostmark - Olympic Place 2 East	Not completed
54" diameter - 9' deep	Hostmark - Olympic Place 2 West	Not completed
54" diameter - 11' deep	CKA - New Add. Between Hostmark & Lincoln	Not completed
54" diameter - 10' deep	8th Ave., Dairy Queen	Not completed
54" diameter - 8' deep	Hostmark Entrance to Wood Creek Apts.	Not completed
54" diameter - 8' deep	Hostmark Wood Creek Apts. NE Corner	Not completed
54" diameter - 9' deep	Hostmark SW Corner of Tech. Building	Not completed
Note: All inspections conducted in December 2003 through March 2004.		

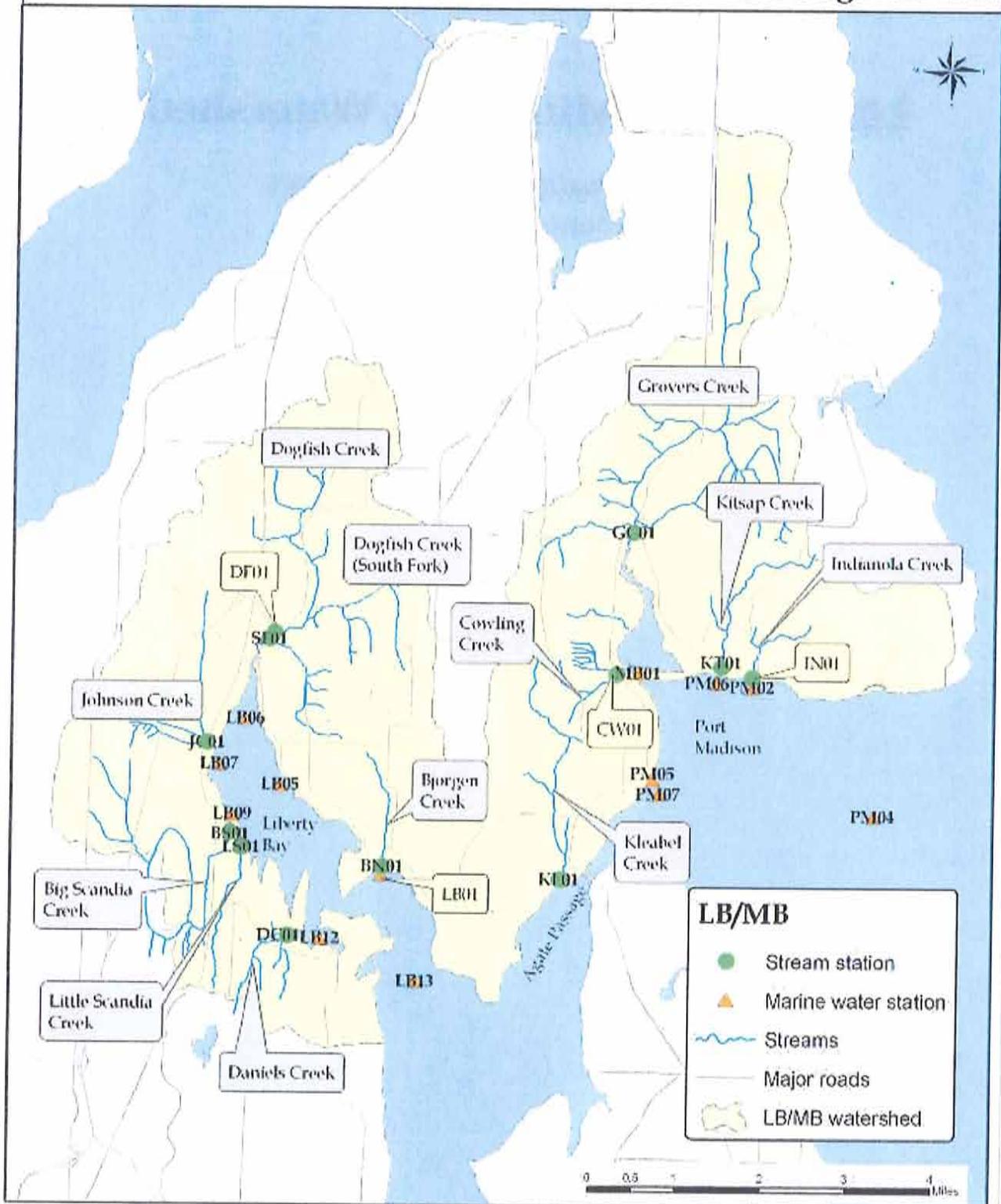
APPENDIX C

**2006 Water Quality Report, Outfall Inventory, Stormwater Water
Quality Data, and Illicit Discharge Detection Connection Report**

Liberty Bay / Miller Bay Watershed

*2006 Water Quality Monitoring Report
Kitsap County Health District*

Liberty Bay / Miller Bay Watershed Monitored Streams and Marine Water Monitoring Stations



Liberty Bay / Miller Bay Watershed

The Liberty Bay / Miller Bay (LB/MB) watershed, designated as Extraordinary Primary Contact waters by the State, is located in northern Kitsap County, as shown in the following watershed map. The Health District began water quality monitoring in the watershed on a regular basis in 1996. Overall water quality is poor, but appears to be improving. Increased development, old on-site sewage treatment systems, and poor agricultural animal waste management are the primary causes of the poor water quality. Continued water quality improvement is expected in response to FC pollution source reduction projects performed by Health District and other agencies. There are three streams (Daniels, Indianola, and Kitsap) in the watershed that are so polluted that the Health District advises against public contact.

2006 Water Quality Summary

Waterbody	Long term trend	Short term trend	FC Standard		Health Advisory	Other WQ standard exceedances
			Met standard	Failed standard		
Big Scandia Creek (BS01)						Dissolved oxygen (3) pH (1)
Bjorgen Creek (BN01)						Not monitored
Cowling Creek (CW01)						Dissolved oxygen (3)
Daniels Creek (DC01)						Dissolved oxygen (3)
Dogfish Creek (DF01)						Dissolved oxygen (1)
Dogfish Creek (South Fork) (SF01)						Dissolved oxygen (2)
Grovers Creek (GC01)						Dissolved oxygen (7)
Indianola Creek (IN01)						Dissolved oxygen (1) pH (1)
Johnson Creek (JC01)						pH (1)
Kitsap Creek (KT01)						Dissolved oxygen (3)
Kleabel Creek (KL01)						Not monitored

Little Scandia Creek (LS01)						Not monitored
Overall marine water ¹			10 of 13			Temperature (41)

¹LB/MB watershed marine waters include Liberty Bay, Miller Bay, Agate Passage, and Port Madison Bay

Water Quality Improvement Efforts and Current Status Summary

Health District Watershed PIC Projects

- The *Dogfish Creek Restoration Project* was completed in 2004; the final report is available upon request. In the unincorporated Kitsap County portion of Dogfish Creek, eight (8) failing on-site sewage systems were identified and repaired, and seventeen (17) properties with poor livestock management either improved practices or removed the livestock from the property.
- In conjunction with the City of Poulsbo, the *City of Poulsbo Nonpoint Pollution Impacts to South Fork of Dogfish Creek Project* was completed in 2002. The project focused upon evaluation and reduction of FC and turbidity from storm water discharges in the South Fork of Dogfish Creek.
- In conjunction with the City of Poulsbo, from 2003 to 2005, the *City of Poulsbo Stormwater Outfall Inventory and Illicit Discharge Detection and Elimination Program*. The program was focused on public education and outreach, and monitoring and assessment of stormwater impacts on Liberty Bay.
- The Kitsap Creek and Daniels Creek upstream investigations were ongoing in 2006, pollutant sources are still being identified and corrected.

State Listed Waterbodies and Listing Parameter(s) and Categories

Big Scandia Creek	FC (5)
Bjorgen Creek	FC (5)
Dogfish Creek	Dissolved Oxygen (5)
Grovers Creek	Dissolved Oxygen (5), FC (5)
Johnson Creek	FC (5)
Kleabel Creek	FC (5)
Liberty Bay	FC (5)
Little Scandia Creek	FC (5)
Snyder Creek	pH (5)

Shellfish Classifications

- The east side of Liberty Bay, adjacent to the City of Poulsbo – *Prohibited*.
- The northern end of Agate Passage, near the Suquamish treatment plant outfall – *Prohibited*.
- All of Miller Bay - *Prohibited*.
- Agate Passage, from Pt. Bolin north to the Hwy. 305 bridge – *Approved*.
- Lemolo Bay - *Approved*.
- The northern shoreline of Port Madison Bay, except the area near Indianola – *Approved*.

Individual Stream Data

Big Scandia Creek

Big Scandia Creek and its tributaries combine for over three miles of stream corridor. The headwaters of the stream are located near Clear Creek Rd. The stream then flows north and discharges into the south shore of Liberty Bay near Scandia. Land use in the Big Scandia Creek drainage is predominately rural residential and agricultural. Water quality is poor, as the creek has met the FC standard **0 times in 11** years of monitoring. Overall trend analysis for the creek shows a **stationary trend**.



Big Scandia Creek monitoring station BS01



The stream mouths of Big (upper stream in photo) and Little Scandia Creeks near Scandia Point.

Bjorgen Creek

Bjorgen Creek originates near North Kitsap High School in Poulsbo. The creek flows approximately 1.5 miles to the south-southeast, crosses Highway 305 and discharges to Liberty Bay near Lemelo. Land use in the drainage is dense and rural residential. Water quality is poor, and the creek does not yet have enough data to determine a bacterial trend.



The mouth of Bjorgen Creek where it discharges into Liberty Bay near Lemelo.

Cowling Creek

Cowling Creek is small stream, which originates just east of the Port Gamble Suquamish Road. From there it flows eastward to its discharge point along the west shore of Miller Bay. Land use in the Cowling Creek drainage is a combination of predominately rural residential and agricultural. Chum hatchery operations take place on this stream. Water quality is poor, as the creek has met the FC standard **1 time in 11** years of monitoring. Overall trend analysis for the creek shows a **stationary trend**.



The Cowling Creek fish rearing pond, just above monitoring station CW01

Daniels Creek

Daniels Creek is a small stream approximately two miles in length that flows north from Central Valley Road to its discharge into the west shore of Dogfish Bay near Keyport. Land use in the drainage is a combination of rural residential and agricultural. Water quality is poor, as the creek has met the FC standard **0 times in 11** years of monitoring. As FC levels at DC01 are very high and the creek has a **stationary** overall trend, a PIC project is being planned to address the bacterial pollution in the creek. **Due to its high bacterial pollution levels, the stream has been posted with a public health advisory for no contact.** There were also seven (7) dissolved oxygen violations, most likely due to low stream flow and riparian area damage.

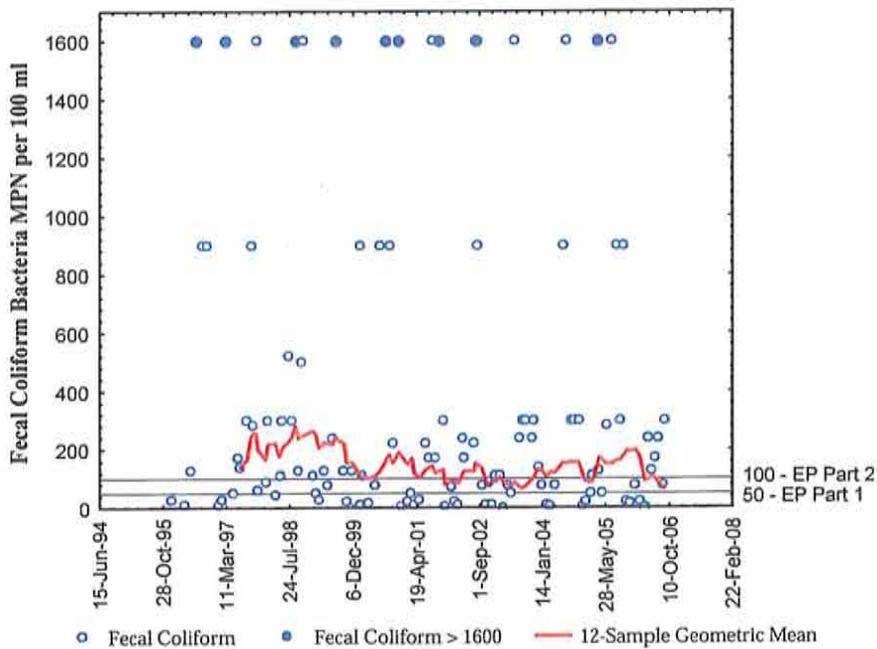


Daniels Creek monitoring station DC01



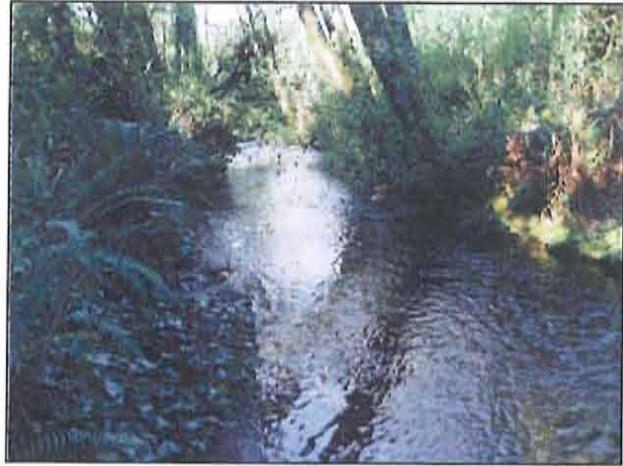
Health Advisory warning sign posted on Daniels Creek

Daniels Creek Trend Graph



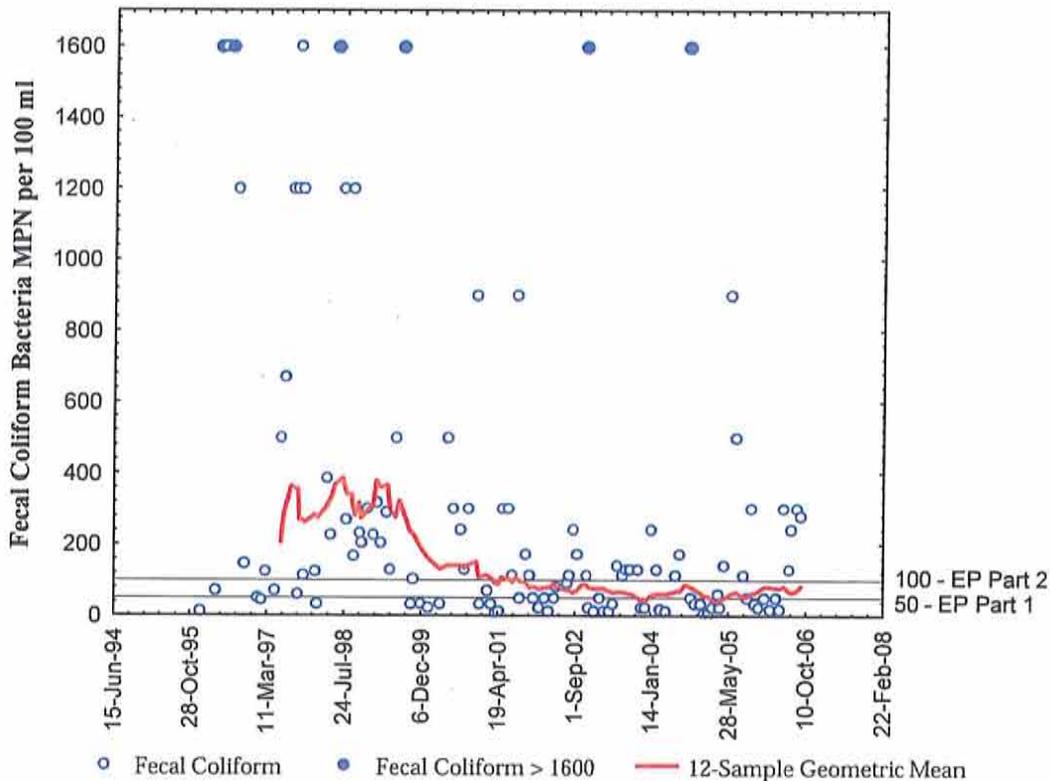
Dogfish Creek

Dogfish Creek and its tributaries (the east, west and south forks) combine for over seven miles of stream corridor. The headwaters of the west fork are located near Big Valley Rd; the east fork near the intersection of Bond Rd. and Gunderson Rd; and the south fork near Caldart Avenue within the City of Poulsbo. The stream discharges into northern Liberty Bay in Poulsbo. Land uses in the drainage include agricultural, rural and urban residential, commercial, and light industrial. Water quality is poor, as the creek has met the FC standard **0 times in 11** years of monitoring. However, Dogfish Creek is one of six creeks in the County where the overall trend analysis shows **an improving long-term trend**. This improving trend can be attributed to cleanup projects in the watershed.



Dogfish Creek monitoring station DF01
 downstream of Bond Road

Dogfish Creek Trend Graph



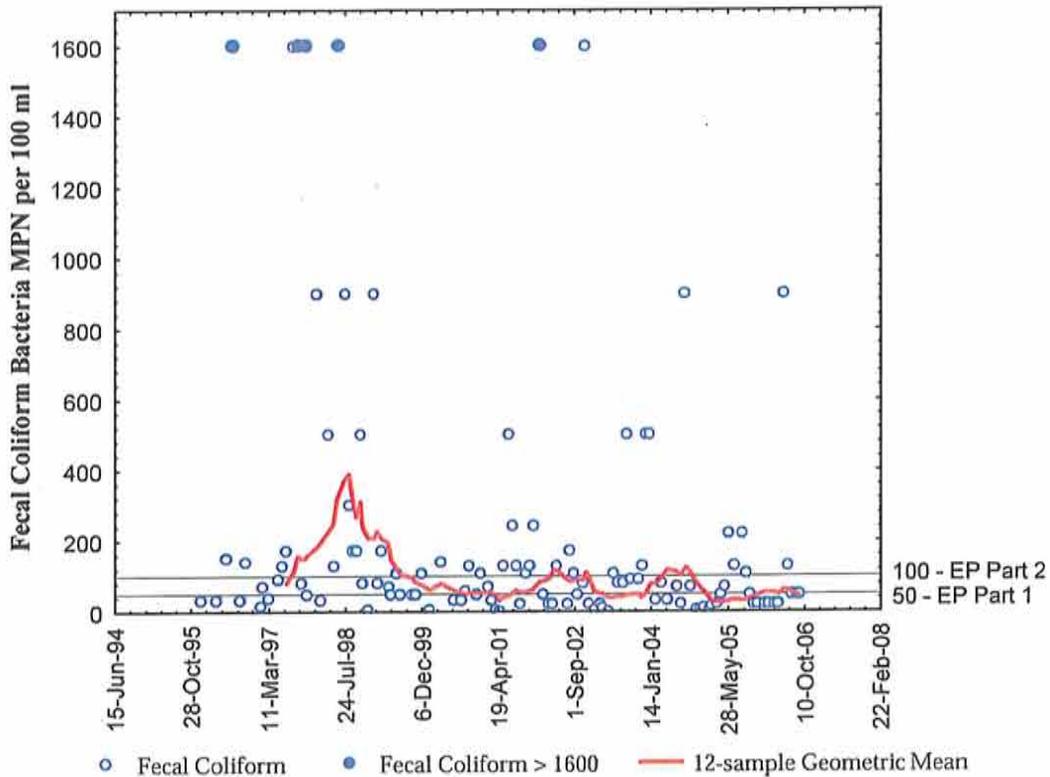
Dogfish Creek (South Fork)

Because the South Fork of Dogfish Creek enters the main fork below the Health District's main fork monitoring station DF01, a separate long term trend analysis is performed for this fork. Water quality is poor, as the creek has met the FC standard **0 times in 11** years of monitoring. However, Dogfish Creek (South Fork) overall trend analysis shows **an improving trend**. This improving trend can be attributed to cleanup projects in the watershed. Dissolved oxygen violations are believed to be due to elevated water temperatures in the creek that may be a result of clearing in the stream corridor and also inputs from manmade stormwater detention ponds.



South fork Dogfish Creek monitoring station SF01 near Bond Road

Dogfish Creek (South Fork) Trend Graph



Grovers Creek

The headwaters of Grovers Creek are located one mile north of Hwy. 104 near Kingston. The stream flows south for four miles and discharges into the north end of Miller Bay. Land use in the Grovers Creek drainage is predominately rural residential and agricultural. Water quality is poor, as the creek has met the FC standard **2 times in 11** years of monitoring. Overall trend analysis for the creek shows a **stationary trend**. Dissolved oxygen violations may be a result of hatchery ponds at the Grovers Creek fish hatchery.



Health District staff collecting stream data at monitoring station GC01

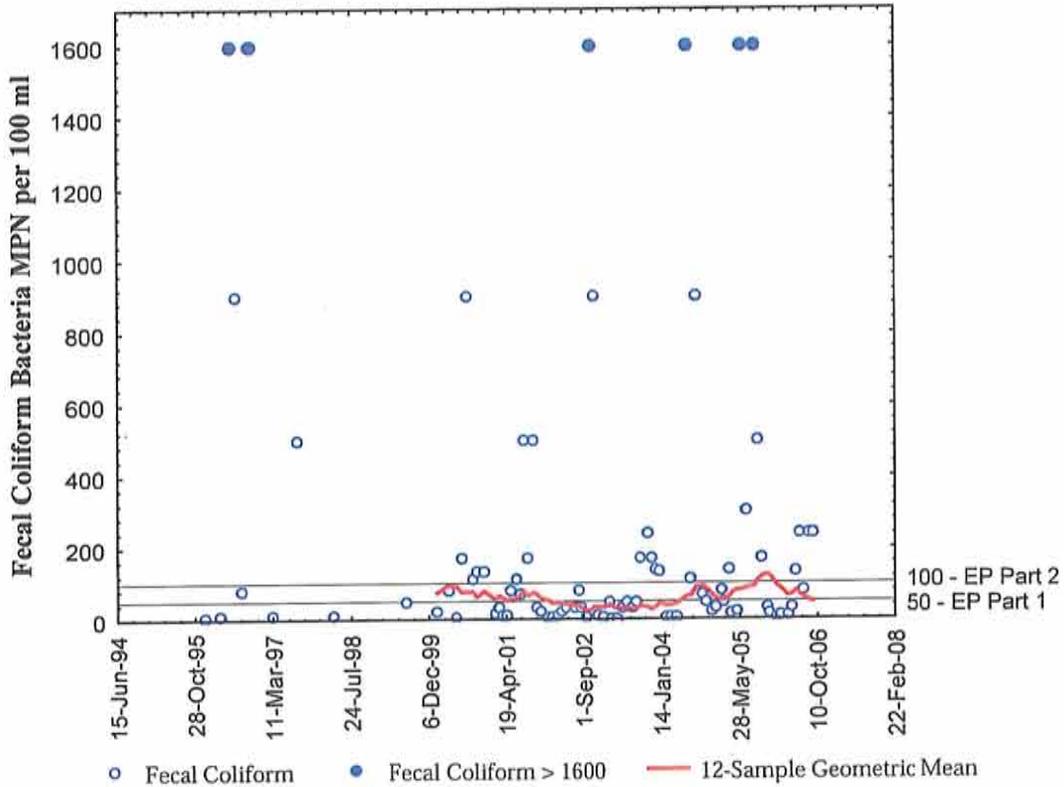
Indianola Creek

Indianola Creek is a small stream approximately one mile in length. The stream flows from north to south and discharges into Port Madison Bay approximately 0.1 mile west of the Indianola Dock. Land use in the Indianola Creek drainage is predominately rural residential and agricultural. Water quality is poor, as the creek has met the FC standard **3 times in 11** years of monitoring. Overall trend analysis for the creek shows a **stationary trend** (see following page).



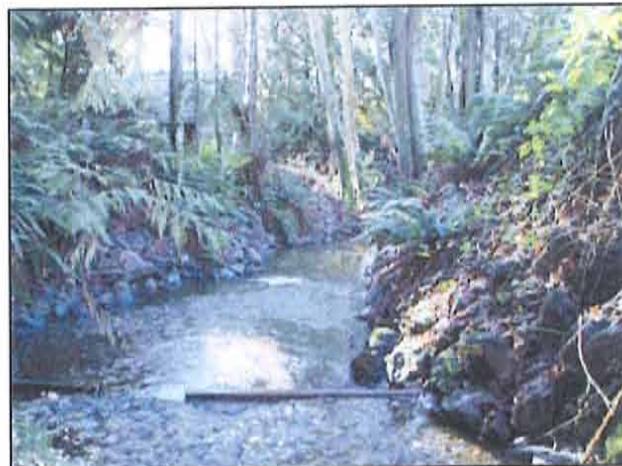
Monitoring station IN01 located at the mouth of Indianola Creek on Indianola beach

Indianola Creek Trend Graph (continued from above)



Johnson Creek

The headwaters of Johnson Creek are located west of Highway 3 and discharge into the western shore of Liberty Bay. The three major tributaries of this stream travel in an easterly direction and make up nearly four miles of stream corridor. Land use in the Johnson Creek drainage has been predominately rural residential and agricultural, but is changing as more concentrated development, such as the Olhava project, occurs in the area. Water quality is poor, as the creek has met the FC standard **2 times in 11** years of monitoring. Overall trend analysis for the creek shows a **stationary trend**.



Johnson Creek monitoring station JC01
 downstream of Viking Way

Kitsap Creek

Kitsap Creek is a small stream approximately three miles in length. The stream flows from north to south and discharges into Port Madison Bay west of the Indianola Dock. Land use in the Kitsap Creek drainage is predominately rural residential and agricultural. Water quality is poor, as the creek has met the FC standard **2 times in 11** years of monitoring. As FC levels at KT01 are very high and the creek has a **stationary** overall trend, further investigation is continuing to address the bacterial pollution in the creek. **Due to its high bacterial pollution levels, the stream has been posted with a public health advisory for no contact.**

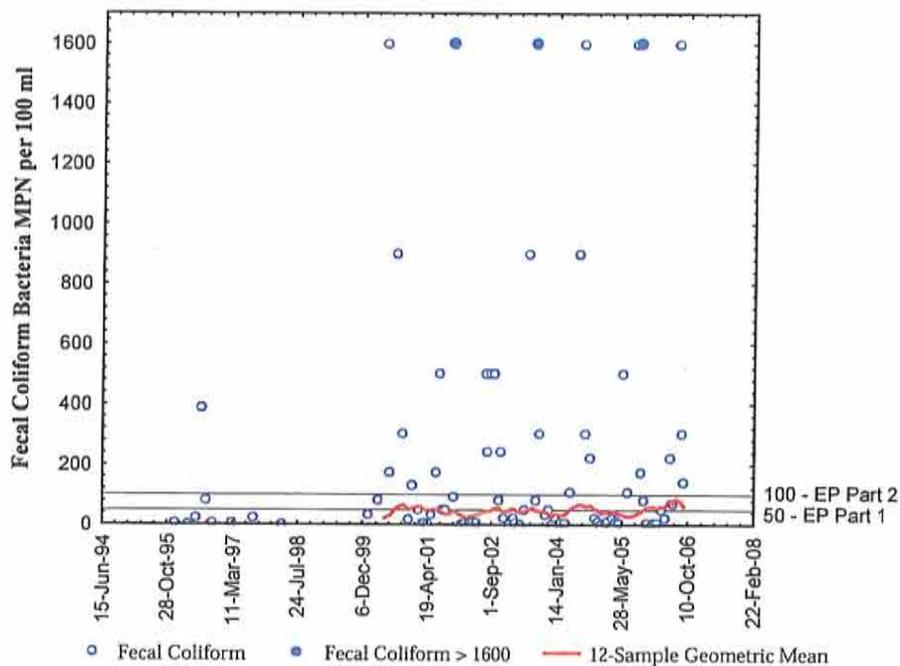


Kitsap Creek downstream of monitoring station KT01



Health Advisory warning sign posted at monitoring station KT01

Kitsap Creek Trend Graph



Kleabel Creek

The headwaters of Kleabel Creek are located near Gunderson Road north of Suquamish. The creek travels almost due south for 3.2 miles to discharge into Agate Passage near the Clearwater Casino. Most of the land in the drainage is undeveloped, although some rural residential properties are located within the area. Water quality is good, but not enough data has been collected to determine a bacterial pollution trend for the creek.



The mouth of Kleabel Creek at its discharge into Agate Passage near the Clearwater Casino

Little Scandia Creek

Little Scandia Creek flows from the Central Valley area north to Liberty Bay. The creek's headwaters are located north of Island Lake, and then flows north, crossing Hwy. 308, approximately 2 miles to discharge into the bay near Scandia. Land use in the drainage is predominately rural residential with some agricultural land use. Water quality is poor, but not enough data has been collected to determine a bacterial pollution trend for the creek.



The mouth of Little Scandia Creek near Scandia Point in Liberty Bay.

Individual Marine Water Monitoring Station Data

Please see the LB/MB watershed map for specific marine water monitoring station locations.

Marine water monitoring stations with a significant trend or insufficient data for trend analysis

- Improving trend – LB06
- Insufficient data – PM05, PM06, and PM07.

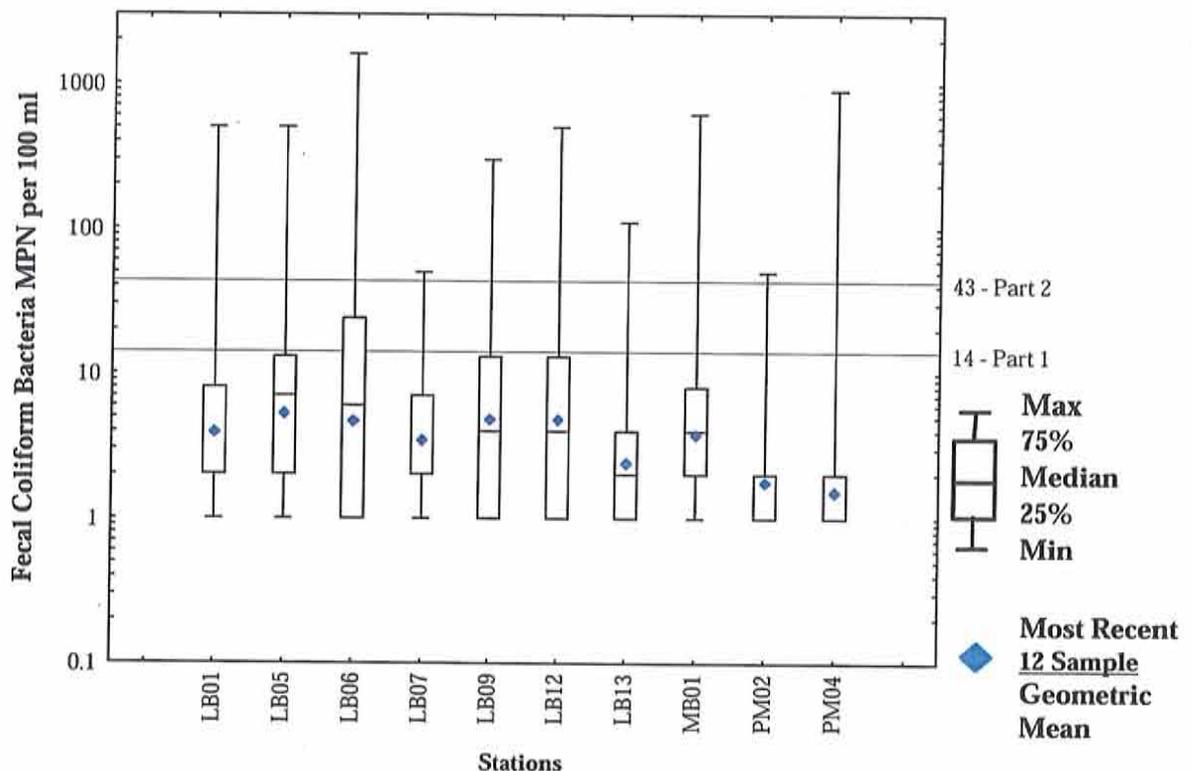
Marine Water Quality Standards Violations

Stations LB01, LB06, and LB07 failed the FC standard, believed to be caused by polluted stream inputs. Overall, there were a total of forty-one (41) temperature violations for the marine water stations. The increased temperatures in the bay may be attributable to the sampling methodology (nearshore, very shallow waters), as well as increasing development in the watershed.

Overall Marine Water Trend

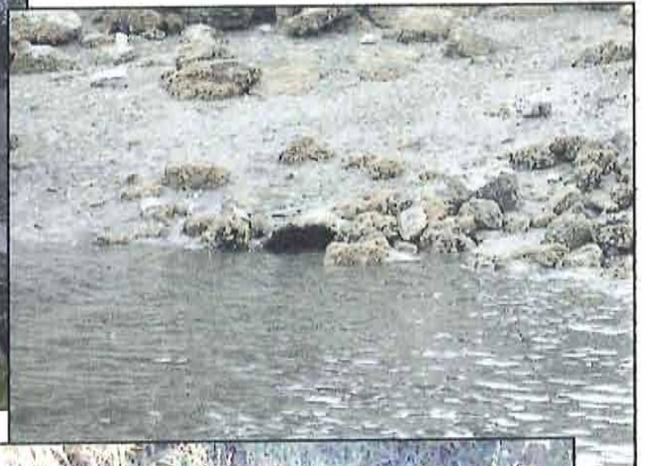
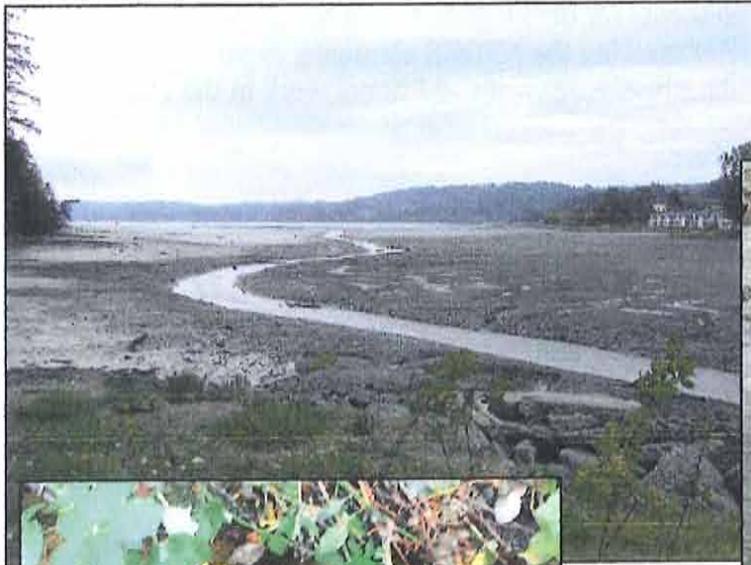
Liberty Bay / Miller Bay marine waters are showing a **stationary trend**. Only one of the ten individual marine stations in this watershed shows significant improvement.

LB/MB Marine Water Summary



**City of Poulsbo Stormwater Outfall Inventory and Illicit Discharge Detection and
Elimination Program, April-December 2003**

Prepared by Mindy Fohn, Environmental Health Specialist
Prepared for the City of Poulsbo, Department of Public Works
May 2005



1) Background

The City of Poulsbo (City) has contracted with the Kitsap County Health District (Health District) for assistance with meeting water quality related elements of the National Pollutant Discharge Elimination System (NPDES) Phase II requirements for stormwater control. Contracts for 2002 through 2005 resulted in a stormwater outfall inventory, stormwater system dry and wet weather water quality screening, and detection and elimination of illicit discharges to the stormwater system. The report "City of Poulsbo Nonpoint Pollution Impacts to South Fork of Dogfish Creek" (July 2002) describes the first phase of meeting the NPDES elements for the Dogfish Creek Drainage Basin. This report summarizes the second phase of meeting the NPDES elements, expanding into the Bjorgen Creek Basin, Liberty Bay shoreline, along with additional work in the Dogfish Creek Basin.

2) Project Description and Methods

The goal of this project is to:

- Inventory stormwater discharge outfalls.
- Field inspect the condition of stormwater discharge outfalls.
- Screen stormwater outfalls for water quality parameters indicative of illicit connections to the stormwater system.
- Eliminate illicit connections when found.

In 2002 Health District staff used outdated 1993 stormwater drainage maps to identify stormwater outfalls in the Dogfish Creek Basin. Eleven outfalls were identified, mapped, inventoried and sampled for illicit discharge detection. In 2003 the City updated the stormwater drainage maps using AutoCAD and incorporated 10 years of significant additions to the stormwater system. These new maps allowed a more thorough and complete study of the stormwater system.

Inventory and Field Inspection of Stormwater Outfalls

The US Environmental Protection Agency (EPA) methods (EPA/600/R-92/238, January 1993) were used for inspection of outfalls. Stormwater drainage systems for the City were field verified for location of systems, outfall locations and map accuracy. Outfalls were photographed, GPS coordinates recorded, size and physical description noted, and given a designation. Field inspection for physical condition was performed. Map corrections were referred to the City.

Dry and Wet Weather Screening

Stormwater outfalls with flows during dry weather and low groundwater conditions (July through October 2003 and 2004) were sampled. Water quality was assessed for indication of illicit sanitary sewer connections using methods described by the EPA

(EPA/600/R-92/238, January 1993) and the Center for Watershed Protection (Illicit Discharge Detection and Elimination Guidance Manual, 2004.). Dry weather Optical Brightener screening was performed using methods described by Ozark Underground Laboratories published in partnership with the Optical Brightener Handbook, Nature Compass, 2004. Fecal coliform sampling and analysis was performed according to Health District methods described in Manual of Protocol: Fecal Coliform Bacteria Pollution Identification and Correction, Version Nine, November 2003.

3) Results

Inventory of Stormwater Outfalls

A total of 51 stormwater discharge points were identified from the City stormwater drainage system. Twenty-three outfalls discharge to the main stem of Dogfish Creek and the South Fork Dogfish Creek, nineteen outfalls discharge to Liberty Bay, six outfalls discharge to Bjorgen Creek and three outfalls discharge to Johnson Creek. The outfall designations, location descriptions, water body impacted by the discharge and latitude/longitude, and outfall diameter/material are shown in Appendix A. Maps of the stormwater outfall location in three of the drainage basins (South Fork Dogfish Creek, Liberty Bay and Bjorgen Creek) are shown in Appendix B. The City has not generated Stormwater basin maps for Johnson Creek as part of their stormwater base maps and are not included in this report. Additionally, the stormwater system was retrofitted in summer 2004 in the upper South Fork Dogfish Creek basin. This new system has not been incorporated in the base maps and is not included in this report. A complete inventory of the stormwater outfalls including photographs, designations and GPS coordinates has been submitted to the City in a separate document.

Dry Weather Screening

Stormwater outfalls were sampled during the site inventory visit if flow was present. During summer dry weather and low groundwater conditions flows may be from a variety of sources: a sewer connection to the stormwater system, other unpermitted discharges with the potential to harm public or environmental health, or from groundwater or springs entering the stormwater system.

Water samples were analyzed for parameters indicative of car or laundry washing (surfactants), industrial or commercial waste water (pH, hardness, copper, and zinc), poor construction erosion control (turbidity), excessive fertilizers (nitrates and phosphorus) and human or animal sewage (fecal coliform bacteria and ammonia).

Flows were present at 15 of 51 (29%) stormwater discharge points. All were sampled and analyzed. Complete water quality results are shown in Appendix C.

Seven of 15 (47%) flows were positive for detergents. All were traced to car washing from residential and commercial areas. The outfall with the highest detergent concentration collects runoff from the Vikings Crest Apartment complex and Torval Canyon residential area (PSW04). Vikings Crest Apartments allowed car washing into the storm system by residents for fifteen years before prohibiting this activity in 2002. The high concentration may be ongoing car wash activity or residual car wash detergent.

Indicators for industrial or commercial waste water were present at two sites. Copper concentrations and pH were normal at all sites, and the elevated conductivity and hardness detected at two sites were due to marine water influence in the samples. Elevated zinc was detected at PSW01 and PSW36. These two stormwater systems were inspected visually and no unusual discharges were observed.

Nitrogen is the limiting nutrient for algae growth in the marine environment and at excessive levels promotes algae growth. Algae growth is detrimental when the algae die-off and consume oxygen during decay, promoting an environment of low dissolved oxygen. Low dissolved oxygen is harmful to aquatic life. Stormwater outfall PSW 24 collects drainage from a residential neighborhood located near the Poulsbo Yacht Club. Nitrate nitrogen concentrations were elevated and can be linked to excessive use of soluble garden fertilizer.

Fecal coliform and ammonia are indicators of human or animal sewage. Fecal coliform is a parameter utilized by the Health District for identifying and correcting fecal sources. Health District methods require a high fecal coliform result (>200 cfu/100ml) be confirmed with a follow-up sample. If the follow-up sample is high, then an effort is made to track the source. If the confirmation sample is below 200 cfu/100ml, then past experience indicates there is most likely not a fecal source. Since ammonia was analyzed, it provides a second indication of sewage.

Four discharge points had high fecal coliform in the first round of sampling. All four sites were visually inspected for indications of a sanitary sewer connection and sampled at key branches of the stormwater system for fecal coliform. One site, PSW13, had high levels for this follow-up confirmation sampling. PSW13, discharging to the upper reaches of South Fork Dogfish Creek, was found to have sewage in the manhole nearest the discharge and was cleaned by the City. Follow-up sampling at that site confirmed a reduction in fecal coliform. Thorough inspection and sampling of the drainage system showed no other sources. It is suspected that waste from a recreational vehicle was dumped into the manhole.

Optical Brightener Screening

One drawback of the EPA method for detecting illicit discharges is that the water sample is collected at one discrete point in time. Therefore, the chances of collecting the sample while the illicit discharge is occurring is low. Graywater comprises approximately 20% of household wastewater and can be indicative of a sanitary sewer connection to the

stormwater system. Therefore, a new method was used to detect graywater discharges over a week long period. Optical brighteners are present in most laundry detergents. These chemicals serve to brighten white fabric. Cotton test fabric, absent of optical brighteners, are placed in the outfall and retrieved after one week. They are then shipped to a contract laboratory and analyzed for fluorescence at the wavelength of optical brighteners. It is a method recently used in a large study of the storm drainage system in the Four Mile Run Watershed, Northern Virginia (<http://www.novaregion.org/obm.htm>). The method instructions and photos of deployed cotton pads are shown in Appendix D.

The test was performed in Fall 2003 during the lowest groundwater level to reduce the influence of dilution from groundwater and enhance the potential to detect optical brighteners. Thirty outfalls were selected for screening.

One of thirty test sites was positive for optical brighteners. It was PSW37, a bioswale system at Nelson Park on Liberty Bay. This stormwater system was investigated by placing optical brightener pads at five locations upstream of the outfall at key branching points. All pads were negative for optical brighteners. One possibility is that laundry detergent was used for car washing during the test period. Complete results are shown in Appendix E.

Wet Weather Screening

Fecal coliform bacteria are an indicator of human and animal waste. Dogfish Creek and Liberty Bay are listed on the Washington State list of Impaired Water Bodies (303d) for fecal coliform bacteria. The majority of Liberty Bay is classified by the Washington State Department of Health as *prohibited* to shellfish harvest due to fecal pollution. More recently, the Liberty Bay Foundation has shown through their fecal monitoring program that the mouth of Bjorgen Creek has significant levels of fecal pollution.

In response to the fecal pollution problem the Health District completed the Dogfish Creek Restoration Project in 2004. The project included surveying for animal waste and failing onsite sewage systems. A majority of the project was located in unincorporated Kitsap County. However, the South Fork of Dogfish Creek is located in the City. The City funded surveying the remaining septic systems located in the City limits which may contribute fecal pollution to South Fork Dogfish Creek. Pollution source correction performed by the residents of the Dogfish Creek basins has resulted in drastic reductions in fecal coliform levels in both the main stem and South Fork Dogfish Creek.

Fecal pollution sources include failing onsite sewage systems, wild, domestic and agricultural animal waste, inadequate sanitary sewer infrastructure, illegal dumping, and stormwater. City stormwater discharges to Liberty Bay, South fork Dogfish Creek and Bjorgen Creek and is a contributor of fecal pollution. In order to provide a preliminary assessment of stormwater fecal pollution the Health District sampled stormwater outfalls during storm events in Fall of 2003 and 2004. These data will provide the City with an indication of which stormwater basins are contributing high concentrations of fecal

bacteria to Liberty Bay, South Fork Dogfish Creek and Bjorgen Creek. Stormwater entering Johnson Creek was not evaluated since the Olhava Development is not complete.

Three sampling events were performed during storm events of greater than 0.5" rainfall for the 24-hour period during the sampling event. Essentially, data was collected representing first flush and mid-storm flows. Appendix F shows the results for wet weather sampling of stormwater outfalls.

Fecal coliform concentrations in City stormwater are typical of the range found in stormwater from other local studies such as the Fecal Coliform Total Maximum Daily Load (Project ENNVEST) study in progress in neighboring Dyes and Sinclair Inlet watersheds. However, the overall geometric mean average fecal coliform concentration is higher in the stormwater outfalls discharging to Liberty Bay (1,557 cfu/100ml) than for stormwater outfalls discharging to Bjorgen Creek (323 cfu/100ml) or South Fork Dogfish Creek (300 cfu/100ml).

Pollution Source Tracking

The City and Health District have successfully performed pollution source identification and correction activities. Soapsuds have been a recurrent problem in Liberty Bay. The Health District has been receiving citizen complaints since 1996. The Health District and City confirmed two significant commercial sources of car washing. Correction was performed in 2004 and 2005 with connection of the car wash areas to the sanitary sewer. Additionally, apartment complexes were notified to discourage car washing and have complied.

The City has corrected two illicit connections to the stormwater system discovered in 2002. Dry weather screening indicates a low probability of additional sanitary sewer connections to the stormwater system.

4) Conclusions

The City and Health District have performed the following the activities to comply with the minimum controls addressing illicit connection detection and elimination for Phase II NPDES for Stormwater:

- Inventory stormwater discharge outfalls.
- Field inspect the condition of stormwater discharge outfalls.
- Screen stormwater outfalls for water quality parameters indicative of illicit connections to the stormwater system.
- Eliminate illicit connections when found.

Appendix A

Poulsbo Stormwater Outfall Inventory						
Outfall Name	Location Description	Receiving water body	Outfall Diameter "	Lat (Deg.dxxxx)	Long	Material
PSW01	Bond at 1st Ave.	SF Dogfish Creek	42	47.75113	122.64829	CMP
PSW02	Bond at 1st Ave./Medical buildings and roadside	SF Dogfish Creek	18	47.75095	122.64791	CMP
PSW03	Bondwood apartments	SF Dogfish Creek	24	47.74968	122.64588	CMP
PSW04, 4a	19054 Highway 305	SF Dogfish Creek	24,24	47.75104	122.64834	CMP, concrete
PSW05	Shopping center at car wash/DME Auto	SF Dogfish Creek	8	47.74298	122.63913	metal
PSW06	Liberty Rd at Highway 305	SF Dogfish Creek	42	47.74169	122.63899	CMP
PSW07	Caldart/Hostmark behind 1514 Hostmark	SF Dogfish Creek	30	47.73439	122.62875	Concrete
PSW08	South outfall on Caldart across from school	SF Dogfish Creek	24	47.73490	122.62795	Concrete
PSW09	7th Ave./8th Ave. shopping center	SF Dogfish Creek	Buried	47.73886	122.64000	
PSW10	Control structure for wetland system on 10th Ave.	SF Dogfish Creek	Swale	47.74607	122.63885	rock
PSW11	Outfall from bioswale of medical buildings on Bond	SF Dogfish Creek	12	47.75034	122.14580	CMP
PSW13	Caldart at Church across from school	SF Dogfish Creek	14	47.73648	122.62802	Black Corr.
PSW14	19082 Highway 305, ditchline system	SF Dogfish Creek	12	47.73624	122.63738	Concrete
PSW15	Liberty Rd at Highway 305, NE corner	SF Dogfish Creek	24	47.74189	122.63851	CMP
PSW16	Highway 305 and parking lot of commercial buildings	SF Dogfish Creek	8	47.73496	122.63630	PVC
PSW17	Iverson/7th Ave storm detention system	SF Dogfish Creek	30	47.73822	122.64159	Concrete
PSW18	South Bank outfalls	SF Dogfish Creek	12	47.74367	122.63912	CMP
PSW19	North Bank outfall	SF Dogfish Creek	12, 12	47.74450	122.63907	CMP
PSW20	Poulsbo Gardens swale at headwaters	SF Dogfish Creek	4, 4	47.74339	122.62898	PVC, Black Flx
PSW21	Poulsbo Gardens swale at outlet	SF Dogfish Creek	Unknown	47.74200	122.62892	
PSW51	Caldart/Lincoln vault outlet	Dogfish Creek	24	47.73855	122.62882	Black Corr. PVC
PSW22	Olhava, Woodward Way and Pamell, from Pond 4	Liberty Bay	8	47.76363	122.65304	Concrete
PSW23	Fjord/NE Holm Ct.	Liberty Bay	24	47.72356	122.63673	Concrete
PSW24	Fjord/9th St.	Liberty Bay	12	47.72389	122.63853	Concrete
PSW25	Fjord/Shorewood Court	Liberty Bay	48	47.43.614	122.38.433	CMP
PSW26	6th Ave. at Yacht Club parking lot	Liberty Bay	8	47.72728	122.64178	PVC
PSW27	Port parking lot near kayak rental area	Liberty Bay	May be part of	47.73309	122.64603	
PSW28	Anderson Parkway parking lot north	Liberty Bay	30	47.73455	122.64753	CMP
PSW29	apartments at boardwalk	Liberty Bay	May be part of	47.73613	122.64943	
PSW30	19265 Front St. at American Legion Park	Liberty Bay	Unknown	47.73816	122.64998	
PSW31	Legion park north below Poulsbo Place	Liberty Bay	Buried	47.73903	122.65036	
PSW32	Legion park north of PSW31	Liberty Bay	24	47.73820	122.65010	CMP
PSW33	CDS Outfall at Front St.	Liberty Bay	6	47.74433	122.65057	CMP
PSW34	Shoreline 50 feet south of rip rap at Bayview	Liberty Bay	36	47.74441	122.65087	metal
PSW35	Rip rap at Liberty Bay Auto	Liberty Bay	18	47.74467	122.65136	CMP
PSW36	Nelson Park Bioswale system	Liberty Bay	28	47.74613	122.65296	CMP
PSW37	Outfall at apartments one block south of Edvard	Liberty Bay	24	47.73852	122.65726	Concrete
PSW38	Outfall at retirement home	Liberty Bay	18	47.73852	122.65726	CMP
PSW39	dissapator from Bovella Lane system	Liberty Bay	12	47.74449	122.65456	Concrete
PSW41	Outfall of bioswale from retirement home	Liberty Bay	12	47.73202	122.62075	CMP
PSW49	Edvard Street	Liberty Bay	12	47.73202	122.62075	Black PVC
PSW40	Hostmark behind school greenhouse	Bjorgen Creek	20, 20	47.74002	122.65795	CMP, CMP
PSW42	Hostmark behind school greenhouse	Liberty Bay	Swale	47.73103	122.61980	
PSW43	Knudsen Place	Bjorgen Creek	14	47.72944	122.61979	CMP
PSW44	Deer Run development stormwater pond	Bjorgen Creek	Unknown	47.72688	122.61953	
PSW45	Field drainage from school field	Bjorgen Creek	14	47.72644	122.60900	CMP
PSW46	Concrete box culvert at school	Bjorgen Creek	2'x5'	47.73178	122.12225	concrete box
PSW50	Olhava, from Pond 1, near 21480 Urdahl, Headwaters	Johnson Creek	24	47.75917	122.66446	Black Corr. PVC
PSW52	Olhava, SE corner of Pond 3, next to Highway 3, DOT ROW	Johnson Creek	24	47.75719	122.65817	Black Corr. PVC
PSW53	Olhava, A St. at Finn Hill Rd, NE of intersection, flow from Pond 2	Johnson Creek	24	47.75451	122.66449	Black Corr. PVC
PSW54	Mesford St. and Caldart Ave., east side of creek	SF Dogfish Creek	24	47.73765	122.62867	Black Corr. PVC
PSW55	Mesford St. and Caldart Ave., west side of creek	SF Dogfish Creek	24	47.73728	122.62915	Black Corr. PVC
PSW56	Across street, from school on Caldart, rock wall	SF Dogfish Creek	24	47.73499	122.62802	Black Corr. PVC
PSW57	Across street from school on Caldart across from tennis courts	SF Dogfish Creek	24	47.73654	122.62807	Black Corr. PVC

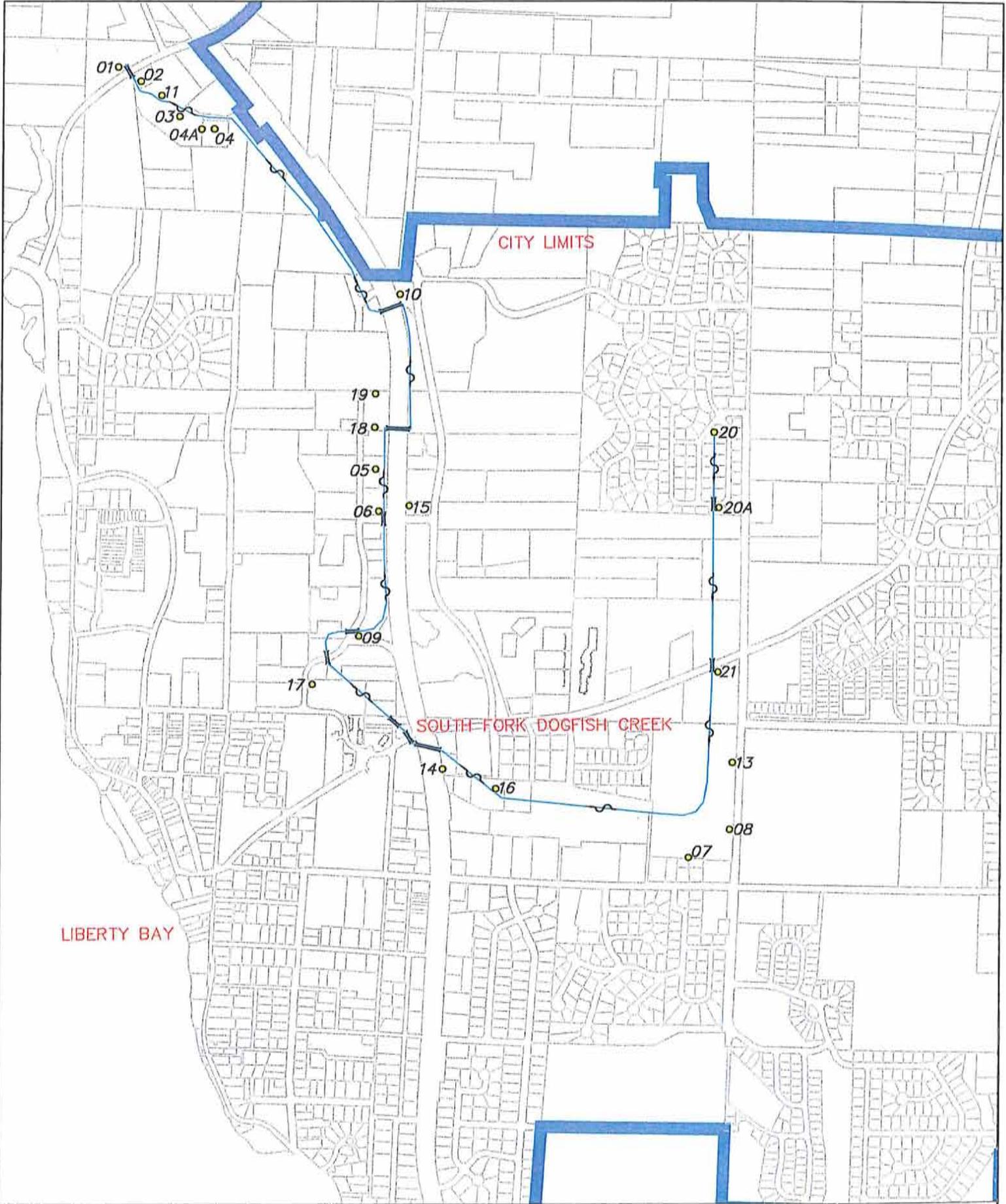
CMP=corrugated metal pipe

SF=South Fork

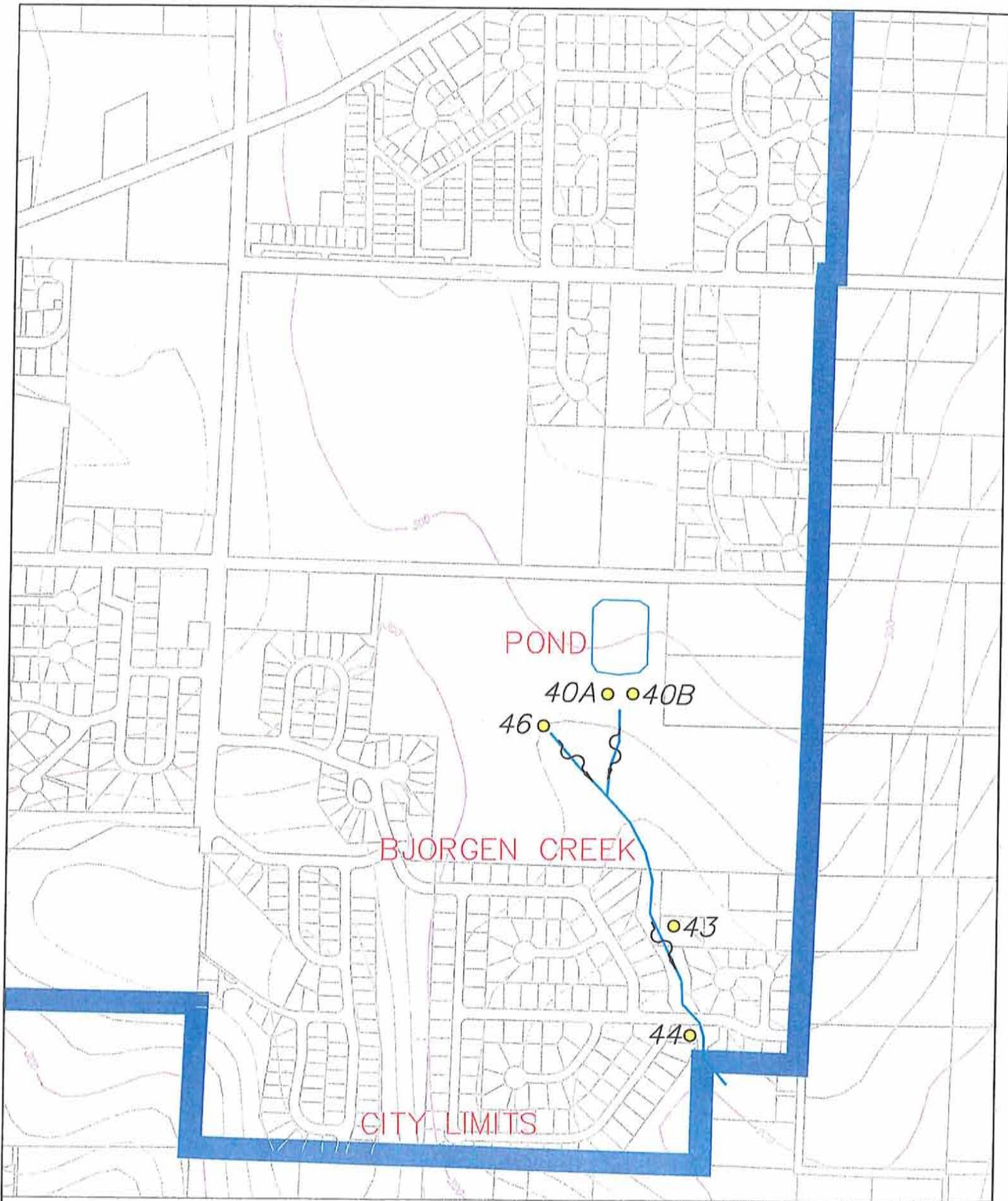
Corr.=corrugated

Appendix B
Stormwater Outfall Location Maps

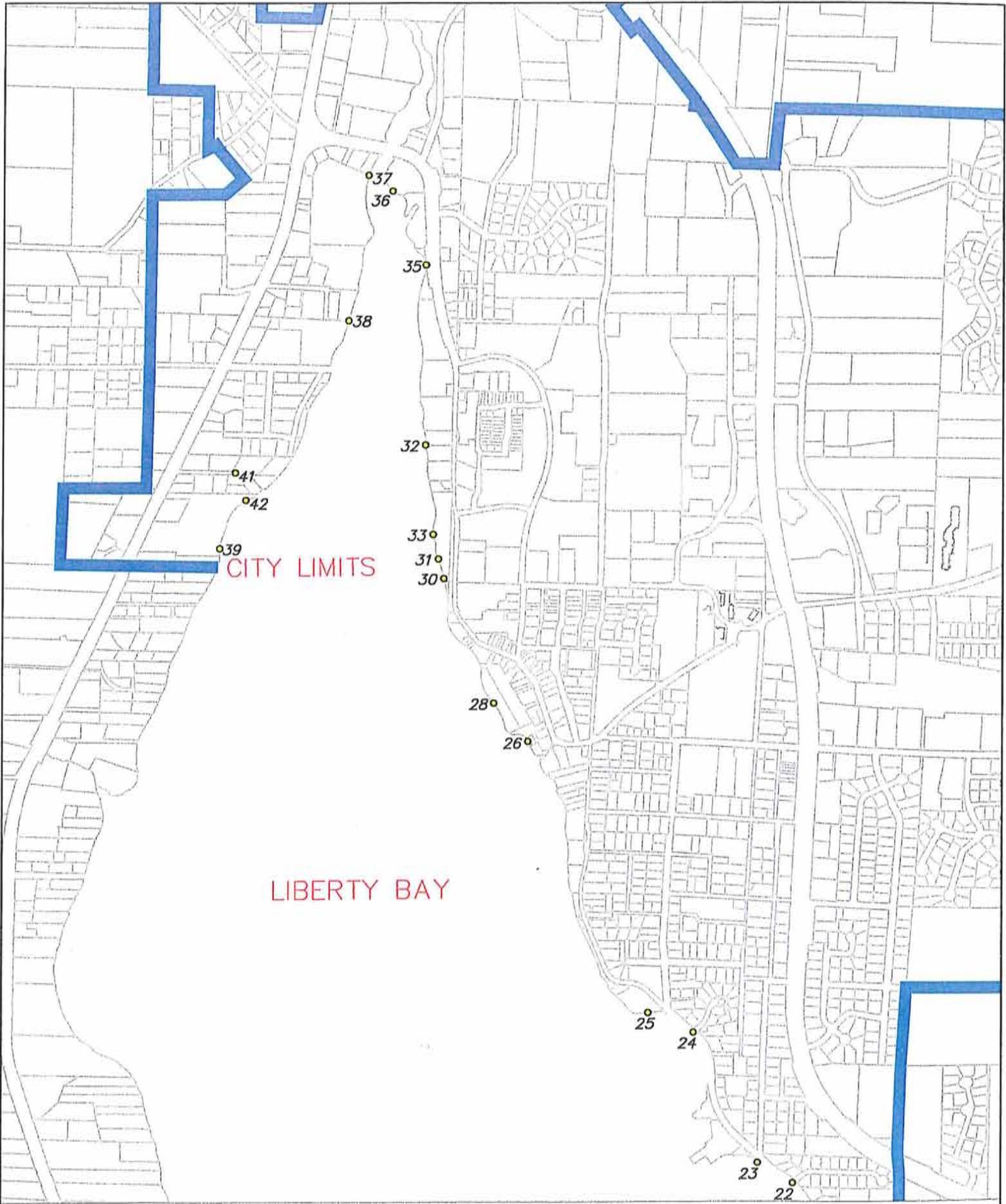
South Fork Dogfish Creek
Liberty Bay
Bjorgen Creek



*City of Poulsbo
Stormwater Outfalls-South Fork Dogfish Creek Drainage*



*City of Poulsbo
Stormwater Outfalls-Bjorgen Creek Drainage*



CITY LIMITS

LIBERTY BAY

*City of Poulsbo
Stormwater Outfalls-Liberty Bay Drainage*

Appendix C		LAB PARAMETERS												
Dry Weather Water Quality Screening														
Outfall Name	Receiving water body	COND us/cm	pH SU	Surfactants mg/L	Turbidity NTU	NH3-N mg/L	NO3+NO2 mg/L	Total Phos	Hardness mg/L	Cu mg/L	Zn mg/L	FC cfu/100ml		
PSW01	SF Dogfish Creek	262	8.03	0.50	4.7	0.21	0.09	0.66	94	0.009	0.081	1601, 2, 130		
PSW04	SF Dogfish Creek	449	8.14	3.00	6.9	0.07	0.43	0.05	254	<0.007	0.019	50, 14		
PSW07	SF Dogfish Creek	518	7.86	0.25	7.1	0.16	0.78	0.02	162	<0.007	0.005	23, 2		
PSW13	SF Dogfish Creek	234	8.16	0.50	38.3	<0.01	0.88	0.04	140	0.008	0.014	900, 500, 70		
PSW23	Liberty Bay	17000	7.21	0.00	1.6	0.06	1.00	0.02	3750	<0.007	0.011	2		
PSW24	Liberty Bay	449	8.36	0.00	0.8	<0.01	2.69	0.05	110	<0.007	<0.01	2, 2		
PSW25	Liberty Bay	976	7.93	0.25	2.6	0.02	0.99	0.08	188	<0.007	0.016	70, 50		
PSW28	Liberty Bay	372	8.28	0.00	1.3	<0.01	0.60	0.08	175	<0.007	<0.01	13, 50		
PSW31	Liberty Bay	355	8.47	0.00	6.5	<0.01	0.25	0.09	164	<0.007	<0.01	11		
PSW32	Liberty Bay	107	8.63	0.50	1.5	0.01	0.68	0.07	44	<0.007	0.066	2		
PSW36	Liberty Bay	17710	7.5	1.50	1.2	0.06	0.60	0.08	2800	0.007	0.034	2, 2		
PSW37	Liberty Bay	995	8.66	0.00	1.6	<0.01	0.46	0.03	88	<0.007	0.01	4		
PSW38	Liberty Bay	271	8.7	0.00	1.8	0.02	0.24	0.15	112	<0.007	0.014	240, 110		
PSW44	Bjorgen Creek	214	7.61	0.00	1.2	0.02	0.07	0.02	88	<0.007	0.02	170, 23		
PSW44D	Bjorgen Creek	185	8.39	0.00	1.4	<0.01	<0.01	0.02	92	<0.007	0.04	23, 2		

COND=Conductivity
 NH3-N=Ammonia nitrogen
 NO3-N=Nitrate nitrogen
 Phos=Phosphorus
 Cu=Copper
 Zn=Zinc
 FC=fecal coliform

Appendix D

Optical Brightener Screening Method Optical Brightener Screening Field Photos

INSTRUCTIONS FOR OPTICAL BRIGHTENER SAMPLING

Ozark Underground Laboratory, Inc.
1572 Aley Lane Protom, MO 65733
417-785-4289

INSTRUCTIONS FOR OPTICAL BRIGHTENER SAMPLING

Samplers

Optical brightener samplers consist of pieces of cotton test fabrics which have not been optically brightened.

Storage of Unused Samplers

Store all samplers in new plastic bags (such as zip-lock bags) which are free of optical brighteners. Optical brighteners are found in laundry soaps and detergents, and are routinely found adsorbed on clothing and paper.

Placement of Samplers

When springs or streams are sampled, the samplers are routinely anchored at a point where the sampler is as well exposed to the current as possible. The typical approach is to use sturdy copper or galvanized wire to attach the sampler to an anchor such as a large rock or brick. Samplers should not be wired flat against an anchor. Instead, there should be at least an inch of space separating the sampler from an anchor.

Do not use iron wire or old galvanized wire which may leave rust stains on the cotton samplers. The rust stains interfere with our analysis of the samplers. Galvanized wire should typically be replaced each time the sampler is replaced unless experience dictates otherwise. Plastic coated copper wire (such as used in house or automotive wiring) is often a good choice for anchoring packets. Plastic garden ties are also good for anchoring.

When wells are sampled, the sampler is placed in a sample holding device which is threaded at both ends for connection to faucets and garden hoses. The sample holder is unscrewed in the middle and the sampler is inserted in such a way as to most efficiently insure that water will pass through it. In well sampling, the well is typically allowed to run continuously at a rate of about one gallon per minute.

Avoid direct contact with laundry soaps and detergents for at least 24 hours prior to handling any samplers. Contact with laundry soaps and detergents does not appear to be a

INSTRUCTIONS FOR OPTICAL BRIGHTENER SAMPLING

significant problem; this is simply a good precaution. Alternately, one can use disposable gloves.

Sample Collection

Samples are unwired or removed from the sample holders used on wells. The samplers are then placed in plastic whirl-pak type bags. Plastic zip-lock bags can be used, but are less desirable. Prior to collection, each bag is labelled with a permanent black ink felt pen to indicate the following:

- A) Sampling Station (Number or Name).
- B) Date and Time Sampler Was Placed.
- C) Date and Time Sampler Was Recovered.

Other relevant records are made as appropriate; these can include logging in a record book or preparation of chain of custody forms.

After placement of the sampler in the plastic bag, squeeze out excess water from the sampler by holding the bag and packet between the palms of your hands and pushing firmly; the excess water is allowed to drip out of the open end of the bag. Do not wring-out the samplers; this makes it more difficult for us to clean them in the laboratory.

Do not put label of any type inside the plastic bag. Do not put any used anchoring wire in the plastic bag. Close the bag effectively.

When sampling springs and streams, one should routinely place more than one sampler. Samplers can be lost to flood, curious people, or to crayfish. Where crayfish are a particular problem, the samplers can be placed inside small wire baskets made of hardware cloth. Samplers placed in springs and streams should not be placed where they are likely to be readily seen; samplers can often be hidden by careful placement of a few rocks.

All collected samplers should be kept in a cooler or refrigerated until shipment. In practice, one keeps a cooler in the sampling vehicle; he may collect several samplers before returning to the vehicle and placing the samplers in the cooler.

Sampling Period

This is typically dictated by the study. One week is a typical period to leave the sampler in place, and is the recommended period unless otherwise noted.

INSTRUCTIONS FOR OPTICAL BRIGHTENER SAMPLING

Shipment

Collected samplers should be shipped via FED EX, UPS, or USPS first class or priority mail to:

Ozark Underground Laboratory, Inc.
1572 Aley Lane
Protem, MO 65733
(417) 785-4289

It is not necessary for the samplers to be shipped under refrigeration or by overnight delivery. Avoid mailing which will likely result in samplers sitting in the post office over a weekend. Parcel post should not be used as delays are sometimes excessive.

When shipped, enclose all of the whirl-pak bags in a larger plastic bag to prevent soggy packages. Enclose all relevant sampling sheets; make sure that they will not become damp by contact with sample bags.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Name: Optical Brightener Survey/ /City of Poulsbo

Location: PSW32

Photo #: _____

Date: 09/09/2003

Time: 0900

Taken by: MJF

Witness: _____

Film: Dig

Camera: Toshiba



Description: Retrieval of OB pad in mesh cage after being deployed for 7 days

Name: Optical Brightener Survey/ /City of Poulsbo

Location: PSW 30

Photo #: _____

Date: 09/19/2003

Time: 1030

Taken by: MJF

Witness: _____

Film: Dig

Camera: Toshiba



Description: Deployment of OB pad in stormwater outfall, tied to brick with fishing line

Appendix E

Poulsbo Stormwater Outfall Inventory			
Oufall Name	Date	Flow?	Optical Brightener Result
PSW01	9/29/2003	Yes	Negative
PSW02	10/6/2003	No	Negative
PSW03	10/6/2003	No	Negative
PSW04	9/29/2003	Yes	Negative
PSW05	10/6/2003	No	Negative
PSW09	10/6/2003	Yes	Negative
PSW07	9/29/2003	Yes	Negative
PSW13	9/29/2003	Yes	Negative
PSW22	10/6/2003	No	Negative
PSW23	10/6/2003	No	Negative
PSW24	10/6/2003	Yes	Negative
PSW25	10/6/2003	Yes	Negative
PSW26	10/6/2003	No	Negative
PSW27	9/29/2003	Yes	Negative
PSW28	9/29/2003	Yes	Negative
PSW29	9/29/2003	Yes	Negative
PSW30	10/6/2003	Yes	Negative
PSW31	10/6/2003	Yes	Negative
PSW32	10/6/2003	No	Negative
PSW34	9/29/2003	Yes	Negative
PSW35	10/6/2003	Yes	Negative
PSW36	10/6/2003	Yes	Negative
PSW37	9/29/2003	Yes	Positive
PSW37	10/6/2003	Yes	Negative
PSW38	10/6/2003	Yes	Negative
PSW39	10/6/2003	Yes	Negative
PSW40	10/6/2003	No	Negative
PSW41	10/6/2003	Yes	Negative
PSW43	10/6/2003	No	Negative
PSW44	10/6/2003	Yes	Negative
PSW46	10/6/2003	Yes	Negative

Appendix F

Wet Weather Stormwater Outfall Screening

Oufall Name	Location Description	Receiving water body	FC Geometric Mean cfu/100ml
PSW01	Bond at 1st Ave.	SF Dogfish Creek	166
PSW02	Bond at 1st Ave./Medical buildings and roadside	SF Dogfish Creek	370
PSW03	Bondwood apartments	SF Dogfish Creek	360
PSW04	19054 Highway 305, concrete outfall	SF Dogfish Creek	360
PSW04a	19054 Highway 305, CMP outfall	SF Dogfish Creek	245
PSW05	Shopping center at car wash/DME Auto	SF Dogfish Creek	986
PSW06	Liberty Rd at Highway 305	SF Dogfish Creek	1166
PSW07	Caldart/Hostmark behind 1514 Hostmark	SF Dogfish Creek	740
PSW08	South outfall on Caldart across from school	SF Dogfish Creek	200
PSW09	7th Ave./8th Ave. shopping center	SF Dogfish Creek	302
PSW10	Control structure for wetland system on 10th Ave.	SF Dogfish Creek	575
PSW11	Outfall from bioswale of medical buildings on Bond	SF Dogfish Creek	20
PSW13	Caldart at Church across from school	SF Dogfish Creek	112
PSW14	19062 Highway 305, ditchline system	SF Dogfish Creek	NS
PSW15	Liberty Rd at Highway 305, NE corner	SF Dogfish Creek	150
PSW16	Higway 305 and parking lot of commercial buildings	SF Dogfish Creek	NS
PSW17	Iverson/7th Ave storm detention system	SF Dogfish Creek	663
PSW18	South Bank outfalls	SF Dogfish Creek	766
PSW19	North Bank outfall	SF Dogfish Creek	68
PSW20	Poulsbo Gardens swale at headwaters	SF Dogfish Creek	566
PSW20a	Poulsbo Gardens swale at outlet	SF Dogfish Creek	307
PSW21	Caldart/Lincoln vault outlet	SF Dogfish Creek	NS
PSW51	Olhava, Woodward Way and Parnell, from Pond 4	Dogfish Creek	NS
PSW22	Fjord/NE Holm Ct.	Liberty Bay	872
PSW23	Fjord/9th St.	Liberty Bay	1598
PSW24	Fjord/Shorewood Court	Liberty Bay	986
PSW25	6th Ave. at Yacht Club parking lot	Liberty Bay	2759
PSW26	Port parking lot near kayak rental area	Liberty Bay	1437
PSW28	Anderson Parkway parking lot north	Liberty Bay	5130
PSW30	apartments at boardwalk	Liberty Bay	1857
PSW31	19265 Front St. at American Legion Park	Liberty Bay	2626
PSW32	Legion park north below Poulsbo Place	Liberty Bay	490
PSW33	Legion park north of PSW31	Liberty Bay	NS
PSW34	CDS Outfall at Front St.	Liberty Bay	NS
PSW35	Shoreline 50 feet south of rip rap at Bayview	Liberty Bay	NS
PSW36	Rip rap at Liberty Bay Auto	Liberty Bay	8963
PSW37	Nelson Park Bioswale system	Liberty Bay	1595
PSW38	Outfall at apartments one block south of Edvard	Liberty Bay	1928
PSW39	Outfall at retirement home	Liberty Bay	304
PSW41	dissapator from Bovella Lane system	Liberty Bay	1907
PSW42	Outfall of bioswale from retirement home	Liberty Bay	304
PSW49	Edvard Street	Liberty Bay	3660
PSW40a	Hostmark behind school greenhouse	Bjorgen Creek	433
PSW40b	Hostmark behind school greenhouse	Bjorgen Creek	49
PSW43	Knudsen Place	Bjorgen Creek	280
PSW44	Deer Run development stormwater pond	Bjorgen Creek	747
PSW45	Field drainage from school field	Bjorgen Creek	NS
PSW46	Concrete box culvert at school	Bjorgen Creek	788
PSW50	Olhava, from Pond 1, near 21460 Urdahl, Headwaters	Johnson Creek	NS
PSW52	Olhava, SE corner of Pond 3, next to Highway 3, DOT ROW	Johnson Creek	NS
PSW53	Olhava, A St. at Finn Hill Rd, NE of inersction, flow from Pond 2	Johnson Creek	NS
PSW54	Mesford St. and Caldart Ave., east side of creek	SF Dogfish Creek	NS
PSW55	Mesford St. and Caldart Ave., west side of creek	SF Dogfish Creek	NS
PSW56	Across street. from school on Caldart, rock wall	SF Dogfish Creek	NS
PSW57	Across street from school on Caldart across from tennis courts	SF Dogfish Creek	NS

NS=No sample collected



SCOTT W. LINDQUIST, MD, MPH, DIRECTOR
345 6TH STREET, SUITE 300
BREMERTON, WA 98337-1866
(360) 337-5235

City of Poulsbo Stormwater Outfall Inventory
Prepared by Mindy Fohn
Kitsap County Health District
May 2005

Appendix A

Poulsbo Stormwater Outfall Inventory						
Outfall Name	Location Description	Receiving water body	Outfall Diameter "	Lat (Deg.ddddd)	Long	Material
PSW01	Bond at 1st Ave.	SF Dogfish Creek	42	47.75113	122.64829	CMP
PSW02	Bond at 1st Ave./Medical buildings and roadside	SF Dogfish Creek	18	47.75095	122.64791	CMP
PSW03	Bondwood apartments	SF Dogfish Creek	24	47.74968	122.64588	CMP
PSW04, 4a	19054 Highway 305	SF Dogfish Creek	24,24	47.75104	122.64834	CMP, concrete
PSW05	Shopping center at car wash/DME Auto	SF Dogfish Creek	8	47.74298	122.63913	metal
PSW06	Liberty Rd at Highway 305	SF Dogfish Creek	42	47.74169	122.63899	CMP
PSW07	Caldart/Hostmark behind 1514 Hostmark	SF Dogfish Creek	30	47.73439	122.62875	Concrete
PSW08	South outfall on Caldart across from school	SF Dogfish Creek	24	47.73490	122.62795	Concrete
PSW09	7th Ave./8th Ave. shopping center	SF Dogfish Creek	Buried	47.73886	122.64000	
PSW10	Control structure for wetland system on 10th Ave.	SF Dogfish Creek	Swale	47.74607	122.63885	rock
PSW11	Outfall from bioswale of medical buildings on Bond	SF Dogfish Creek	12	47.75034	122.14580	CMP
PSW13	Caldart at Church across from school	SF Dogfish Creek	14	47.73648	122.62802	Black Corr.
PSW14	19082 Highway 305, ditchline system	SF Dogfish Creek	12	47.73624	122.63738	Concrete
PSW15	Liberty Rd at Highway 305, NE corner	SF Dogfish Creek	24	47.74189	122.63851	CMP
PSW16	Highway 305 and parking lot of commercial buildings	SF Dogfish Creek	8	47.73496	122.63630	PVC
PSW17	Iverson/7th Ave storm detention system	SF Dogfish Creek	30	47.73822	122.64159	Concrete
PSW18	South Bank outfalls	SF Dogfish Creek	12	47.74367	122.63912	CMP
PSW19	North Bank outfall	SF Dogfish Creek	12, 12	47.74450	122.63907	CMP
PSW20	Poulsbo Gardens swale at headwaters	SF Dogfish Creek	4, 4	47.74339	122.62898	PVC, Black Flx
PSW21	Poulsbo Gardens swale at outlet	SF Dogfish Creek	Unknown	47.74200	122.62892	
PSW51	Caldart/Lincoln vault outlet	Dogfish Creek	24	47.73855	122.62882	Black Corr. PVC
PSW22	Olhava, Woodward Way and Parnell, from Pond 4	Liberty Bay	8	47.76363	122.65304	Concrete
PSW23	Fjord/NE Holm Ct.	Liberty Bay	24	47.72356	122.63673	Concrete
PSW24	Fjord/9th St.	Liberty Bay	12	47.72389	122.63853	Concrete
PSW25	Fjord/Shorewood Court	Liberty Bay	48	47.43.614	122.38.433	CMP
PSW26	6th Ave. at Yacht Club parking lot	Liberty Bay	8	47.72728	122.64178	PVC
PSW27	Port parking lot near kayak rental area	Liberty Bay	May be part of	47.73309	122.64603	
PSW28	Anderson Parkway parking lot north	Liberty Bay	30	47.73455	122.64753	CMP
PSW29	apartments at boardwalk	Liberty Bay	May be part of	47.73613	122.64943	
PSW30	19265 Front St. at American Legion Park	Liberty Bay	Unknown	47.73816	122.64998	
PSW31	Legion park north below Poulsbo Place	Liberty Bay	Buried	47.73903	122.65036	
PSW32	Legion park north of PSW31	Liberty Bay	24	47.73820	122.65010	CMP
PSW33	CDS Outfall at Front St.	Liberty Bay	6	47.74433	122.65057	CMP
PSW34	Shoreline 50 feet south of rip rap at Bayview	Liberty Bay	36	47.74441	122.65087	metal
PSW35	Rip rap at Liberty Bay Auto	Liberty Bay	18	47.74467	122.65136	CMP
PSW36	Nelson Park Bioswale system	Liberty Bay	28	47.74613	122.65296	CMP
PSW37	Outfall at apartments one block south of Edvard	Liberty Bay	24	47.73852	122.65726	Concrete
PSW38	Outfall at retirement home	Liberty Bay	18	47.73852	122.65726	CMP
PSW39	dissapator from Bovella Lane system	Liberty Bay	12	47.74449	122.65456	Concrete
PSW41	Outfall of bioswale from retirement home	Liberty Bay	12	47.73202	122.62075	CMP
PSW49	Edvard Street	Liberty Bay	12	47.73202	122.62075	Black PVC
PSW40	Hostmark behind school greenhouse	Bjorgen Creek	20, 20	47.74002	122.65795	CMP, CMP
PSW42	Hostmark behind school greenhouse	Liberty Bay	Swale	47.73103	122.61980	
PSW43	Knudsen Place	Bjorgen Creek	14	47.72944	122.61979	CMP
PSW44	Deer Run development stormwater pond	Bjorgen Creek	Unknown	47.72688	122.61953	
PSW45	Field drainage from school field	Bjorgen Creek	14	47.72644	122.60900	CMP
PSW46	Concrete box culvert at school	Bjorgen Creek	2x5'	47.73178	122.12225	concrete box
PSW50	Olhava, from Pond 1, near 21460 Urdahl, Headwaters	Johnson Creek	24	47.75917	122.66446	Black Corr. PVC
PSW52	Olhava, SE corner of Pond 3, next to Highway 3, DOT ROW	Johnson Creek	24	47.75719	122.65817	Black Corr. PVC
PSW53	Olhava, A St. at Finn Hill Rd, NE of Inersection, flow from Pond 2	Johnson Creek	24	47.75451	122.66449	Black Corr. PVC
PSW54	Mesford St. and Caldart Ave., east side of creek	SF Dogfish Creek	24	47.73765	122.62867	Black Corr. PVC
PSW55	Mesford St. and Caldart Ave., west side of creek	SF Dogfish Creek	24	47.73728	122.62915	Black Corr. PVC
PSW56	Across street. from school on Caldart, rock wall	SF Dogfish Creek	24	47.73499	122.62802	Black Corr. PVC
PSW57	Across street from school on Caldart across from tennis courts	SF Dogfish Creek	24	47.73654	122.62807	Black Corr. PVC

CMP=corrugated metal pipe

SF=South Fork

Corr.=corrugated

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW01_ ___

Address: Bond Road and 1st Ave. NE

Lat: 47.75113_ ___

Long: _122.64829_ ___

Receiving Water: _South Fork Dogfish Creek

Taken by: MF_ ___



Notes: ___ Stream is the east culvert, and the west culvert is stormwater.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW02

Address: 206 Bond Rd.

Lat: 47.75095

Long: 122.64791

Receiving Water: South Fork
Dogfish Creek

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW03

Address: 20602 Bond Rd. NE,
Bondwood Apartments

Lat: 47.74968

Long: 122.64588

Receiving Water: South Fork
Dogfish Creek

Taken by: MF_____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW04

Address: 19054 Highway 305

Lat: 47.75104

Long: 122.64834

Receiving Water: South Fork Dogfish Creek

Taken by: MF _____



Notes: Two outfalls at this site. 12" concrete is PSW04, and 12" CMP is PSW04a. Both appear to discharge from the same system from Torval Canyon Rd. basin.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW04a

Address: 19054 Highway 305

Lat: 47.75104

Long: 122.64834

Receiving Water: South Fork Dogfish Creek



Taken by: MF _____

Notes: Two outfalls at this site. 12" concrete is PSW04, and 12" CMP is PSW04a. Both appear to discharge from the same system from Torval Canyon Rd. basin.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW05

Address: Poulsbo Village Shopping Center at DME Auto, 19820 7th Ave. NE

Lat: 47.74298

Long: 122.63913

Receiving Water: Southfork Dogfish Creek



Taken by: MF _____



Notes: Outfall buried. Flow is evident during wet weather. Can sample at last catch basin in parking lot.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW06

Address: Liberty Road and Highway 305, NW corner, 760 Liberty Rd. NE

Lat: 47.74169

Long: 122.63899

Receiving Water: South Fork Dogfish Creek



Taken by: MF_____



Notes: Outfall is hidden in cattails. Flow is evident during storm events. Can sample from last catch basin. However, flow from roadside drainage at intersection enters outfall after catch basin.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

**Poulsbo Stormwater Outfall Inventory
Photolog**

Outfall Name: PSW07

Address: Caldart and Hostmark,
downslope of 1514 Hostmark NE

Lat: 47.73439

Long: 122.62875

Receiving Water: South Fork Dogfish
Creek

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW08

Address: South outfall on Caldart at North Kitsap High School

Lat: 47.73490

Long: 122.62795

Receiving Water: South Fork Dogfish Creek



Taken by: MF_____



Notes: Abandoned summer 2004

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW09

Address: Intersection of 7th and 8th Ave NE

Lat: 47.73886

Long: 122.64000

Receiving Water: South Fork Dogfish Creek



Taken by: MF_____



Notes: Outfall is buried, but can sample at last catch basin. Upper photo is of stream culvert.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

**Poulsbo Stormwater Outfall Inventory
Photolog**

Outfall Name: PSW10_ ____

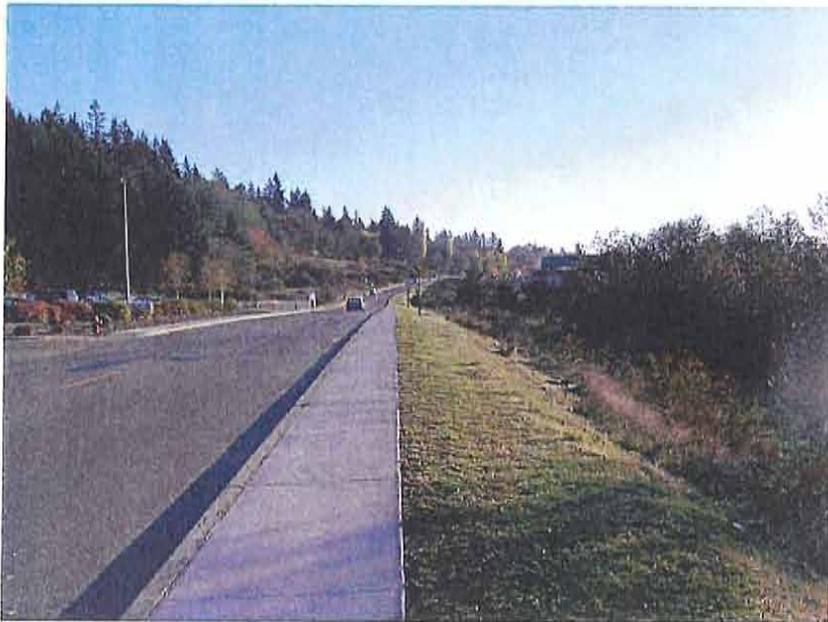
Address: Control structure for wetland system on 10th Ave., across street from 20148 10th Ave. NE

Lat: 47.74607 ____

Long: _122.63885 ____

Receiving Water: _South Fork Dogfish Creek

Taken by: MF ____



Notes: ____ Structure covered by plant vegetation, outlet near Highway 305.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW11

Address: 20669 Bond Rd. NE

Lat: 47.75034

Long: 122.14580

Receiving Water: South Fork
Dogfish Creek

Taken by: MF _____



Notes: Bioswale system for building and parking
lots.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW13

Address: Caldart at Church, across from North Kitsap High School

Lat: 47.73648

Long: 122.62802

Receiving Water: South Fork Dogfish Creek



Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW14

Address: 19062 Highway 305

Lat: 47.73624

Long: 122.63738

Receiving Water: South Fork Dogfish Creek



Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW15_ ___

Address: NE corner of Liberty Road,
Highway 305, 19723 10th Ave. NE

Lat: 47.74189

Long: -122.63851

Receiving Water: South Fork Dogfish
Creek

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW16

Address: Highway 305 and commercial parking lot

Lat: 47.73496

Long: 122.63630

Receiving Water: South Fork Dogfish Creek



Taken by: MF_____

Notes: ___This is a private outfall and may not be included in the inventory. Outfall not located. Photo is of last catch basin.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW17

Address: Iverson St. and 7th Ave. NE

Lat: 47.73822

Long: 122.64159

Receiving Water: South Fork Dogfish Creek

Taken by: MF_____



Notes: Carries flows from storm detention system on Iverson St. and parking lots on 7th and Iverson. Bottom photo is last vault before entering the Creek.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW18_ ____

Address: Outfall on south end of Bank,
Highway 305, 18690 Highway 305 N

Lat: 47.74367_ ____

Long: _122.63912_ ____

Receiving Water: _South Fork Dogfish
Creek

Taken by: MF_ ____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW19

Address: North outfalls at Bank, 18690
N. Highway 305,

Lat: 47.74450

Long: 122.63907

Receiving Water: South Fork Dogfish
Creek

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW20

Address: 19891 Mosjon Circle NE, headwaters of South Fork

Lat: 47.74339

Long: 122.62898

Receiving Water: South Fork Dogfish Creek



Taken by: MF _____

Notes: ____ Local flows from neighborhood enters bioswale. _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW21_ ____

Address: Intersection of Caldart and Lincoln Rd., approximately 50 feet west on the SW corner

Lat: 47.73855

Long: 122.62882

Receiving Water: South Fork Dogfish Creek

Taken by: MF _____



Notes: _____ Vault system under road discharging to creek _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW22

Address: 17686 Fjord and NE Holm St

Lat: 47.72356

Long: 122.63673

Receiving Water: Liberty Bay



Taken by: MF _____



Notes: _____ Outfall buried under brush in bank. Sample from last catch basin at roadside. _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW23

Address: Fjord and 9th St., 17811 Ave. NE

Lat: 47.72389

Long: 122.63853

Receiving Water: Liberty Bay



Taken by: MF_____

Notes: Requires very low tide to sample.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW24

Address: 733 Shorewood Court NE and Fjord Drive at shoreline

Lat: 47.43614

Long: 122.38433

Receiving Water: Liberty Bay

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW25

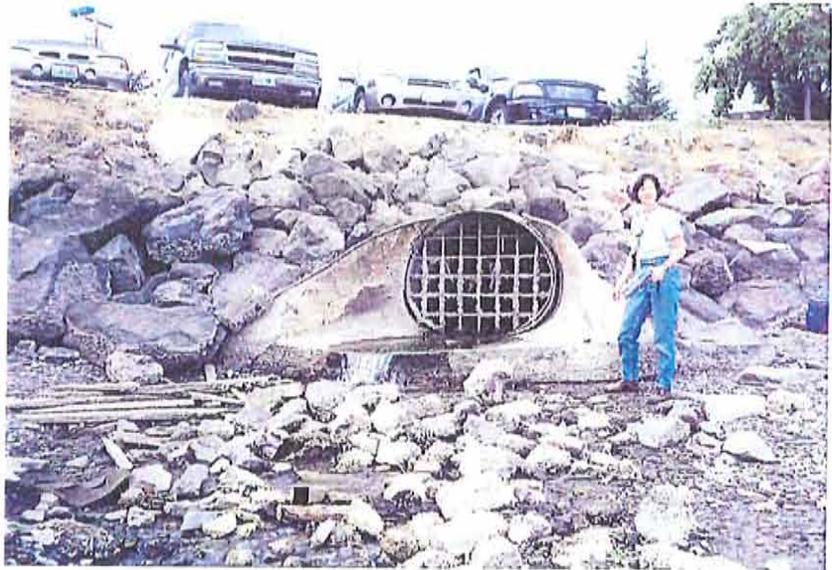
Address: 6th Ave. NE and Fjord Drive

Lat: 47.72728

Long: 122.64178

Receiving Water: Liberty Bay

Taken by: LB_____



Notes: Former Creek

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

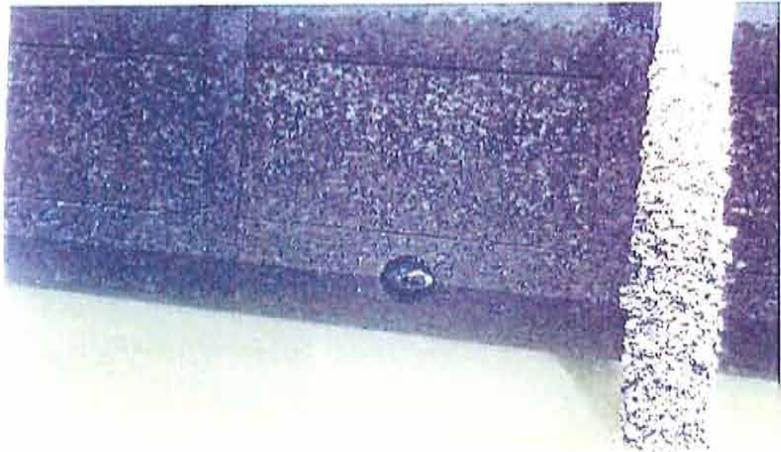
Outfall Name: PSW26

Address: Poulsbo Port parking lot on Anderson Drive, 100 feet south of 18743 St.

Lat: 47.73309

Long: 122.64603

Receiving Water: Liberty Bay



Front

Taken by: MF, LB _____



Notes: Upper photo is outfall at bulkhead, requires low tide for sampling. Photo, left, is last catch basin for sampling.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW28

Address: Parking lot on Anderson
Parkway, near 18925 Front St. NE

Lat: 47.73455

Long: -122.64753

Receiving Water: Liberty Bay

Taken by: MF



Notes: Requires low tide -1.0 or greater to see outfall. Can sample at last catch basin in parking lot.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW30

Address: North end of Anderson Parkway under Boardwalk at Gran Kirk Apartments, 19083 Front St.

Lat: 47.73613

Long: 122.64943

Receiving Water: Liberty Bay

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW31

Address: 19265 Front St.,
American Legion Park

Lat: 47.73816

Long: 122.64998

Receiving Water: Liberty Bay



Taken by: MF _____



Notes: _____ Outfall buried, discharge flow is visible during storm events. _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW32

Address: Legion Park north below
Poulsbo Place

Lat: 47.73903

Long: 122.65036

Receiving Water: Liberty Bay



Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW33

Address: Legion Park north of PSW31

Lat: 47.73820

Long: 122.65010

Receiving Water: Liberty Bay

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW34

Address: CDS outfall on shoreline,
Front Street, approximately 500 feet on
shoreline north of Legion Park northern
boundary.

Lat: 47.74433

Long: 122.65057

Receiving Water: Liberty Bay

Taken by: MF



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW35

Address: Shoreline at Front St.,
approximately 50 feet south of Fitness
Center on rip rap bulkhead, 20101
Lindvig Way

Lat: 47.74441

Long: 122.65087

Receiving Water: Liberty Bay



Taken by: MF_____

Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW36

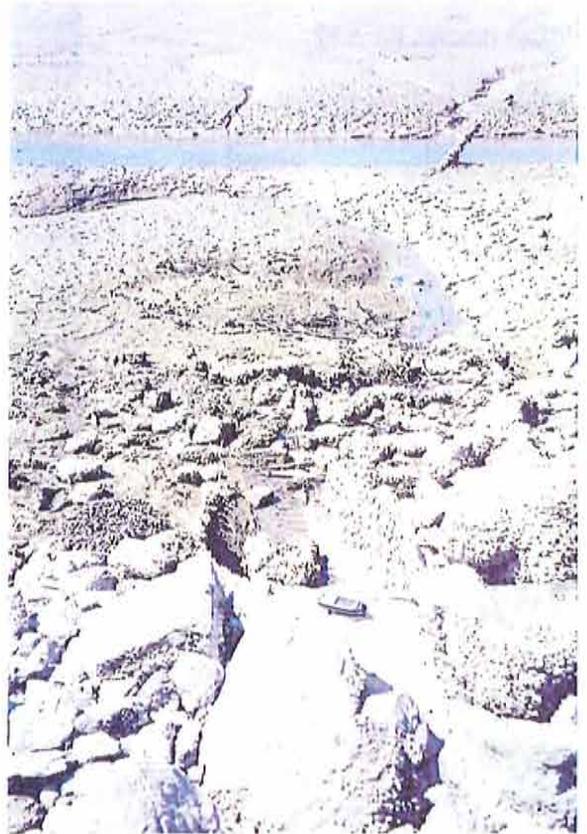
Address: Rip rap at Liberty Bay Auto, 20201 Lindvig Way

Lat: 47.74467

Long: 122.65136

Receiving Water: Liberty Bay

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW37

Address: Nelson Park Bioswale

Lat: 47.74613

Long: 122.65296

Receiving Water: Liberty Bay



Taken by: MF_____



Notes: Top photo is the outfall, bottom photo is the bioswale

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW38

Address: At the end of Edvard and 3rd Ave., apartments

Lat: 47.73852

Long: 122.65726

Receiving Water: Liberty Bay

Taken by: MF _____



Notes: __Top photo is outfall at shoreline, bottom photo is last manhole at apartment.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW39

Address: 19220 Viking Ave, Retirement Center

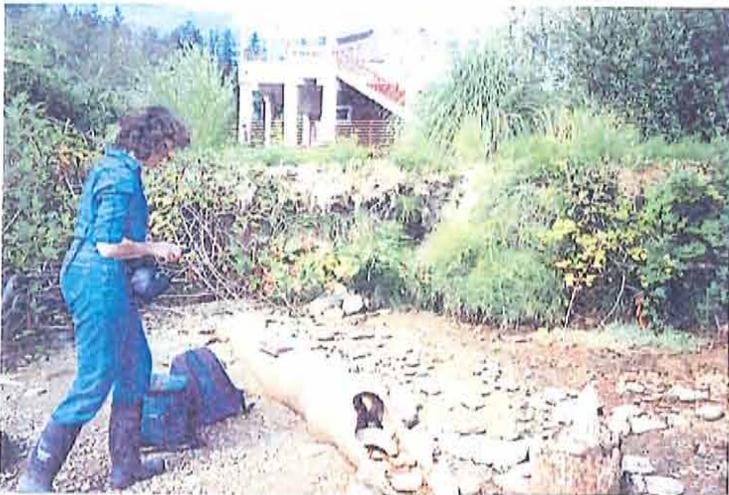
Lat: 47.73852

Long: 122.65726

Receiving Water: Liberty Bay



Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW49__

Address: 19950 Viking Ave. NW at
Edvard St.

Lat: __47.74449__

Long: __122.65456__

Date: _7/14/2003__

Taken by: __MF__

Receiving water: Liberty Bay



Notes: __Car wash complaint 2004, corrected._____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW40a, PSW40b

Address: 18360 Hostmark, behing Horticulture building

Lat: 47.73202

Long: 122.62075

Receiving Water: Bjorgen Creek



Taken by: MF _____



Notes: __Two outfalls from the same stormwater pond.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW41_ ____

Address: 650 Bovella Lane NW

Lat: 47.74002 ____

Long: 122.65795 ____

Receiving Water: Liberty Bay

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW42

Address: Outfall from bioswale at Retirement home, 19360 Viking Ave.

Lat: 47.73103

Long: 122.61980

Receiving Water: Liberty

Taken by: MF _____



Bay

Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW43

Address: 2216 Thistle Court

Lat: 47.72944

Long: 122.61979

Receiving Water: Bjorgen Creek



Taken by: MF _____



Notes: ___ Top photo is the outfall located down slope of the vault. Bottom photo is the location of the vault in the culdesac. _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW44

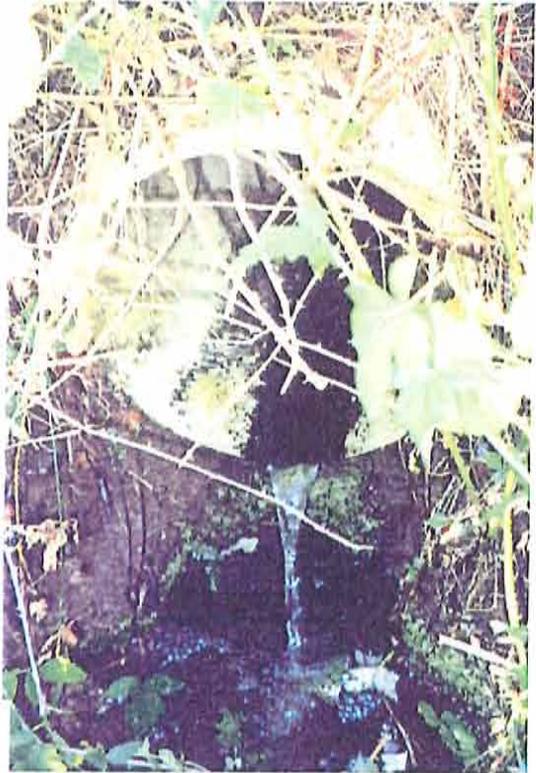
Address: 2145 Miss Ellis Loop Rd, Deer Run
Development stormwater pond

Lat: 47.72688

Long: 122.61953

Receiving Water: Bjorgen Creek

Taken by: MF _____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW45

Address: 18360 Hostmark, at Poulsbo Elementary School

Lat: 47.72644

Long: 122.60900

Receiving Water: Bjorgen Creek



Taken by: MF _____

Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW46

Address: Vault behind Junior High School NE corner of athletic field,

Lat: 47.73178

Long: 122.12225

Receiving Water: Bjorgen Creek

Taken by: MF _____



Notes: ___ Upper photo is the outfall area, bottom photo is the eroded streambed. _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW50____

Address: Near 21460 Urdahl,
Headwaters of Johnson Creek, Olhava
Pond 1

Lat: 47.75917

Long: 122.66446

Receiving water: Johnson Creek

Taken by: MF



Notes: Historical water quality complaint regarding turbidity during winter 2003-2004.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW51__

Address: Olhava, Woodward Way and Parnell, from Pond 4

Lat: 47.76363

Long: 122.65304

Receiving Water: Dogfish Creek

Taken by: LJ



Notes: Constructed 2003, Historical water quality complaint for turbidity winter 2003-2004

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

**Poulsbo Stormwater Outfall Inventory
Photolog**

Outfall Name: PSW52_____

Address: _Olhava Pond 3, SE corner,
next to Highway 3, DOT ROW

Lat: 47.75719_____

Long: 122.65817_____

Receiving Water: _Johnson Creek

Taken by: _LJ_____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

**Poulsbo Stormwater Outfall Inventory
Photolog**

Outfall Name: PSW53_____

Address: _Olhava Pond 2, Finn Hill Rd
and A St., NE corner of intersection

Lat: 47.75451

Long: 122.66449_____

Receiving Water: _Johnson Creek

Taken by: MF_____



Notes: _____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW54

Address: Mesford St. and Caldart Ave.

Lat: 47.73765

Long: 122.62867

Receiving Water: South Fork Dogfish Creek



Taken by: MF _____



Notes: Constructed summer 2004

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

**Poulsbo Stormwater Outfall Inventory
Photolog**

Outfall Name: PSW55

Address: Mesford St. and Caldart Ave.

Lat: 47.73728

Long: 122.62915

Receiving Water: South Fork Dogfish
Creek



Taken by: MF _____



Notes: ___ Pond on west side of creek, constructed summer
2004.

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW56

Address: Across the street from High School parking lot at Caldart, at rock wall

Lat: 47.73499

Long: 122.62802

Receiving Water: _South Fork Dogfish Creek

Taken by: MF_____



Notes: __Constructed summer 2004._____

KITSAP COUNTY HEALTH DISTRICT PHOTO LOG

Poulsbo Stormwater Outfall Inventory Photolog

Outfall Name: PSW57

Address: Across the street from High School tennis courts on Caldart

Lat: 47.73654

Long: 122.62807

Receiving Water: South Fork Dogfish Creek

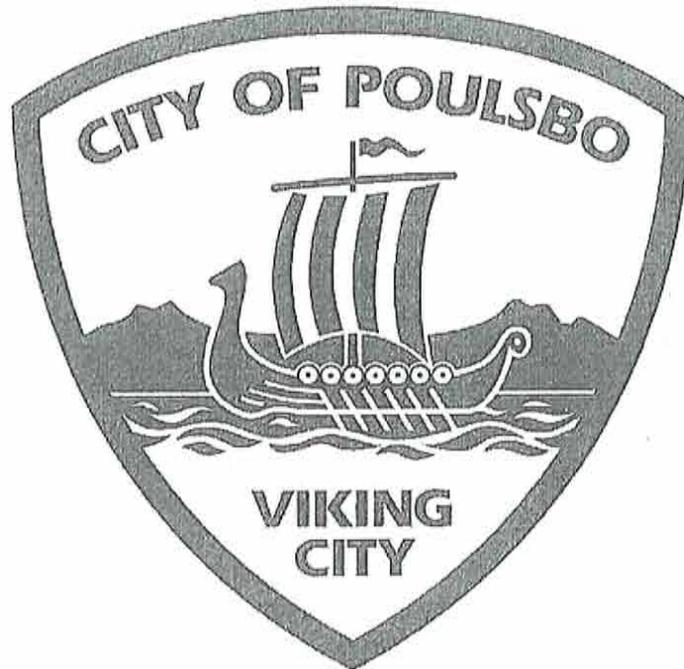
Taken by: MF _____



Notes: Constructed summer 2004.

APPENDIX D

2007 Stormwater Management Program Report



2007 Stormwater Management Program

for

**National Pollutant Discharge Elimination System
(NPDES)**

March 2008

Introduction:

This document entitled 2007 Stormwater Management Program for National Pollutant Discharge Elimination System (NPDES) summarizes the actions taken by the City of Poulsbo to fulfill its obligations as listed in the Western Washington Phase II Municipal NPDES Stormwater Permit issued by the Washington State Department of Ecology on January 17, 2007. Each section of this document contains information in the same order as listed in Section S.5.C of the Western Washington Phase II Municipal Stormwater Permit. A short description of each performance measure is provided, along with a summary of Poulsbo's existing program.

Public Education and Outreach:

S.5.C.1.a By February 15, 2009, provide an educational and outreach program.

In prior years, local activities have included presentations to school classes, painting stenciled messages near storm drain inlets, and distributing educational brochures. The City of Poulsbo along with regional partners is assessing the existing water quality public education efforts conducted within the greater Kitsap area. The City intends to join with these partners to create a regional educational and outreach program to enhance and expand upon the educational efforts underway locally.

S.5.C.1.b By February 15, 2009, measure the understanding and adoption of the targeted behaviors among the targeted audiences.

The City of Poulsbo is a member of the Kitsap Stormwater Consortium which has been organized to conduct a statistically based survey regarding target audiences' understanding and behavior regarding stormwater programs. The survey is tentatively scheduled to occur in 2008. The results will be compared with a similar survey conducted in 2000.

S.5.C.1.c By February 15, 2009, track and maintain records of public education and outreach activities.

Currently these activities are tracked informally. Prior to February 15, 2009, the City will institute practices to formally track and document public education and outreach activities.

Public Involvement and Participation:

S.5.C.2.a By February 15, 2008, create opportunities for public participation for updating the City's Stormwater Management Program.

Throughout 2007 there was extensive public involvement in the review and adoption of a Critical Areas Ordinance. Among other things, this regulation further protects surface and groundwater resources within the City of Poulsbo. Public involvement included a stakeholders task force, several articles in the local newspaper, and numerous (televised) presentations and hearings before the Poulsbo City Council.

This annual report is being provided in draft form for public review and comment prior to formal submittal to the Department of Ecology. In 2008 there will be further opportunities for public review and participation as the City updates its Stormwater Master Plan and incorporates it into the City's updated Comprehensive Plan.

S.5.C.2.b Make required documents available to the public. Post the latest annual report on the City's website.

The City has made these documents available to the public and is posting the annual report on the City's website.

Illicit Discharge Detection and Elimination:

S.5.C.3.a (i thru vi) By February 15, 2011, develop and maintain an updated storm sewer system map.

Much of this information has already been assembled, mapped, and is included in the Stormwater Master Plan being updated in 2008. Prior to February 15, 2011, the City will verify the completeness and accuracy of this information and will maintain an updated mapping system.

S.5.C.3.b (i thru vi) By August 15, 2009, develop and implement an ordinance to effectively prohibit non-stormwater, illegal discharges, and/or dumping into the City's storm sewer system.

In part, this requirement is met by Ordinance No. 96-08. Prior to August 15, 2009, a thorough review of the City Code and the City's stormwater regulations will be undertaken. Revisions and/or additions will be made to fully comply with this requirement. Additional enforcement is available through Kitsap County Health District regulations.

S.5.C.3.c (i thru v) By August 19, 2011, develop and implement an ongoing program to detect and address non-stormwater discharges, spills, illicit connections and illegal dumping into the City's stormwater system.

In prior years, the Kitsap County Health District assisted the City of Poulsbo in the first phase of a project to identify illicit connections to the City's storm sewer system. The Kitsap County Health District also conducted monitoring of Poulsbo's stormwater outfalls to help detect non-stormwater discharges and spills. As part of a regional grant-supported program in 2008, the City has partnered with the Kitsap County Health District to proceed with the second phase of this investigation. This will include establishing priorities for visual inspection of receiving waters prior to February 15, 2010, and field assessments for three high priority water bodies by February 15, 2011.

Through another regional grant-supported program in 2008, the City has also partnered with the Kitsap County Solid Waste Division to conduct site visits whereby businesses in Poulsbo can better understand how their activities impact stormwater quality, and to provide technical assistance to these businesses for better control of stormwater runoff.

S.5.C.3.d.i By August 19, 2011, distribute appropriate information to target audiences regarding the hazards associated with illegal discharges and improper disposal of waste.

As noted in the paragraph above, the City is participating in a regional grant-supported program to provide technical assistance to businesses in Poulsbo. Prior to August 19, 2011, the City will also expand its current public outreach and public information efforts to address this requirement.

S.5.C.3.d.ii By February 15, 2009, publish a hotline or other local telephone number for public reporting of spills and other illicit discharges.

Currently the City's Public Works Office takes such calls. The City also has a 24-hour pager that can be contacted to report after-hour spills. If the 911 Center receives such a call pertaining to Poulsbo, such calls are referred to Poulsbo's 24-hour standby duty officer. Poulsbo has joined with the County and the other municipalities on the Kitsap Peninsula to establish and publish a more standardized hotline reporting process which will be implemented prior to February 15, 2009.

S.5.C.3.e By August 19, 2011, adopt and implement procedures for program evaluation and assessment.

The City of Poulsbo is working with regional partners to best determine how to evaluate and assess the illicit discharge detection and elimination program. The City plans to document the process prior to August 19, 2011.

S.5.C.3.f.i By August 15, 2009, provide appropriate training for field staff on identification and reporting of illicit discharges.

In prior years, formal training was provided to a member of Poulsbo's staff who in turn has conveyed informal on-the-job training to coworkers. Prior to August 15, 2009, a more formal training program will be conducted and documented for all applicable field staff.

S.5.C.3.f.ii By February 15, 2010, develop an ongoing training program for all field staff for reporting and responding to illicit discharges.

In prior years, formal training was provided to a member of Poulsbo's staff who in turn has conveyed informal on-the-job training to coworkers. Prior to February 15, 2010, a more formal training program will be conducted and documented for all applicable field staff.

Controlling Runoff from new Development, Redevelopment, and Construction Sites:

S.5.C.4.a (i thru v) By August 15, 2009, establish an enforceable mechanism that addresses runoff from new development, redevelopment, and construction site projects.

Through Ordinance No. 96-08 the City of Poulsbo imposes requirements for stormwater management regarding development, redevelopment, and construction sites. As a basis for such requirements the City follows the design standards adopted by Kitsap County. As Kitsap County adjusts and updates their standards, the City of Poulsbo adjusts and updates accordingly. This not only assures a high level of stormwater management, but also assures consistency and continuity of performance among jurisdictions in this region. In 2008 it is anticipated that standards for Low Impact Development (LID) techniques will be established to encourage source reduction and help minimize disturbance of native soils and vegetation.

S.5.C.4.b (i thru vii) By August 15, 2009, implement a permitting process with plan review, inspection and enforcement capability to meet applicable stormwater management standards.

The City has a permitting process which includes plan review, inspection and enforcement. The City's Planning, Building, Engineering and Public Works Departments are involved in the review process. During calendar year 2007, 243 permit applications were evaluated (many of which involved more than one round of review over the course of the pre-application, application and approval process). Once a project has been approved, field inspections are conducted during construction. If stormwater management standards are not met, enforcement actions such as stop work orders and compliance schedules are imposed. Final approval is not granted unless all applicable conditions of approval have been satisfied. Refinements to the City's review, inspection, enforcement and tracking activities will be made to assure full compliance with Section S.5.C.4.b prior to August 15, 2009.

S.5.C.4.c (i thru iv) By August 15, 2009, develop and implement a long-term operation and maintenance program for post-construction stormwater facilities and best management practices (BMPs).

The City annually inspects City-owned stormwater facilities, and also has a program for scheduled cleaning of catch basins. Other operations and maintenance activities are conducted on an as needed basis. To fully comply with the August 15, 2009, requirements the City will increase its efforts in terms of inspecting privately owned stormwater controls (including BMPs) and documenting maintenance activities. In addition the City will establish standards regarding required maintenance, and will also establish a regulatory mechanism to identify maintenance responsibilities and enforcement procedures.

S.5.C.4.d By August 15, 2009, establish a procedure for record keeping of inspections and enforcement actions including inspection reports, warning letters, notices of violation, and other enforcement records.

Currently such records are kept in a decentralized and informal way. Prior to August 15, 2009, such record keeping will be consolidated and formalized.

S.5.C.4.e Make available copies of Notice of Intent for Construction Activity and Notice of Intent for Industrial Activity.

Applicants for proposed new development and/or redevelopment are advised of such Notices of Intent (NOI) and are directed to the Department of Ecology's website for more detailed information.

S.5.C.4.f By August 15, 2009, verify all staff responsible for permitting, plan review, inspection and enforcement are trained to conduct these activities.

Staff responsible for these activities have had some training (including on-the-job training). Prior to August 15, 2009, a more formalized training program will be instituted.

Pollution Prevention and Operation and Maintenance for Municipal Operations

S.5.C.5.a (i and ii) By February 15, 2010, adopt maintenance standards that are as protective, or more protective, of facility functions than those specified in Chapter 4 of Volume V of the 2005 Stormwater Management Manual for Western Washington.

The City of Poulsbo follows the standards contained in the Kitsap County Stormwater Management Design Manual, which is very similar to those found in Volume V of the 2005 Manual. As Kitsap County updates and amends its Stormwater Management Design Manual to comply with Section S.5.C.5.a, such changes will be incorporated into the City of Poulsbo's program.

S.5.C.5.b By February 15, 2010, conduct annual inspections of all municipally owned or operated stormwater treatment and flow control facilities other than catch basins, taking appropriate maintenance actions in accordance with the adopted maintenance standards.

Much of this work is already being done as part of the City's current program of annual inspections. This program will be enhanced, formalized and better documented prior to February 15, 2010.

S.5.C.5.c By February 15, 2010, conduct spot checks of potentially damaged permanent treatment and flow control facilities after major storm events. Conduct repairs or take appropriate maintenance action based on the results of the inspections.

Such spot checks and follow-up actions already occur as part of the City's current program. The level of rigor will be enhanced and better documented prior to February 15, 2010.

S.5.C.5.d By February 15, 2010, inspect municipally owned or operated catch basins at least once.

The City already has an annual inspection program for catch basins. Prior to February 15, 2010, we will verify and document that all catch basins have been inspected at least once.

S.5.C.5.e By February 15, 2010, compliance with the inspection requirements for subsections a, b, c, and d above shall be determined by the presence and records of an established inspection program designed to achieve at least 95% of scheduled inspections at all sites.

As previously noted, the City currently has an inspection program. Prior to February 15, 2010, we will establish a record keeping system to verify full compliance with inspection requirements.

S.5.C.5.f By February 15, 2010, establish and implement practices to reduce stormwater impacts associated with runoff from streets, parking lots, roads or highways owned or maintained by the City, and road maintenance activities conducted by the City.

The City currently conducts street sweeping as well as ditch and culvert maintenance on a regular basis. Prior to February 15, 2010, additional efforts will be implemented to assure full compliance with this requirement.

S.5.C.5.g By February 15, 2010, establish and implement policies and procedures to reduce pollutants in discharges from all lands owned or maintained by the City and subject to this Permit, including but not limited to: parks, open space, road right-of-way, maintenance yards, and stormwater treatment and flow control facilities.

Some but not all of these activities already occur as part of the City's current program. Additional efforts will be implemented to assure full compliance prior to February 15, 2010.

S.5.C.5.h By February 15, 2010, implement an on-going training program for City employees whose construction, operations and maintenance job functions may impact stormwater quality.

Staff responsible for these activities have had some training (including on-the-job training). Prior to February 15, 2010, a more formalized on-going training program will be instituted.

S.5.C.5.i By February 15, 2010, develop and implement a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards and material storage facilities owned or operated by the City.

Some of these pollution prevention practices have already been initiated. Prior to February 15, 2010, a more extensive SWPPP will be formalized and implemented.

S.5.C.5.j By February 15, 2010, maintain records of inspections and maintenance or repair activities in accordance with S9 Reporting Requirements.

Currently, such documentation is decentralized and incomplete. Prior to February 15, 2010, record keeping for the City's inspections, maintenance and repair activities will be formalized in accordance with S9 Reporting Requirements.

APPENDIX E
Preventative Maintenance Procedures

DETENTION POND INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Stormwater Detention Ponds including both corrective and preventive maintenance procedures. This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Stormwater Detention Ponds should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events where precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Detention Ponds

Problem	When Maintenance is Needed	Corrective Action
Pond		
Trash and Debris	Trash and/or debris observed in or around pond.	Remove trash and debris, as needed
Sediment	Sediments exceeds 10% of design pond depth or as needed	Remove sediment to the designed pond depth and shape. Re-vegetate bottom and sides as necessary.
Side Slope Erosion	Greater than 2-inches deep or potential for continued erosion.	Stabilize slopes using erosion control such as vegetation, rock lining, compaction, etc.
Liner (if applicable)	Three or more ¼-inch holes or greater observed in liner.	Repair or replace liner.
Contaminants	Evidence of possible contaminants including oil sheens and odors	Contact City water quality personnel or City Engineer.
Pond Berms		
Water Seepage through Pond Berm	Excessive water seeping through pond berm(s).	Contact City Engineer
Erosion on Berm	See "Side Slope Erosion"	See "Side Slope Erosion"

DETENTION POND INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Detention Ponds

Problem	When Maintenance is Needed	Corrective Action
Control/Outlet Structure		
Trash and Debris (including sediment)	Trash, debris or sediment observed at inlet and/or outlet, blocking inlet and/or outlet.	Remove trash, debris, or sediment, as needed
Structural Damage	Damage to control structure such as holes, leaks, rusting, etc.	Repair or replace, as needed.
Inlet/Outlet Obstructions	Trash, debris, sediment, vegetation obstructing inlet/outlet or overflow	Remove trash, debris, sediment, or vegetation, as needed
Emergency Overflow		
Obstructions	See "Inlet/Outlet Obstructions"	See "Inlet/Outlet Obstructions"
Erosion Around Spillway or Pipe	See "Side Slope Erosion"	See "Side Slope Erosion"

3. RECORDKEEPING

All Stormwater Detention Pond inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

DETENTION TANK AND VAULT INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Stormwater Detention Tanks or Vaults including both corrective and preventive maintenance procedures. This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Stormwater Detention Tanks/Vaults should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events were precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Detention Tank or Vault

Problem	When Maintenance is Needed	Corrective Action
Tank/Vault		
Trash and Debris	Trash and/or debris observed in tank/vault.	Remove trash and debris, as needed
Sediment	Sediment depth in tank/vault exceeds 10% of the diameter of the storage area for ½ the length.	Remove sediment to the designed depth.
Structural Damage to Tank/Vault	Cracks in tank/vault greater than ½-inch wide in top, bottom or sides. Soil entering tank/vault through the cracks. Cracks wider than ½ inch at joints to any inlet/outlet piping.	Repair to design specification. If problem cannot be repaired, contact the City Engineer.
Other Structural Damage	Structural damage which may include bent or damaged piping, openings or voids in tank/vault joints, etc.	Repairs, as applicable. Contact City Engineer.
Plugged Air Vents	One-half or greater of the vent opening is plugged.	Clear vent opening to full design diameter.
Contaminants	Evidence of possible contaminants including oil sheens and odors	Contact City water quality personnel or City Engineer.

DETENTION TANK AND VAULT INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Detention Tank or Vault

Problem	When Maintenance is Needed	Corrective Action
Manhole		
Cover Missing	Manhole cover is missing or badly damaged so that all or part of the manhole is open.	Replace manhole cover.
Ladder Unsafe	Ladder unsafe due to missing rungs, not attached to sidewall, or other structural damage.	Repair or replace ladder.
Catch Basin (if applicable)		
Trash and Debris	Trash immediately in front of catch basin or blocking inlet. Trash and debris obstructing inlet or outlet pipe.	Remove trash and debris, as needed
Sediment	Sediment exceeds 60% of sump depth measured from bottom of the basin to the bottom of the lowest inlet or outlet pipe.	Remove all sediment from catch basin.
Vegetation	Vegetation blocking basin inlets/outlets or growing through cracks in basin sides or bottom.	Remove vegetation and repair cracks, as needed.
Ladder Unsafe	Ladder unsafe due to missing rungs, not attached to sidewall, or other structural damage.	Repair or replace ladder.
Structural Damage	Structural damage which may include cracks or holes in top/bottom slab or sidewalls, cracks or holes around inlet/outlet piping, etc.	Repair or replace, as required. Contact City Engineer.

3. RECORDKEEPING

All Stormwater Detention Tank/Vault inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

INFILTRATION/RETENTION POND INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Stormwater Infiltration/Retention Ponds including both corrective and preventive maintenance procedures. This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Stormwater Infiltration/Retention Ponds should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events were precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Infiltration/Retention Ponds

Problem	When Maintenance is Needed	Corrective Action
Pond		
Trash and Debris	Trash and/or debris observed in or around pond.	Remove trash and debris, as needed
Sediment	Infiltration is slow or not occurring.	Remove sediment to the designed pond depth and shape. Re-vegetate bottom and sides as necessary.
Side Slope Erosion	Greater than 2-inches deep or potential for continued erosion.	Stabilize slopes using erosion control such as vegetation, rock lining, compaction, etc.
Rock Filters not Operating Properly	Little to no water flowing through filter during heavy storm events.	Replace gravel in rock filter.
Contaminants	Evidence of possible contaminants including oil sheens and odors	Contact City water quality personnel or City Engineer.
Pond Berms		
Water Seepage through Pond Berm	Excessive water seeping through pond berm(s).	Contact City Engineer
Erosion on Berm	See "Side Slope Erosion"	See "Side Slope Erosion"
Emergency Overflow		

INFILTRATION/RETENTION POND INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Infiltration/Retention Ponds

Problem	When Maintenance is Needed	Corrective Action
Overflow Obstructions	Trash, debris, sediment, vegetation obstructing inlet/outlet or overflow	Remove trash, debris, sediment, or vegetation, as needed
Erosion Around Spillway or Pipe	See "Side Slope Erosion"	See "Side Slope Erosion"
Pre-settling Pond or Vault		
Sediment	6-inches or designed depth of sediment in pre-settling pond.	Remove sediment.

3. RECORDKEEPING

All Stormwater Infiltration/Retention Pond inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

BIOFILTRATION SWALE INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Biofiltration Swale including both corrective and preventive maintenance procedures. This PMP applies primarily to Catch Basins not associated with other stormwater facilities such as detention ponds, detention tanks/vaults, oil/water separators, etc. Please see appropriate PMP for these types of catch basins.

This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Biofiltration Swales should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events were precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Biofiltration Swales

Problem	When Maintenance is Needed	Corrective Action
Trash and Debris	Trash and debris accumulated in swale	Remove trash and debris, as needed
Sediment Covering Grass in Swale	Sediment exceeds 2 inches in depth and covers grass in swale.	Remove all sediment from swale. Following removal, ensure that swale is level and drains to outlet.
Standing Water	Standing water remains in swale following storm event.	Remove blockage, re-grade bottom, remove and replace clogged check dams, etc.
Poor Vegetation Cover	Bare spaces or eroded areas cover more than 10% of the swale bottom.	Determine why poor growth is occurring. Replant and/or reseed, as needed.
Vegetation	Grass in swale is greater than 10-inches tall or nuisance weeds and other vegetation are taking over.	Mow vegetation to a height of 3 to 4 inches. Remove grass clippings.
Inlet/Outlet Clogged	The inlet and/or outlet are clogged with	Remove material causing the clog.

BIOFILTRATION SWALE INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Biofiltration Swales

Problem	When Maintenance is Needed	Corrective Action
	sediment, trash, and debris.	
Erosion or Scouring	Swale bottom is eroded or scoured due to high flows.	For ruts or bare areas less than 12 inches wide, repair damaged area by filling with crushed gravel. For areas greater than 12 inches wide, re-grade and re-vegetate swale.
Flow Spreader not Operating Properly (if applicable)	Flow spreader is clogged or uneven so flow is not spread uniformly over the entire swale width.	Clean and/or level spreader so flow is uniformly distributed.

3. RECORDKEEPING

All Biofiltration Swale inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

CONTROL STRUCTURE INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Control Structures including both corrective and preventive maintenance procedures. This PMP applies primarily to Control Structures not associated with other stormwater facilities such as detention ponds. Inspection and maintenance of detention pond control structures is presented in PMP #1.

This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Control Structures should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events where precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Control Structures

Problem	When Maintenance is Needed	Corrective Action
Control/Outlet Structure		
Trash and Debris (including sediment)	Trash, debris or sediment observed at inlet and/or outlet, blocking inlet and/or outlet.	Remove trash, debris, or sediment, as needed
Structural Damage	Damage to control structure such as holes, leaks, rusting, etc.	Repair or replace, as needed.
Inlet/Outlet Obstructions	Trash, debris, sediment, vegetation obstructing inlet/outlet or overflow	Remove trash, debris, sediment, or vegetation, as needed
Catch Basin (if applicable)		
Trash and Debris	Trash immediately in front of catch basin or blocking inlet. Trash and debris obstructing inlet or outlet pipe.	Remove trash and debris, as needed
Sediment	Sediment exceeds 60% of sump depth measured from bottom of the basin to the bottom of the lowest inlet or outlet pipe.	Remove all sediment from catch basin.

CONTROL STRUCTURE INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Control Structures

Problem	When Maintenance is Needed	Corrective Action
Vegetation	Vegetation blocking basin inlets/outlets or growing through cracks in basin sides or bottom.	Remove vegetation and repair cracks, as needed.
Ladder Unsafe	Ladder unsafe due to missing rungs, not attached to sidewall, or other structural damage.	Repair or replace ladder.
Structural Damage	Structural damage which may include cracks or holes in top/bottom slab or sidewalls, cracks or holes around inlet/outlet piping, etc.	Repair or replace, as required. Contact City Engineer.
Manhole (if applicable)		
Cover Missing	Manhole cover is missing or badly damaged so that all or part of the manhole is open.	Replace manhole cover.
Ladder Unsafe	Ladder unsafe due to missing rungs, not attached to sidewall, or other structural damage.	Repair or replace ladder.

3. RECORDKEEPING

All Control Structure inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

OIL/WATER SEPARATOR INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Oil/Water Separator including both corrective and preventive maintenance procedures. This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Oil/Water Separators should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events were precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Oil/Water Separators

Problem	When Maintenance is Needed	Corrective Action
Vault		
Trash and Debris	Trash and/or debris observed in separator vault or inlet/outlet piping.	Remove trash and debris, as needed
Sediment	Sediment depth in separator vault exceeds 6 inches.	Remove sediment to the designed depth.
Structural Damage to Tank/Vault	Cracks in vault greater than ½-inch wide in top, bottom or sides. Soil entering separator vault through the cracks. Cracks wider than ½ inch at joints to any inlet/outlet piping.	Repair to design specification. If problem cannot be repaired, contact the City Engineer.
Baffles	Baffles corroded, cracked, warped and/or show signs of failure.	Baffles replaced or repair to specification.
Other Structural Damage	Structural damage which may include bent or damaged piping, openings or voids in vault joints, etc.	Repairs, as applicable. Contact City Engineer.
Oil Accumulation	Oil on water surface exceeds 1 inch in thickness	Remove oil by vactoring or similar method and dispose of properly in accordance with City and State rules and regulations
Contaminants	Evidence of possible contaminants	Contact City water quality personnel

OIL/WATER SEPARATOR INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Oil/Water Separators

Problem	When Maintenance is Needed	Corrective Action
	including oil sheens at discharge.	and City Engineer.
Catch Basin (if applicable)		
Trash and Debris	Trash immediately in front or catch basin or blocking inlet. Trash and debris obstructing inlet or outlet pipe.	Remove trash and debris, as needed
Sediment	Sediment exceeds 60% of sump depth measured from bottom of the basin to the bottom of the lowest inlet or outlet pipe.	Remove all sediment from catch basin.
Vegetation	Vegetation blocking basin inlets/outlets or growing through cracks in basin sides or bottom.	Remove vegetation and repair cracks, as needed.
Ladder Unsafe	Ladder unsafe due to missing rungs, not attached to sidewall, corrosion, or other structural damage.	Repair or replace ladder.
Structural Damage	Structural damage which may include cracks or holes in top/bottom or sidewalls, cracks or holes around inlet/outlet piping, etc.	Repair or replace, as required. Contact City Engineer.

3. RECORDKEEPING

All Oil/Water Separator inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

CATCH BASIN INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Catch Basins including both corrective and preventive maintenance procedures. This PMP applies primarily to Catch Basins not associated with other stormwater facilities such as detention ponds, detention tanks/vaults, oil/water separators, etc. Please see appropriate PMP for these types of catch basins.

This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Catch Basins should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events where precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Catch Basins

Problem	When Maintenance is Needed	Corrective Action
Trash and Debris	Trash immediately in front of catch basin or blocking inlet. Trash and debris obstructing inlet or outlet pipe.	Remove trash and debris, as needed
Sediment	Sediment exceeds 60% of sump depth measured from bottom of the basin to the bottom of the lowest inlet or outlet pipe.	Remove all sediment from catch basin.
Vegetation	Vegetation blocking basin inlets/outlets or growing through cracks in basin sides or bottom.	Remove vegetation and repair cracks, as needed.
Ladder Unsafe	Ladder unsafe due to missing rungs, not attached to sidewall, corrosion, or other structural damage.	Repair or replace ladder.

CATCH BASIN INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Catch Basins

Problem	When Maintenance is Needed	Corrective Action
Structural Damage	Structural damage which may include cracks or holes in top/bottom slab or sidewalls, cracks or holes around inlet/outlet piping, etc.	Repair or replace, as required. Contact City Engineer.
Contaminants	Evidence of possible contaminants including oil sheens and odors	Contact City water quality personnel or City Engineer.

3. RECORDKEEPING

All Catch Basin inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

STORMWATER FILTER INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and private Stormwater Filters including both corrective and preventive maintenance procedures. This PMP provides procedures used to determine if maintenance is required based on the results of periodic facility inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Stormwater Filters should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events where precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions. The Maintenance Standards presented in Table 1 are based on requirements and recommendations presented in *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology, August 2001). These Standards are required and/or recommended to insure proper facility operation and to prevent potential non-compliance with local and state stormwater quality requirements.

Table 1. Maintenance Requirements for Stormwater Filters

Problem	When Maintenance is Needed	Corrective Action
Aboveground Sand Filter		
Trash and Debris	Trash and/or debris observed in filter vault or inlet/outlet piping.	Remove trash and debris, as needed
Sediment on Top Layer of Filter	Sediment exceeds ½ inches in depth.	Remove all sediment from top layer of sand filter.
Sediment in Cleanout	Cleanout clogged or partially clogged with sediment and/or debris.	Remove sediment and/or debris, as needed.
Sand Filter Media not Draining Properly	Water drains slowly through filter media.	Remove and replace top few inches of sand from filter. If this does not fix problem, remove and replace the entire depth of sand filter.
Erosion of Side Slopes	Erosion over 2 inches deep or continued erosion is possible.	Stabilize slopes using proper erosion control methods.
Flow Spreader Not Operating Properly (if applicable)	Flow spreader is clogged or uneven so flow is not spread uniformly over the entire swale width.	Clean and/or level spreader so flow is uniformly distributed.
Underground Sand Filter		
Trash and Debris	Trash and/or debris observed in filter vault or inlet/outlet piping.	Remove trash and debris, as needed
Sediment on Sand Media	Sediment exceeds ½ inches in depth.	Remove all sediment from filter section.

STORMWATER FILTER INSPECTION AND MAINTENANCE

Table 1. Maintenance Requirements for Stormwater Filters

Problem	When Maintenance is Needed	Corrective Action
Sediment in Vault	Sediment depth in vault exceeds 6 inches.	Remove sediment to the designed depth.
Sediment in Drainpipes or Cleanout	Drainpipes or cleanout clogged with sediment and/or debris.	Remove sediment and/or debris, as needed.
Plugged Air Vents	One-half or greater of the vent opening is plugged.	Clear vent opening to full design diameter.
Structural Damage to Vault	Cracks in vault greater than ½-inch wide in top, bottom or sides. Soil entering vault through the cracks. Cracks wider than ½ inch at joints to any inlet/outlet piping.	Repair to design specification. If problem cannot be repaired, contact the City Engineer.
Other Structural Damage	Structural damage which may include bent or damaged piping, openings or voids in vault joints, etc.	Repairs, as applicable. Contact City Engineer.
Stormfilter		
Trash and Debris	Trash and/or debris observed in filter vault or inlet/outlet piping.	Remove trash and debris, as needed
Sediment on Compost Filter Media	Sediment exceeds ¼ inches in depth.	Remove all sediment from filter media section.
Sediment in Vault	Sediment depth in first section of vault exceeds 6 inches.	Remove sediment to the designed depth.
Sediment in Drainpipes or Cleanout	Drainpipes or cleanout clogged with sediment and/or debris.	Remove sediment and/or debris, as needed.
Structural Damage to Vault	Cracks in vault greater than ½-inch wide in top, bottom or sides. Soil entering vault through the cracks. Cracks wider than ½ inch at joints to any inlet/outlet piping.	Repair to design specification. If problem cannot be repaired, contact the City Engineer.
Other Structural Damage	Structural damage which may include bent or damaged piping, openings or voids in vault joints, etc.	Repairs, as applicable. Contact City Engineer.
Ladder Unsafe	Ladder unsafe due to missing rungs, not attached to sidewall, or other structural damage.	Repair or replace ladder.
Compost Filter Media not Draining Properly	Water drains slowly through filter media.	Replace media cartridge.

3. RECORDKEEPING

All Stormwater Filter inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

DRAINAGE CHANNEL AND CULVERT INSPECTION AND MAINTENANCE

1. PURPOSE AND SCOPE

The purpose of this Preventive Maintenance Procedure (PMP) is to establish the minimum requirements for inspection and maintenance of City-owned and Drainage Channels and Culverts including both corrective and preventive maintenance procedures. This PMP provides procedures used to determine if maintenance is required based on the results of periodic inspection and provides City of Poulsbo personnel with a series of procedures for conducting inspection and maintenance to insure long-term and proper operation of City and privately owned stormwater facilities.

2. INSPECTION AND MAINTENANCE PROCEDURES

Inspections of the Drainage Channels and Culverts should be conducted at least annually to insure proper operation and to determine if any problems or potential problems exist. Additional inspections should be conducted following extreme storm events were precipitation exceeds 1-inch of rainfall over a 24-hour period.

Table 1 shows common maintenance issues that may be observed during facility inspection and provides recommended corrective actions.

Table 1. Maintenance Requirements for Drainage Channels

Problem	When Maintenance is Needed	Corrective Action
Drainage Channels		
Trash and Debris	Trash or debris in drainage channel.	Remove trash and debris, as needed
Sediment Accumulation in Channel	Sediment accumulation blocking stormwater flow or causing channel overflow.	Remove all sediment to return channel to designed depth and shape.
Vegetation	Vegetation in swale is greater than 10-inches tall or blocking normal water flow.	Mow or remove vegetation, as needed
Side Slope Erosion	Greater than 2-inches deep or potential for continued erosion.	Stabilize slopes using erosion control such as vegetation, rock lining, compaction, etc.
Culverts		
Trash and Debris	Trash or debris in culvert.	Remove trash and debris, as needed
Sediment Accumulation in Culvert	Sediment accumulation in culvert or at inlet/outlet blocking or limiting stormwater flow through culvert.	Remove all sediment from culvert. If problem continues, re-grading associated drainage channel may be required.
Vegetation	Vegetation blocking culvert inlet and/or outlet.	Remove vegetation, as needed.
Structural Damage	Culvert is crushed, etc. reducing water flow through culvert.	Repair or replace culvert.

DRAINAGE CHANNEL AND CULVERT INSPECTION AND MAINTENANCE

3. RECORDKEEPING

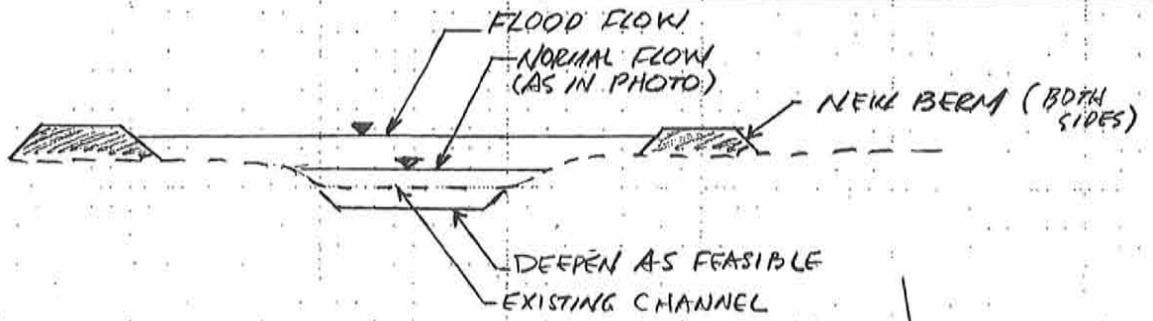
All Drainage Channel and Culvert inspections should be recorded on the Inspection Form provided in Appendix A of the city of Poulsbo Operations and Maintenance Manual. All completed maintenance activities resulting from the inspections should be documented on the Inspection Form or in a daily logbook.

APPENDIX F

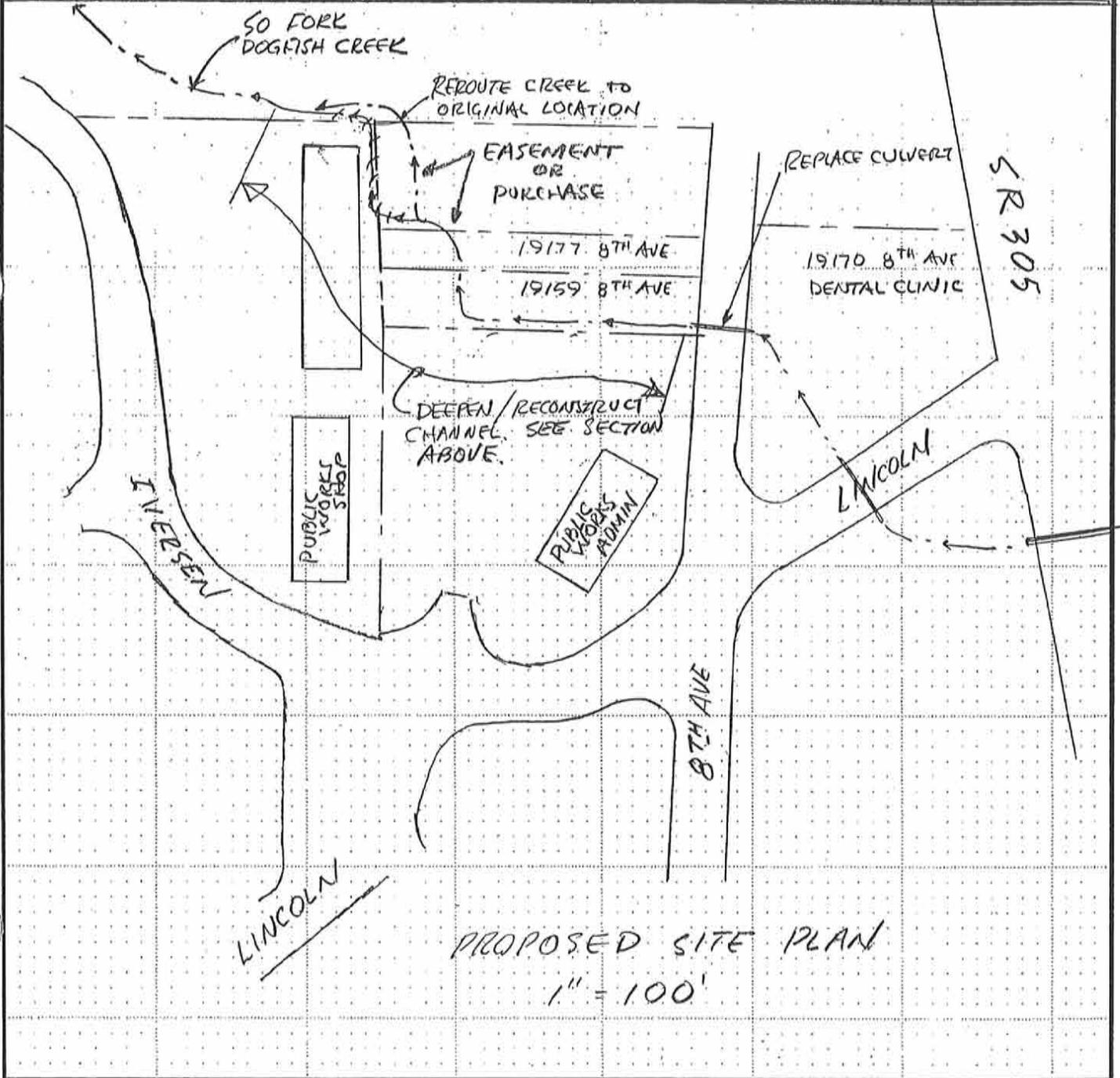
Capital Improvement Plan Worksheets

PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan SHEET _____ OF _____
BY: K Brown DATE: _____ CHECKED: _____ DATE: _____
SUBJECT: Capital Improvement Projects JOB NO.: 258-2237-020 PHASE: 01 TASK: 05



STREAM CROSS-SECTION
NO SCALE



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: 18" Storm Drain Viking Way Behind Shoomadoggie

Date: 5/7/07

DESCRIPTION:

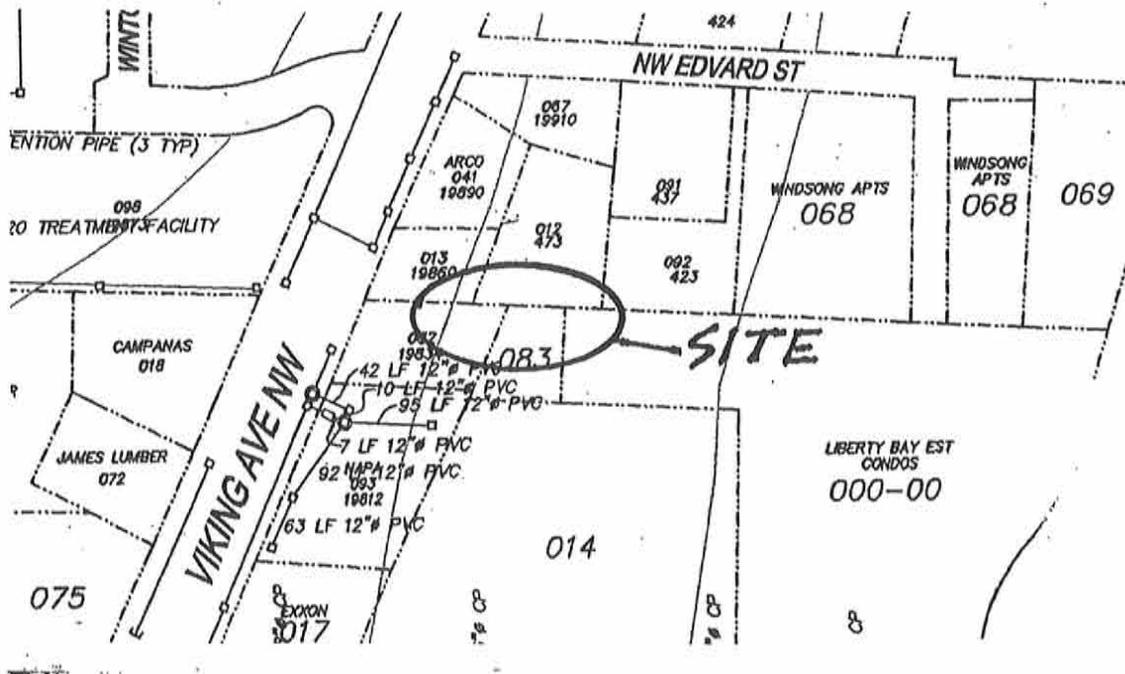
Replace 90 lineal feet of open ditch with 18" dia PVC pipe. Install two Type 2 catch basins. Tie one existing parking lot catch basin to a new catch basin with 20 lineal feet of 12" PVC. Tie other drains to other new catch basins. Reroute as necessary. Landscape disturbed areas and patch the asphalt parking lot.

JUSTIFICATION:

The storm drain plugs with debris and then overflows to the downstream property, resulting in damage to the Liberty Bay Condo swimming pool.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	\$3,000	\$3,000
2	Temporary Erosion Control	1	LS	\$700	\$700
3	18" PVC Storm Drain	90	LF	\$45	\$4,050
4	12" PVC Storm Drain	20	LF	\$40	\$800
5	Catch Basin, 48" Dia, Type 2	2	EA	\$3,000	\$6,000
6	Pavement Patching	1	LS	\$4,000	\$4,000
7	Landscape Repair	1	LS	\$2,000	\$2,000
8	Select Backfill / Topsoil	150	CY	\$50	\$7,500
9	Cleanup and Restoration	1	LS	\$3,000	\$3,000
	Subtotal				\$31,050
	Contingency	15%			\$4,658
	Tax	8.5%			\$2,639
	Construction Total				\$38,347
	Design	15%			\$5,752
	Total Project Cost				\$44,099

SITE PLAN

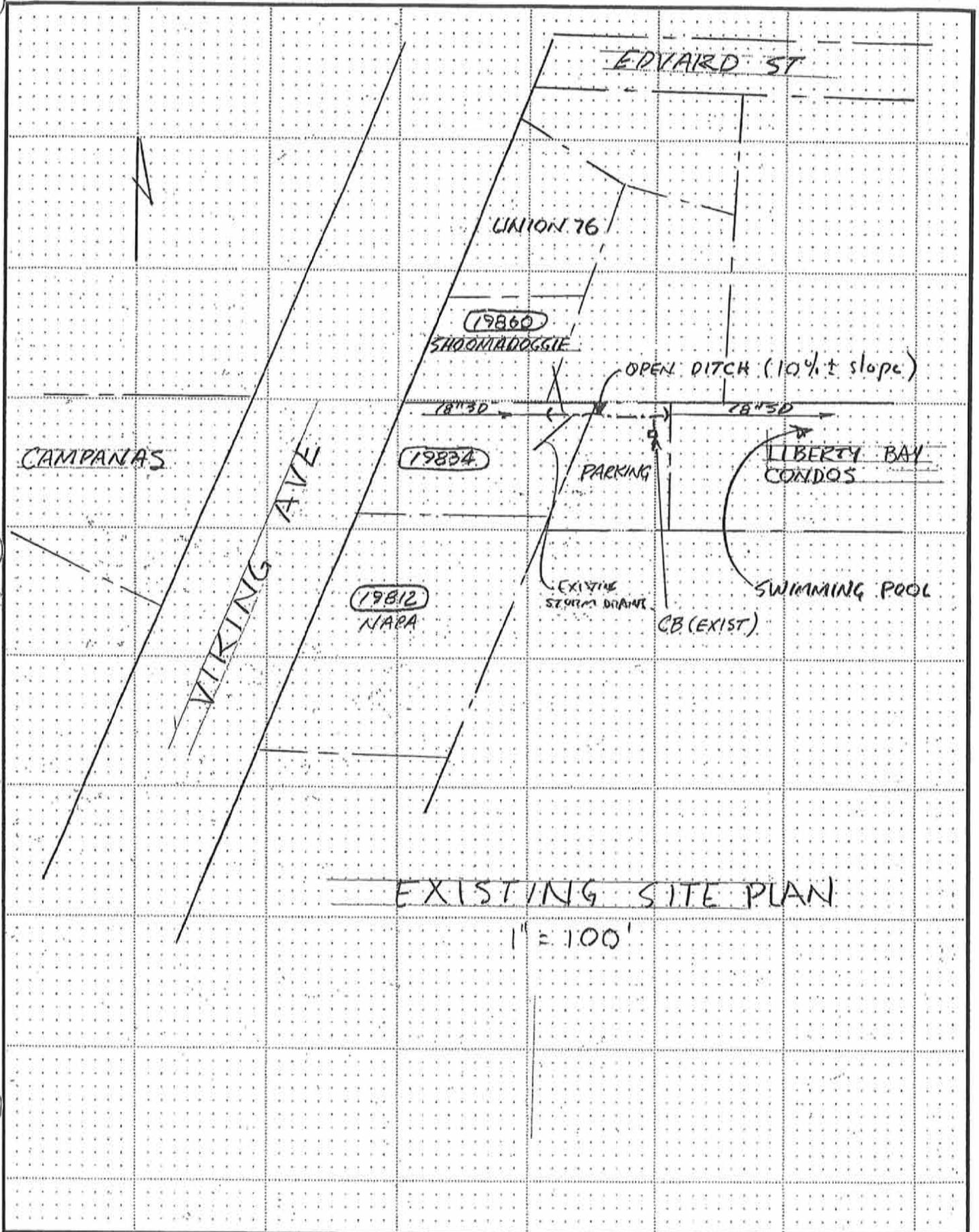


PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan SHEET _____ OF _____

BY: K Brown DATE: _____ CHECKED: _____ DATE: _____

SUBJECT: Capital Improvement Projects JOB NO.: 258-2237-020 PHASE: 01 TASK: 05



PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan

SHEET _____ OF _____

BY: K Brown

DATE: _____

CHECKED: _____

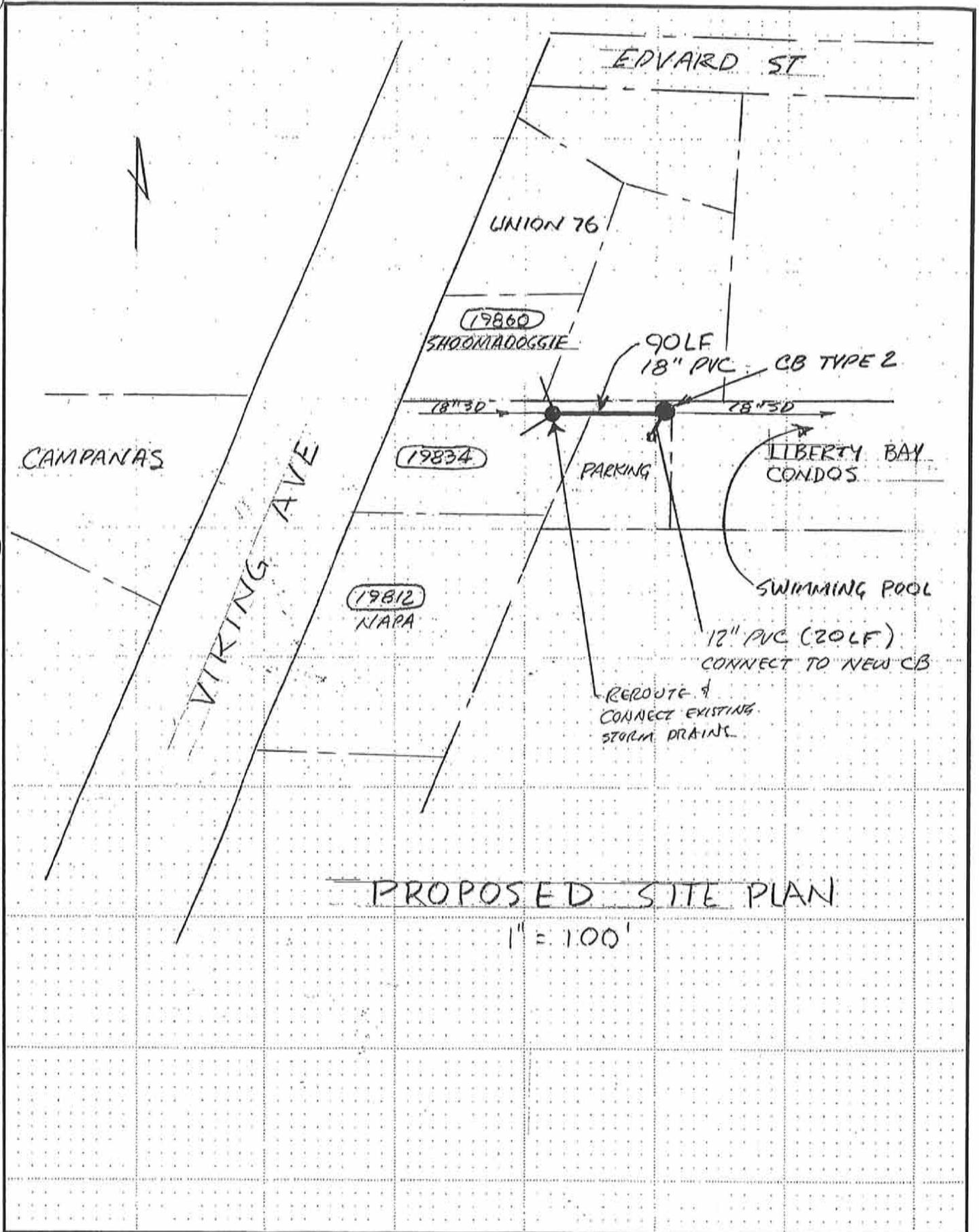
DATE: _____

SUBJECT: Capital Improvement Projects

JOB NO.: 258-2237-020

PHASE: 01

TASK: 05



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Fjord Drive Bank Repair

Date: 5/7/07

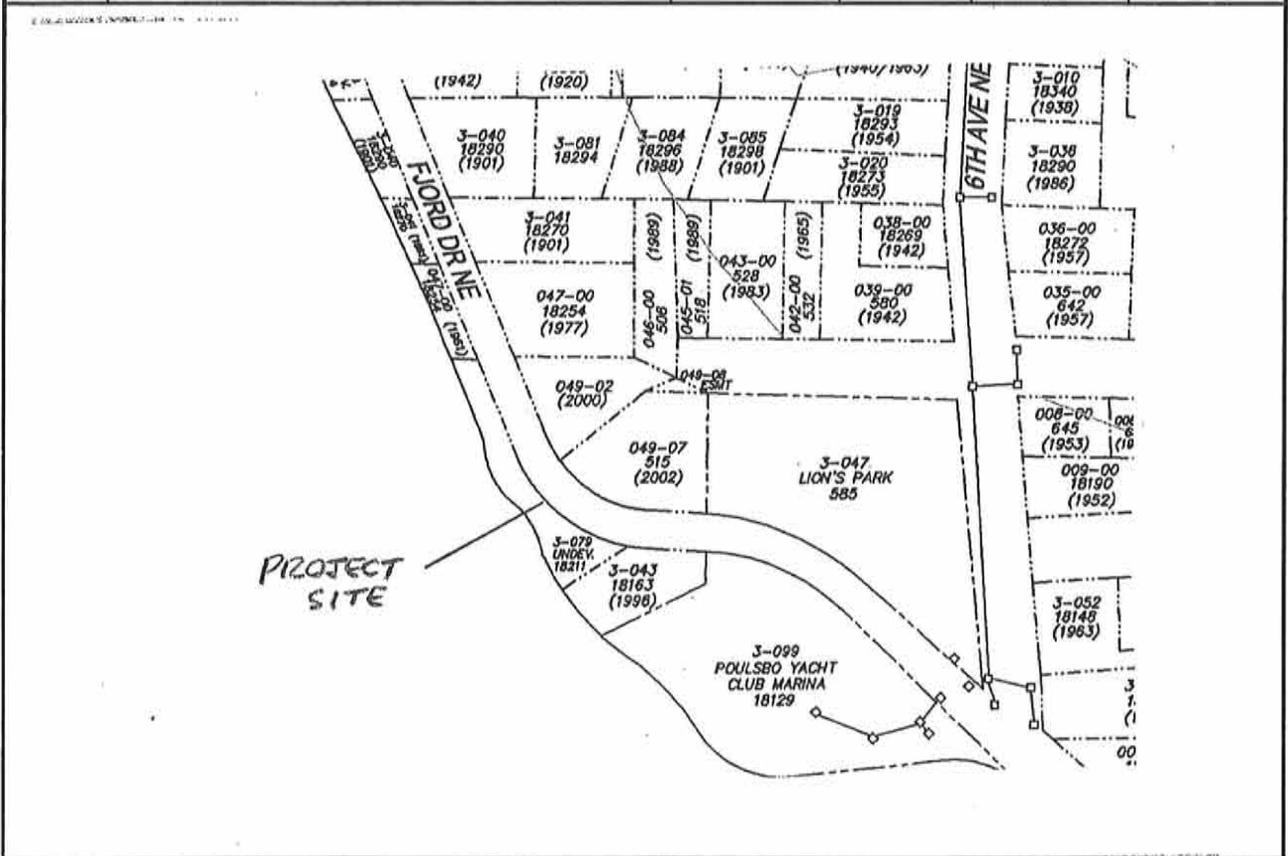
DESCRIPTION:

Provide curb at edge of street to prevent runoff from saturating soil at top of slope and flowing down bank. Repair damaged bank by adding soil, placing and anchoring erosion control matting, and planting vegetation.

JUSTIFICATION:

Stormwater has sheet-flowed off the edge of the street and severely eroded the steep bank. Sandbags and plastic have been installed to temporarily halt erosion. A more permanent repair is required. This project will provide the minimum acceptable repair pending a more permanent solution.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	5,000	\$5,000
2	Temporary Erosion Control	1	LS	5,000	\$5,000
3	Asphalt Curb	1	LS	3,000	\$3,000
4	Erosion Control Mat	1	LS	10,000	\$10,000
5	Plants (Live stakes)	1	LS	2,000	\$2,000
6	Hydroseed	1	LS	3,500	\$3,500
7	Cleanup and Restoration	1	LS	3,000	\$3,000
	Subtotal				\$31,500
	Contingency	15%			\$4,725
	Tax	8.5%			\$2,678
	Construction Total				\$38,903
	Design and Geotech	13%			\$5,057
	Total Project Cost				\$43,960



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Replace Storm Drain in Wendy Way

Date: 5/7/07

DESCRIPTION:

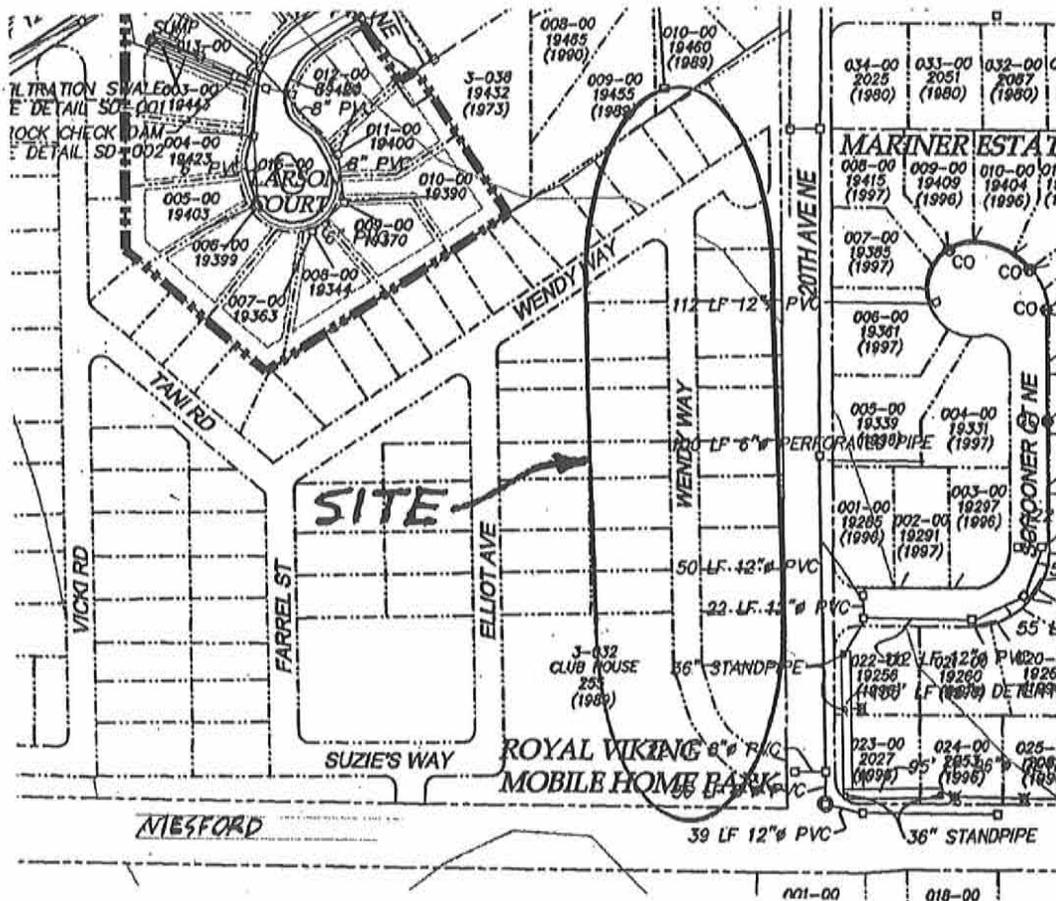
Replace the existing 700 lineal feet of storm drain in Wendy Way with new 18" dia PVC storm drain pipe.

JUSTIFICATION:

The existing 12" pipe is undersized to convey storm water flows from the Norrland housing area. It overflows and floods private property and runs down Wendy Way.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	\$5,500	\$5,500
2	Temporary Erosion Control	1	LS	\$2,000	\$2,000
3	18" Dia PVC Storm Drain	700	LF	\$50	\$35,000
4	Pavement Saw Cut	700	LF	\$3.00	\$2,100
5	Pavement Restoration	700	LF	\$15.00	\$10,500
6	Cleanup and Restoration	1	LS	3,000	\$3,000
Subtotal					\$58,100
Contingency		15%			\$8,715
Tax		8.5%			\$4,939
Construction Total					\$71,754
Design		15%			\$10,763
Total Project Cost					\$82,517

SITE PLAN



PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan

SHEET _____ OF _____

BY: KBrown

DATE: _____

CHECKED: _____

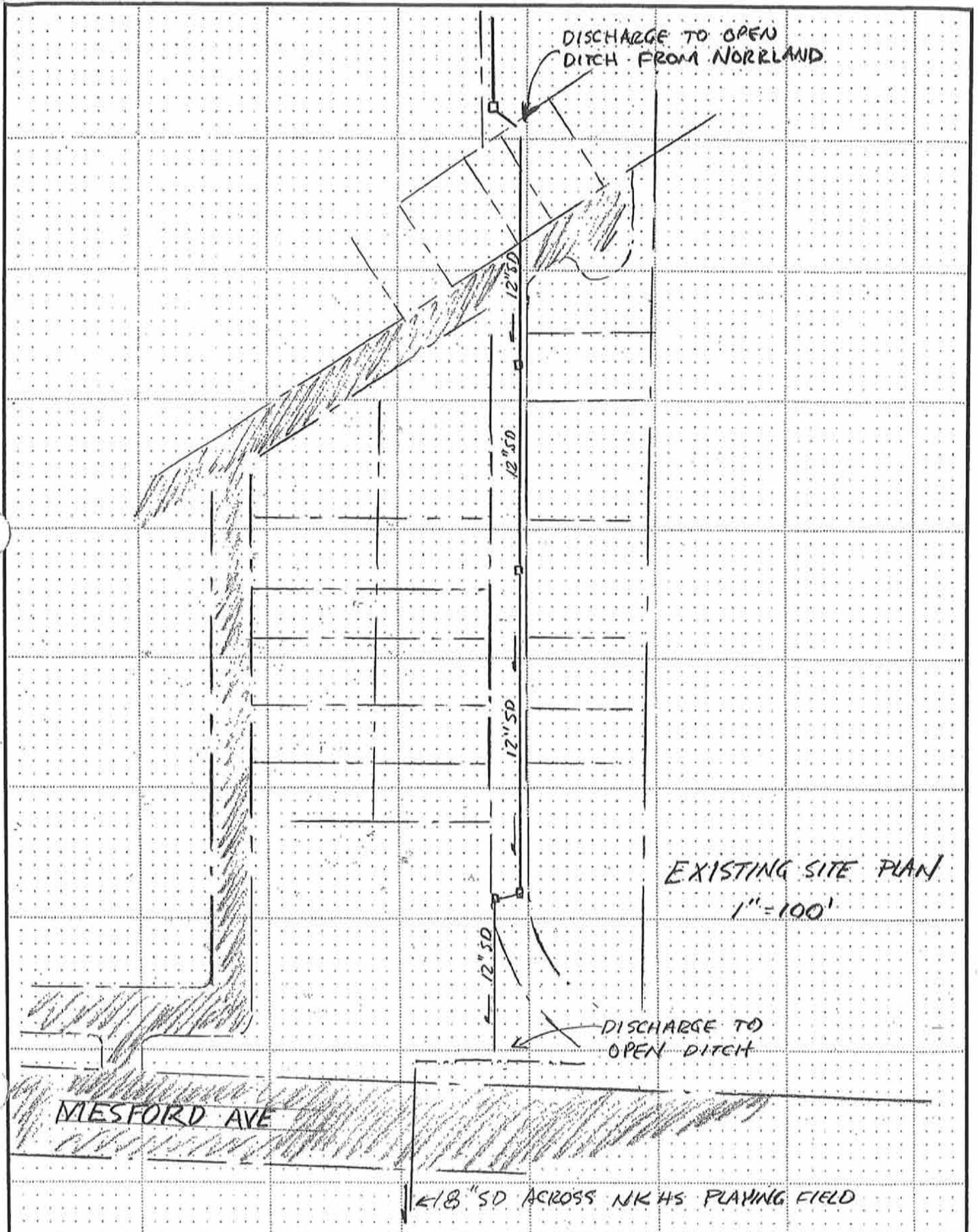
DATE: _____

SUBJECT: Capital Improvement Projects

JOB NO.: 258-2237-020

PHASE: 01

TASK: 05



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Replace Norrland drainage ditch

Date: 5/7/07

DESCRIPTION:

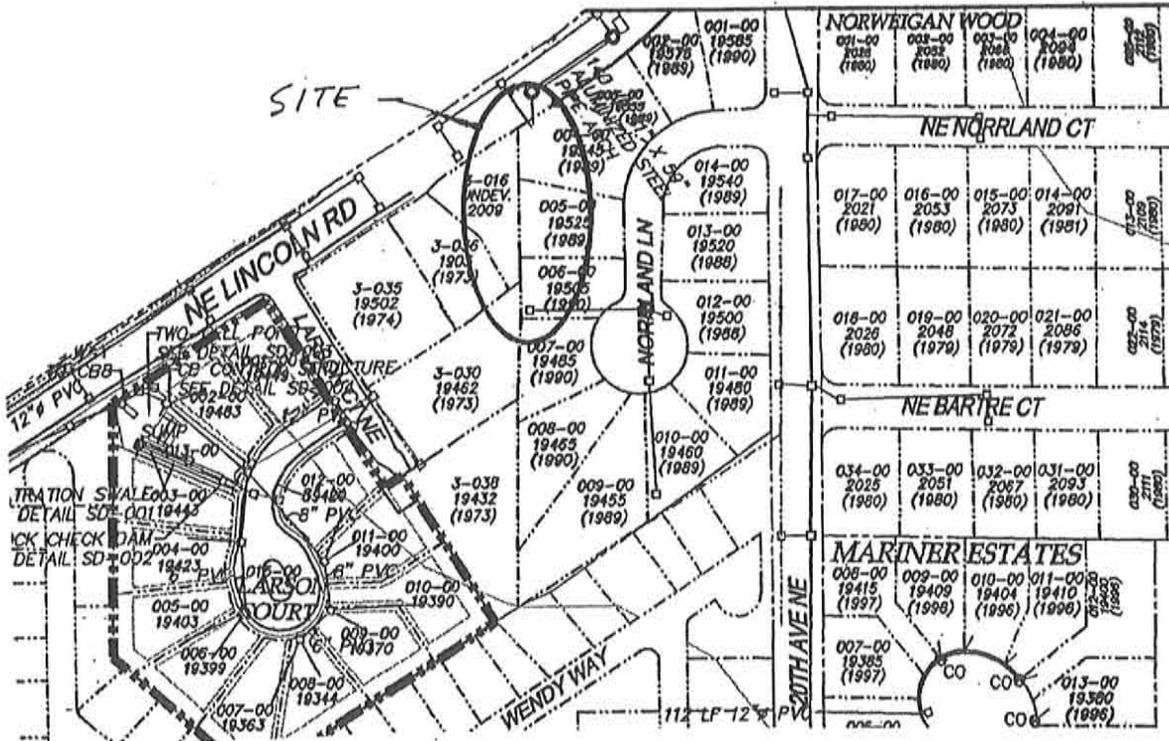
Two storm drains discharge to an open ditch that flows through the back yards of 3 homes. Replace the ditch with 90 lineal feet of 18" dia PVC. Install two catch basins.

JUSTIFICATION:

The drainage ditch was originally designed to carry flow from the drainage channel north of Lincoln Road. A detention structure was placed in Lincoln Road and discharged to the ditch. This caused the control structure in the Norrland cul-de-sac to back up into the yards and flood at least one of the crawl spaces. The control structure has now been opened to minimize the problem. This project cannot be accomplished until the Wendy Way storm main is increased to 18".

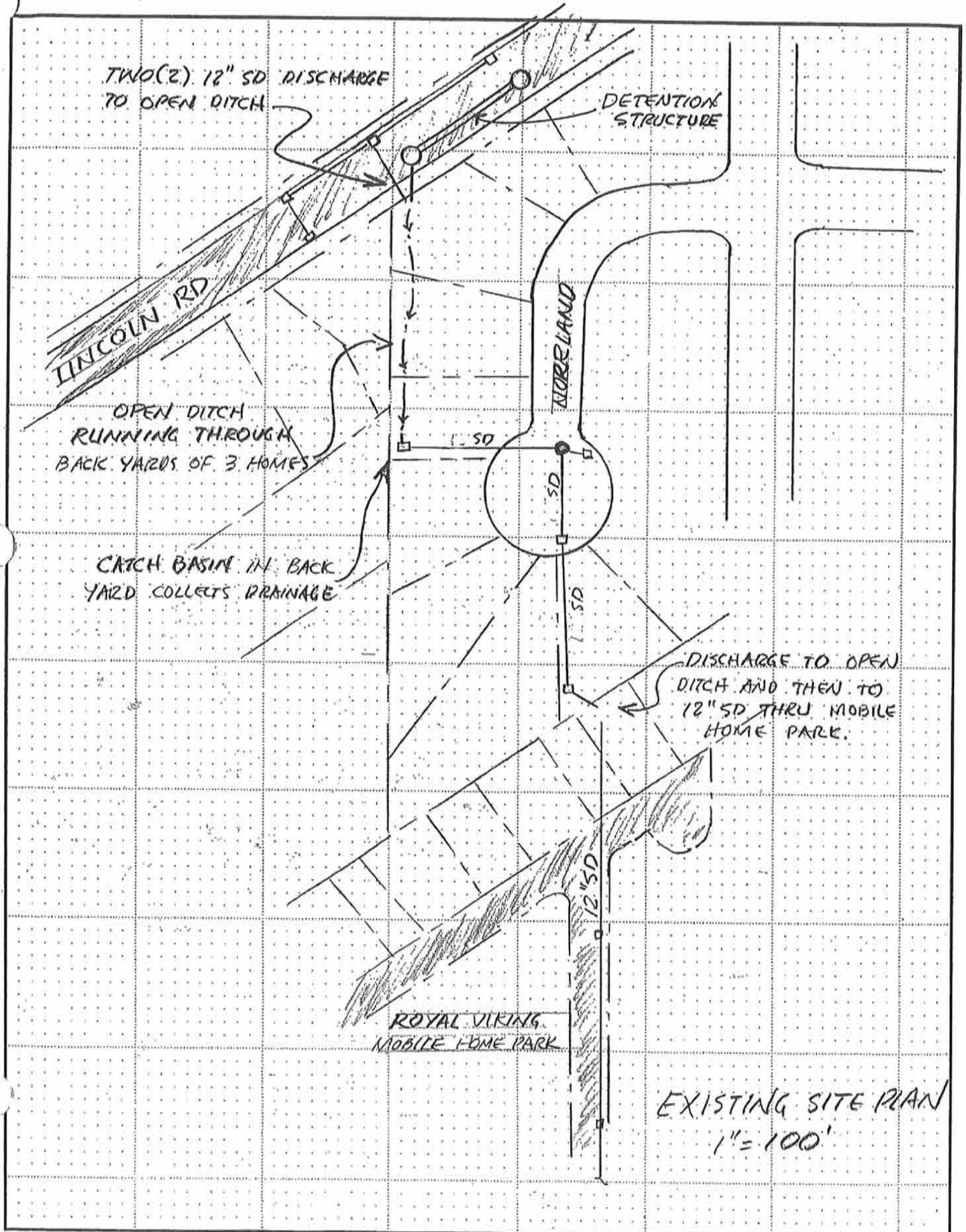
Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	\$4,000	\$4,000
2	Temporary Erosion Control	1	LS	\$2,000	\$2,000
3	18" PVC Storm Drain	90	LF	\$50	\$4,500
4	Catch Basin, 48" Dia, Type 2	2	EA	\$3,000	\$6,000
5	Landscape Repair	1	LS	\$2,000	\$2,000
6	Select Backfill/Topsoil	350	CY	\$50	\$17,500
7	Cleanup and Restoration	1	LS	\$4,000	\$4,000
Subtotal					\$40,000
Contingency		15%			\$6,000
Tax		8.5%			\$3,400
Construction Total					\$49,400
Design		15%			\$7,410
Total Project Cost					\$56,810

SITE PLAN



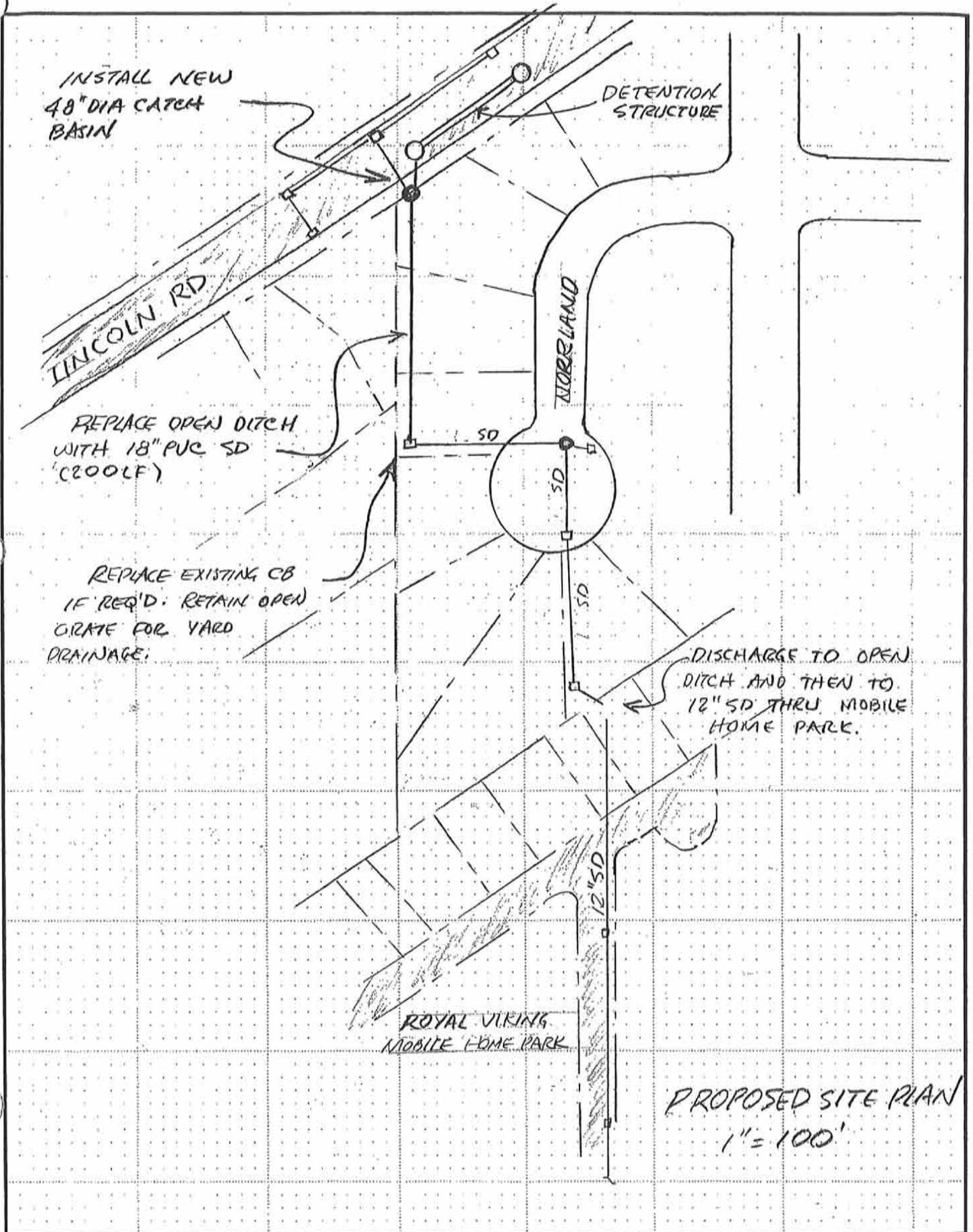
PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan SHEET _____ OF _____
BY: K Brown DATE: _____ CHECKED: _____ DATE: _____
SUBJECT: Capital Improvement Projects JOB NO.: 258-2237-020 PHASE: 01 TASK: 05



PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan SHEET _____ OF _____
BY: K Brown DATE: _____ CHECKED: _____ DATE: _____
SUBJECT: Capital Improvement Projects JOB NO.: 258-2237-020 PHASE: 01 TASK: 05



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Replace Storm Drain West of 10th Ave

Date: 5/7/07

DESCRIPTION:

Replace about 150 feet of storm drain main running through the private property at 18581 10th Ave NE with larger diameter pipe. Replace catch basins if required, patch asphalt pavement, and restore all landscaping in the yard.

JUSTIFICATION:

This short segment of storm drain carries a large quantity of water. Evaluate pipe conditions to determine whether there may be a partial collapse of the line. A portion was repaired in 2001 but the problem still exists. Consider replacing with a larger diameter main.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	\$3,000	\$3,000
2	Temporary Erosion Control	1	LS	\$500	\$500
3	18" PVC Storm Drain	150	LF	\$50	\$7,500
4	Catch Basin, 48" Dia, Type 2	1	EA	\$3,000	\$3,000
5	Pavement Patching	1	LS	\$2,500	\$2,500
6	Landscape Repair	1	LS	\$3,000	\$3,000
7	Cleanup and Restoration	1	LS	\$3,000	\$3,000
Subtotal					\$22,500
Contingency		15%			\$3,375
Tax		8.5%			\$1,913
Construction Total					\$27,788
Design		15%			\$4,168
Total Project Cost					\$31,956

SITE PLAN



REPLACE 150 LF SECTION
OF STORM DRAIN

1" = 200'

POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Dogfish Creek Regional Detention Facility-Phase 2

Date: 5/7/07

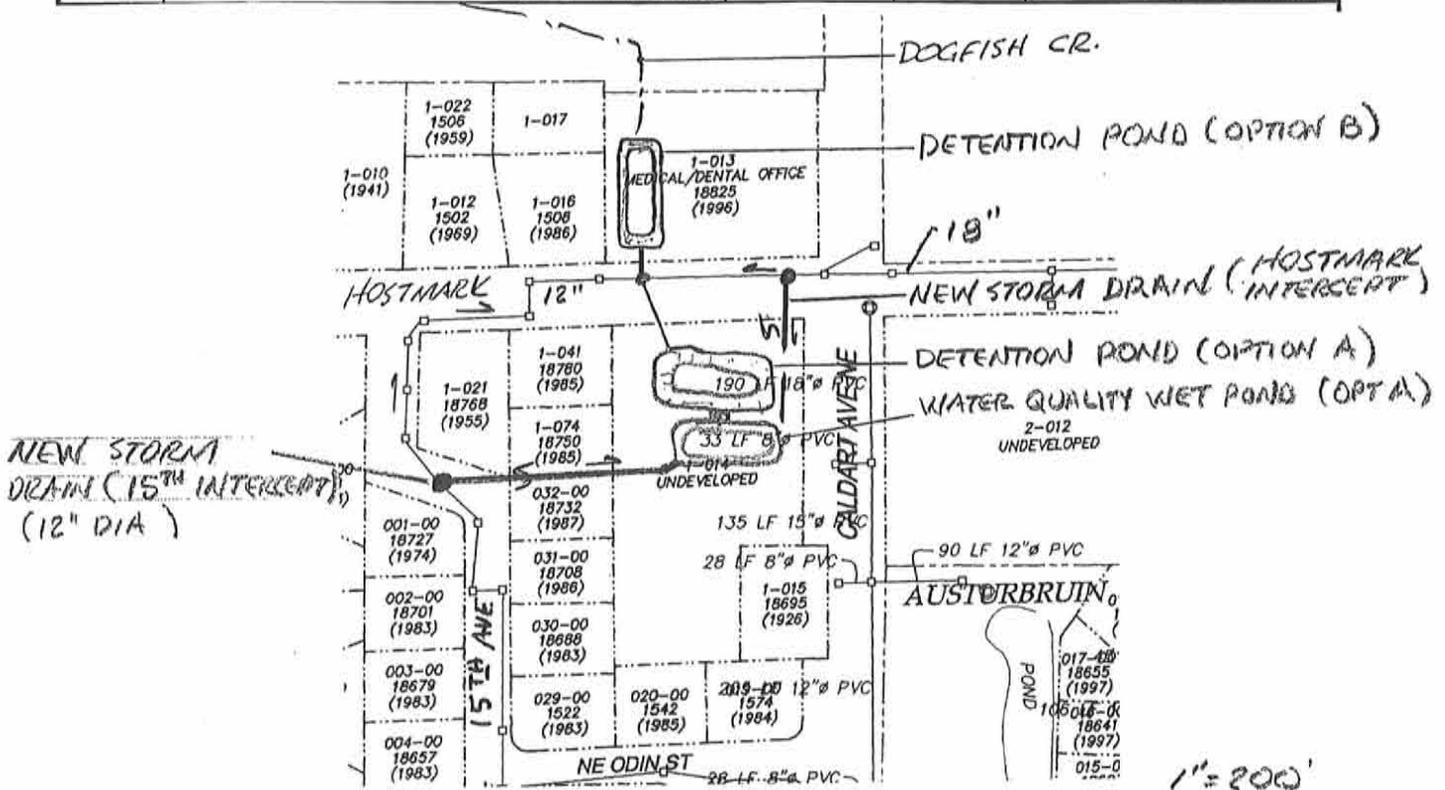
DESCRIPTION:

Construct a regional detention facility near the intersection of Caldart Ave and Hostmark. This facility can be located on either the north or south side of Hostmark. The preferred location (232601-1-014-2000) is south of Hostmark on currently vacant property (assessed value is \$112,310). Intercept the east flowing Caldart main and the north flowing 15th main and route to the facility. Facility can be an open detention/wet pond, or if developed, could be an underground vault beneath a parking lot. Outflow from the pond would be via a control structure and pipe beneath Hostmark discharging to Dogfish Creek. The existing contours of the property will require little grading to construct a pond.

JUSTIFICATION:

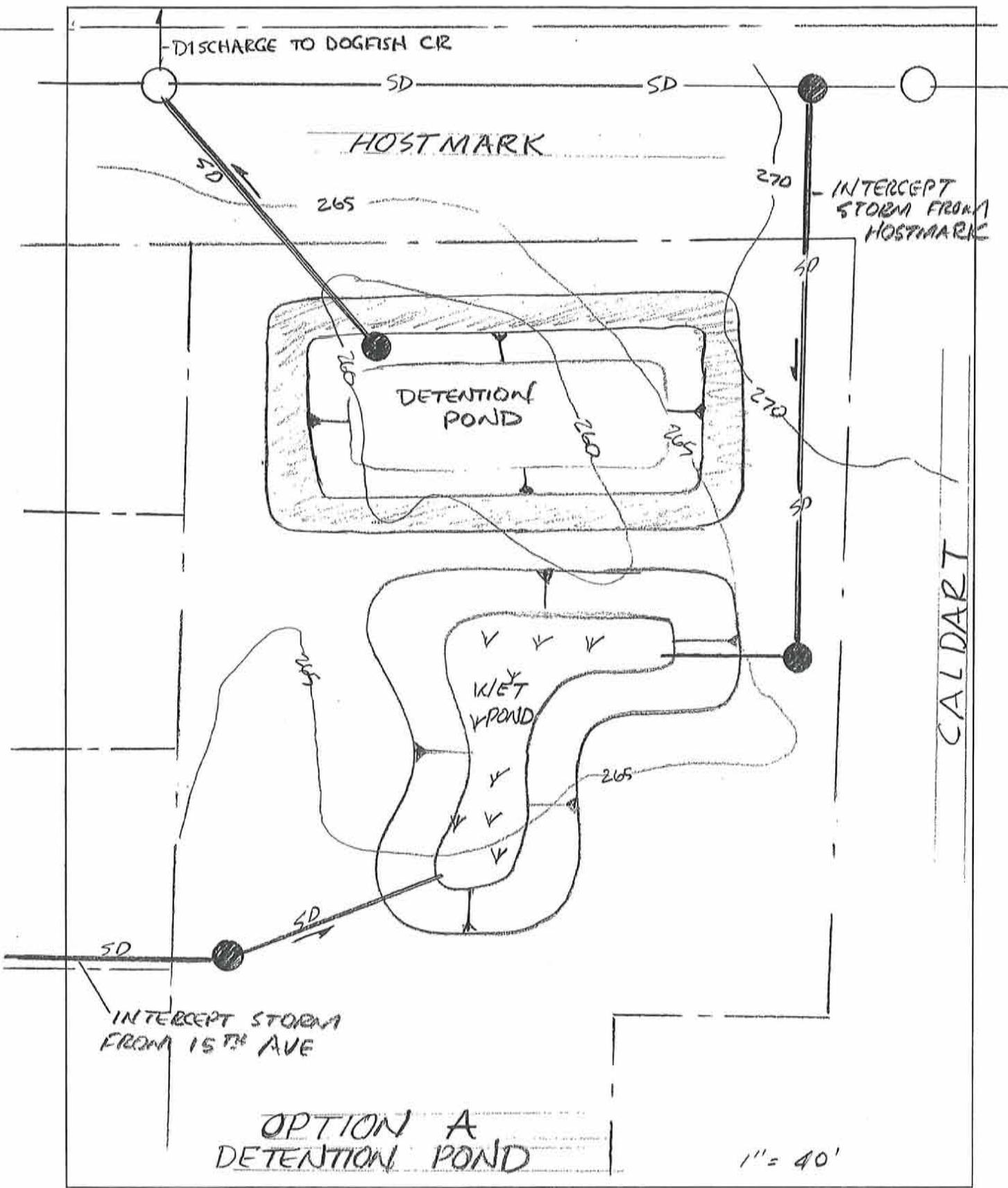
Dogfish Creek runs on a steep gradient through the Myroboe Wilderness Park. A regional detention structure was placed in the North Kitsap School parking lot to detain flow from the north and east portions of the basin. However, no detention facility restricts flow from the western portion of the basin. This contributes to erosion, stream bed cutting, and other downstream impacts during heavy rain events. This project will reduce high flows and allow for enhancement of the stream and park and reduce potential damage to downstream enhancements.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	50,000	\$50,000
2	Purchase Property	1	LS	150,000	\$150,000
3	Temporary Erosion Control	1	LS	5,000	\$5,000
4	Detention Facility	1	LS	350,000	\$350,000
5	Control Structure	1	LS	20,000.00	\$20,000
6	Catch Basin, 48", Type 2	4	EA	3,000.00	\$12,000
7	12" and 18" Dia PVC Storm Drain	250	LF	30	\$7,500
8	24" Outfall	150	LF	60.00	\$9,000
9	Cleanup and Restoration	1	LS	3,000	\$3,000
Subtotal					\$606,500
Contingency		15%			\$90,975
Tax		8.5%			\$51,553
Construction Total					\$749,028
Design		10%			\$74,903
Total Project Cost					\$823,930



PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan SHEET _____ OF _____
BY: K Brown DATE: _____ CHECKED: _____ DATE: _____
SUBJECT: Capital Improvement Projects JOB NO.: 258-2237-020 PHASE: 01 TASK: 05

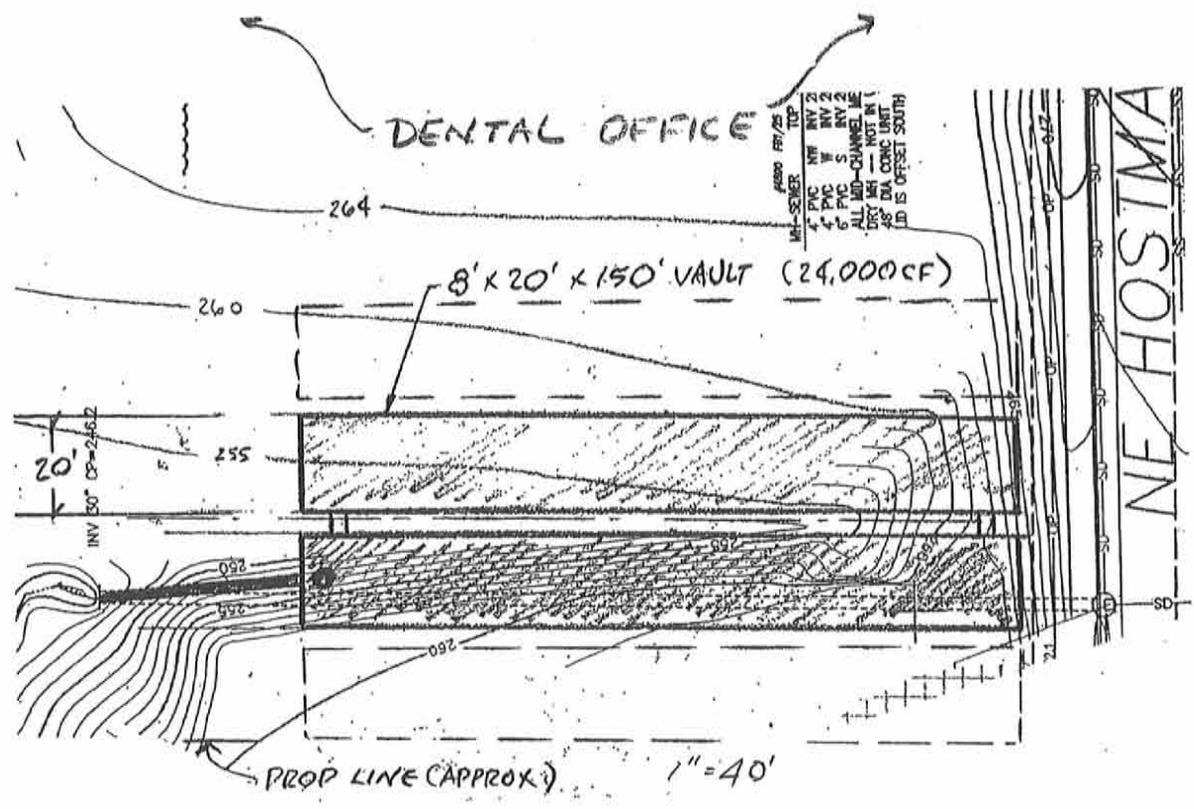


OPTION A
DETENTION POND

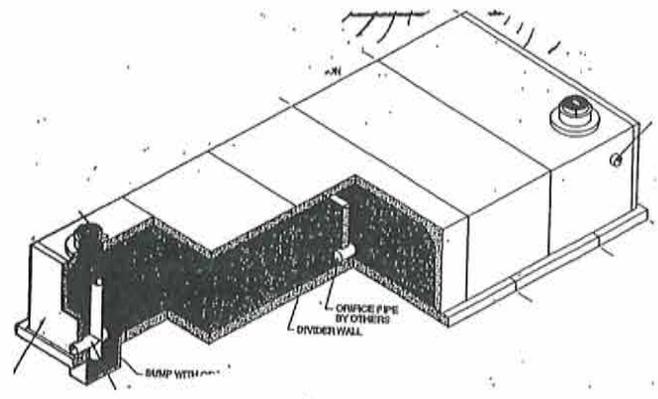
1" = 40'

PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan SHEET _____ OF _____
 BY: K Brown DATE: _____ CHECKED: _____ DATE: _____
 SUBJECT: Capital Improvement Projects JOB NO.: 258-2237-020 PHASE: 01 TASK: 05



NOTE: PARKING ON VAULT IS FEASIBLE.



OPTION B USING CONCRETE VAULT FOR DETENTION

POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Dogfish Creek Enhancement (Wilderness Park Segment) **Date:** 5/7/07

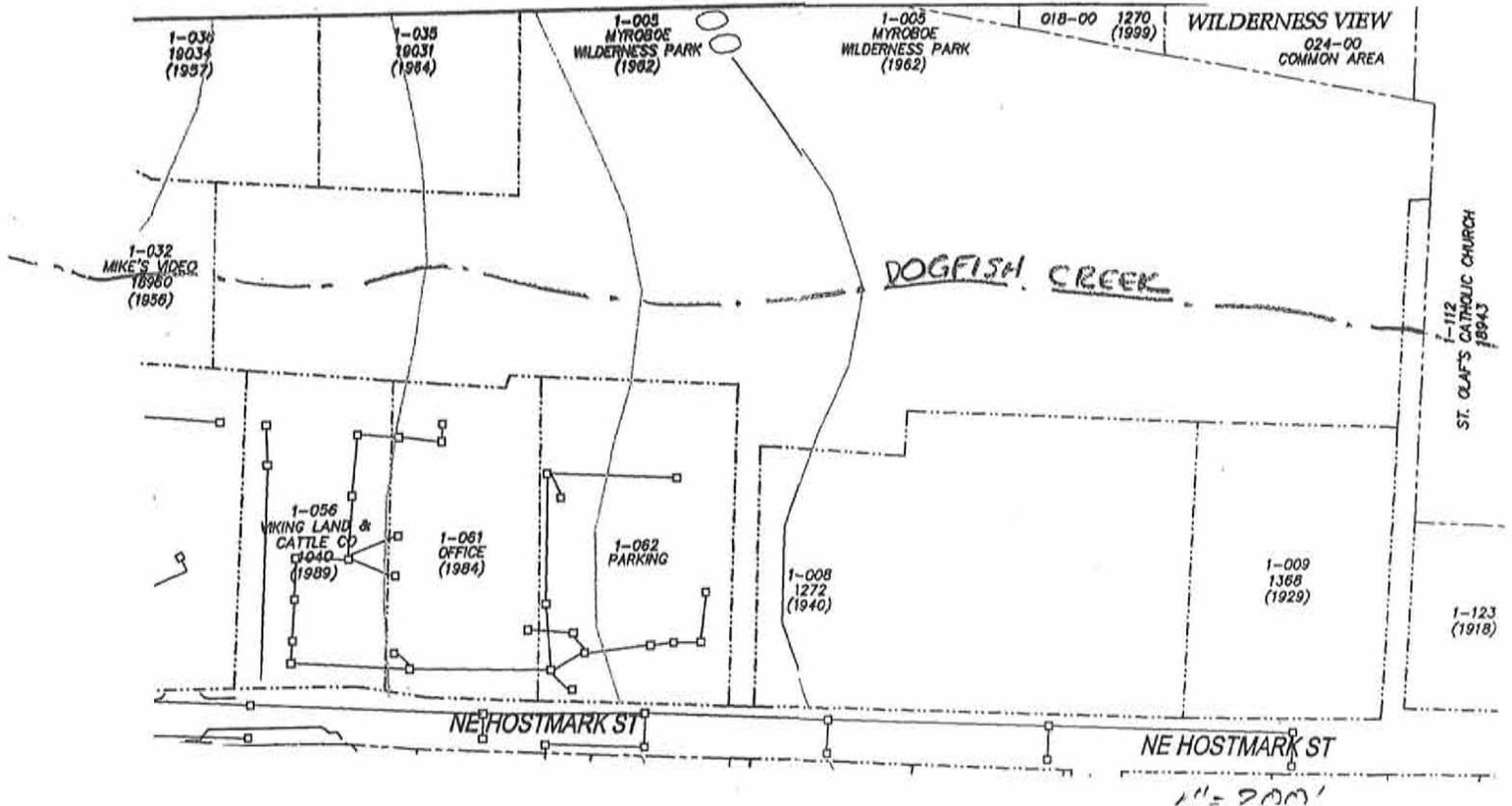
DESCRIPTION:

Install stream enhancement features in Dogfish Creek within the confines of the Myroboe Wilderness Park. Typical features are rock and log weirs to slow the flow and create ponds, plantings in eroded and scoured sections of the creek, rock walls, stream path crossings, plantings to enhance the stream and associated wetlands, signs, and other related features.

JUSTIFICATION:

Severe streambed cutting and erosion has occurred due to commercial and residential development that caused increased stormwater runoff. A new detention structure was constructed in the High School parking lot in 2006, and a new detention structure to reduce high flows has been identified for drainage along Hostmark and 15th Street. With these detentions structures controlling high flow volumes, enhancement features can be installed with less concern for wash out or excessive erosion. These features will not only improve the appearance of the park, but will improve water quality by reducing erosion and by filtering water as it flows along the stream.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	30,000	\$30,000
2	Temporary Erosion Control	1	LS	5,000	\$5,000
3	Log weirs	1	LS	25,000	\$25,000
4	Rock weirs	1	LS	40,000	\$40,000
5	Rock walls	1	LS	25,000	\$25,000
6	Plants	1	LS	25,000	\$25,000
7	Trail safety or viewing enhancements	1	LS	30,000	\$30,000
8	Cleanup and Restoration	1	LS	5,000	\$5,000
	Subtotal				\$185,000
	Contingency	15%			\$27,750
	Tax	8.5%			\$15,725
	Construction Total				\$228,475
	Design	10%			\$22,848
	Total Project Cost				\$251,323



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Dogfish Cr Enhancement (7th to Liberty)

Date: 5/7/07

DESCRIPTION:

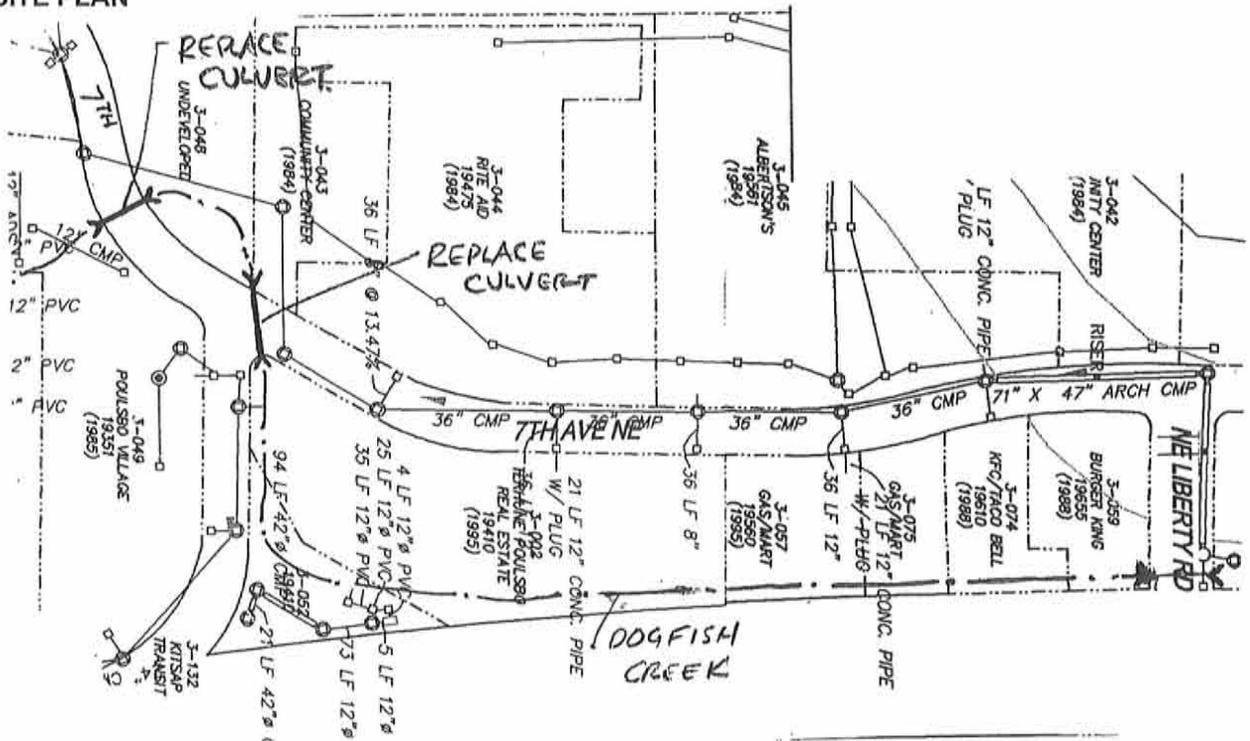
This project enhances and restores a section of Dogfish Creek between 7th Ave and Liberty Road. Replace two culverts under 7th Avenue and restore the stream between the two culverts. Restore the stream from 7th Avenue to Liberty Road. Stream restoration will remove willows, brush, and debris, install fabric and fish-mix gravel, and replanting of suitable vegetation.

JUSTIFICATION:

Dogfish Creek is heavily overgrown with willows and blackberries, reducing the potential for fish migration to the upper reaches of the creek. The culverts are undersized and can cause flooding during heavy storms. Fish passage through these small culverts is difficult. This restoration will prevent flooding, improve the Creek appearance, and enhance salmon migration upstream.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	\$30,000	\$30,000
2	Temporary Erosion Control	1	LS	\$5,000	\$5,000
3	Stream Diversion	1	LS	\$30,000	\$30,000
4	Dredge channel and remove brush/willows	1	LS	\$100,000	\$100,000
5	Geosynthetic fabric	1	LS	\$75,000	\$75,000
6	Fish Mix Gravel	1	LS	\$75,000	\$75,000
7	Replace Culverts under 7th Ave	2	EA	\$75,000	\$150,000
8	Landscape/Vegetation/LWD	1	LS	\$40,000	\$40,000
9	Cleanup and Restoration	1	LS	\$10,000	\$10,000
Subtotal					\$515,000
Contingency		15%			\$77,250
Tax		8.5%			\$43,775
Construction Total					\$636,025
Design		20%			\$127,205
Total Project Cost					\$763,230

SITE PLAN



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: North Viking Way WQ Facility

Date: 5/7/07

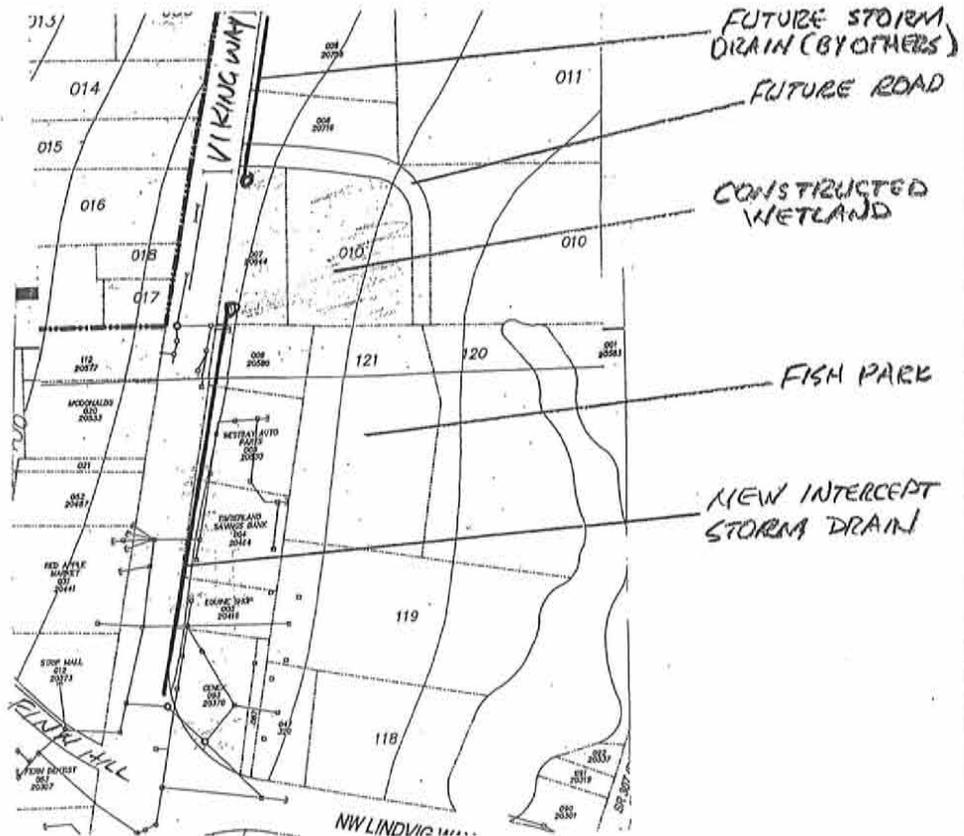
DESCRIPTION:

Construct a regional water quality treatment facility using Low Impact Development (LID) techniques to treat runoff from Viking Way between Lindvig Way and SR 305. Purchase two properties between Fish Park and Viking Way. Construct wetland complex and trail system to treat storm water from Viking Way. Construct a new storm drain interceptor from the Lindvig intersection to the wetland. The storm drain system along the northern portion of Viking Way will be installed as part of the future road widening project.

JUSTIFICATION:

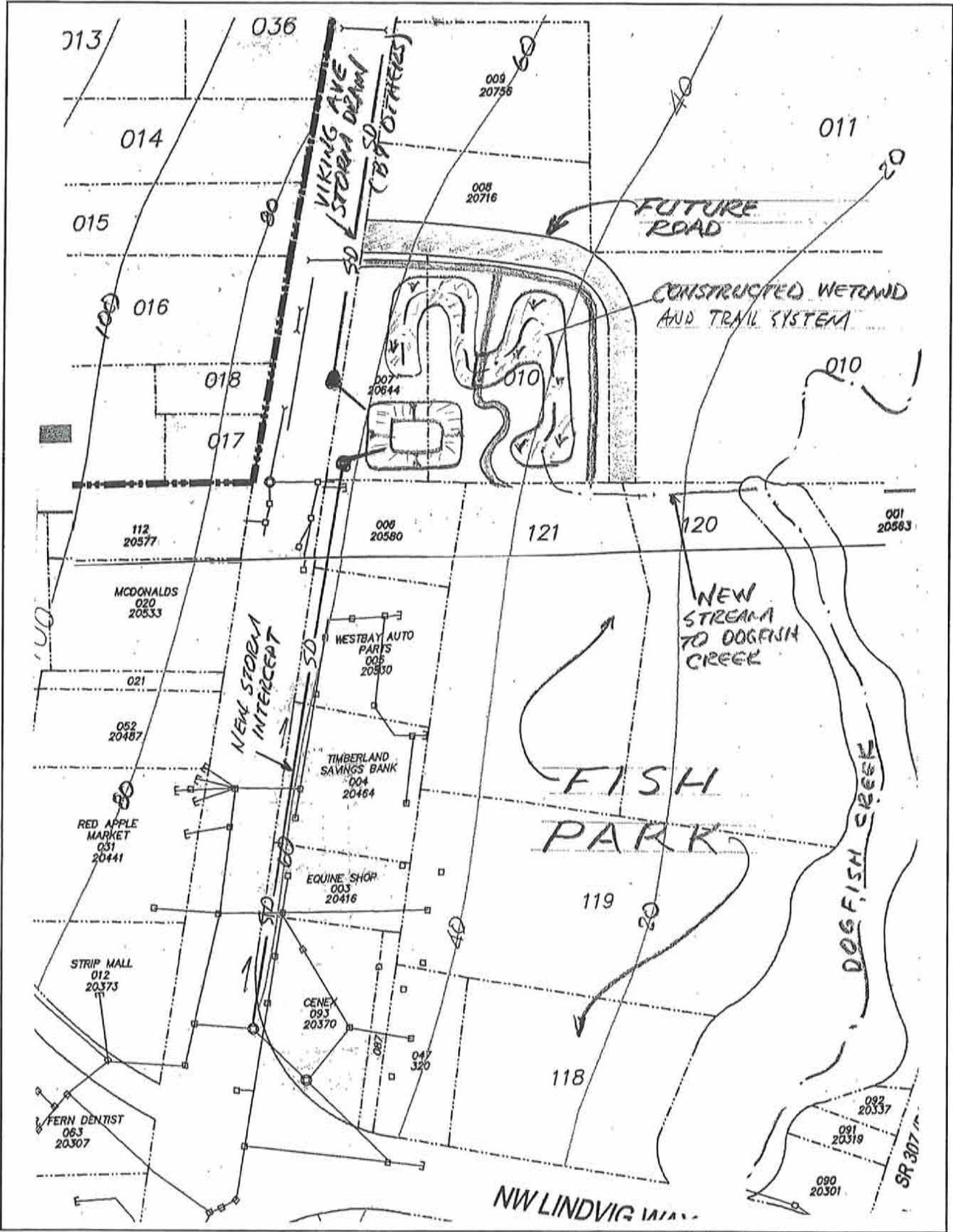
The City owns a future road access parcel leading to Fish Park. Two adjacent properties have limited development potential due to existing wetlands. This property will provide a site for a water quality facility to treat runoff from the heavily traveled Viking Way, as well as parking lots for business south of the site.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	50,000	\$50,000
2	Purchase Property	1	LS	150,000	\$150,000
3	Temporary Erosion Control	1	LS	10,000	\$10,000
4	Constructed Wetland	1	LS	350,000	\$350,000
5	Catch Basin, 48", Type 2	4	EA	3,000	\$12,000
6	12" and 18" Dia PVC Storm Drain	1000	LF	30	\$30,000
7	Outfall to Dogfish Creek	1	LS	30,000	\$30,000
8	Trail and Landscape	1	LS	50,000	\$50,000
	Subtotal				\$682,000
	Contingency	15%			\$102,300
	Tax	8.5%			\$57,970
	Construction Total				\$842,270
	Design	10%			\$84,227
	Total Project Cost				\$926,497



PARAMETRIX

PROJECT: Poulsbo Stormwater Comprehensive Plan SHEET _____ OF _____
BY: K Brown DATE: _____ CHECKED: _____ DATE: _____
SUBJECT: Capital Improvement Projects JOB NO.: 258-2237-020 PHASE: 01 TASK: 05



1"=200'

POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: South Viking Way WQ Facility

Date: 5/7/07

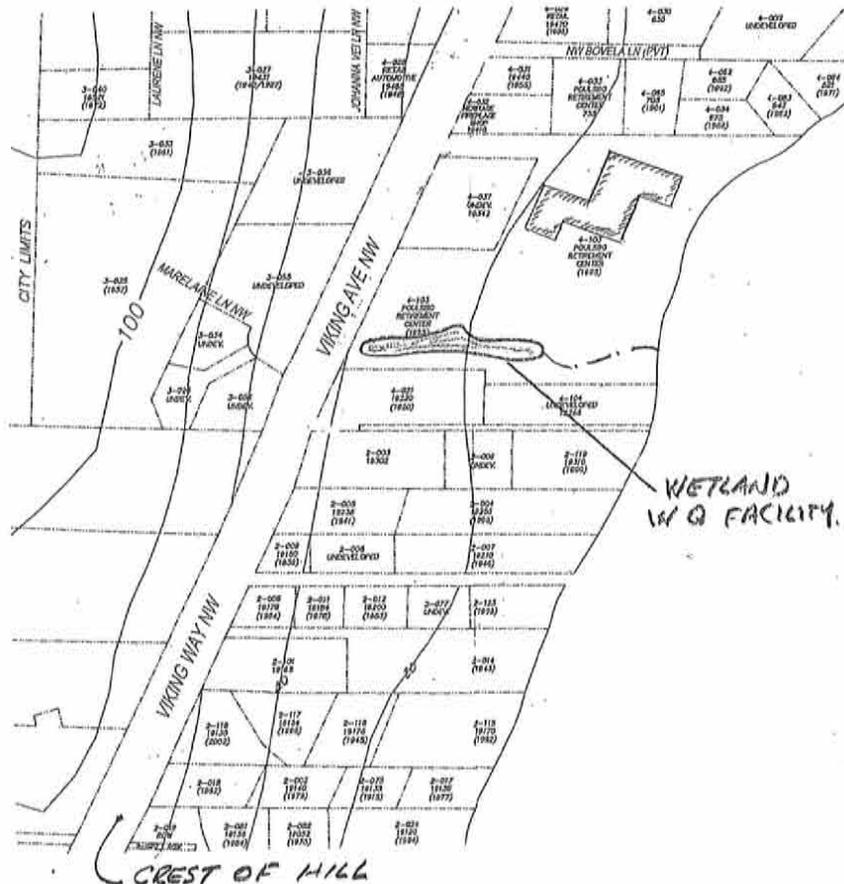
DESCRIPTION:

Construct a regional water quality treatment facility using Low Impact Development (LID) techniques to treat runoff from the portion of Viking Way between the Poulsbo Retirement Center and the crest of the hill north of Anderson Way. Purchase an easement or a portion of the Retirement Center property for a bioretention swale or a constructed wetland. The storm drain system in Viking Avenue will be installed as part of future road widening project.

JUSTIFICATION:

A water quality system to treat stormwater runoff from Viking Way and other side streets and parking lots will result in cleaner water being discharged to Liberty Bay.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	50,000	\$50,000
2	Purchase Property	1	LS	100,000	\$100,000
3	Temporary Erosion Control	1	LS	10,000	\$10,000
4	Bioretention Swale	1	LS	100,000	\$100,000
5	Catch Basin, 48", Type 2	4	EA	3,000	\$12,000
6	12" and 18" Dia PVC Storm Drain	250	LS	50	\$12,500
7	Outfall and drainage to Liberty Bay	1	LF	30,000	\$30,000
8	Cleanup and Restoration	1	LS	5,000	\$5,000
	Subtotal				\$319,500
	Contingency	15%			\$47,925
	Tax	8.5%			\$27,158
	Construction Total				\$394,583
	Design	10%			\$39,458
	Total Project Cost				\$434,041



PARAMETRIX

PROJECT: Poulosbo Stormwater Comprehensive Plan

SHEET _____ OF _____

BY: K Brown

DATE: _____

CHECKED: _____

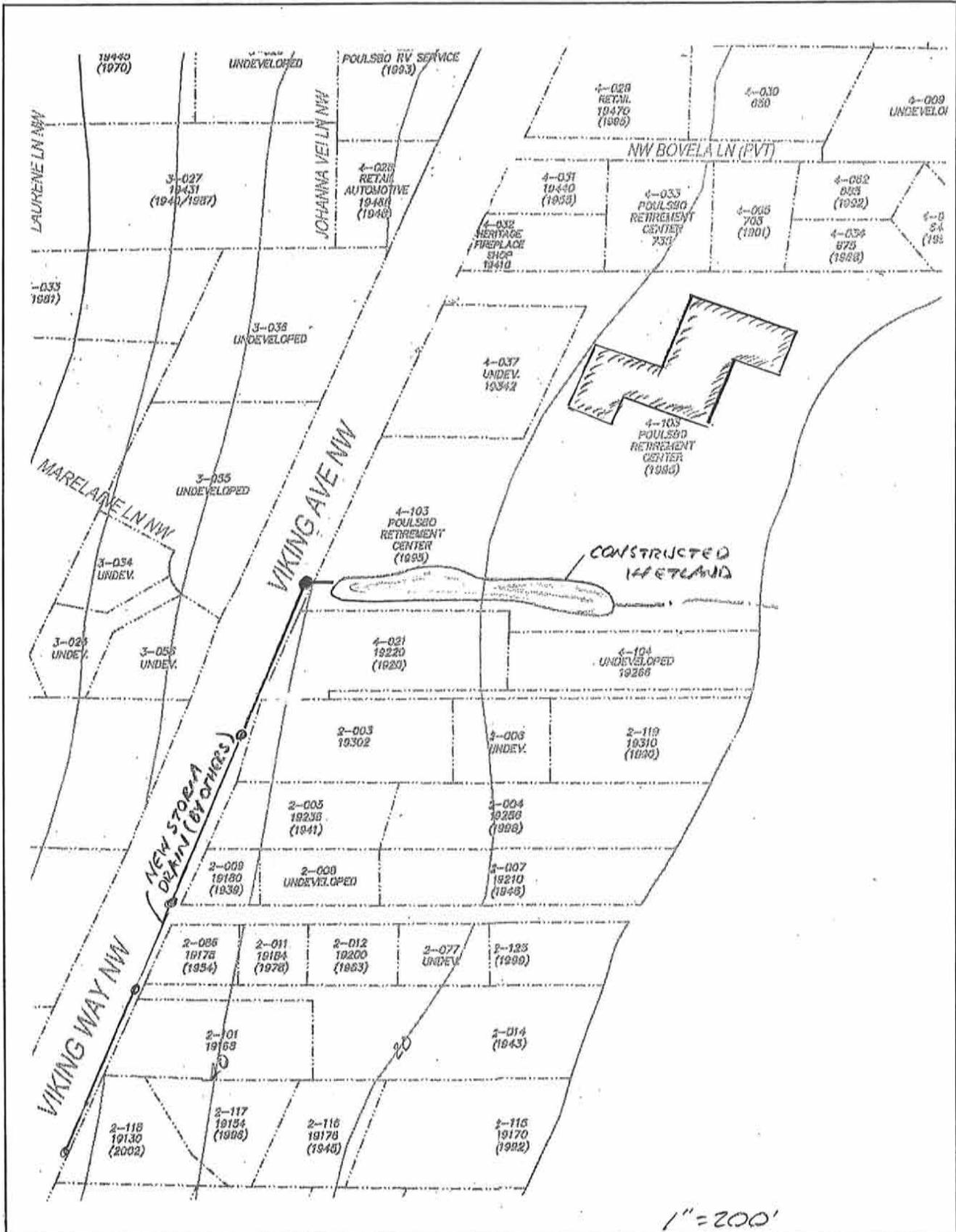
DATE: _____

SUBJECT: Capital Improvement Projects

JOB NO.: 258-2237-020

PHASE: 01

TASK: 05



1" = 200'

POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Noll Road WQ/Detention Facility

Date: 5/24/07

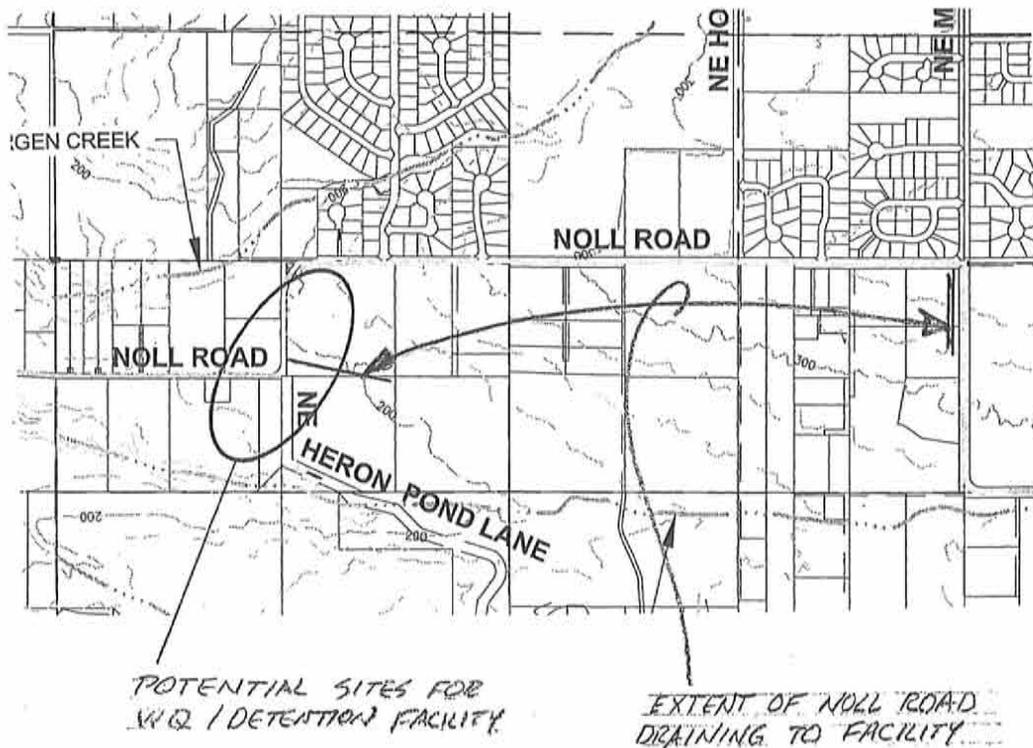
DESCRIPTION:

Construct a regional water quality treatment and detention facility at the south end of Noll Road southeast of Deer Run. Facility to be an open detention and wet pond located on land to be purchased by the City. The location shown is conceptual; the actual location is dependent on land availability and cost. Discharge from the pond is to Lemolo Creek.

JUSTIFICATION:

Noll Road will be widened to support additional housing development. The existing two lane road will be widened to three lanes with shoulders, bike lane and sidewalk. This results in about 180,000 sf of new impervious area, requiring a 21,000 cf of detention facility.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	50,000	\$50,000
2	Purchase Property	1	LS	300,000	\$300,000
3	Temporary Erosion Control	1	LS	20,000	\$20,000
4	Detention Pond	1	LS	200,000	\$200,000
5	Water Quality Wet Pond	1	LS	200,000	\$175,000
6	Outfall to Lemolo Creek	1	LS	30,000	\$30,000
	Subtotal				\$775,000
	Contingency	15%			\$116,250
	Tax	8.5%			\$65,875
	Construction Total				\$957,125
	Design	10%			\$95,713
	Total Project Cost				\$1,052,838



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Fjord Drive Repair and Stormwater Treatment

Date: 5/11/06

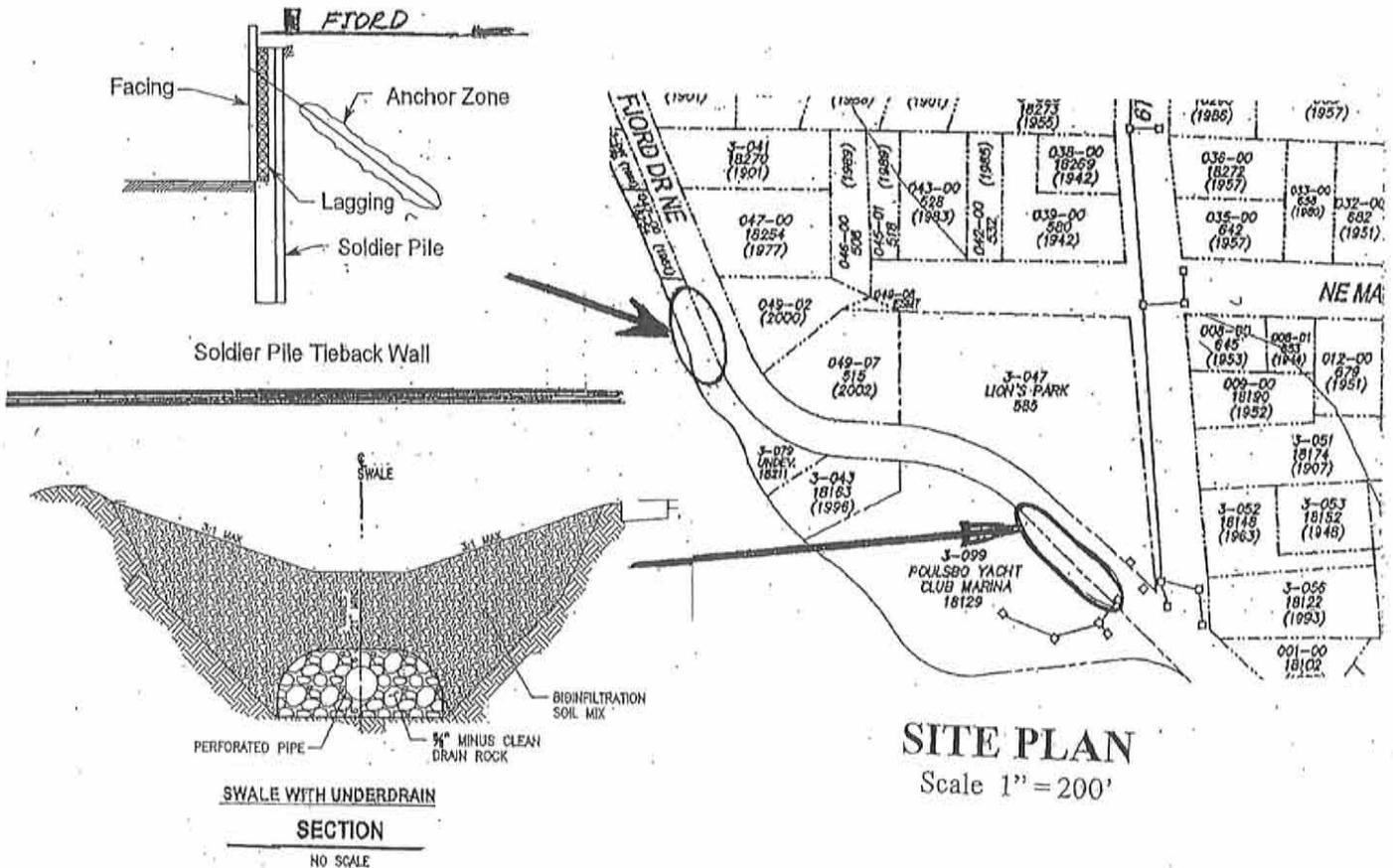
DESCRIPTION:

Route stormwater to a new water quality treatment swale on the west side of Fjord Drive. Provide curbs and regrading of Fjord Drive as required to direct stormwater into the swale. Repair the eroded bank caused by stormwater runoff from the street.

JUSTIFICATION:

Erosion at the edge of Fjord Drive must be halted before further damage to the street occurs. Stormwater flowing down the street towards the marina should be collected and routed through a bioswale. Better treatment of the water can occur if the swale is reconstructed

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	40,000	\$40,000
2	Temporary Erosion Control	1	LS	5,000	\$5,000
3	Retaining Wall (soldier pile tie back)	2500	LF	120	\$300,000
4	Catch Basin, Type 1	2	EA	1,000	\$2,000
5	Catch Basin, 48" Type 2	2	EA	3,000	\$6,000
6	12" Dia PVC Storm Drain	100	LF	35	\$3,500
7	Bio-infiltration Swale	1	LS	25,000	\$25,000
8	Landscape	1	LS	4,000	\$4,000
9	Cleanup and Restoration	1	LS	7,000	\$7,000
	Subtotal				\$392,500
	Contingency	15%			\$58,875
	Tax	8.5%			\$33,363
	Construction Total				\$484,738
	Design and Geotech	13%			\$63,016
	Total Project Cost				\$547,753



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Fjord Drive Stormwater Drainage Repair

Date: 5/7/07

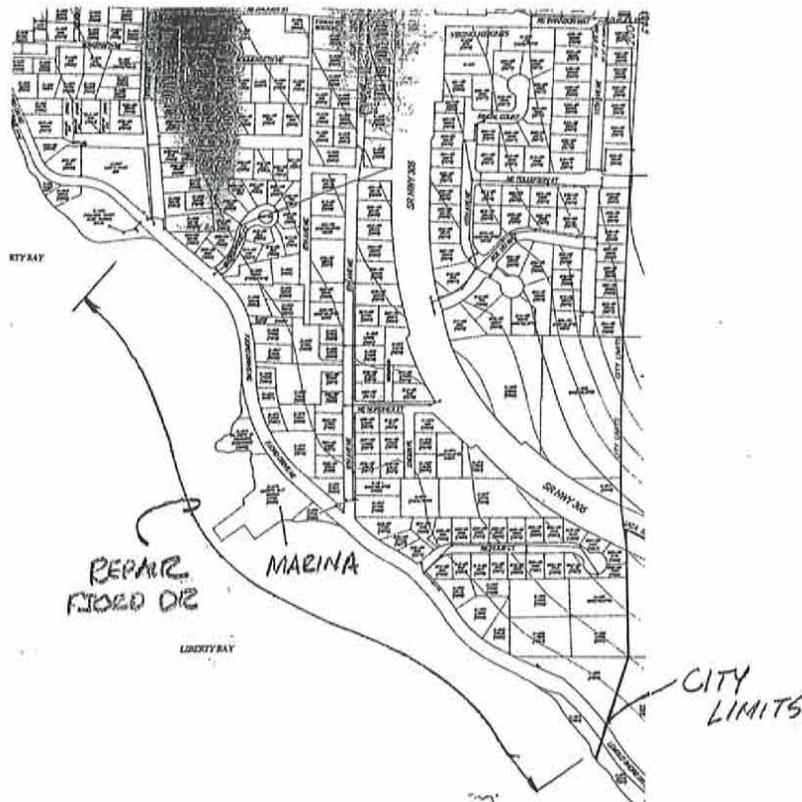
DESCRIPTION:

Repair sections of the shoreline along Fjord Drive between 6th Avenue and the City Limits where stormwater flows over the bank into Liberty Bay resulting in erosion of the bank. Stabilize eroded shoreline areas with coir fabric, vegetation, and habitat features.

JUSTIFICATION:

Erosion of the bank can lead to damage to the road as well as to vegetation, landscaping, or other features along the beach.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	20,000	\$20,000
2	Temporary Erosion Control	1	LS	2,000	\$2,000
3	Asphalt Curb	1	LS	12,000	\$12,000
4	Catch Basin, Type 1	5	EA	1,000	\$5,000
5	Catch Basin, 48" Type 2	2	EA	3,000	\$6,000
6	12" Dia PVC Storm Drain	750	LF	35	\$26,250
7	Shoreline Stabilization	1	LS	25,000	\$25,000
8	Landscape	1	LS	10,000	\$10,000
9	Cleanup and Restoration	1	LS	5,000	\$5,000
	Subtotal				\$111,250
	Contingency	15%			\$16,688
	Tax	8.5%			\$9,456
	Construction Total				\$137,394
	Design and Geotech	13%			\$17,861
	Total Project Cost				\$155,255



PARAMETRIX

PROJECT: Poulosbo Stormwater Comprehensive Plan

SHEET _____ OF _____

BY: K Brown

DATE: _____

CHECKED: _____

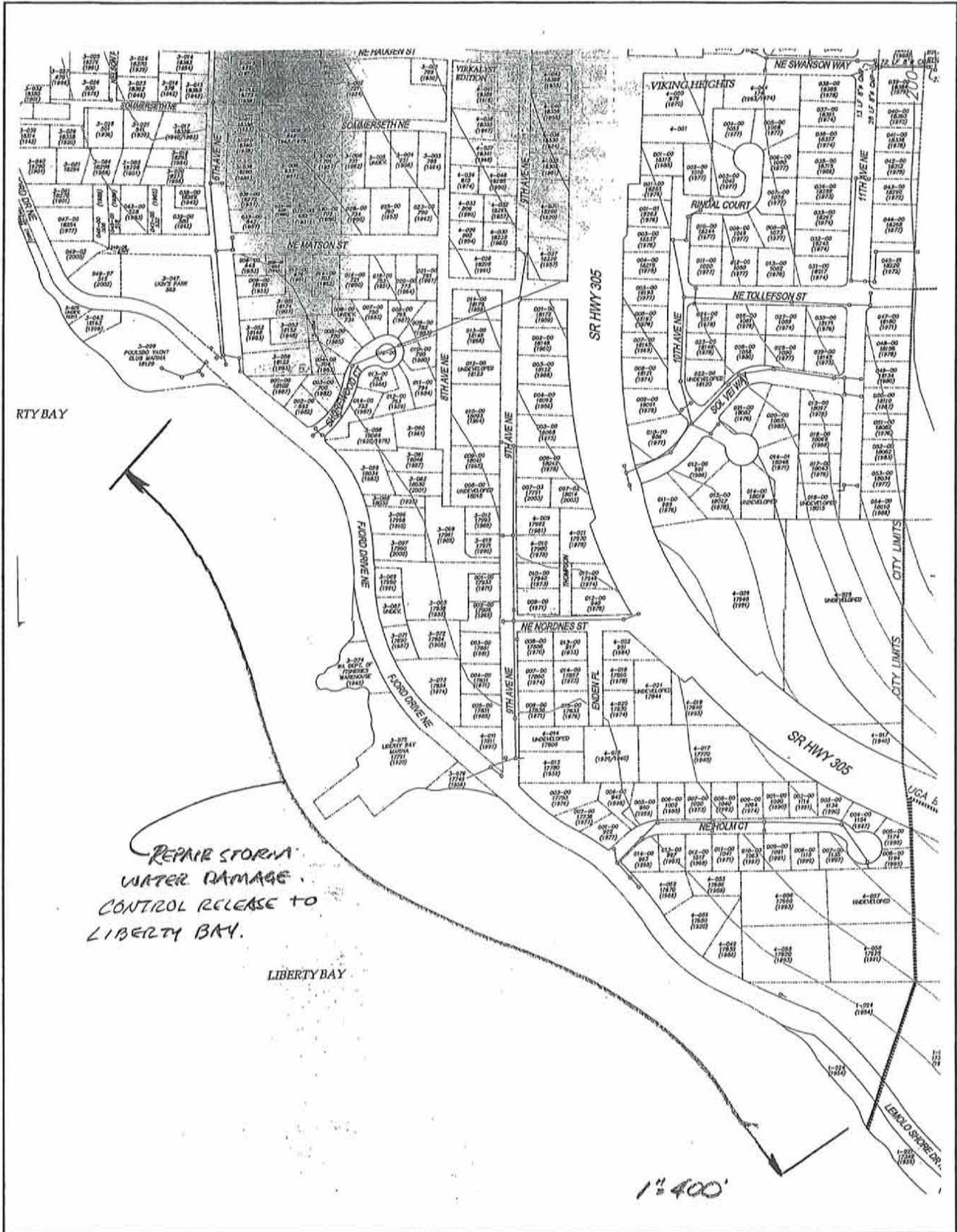
DATE: _____

SUBJECT: Capital Improvement Projects

JOB NO.: 258-2237-020

PHASE: 01

TASK: 05



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Replace Culvert Bjorgen Creek

Date: 5/7/07

DESCRIPTION:

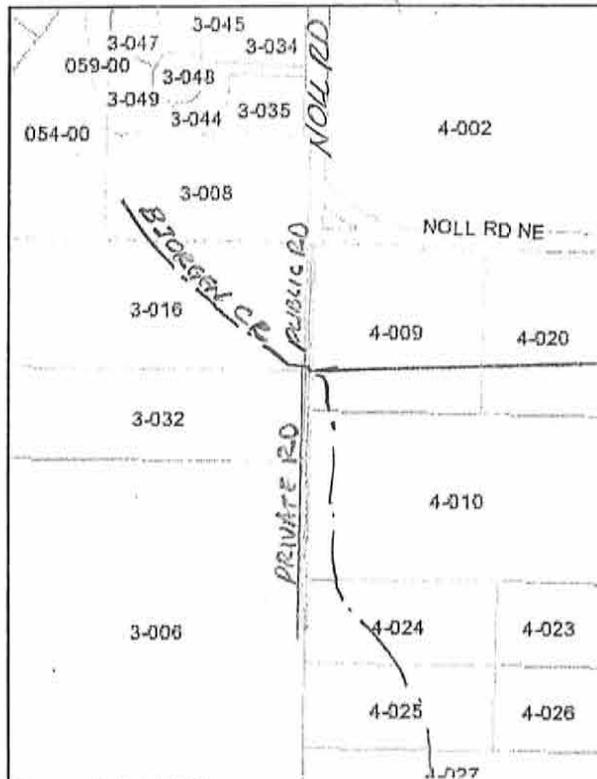
Replace the existing culvert in Bjorgen Creek where it passes under a narrow gravel road about 200 feet south of Noll Road. Replace with a 10 foot wide bottomless arch-type culvert for enhanced fish passage and to prevent clogging and overflowing of the road.

JUSTIFICATION:

This culvert easily plugs and overflows the gravel residential access drive. It is also a barrier to fish passage.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	\$3,000	\$3,000
2	Temporary Erosion Control	1	LS	\$3,000	\$3,000
3	10 foot arch culvert	30	FT	\$1,000	\$30,000
4	Regrade and raise road	1	LS	\$55,000	\$55,000
5	Landscape, Hydroseed, and Vegetation	1	LS	\$15,000	\$15,000
6	Cleanup and Restoration	1	LS	\$5,000	\$5,000
	Subtotal				\$111,000
	Contingency	15%			\$16,650
	Tax	8.5%			\$9,435
	Construction Total				\$137,085
	Design	15%			\$20,563
	Total Project Cost				\$157,648

SITE PLAN



POULSBO STORMWATER CIP PROJECT SUMMARY SHEET

Project: Haugen Street Storm Drainage

Date: 2/12/08

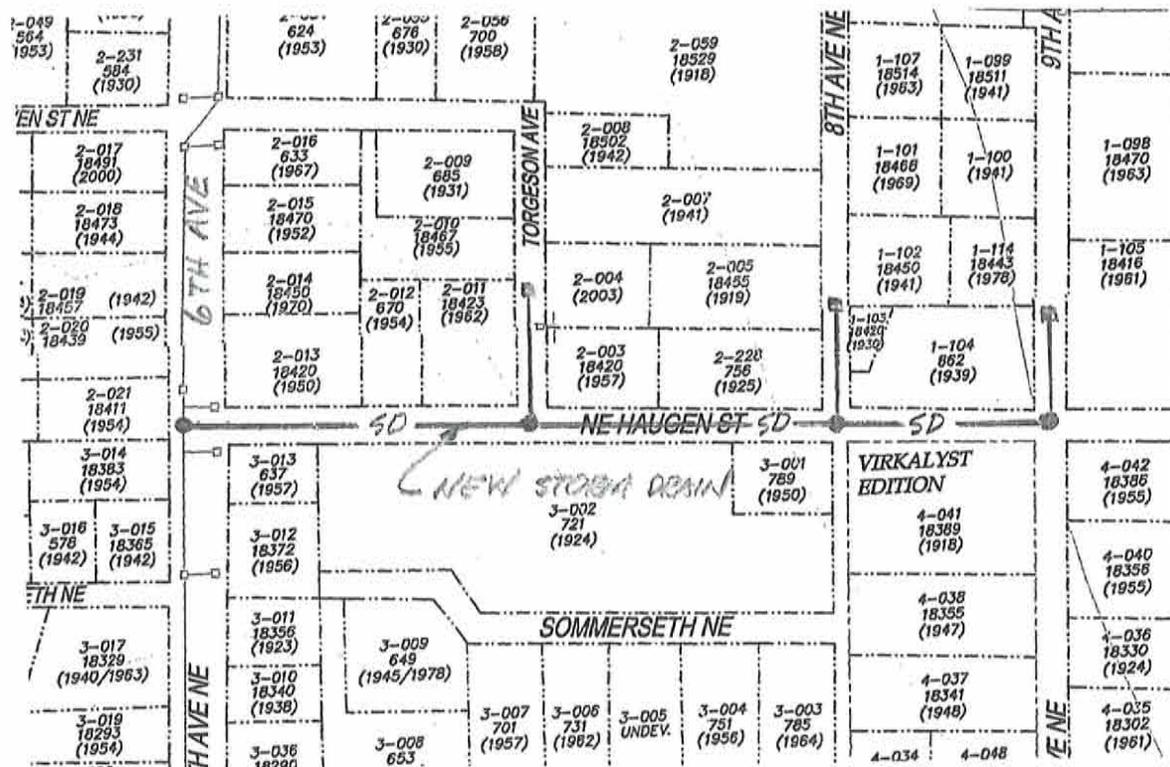
DESCRIPTION:

Install a storm drain collection system in Haugen Street to collect drainage from 8th Ave, 9th Ave, and Torgerson Ave. Extend the drainage up each of these avenues as necessary to collect stormwater. Install catch basins at street intersections. Tie this new storm drain into the existing 6th Avenue storm drain that leads to the outfall at the low end of 6th Avenue.

JUSTIFICATION:

Recent construction along SR 305, as well as recent home construction along Haugen Street, has resulted in flooding of property south of Haugen Street.

Item	Description	Quant./Units	Unit	Unit Cost	Total
1	Mobilization	1	LS	15,000	\$15,000
2	Temporary Erosion Control	1	LS	2,000	\$2,000
3	Catch Basin, Type 1	3	EA	1,000	\$3,000
4	Catch Basin, 48" Type 2	4	EA	3,000	\$12,000
5	12" Dia PVC Storm Drain	1500	LF	35	\$52,500
6	Landscape	1	LS	2,000	\$2,000
7	Cleanup and Restoration	1	LS	7,000	\$7,000
Subtotal					\$93,500
Contingency		15%			\$14,025
Tax		8.5%			\$7,948
Construction Total					\$115,473
Design		10%			\$11,547
Total Project Cost					\$127,020



1" = 200'