

AGENDA

Lynnwood Planning Commission

Thursday, July 9, 2009 — 7:00 pm

City Council Chambers, 19100 – 44th Ave. W., Lynnwood WA

A. CALL TO ORDER

Chair WRIGHT
Commissioner AMBALADA
Commissioner AUBUCHON
Commissioner BRAITHWAITE
Commissioner DAVIES
Commissioner LARSEN, First Vice-chair
Commissioner WOJACK, Second Vice-chair

B. APPROVAL OF MINUTES:

Meeting of June 25, 2009

C. COUNCIL LIAISON REPORT

D. CITIZEN COMMENTS – on matters not on tonight's agenda.

E. PUBLIC HEARINGS

None

F. WORK SESSION

1. 2009 Comprehensive Plan Amendments (2009CPL0002)

A. MUGA Land Use Designations: Revise land use designations (map) for properties in the City's Municipal Urban Growth Area (and North-East-South Annexation Area) in response to comments from public meetings and current status of development proposals.

G. OTHER BUSINESS

1. **Surface Water Management Plan.** Update of the City's plan for managing surface water, responding to regulatory requirements and addressing drainage and water quality problems.

H. DIRECTOR'S REPORT

1. Update on Annexation Project

2. Other Matters

I. ADJOURNMENT

The public is invited to attend and participate in this public meeting. Parking and meeting rooms are accessible to persons with disabilities. Upon reasonable notice to the City Clerk's office (425) 670-5161, the City will make reasonable effort to accommodate those who need special assistance to attend this meeting.

Lynnwood Planning Commission
Meeting of July 9, 2009

Staff Report

Agenda Item: F 1 A
2009 Comprehensive Plan
Amendments

- Public Hearing
- Informal Public Meeting
- Work Session
- Other Business
- Information
- Miscellaneous

Lynnwood Dept. of Community Development — Staff Contact: Kevin Garrett, Planning Manager

ACTION:

Discussion only at this work session.

Following a public hearing on the 2009 proposed Comprehensive Plan Amendments (July 23, 2009), the Planning Commission will be asked to make a recommendation on each proposal.

BACKGROUND:

The Municipal Code provides a process for annual consideration of amendments to the City's Comprehensive Plan. Review of these amendments is a major component of the Planning Commission's annual work program.

The Municipal Code provides for two "types" of proposals to amend the Plan: formal amendment applications and suggested amendments. Suggested amendments are ideas or proposals that someone would like the City to consider but, for whatever reason, they do not wish to file a formal application.

This year, no suggested amendments were filed. One "formal" application was received; all other 2009 Amendments have been initiated by staff. Attachment E lists the proposed 2009 Comprehensive Plan Amendments.

The Agenda for this meeting includes work sessions on the last of the 2009 proposals: amendments to the Future Land Use Plan Map for the Municipal Urban Growth Area (MUGA). The public hearing on all the proposed amendments is scheduled for July 23.

See Attachment A for the criteria for evaluating amendments to the Comprehensive Plan.

PROPOSAL:

Tonight's work session introduces the following proposed 2009 Amendment:

A. MUGA Future Land Use Map Amendments

This docket item is proposing a number of revisions to the Future Land Use Map for the Municipal Urban Growth Area. The Land Use Element of the Comprehensive Plan includes a map of future land use designations for all properties in the City and in our MUGA. This map shows the type of planned or intended land use and development at all properties in the City's planning area. This map and the policy descriptions in the Element set the policy-direction for the zoning designations for each property in the City, as well as for pre-annexation zoning in annexation areas.

The 2008 Docket of Comprehensive Plan Amendments included an initial Land Use Map for the MUGA – the City Council approved that map in November, 2008. In large part, staff developed that MUGA land use map by directly converting County land use designations into the more-equivalent City designations. The City's land use designations for the MUGA are described as "initial" because the City committed to a three-year process to establish (first year) and then refine (second and third years) land use designations in the MUGA. These changes are intended to be the second step in refining and realigning Future Land Use designations prior to subsequent rezoning, now planned for late 2009.

Permitted and "Vested" Developments: In one aspect of County development policy, City policy does not support direct conversion of County land use designations directly into City designations– small-lot single family residential development in existing neighborhoods. However, state law and court decisions require that the City recognize development applications that are already in the pipeline ("vested" legal doctrine). For the 2008 Docket, staff generally reviewed small-lot single family designations in the County plan and, where development was not already underway, changed those designations to larger-lot designations (SF-1 or SF-2) in the City's land use map designated. As none of the City's current land use designations is appropriate for existing or "vested" small-lot single family developments, a new designation of SF-4 ("High Density Single Family MUGA") was applied to these developments. In the 2009 Docket, staff is reviewing the SF-4 designations to confirm the status of vested applications. Where development is not vested or under construction, staff is recommending designating a property either SF-1 or SF-2.

Existing Development That Does Not Fit Well Into the Lynnwood System: This year's review of lot sizes in the MUGA identified developments with lots sizes that are considerably less than allowed under Lynnwood development regulations. These developments include areas zoned or developed under the county's Planned Residential Development (PRD) codes or other County approvals. Another use placed into this designation is existing high density SFR uses in county multifamily zones (so-called single family detached communities). These areas have also been mapped with the SF4 designation.

Multiple Dwelling Units on a Single Lot: A number of single family (zoning and land use designation) properties in the MUGA are developed with more than one residence.

Examples of this situation include duplexes (on single lots and in subdivisions), triplexes, four-plexes and multiple unattached single family residences on a single lot. Current County codes allow a duplex in a single family zone where the lot size is greater than 150% of the minimum lot size. The other situations likely have developed under prior County codes or over the years. City codes do not allow any of these situations in single family zones. For the duplex subdivisions, staff is proposing to apply the City's MF-1 (Low Density Multiple Family Residential) land use category. For all the other situations, staff proposes to apply the predominant land use designation in the immediate vicinity and include a provision in the Zoning Code that residences in this situation will not be considered a non-conforming use.

Density of Multiple Family Developments: The County has only a single multiple-family residential zone – MR. As a consequence, determining the density of existing developments – and the appropriate City Future Land Use designation – requires project-by-project reviews. In the initial designation process last year, nearly all existing multifamily developments were designated MF2 (Medium Density Multiple Family Residential). This year we have reviewed all multifamily developments, determined the actual density, and applied the appropriate designation. When this resulted in a mixture of designations, larger assemblies of the most appropriate designation were created.

Mobile Home Parks: The MUGA includes a number of mobile home parks. In 2007, the City established a program to encourage preservation of mobile home parks. Parks that were designated on the Future Land Use Map for residential land use (12 of the 17 parks in the City) were made eligible for the preservation program. Parks that were designated on the Future Land Use Plan Map for non-residential uses were not included in the preservation program. In the 2009 Docket, staff is recommending extending the program to parks in the MUGA. As in the City, parks with a residential land use designation are proposed to be eligible for the program; those with non-residential designations would not be eligible.

Staff is preparing maps of the properties that are affected by these changes, and we will present those maps at the work session.

RECOMMENDATION:

Review/discuss proposed Map Amendments

ATTACHMENTS:

A. Decision Criteria for Comprehensive Plan Amendments

DECISION CRITERIA:

The Implementation Element of the Comprehensive Plan states the following criteria for taking action on proposed Plan amendments:

"Each component of a Comprehensive Plan Amendment package shall be reviewed and approved only if it meets all of the following criteria:

- "The proposal is consistent with the provisions of the Growth Management Act and will not result in Plan or regulation conflicts; and
- "The proposal will change the development or use potential of a site or area without creating significant adverse impacts on existing sensitive land uses, businesses, or residents; and
- "The proposed amendment can be accommodated by all applicable public services and facilities, including transportation; and
- "The proposal will help implement the goals and policies of the Lynnwood Comprehensive Plan; and
- "If the proposal could have significant impacts beyond the Lynnwood City Limits, it has been sent to the appropriate Snohomish County officials for review and comment."

These criteria will form the basis for action on the 2009 Docket proposals by the Planning Commission and the City Council. Action on the proposed amendments will be scheduled following work sessions with (to brief the Commission on the amendments) and a public hearing (for comments from the public on the amendments).

Lynnwood Planning Commission
Meeting of July 9, 2009

Staff Report

Agenda Item: G-1
Draft 2009 Surface Water
Management Comprehensive Plan

- Public Hearing
- Joint Public Meeting
- Work Session
- Other Business
- Information
- Miscellaneous

Staff Contact: Jared S. Bond, Public Works Department

Introduction:

Based on the discussion at the June 25, 2009 meeting, this briefing will focus on the capital projects section of the Draft 2009 Surface Water Management Comprehensive Plan, specifically Appendix E.

Because the City cannot afford to implement all of the identified projects in a short time frame, it is important to prioritize these potential capital improvement program (CIP) projects. Attached in Appendix E, in Table E-1 are the recommended capital improvement projects (which were identified in Appendix D). Table E-2 explains the scoring system and values used to prioritize these projects.

Appendix E also contains a summary for each project, along with the estimated cost.

The scoring system we used attempts to assign a cost-benefit value to each project. This value is based on the estimated implementation cost (design, permitting, and construction) divided by a benefit value assigned to that project. A lower cost-benefit index number correlates to higher priority, as the project would have a relatively higher overall benefit for the investment made.

Tables E-3, E-4, and E-5 show the specific values of this exercise. Table E-6 shows the results of this prioritization.

Table E-6 (the final ranking) is summarized as follows:

Rank	Cost/Benefit Score	Project ID	Project Title	Benefit Points	Estimated Cost (2009 dollars)
1	1833	WQ-3B	Installation of a street edge or parking lot treatment system such as a Bacteria™ bioretention system.	30	\$55,000
2	2000	WQ-1A	Aeration system retrofit for Scriber Lake.	50	\$100,000

Rank	Cost/Benefit Score	Project ID	Project Title	Benefit Points	Estimated Cost (2009 dollars)
3	2139	FL-6	Flood study at Maple Road and Ash Way.	72	\$154,000
4	2727	WQ-1B	Floating island treatment system for Scriber Lake.	55	\$150,000
5	3714	WQ-3A	Drainage ditch retrofit to create a bioretention swale in the Golde Creek basin.	35	\$130,000
6	3714	WQ-5	Conversion of existing unimproved ditch to a bioretention swale along 180th St. SW between SR 99 and Scriber Creek.	35	\$130,000
7	7193	FL-8	Install backflow preventers and construct berm upstream of 200 th Street SW and 50 th Ave W.	57	\$410,000
8	12000	ER-1	Stabilize approximately 200 linear feet of stream channel with grade control structures made of logs and boulders.	30	\$360,000
9	13400	FL-1	Scriber Creek culvert replacement at 188th Street SW.	50	\$670,000
10	16286	FL-4	Scriber Creek culvert replacement at 191st Street SW.	35	\$570,000
11	18108	FL-3	Scriber Creek culvert replacement at 190th Street SW.	37	\$670,000
12	18500	FL-7	Scriber Creek culvert replacement at Casa Del Rey condominiums driveway and construct berm.	40	\$740,000
13	18889	FL-2	Scriber Creek culvert replacement at 189th Street SW.	27	\$510,000
14	38909	WQ-2	Street edge runoff treatment retrofits in the Hall Lake Basin.	55	\$2,140,000
15	47879	ER-2	Stabilize approximately 1,000 linear feet of streambank using bioengineering techniques.	33	\$1,580,000
16	81818	FL-5	44th Avenue W. roadway raising at Scriber Creek Crossing.	55	\$4,500,000
17	236000	WQ-4	Decommissioning septic tanks and connecting residences to the sanitary sewer system.	20	\$4,720,000

At the meeting, we will discuss the methodology and merits of the ranking system. Staff is interested in any feedback which may affect the ranking or ranking system.

Requested Action:

Following the discussion, Public Works staff will ask the Planning Commission to recommend the City Council adopt the 2009 Surface Water Management Comprehensive Plan, or as amended.

Attachment:

Appendix E – Draft 2009 Surface Water Management Comprehensive Plan

The entire plan can be downloaded at <http://www.ci.lynnwood.wa.us/surfacewater>

APPENDIX E

Capital Improvement Projects for Flood Control, Water Quality, and Habitat Improvement

Capital Improvement Projects for Flooding, Erosion, and Water Quality Improvement

Introduction

Appendix D presents an overview of citywide and site-specific surface water problems occurring in Lynnwood and the types of solutions that could be implemented to eliminate or reduce the severity of those problems. Because the City of Lynnwood (City) cannot afford to implement all of these projects in a short time frame, it is important to prioritize the potential capital improvement program (CIP) projects. This appendix includes discussion of a CIP project screening process to derive priorities for implementation, and provides backup detail for the preliminary cost estimates derived for each CIP project.

CIP Project Prioritization

Table E-1 provides a list of CIP projects and Table E-2 presents a scoring system used to quantify the benefits for each CIP project presented in this appendix. This scoring system reflects a variety of considerations that collectively represent the kinds of non-monetary issues the City must weigh when deciding on allocation of limited funding in the CIP program. Projects that would control a flooding problem are given an “FL” designation. Projects that would control erosion are given an “ER” designation. Projects that would improve upon existing water quality conditions are given a “WQ” designation.

Table E-1. Recommended capital improvement program projects.

Project ID	Project Title
FL-1	Scriber Creek culvert replacement at 188th Street SW
FL-2	Scriber Creek culvert replacement at 189th Street SW
FL-3	Scriber Creek culvert replacement at 190th Street SW
FL-4	Scriber Creek culvert replacement at 191st Street SW
FL-5	Raising the roadway at 44th Avenue W
FL-6	Flood study at Maple Road and Ash Way
FL-7 ^a	Scriber Creek culvert replacement at Casa Del Rey condominiums driveway
FL-8 ^a	Install backflow preventers and construct berms upstream of 200th Street SW and 50th Ave W
ER-1	Stabilize approximately 200 linear feet of stream channel between 191st Street SW and 193rd Place SW with grade control structures made of logs and boulders.
ER-2 ^a	Stabilize approximately 1,000 linear feet of streambank using bioengineering techniques.
WQ-1A	Aeration system retrofit for Scriber Lake
WQ-1B	Floating island treatment system for Scriber Lake
WQ-2	Street edge runoff treatment retrofits in the Hall Lake basin
WQ-3A	Drainage ditch retrofit to create a bioretention swale in the Golde Creek basin
WQ-3B	Installation of a street edge or parking lot treatment system such as a Bacterra™ bioretention system.
WQ-4	Conversion of existing unimproved ditch to a bioretention swale along 180th Avenue SW between State Route (SR) 99 and Scriber Creek

Notes:

^a Problem and solution are on private property.

Problem and solution are on private property. A cost-benefit index for each project was derived based on the estimated implementation cost (design, permitting, and construction) divided by the benefit points. A lower cost-benefit index number correlates to higher priority, as the project would have a relatively higher overall benefit for the investment made. Tables E-3, E-4, and E-5 show the benefit points tallied for each CIP project presented in this appendix. Cost estimates for the projects are presented in the attached project summary sheets, as further described below.

Table E-5 presents the results of the project prioritization based on the cost-benefit calculations. These results should be used to generally guide the order in which the City implements the projects. For one project, retrofitting bioretention swales on residential streets in the Hall Lake drainage basin (WQ-2), there is a range of implementation scale (e.g., linear feet of street retrofitted with bioretention swales). This range of implementation scale results in a wide range of potential cost for this project, making it difficult to define a specific cost-benefit score to use in prioritization. For the purposes of initial project ranking presented in Table E-5, the midpoint of the potential quantity range was used to estimate the cost for CIP project WQ-2 project summary sheet. If the City decides to pursue a larger or smaller quantity than assumed here, the cost-benefit scoring of WQ-2, and resultant ranking for prioritized implementation, should be recalculated.

CIP Project Details

The attached project summary sheets describe the specific problems that can be addressed with a CIP project, the location of the project, the benefits that could be realized, a brief listing of key assumptions, and the estimated cost of design, permitting and construction. Each CIP project is given a unique title and identification number for reference. The locations of these projects are displayed in Figure E-1.

The cost estimates for most of the CIP projects were developed based upon information from similar projects in the region. The unit costs are appropriate for common applications. These costs are intended to provide an indication of the level of funding needed for implementation for CIP planning purposes, and should be assessed in greater detail and adjusted as necessary before launching analysis and design of any particular project.

Table E-2. Benefit points scoring system for potential flooding, erosion, and water quality improvement projects.

Flooding Reduction	
Project Benefits	Points
<i>Roadway Flooding</i>	
Major roadway - flooding for longer duration	15
Major roadway - flooding for a few hours	10
Minor roadway, parking lot, or building exterior area - flooding for longer duration	5
Minor roadway, parking lot, or building exterior area - flooding for a few hours	2
Roadway flooding multiplier for problem frequency (2 yr MRI = 3; 10 yr MRI = 2; 20 yr MRI = 1)	1,2,3
<i>Property Flooding</i>	
Property flooding - apartment complex and/or > 10 residences	20
Property flooding - 4 to 10 residences	10
Property flooding - 4 or more businesses	8
Property flooding - less than 3 residences	5
Property flooding - less than 3 businesses	4
Property flooding multiplier for problem frequency (2 yr MRI = 3; 10 yr MRI = 2; 50 yr MRI = 1)	1,2,3
<i>Benefits of Reducing Flooding</i>	
Flooding eliminated in 100 yr MRI event	15
Flooding recurrence reduced to 50 yr MRI or better	10
<i>Public perception</i>	
High public visibility / importance; or good faith opportunity to assist other jurisdictions	5
Low public visibility / importance; or no good faith opportunity to assist other jurisdictions	3
<i>Source of Funding</i>	
Attractive project with reasonable likelihood of grant funding or other external funding	5
Likely to receive funding only from Lynnwood Surface Water Utility	0
<i>Property Ownership</i>	
Public property	5
Private property	0
Erosion Control	
Project Benefits	Points
<i>Type of Problem Addressed</i>	
Systemic bank/channel erosion for long segments of stream channel	15
Concentrated erosion at outfall or streambank	10
Sheet erosion along roadway or streambank	3
<i>Benefits of Addressing Erosion Problem</i>	
Significant benefits to drainage conveyance, stream channel condition, and/or water quality	15
Moderate benefits to stream channel and/or water quality	5
<i>Public perception</i>	
High public visibility / importance; or good faith opportunity to assist other jurisdictions	5
Low public visibility / importance; or no good faith opportunity to assist other jurisdictions	3
<i>Source of Funding</i>	
Attractive project with reasonable likelihood of grant funding or other external funding	5
Likely to receive funding only from Lynnwood Surface Water Utility	0
<i>Property Ownership</i>	
Public property	5
Private property	0

Table E-2 (continued). Benefit points scoring system for potential flooding, erosion, and water quality improvement projects.

Water Quality Improvement	
Project Benefits	Points
<i>Relative Size and Importance of Pollution Source</i>	
Major pollution source to a priority water body (ESA listed species, TMDL, or on 303(d) list)	20
Moderate pollution source to a priority water body (ESA listed species, TMDL, or on 303(d) list)	10
Minor pollution source to a priority water body (ESA listed species, TMDL, or on 303(d) list)	5
<i>Drainage Location</i>	
Direct drainage to stream with known salmonid use	20
Drainage to lake or major wetland	10
Direct drainage to stream without known salmonid use	5
Drainage to minor wetland	2
<i>Benefits of Solution</i>	
Major reduction in runoff pollution to a priority water body (ESA listed species, TMDL, or on 303(d) list)	20
Major reduction in runoff pollution, or moderate reduction to a priority water body (ESA listed species, TMDL, or on 303(d) list)	15
Moderate reduction in runoff pollution, or minor reduction to a priority water body (ESA listed species, TMDL, or on 303(d) list)	10
Minor reduction in runoff pollution to non-priority water body	5
<i>Public Education</i>	
Opportunity for public education high	5
Opportunity for public education low	0
<i>Public Perception</i>	
High public visibility / importance; or good faith opportunity to assist other jurisdictions	5
Low public visibility / importance; or no good faith opportunity to assist other jurisdictions	0
<i>Source of Funding</i>	
Attractive project with reasonable likelihood of grant funding or other external funding	5
Likely to receive funding only from Lynnwood Surface Water Utility	0
<i>Property Ownership</i>	
Public property	5
Private property	0

Table E-3. Benefit scores for potential flood control CIP projects.

Flooding Reduction									
Project Benefits	Possible Points	FL-1	FL-2	FL-3	FL-4	FL-5	FL-6 ^a	FL-7	FL-8 ^b
<i>Roadway Flooding</i>									
Major roadway - flooding for longer duration	15					15	15		
Major roadway - flooding for a few hours	10	10							
Minor roadway, parking lot, or building exterior area - flooding for longer duration	5								
Minor roadway, parking lot, or building exterior area - flooding for a few hours	2		2	2	2			2	2
Roadway flooding multiplier for problem frequency (2 yr MRI = 3; 10 yr MRI = 2; 20 yr MRI = 1)	1,2,3	2	2	2	1	2	3	1	2
<i>Property Flooding</i>									
Property flooding - apartment complex and/or > 10 residences	20							20	20
Property flooding - 4 to 10 residences	10								
Property flooding - 4 or more businesses	8								
Property flooding - less than 3 residences	5			5	5				
Property flooding - less than 3 businesses	4						4		4
Property flooding multiplier for problem frequency (2 yr MRI = 3; 10 yr MRI = 2; 50 yr MRI = 1)	1,2,3			2	2		3	1	2
<i>Benefits of Reducing Flooding</i>									
Flooding eliminated in 100 yr MRI event	15	15	15	15	15			15	
Flooding recurrence reduced to 50 yr MRI or better	10					10			
<i>Public perception</i>									
High public visibility / importance; or good faith opportunity to assist other jurisdictions	5	5				5	5		5
Low public visibility / importance; or no good faith opportunity to assist other jurisdictions	3		3	3	3			3	
<i>Source of Funding</i>									
Attractive project with reasonable likelihood of grant funding or other external funding	5	5				5	5		
Likely to receive funding only from Lynnwood Surface Water Utility	0		0	0	0			0	0
<i>Property Ownership</i>									
Public property	5	5	5	5	5	5	5		
Private property	0							0	0
Total Benefit Points		50	27	37	35	55	72	40	57

Notes:

^a Project is a study to define a CIP project.^b Solution not modeled.

ab /07-03686-000 appendix e - cip projects and prioritization

Table E-4. Benefit scores for potential erosion control CIP projects.

Erosion Control			
Project Benefits	Possible Points	ER-1	ER-2
<i>Type of Problem Addressed</i>			
Systemic bank/channel erosion for long segments of stream channel	15		15
Concentrated erosion at outfall or streambank	10	10	
Sheet erosion along roadway or streambank	3		
<i>Benefits of Addressing Erosion Problem</i>			
Significant benefits to drainage conveyance, stream channel condition, and/or water quality	15		15
Moderate benefits to stream channel and/or water quality	5	5	
<i>Public perception</i>			
High public visibility / importance; or good faith opportunity to assist other jurisdictions	5	5	
Low public visibility / importance; or no good faith opportunity to assist other jurisdictions	3		3
<i>Source of Funding</i>			
Attractive project with reasonable likelihood of grant funding or other external funding	5	5	
Likely to receive funding only from Lynnwood Surface Water Utility	0		0
<i>Property Ownership</i>			
Public property	5	5	
Private property	0		0
Total Benefit Points		30	33

Table E-5. Benefit scores for potential water quality improvement CIP projects.

Project Benefits	Possible Points	WQ-1A	WQ-1B	WQ-2	WQ-3A	WQ-3B	WQ-4
<i>Relative Size and Importance of Pollution Source</i>							
Major pollution source to a priority water body (ESA listed species, TMDL, or on 303(d) list)	20	20	20				
Moderate pollution source to a priority water body (ESA listed species, TMDL, or on 303(d) list)	10			10		10	
Minor pollution source to a priority water body (ESA listed species, TMDL, or on 303(d) list)	5				5		5
<i>Drainage Location</i>							
Direct drainage to stream with known salmonid use	20						
Drainage to lake or major wetland	10	10	10	10			
Direct drainage to stream without known salmonid use	5				5	5	5
Drainage to minor wetland	2						
<i>Benefits of Solution</i>							
Major reduction in runoff pollution to a priority water body (ESA listed species, TMDL, or on 303(d) list)	20						
Major reduction in runoff pollution, or moderate reduction to a priority water body (ESA listed species, TMDL, or on 303(d) list)	15			15			
Moderate reduction in runoff pollution, or minor reduction to a priority water body (ESA listed species, TMDL, or on 303(d) list)	10	10	10		10	10	10
Minor reduction in runoff pollution to non-priority water body	5						
<i>Public Education</i>							
Opportunity for public education high	5		5	5	5		5
Opportunity for public education low	0	0				0	
<i>Public Perception</i>							
High public visibility / importance; or good faith opportunity to assist other jurisdictions	5	5	5	5	5		5
Low public visibility / importance; or no good faith opportunity to assist other jurisdictions	0					0	

Table E-5 (continued). Benefit scores for potential water quality improvement CIP projects.

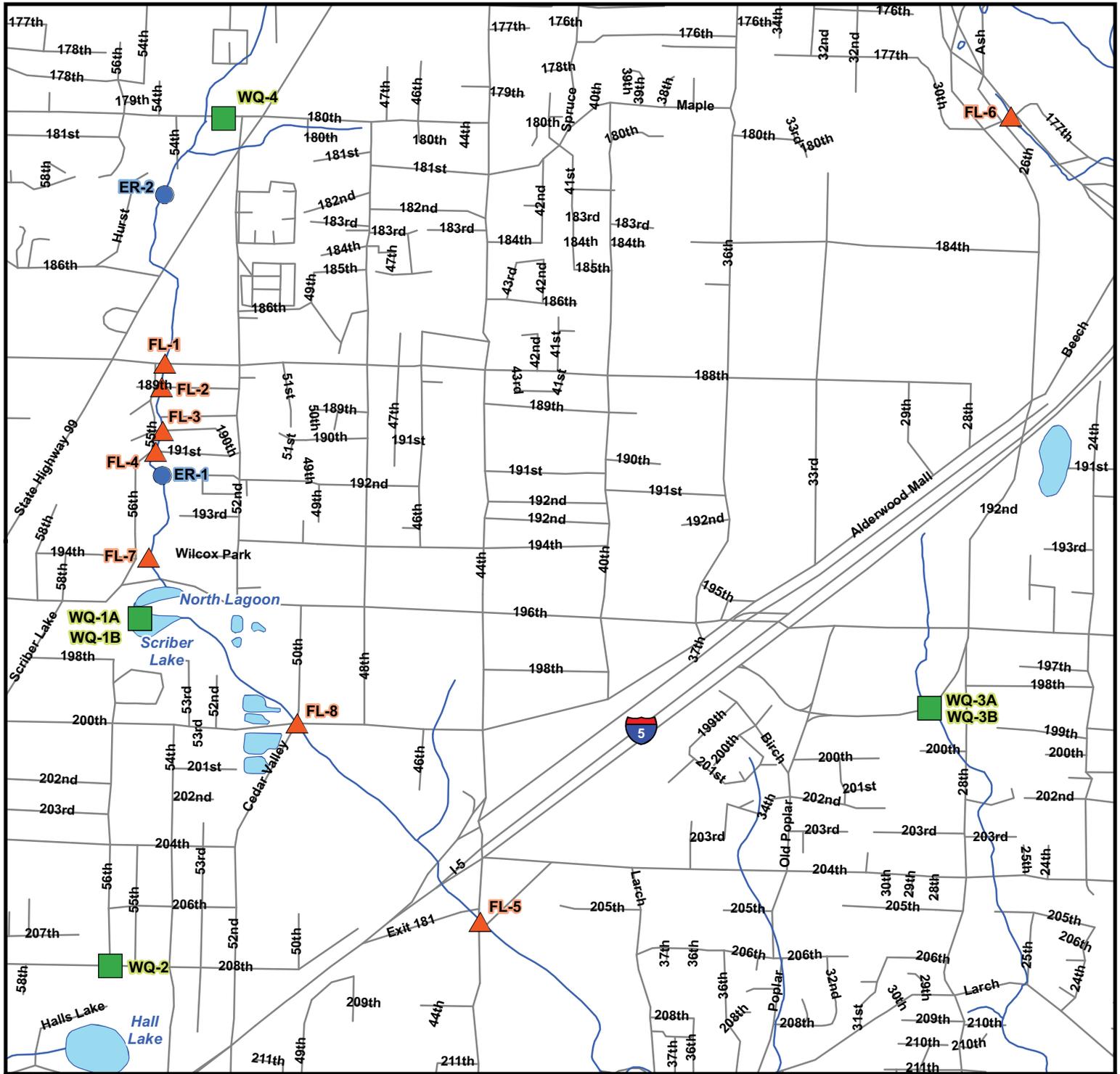
Project Benefits	Possible Points	WQ-1A	WQ-1B	WQ-2	WQ-3A	WQ-3B	WQ-4
<i>Source of Funding</i>							
Attractive project with reasonable likelihood of grant funding or other external funding	5			5			
Likely to receive funding only from Lynnwood Surface Water Utility	0	0	0		0	0	0
<i>Property Ownership</i>							
Public property	5	5	5	5	5	5	5
Private property	0						
Total Benefit Points		50	55	55	35	30	35

Table E-6. CIP project prioritization based on cost-benefit index calculations.

Rank	Cost/Benefit Score	Project ID	Project Title	Benefit Points	Estimated Cost (2009 dollars)
1	1833	WQ-3B	Installation of a street edge or parking lot treatment system such as a Bacterra™ bioretention system.	30	\$ 55,000
2	2000	WQ-1A	Aeration system retrofit for Scriber Lake	50	\$ 100,000
3	2139	FL-6	Flood study at Maple Road and Ash Way	72	\$ 154,000
4	2727	WQ-1B	Floating island treatment system for Scriber Lake	55	\$ 150,000
5	3714	WQ-3A	Drainage ditch retrofit to a create a bioretention swale in the Golde Creek basin	35	\$ 130,000
5	3714	WQ-5	Conversion of existing unimproved ditch to a bioretention swale along 180th St. SW between SR 99 and Scriber Creek	35	\$ 130,000
7	7193	FL-8	Install backflow preventers and construct berm upstream of 200th Street SW and 50th Ave W	57	\$ 410,000
8	12000	ER-1	Stabilize approximately 200 linear feet of stream channel with grade control structures made of logs and boulders.	30	\$ 360,000
9	13400	FL-1	Scriber Creek culvert replacement at 188th Street SW	50	\$ 670,000
10	16286	FL-4	Scriber Creek culvert replacement at 191st Street SW	35	\$ 570,000
11	18108	FL-3	Scriber Creek culvert replacement at 190st Street SW	37	\$ 670,000
12	18500	FL-7	Scriber Creek culvert replacement at Casa Del Rey condominiums driveway and construct berm	40	\$ 740,000
13	18889	FL-2	Scriber Creek culvert replacement at 189th Street SW	27	\$ 510,000
14	38909	WQ-2	Street edge runoff treatment retrofits in the Hall Lake basin ^a	55	\$ 2,140,000
15	47879	ER-2	Stabilize approximately 1,000 linear feet of streambank using bioengineering techniques.	33	\$ 1,580,000
16	81818	FL-5	44th Avenue W. roadway raising at Scriber Creek crossing	55	\$ 4,500,000
17	236000	WQ-4	Decommissioning septic tanks and connecting residences to the sanitary sewer system ^a	20	\$ 4,720,000

Notes:

^a Range of implementation scale will affect cost and benefit.



Legend

-  Erosion project
-  Flooding project
-  Water quality project
-  Lake
-  Creek
-  Road

Figure E-1. Capital Improvement Program Project Locations.



0 750 1,500 3,000 Feet



PROJECT SUMMARY SHEET

Project Title:	Scriber Creek channel stabilization south of 191st Street SW
Problem Description:	The Scriber Creek channel is incising where the creek passes through a forested area between 191st Street SW and the school district property north of the Case Del Rey condominiums. The incising channel exports sediment in streamflow, increasing sediment loading to lower reaches of the creek where it deposits in lower-energy locations, thereby reducing streamflow conveyance capacity, contributing to flooding problems, and adding to the City's maintenance burden.
Project Description:	Stabilize approximately 200 linear feet of stream channel with grade control structures made of logs and boulders.
Design Assumptions:	<ul style="list-style-type: none"> ▪ Property owners will allow the City to access to the channel for construction work ▪ Stream dewatering via temporary sandbag dams and bypass pipe ▪ Bank regrading not necessary ▪ Installation of logs embedded into bank and channel bottom, backfilled with boulders and stream substrate ▪ Geotechnical exploration not needed for design ▪ Treatments will not be continuous between 191st Street SW and the school district property
Project Benefits:	Improved instream habitat; greater connectivity of channel to floodplain wetland areas, providing flood storage capacity; retention of sediments transported from upstream; reduced sediment removal burden on the City in downstream locations.
Maintenance Requirements:	<ul style="list-style-type: none"> ▪ Inspections to determine if long-term stabilization is accomplished. ▪ Minor log or boulder adjustment as necessary with hand-held equipment
Estimated Project Cost:	\$360,000



Figure 1. Proposed location for Scriber Creek channel stabilization.

Table 1. Planning level design, permitting, and construction cost estimate for Scriber Creek bed and bank stabilization between 191st Street SW and 193rd Street SW.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
GRADE CONTROL STRUCTURES	10	EA	\$5,000	\$50,000	log weirs on 20' spacing along channel length
STREAMBED GRAVEL	20	CY	\$50	\$1,000	8" depth for total length of 200' of stream channel
RIPARIAN PLANTINGS	1	LS	\$20,000	\$20,000	
Earthwork and Material Subtotal:				\$71,000	
OTHER ITEMS					
MOBILIZATION			10%	\$7,100	
STREAM CHANNEL DEWATERING / FLOW BYPASS				\$25,000	
TEMPORARY EROSION AND SEDIMENT CONTROL			10%	\$7,100	
TRAFFIC CONTROL			5%	\$3,550	
CONTINGENCY			150%	\$106,500	
SALES TAX			9%	\$6,390	
Subtotal Construction Cost:				\$226,600	
DESIGN			30%	\$67,980	assume a few design plan sheets with typical details is sufficient assume JARPA, SEPA checklist, ESA no effect letter, and City of Lynnwood critical areas report; all work completed within 2 yrs
PERMITTING			15%	\$33,990	
CONSTRUCTION MANAGEMENT			15%	\$33,990	
Total Estimated Project Cost:				\$360,000	

PROJECT SUMMARY SHEET

Project Title:	Scriber Creek bank stabilization
Problem Description:	Scriber Creek is eroding its banks in several areas between 176th Street SW and State Route 99, increasing sediment loading to lower reaches of the creek where it deposits in lower-energy locations, thereby reducing streamflow conveyance capacity, contributing to flooding problems, and the City's maintenance burden.
Project Description:	Stabilize approximately 1,000 linear feet of streambank using bioengineering techniques.
Design Assumptions:	<ul style="list-style-type: none">▪ Private property owners will be willing to allow to the City access to the bank for construction work▪ Stream dewatering via temporary sandbag dams and bypass pipe▪ Minor bank regrading, and installation of vegetated geogrids or similar means to stabilize the bank with reinforced soil and native riparian vegetation plantings▪ Some geotechnical exploration needed for design
Project Benefits:	Increased flow conveyance capacity, improved instream habitat, reduced downstream flooding, and reduced sediment removal burden on the City in downstream locations.
Maintenance Requirements:	<ul style="list-style-type: none">▪ Inspections to determine if long-term stabilization is accomplished.▪ Maintenance of new vegetation plantings for approximately 3 years
Estimated Project Cost:	\$1,580,000



Figure 1. Proposed location for Scriber Creek bank stabilization.

Table 1. Planning level design, permitting, and construction cost estimate for Scriber Creek bank stabilization between 176th Street SW and SR 99.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
BANK EXCAVATION	740	CY	\$40	\$29,600	typical excavation per foot of channel length = 5' high bank * 4' bank face
REMOVE STRUCTURES AND OBSTRUCTIONS	1	LS	\$25,000	\$25,000	
BIOENGINEERED BANK TREATMENTS	1000	LF	\$300	\$300,000	planting and minor channel improvements included (gravel, wood pieces)
SEEDING ON DISTURBED GROUND	10,000	SF	\$0.75	\$7,500	
OTHER ITEMS				\$362,100	
Earthwork and Material Subtotal:					
GEOTECHNICAL INVESTIGATION				\$30,000	several locations along stream length where easy access accommodated
MOBILIZATION				\$36,210	
STREAM CHANNEL DEWATERING / FLOW BYPASS				\$90,525	
TEMPORARY EROSION AND SEDIMENT CONTROL				\$36,210	
TRAFFIC CONTROL				\$36,210	
CONTINGENCY				\$543,150	
SALES TAX				\$32,589	
Subtotal Construction Cost:				\$1,167,000	
DESIGN				\$175,050	assume typical design details applicable to numerous locations; much of design effort focused on site-specific issues from landowner coordination
PERMITTING				\$58,350	assume JARPA, SEPA checklist, ESA no effect letter, and City of Lynnwood critical areas report; all work completed within 2 yrs
CONSTRUCTION MANAGEMENT				\$175,050	
Total Estimated Project Cost:				\$1,580,000	

PROJECT SUMMARY SHEET

- Project Title:** Scriber Creek culvert replacement at 188th Street SW
- Problem Description:** Scriber Creek overtops 188th Street SW in a 10-yr recurrence interval flood event, disrupting traffic, endangering motorists and pedestrians, and causing flooding damage to adjacent properties.
- Project Description:** Replace existing 36-inch diameter culvert with a 90-foot long, 8'-2"-by-5'-9" corrugated metal pipe arch that accommodates fish passage.
- Design Assumptions:**
- Cut-and-cover construction.
 - Temporary traffic detour during installation
 - Stream dewatering via temporary sandbag dams and bypass pipe
 - Bottomless concrete box structure placed on strip footing
 - Geotechnical exploration needed for design
 - Instream grade controls needed on upstream side to maintain wetland hydroperiod and stage-storage-discharge relationship
- Project Benefits:** Improved public safety, increased flow conveyance capacity, improved instream habitat, and improved fish passage.
- Maintenance Requirements:** Same as with all other city culverts.
- Estimated Project Cost:** \$670,000
- Notes.
1. Culvert is countersunk 2 feet below existing channel grade.



Figure 1. Proposed location for Scriber Creek culvert replacement at 188th Street SW.

Table 1. Planning level design, permitting, and construction cost estimate for Scriber Creek culvert replacement at 188th Street SW.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
REMOVE PAVEMENT	140	SY	\$25	\$3,500	
STRUCTURE EXCAVATION AND BACKFILL	440	CY	\$35	\$15,400	assume 14' wide x 90' length
TEMPORARY SHORING	1,620	SF	\$3	\$4,860	depth of excavation = 9', also includes wingwall areas
REMOVE AND DISPOSE OF EXISTING CULVERT	1	LS	\$2,000	\$2,000	
GRAVEL BEDDING	53	CY	\$45	\$2,385	
8'-2" x 5'-9" CORRUGATED GALVANIZED STEEL PIPE ARCH	1	EA	\$17,000	\$17,000	vendor quote, delivered to site
					timbers or cast-in-place concrete with minor bank modifications
WING WALLS FOR ENTRANCE PROTECTION	1	LS	\$15,000	\$15,000	
CULVERT INSTALLATION	1	LS	\$30,000	\$30,000	
GRADE CONTROL STRUCTURE(S) TO MAINTAIN UPSTREAM WETLANDS	1	LS	\$10,000	\$10,000	12" depth for total length of 110' of stream channel /culvert
STREAMBED GRAVEL	33	CY	\$50	\$1,650	assume minor streambank replanting for 10' length at each end of culvert
RIPARIAN PLANTINGS	1	LS	\$10,000	\$10,000	4" depth for 80' length of roadway width; high unit
CRUSHED SURFACING TOP COURSE	14	CY	\$75	\$1,050	proce for small quantity
PAVEMENT, HOT MIX ASPHALT	36	TN	\$300	\$10,800	4" thickness
CEMENT CONCRETE SIDEWALK	120	SF	\$16	\$1,920	
CEMENT CONCRETE CURB AND GUTTER	24	LF	\$30	\$720	
METAL HANDRAIL	40	LF	\$120	\$4,800	
Earthwork and Material					
				Subtotal:	does not include any utility relocations that may be necessary
OTHER ITEMS				\$131,085	
SUPPLEMENTAL SITE SURVEY DATA				\$3,000	
GEOTECHNICAL INVESTIGATION				\$20,000	
MOBILIZATION			10%	\$13,109	assume necessary for culvert foundation design
STREAM CHANNEL DEWATERING / FLOW BYPASS			10%	\$20,000	
TEMPORARY EROSION AND SEDIMENT CONTROL			10%	\$13,109	
TRAFFIC CONTROL			10%	\$13,109	
CONTINGENCY			150%	\$196,628	
SALES TAX			9%	\$11,798	
DESIGN			Subtotal Construction Cost:	\$421,800	assume JARPA, SEPA checklist, wetland effects assessment, ESA no effect letter, and City of Lynnwood critical areas report
			30%	\$126,540	
PERMITTING			15%	\$63,270	
CONSTRUCTION MANAGEMENT			15%	\$63,270	
				Total Estimated Project Cost:	
				\$670,000	

PROJECT SUMMARY SHEET

Project Title:	Scriber Creek culvert replacement at 189th Street SW
Problem Description:	Scriber Creek overtops 189th Street SW in a 10-yr recurrence interval flood event, disrupting traffic, endangering motorists and pedestrians, and causing flooding damage to adjacent properties.
Project Description:	Replace existing 42-inch diameter culvert with a 42-foot long, 12'-4"-by-7'-9" ¹ corrugated metal pipe arch that accommodates fish passage.
Design Assumptions:	<ul style="list-style-type: none"> ▪ Cut-and-cover construction. ▪ Temporary traffic detour during installation ▪ Stream dewatering via temporary sandbag dams and bypass pipe ▪ Bottomless concrete box structure placed on strip footing ▪ Geotechnical exploration needed for design ▪ Instream grade controls needed on downstream side to raise water surface profile through culvert
Project Benefits:	Improved public safety, increased flow conveyance capacity, improved instream habitat, and improved fish passage.
Maintenance Requirements:	Same as with all other city culverts.
Estimated Project Cost:	\$510,000
Notes.	
1. Culvert is countersunk 3.82 feet below existing channel grade.	



Figure 1. Proposed location for Scriber Creek culvert replacement at 189th Street SW.

Table 1. Planning level design, permitting, and construction cost estimate for Scriber Creek culvert replacement at 189th Street SW.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
REMOVE PAVEMENT	70	SY	\$25	\$1,750	assume 18' wide x 35' length depth of excavation = 1' (overexcavate to countersink approx 3' of pipe)
STRUCTURE EXCAVATION AND BACKFILL	350	CY	\$35	\$12,250	
TEMPORARY SHORING	924	SF	\$3	\$2,772	
REMOVE AND DISPOSE OF EXISTING CULVERT GRAVEL BEDDING	1	LS	\$3,000	\$3,000	
12'-4" x 7'-9" CORRUGATED GALVANIZED STEEL PIPE ARCH	39	CY	\$45	\$1,755	
WING WALLS FOR ENTRANCE PROTECTION	1	EA	\$11,400	\$11,400	vendor quote, delivered to site timbers or cast-in-place concrete with minor bank modifications
CULVERT INSTALLATION	1	LS	\$15,000	\$15,000	
CHANNEL GRADE CONTROL STRUCTURES	1	LS	\$20,000	\$20,000	
STREAMBED GRAVEL	1	LS	\$5,000	\$5,000	to backwater culvert from downstream side
RIPARIAN PLANTINGS	27	CY	\$50	\$1,350	12" depth for total length of 60' of stream channel /culvert assume minor streambank replanting for 10' length at each end of culvert
CRUSHED SURFACING TOP COURSE PAVEMENT, HOT MIX ASPHALT	1	LS	\$10,000	\$10,000	4" depth for 80' length of roadway width; high unit price for small quantity
GUARDRAIL REMOVAL AND REPLACEMENT	8	CY	\$75	\$600	4" thickness
OTHER ITEMS	22	TN	\$300	\$6,600	
SUPPLEMENTAL SITE SURVEY DATA	1	LS	\$3,000	\$3,000	
GEOTECHNICAL INVESTIGATION MOBILIZATION				\$94,477	Earthwork and Material Subtotal:
STREAM CHANNEL DEWATERING / FLOW BYPASS				\$3,000	
TEMPORARY EROSION AND SEDIMENT CONTROL				\$20,000	assume necessary for culvert foundation design
TRAFFIC CONTROL				\$9,448	10% deeper excavation requires more dewatering than at shallow culvert installations
CONTINGENCY				\$25,000	
SALES TAX				\$9,448	
DESIGN				\$9,448	
PERMITTING				\$141,716	
CONSTRUCTION MANAGEMENT				\$8,503	
				\$321,000	assume JARPA, SEPA checklist, ESA no effect letter, and City of Lynnwood critical areas report
				\$96,300	
				\$48,150	
				\$48,150	
				\$510,000	Total Estimated Project Cost:

PROJECT SUMMARY SHEET

- Project Title:** Scriber Creek culvert replacement at 190th Street SW
- Problem Description:** Scriber Creek overtops 190th Street SW in a 10-yr recurrence interval flood event, disrupting traffic, endangering motorists and pedestrians, and causing flooding damage to adjacent properties.
- Project Description:** Replace existing 6-by-4 foot precast concrete box culvert with a 46-foot long, 10-by-4-foot¹ precast concrete 3-sided culvert that accommodates fish passage.
- Design Assumptions:**
- Cut-and-cover construction.
 - Temporary traffic detour during installation
 - Stream dewatering via temporary sandbag dams and bypass pipe
 - Bottomless concrete box structure placed on strip footing
 - Geotechnical exploration needed for design
 - Instream grade controls needed on downstream side to raise water surface profile through culvert
- Project Benefits:** Improved public safety, increased flow conveyance capacity, improved instream habitat, and improved fish passage.
- Maintenance Requirements:** Same as with all other city culverts.
- Estimated Project Cost:** \$670,000

Notes.

1. Culvert is countersunk 1 foot below existing channel grade.



Figure 1. Proposed location for Scriber Creek culvert replacement at 190th Street SW.

Table 1. Planning level design, permitting, and construction cost estimate for Scriber Creek culvert replacement at 190th Street SW.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
REMOVE PAVEMENT	50	SY	\$25	\$1,250	assume 16' wide x 30' length depth of excavation = 7' (overexcavate to countersink 1' of culvert bottom)
STRUCTURE EXCAVATION AND BACKFILL	190	CY	\$35	\$6,650	
TEMPORARY SHORING	644	SF	\$3	\$1,932	
REMOVE AND SALVAGE EXISTING CULVERT	1	LS	\$7,000	\$7,000	
10' x 4' CONCRETE 3-SIDED CULVERT STRUCTURE	1	EA	\$27,600	\$27,600	vendor quote, delivered to site, 46' culvert length timbers or cast-in-place concrete with minor bank modifications
WING WALLS FOR ENTRANCE PROTECTION	1	LS	\$15,000	\$15,000	
CULVERT INSTALLATION	1	LS	\$30,000	\$30,000	
CHANNEL REGRADING AND GRADE CONTROL STRUCTURES	1	LS	\$20,000	\$20,000	
STREAMBED GRAVEL	28	CY	\$50	\$1,400	
RIPARIAN PLANTINGS	1	LS	\$10,000	\$10,000	12" depth for total length of 75' of stream channel /culvert assume minor streambank replanting for 10' length at each end of culvert
CRUSHED SURFACING TOP COURSE PAVEMENT, HOT MIX ASPHALT	6	CY	\$75	\$450	
GUARDRAIL REMOVAL AND REPLACEMENT	17	TN	\$300	\$5,100	4" depth for 30' length of roadway width; high unit price for small quantity
	1	LS	\$3,000	\$3,000	4" thickness
Earthwork and Material					
Subtotal:				\$129,382	
OTHER ITEMS					
SUPPLEMENTAL SITE SURVEY DATA				\$3,000	
GEOTECHNICAL INVESTIGATION				\$20,000	
MOBILIZATION			10%	\$12,938	assume necessary for culvert foundation design
STREAM CHANNEL DEWATERING / FLOW BYPASS			10%	\$20,000	
TEMPORARY EROSION AND SEDIMENT CONTROL			10%	\$12,938	
TRAFFIC CONTROL			150%	\$194,073	
CONTINGENCY			9%	\$11,644	
SALES TAX				\$416,900	
DESIGN			30%	\$125,070	
PERMITTING			15%	\$62,535	assume JARPA, SEPA checklist, ESA no effect letter, and City of Lynnwood critical areas report
CONSTRUCTION MANAGEMENT			15%	\$62,535	
Total Estimated Project Cost:				\$670,000	

PROJECT SUMMARY SHEET

- Project Title:** Scriber Creek culvert replacement at 191st Street SW
- Problem Description:** Scriber Creek overtops 191st Street SW in a 20-yr recurrence interval flood event, disrupting traffic, endangering motorists and pedestrians, and causing flooding damage to adjacent properties. This culvert also contributes to flooding of the roadway and single family residences at 190th Street.
- Project Description:** Replace existing 48-inch diameter culvert with a 42-foot long, 8-by-5-foot¹ precast concrete 3-sided culvert that accommodates fish passage.
- Design Assumptions:**
- Cut-and-cover construction.
 - Temporary traffic detour during installation
 - Stream dewatering via temporary sandbag dams and bypass pipe
 - Bottomless concrete box structure placed on strip footing
 - Geotechnical exploration needed for design
 - Instream grade controls needed on downstream side to raise water surface profile through culvert
- Project Benefits:** Improved public safety, increased flow conveyance capacity, improved instream habitat, and improved fish passage.
- Maintenance Requirements:** Same as with all other city culverts.
- Estimated Project Cost:** \$570,000

Notes.

1. Culvert is countersunk 1 foot below existing channel grade.



Figure 1. Proposed location for Scriber Creek culvert replacement at 191st Street SW.

Table 1. Planning level design, permitting, and construction cost estimate for Scriber Creek culvert replacement at 191st Street SW.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
REMOVE PAVEMENT	50	SY	\$25	\$1,250	
STRUCTURE EXCAVATION AND BACKFILL	160	CY	\$35	\$5,600	assume 14' wide x 35' length depth of excavation = 7'
TEMPORARY SHORING	630	SF	\$3	\$1,890	
REMOVE AND DISPOSE OF EXISTING CULVERT	1	LS	\$2,000	\$2,000	
8' x 5' CONCRETE 3-SIDED CULVERT STRUCTURE	1	EA	\$25,000	\$25,000	vendor quote, delivered to site
FOUNDATION PREPARATION	1	LS	\$8,000	\$8,000	
WING WALLS FOR ENTRANCE PROTECTION	1	LS	\$15,000	\$15,000	timbers or cast-in-place concrete with minor bank modifications
CULVERT INSTALLATION	1	LS	\$25,000	\$25,000	
CHANNEL GRADE CONTROL STRUCTURES	1	LS	\$5,000	\$5,000	to backwater culvert from downstream side
STREAMBED GRAVEL	18	CY	\$50	\$900	12" depth for total length of 60' of stream channel /culvert
RIPARIAN PLANTINGS	1	LS	\$10,000	\$10,000	assume minor streambank replanting for 10' length at each end of culvert
CRUSHED SURFACING TOP COURSE	6	CY	\$75	\$450	4" depth for 40' length of roadway width; high unit price for small quantity
PAVEMENT, HOT MIX ASPHALT	17	TN	\$300	\$5,100	4" thickness
GUARDRAIL REMOVAL AND REPLACEMENT	1	LS	\$3,000	\$3,000	
Earthwork and Material Subtotal:				\$108,190	
OTHER ITEMS				\$3,000	
SUPPLEMENTAL SITE SURVEY DATA				\$20,000	
GEOTECHNICAL INVESTIGATION				\$10,819	10%
MOBILIZATION				\$20,000	
STREAM CHANNEL DEMATERING / FLOW BYPASS				\$10,819	10%
TEMPORARY EROSION AND SEDIMENT CONTROL				\$10,819	10%
TRAFFIC CONTROL				\$162,285	150%
CONTINGENCY				\$9,737	9%
SALES TAX				\$355,700	30%
DESIGN				\$106,710	
PERMITTING				\$53,355	15%
CONSTRUCTION MANAGEMENT				\$53,355	15%
Total Estimated Project Cost:				\$570,000	

assume JARPA, SEPA checklist, ESA no effect letter, and City of Lynnwood critical areas report

PROJECT SUMMARY SHEET

Project Title:	Scriber Creek Culverts at 44th Avenue W. Phase 2
Problem Description:¹	Scriber Creek has overtopped the roadway at 44th Avenue during previous flood events. Scriber Creek crossing at 44th Avenue W was identified as a problem in the 1998 Comprehensive Flood and Drainage Management Plan.
Project Description:¹	This project is the second phase of project SD2003017A. The existing roadway has experienced substantial settlement due to poor underlying soils. Scriber Creek has experienced substantial sediment accumulation resulting in a higher creek profile. As a result, roadway flooding occurs during high storm events and is expected to increase in frequency as roadway settlement and creek siltation continues. The first phase of the project will improve roadway flooding but not ultimately. Phase two will raise the existing roadway.
Design Assumptions:¹	<ul style="list-style-type: none"> ▪ Problem and project solution were not evaluated during development of this plan.
Project Benefits:¹	Improved public safety and reduced frequency of flooding at 44th Avenue W.
Maintenance Requirements:¹	Same as with all other city culverts.
Estimated Project Cost:¹	\$4,500,000

Notes.

1. Problem and solution were not evaluated during development of this plan. Causes, solution, and cost presented here are based on the City's 2008-2013 Capital Facilities Plan (Lynnwood, 2007).

PROJECT SUMMARY SHEET

Project Title:	Flood study at Maple Road and Ash Way
Problem Description:	The intersection of Maple Road and Ash Way floods during every significant rain event and the intersection is closed approximately two times per year due to severe flooding, disrupting arterial traffic flow for hours.
Project Description:	Conduct detailed study of causes of flooding, evaluate potential solutions, and identify a preferred solution.
Study Assumptions:	<ul style="list-style-type: none">▪ Field survey required▪ Hydrogeology investigation▪ Hydrologic and hydraulic modeling
Project Benefits:	Identification of a solution that will solve flooding problems at Maple Road and Ash Way, thereby improving public safety, reducing the number of traffic disruptions, and reducing traffic congestion during rain storms.
Maintenance Requirements:	Not applicable.
Estimated Project Cost:	\$154,000



Figure 1. Proposed location for flood study at Maple Road and Ash Way.

Table 1. Planning level cost estimate for detailed study of flooding at Maple Road and Ash Way intersection and planning level solution development and cost estimate.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
HYDROLOGIC MODELING	1	EA	\$13,200	\$13,200	Develop input for hydraulic model. Assumes revisions to existing Swamp Creek and Tunnel Creek hydrologic models previously prepared for Snohomish County Drainage Needs Reports.
FIELD RECONNAISSANCE	1	EA	\$8,800	\$8,800	Redelineate tunnel creek and drainage basins tributary to problem area. Drainage system and roadway reconnaissance. Other field work as required. Topographic survey of drainage system and roadway. Survey of 500 feet of Swamp Creek channel. Traffic control. Assumes LIDAR will be adequate for modeling floodplain.
SURVEY DATA COLLECTION	1	EA	\$15,000	\$12,000	Model to simulate flow interaction between Tunnel Creek (upstream) and Swamp Creek (downstream) at drainage system and landscape scale in project vicinity. Includes modeling of 4 flow scenarios and 3 alternative solutions. Est. from HWA Geosciences Inc.
REVIEW AS BUILTS	1	EA	\$2,400	\$2,400	
2-DIMENSIONAL HYDRAULIC MODELING	1	EA	\$40,000	\$48,000	Conceptual design and planning level cost estimate. Basic graphics (not CAD). Modeling methods and design documentation.
GEOTECHNICAL EVALUATION AND REPORT	1	EA	\$25,000	\$25,000	
REPORT PREPARATION	1	EA	\$20,000	\$20,000	
ENGINEERING PREDESIGN	1	EA	\$10,000	\$10,000	
MODEL DOCUMENTATION	1	EA	\$10,000	\$15,000	
				Study Subtotal:	\$154,400
				Total Estimated Project Cost:	\$154,000

PROJECT SUMMARY SHEET

- Project Title:** Scriber Creek culvert replacement at Casa Del Rey condominiums driveway (extension of 194th Street SW) and embankment construction upstream of Casa Del Rey condominiums
- Problem Description:** Scriber Creek overtops driveway in a 100-yr recurrence interval flood event, endangering motorists and pedestrians and causing flooding damage to adjacent properties and several residences in a condominium.
- Project Description:** Replace existing twin 42-inch diameter concrete culverts with a 42-foot long, 12-by-5-foot¹ precast concrete 3-sided culvert that accommodates fish passage.
- Design Assumptions:**
- Cut-and-cover construction.
 - Temporary traffic detour during installation
 - Stream dewatering via temporary sandbag dams and bypass pipe
 - Bottomless concrete box structure placed on strip footing
 - Geotechnical exploration needed for design
- Project Benefits:** Improved public safety, increased flow conveyance capacity, improved instream habitat, and improved fish passage.
- Maintenance Requirements:** Same as with all other city culverts.
- Estimated Project Cost:** \$740,000

Notes.

1. Culvert is countersunk 1 foot below existing channel grade.



Figure 1. Proposed location for Scriber Creek culvert replacement at Casa Del Rey condominiums driveway.

Table 1. Planning level design, permitting, and construction cost estimate for Scriber Creek culvert replacement at 194th Street SW / Casa Del Rey Driveway and embankment construction upstream of Casa Del Rey.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
REMOVE PAVEMENT	80	SY	\$25	\$2,000	
STRUCTURE EXCAVATION AND BACKFILL	220	CY	\$35	\$7,700	assume 18' wide x 40' length depth of excavation = 7'
TEMPORARY SHORING	588	SF	\$3	\$1,764	
REMOVE AND DISPOSE OF EXISTING CULVERT	1	LS	\$3,000	\$3,000	
12' x 5' CONCRETE 3-SIDED CULVERT STRUCTURE	1	EA	\$40,000	\$40,000	vendor quote, delivered to site
FOUNDATION PREPARATION	1	LS	\$10,000	\$10,000	timbers or cast-in-place concrete with minor bank modifications
WING WALLS FOR ENTRANCE PROTECTION	1	LS	\$15,000	\$15,000	
CULVERT INSTALLATION	1	LS	\$30,000	\$30,000	
STREAMBED GRAVEL	27	CY	\$50	\$1,350	12" depth for total length of 60' of stream channel /culvert
RIPARIAN PLANTINGS	1	LS	\$10,000	\$10,000	assume minor streambank replanting for 10' length at each end of culvert
CRUSHED SURFACING TOP COURSE	9	CY	\$75	\$675	4" depth for 80' length of roadway width; high unit price for small quantity
PAVEMENT, HOT MIX ASPHALT	25	TN	\$300	\$7,500	4" thickness
CHAIN LINK FENCE REMOVAL AND REPLACEMENT	1	LS	\$4,000	\$4,000	on embankment faces; high unit price for small quantity
CONSTRUCTION GEOTEXTILE FOR PERMANENT SOIL STABILIZATION	500	SY	\$8	\$4,000	quantity
BACKFILL FOR STRUCTURAL EARTH WALL INCL HAUL	150	CY	\$50	\$7,500	berm/embankment fill; high unit price for small quantity
EMBANKMENT COMPACTION	150	CY	\$10	\$1,500	high unit price for small quantity
WET NATIVE SEEDING AND MULCHING	250	SY	\$5	\$1,250	high unit price for small quantity
				Earthwork and Material Subtotal:	\$147,239
OTHER ITEMS					
SUPPLEMENTAL SITE SURVEY DATA				\$3,000	
GEOTECHNICAL INVESTIGATION				\$15,000	assume necessary for culvert foundation design
MOBILIZATION				\$14,724	10%
STREAM CHANNEL DEWATERING / FLOW BYPASS				\$20,000	10%
TEMPORARY EROSION AND SEDIMENT CONTROL				\$14,724	10%
TRAFFIC CONTROL				\$14,724	10%
CONTINGENCY				\$220,859	150%
SALES TAX				\$13,252	9%
DESIGN				\$463,500	30%
PERMITTING				\$69,525	15%
CONSTRUCTION MANAGEMENT				\$69,525	15%
				Total Estimated Project Cost:	\$740,000

PROJECT SUMMARY SHEET

- Project Title:** Backflow preventers on outfalls to Scriber Creek and embankments upstream of 200th Street SW and 50th Avenue W
- Problem Description:** High water in Scriber Creek causes flooding of apartments and businesses upstream of the culvert under 200th Street SW and 50th Avenue W resulting in private property damage.
- Project Description^a:** Install backflow preventers on low lying parking lot storm drain outfalls and construct embankments that protect buildings from high water levels in the creek.
- Design Assumptions:**
- Simple access to outfalls
 - 1989 design solution and quantities are correct
 - Additional design will be performed to evaluate outfalls and embankments size and locations prior to budgeting for this project
- Project Benefits:** Reduced flooding of apartments and businesses.
- Maintenance Requirements:**
- Annual inspection of check valves and embankments by property owners.
 - Maintenance of embankment vegetation by property owners
- Estimated Project Cost:** \$410,000

Notes.

a. This is an update of the solution developed in the Scriber Creek Watershed Management Plan (Snohomish County et al. 1989). Additional field reconnaissance and design must be conducted prior to CIP budgeting.



Figure 1. Install backflow preventers on storm drain outfalls and construct embankments along Scriber Creek upstream of 200th Street SW and 50th Avenue W.

Table 1. Planning level design, permitting, and construction cost estimate for installation of backflow preventers and berms near apartments and businesses directly upstream of 200th Street SW and 50th Avenue W.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
12" SLIP ON STYLE RUBBER CHECKVALVE W/ CLAMP	5	EA	\$1,255	\$6,275	vendor quote from Greaves 40 percent of material cost. Simple access to outfall.
CHECK VALVE INSTALLATION	5	EA	\$500	\$2,500	
WET NATIVE SEEDING AND MULCHING	3,000	SY	\$3	\$9,000	
CONSTRUCTION GEOTEXTILE FOR PERMANENT SOIL STABILIZATION	6,000	SY	\$4	\$24,000	
BACKFILL FOR STRUCTURAL EARTH WALL INCL HAUL	2,000	CY	\$35	\$70,000	
EMBANKMENT COMPACTION	2,000	CY	\$5	\$10,000	
Earthwork and Material Subtotal:				\$121,775	
OTHER ITEMS					
SUPPLEMENTAL SITE SURVEY DATA				\$3,000	
MOBILIZATION				\$12,177	10%
TEMPORARY EROSION AND SEDIMENT CONTROL				\$12,177	10%
TRAFFIC CONTROL				\$12,177	10%
CONTINGENCY				\$121,775	100%
SALES TAX				\$10,960	9%
DESIGN				\$294,000	20%
Subtotal Construction Cost:				\$294,000	
				\$58,800	assume JARPA, SEPA checklist, ESA no effect letter, and City of Lynnwood critical areas report
PERMITTING				\$29,400	10%
CONSTRUCTION MANAGEMENT				\$29,400	10%
Total Estimated Project Cost:				\$410,000	

PROJECT SUMMARY SHEET

Project Title:	Aeration system retrofit for Scriber Lake
Problem Description:	Scriber Lake was included on the Department of Ecology's Section 303(d) list for total phosphorus in 1996, 1998, and 2002/2004. Low levels of dissolved oxygen in the hypolimnion are also a concern.
Project Description:	Retrofit of aeration system installed in 1989 to aerate the hypolimnion of the lake.
Design Assumptions:	<ul style="list-style-type: none"> ▪ Existing system is no longer functional. ▪ Aerators, pumps, and a new pipe network will be installed.
Project Benefits:	Increased dissolved oxygen levels in the lake hypolimnion, reduced total phosphorus concentrations, and decreased frequency of algae blooms.
Maintenance Requirements^a:	<ul style="list-style-type: none"> ▪ <u>Aerators</u>: Consult manufacturer's operation and maintenance data ▪ <u>Pumps</u>: Consult manufacturer's operation and maintenance data ▪ <u>Vault</u>: Inspect weekly, open enclosures. Touch up damaged painting. Check for leakage and corrosion. ▪ <u>Diffusers and Intake Screens</u>: Unless there are indicators of flow restriction that cannot be resolved otherwise, there is no need to inspect the diffusers and intake screens. Excessive local bubbling at one or more diffuser ports may indicate plugging at other diffuser ports. ▪ <u>Alarm Light</u>: The alarm light in the park's restroom building should be visually observed on a daily basis.
Estimated Project Cost:	\$100,000

^a Source: Manufacturer's recommendations and Scriber Lake Restoration Aeration, Surface Water Dilution, and Oil Separation Operations and Maintenance Manual (URS 1989).



Figure 1. Proposed location for aeration system retrofit in Scriber Lake.

Table 1. Planning level design, permitting, and construction cost estimate for the aeration system retrofit in Scriber Lake.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions / Notes
AERATOR	2	EA	\$5,336	\$10,672	2 HP freshwater submersible aerator (Quote received via electronic mail from Aeromix, January 14, 2009)
PUMP	2	EA	\$6,865	\$13,730	Flygt Model CP3085.436, 3-inch impeller, 2.4 HP, 230 Volt, single-phase motor (Quote received via electronic mail from Aeromix, January 22, 2009)
PVC PIPE	1,600	LF	\$1.40	\$2,240	4-inch schedule 40 PVC pipe, comes in 10-foot lengths. Telephone conversation with Home Depot sales associate, Seattle, Washington.
Material Subtotal:					\$26,642
OTHER ITEMS					
MOBILIZATION				\$2,664	10%
CONTINGENCY				\$26,642	100%
SALES TAX				\$2,398	9%
					Subtotal Construction
				\$58,300	Cost:
DESIGN				\$17,490	30%
PERMITTING				\$11,660	20%
CONSTRUCTION					Coordination with vendor to confirm sizing, installation procedures, etc.
MANAGEMENT					Assumes simple JARPA submittal/review process and no ESA documentation
				\$8,745	15%
Total Estimated Project				Cost:	\$100,000

PROJECT SUMMARY SHEET

- Project Title:** Floating island treatment system for Scriber Lake
- Problem Description:** Scriber Lake was included on the Department of Ecology's Section 303(d) list for total phosphorus in 1996, 1998, and 2002/2004. Low levels of dissolved oxygen in the hypolimnion are also a concern.
- Project Description:** Installation of a floating island treatment system planted with sod, garden plants, or wetland plants.
- Design Assumptions:** The treatment system will include a series of semi-circular islands and an in-lake aerator to promote circulation between the islands. This design assumes that the aeration system retrofits described in WQ-1A will not be implemented.
- Project Benefits:** Reduced total phosphorus, nitrate, ammonia, and heavy metals concentrations. Decreased frequency of algae blooms. Increased dissolved oxygen concentrations.
- Maintenance Requirements:**
- Initial Maintenance: Keep the plants and sod damp until the roots grow down below the waterline. Remove rocks after a week or two, if desired.
 - Ongoing Maintenance: The two maintenance options include tending to the floating island like a garden or allowing it to grow naturally. Avoid using chemicals such as algaecides, pesticides, and fertilizers.
- Estimated Project Cost:** \$150,000



Figure 1. Example of a floating island treatment system (Floating Island International 2008).



Figure 2. Proposed location for a floating island treatment system in Scriber Lake.

Table 1. Planning level design, permitting, and construction cost estimate for a floating island treatment system in Scriber Lake.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions / Notes
FLOATING ISLANDS	1,000	SF	\$29	\$29,000	1,000 SF total, semi-circle islands. Includes conceptual design, construction, and plant specification. Telephone conversation with Tim Mulholland (Floating Islands International).
NATIVE PLANTINGS	1,000	SF	\$5	\$5,000	Telephone conversation with Tim Mulholland (Floating Islands International)
IN-LAKE AERATOR	1.0	LS	\$10,000	\$10,000	Blue Frog 1/2-hp pump with slow moving impeller, 5,000 gallons/minute. Telephone conversation with Tim Mulholland (Floating Islands International).
Material Subtotal:					\$44,000
OTHER ITEMS					
MOBILIZATION				\$4,400	10%
CONTINGENCY				\$44,000	100%
SALES TAX				\$3,960	9%
Subtotal Construction Cost:					\$96,400
DESIGN				\$24,100	25% Coordination with vendor to confirm sizing, installation procedures, etc.
PERMITTING				\$14,460	15% Assumes simple JARPA submittal/review process and no ESA documentation
CONSTRUCTION					
MANAGEMENT				\$14,460	15%
Total Estimated Project Cost:					\$150,000

PROJECT SUMMARY SHEET

Project Title:	Street Edge Runoff Treatment Retrofits in the Hall Lake Basin
Problem Description:	Nutrient and metals loading to Hall Lake and downstream water bodies from urban development in the watershed.
Project Description:	Installation of compost-amended soil, small trees, shrubs, and groundcover in roadside swales, and decreasing street width (e.g., impervious area) within the existing right-of-way.
Design Assumptions:	<ul style="list-style-type: none"> ▪ Minimum road width of 20 feet based on the Lynnwood Fire Code. ▪ Vegetation will be selected by the City and local residents and will include a variety of small trees, shrubs, and groundcover. Plants should be selected to be drought tolerant and not require watering after establishment (2-3 years). ▪ Maximum ponding depth will be 12 inches. ▪ Planting soil depth approximately 12 inches. ▪ Mulch layer depth = 3 inches. ▪ 6-8" diam. underdrain - slotted PVC pipe.
Project Benefits:	Enhanced runoff storage, infiltration, and pollutant removal (e.g., heavy metals, phosphorus, oil, and suspended solids).
Maintenance Requirements^a:	<ul style="list-style-type: none"> ▪ <u>Watering</u>: First 2-3 years until plants are established, watering during prolonged dry periods ▪ <u>Erosion Control</u>: Inspect periodically and replace soil, plant material, and/or mulch layer in areas where erosion has occurred ▪ <u>Plant Material</u>: Occasional pruning and removing dead plant material. Periodic weeding is necessary until plants are established. ▪ <u>Nutrients and Pesticides</u>: Nutrient and pesticide inputs should not be required since the soil mix and plants are selected for plant establishment and growth. ▪ <u>Mulch</u>: Add mulch as needed to maintain a 2-3 inch depth at least once every 2 years. ▪ <u>Soil</u>: The soil mix is designed to maintain long-term pollutant processing capability and should not need to be replaced for at least 20 years.

Estimated Project Cost^b: \$2,140,000

Notes.

^a Source: Low Impact Development Technical Guidance Manual for Puget Sound (PSAT 2005).

^b Assumes implementation of Simple Green Streets at half of the potential locations. Total project cost depends on the number of blocks treated the type of retrofit (i.e., Simple Green Streets of SEA Streets).

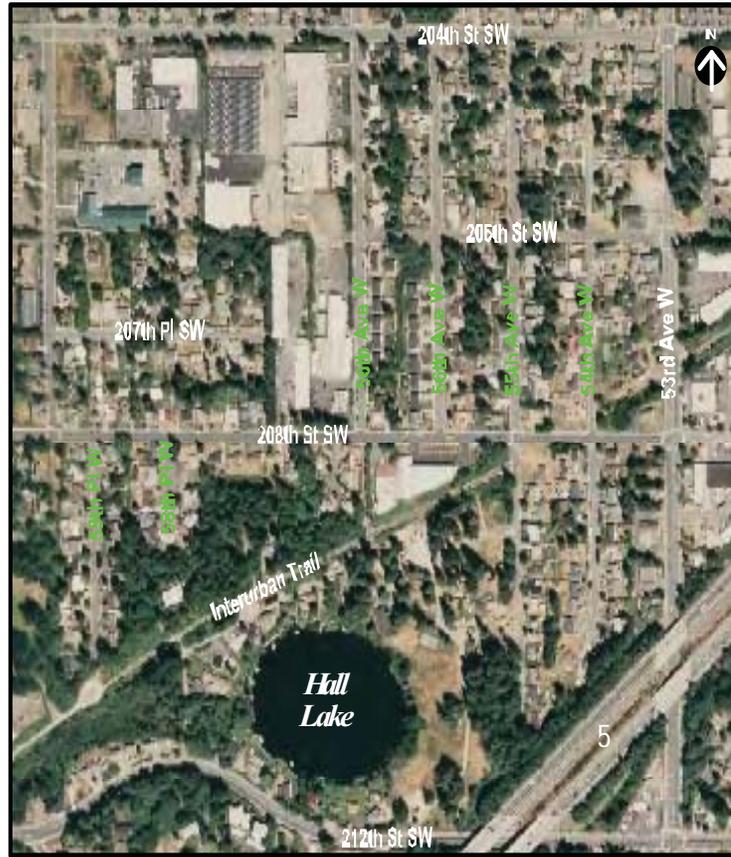


Figure 1. Potential locations for street edge runoff treatment retrofits in the Hall Lake drainage basin (highlighted in green).



Figure 2. Seattle Street Edge Alternative (SEA) (Seattle Public Utilities 2002).



Figure 3. Portland Simple Green Street (Elkin 2008).

Table 1. Planning level design, permitting, and construction cost estimate for street edge runoff treatment retrofits in the Hall Lake Basin.

Street	Current ROW Width (ft)	Current ROW Length (ft)	ROW Area (sf)	Local SEA Street Cost/LF (\$) ^a	Total SEA Street Cost (\$)	Simple Green Street Cost/LF (\$) ^b	Total Simple Green Street Cost (\$)
59th PI W (S of 208th St SW)	59.1	723	42,729	\$1,125	\$813,214	\$990	\$715,647
58th PI W (S of 208th St SW)	59.1	180	10,638	\$1,125	\$202,460	\$990	\$178,169
56th Ave W (N of 208th St SW)	59.1	610	36,051	\$1,125	\$686,114	\$990	\$603,796
55th Ave W (N of 208th St SW)	65	603	39,195	\$1,125	\$678,241	\$990	\$596,867
54th Ave W (N of 208th St SW)	58	605	35,090	\$1,125	\$680,490	\$990	\$598,847
53rd Ave W (N of 208th St SW)	65	603	39,195	\$1,125	\$678,241	\$990	\$596,867
53rd Ave W (S of 208th St SW)	65	555	36,075	\$1,125	\$624,251	\$990	\$549,356
Subtotal Construction Cost					\$4,363,000		\$3,840,000
Design (10%)					436,000		384,000
Permitting					50,000		50,000
First 2-3 yrs maintenance					5,000		4,000
Total Estimated Cost					4,855,000		4,278,000

^a Low Impact Development Technical Guidance Manual for Puget Sound (PSAT 2005). Jan. 2005 costs updated to Jan. 2008 using the Engineering News Record (ENR) construction cost index (CCI), 3% added for inflation to estimate 2009 costs. Cost estimate includes 1 sidewalk per block, new street paving, traffic calming design, and enhanced landscaping.

^b Source: Elkin 2008. 3% added for inflation to estimate 2009 costs. Cost estimate includes widening the existing planter strip, step-out zones to accommodate pedestrian access to vehicles, and enhanced landscaping/streetscapes. Cost estimate assumes road repaving not required.

ft = feet.

LF = linear foot.

ROW = right-of-way.

SEA = Street Edge Alternative.

sf = square feet.



Figure 5. Wide residential streets in the Hall Lake basin are also ideal for street edge treatment swale retrofits.



Figure 4. Wide road shoulders in the Hall Lake basin are ideal for street edge treatment swale retrofits.

PROJECT SUMMARY SHEET

- Project Title:** Drainage ditch retrofit to a create a bioretention swale in the Golde Creek basin
- Problem Description:** Sedimentation in Golde Creek due to runoff from urban development in the watershed. Potential source of fecal coliform bacteria in Swamp Creek downstream (which has a TMDL for fecal coliform bacteria).
- Project Description:** Conversion of a drainage ditch along the south side of Alderwood Mall Parkway between 28th Ave and Poplar Way to a bioretention swale.
- Design Assumptions:**
- Vegetation will be selected by the City and local residents and will include a variety of small trees, shrubs, and groundcover. Plants should be selected to be drought tolerant and not require watering after establishment (2-3 years).
 - Maximum ponding depth will be 12 inches.
 - Planting soil depth should be approximately 1 foot.
 - Mulch layer will be 3 inches.
 - Underdrain of 6-8 inches slotted PVC pipe.
- Project Benefits:** Enhanced storage, infiltration, and pollutant removal (e.g., heavy metals, phosphorus, oil, and suspended sediments).
- Maintenance Requirements^a:**
- Watering: First 2-3 years until plants are established, watering during prolonged dry periods
 - Erosion Control: Inspect periodically and replace soil, plant material, and/or mulch layer in areas where erosion has occurred
 - Plant Material: Occasional pruning and removing dead plant material. Periodic weeding is necessary until plants are established.
 - Nutrients and Pesticides: Nutrient and pesticide inputs should not be required since the soil mix and plants are selected for plant establishment and growth.
 - Mulch: Add mulch as needed to maintain a 2-3 inch depth at least once every 2 years.
 - Soil: The soil mix is designed to maintain long-term pollutant processing capability and should not need to be replaced for at least 20 years.

Estimated Project Cost: \$130,000

^a Source: Low Impact Development Technical Guidance Manual for Puget Sound (PSAT 2005).



Figure 1. Potential location for a bioretention swale in the Golde Creek basin.



Figure 2. Current condition of drainage ditch along the south side of Alderwood Mall Parkway between 28th Ave and Poplar Way.

Table 1. Planning level design, permitting, and construction cost estimate for drainage ditch retrofit in the Golde Creek basin.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
REMOVE EXISTING ASPHALT	89	SY	\$36	\$3,200	Assume existing walkway has approximate dimensions 200-feet long by 4-feet wide. Unit cost is from Jan. 2007 Seattle Public Utilities (SPU) Unit Cost Report, 5% added for inflation.
POROUS CONCRETE	800	SF	\$10	\$8,000	Assume dimensions 200-feet long by 4-feet wide by 6-inch thickness. Telephone conversation with Glacier NW sales person and Robin Kirschbaum on 10-2-2007. Cost includes materials, placement, and environmental surcharge. Unit cost is high end, 5% added for inflation.
TOP COURSE	4.9	CY	\$63	\$311	2-inch depth. Unit cost is from Jan. 2007 SPU Unit Cost Report. 5% added for inflation.
AGGREGATE BASE	30	CY	\$57	\$1,689	12-inch depth. Unit cost is from Jan. 2007 SPU Unit Cost Report, 5% added for inflation.
GEOTEXTILE FOR SEPARATION	89	SY	\$5.25	\$467	Unit cost is from Jan. 2007 SPU Unit Cost Report, 5% added for inflation.
EXCAVATION	119	CY	\$37	\$4,385	Assume small bobcat access, 1.5-foot depth of bioretention soil mix and 0.5-foot swale depth, 2-foot bottom width, 3:1 side slopes.
INITIAL ROTOLLING	52	CY	\$0.75	\$39	6-inch depth. Unit cost from SPU Raincatchers Project
COMPOST	12	CY	\$50	\$602	3-inch depth. Includes material, installation, and rototilling. Unit cost is from Jan. 2007 SPU Unit Cost Report, 5% added for inflation.
BIORETENTION SOIL	72	CY	\$55	\$3,972	1.5-foot depth. Includes material, installation, and rototilling. Unit cost is from Jan. 2007 SPU Unit Cost Report, \$5/CY price difference from compost quoted by Cedar Grove, 5% added for inflation.
INFLOW SPREADER AND CHECK DAMS	1	LS	\$3,000	\$3,000	Use quarry spalls, treated timber, or other inexpensive materials. Based on professional judgment.
NATIVE PLANTINGS	1,950	SF	\$5.00	\$9,750	Based on professional judgment.
				Earthwork and Material Subtotal:	\$35,415
OTHER ITEMS					
SUPPLEMENTAL SITE SURVEY DATA				\$3,000	
MOBILIZATION				\$3,541	10%
TEMPORARY EROSION AND SEDIMENT CONTROL				\$3,541	10%
TRAFFIC CONTROL				\$3,541	10%
CONTINGENCY				\$35,415	100%
SALES TAX				\$3,187	9%
				Subtotal Construction Cost:	\$87,600
DESIGN				\$17,520	20%
PERMITTING				\$8,760	10%
CONSTRUCTION MANAGEMENT				\$17,520	20%
				Total Estimated Project Cost:	\$130,000

PROJECT SUMMARY SHEET

- Project Title:** Street edge or parking lot runoff treatment retrofits in the Golde Creek drainage basin
- Problem Description:** Sedimentation in Golde Creek due to increased runoff from urban development in the watershed. Potential source of fecal coliform bacteria to Swamp Creek downstream (which has a TMDL for fecal coliform bacteria).
- Project Description:** Installation of a street edge or parking lot treatment system such as a Bacterra™ bioretention system.
- Design Assumptions:**
- Design infiltration rate of 65 inches per hour.
 - Sizing infiltration rate from the Washington State Department of Ecology of 33 inches per hour.
 - One 6 foot X 8 foot unit would treat 0.5 acre of impervious area (flat slope = 0-5%).
 - Unit will be filled with Bacterra™ media to remove fecal coliform bacteria.
- Project Benefits:** Pollutant removal (e.g., heavy metals, oil, total suspended solids, fecal coliform bacteria).
- Maintenance Requirements:** The following maintenance activities should occur twice per year (once in the spring and once in the fall):
- Remove foreign debris, silt, mulch, and trash.
 - Prune and replace plant, if necessary.
 - Replace mulch.
- Estimated Project Cost^a:** \$55,000

Notes.

^a Assumes treatment for 1 acre. Total project cost depends on the amount of drainage area treated and the total number of units installed.



Figure 1. Example of a Filterra® bioretention system (Americast, Inc. 2007).

Table 1. Planning level design, permitting, and construction cost estimate for street edge or parking lot runoff treatment retrofits in the Golde Creek Basin.

	One 6 foot x 8 foot Bacterra® unit treating 0.5 acre	Two 6 foot x 8 foot Bacterra® units treating 1.0 acre
Capital Cost ^a	\$13,700	\$26,800
Construction Cost (50%) ^b	\$6,850	\$13,400
Patch adjacent pavement	\$3,000	\$6,000
Subtotal		
Construction Cost	\$23,600	\$46,200
Design	\$4,000	\$6,000
Permitting	\$2,000	\$3,000
Total Cost	\$30,000	\$55,000

Source: Americast, Inc. (Evans 2008).

a Capital cost includes delivery, Bacterra® unit, plant, mulch, start up, and a one-year maintenance fee.

b Construction cost includes excavation, new piping, and labor.



Figure 2. Potential locations for street edge or parking lot retrofits in the Golde Creek basin.



Figures 3 and 4. Potential location for a street edge retrofit along Alderwood Mall Parkway (left) and an example of commercial development in the Golde Creek basin (above).

PROJECT SUMMARY SHEET

- Project Title:** Conversion of existing unimproved ditch to a bioretention swale along 180th Ave. SW between Hwy. 99 and Scriber Creek
- Problem Description:** Stormwater runoff from urban development transports sediment, oil and heavy metals into Scriber Creek
- Project Description:** Installation of compost-amended soil, small trees, shrubs, groundcover, and decreasing street width (e.g., impervious area) within the existing right-of-way.
- Design Assumptions:**
- Vegetation will be selected by the City and local residents and will include a variety of small trees, shrubs, and groundcover. Plants should be selected to be drought tolerant and not require watering after establishment (2-3 years).
 - Maximum ponding depth 12 inches.
 - Planting soil depth approximately 12 inches.
 - Mulch layer depth 3 inches.
 - 6-8" diam. slotted PVC underdrain pipe.
- Project Benefits:** Enhanced runoff storage, infiltration, and pollutant removal (e.g., heavy metals, phosphorus, oil, and suspended sediments)
- Maintenance Requirements^a:**
- Watering: First 2-3 years until plants are established, watering during prolonged dry periods
 - Erosion Control: Inspect periodically and replace soil, plant material, and/or mulch layer in areas where erosion has occurred
 - Plant Material: Occasional pruning and removing dead plant material. Periodic weeding is necessary until plants are established.
 - Nutrients and Pesticides: Nutrient and pesticide inputs should not be required since the soil mix and plants are selected for plant establishment and growth.
 - Mulch: Add mulch as needed to maintain a 2-3 inch depth at least once every 2 years.
 - Soil: The soil mix is designed to maintain long-term pollutant processing capability and should not need to be replaced for at least 20 years.

Estimated Project Cost: \$130,000

^a Source: Low Impact Development Technical Guidance Manual for Puget Sound (PSAT 2005).



Figure 1. Proposed location for a bioretention swale in the Scriber Creek basin.



Figure 2. Current condition of unimproved ditch along 180th Ave SW between Hwy. 99 and Scriber Creek.

Table 1. Planning level design, permitting, and construction cost estimate for bioretention swale retrofit along 180th Ave. between SR 99 and Scriber Creek.

Item	Quantity	Unit	Unit Cost	Amount	Assumptions/Notes
REMOVE EXISTING ASPHALT	89	SY	\$36	\$3,200	Assume existing walkway has approximate dimensions 200-feet long by 4-feet wide. Unit cost is from Jan. 2007 Seattle Public Utilities (SPU) Unit Cost Report, 5% added for inflation.
POROUS CONCRETE	800	SF	\$10	\$8,000	Assume dimensions 200-feet long by 4-feet wide by 6-inch thickness. Telephone conversation with Glacier NW sales person and Robin Kirschbaum on 10-2-2007. Cost includes materials, placement, and environmental surcharge. Unit cost is high end, 5% added for inflation.
TOP COURSE	4.9	CY	\$63	\$311	2-inch depth. Unit cost is from Jan. 2007 SPU Unit Cost Report. 5% added for inflation.
AGGREGATE BASE	30	CY	\$57	\$1,689	12-inch depth. Unit cost is from Jan. 2007 SPU Unit Cost Report, 5% added for inflation.
GEOTEXTILE FOR SEPARATION	89	SY	\$5.25	\$467	Unit cost is from Jan. 2007 SPU Unit Cost Report, 5% added for inflation.
EXCAVATION	119	CY	\$37	\$4,385	Assume small bobcat access, 1.5-foot depth of bioretention soil mix and 0.5-foot swale depth, 2-foot bottom width, 3:1 side slopes.
INITIAL ROTOTILLING	52	CY	\$0.75	\$39	6-inch depth. Unit cost from SPU Raincatchers Project
COMPOST	12	CY	\$50	\$602	3-inch depth. Includes material, installation, and rototilling. Unit cost is from Jan. 2007 SPU Unit Cost Report, 5% added for inflation.
BIORETENTION SOIL	72	CY	\$55	\$3,972	1.5-foot depth. Includes material, installation, and rototilling. Unit cost is from Jan. 2007 SPU Unit Cost Report, \$5/CY price difference from compost quoted by Cedar Grove, 5% added for inflation.
INFLOW SPREADER AND CHECK DAMS	1	LS	\$3,000	\$3,000	Use quarry spalls, treated timber, or other inexpensive materials. Based on professional judgment.
NATIVE PLANTINGS	1,950	SF	\$5.00	\$9,750	Tracy Tackett (SPU), personal communication
				Earthwork and Material Subtotal:	\$35,415
OTHER ITEMS					
SUPPLEMENTAL SITE SURVEY DATA				\$3,000	
MOBILIZATION				\$3,541	10%
TEMPORARY EROSION AND SEDIMENT CONTROL				\$3,541	10%
TRAFFIC CONTROL				\$3,541	10%
CONTINGENCY				\$35,415	100%
SALES TAX				\$3,187	9%
				Subtotal Construction Cost:	\$87,600
DESIGN				\$17,520	20%
PERMITTING				\$8,760	10%
CONSTRUCTION MANAGEMENT				\$17,520	20%
				Total Estimated Project Cost:	\$130,000
Assume a few design plan sheets and no special provisions Assumes only City permits needed					