

Lake Samish Basin Comprehensive Stormwater Plan



Prepared for



Prepared by



June 1, 2012

Lake Samish Basin Comprehensive Stormwater Plan



Prepared for
Whatcom County, Washington

Prepared by
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SURVEY/ENGINEERING

June 1, 2012

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Acronyms and Abbreviations

BMPs	best management practices
BPA	Bonneville Power Administration
CAO	Critical Areas Ordinance
CFR	Code of Federal Regulations
Centennial	Centennial Clean Water Fund
cfs	cubic feet per second
cfu	colony-forming units
CIP	capital improvement project
CMMS	computerized maintenance management system
CRIS	County Road Inventory System
Cu	copper
DO	dissolved oxygen
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EIA	effective impervious area
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERU	equivalent residential unit
ESA	Endangered Species Act
FC	fecal coliform
FCZD	flood control zone district
ft ²	square feet
FTE	full-time equivalent
G.O.	general obligation
GIS	geographic information system
GPS	Global Positioning System
HPA	Hydraulic Project Approval
HSPF	Hydrologic Simulation Program - Fortran
ICT	Interjurisdictional Coordinating Team
kg	kilograms
LID	low-impact development

LIDs	local improvement districts
LWD	large woody debris
M&O	maintenance and operations
MEP	maximum extent practicable
mg/L	milligrams per liter
mL	milliliters
NSEA	Nooksack Salmon Enhancement Association
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWIFC	Northwest Indian Fisheries Commission
ORV	off-road vehicle
OSS	on-site sewage system
P	phosphorus
PCBs	polychlorinated biphenyls
PDS	Whatcom County Planning and Development Services
PIE	public involvement and education
PSU	Portland State University
PWTF	Public Works Trust Fund
RCW	Revised Code of Washington
REET	real estate excise tax
ROW	right of way
SCADA	Supervisory Control and Data Acquisition
SDC	system development charge
SEPA	State Environmental Policy Act
SFR	single-family residence
SMP	Shoreline Management Program
SRF	State Revolving Fund
SSURGO	Soil Survey Geographic
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
TDS	total dissolved solids
TIA	total impervious area

TMDL	total maximum daily load
TP	total phosphorus
TSS	total suspended solids
UGA	urban growth area
ULID	utility local improvement district
USDA	U. S. Department of Agriculture
WAC	Washington Administrative Code
WCC	Whatcom County Code
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WRIA	Water Resource Inventory Area
WWU	Western Washington University

LAKE SAMISH

COMPREHENSIVE STORMWATER PLAN

EXECUTIVE SUMMARY



Executive Summary

Introduction

Lake Samish is located in the southwest corner of Whatcom County, Washington just south of the City of Bellingham. The 816-acre lake is a valuable resource for public recreation such as boating, fishing, swimming, and other water and lakeshore activities. The lake serves as a water supply for 95 percent of the 1,300 residents that live around its shores. There is no public water system, but 400 houses closest to the lake are served by a public sewer system. Heavily traveled I-5 traverses the watershed and runs adjacent to the eastern lakeshore for three miles.

Lake Samish discharges into Friday Creek, a salmon spawning tributary of the Samish River. The Lake Samish Basin is located in Water Resource Inventory Area No. 3, and is entirely outside the City of Bellingham Urban Growth Area (UGA) in unincorporated Whatcom County.

Forestry land comprises 67% of the basin area, with active logging typically underway somewhere in the basin at all times. Despite some 560 existing residences, less than 2% of the Lake Samish Basin's total area is covered by impervious surfaces.



Goals of the Lake Samish Comprehensive Stormwater Plan

- Understand the Lake Samish Basin stormwater system.
- Develop guidance for improving water quality, and managing water quantity.
- Reduce stormwater impacts from beneficial land uses: homes, highways, recreation, natural habitat, and forestry.

EXECUTIVE SUMMARY

Surface Water Quality Issues in Lake Samish Basin

Lake Samish residents are keenly aware of the potential for both acute and chronic risks to water quality. This Comprehensive Stormwater Plan explains the lake's dynamic workings, suggests simple but effective changes through education, and directs public and private resources to maximum advantage.

The lake does not generally exceed surface water quality standards, so protection and preventing any further degradation is the goal. Urban-quality stormwater runoff contains sediment, nutrients, fecal coliform, petroleum hydrocarbons and metals, which are all of concern. Sediment from residential development, forestry, and lakeshore recreation creates alluvial fans at creek mouths and collects behind the Friday Creek outlet dam.

While some gradual changes in lake trophic status are naturally occurring, stakeholders do not want to accelerate any process that leads to excess algal growth and murky waters unsuitable for drinking and contact recreation.



Alluvial Deposits

Water Quantity and Changing Hydrology

With forestry zoning comprising 67% of the basin, sediment and natural debris must be carefully managed to prevent downstream flooding and siltation. When residential development and logging change the land surface, the natural hydrology evolves very quickly from largely underground movement of water to the lake, to a higher percentage of surface runoff with attendant sediment and potential contamination of runoff. In the worst cases, drainage pipes become clogged with sediment and debris, causing localized flooding. Flooded roads next to the lake are a public safety driving hazard, and create acute spill potential if an accident were to occur. Debris flows, flooding, and road washouts can prevent emergency access to Samish Water District sewer facilities, with attendant potential for sewage spills.



January 2009 Flooding

EXECUTIVE SUMMARY

Plan Contents

Chapter 1 - Introduction and background of Lake Samish Basin physical attributes, environmental and political history.

Chapter 2 – Conditions and characteristics of the lake and basin; monitoring and modeling review.

Chapter 3 –Regulations relevant to stormwater management.

Chapter 4 – Maintenance and operations of stormwater-impacting facilities (multiple agencies)

Chapter 5 – Capital improvements needed

Chapter 6 – Programmatic recommendations

Chapter 7 – Funding and governance



Public Participation

- Stakeholders are focused, knowledgeable
- Five public meetings held on plan topics
- Review of complex Technical Memos
- 50+ unique comments on issues
- Public helped planning stage
- Public willing to help with implementation

Public comment has thoroughly informed the plan and the recommendations. Stakeholder adoption of roles and responsibilities is key.



Solutions

More than fifty programmatic actions and ten capital improvement projects were identified to address problems. An avenue for some form of action is clearly available for every agency and stakeholder. While some of the programmatic activities can be accomplished by citizen volunteers and County staff within existing budgets, all remaining projects will require a new source of funding.

A County-designated watershed manager would most effectively direct the collaboration between residents and multiple government agencies. A watershed manager could accomplish many of the programmatic actions, keep the public informed and involved, and be the County's official Lake Samish point of contact with all responsible entities.

These agencies play key roles in the health of Lake Samish:

- Whatcom County –multiple departments
- Samish Water District
- WA Dept. of Natural Resources
- WA Department of Fish and Wildlife
- WA Department of Transportation
- WA Department of Ecology

Programmatic Highlights

- Inform lake visitors that Lake Samish is a drinking water supply.
- Maintain culverts and catch basins.
- Maintain rutted roads and prevent ditch erosion.
- Designate watershed manager for program management and contact with public.
- Create GIS-based inventory of facilities to aid maintenance work.
- Request maintenance of WSDOT stormwater treatment vault.
- Resolve roles for continuation of lake-level management.
- Use relevant education materials from other watersheds.
- Manage boat launch for water quality considerations.
- Perform monitoring/modeling as funds permit.
-



Finney Creek at North Lake Samish Rd, January 2009

Capital Project Highlights

- Replace or install key culverts at four different locations.
- Provide water quality treatment catch basins at several locations.
- Reconfigure road drainage near Calmor Cove.
- Dissipate energy of Pacific Creek
- Dredge Friday Creek dam sediments.

Funding and Governance

Some recommended actions can be funded and administered from Whatcom County's general, road and flood control taxes. Other programmatic activities and all of the capital projects will require an additional funding source.

This plan recommends the existing Samish Watershed Subzone structure for revenue generation for both the lake-level and stormwater management activities.

Programmatic activities were classified as "Basic/Now" or "Special/Later" depending upon whether they were routine activities already covered by existing funding, or activities that were specially related to the circumstance of Lake Samish serving as a drinking water source subject to "urban-quality" runoff.

Funding for "Basic/Now" activities is a continuation of several County Department budgets potentially applied to the Lake Samish Basin, plus current subzone assessments for lake-level management. "Special/Later" activities require additional funding and time to implement. County Council acting as Board of Supervisors of the Flood Control Zone District has several options for raising the suggested additional revenue through the existing Samish Watershed Subzone: an *ad valorem* tax, a "per domestic unit" tax, or a user fee. This plan presents several funding examples.

For More Information

To learn more about Lake Samish and Whatcom County stormwater planning efforts, contact:

Kraig Olason, Senior Planner
Stormwater Division
Whatcom County Public Works
322 North Commercial, Suite 120
Bellingham WA 98225
Email: kolason@co.whatcom.wa.us
Telephone: 360-715-7450

Or visit the project website:
[Http://www.co.whatcom.wa.us/pds/LakeSamishComprehensiveStormwaterPlan](http://www.co.whatcom.wa.us/pds/LakeSamishComprehensiveStormwaterPlan)

1 Introduction and Background

Lake Samish is located in the southwest corner of Whatcom County, Washington just south of the City of Bellingham (Figure 1-1). The lake is a valuable resource for the citizens of Whatcom County and Skagit County, providing public access for boating, fishing, swimming, picnicking, and other water and lakeshore activities. The lake serves as a water supply for 95 percent of the 1,300 residents that live around its shores. Lake Samish is located in Water Resource Inventory Area #3 (WRIA 3), and discharges into Friday Creek, a salmon spawning tributary of the Samish River. The Lake Samish Basin, or watershed, is located entirely outside the City of Bellingham Urban Growth Area (UGA) in unincorporated Whatcom County. The Whatcom County Comprehensive Plan (2009) addresses land use planning for the area.

A multi-year process of public outreach, research, analysis, and governmental coordination has led to the completion of this document, the Lake Samish Basin Comprehensive Stormwater Plan. The document covers the stormwater-related past, present and future in terms of lessons learned, current conditions, and recommendations for improvement. A series of seven draft Technical Memos were used to compile and organize complex data for presentation to the public. Public feedback was solicited on the content of the Technical Memos, and public comments on new or additional topics of community interest were collected for further consideration. Chapters 1 through 7 of this document provide a succinct overview of the in-depth material covered in the public-reviewed Technical Memos (included herein as appendices).

1.1 Goals and Objectives of the Comprehensive Stormwater Plan

This section lays out the goals of the comprehensive stormwater plan, the key objectives (actions) necessary to achieve the goals, and the corresponding measures of performance for the objectives. Although one must read the entire plan for detail and context in each subject matter area, it is helpful to start with a framework upon which to array the facts, analysis and recommendations presented.

- Develop and present a thorough understanding of the Lake Samish Basin stormwater system.
- Develop fact-based guidance for improving and protecting water quality, and effectively managing basin water quantity.
- Empower public and private stakeholders to participate in the management of beneficial uses within the basin: residential, recreational, natural habitat, and forestry.

These goals are both congruent and hierarchical with respect to each other. Understanding must precede and inform guidance. Both understanding and guidance are necessary to empower stakeholders to act individually and in concert with other stakeholders.

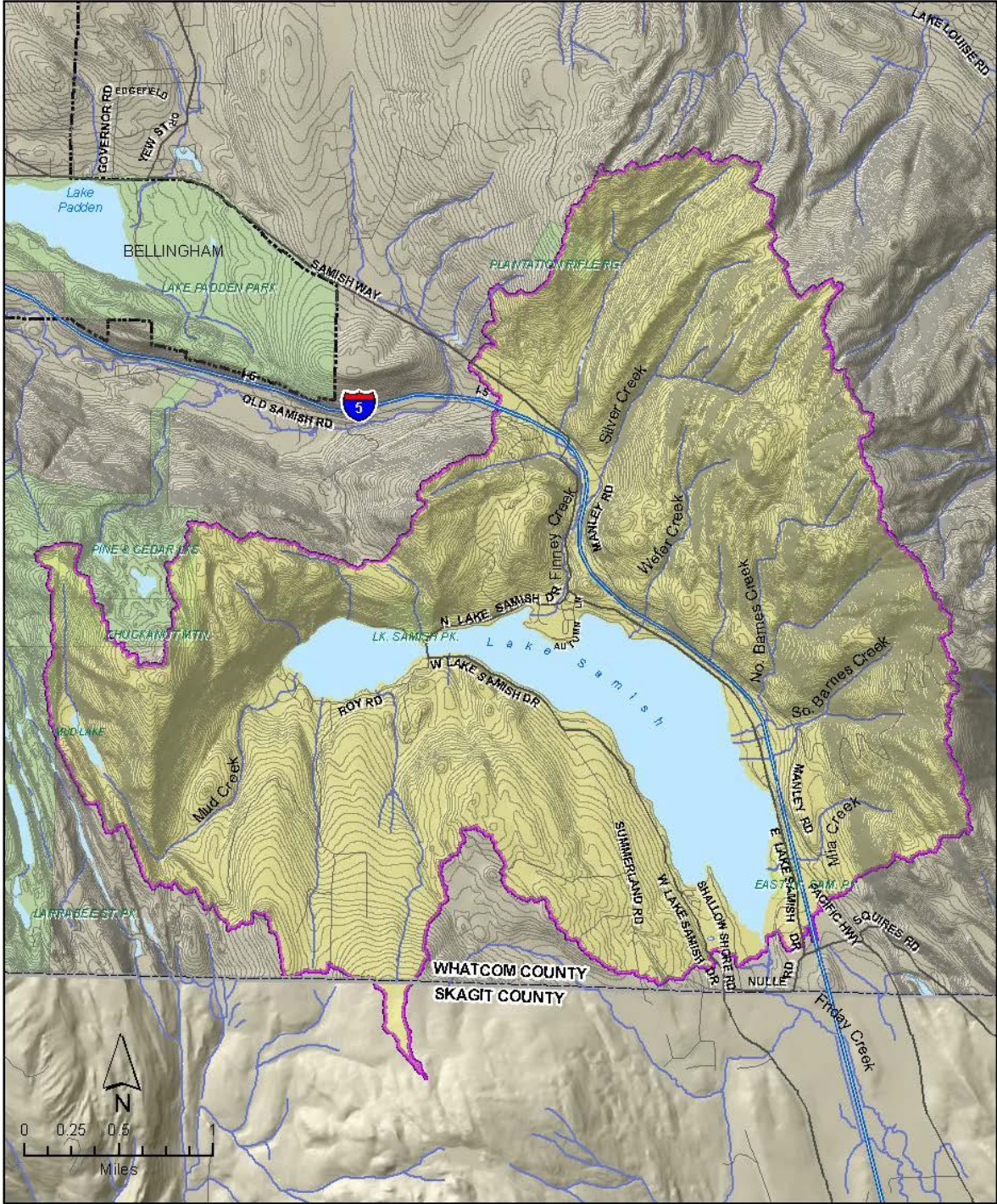
The goals are introduced in Section 1.1.1 below, and the objectives follow in Section 1.1.2 and Table 1-1 for brevity.

1.1.1 Goals

These goals (more akin to objectives) were originally placed on the project website for community review.

- Identify and address public stakeholder issues regarding stormwater in the Lake Samish Basin.
- Construct and calibrate a working hydrologic model for the Basin.
- Review current stormwater codes, regulations, and programs and recommend modifications, as necessary, to address issues in the Basin.
- Identify and rank potential stormwater programs and projects to address issues in the Basin.
- Craft a comprehensive stormwater management plan for the Basin.
- Identify funding and governance mechanisms for implementation of recommendations.

Figure 1-1. Lake Samish Basin



- Legend**
- Stream
 - 20 Ft Contour
 - Bellingham City Limits
 - Basin Boundary
 - Parks

Figure 1-1
Lake Samish Basin

1.1.2 Objectives and Corresponding Measures of Performance

The organization of goals and objectives in table form early in this document helps the reader comprehend the complex, detailed and interrelated information that follows in subsequent chapters. Where possible, each plan objective has a corresponding measure of performance, i.e. a completed action or deliverable indicating that the objective has been or will be met. The objectives were grouped into six topical categories to aid review and discussion, recognizing that: 1) subject matter areas frequently overlap in regards to stormwater; and 2) a completed objective might support the achievement of more than one of the goals.

Subject Matter Grouping of Objectives

- A. Water Quality
- B. Water Quantity and Changing Hydrology
- C. Fish Habitat
- D. Community Education, Involvement and Partnering with Agencies
- E. Planning Priorities
- F. Governance and Funding Mechanisms

Table 1-1. Plan Objectives and Corresponding Measures of Performance

Objective	Corresponding Measure of Performance
A. Water Quality	
1. Raise awareness about Lake Samish as a public drinking water supply for area residents.	Education strategy to raise awareness with basin stakeholders, the public, and public decision makers.
2. Identify potential sources of nutrient loading and sediment in the lake.	Results of scientific literature and field review on potential nutrient and sediment sources. Strategies to reduce nutrient and sediment loading (based on use of a water quality model.)
3. Identify contamination potential in the basin that could affect public health and safety.	Results of scientific literature and historical background reviews identifying potential contamination sources affecting public health and safety in the basin.
4. Identify information gaps with regard to current stormwater quality in the basin.	Recommendation for additional monitoring and studies as necessary to describe basin water quality.

Table 1-1. Plan Objectives and Corresponding Measures of Performance

Objective	Corresponding Measure of Performance
B. Water Quantity and Changing Hydrology	
1. Identify sub-basin drainages within the basin and determine current and projected stormwater flows.	Output from a hydrologic model, and mapping. Summary of research, public input, field visits, and discussions with basin stakeholders to document existing or potential problems related to stormwater flow quantity
2. Identify information gaps with regard to current stormwater flows in the basin.	Recommendations for additional study and modeling required to fill identified information gaps.
3. Identify and evaluate inadequacies in existing stormwater infrastructure.	List of infrastructure projects to address identified inadequacies.
C. Fish Habitat	
1. Evaluate current need for stream and lake bank restoration within the basin.	Scientific literature and background information review to determine stream and lake bank issues. List of restoration references and options.
2. Evaluate current needs for removal of instream fish barriers.	Review of current fish barrier surveys identifying barrier locations within the basin.
3. Evaluate the capacity of the basin to provide the required instream flows in Friday Creek.	Basin water budget that determines current and future expected flows in Friday Creek.
D. Community Education, Involvement and Partnering with Other Agencies	
1. Identify stormwater issues best addressed by community education and public involvement.	Strategies for community education and public involvement and recommendations for implementation.
2. Identify partnering opportunities for cooperative management of common stormwater related issues.	Stakeholder contact list and recommendations for partnering.
E. Planning Priorities	
1. Determine public concerns and expectations for stormwater management in the basin.	Public Participation Plan to receive public input on stormwater related concerns and issues in the basin.
2. Identify system for prioritization	Strategy for prioritizing problems and issues identified in the planning effort.

Table 1-1. Plan Objectives and Corresponding Measures of Performance

Objective	Corresponding Measure of Performance
F. Governance and Funding Mechanisms	
1. Determine public expectation with regard to governance and costs associated with stormwater management in the basin.	Technical Memo summarizing determined public expectations for governance form and costs.
2. Evaluate current governance and funding mechanisms.	Technical Memo documenting optional governance options, funding options, plan implementation, and recommendations.
3. Prepare the Lake Samish Basin Stormwater Comprehensive Plan (this document in final form)	Whatcom County Council adoption of this plan in final form.

1.2 Factors Driving Plan Development

A high level of community interest in developing this plan is driven by several unique circumstances. These circumstances include exposures to several types of public health and safety risks, and compelling opportunities for collaboration on area-wide environmental benefits. These risk and opportunity factors warrant an early and brief introduction to the reader in this first chapter and are then also described in more detail in subsequent chapters and the Technical Memos.

1.2.1 Risks to Lake Samish as a Public Water Supply

Over 95 percent of the residents living around Lake Samish rely on the lake for their domestic water needs through private lake withdrawals or private wells. While a public sewer system currently serves most residential development around the lake, there is no public water system serving the area. Residents either employ point-of-use residential water treatment systems, or use the water untreated. The land use in the basin includes forestry, dense residential development along the lakeshore, an interstate highway (I-5), and recreational activity near the lakeshore and on the lake. Each of these land uses can impair water quality in the basin by introducing nutrients, pollutants, and sediment into runoff to the lake and its tributaries.

The lake has experienced periodic blooms of cyanobacteria (blue-green algae) during the summer months. The Whatcom County Health Department has issued warning notices to residents drawing water from the lake due to concern about the potential health effects of cyanobacteria toxins to humans and animals.

Residents have also asked for study of whether lead from bullets might leach and contaminate groundwater or stormwater runoff to Ruby Creek near the long-established Plantation Gun and Rifle Range in the upper reaches of the Ruby sub-basin.

1.2.2 Altered Hydrology–Flooding and Aquatic Habitat Degradation

Conversion of undisturbed forestland to other uses increases the magnitude and frequency of storm flows, as well as other changes in the hydrologic regime. The effects on stream channels due to these hydrologic changes are well described in Whatcom County's 10-year Urban Growth Area Review Environmental Impact Statement (2009). These effects include:

- Increased scour of streambeds.
- Decreased streambank stability.
- Loss of gravels and cobbles, which would otherwise provide aquatic habitat, in steeper or more confined reaches.
- Excessive deposition of fine sediment in the gravels and cobbles in flatter or less confined reaches.
- Loss of physical channel structure that would normally provide energy dissipation of high flows and habitat for aquatic life.
- Degradation of water quality by sediments and other pollutants, such as heavy metals, nutrients, fecal pathogens, and petroleum products.
- Increased sediment deposition in downstream lakes.

Residential development, timber harvesting, local roads, and I-5 are all contributory causes of an altered hydrologic regime in the basin. A major road leading into the residential areas experienced a severe washout during heavy rains and creek flooding in 2009. Lake Samish has experienced increasing sediment deposition from inflowing streams in the form of alluvial fans, most sizeable at the mouths of Mud Creek, Finney Creek, and Barnes Creek. The lake's numerous tributaries have experienced increased streambank erosion and degradation of aquatic habitat.

1.2.3 Oil, Chemical or Wastewater Spill Potential

Lake Samish faces significant risk of sudden contamination from three different sources: (1) a hazardous material spill from traffic on I-5, (2) an overflow or breach of Samish Water District sanitary sewer facilities around the lake, or (3) an isolated residential spill that enters the drainage system flowing to the lake. A significant spill of aviation fuel resulted from an accident on I-5 in 1995. A much smaller fuel spill (10-15 gallons to the I-5 roadside) occurred in 2010. There have been no known leaks or overflows from the public sewer system within the last 15 years, but the potential exists since a portion of the sewer system is actually underwater at the Lake's edge.

1.2.4 Friday Creek Instream Flows for Fish

Since 1992, an agreement between the Washington State Department of Ecology (Ecology) and Whatcom County Lake Management District No. 1 (LMD) has required that outflow from Lake Samish into Friday Creek be sustained at 2 cubic feet per second (cfs) or higher to preserve fish habitat. The current method for sustaining instream flow throughout the summer is to raise the lake level during the wet season and draw down the level during the dry season by increasing the weir height of a retention dam at the outlet of the lake. The LMD has recently legally sunsetted, so this plan recommends transferring the flow management function to a different governance structure, the Samish Subzone of the County-wide Flood Control Zone District. The flow gauging and recording for this function is not as reliable as desired.

1.2.5 Opportunity for Inter-Agency and Stakeholder Cooperation within the Basin

Due to its geographic location, land use, zoning, recreational opportunities, and the presence of I-5, the Lake Samish Basin involves many significant public and private stakeholders. Because the basin drains south through Skagit County to Samish Bay, there are even more downstream stakeholders reliant, in part, on the quality and quantity of flow from the basin. Success of any stormwater management activities for the Lake Samish area will be dependent upon the level of interagency and stakeholder cooperation built into the management strategy.

An important element of this stormwater plan has been to identify strategies and methods for involving key agencies and stakeholders in the development and implementation of the plan, and to develop forums where these same agencies and stakeholders can directly interact with the public.

1.3 Previous Planning Efforts within the Lake Samish Basin

This section presents a brief overview of several historical planning efforts that involved the Lake Samish Basin. All are discussed in additional detail in Chapter 3 and Technical Memo 3 (Appendix A-3).

1.3.1 Comprehensive Planning

The *Chuckanut Lake Samish Subarea Comprehensive Plan* was developed as a component of the *Whatcom County Comprehensive Land Use Plan* in May 1986, prior to adoption of the State's Growth Management Act. It focused on regional design standards, growth management, land use, cultural resources, natural resources, citizen planning involvement, and intergovernmental coordination. Although technically still in effect, the subarea plan has largely been superseded by the countywide Comprehensive Plan.

1.3.2 Non-Point Action Planning

The *Samish Bay Watershed Non-Point Action Plan and Final Closure Response Strategy* was completed in December 1995. The plan introduced a source control strategy and implementation plan for abating and preventing nonpoint source pollution. Source control strategies were presented for agricultural activities, residential and commercial development, on-site sewage systems, forest practices, boats and marinas, mining activities, old landfills, transportation/utility corridors, spills and emergency response, recreational activities, and surface and groundwater withdrawals.

1.3.3 Instream Flows and Water Withdrawals Planning

In August 2003, the Skagit Watershed Planning Unit issued the *Water Resource Inventory Area #3 (WRIA 3) Samish River Sub-basin Watershed Management Plan (Draft)*. The goal of the planning effort was to ensure adequate water supplies remain available. The plan recommended various alternatives and strategies to manage instream flow needs and the water withdrawal needs for agricultural use, commercial use, and population and economic growth. Disputes have arisen regarding the instream flow recommendations included in the WRIA 3 draft plan, and the plan has yet to be adopted.

1.3.4 Wastewater and Drinking Water Planning

Since its formation in 1973, Samish Water District (SWD) (formerly Whatcom County Water District No. 12) has maintained an up-to-date comprehensive sewer plan for the public sewer system surrounding Lake Samish. On three separate occasions (circa 1975, 1992, and 2001), the District undertook comprehensive drinking water supply planning at the request of residents. Each of these planning efforts explored the feasibility and cost of implementing a public water system to serve residents around the lake. Each effort failed to garner sufficient public support for implementation. There are currently no ongoing planning efforts for establishment of a public water system within the basin.

1.4 Prior Stormwater Programmatic Efforts in Basin

1.4.1 Whatcom County Lake Management District No. 1 (LMD No. 1)

In 1989, Ecology informed the residents of Lake Samish that several Washington State resource agencies, Whatcom County Planning and Development Services, Whatcom County Health Department, and several Lake Samish riparian landowners were concerned about the long-term effects of increasing water withdrawals from Lake Samish and Friday Creek due to population growth in the basin. The impacts of low stream flows on fish habitat were a major concern. Ecology indicated that property owners around the lake would be required to stop drawing water from the lake unless they developed and implemented a plan to augment the stream flow in Friday Creek (the outlet of Lake Samish).

In 1991, lake residents petitioned Whatcom County for the formation of a lake management district, which would control lake level in order to attain the required minimum instream flows. Whatcom County Council created Lake Management District No. 1 in 1992, and that entity has been responsible for operation and maintenance of the flow control dam at the lake outlet ever since. The dam's weir height is typically raised in mid-April and lowered in mid-September each year.

The most recent development on this subject is that Lake Management District No. 1 was automatically sunset on January 28, 2012 in accordance with prior County Ordinance No. 2001-214, which extended the life of LMD No. 1 until a public water supply was available or January 28, 2012, whichever came first. Chapters 4 and 7 of this plan recommend transferring the Friday Creek flow management function to the Samish Subzone of the County wide Flood Control Zone District.

1.4.2 Lake Samish Watershed Management Advisory Committee (LSWMAC)

The Lake Samish Watershed Management Advisory Committee (LSWMAC) was formed by Samish Water District (SWD) in 2000 with the mission to investigate stormwater related issues within the basin and provide a forum for community expectations and concerns surrounding stormwater management. The district funded the committee's operations from its general fund, and received direct reports on the committee's activities. The committee prepared public newsletters updating residents on current stormwater planning efforts, conducted a public survey on stormwater issues in the basin, and hosted presentations by Whatcom County Public Works staff and Western Washington University water quality scientists at their regular meetings.

1.5 Review of Past and Ongoing Monitoring, Modeling

A significant piece of the comprehensive stormwater planning scope was to review and summarize past and ongoing water quality monitoring studies, and hydrologic and water quality modeling efforts with relevance to stormwater in the basin. That summary overview of studies and results is included in Chapter 2 Lake Samish Basin Characteristics and Conditions Assessment, Section 2.7. The studies are categorized there by entity sponsoring or performing the work. Additional detail on monitoring and modeling can also be found in Technical Memos No. 1, 2a and 2b included in Appendices A-1 and A-2. Recommendations for future additional monitoring and modeling are included in Chapter 5.

Monitoring performed in 1995-96 did not sample for petroleum hydrocarbons that might have been present as after-effects of the fuel spill. However, monitoring performed by Western Washington University in 1997-2000 (commencing two years after the aviation fuel spill) showed no troubling concentrations for any pollutant studied:

- Most total metals concentrations were either below detection limits and/or below State and Federal regulatory criteria.
- Only one composite sample (October 1997) from the West Arm of the lake contained a total lead concentration (0.009 mg/L) above the proposed drinking water MCL of 0.005 mg/L.
- During the other three sampling events in that location, lead was either at the detection limit of 0.001 mg/L or barely above it at 0.002 mg/l. No other metals exceeded the criteria.
- Fecal coliform levels were below the State surface water criteria in all samples, and most samples were even below the detection limit.
- No petroleum hydrocarbons were detected in the samples.
- No synthetic organics, herbicides or pesticides were detected in the samples.
- Nitrates were detected in all water samples at levels far below the Federal MCL.

1.6 Completed Stormwater Improvement Project

1.6.1 Washington Department of Transportation

I-5 is the dominant feature of the built environment on the eastern side of Lake Samish. I-5 is the only major traffic route through the basin and runs diagonally from the north to the southeast part of the basin. Surface water originating in the upper reaches of the northeast and eastern sides of the basin flows across the I-5 right-of-way either under bridges or through culverts. Runoff from I-5 traffic lanes and shoulders is collected and conveyed to outfalls and thence to the lake.

In 1995, WSDOT installed a stormwater treatment vault (approximately 75,000 gallons capacity) designed to remove sediment, floatable debris, and floatable petroleum products from stormwater for a large segment (but not all) of the I-5 drainage system. WSDOT installed the vault in response to public concern over the aforementioned 1995 aviation fuel spill on I-5 that temporarily contaminated Lake Samish, prompting Whatcom County Health Department to issue a warning to residents not to drink the lake water.

The water quality vault is located one-fifth of a mile south of the Wefer Creek crossing on the west side of East Lake Samish Drive. The function, maintenance, and operation of this vault was one of the public comment topics; it is further discussed with recommendations in Chapter 4.

1.7 Whatcom County Involvement in Plan Development

This plan was developed in close partnership with Whatcom County Public Works Stormwater. Senior County stormwater staff participated in the development of the public participation plan, participated in all of the public meetings, assisted in coordination with various private and public stakeholders within the basin, assisted in the organization and prioritization of the planning goals and recommendations, and provided review and feedback on the Technical Memos and the final plan document.

In addition, Whatcom County's Planning and Development Services, Health Department, Public Works Department, and Parks and Recreation Department employees offered planning assistance and background. The Whatcom County Council reviews the final plan, and solicits public comments on the final draft prior to plan adoption or instructed revision.

1.8 Public Outreach Regarding Stormwater

A public participation plan was implemented in early 2010 to facilitate public involvement early in this stormwater planning process. Strong emphasis was placed on ascertaining and publicizing public expectations and priorities. The public participation plan is described here in Chapter 1- Introduction and Background so that the reader will know that significant public input was received and is fittingly reflected throughout this document and incorporated into the recommendations for action. Chapter 4 Maintenance and Operations, and Appendix A-4 contain detailed public comment on a variety of existing facilities. Programmatic recommendations in Chapter 5 recognize that public and private stakeholder outreach, education, and discourse should continue even after the plan is complete.

Through the years, Lake Samish Basin stakeholders have had prior public comment opportunities in which to learn about and discuss their mutual and separate interests within the basin. The current public participation plan was focused on stormwater, but all comments were recorded in order to aid governmental and community understanding and resolution of overlapping problems.

1.8.1 Public Participation Plan for Comprehensive Stormwater Plan

The public participation plan identified the following activities and strategies for the outreach process. All of these strategies have been implemented since 2010.

- Public meetings
- Informal stakeholder meetings
- Additional local presentations to community groups and local agencies such as:
 - Lake Samish Association
 - Samish Water District
 - Whatcom County Council
- Newsletters
- Development of a Project Website

1.8.2 Public Meetings

Three public meetings were held at Lutherwood Camp in the basin to solicit public input on the Technical Memos and the topics listed below. (April 20, 2010; November 4, 2010 and March 15, 2011). A presentation was also made at a regular public meeting of the Lake Samish Association on April 22, 2010. A fifth public meeting to take comments on the final draft of the plan is anticipated for late June 2012.

Comment topics included the following :

- Development within the basin
- Potential impacts of I-5 on lake water quality
- Potential impacts of timber harvesting on lake water quality
- Impacts of various recreational activities on lake water quality
- Maintenance and operations activities for stormwater management within the basin
- Programmatic stormwater planning recommendations
- Capital improvement projects to be included in the final management plan
- Governance and funding strategies for stormwater and lake-level management in the basin

The largest number of unique public comments on the comprehensive planning effort were received and recorded at the first two meetings on April 20 and April 22, 2010. Comments were tabulated and organized according to sub-basin(s), scale of impact, and type of potential solution (i.e. programmatic and/or capital infrastructure). These public comment tables were placed on the project website for the benefit of those who had been unable to attend the meetings, and for the ability of attendees to recognize and be assured that their input had been accurately reflected. The public meeting comments from the first three

meetings are tabulated in this plan in Appendix B. The March 15, 2011 meeting produced focused discussion of the governance and funding questions, and did not result in another public comment table.

2 Lake Samish Watershed Characteristics and Conditions Assessment

Chapter 2 presents wide-ranging subject matter intended to give the community an overview of the complexity of the natural and human-influenced factors at work in this system.

Lake Samish defines the community surrounding it. It is the drinking water source for area residents and is the focus of recreation and scenic value. Since first being homesteaded in the 1890's, the Lake Samish Basin has hosted a number of diverse land uses including timber harvesting, three shingle mills, coal interests, the Great Northern Railroad, heavily traveled I-5, other rural roads, and residential and recreational uses. This chapter includes description of Lake Samish Basin's physical characteristics, an assessment of current social and environmental conditions, and proof and premise about the impacts of various land uses.

Relevant past and ongoing monitoring and modeling efforts are described in this Chapter. New hydrologic modeling that was performed as a part of the scope of this comprehensive stormwater plan is summarized in this Chapter. Water quality monitoring summaries are supported in more detail by Technical Memo No. 1 in Appendix A-1. Summaries of the current hydrologic modeling and the current and inconclusive water quality modeling are respectively supported by additional detail in Technical Memos No. 2a and 2b in Appendix A-2.

2.1 Lake Characteristics

Lake Samish, an 816-acre natural, freshwater lake, is located in the southwestern corner of Whatcom County approximately 5 miles southeast of Bellingham, Washington. The lake provides local residents and day-use visitors with numerous recreational opportunities including swimming, boating, fishing, hiking, and camping. The lake serves as the drinking water source for approximately 95 percent of residents living around the lake. According to public comments, many residents rely on the lake water for direct domestic use without treatment, and others provide their own point-of-use treatment systems.

Lake Samish was formed, in part, by glaciation during the Pleistocene Epoch. The lake is divided into two distinct basins (East Arm and West Arm) by an underwater sill. The East Arm contains approximately 84% of the total lake surface area (686 acres) with a mean depth of 32 feet and a maximum depth of 75 feet. The West Arm is smaller in surface area (130 acres), and significantly deeper with a mean depth of 71 feet and a maximum depth of 140 feet. The ratio of water volume in the East Arm to the West Arm is 2.3 to 1. The evolving trophic state of Lake Samish is discussed in Chapter 2.6.1.

2.2 Basin Characteristics

The Lake Samish Basin is an 8,005-acre watershed consisting of forested hillsides, valleys, ravines, and the lake area itself. No old-growth forest remains, and much of the second growth forest is now being harvested over time.

The basin is located entirely outside the City of Bellingham Urban Growth Area (UGA) in unincorporated Whatcom County. The topographically-defined basin is the "unit of study"

for this comprehensive stormwater plan, because all land within the basin contributes stormwater runoff to Lake Samish, and almost all of that land is within Whatcom County's jurisdiction. As noted in other sections of this plan, the Lake Samish Basin is itself one subset or sub-basin of a larger watershed downstream, the Samish River Basin. The Samish River Basin (and including Lake Samish Basin) is in Water Resource Inventory Area 3 (WRIA3), a state-level planning unit. Aside from the Lake Samish Basin, the substantial remainder of the Samish River Basin lies within Skagit County, the county immediately south of Whatcom County. Lake Samish is the headwater of Friday Creek, which flows for 9.3 miles to its intersection with the Samish River in Skagit County. The Samish River drains to Samish Bay in the Puget Sound, now also known as the Salish Sea.

Friday Creek is an important spawning tributary of the Samish River (steelhead, chinook, coho, and chum). The mandated minimum instream flow to Friday Creek, necessary to maintain natural fish habitat, is 2 cubic feet per second. In addition, the Washington Department of Fish and Wildlife operates a fish hatchery (approximately eight miles downstream from Lake Samish) which depends on Friday Creek flows for its operations.

The Lake Samish Basin is zoned for residential development in the nearshore areas, and commercial forestry or rural forestry in the upper reaches. I-5 is located very close to the eastern shore of the lake and traverses the basin in a northwest/southeasterly direction.

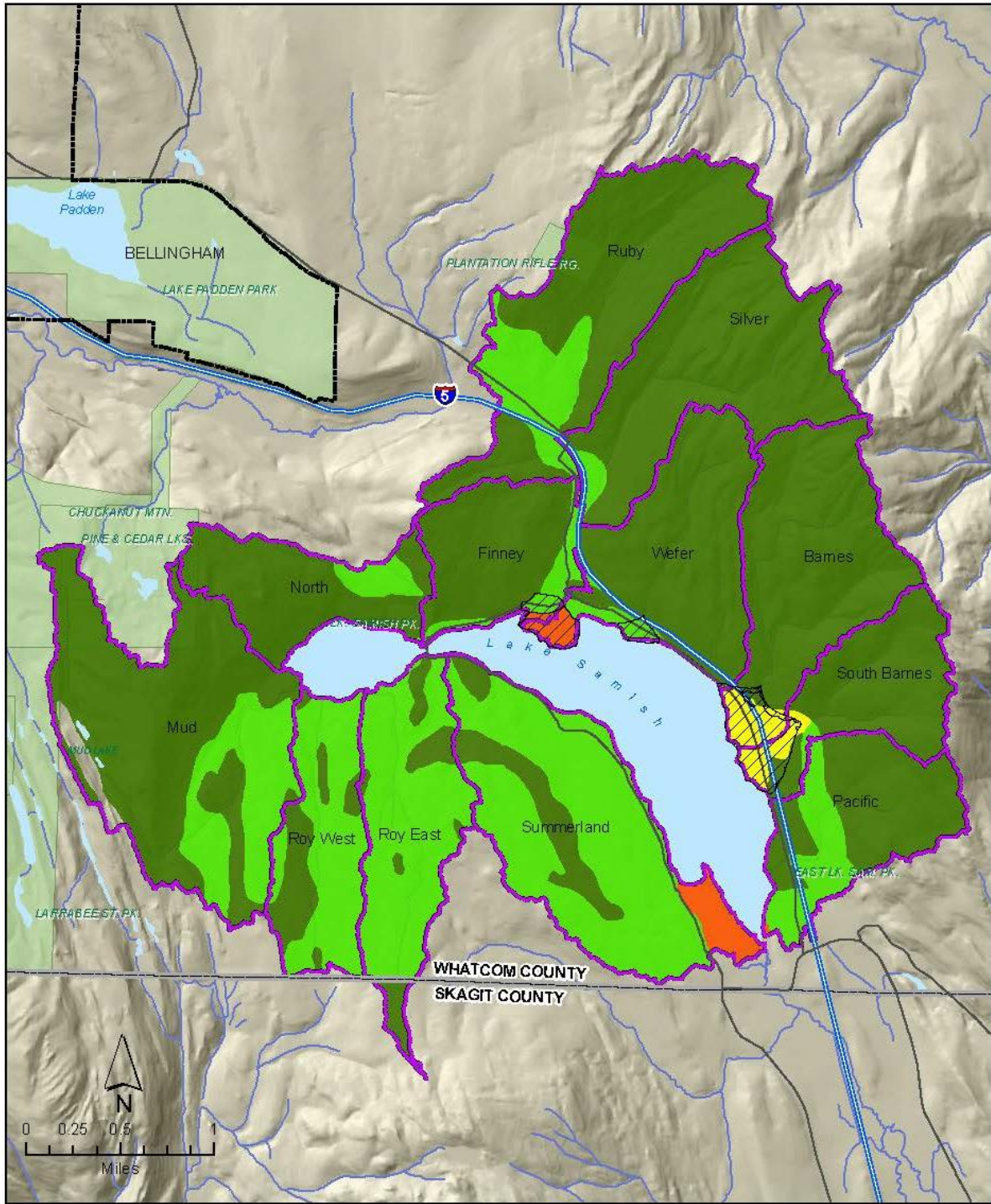
The presence of three separate geologic units define the soils in the Lake Samish Basin. The predominant geologic material is Pre-Jurassic Metamorphic rock (pJm) comprised of sedimentary rocks that metamorphosed under conditions of extreme heat and pressure. This material makes up the southern portion of the watershed with an additional finger of the formation extending up along the eastern side of the lake as far as Barnes Creek. The second most common geologic unit is the Chuckanut Formation (TKc), a consolidated sedimentary rock formed from the deposits of former rivers or river outflows. This formation is located around the balance of the watershed with the exception of the lake floor on the northern shore of the lake. That area is comprised of modern alluvium (Qal) of silt, clay, and fine sands deposited by the lake tributaries.

Figure 2-1 depicts the soil drainage classifications generally associated with the three geologic units in this basin: 1) pre-Jurassic, "moderately well-drained"; 2) Chuckanut Formation, "well-drained"; and 3) modern alluvium, "somewhat poorly drained." An area of "somewhat excessively drained" soils occur at the lower elevation reaches of the Barnes and South Barnes sub-basins on both sides of I-5.

The annual precipitation in the Lake Samish Basin microclimate can range from 70 to 130 inches, which is two to three times that observed for Bellingham just to the north. Temperatures (Fahrenheit) may range from winter lows in the teens to summer highs in the upper eighties.

The current Skagit County Flood Insurance Rate Map shows the northernmost boundary of the Samish River flood zone starting approximately 1.5 miles south of the lake. Land along the immediate shoreline of Lake Samish can experience flooding during major wet weather events, but this is hydraulically disconnected from the Samish River flood zone. Friday Creek peak flows can have a significant flooding impact on land in Skagit County (south of Lake Samish).

Figure 2-1. Lake Samish Basin – Soil Drainage Classifications



Legend

- Stream
 - Road
 - ⬜ Bellingham City Limits
 - ⬜ Drainage Sub-basins
 - ⬜ Parks
- Drainage Class**
- ⬜ Somewhat excessively drained
 - ⬜ Well drained
 - ⬜ Moderately well drained
 - ⬜ Somewhat poorly drained
- ⬜ Alluvial Fan

**Figure 2-1
Lake Samish Basin
Soil Drainage Classifications**

2.3 Sub-basin Characteristics

The Lake Samish watershed is topographically delineated into 12 major sub-basins for the purposes of this plan (Figure 2-2). Six major streams and numerous small and/or intermittent drainages feed the lake, and many of the sub-basins have very steep topography. Sub-basin areas and the surface waters in each are summarized in Table 2-1. Additional descriptive paragraphs including land use and observed physical characteristics for each sub-basin follow the table and the figure.

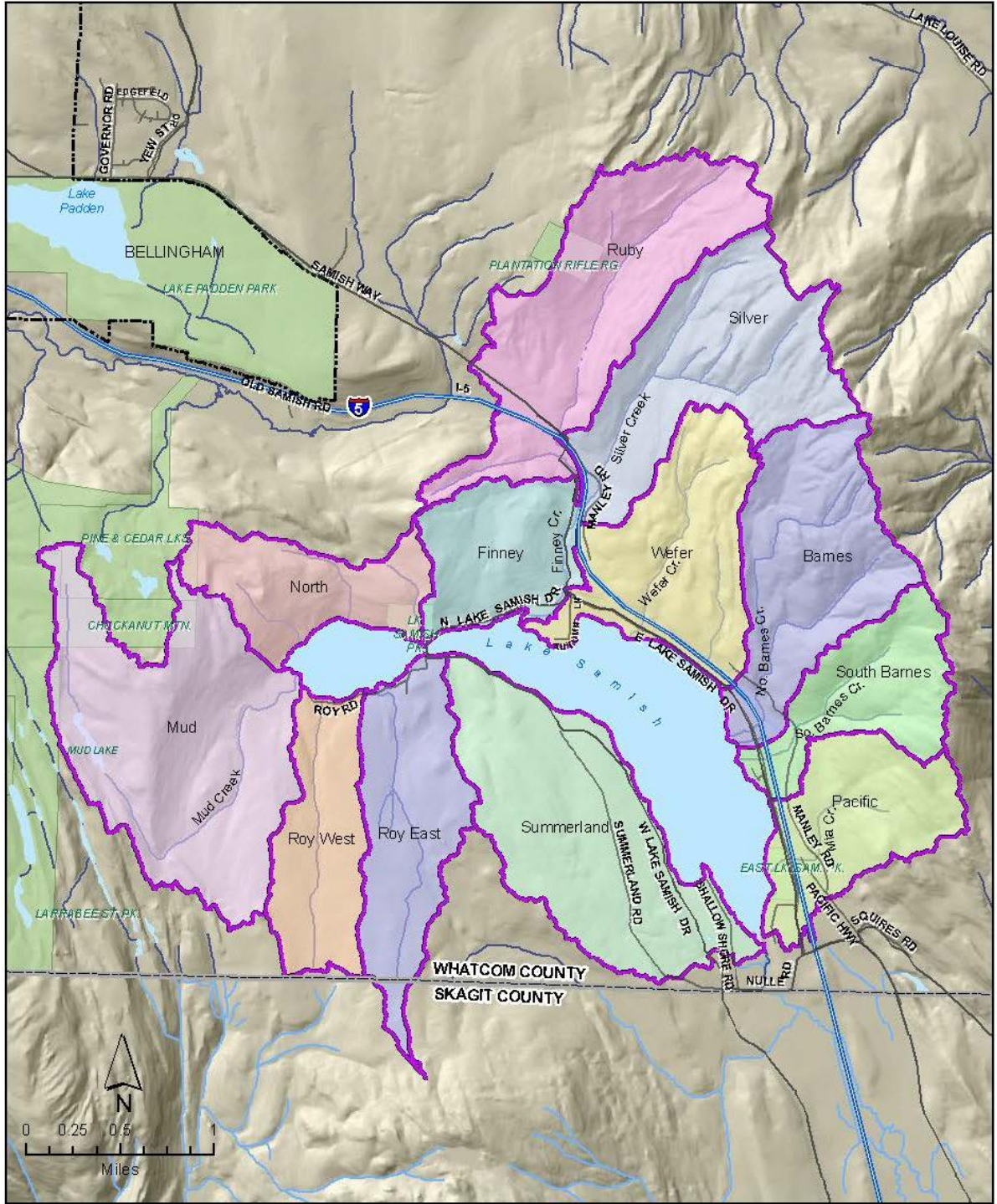
Table 2-1. Lake Samish Watershed Sub-basins

Sub-basin	Major Surface Waters	Area (acres)	Percent of Watershed Area
Summerland	None	865	12.0%
Roy East	Unnamed creek and tributary	509	7.1%
Roy West	Unnamed creek	395	5.5%
Mud	Mud Creek, Mud Lake (in upper reach)	1046	14.5%
North	3 unnamed creeks	372	5.2%
Finney	Finney Creek	378	5.3%
Ruby	Ruby Creek and tributaries (Finney Creek tributary)	828	11.5%
Silver	Silver Creek and tributaries (Finney Creek tributary)	718	10.0%
Wefer	Wefer Creek and tributary, and unnamed creek	596	8.3%
Barnes	Barnes Creek and unnamed tributaries	653	9.1%
South Barnes	Unnamed creek (lower Barnes Creek tributary) and tributary	381	5.3%
Pacific	Unnamed creek	448	6.2%
Total		7,189*	100%

*Note: Table 2-1 does not include the area of Lake Samish.

Below, each sub-basin has a short description of land slope, tributaries, existing development, and zoning. Figure 2-3 is a basin-wide zoning map to accompany the sub-basin map in Figure 2-2 and the discussion below. Zoning in the context of stormwater is presented with analysis in Chapter 3 - Review of Relevant Regulations and Plans.

Figure 2-2. Lake Samish Basin – Drainage Sub-basins

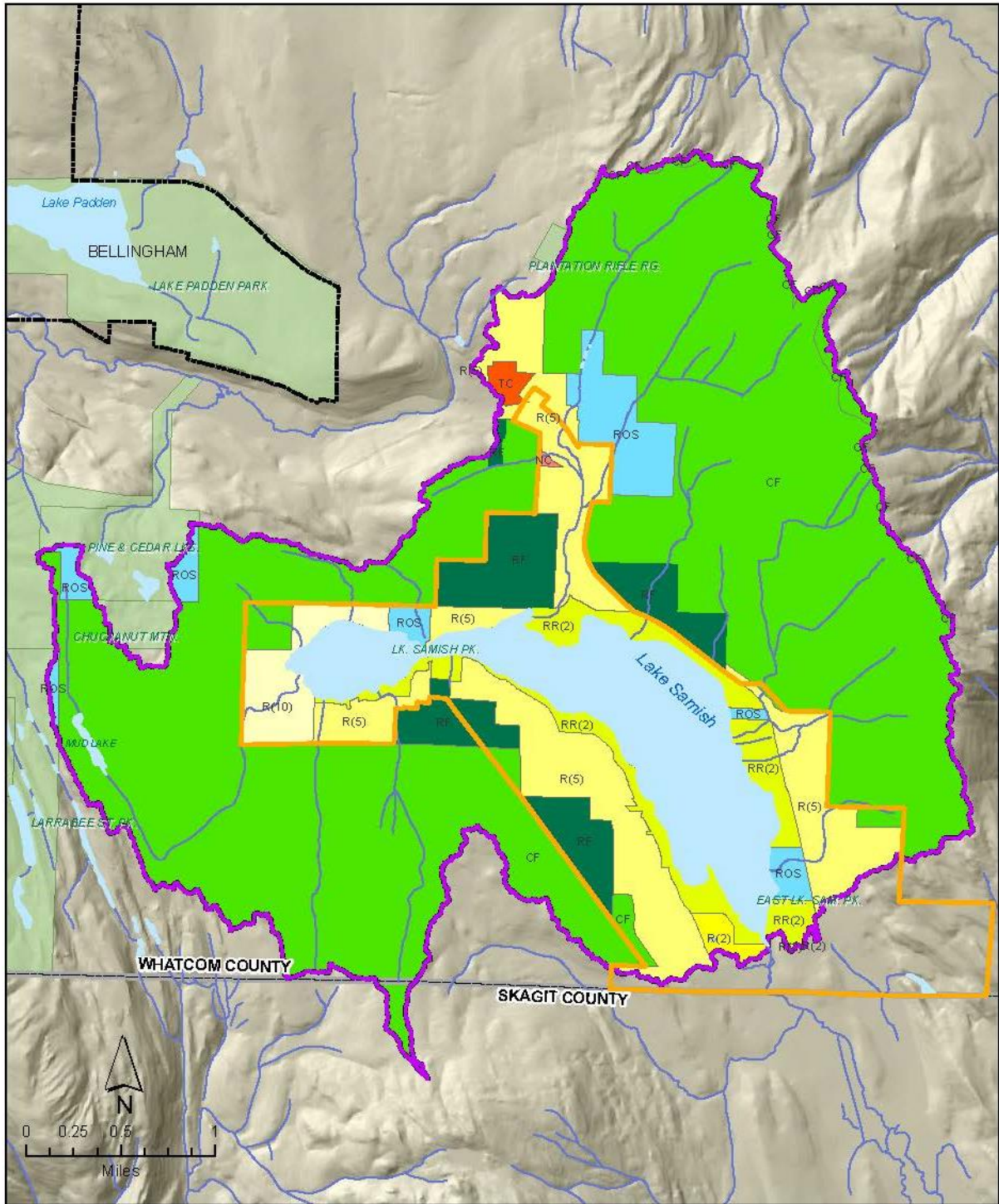


Legend

- Stream
- Road
- ▭ Bellingham City Limits
- ▭ Drainage Sub-basins
- ▭ Parks

**Figure 2-2
Lake Samish Basin
Drainage Sub-basins**

Figure 2-3. Lake Samish Basin – Zoning Designations



Legend

Samish WD Boundary	Zoning	R(2)	RR(2)
COB Limits	CF	R(5)	TC
Stream	NC	RF	WATER
Basin Boundary	R(10)	ROS	IF-NRL (Skagit County)
			Parks

**Figure 2-3
Lake Samish Basin
Zoning Designations**

*Lake Samish Comprehensive
Stormwater Plan*

2.3.1 Summerland

The Summerland sub-basin is mostly undeveloped and forested. The small developed area is zoned Residential Rural 2 (2 units/1 acre) and located along the shoreline. The upper reaches of the sub-basin are zoned Commercial Forestry and Rural Forestry. The middle elevations (approximately 40 percent of the sub-basin) are zoned Rural (1 unit/5 acres).

The Summerland sub-basin is not as steep as other parts of the watershed and has a generally uniform slope (average 13 percent). The upper sub-basin surface drainage is intercepted and routed through ditches and culverts along Summerland Road and West Lake Samish Drive to the lake.

2.3.2 Roy East

The majority of the Roy East sub-basin is undeveloped and zoned Commercial Forestry. There are small areas in the lower sub-basin that are currently undeveloped forest designated as Rural Forestry and Rural 5A (1 unit/5 acres). The only existing development is along the half mile of lake shoreline zoned Residential Rural 2 (2 units/1 acre).

The Roy East sub-basin has approximate average slopes of 12 percent. The majority of the sub-basin drains to a single unnamed creek that runs down the center of the narrow sub-basin. The unnamed creek is routed under Roy Road through a culvert approximately 200-ft from the lake. A small portion of the lower sub-basin drains to the east of the unnamed creek and is collected in ditches along Roy Road and North and West Lake Samish Drives, from whence it flows a short distance to the lake.

2.3.3 Roy West

The majority of the Roy West sub-basin is undeveloped and zoned for Commercial Forestry. There are also small portions in the lower sub-basin that are mostly undeveloped forest zoned as Rural 5A (1 unit/5 acres) and Rural 10A (1 unit/10 acres). Existing development is along most of the approximately ½-mile of lake shoreline and designated as Rural Residential 2 (2 units/1 acre). Lutherwood Camp & Retreat Center is in the northwestern corner of the sub-basin adjacent to the lake.

The Roy West sub-basin has approximate average slopes of 17 percent. The majority of the sub-basin drains to a single unnamed creek that also runs down the center of this narrow sub-basin. The unnamed creek is routed under Roy Road through a culvert approximately 100 feet from the lake. A small portion of the lower sub-basin drains to the east of the unnamed creek and is collected in a ditch along Roy Road and then under the road to the lake.

2.3.4 Mud

Mud is the largest sub-basin in the Lake Samish watershed. The majority is undeveloped and zoned for Commercial Forestry. All of the nearshore area is still forested (except for a small area occupied by Lutherwood Camp), but the land is zoned as Rural 10A development (1 unit/10 acres). There are two small recreation and open space (ROS) areas in the upper reaches of Mud sub-basin, adjacent to Pine and Cedar lakes in Larrabee State Park. The public does not generally access these recreation areas through the Lake Samish Basin. The favored public trails leading to these ROS areas are in the Chuckanut Bay drainage basin to the west.

The southeast portion of the sub-basin (adjacent to Roy West) has relatively flatter slopes, whereas the western and northern portions have steeper mountainous slopes more similar to the majority of the Lake Samish watershed. The average slope of the Mud sub-basin is 31 percent. The uppermost reach of the sub-basin (approximately one-quarter of the entire drainage area) drains to tiny Mud Lake, which flows out to Mud Creek. The rest of the sub-basin drains directly to Mud Creek, which flows into Lake Samish just east of Camp Lutherwood. An alluvial fan is forming at the mouth of Mud Creek.

2.3.5 North

The North sub-basin is almost entirely undeveloped and forested except for the immediate shoreline. Most of the sub-basin is zoned for Commercial Forestry. The only development is a portion of the County's Samish Park located in the southeast corner of the basin, and a few homes located west of the park along the shoreline. Samish Park includes a parking lot, a day lodge/community building with concessions, short hiking trails, and a swimming beach. In addition to the park, there is a small area zoned as Recreation and Open Space in the upper northwest corner of the sub-basin adjacent to the Pine and Cedar Lakes, which are in a different drainage basin to the west. The shoreline area west of the park is zoned Rural 10A (1 unit/10 acres).

The North sub-basin has a uniformly steep slope (average 35 percent). The sub-basin has no major streams, but does contain three small, unnamed creeks.

2.3.6 Finney

The Finney sub-basin is mostly undeveloped, forested land designated as Rural Forest or Commercial Forest. Developed areas are located mostly along the lake shoreline (approximately three-fourths of a mile) and to a lesser extent along Lake Samish Drive. Zoning includes Rural Residential 2 (2 units/1 acre) in the southeast corner, Rural 5A (1 unit/5 acres) along Lake Samish Drive/I-5 and North Lake Samish Drive, and Recreation and Open Space (ROS) in the southwest corner near Lake Samish County Park. Finney sub-basin generally has steep slopes (average 31 percent), and there is an alluvial fan at the mouth of Finney Creek.

Finney Creek is formed by the confluence of Ruby and Silver Creeks; thus, Finney Sub-basin is located downstream of these two sub-basins. Only the eastern one-third of the sub-basin drains to Finney Creek. The remainder drains directly to the lake. Finney Creek flows between I-5 and Lake Samish Drive in its upper reaches of the sub-basin and eventually crosses over to the west side of Lake Samish Drive. Finney Creek flows through a culvert under North Lake Samish Drive before flowing approximately 1,200 feet to Lake Samish. Drainage from the western two-thirds of the sub-basin is intercepted by a ditch and culvert system along North Lake Samish Drive, which has numerous outlets to the lake. This drainage system was the site of a significant road washout during heavy rains in January 2009. (Appendix A-4 Maintenance and Operations)

2.3.7 Ruby

Most of the Ruby sub-basin is undeveloped and zoned for commercial forestry. Much of the upper Ruby sub-basin forested area has been harvested and is now relatively young growth. There are a number of smaller areas of the sub-basin along I-5 designated as rural forestry, recreation and open space, neighborhood commercial (which includes the Shell fueling station), tourist commercial, or rural 1 unit/5 acres.

The Ruby sub-basin has steeper slopes in the upper reaches and gentler slopes near I-5 (average 30 percent).

The majority of the Ruby sub-basin, especially the upper reaches, drains directly to Ruby Creek, which is a major tributary to Finney Creek. Much of the drainage around I-5, Samish Way and Lake Samish Drive and their interchange area is collected by ditches and routed through culverts and eventually to Ruby Creek and hence to Finney Creek. One unnamed creek drains a finger portion of forested area west of Lake Samish Drive and I-5.

2.3.8 Silver

Most of the Silver sub-basin is undeveloped and designated as commercial forestry. Much of the middle elevation forest has been harvested and is now relatively young growth. A forested portion of the lower reach of the sub-basin is designated as recreation and open space. There are no residences in the Sub-basin. The only developed area is along I-5 and is designated as rural 1 unit/5 acres.

The majority of the Silver sub-basin drains directly to Silver Creek, which is a major tributary to Finney Creek. Silver Creek's drainage path is interrupted by I-5 and for a short distance flows along I-5 and under it through a culvert, where it merges with Ruby Creek to form Finney Creek. I-5 runoff flows to Silver Creek.

2.3.9 Wefer

The majority of the Wefer sub-basin is undeveloped and designated as commercial forestry and rural forestry. There is a small area in the upper sub-basin designated as recreation and open space. Most of the development in the sub-basin occurs in the areas along the lakeshore south of I-5 and East Lake Samish Drive; these areas are designated as residential rural 2 units/1 acre (this includes the Lake Samish Terrace Park residence area). There is also a section of the sub-basin along I-5 designated as rural 1 unit/5 acres.

The Wefer sub-basin uphill from I-5 is uniformly steep in slope (approximate average slope of 31 percent). The slope becomes quite flat, however, in the developed areas closer to the lake. An alluvial fan is present at the mouth of Wefer Creek (smaller than for Barnes Creek or Finney Creek).

Wefer Creek drains the upper reaches of the Sub-basin. The lower areas drain in a direction perpendicular to I-5. These flows are routed in ditches and culverts under I-5 and East Lake Samish Drive and to the lake. Stormwater from Lake Samish Terrace Park flows directly to the lake from some of the shoreline parcels or is conveyed north before discharging into the bay on the east side of the Terrace Park peninsula. A smaller eastern portion of the sub-basin is drained by an unnamed creek that flows through culverts under I-5 and East Lake Samish Drive before flowing into the lake.

2.3.10 Barnes

The Barnes sub-basin is almost entirely undeveloped and designated as commercial forestry. Much of the upper Barnes sub-basin forested area has been harvested and is now relatively young forest growth. The only development is a few residences along the lake shoreline below I-5, where the zoning is residential rural 2 units/1 acres. The lower sub-basin along I-5 is designated rural 1 unit/5 acres and there is a small area along the lake

designated as recreation and open space. The Barnes sub-basin has a relatively short lake shoreline, approximately one-quarter mile.

With the exception of some of the lake shoreline area, the entire Barnes sub-basin is drained by Barnes Creek and its upper reach tributaries. Barnes Creek is routed along I-5 ditch and under I-5 through a culvert, again through a ditch and culvert under East Lake Samish Drive and finally into Lake Samish.

The topography on the uphill side of I-5 is steeply sloped (average slope of 43 percent), whereas the topography on the downhill side of I-5 (the developed area) is mildly sloped. A relatively large alluvial fan is present at the mouth of Barnes Creek.

2.3.11 South Barnes

Most of the South Barnes sub-basin is undeveloped and zoned for commercial forestry. Much of the forested upper reach has been harvested and is now relatively young forest growth. There are a few residences around Manley Road and west to I-5 in an area zoned rural 1 unit/5 acres. Most development is along the shoreline of the lake in areas zoned residential rural 2 units/1 acre.

The upper reaches of the sub-basin are uniformly steep (approximate average slope of upper reaches is 60 percent). Slopes are gentler near Manley Road and relatively flat between I-5 and the lake shoreline (lower reach average slope of 17 percent).

The majority of the South Barnes sub-basin drains to the unnamed creek and its tributaries above Manley Rd. The creek collects some Manley Road ditch flow. The creek flows via culverts under Manley Road, under I-5, and then under East Lake Samish Drive, picking up ditch flow along the way before flowing into Lake Samish. An assortment of ditches and culverts convey stormwater to the lake from the lower reaches of the sub-basin.

2.3.12 Pacific

The majority of the Pacific sub-basin is undeveloped and forested. The upper elevations (approximately half the total sub-basin) are designated as commercial forestry. Approximately one-third of the sub-basin (middle reach) is designated as rural 1 unit/5 acres. This area includes a number of residences located along Manley Road and Pacific Highway. The sub-basin has approximately three-quarters of a mile of lake shoreline, approximately half of which is designated residential rural 2 units/1 acre and is mostly developed. The other half of the shoreline is designated recreation open space. The upper reach, approximately half the sub-basin is uniformly steep with average slope of 44 percent. The lower half of the sub-basin flattens out and has an approximate average slope of 16 percent.

Most of the Pacific drainage is first collected in the Manley Road ditch and then conveyed via ditches and culverts under Manley Road, Pacific Highway, I-5, and East Lake Samish Drive. One small unnamed creek drains a portion of the sub-basin. East Friday Creek Road is a developed lakeshore area that also has a system of small ditches and culverts conveying flow into the lake.

2.4 Critical Areas

“Critical areas” are environmentally sensitive natural resources that are defined, protected, and managed in accordance with many different federal, state, and local regulations. Many different kinds of critical areas are observed in the Lake Samish Basin, and strangely, they are both resources to be protected, as well as potential contributors to some of the water quality concerns in the basin. The regulatory issues associated with critical areas are covered in detail in Chapter 3. In this section, we provide only a brief overview of critical areas in the Lake Samish Basin to further the understanding of the complex relationships among land slope, vegetation, soil classifications, water volumes and velocities, and ultimately water quality. Table 2-2 lists six different categories of regulated critical areas found within the Lake Samish Basin, and the types of locations where they typically occur.

1. Geologically Hazardous Areas
2. Frequently Flooded Areas
3. Critical Aquifer Recharge Areas
4. Wetland Areas
5. Wildlife Habitat Conservation Areas
6. Fish Habitat Conservation Areas

Table 2-2. Summary of Critical Areas in the Lake Samish Basin

Category /Subcategory	Location Description
1. GEOLOGICALLY HAZARDOUS AREAS (GHA, WCC 16.16.3)	
GHA 1A – Landslide Hazard Areas (WC PDS 1998)	
15-35% Slope	Upper basin slopes, especially to the north, east, and west of the lake.
>35% Slope	Upper basin slopes especially to the east and west of the lake.
GHA 2 – Seismic Hazard Areas – Site Class and Liquefaction (WDNR 2004)	
Low to Moderate Liquefaction Susceptibility with Potential for Increased Amplification of Ground Shaking	<ul style="list-style-type: none"> • Northern Peninsula – South of N. Lk Samish Road. • Southern & Eastern Area – Between Samish Drive and Manley Rd/Pacific Hwy. • On the eastern side of the lake, GHA 2 zone extends as far north as the Barnes Creek sub-basin
GHA 3 – Alluvial Fan Hazards	
Alluvium (Whatcom County PDS 1994, 2005)	Northern Peninsula – South of N. Lk Samish Road

Table 2-2. Summary of Critical Areas in the Lake Samish Basin

Category /Subcategory	Location Description
2. FREQUENTLY FLOODED AREAS (FFA, WCC 16.16.4)	
Area Inundated by 100-year Flooding (according to FEMA's FIRM)	All low-lying, developed areas immediately adjacent to the lake.
3. CRITICAL AQUIFER RECHARGE AREAS (CAR, WCC 16.16.5)	
Ground Water Boundaries – Surficial Aquifers (see Note - Susceptibility not assessed)	Identified in two areas: southwest shore of Lake Samish (between shoreline and Manley Rd) and Camp Lutherwood off the West Arm of Lake Samish.
Wellhead Protection Areas	Eight wellhead protection zones are identified: Calmor Cove (1), Lutherwood (1), West of Samish Park (1), Near mouth of Finney Creek (3), South of N. Lake Samish Interchange on I-5 (1), and Ruby Cr. north of I-5 (1)
<p>Note: Surficial aquifers are shallow aquifers typically less than 50 feet thick(15m), but thicknesses of about 60 feet (18 m) have been mapped. In surficial aquifers, the groundwater is unconfined and continuously moves along the hydraulic gradient from areas of recharge to streams and other places of discharge. Surficial aquifers are recharged locally as the water table fluctuates in response to drought or rainfall. Therefore, the temperature and flow from water-table springs varies.</p>	
4. WETLANDS (WCC 16.16.6)	
Wetlands (Forested & Non forested)	<ul style="list-style-type: none"> • Southern end and eastern shore of Lake Samish, predominantly near the outlet to Friday Creek. • Intermittent wetlands all along Mud Cr. from Mud Lake to the mouth. • Intermittent upland, forested wetlands in the Finney, North, Ruby, Roy East, and Summerland sub-basins, and elsewhere throughout the basin.
5. WILDLIFE HABITAT CONSERVATION AREA (HCA, WCC 16.16.7)	
HCA 2 – State & Federal listed Species Have a Primary Association	<ul style="list-style-type: none"> • Lowlands around the perimeter of the lake with the exception of the north lake shore in the North sub-basin. • East of I-5 within the Barnes, S. Barnes, and Pacific sub-basins.
HCA 3 – Habitats and Areas Associated with State Priority Species	Upland areas north and east of the lake.
HCA 10 – Habitats and Species of Local Importance	Lowland and upland areas south and southeast of the lake.
6. FISH HABITAT CONSERVATION AREA (HCA, WCC 16.16.7)	
HCA 1b – Other Fish Bearing Streams	<ul style="list-style-type: none"> • CAO mapping shows detailed distribution primarily for WRIA 1. • Lake Samish current fish distribution includes Mud Cr., Finney Cr., Silver Cr., Ruby Cr., Barnes Cr., and Friday Cr.

2.5 Built Environment

The built environment in the Lake Samish Basin largely consists of single-family residences and roads (both paved and unpaved). Forest roads, I-5, local roads, and private driveways make up the majority of impervious surfaces. Single-family residence roofs make up most of the remainder of the impervious surfaces. The total amount of impervious area is very low – only 123 acres, or 1.7% of the basin land area.

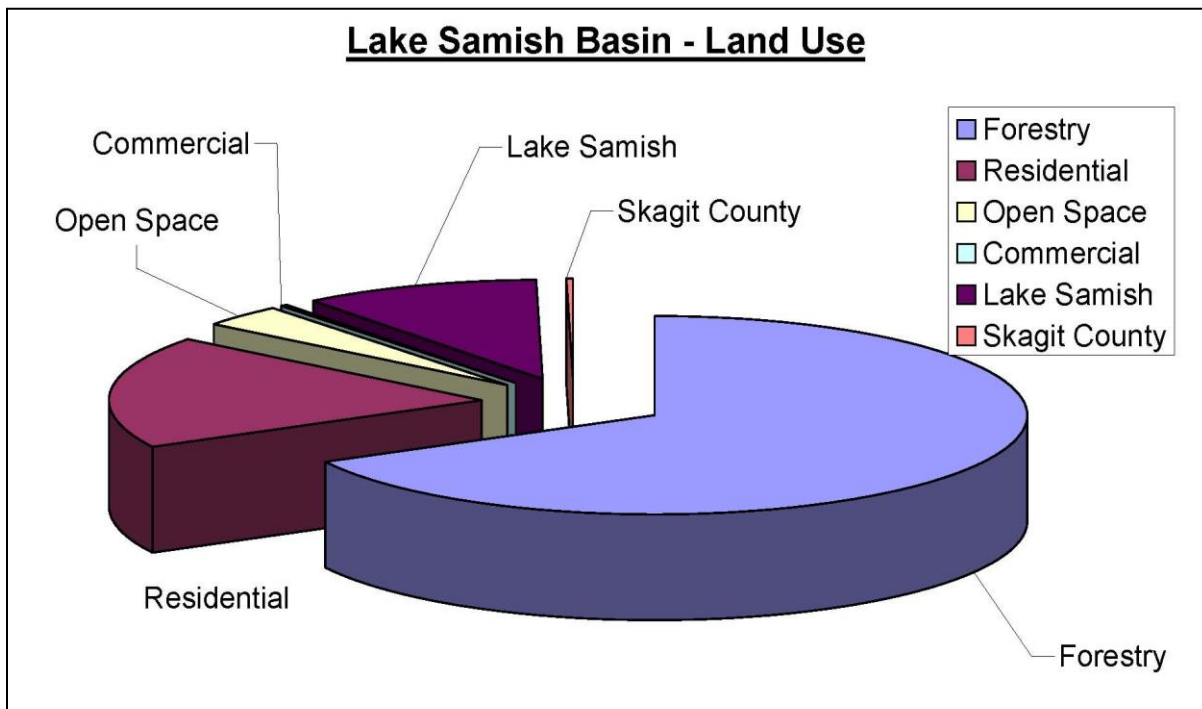
The majority of land use is forestry (75%) and most of the remainder is residential (21%), which is concentrated near the lakeshore. Table 2-3 gives the area of existing impervious surface in each sub-basin, the total area of each sub-basin, and the predicted area of potential additional impervious surface in each sub-basin at maximum build out. Zoning designations generally correspond to existing land use and are discussed in Chapter 3.

Table 2-3. Existing and Future Impervious Areas in the Lake Samish Basin

Sub-Basin	Sub-Basin Area (acres)	Existing Impervious Area (acres)	Build-Out Impervious Area (acres)	Potential Increase in Impervious Area from Development (acres)	Build-Out Increase as Percent of Sub-Basin %
Ruby	828	14.8	20.5	5.7	0.7%
Silver	718	3.2	4.3	1.1	0.2%
Mud	1,046	0.2	0.8	0.6	0.0%
Summerland	865	24.2	57.4	33.2	3.8%
Barnes	653	5.6	8.3	2.7	0.4%
Wefer	596	28.9	34.8	5.9	1.0%
Roy East	509	3.5	7.5	4.0	0.8%
Pacific	448	20.9	33.1	12.2	2.7%
Roy West	395	2.4	5.4	3.0	0.8%
South Barnes	381	11.8	18.0	6.2	1.6%
Finney	378	7.7	13.1	5.4	1.4%
North	372	0.0	0.6	0.6	0.2%
TOTAL	7,189*	123.2	203.8	80.6	1.1%**

* Total does not include the area of the lake (816 acres).

** Potential increase in impervious surface as percent of total basin land area. (Not a sum of column above).

Figure 2-4. Land Use in Lake Samish Basin

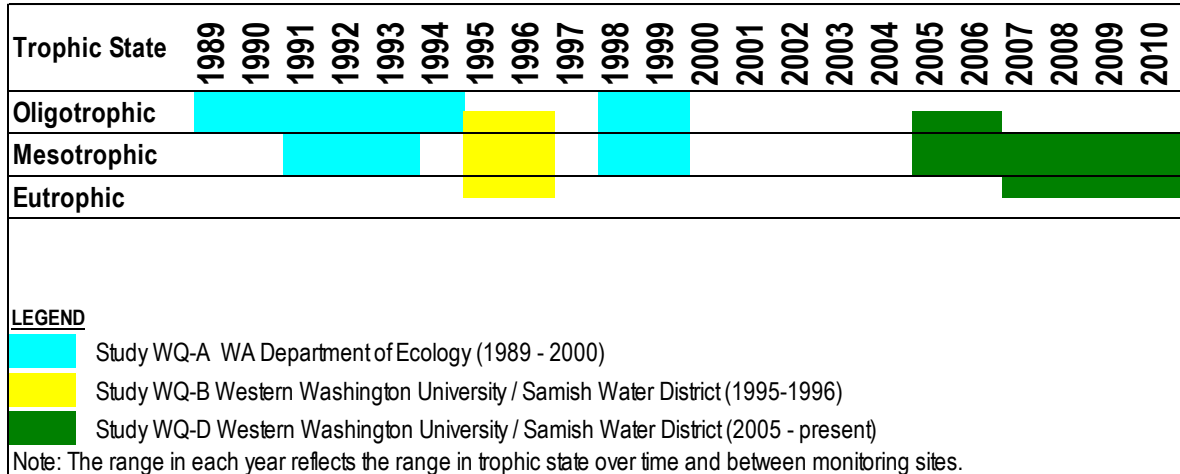
2.6 Surface Water Conditions, Issues and Problems

This section describes the relationships among natural and human-caused factors affecting water quality. The four main sources of information for this section are Lake Samish stakeholder comments (issues and problems), results of past water quality monitoring studies (conditions), hydrologic modeling performed specifically to inform this plan (conditions), and a scientific literature search (issues and conditions). Although one may try to discuss water quality and water quantity investigations separately, it soon becomes clear that the two topics are inseparably tied to water quality outcomes in the basin. Careful and specific word choice and recognition of perspective are necessary to discuss water quality and quantity changes effectively.

2.6.1 Causes of Water Quality Change

Lake Samish is undergoing the process of eutrophication or enrichment. Eutrophication is enrichment over time in dissolved nutrients (predominantly phosphorous and nitrogen), which typically leads to increased algal blooms, lower dissolved oxygen, and changes in the biotic community. Eutrophication occurs naturally over time in most watersheds, but accelerates as a result of human activities that increase nutrient inputs to the lake (“cultural eutrophication”). Historically, the trophic state of Lake Samish has been oligotrophic, meaning little enrichment, low algal productivity, and clear waters (if not impacted by sediment turbidity). The current trophic state of the lake is mesotrophic, indicating an intermediate level of algal productivity. Figure 2-5 graphs the trend toward eutrophication and is based on three different water quality monitoring studies described in Section 2.7 below.

Figure 2-5. Timeline of Trophic States for Lake Samish



Nutrient and/or sediment inputs from developed land runoff, on-site sewage systems, residential and recreational activities, and forest practices can far exceed the rate and total natural inputs to a lake in areas not affected by human activity. The accelerated rate of water quality change caused by these nutrient loads usually result in algal blooms, and proliferation of rooted aquatic weeds. (Sometimes, contamination of water, fish, and sediments can occur from chemicals or metals *not* normally associated with natural lake systems, for example organic pesticides, PCB's, synthetic fuels, copper, lead or mercury. These instances of water quality change, however, are not associated with nor causes of eutrophication.) It is not always easy to distinguish between a source for something that is clearly a “pollutant” and never belongs in a natural lake system, versus one that is part of a natural lake system but becomes imbalanced (e.g. nitrogen, phosphorous, sediment, sand and gravel).

The degree of eutrophication is a continuum from very low concentrations of nutrients to very high relative concentrations of nutrients. For practicality, limnologists have classified the degree of eutrophication into several progressive stages. Criteria have been established to define the stages of eutrophication. Trophic state indices (TSI) are calculated for a lake based upon three metrics:

- total phosphorus concentration,
- chlorophyll a concentration, and
- water transparency (Secchi depth).

Trophic states and their range of TSI values are shown in Table 2-4. “Good quality” in this instance is largely indicative of clarity, a water characteristic valued by humans for drinking and swimming, for example.

Table 2-4. General Trophic State Indices

Trophic Class (water quality)	TSI	Chlorophyll <i>a</i>	P	Secchi Disk
Oligotrophic (excellent)	< 30-40	0-2.6	0-12	> 8-4
Mesotrophic (good)	40-50	2.6-20	12-24	4-2
Eutrophic (poor)	50-70	20-56	24-96	2-0.5
Hypereutrophic (very poor)	70-100+	56-155+	96-384+	0.5-<0.25

Table 2-5 summarizes various nutrient, sediment, and pollutant types and potential sources, both natural and human-caused, in the Lake Samish Basin.

Table 2-5. Potential Surface Water Pollutants and Sources

Pollutant	Common Sources
RESIDENTIAL ACTIVITIES – VIA STORMWATER	
Suspended Solids (particles of sand, silt, clay , organic)	Bare spots in lawns and gardens, construction sites, streambank erosion, sloping areas, farm fields, vehicle wash water
Nutrients (nitrogen, phosphorus, others)	Over-application or spilled fertilizer, pet waste, livestock manure, wildlife, grass clippings, leaves, failing on-site sewage systems
Pesticides	Over-application or spilled material, leaks, sprayer wash-out
Disease-causing Organisms (bacteria, viruses)	Pet waste, livestock manure, wildlife, garbage, failing on-site sewage systems
Hydrocarbons (petroleum products)	Engine exhaust, fuel and oil spills and leaks, vehicle tire wear, burning plastics
Metals	Vehicle brake and tire wear, engine exhaust, metal gutters and downspouts, scrap piles
RECREATIONAL ACTIVITIES - VIA STORMWATER AND DIRECT DISCHARGE	
Disease-causing Organisms (bacteria, viruses)	Swimming, human waste (improperly disposed), pet waste, garbage
Biological Contamination & Invasive Species	Recreational boats
Hydrocarbons (petroleum products)	Engine exhaust, fuel and oil spills and leaks from boats and other watercraft
Metals	Engine exhaust from boats and watercraft
PUBLIC SEWER SYSTEM - VIA STORMWATER AND DIRECT DISCHARGE	
Disease-causing Organisms (bacteria, viruses)	Failures: rupture or break in system; backups and overflows
Nutrients (nitrogen, phosphorus, others)	Failures: rupture or break in system; backups and overflows

Table 2-5. Potential Surface Water Pollutants and Sources

Pollutant	Common Sources
FORESTRY ACTIVITIES - VIA STORMWATER AND GROUNDWATER	
Nutrients (nitrogen, phosphorus, others)	Nutrients adsorbed to disturbed soils and released from decaying vegetation.
Hydrocarbons (petroleum products)	Engine fuel and oil leaks from logging trucks and equipment into runoff and groundwater
Suspended Solids (particles of sand, silt, clay , organic)	Runoff from logging roads, and clearing activities
ATMOSPHERIC DEPOSITION - VIA INDIRECT (RUNOFF) AND DIRECT DEPOSITION (LAKE SURFACE)	
Metals (mercury)	Fossil fuel burning for power and transportation; woodstoves; volcanos and forest fires
Hydrocarbons (petroleum products)	Fossil fuel burning for power and transportation.
GROUNDWATER INPUT - DIRECT UNDERGROUND DISCHARGE	
Hydrocarbons (petroleum products)	Fuel spills that migrate to groundwater ; undiscovered underground storage tanks or private dumps (paint, solvents, heating oil) that migrate to groundwater

2.6.2 Aquatic Invasive Species

Aquatic invasive species (including plants, animals and pathogens) are a threat to several of the beneficial uses of Lake Samish. Potential transmission vectors of plant, animal, and bacterial invasive species include both natural wildlife and human activity. Rational means of minimizing negative impacts from invasive species infestations include both public education about the various species, and thwarting their spread wherever possible.

While invasive species are not the subject of this comprehensive stormwater plan, it is beneficial to mention in the overall context of water quality protection that there are relevant and easily accessed educational resources available to the public. Whatcom County recently completed an Aquatic Invasive Species Action Plan for Lake Whatcom, which is very relevant in breadth and detail to existing and potential conditions at Lake Samish. (Ward, T.E. (2011). *Aquatic Invasive Species Action Plan for Lake Whatcom Reservoir*. City of Bellingham, Washington. September, 2011.) This Action Plan is recommended reading for all Lake Samish property owners and recreational visitors, and it can be found on the Lake Whatcom Management Team website at:

<http://www.lakewhatcom.whatcomcounty.org/resources>.

This relevant Action Plan documents many negative impacts from Asian clam, zebra mussel, and quagga mussel infestations in other parts of the country. Of particular relevance to Lake Samish are clogged drinking water intake pipes, and taste and odor problems in raw water supplies. The USGS, City of Bellingham, and the Lake Whatcom Management Team maintain up-to-date websites with relevant information on the spread of various invasive species. Asian clams have been confirmed in several locations around Lake Whatcom (Wildwood, Sudden Valley, Lakewood, and the Bloedel Donovan area). Whatcom County staff found no Asian clams during a preliminary survey of Lake Samish in April 2012.

The City of Bellingham is currently considering implementation of a watercraft inspection program for its popular Bloedel Donavan boat launch site at Lake Whatcom. The focus is to first educate boat owners who use their boats in multiple water bodies to learn the “Clean, Drain and Dry” routines to prevent the spread of infestations. Whatcom County and residents of Lake Samish should pay close attention to the ongoing efficacy of these new invasive species control measures currently being implemented at Lake Whatcom. It is conceivable that a more restrictive launch experience in one location could drive non-resident boaters to other nearby lakes and boats launches.

With no public water system in place, Lake Samish property owners may also need to become even more vigilant about inspecting and maintaining their individual water intakes from invasive clam or mussel infestation. Acting collectively to have adjacent private systems routinely inspected and maintained at the same time may provide the most thorough deterrence to infestation.

2.7 Monitoring, Modeling, and Other Ongoing Studies

A significant part of the comprehensive stormwater planning scope was to review and summarize past and ongoing monitoring and modeling studies with relevance to stormwater in the Lake Samish Basin. There have been five major studies since 1989 that have monitored different aspects of water quality in Lake Samish and its tributaries (see Figure 2-6 for monitoring site locations). The studies are grouped below by the entity sponsoring or performing the work, and the labels (WQ-A, WQ-B, etc.) correspond to ordering in Technical Memo No. 1. Additional detail can be found in Technical Memo No. 1 in Appendix A-1 of this plan. Quantity-related modeling (hydrologic and/or hydraulic) has been performed on two occasions since 1989.

Table 2-6. Past Monitoring and Modeling Studies

Agency	Study Code	Description / Date Performed
WATER QUALITY MONITORING		
Washington Department of Ecology	Study WQ-A	Ecology Lake Quality Assessment Program (1989-2000)
Western Washington University	Study WQ-B	WWU Lake Samish Monitoring Study (1995-1996)
	Study WQ-D	WWU Lake Samish Monitoring Study (2005-present)
Samish Water District	Study WQ-C	Samish Water District Monitoring Study (1997-2000)
Whatcom County	Study WQ-E	Whatcom Co. Public Works (2006-2007) – (tributary monitoring only)
WATER QUANTITY MODELING		
Water Resource Inventory Area 3 (WRIA 3) - Ecology / Devine Tarbell & Associates		Instream flow assessment, wetlands study, and small stream study focused on habitat of anadromous and resident salmonids and trout in Samish River basin.
Whatcom County – Wilson Engineering, LLC		Hydrologic basin modeling, Technical Memo 2a, Appendix A-2), (2011)

2.7.1 Ecology

Lake Monitoring

From 1989 through 1992, the Ambient Monitoring Section of Ecology's Environmental Investigations and Laboratory Services Program implemented an EPA-sponsored lake and reservoir water quality assessment program that included the following monitoring activities:

- Citizen volunteers monitoring temperature and Secchi disc depth at 50 lakes (including Lake Samish)
- Conventional water quality monitoring by Ecology staff including hydrolab profiles, fecal coliform bacteria, chlorophyll-a, turbidity, and nutrients (including Lake Samish)
- Toxic survey of ten lakes (including Lake Samish)

Results from these monitoring activities were published by Ecology in four reports issued between 1990 and 1994 that included interpretation of the monitoring results as well as recommendations for additional monitoring (Ecology 1990, 1991, 1993, 1994).

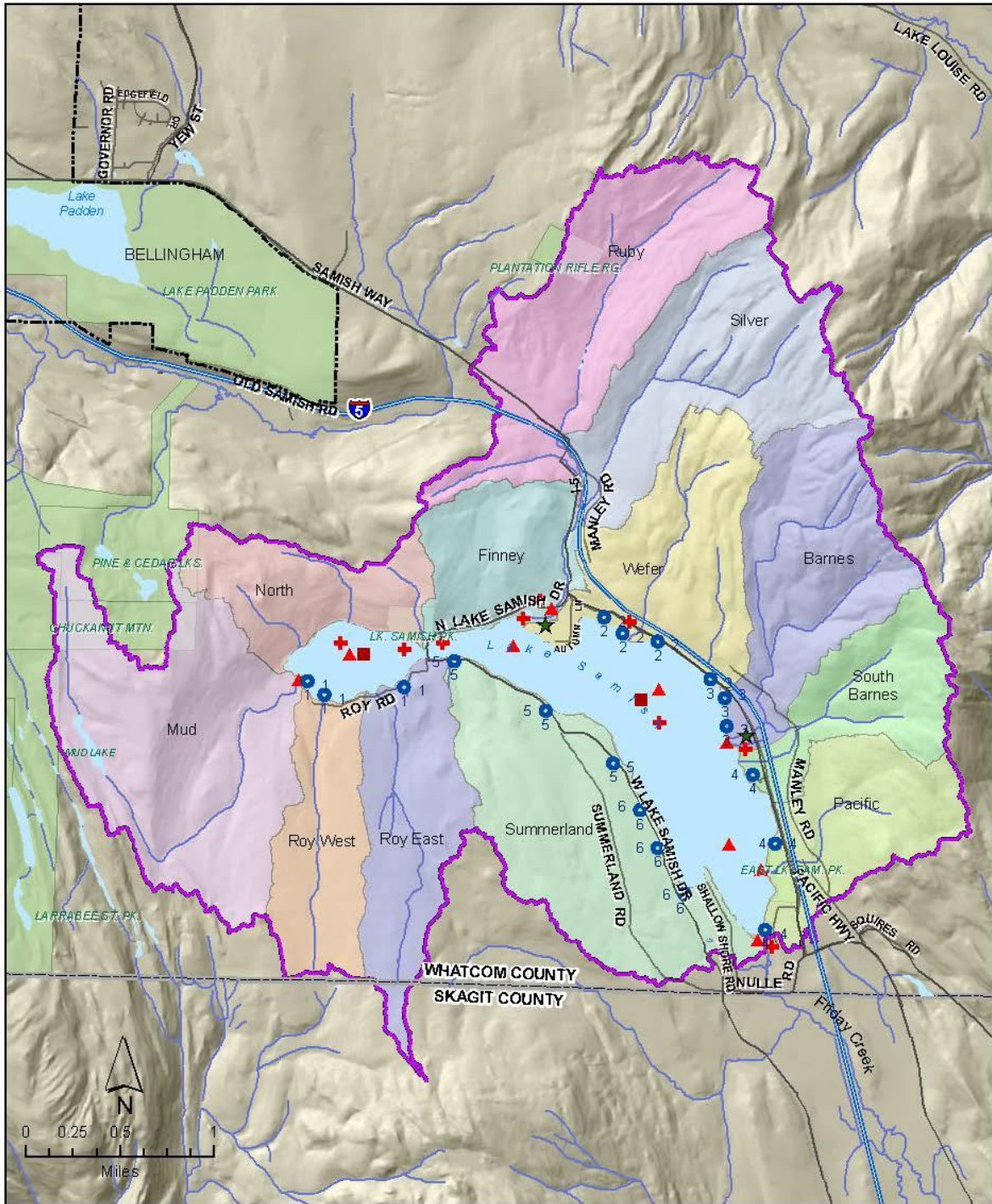
Mercury and PCBs

Lake Samish (West Arm) is currently on Ecology's 303(d) list (Year 2008) as:

- Category 5 Impaired Water body for PCB levels in fish tissue. Data shows the National Toxics Rule criterion was exceeded in fillet samples of Cutthroat trout collected in 2001.
- Category 2 Water of Concern for elevated levels of mercury in fish tissue. Data show one excursion beyond the National Toxics Rule criterion in fillet samples of Largemouth bass collected in 2001.

Ecology continues to monitor the lake for bioaccumulative toxins and is in the process of developing a PCB TMDL for Lake Samish.

Figure 2-6. Lake Samish Basin – Lake and Tributary Monitoring Sites



Legend

- Stream
- Road
- Bellingham City Limits
- Basin Boundary
- Parks
- Study WQ - A
- + WWU Sample Sites:
- + Study WQ - B
- ▲ Study WQ - D
- ★ Study WQ - E
- SWD Sample Sites:**
- Study WQ - C
- SWD Sample Sites (1997-1999), 6 Composites of 3 samples each, # indicates composite sample group

**Figure 2-6
Lake Samish Basin
Lake & Tributary
Monitoring Sites**

2.7.2 Western Washington University

A 1995 tanker truck accident on I-5 resulted in aviation fuel spilling as runoff into Lake Samish. In response to residents' concerns over the spill, Western Washington University (WWU) collaborated with Samish Water District (then Whatcom County Water District No. 12) to perform water quality monitoring within the lake and at key lake tributaries during the period from 1995 to 1996. However, this study did not look for petroleum hydrocarbons that might have been introduced by the fuel spill. The study included monitoring of dissolved oxygen, turbidity, chlorophyll *a*, fecal coliform, nitrogen, phosphorus, precipitation and temperature. Results of the monitoring program were compiled and published by David Bennink (WWU) as the *Lake Samish Monitoring Project 1995-1996*.

Beginning in June 2005, Samish Water District has contracted annually with Western Washington University's Huxley College Institute for Watershed Studies to perform regular monitoring of Lake Samish and its major tributaries. This years-long study included investigation into the periodic algal blooms, including blooms of potentially toxic cyanobacteria (blue-green algae). A major objective of the study was to collect water quality data useful in evaluating causes of the algal blooms and in identifying recommended protective measures to prevent further water quality degradation. The monitoring results are published by WWU annually and are available on the *Institute for Watershed Studies* website. As of 2012, further monitoring has been terminated for two reasons. The monitoring has shown no trends to date, and Samish Water District is not able to fund the activity any more.

2.7.3 Samish Water District

In 1997, Samish Water District initiated a three-year water quality study to determine the overall quality of the lake water for public water supply use and to establish baseline levels for selected chemicals in the lake. Water samples were analyzed for metals, fecal coliform, petroleum hydrocarbons, herbicides, pesticides, nitrate, nitrite, and hardness. While no immediate health risks were identified by this study, final recommendations called for periodic future sampling of the lake to determine trends.

2.7.4 WRIA 3 Modeling

In support of the WRIA 3 water resource planning efforts, Devine Tarbell & Associates completed the following modeling and studies for the Upper Samish Basin:

- An instream flow assessment focused on the habitat and instream flow needs of anadromous and resident salmonids and trout.
- A small stream study that looked at small and medium sized streams in the Samish Basin.
- A wetlands study that assessed the optimization levels as rearing habitat of existing wetlands given current instream flows.

Results and recommendations from these studies were included in the final recommendations for WRIA 3 instream flows.

2.7.5 Whatcom County - Lake Samish Basin Hydrologic Model (2011)

As a part of this comprehensive stormwater planning effort, a hydrologic model for the Lake Samish Basin was developed. A hydrologic watershed model is a simplified mathematical model designed to simulate precipitation and runoff processes within a basin. It is a tool to aid in long-term planning and lake water quantity management. The principal goals for this hydrologic model were to:

- Determine the drainage sub-basins for the Lake Samish Basin.
- Define the stage-storage relationship between lake water surface elevation and the storage volume of the lake.
- Calculate existing and future stormwater flows for each sub-basin.
- Develop a water budget showing inflow and outflow from Lake Samish for a range of climate conditions (i.e., from dry years to wet years).

Watershed and sub-basin delineation was performed using electronic digital elevation model (DEM) information to determine the boundaries of the watershed and each of the sub-basins. The DEM model was analyzed to determine drainage locations and directions, set culvert locations, and determine the flow characteristics for each sub-basin. Lake Samish stage-storage relationship was developed using bathymetric contour data obtained from Ecology's *Lakes of Washington, Western Washington, 3rd Edition* by Ernest E. Wolcott.

A continuous simulation hydrologic model of the Lake Samish watershed was developed using the US Army Corps of Engineers ® Hydrologic Engineering Center's (HEC) Hydrologic Modeling System (HMS). The HEC-HMS model is designed to simulate the precipitation-runoff processes of a dendritic (branching) watershed system. This type of model is well suited for characterizing watersheds ranging from small natural watersheds to large river basins. The model generates hydrographs and datasets that can be used with other software for analyzing water availability, urban drainage, flood damage reduction, and flow forecasting. The HEC-HMS model is capable of simulating a broad range of parameters within a basin. The modeler has the ability to create sub-basins, stream reaches, junctions, and reservoirs and to simulate water diversions or sources within the basin.

The Lake Samish HEC-HMS model is composed of two sub-models: the meteorological sub-model and the hydrologic basin sub-model. The meteorological sub-model applies precipitation and evapo-transpiration (ET) losses to the simulated watershed sub-basins. The hydrologic basin sub-model applies the physical characteristics of each sub-basin that affect surface water runoff and base flow. Key model components include:

- Soil losses – the amount of precipitation that infiltrates to groundwater
- Runoff transform – converts precipitation to runoff
- Open-channel Routing Mechanism – simulates flowing water in a channel, ditch, stream, etc.

The HEC-HMS model was calibrated using existing lake-level data collected by Samish Water District (SWD). Model parameters were manually adjusted to obtain an optimized fit between simulated and observed lake level data. The calibrated model was then run for three different land use scenarios.

- Scenario No. 1 - Existing Land Use Conditions. Model Scenario No. 1 represents the existing conditions of the watershed. The model was calibrated through trial and error to fit the existing data for lake level fluctuations and Friday Creek flow. This model scenario was also used to develop seasonal water budgets for precipitation, watershed runoff, base flow, total basin outflow and soil losses and changes in lake storage. Model results from this scenario were used as the baseline for comparisons with the model Scenarios No. 2 and No. 3.
- Scenario No. 2 - Future Land Use at Build-out Conditions. This model scenario represents development to full build-out levels allowed by current zoning.
- Scenario No. 3 - Differential Impacts of Timber Harvesting. The third model scenario evaluated the changes in stormwater flow resulting from maximum timber harvesting as allowed by current zoning.

The following programmatic recommendations are based upon results of the hydrologic model and are also listed and prioritized in Chapter 6.

- Develop a targeted, sub-area hydrologic model for analysis of any proposed, future development project of significance, such as the planned Sleepy Hollow residential subdivision (up to 46 units on 20 acres) in the Summerland Sub-Basin on the west side of Lake Samish.
- Develop basin-wide and sub-basin hydraulic models. A hydraulic model will quantify the flow capacity of streams, ditches, culverts, and pipes. The output from the hydrologic model would be used as input for the hydraulic model.

The following recommendation for a capital project is also listed in Chapter 6.

- Implement a Friday Creek Flow Gauging Station. Accurate flow records would improve the hydrologic model's accuracy and predictive capacity. In an effort to better document seasonal instream flows and provide accurate flow data for model calibration and analysis, it is recommended that a flow gauging station be considered for Friday Creek at the lake outlet.

See Appendix A-2 for a full presentation of the Lake Samish Basin hydrologic model.

2.8 Summary

Chapter 2's staging of the basin/sub-basin characteristics and conditions has highlighted several overlapping opportunities for stakeholders.

- Complex problems are more easily resolved or reduced when broken down into manageable increments.
- Stakeholders now understand that small "everyday" actions have a cumulative negative impact on runoff as well as the higher profile "low risk / high perceived impact" occurrences.
- This knowledge empowers individuals to undertake small actions immediately on their own properties and in their neighborhoods, set priorities to work together non-governmentally on group efforts, and advocate to raise taxes for the future capital or enforcement work that only state or local government is empowered to perform.

The Whatcom County Council has previously encouraged a citizen self-help approach to stormwater runoff when they considered the Birch Bay and Lake Whatcom watershed plans. There is not a compelling reason to establish new taxes and run programs through local government when many of the desired outcomes can more easily be accomplished by dedicated individuals. Knowledge of the physical systems and the impacts of behaviors will help each public and private stakeholder identify and act on his/her piece of the shared responsibility for clean water and safe infrastructure.

3 Review of Relevant Regulations and Plans

There are many local, state, and federal rules that govern how man may alter landforms, what may be done by private parties, and what is typically publicly constructed, owned and operated. In the context of this comprehensive stormwater plan, three areas of inquiry and understanding about regulatory control are essential:

- How well do current governmental controls work to reduce negative outcomes related to stormwater?
- Can new stormwater-related improvements (capital or programmatic) be implemented within the framework of existing governmental controls?
- Are changes to existing controls recommended as an outcome of this stormwater planning effort?

This chapter provides a summary overview of the many types and layers of regulations currently affecting the existing built environment, new development and any stormwater management projects that might be proposed in the basin (Tables 3-1 through 3-5). This overview is based on detailed analysis included in Appendix A-3, Technical Memo: Existing Codes and Regulations, Review and Recommendations. Recommendations related to codes, plans, programs, and standards are presented at the end of this chapter.

This chapter is divided for clarity into five jurisdictional areas of control affecting stormwater management in the Lake Samish Basin. A table is provided for each jurisdictional type identifying the specific code or regulation; its applicability to stormwater; the location in this plan where additional detail can be found; and an indication of whether the code or regulation affects both existing and new activities, or only new activities.

- Table 3.1 Whatcom County Codes - codified policy of elected County Council.
- Table 3.3 Whatcom County Plans, Programs, and Standards – defined as plans responding to state Growth Management Act mandates; and programs, rules, regulations and standards that are more administrative in nature and help implement and enforce policy. County Council also approves and adopts the Comprehensive Plan and the lower-tier controls.
- Table 3.4 Skagit County Planning – two Samish River Basin environmental studies (as opposed to regulatory actions) that consider the Lake Samish Basin important to reducing non-point pollution and assuring instream flows to Friday Creek.
- Table 3.5 Washington State Standards – Washington Department of Ecology stormwater management regulations, and Washington State Department of Transportation standards for design of facilities (roads or drainage) in the 1-5 right-of-way and associated easements.
- Western Washington Phase II Municipal Stormwater Permit - Although the Lake Samish Basin is not subject to Western Washington Phase II Municipal Stormwater Permit requirements, a gap analysis was nevertheless performed comparing current applicable stormwater regulations and management practices with the Phase II permit as an inquiry into potential voluntary areas of improvement.

3.1 Relevant Whatcom County Codes

Table 3-1. - Whatcom County Code Titles Relevant to Lake Samish Basin Stormwater

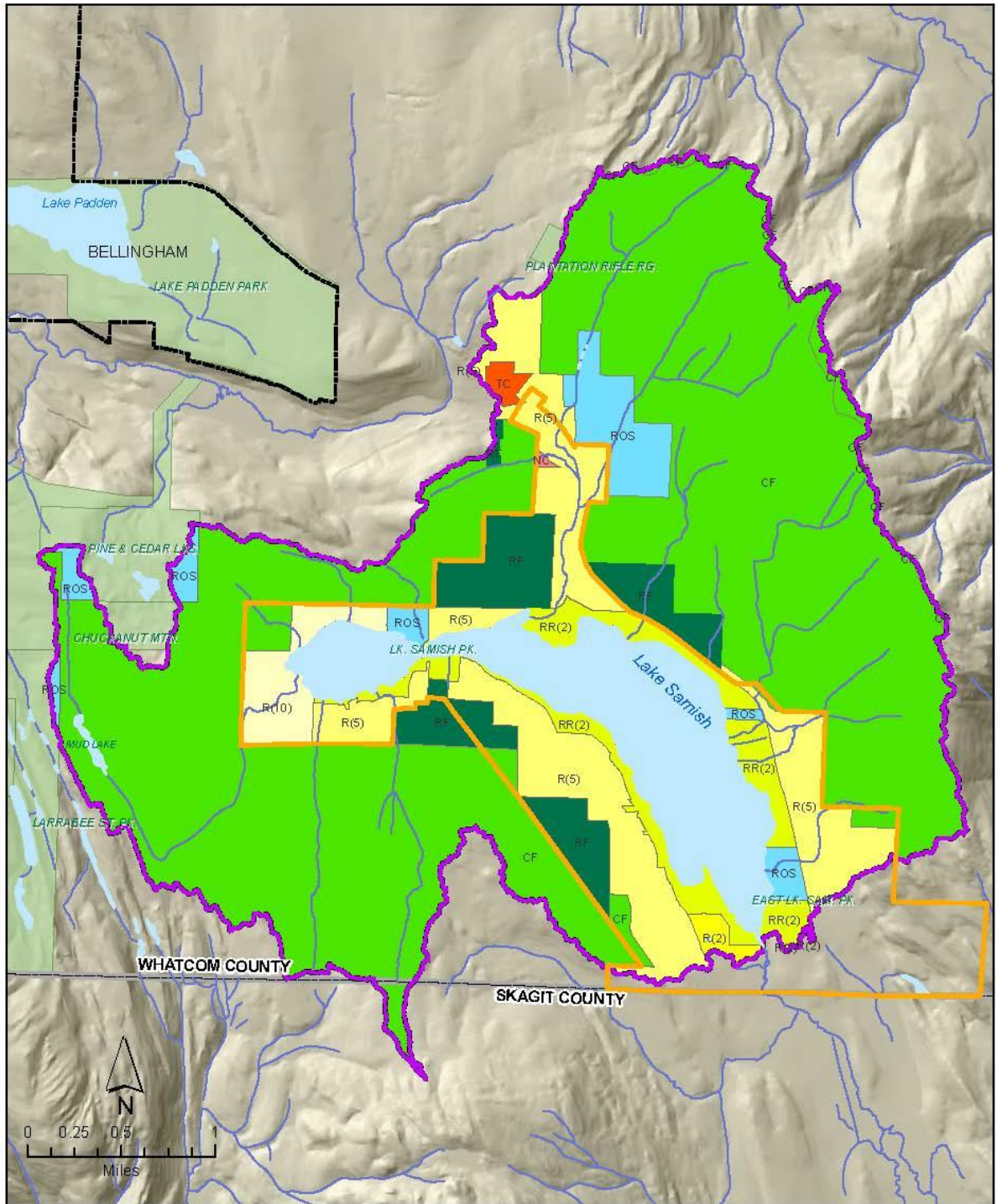
Code Title	Lake Samish Basin Applicability	See for More Detail	Affects Existing	Affects New
WCC Title 16.16 Critical Areas Ordinance (CAO)	Defines critical areas as environmentally sensitive natural resources designated for protection and management. <u>Examples:</u> geologically hazardous areas, frequently flooded areas, critical aquifer recharge areas, wetlands, wildlife habitat conservation areas, fish habitat conservation areas.	Appendix A-3, Table 1	Yes	Yes
WCC Title 20 Zoning	Regulates physical development to meet the goals and policies of the Whatcom County Comprehensive Plan. <u>Example Zones:</u> Commercial and Rural Forestry, Rural Residential, Recreation and Open Space, Tourist Commercial, Neighborhood Commercial	Appendix A-3, Table 2 Table 3-2	No	Yes
WCC Title 20.71 Water Resource Protection Overlay District	Imposes <i>additional</i> development and land use controls to preserve and protect unique water resource, Lake Samish. <u>Examples:</u> limit new impervious surfaces, cluster subdivision design standards, increase building setbacks and buffers, permeable surfacing.	Appendix A-3	No	Yes
WCC Title 20.80.635 Stormwater Special District	Requires permanent on-site facilities for stormwater quality and quantity management for all lots smaller than five acres. <u>Example:</u> new construction and remodels of defined significance	Appendix A-3	If modified	Yes
WCC Title 20.80.735 Water Resource Special Management Area	Requires stringent best management practices related to clearing and preventing soil erosion. <u>Examples:</u> seasonal clearing, phased clearing, tree retention, seasonal soil exposure limited to 500 square feet Sept 1 – April 30.	Appendix A-3	Yes	Yes
WCC Title 21 Subdivision	Regulates land division and property delineation activities. <u>Examples:</u> vested and new subdivision applications (long and short plats), rules based on vested date, lot line adjustments, delineation of code-required setbacks and protected areas on plats.	Appendix A-3	If modified	Yes

Table 3-1. - Whatcom County Code Titles Relevant to Lake Samish Basin Stormwater

Code Title	Lake Samish Basin Applicability	See for More Detail	Affects Existing	Affects New
WCC Title 23 Shoreline Management Program	Regulates development on various defined types of shorelines to reduce pollution, erosion, sedimentation, habitat loss, flooding, and loss of property. <u>Examples:</u> Lake Samish, Friday Creek	Appendix A-3	If modified	Yes
WCC Title 24 Health Code	Regulates small private onsite sewage systems, small public drinking water systems, solid waste handling and disposal. Establishes advisory role of Health Department on emerging and emergency conditions affecting health and safety. <u>Examples:</u> monitoring and notices for fecal coliform, blue-green algae, fuel spill contamination.	Appendix A-1 Appendix A-3	Yes	Yes

The following Figure 3-1 Lake Samish Basin Zoning Designations and accompanying Table 3-2 Areas of Zoning Classifications in the Lake Samish Basin lend perspective to how regulations associated with a particular zoning designation may have a more or a less significant influence on stormwater management outcomes in this basin due to area involved. That is not to say that relatively small areas of influence should be completely overlooked, since it is possible for serious negative impacts to arise from a single property. Figure 3-2 Land Use depicts the existing distribution of land uses among residential, governmental, commercial, etc.

Figure 3-1. Lake Samish Basin Zoning Designations



Legend

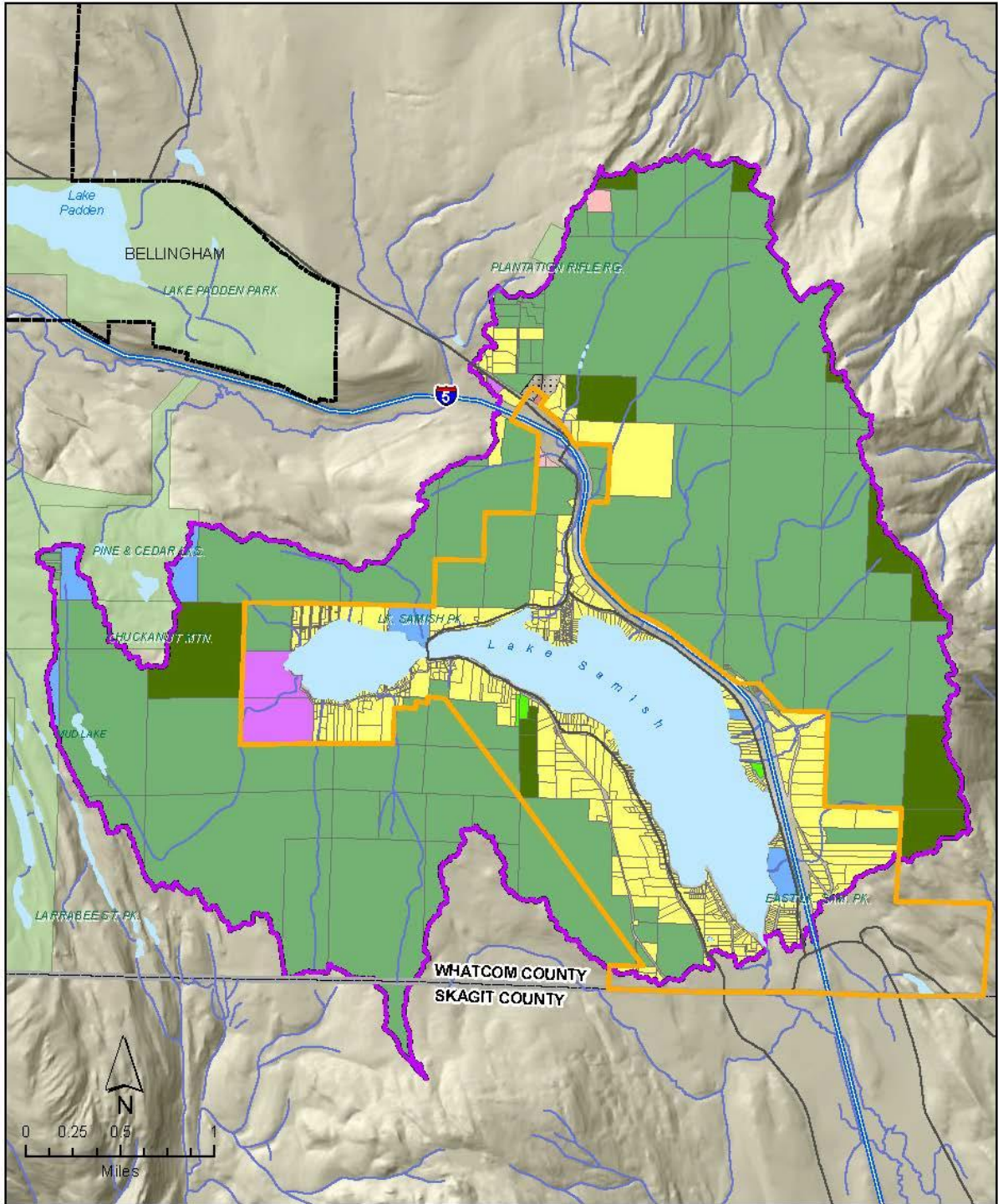
Samish WD Boundary	Zoning	R(2)	RR(2)
COB Limits	CF	R(5)	TC
Stream	NC	RF	WATER
Basin Boundary	R(10)	ROS	IF-NRL (Skagit County)
			Parks

**Figure 3-1
Lake Samish Basin
Zoning Designations**
*Lake Samish Comprehensive
Stormwater Plan*

Table 3-2. Areas of Zoning Classifications within Lake Samish Basin

Zoning Classification	In Whatcom County (acres)	In Skagit County (acres)	Percent of Basin Area	
WHATCOM COUNTY CODE - TITLE 20 - ZONING				
Commercial Forestry, CF (Title 20.43)	4,889		61.1%	
Rural Forestry, RF (Title 20.42)	462		5.8%	
Rural (1 unit/10 ac), R(10) (Title 20.36)	155		1.9%	
Rural (1 unit /2 ac), R(2) (Title 20.36)	34		0.4%	
Rural (1 unit /5 ac), R(5) (Title 20.36)	967		12.1%	
Rural Residential (2 unit /ac), RR(2) (Title 0.32)	327		4.1%	
Recreation & Open space, ROS (Title 20.44)	300		3.7%	
Tourist Commercial, TC (Title 20.63)	24		0.3%	
Neighborhood Commercial, NC (Title 20.60)	4		0.05%	
Lake Area	816		10.2%	
SKAGIT COUNTY CODE - TITLE 14 - ZONING				
Industrial Forest – Natural Resource Lands, IF-NRL (Title 14.16.410)		27	0.3%	
Total Area by County (acres)	7,978	27		
			100.0%	
Total Basin Area Including Lake Samish (acres)				8,005

Figure 3-2. Lake Samish Basin Land Use



Legend

Stream	Land Use	Mining
Samish WD Boundary	Residential	Recreational
Bellingham City Limits	Commercial	Agricultural
Basin Boundary	Governmental	NonCommercial Forest
Parks	Religious Services	Designated Forest

**Figure 3-2
Lake Samish Basin
Land Use**

3.2 Relevant Whatcom County Plans, Programs, and Standards

In addition to the Whatcom County Code summarized in Table 3-1 above, County government also engages in periodic County-wide and subarea long-term planning exercises to comply with Washington State’s Growth Management Act.

The County also develops administrative rules and regulations to implement and enforce adopted policy at the consumer level (for example, building permits, private and public site planning, platting, design and construction). Table 3-3 below summarizes this category of controls where relevant to Lake Samish Basin stormwater management.

Table 3-3. – Whatcom County Plans, Programs and Standards Relevant to Lake Samish Basin Stormwater

Plan Title	Lake Samish Basin Applicability	More Detail	Affects Existing	Affects New
Whatcom County Comprehensive Plan (2009 latest update)	Guides growth in unincorporated areas of County for a 20-year planning horizon in compliance with the Growth Management Act (GMC) and judicial interpretation.	Appendix A-3	If Modified	Yes
Whatcom County Development Standards (2002 latest edition)	Chapter 2 – Stormwater Management Standards. Require engineering designs incorporating stormwater best management practices into all projects. Chapter 2, Section 221 – Stormwater Special District Standards for new and remodeled single-family residences and duplexes on existing lots. Chapter 5 – Road Standards. Requires stormwater plan per Chapter 2 above for rural road, shoulder, and drainage design. Requires construction phase temporary erosion and sedimentation control plan (TESC) for road and drainage construction.	Appendix A-3	If Modified	Yes
Chuckanut Lake Samish Subarea Comprehensive Plan (1986)	A subarea-specific component of above County Comprehensive Plan. Due to the number of superseding overlay regulations, this plan’s relevance is diminished.		n/a	n/a
Onsite Sewage System (OSS) Local Management Plan of the Whatcom County Health Department	Regulatory oversight and management assistance for on-site sewage systems of less than 14,500 gpd of capacity. <u>Example:</u> failing OSS can degrade surface water quality, and create drainage problems if not detected and repaired.		Yes	Yes

3.3 Relevant Skagit County Planning Efforts

The planning reports in this table are non-regulatory with regard to the Lake Samish Basin. Only 27 acres of the basin area is included in the boundaries of Skagit County, and that property is zoned Industrial Forest -Natural Resource Land (IF-NRL) as described below.

Table 3-4. – Skagit County Planning Relevant to Lake Samish Basin Stormwater

Plan Title	Lake Samish Basin Applicability	More Detail	Affects Existing	Affects New
Samish Bay Watershed Non-Point Action Plan and Final Closure Response Strategy (1995) Author Agencies: Washington DOE; Skagit County Dept. of Community Planning and Development; and Samish watershed Management Committee	. Study provides background information about Lake Samish Basin’s estimated historical contribution to downstream non-point source pollution. No regulatory action involving this basin.	Appendix A-3	n/a	n/a
Water Resource Inventory Area 3 (WRIA 3) - Samish River Sub-Basin Watershed Management Plan (2003 Draft/ No final) Author Agency: Skagit Watershed Planning Unit	Recommends strategies to manage water supplies (instream and out-of-stream) in the Samish River Sub-Basin. Friday Creek is a tributary. Plan not yet adopted due to disputes over instream flow recommendations. <u>Example:</u> management of retention structure at Lake Samish outflow affects Friday Creek instream flows.	Appendix A-3	n/a	n/a
Skagit County Code – Zoning - Title 14.16.410 IF-NRL Industrial Forest – Natural Resource Lands	IF-NRL zoning ensures that forest lands of long-term commercial significance are conserved and managed to provide sustainable forest yields, job stability, ecological values and the continuation of a viable commercial forest industry in Skagit County. Forest activities shall not constitute a nuisance if conducted in accordance with the State Forest Practice Rules and Regulations, WAC Title 222.		Yes	Yes

3.4 Relevant Washington State Standards

No area of legislative responsibility has been overlooked by the State of Washington concerning impacts on Lake Samish Basin stormwater. Three agencies have significant roles to play in directing good engineering design, and performing or enforcing maintenance and operations of facilities that potentially affect stormwater runoff and Lake Samish. Table 3-5 gives an overview of regulatory reach and refers those further interested to the detail contained in the Revised Code of Washington (RCW) and the Washington Administrative Code (WAC). Maintenance and Operations obligations are covered in Chapter 4 of this plan.

- Washington Department of Ecology regulates stormwater management, wastewater collection and treatment, water rights, water resource planning, and water pollution prevention in many forms.
- Washington Department of Transportation manages I-5, including stormwater quality and quantity concerns in joint regulatory programs with the Department of Ecology, and provides I-5 incident response that can involve stormwater.
- Washington Department of Natural Resources regulates forestry practices, which have a large potential impact on stormwater in the Lake Samish Basin.

Table 3-5. – Washington State Authority Relevant to Lake Samish Basin Stormwater

Standards Title	Lake Samish Basin Applicability	More Detail	Affects Existing	Affects New
Stormwater Management Manual for the Puget Sound Basin (1992 or most current version) Department of Ecology	Whatcom County Development Standards, Chapter 2 Stormwater Management references this as equivalent standard. Still applicable to non NPDES Phase II areas of the County such as Lake Samish Basin for all issues except Runoff Treatment BMP's <u>Example:</u> applicable to new and significant remodels of private or public facilities involving sites, roads, drainage, etc.	Appendix A-3	If modified	Yes
Stormwater Management Manual for Western Washington (February 2005) Department of Ecology	Applicable to Runoff Treatment BMPs for all areas of the county, including Lake Samish Basin. <u>Example:</u> affects runoff treatment for new and significant remodels of private or public facilities involving sites, roads, drainage, etc.	Appendix A-3	If modified	Yes

Table 3-5. – Washington State Authority Relevant to Lake Samish Basin Stormwater

Standards Title	Lake Samish Basin Applicability	More Detail	Affects Existing	Affects New
Standard Plans and Specifications (most current edition) Washington State Department of Transportation (WSDOT)	Standards govern design, rehabilitation, or new construction in the I-5 right-of-way corridor or associated easements. <u>Example:</u> affects all WSDOT facilities that run through the Lake Samish Basin, including existing stormwater vault	WSDOT Standard Plans and Specifications	If modified	Yes
RCW 76.09 Forest Practices Act WAC Forest Practices Board Title 222 Washington Department of Natural Resources	Rules govern the conduct of forestry including associated clearing, road building, and drainage.	RCW 76.09 WAC 222	Yes	Yes

3.4.1 Western Washington Phase II Municipal Stormwater Permit and Gap Analysis – Not Directly Applicable

In compliance with EPA’s Stormwater Phase II Rule, Ecology required Whatcom County NPDES Phase II coverage under the *Western Washington Phase II Municipal Stormwater Permit* for all urbanized areas and urban growth areas under the jurisdictional control of the County. The Lake Samish Basin is not designated as an urban area, and it does not lie within an urban growth area boundary for any city. Therefore, coverage under the current Phase II permit is not required for the Lake Samish Basin.

The Technical Memo on Codes and Regulation Review (Appendix A-3) included a very detailed analysis of what might have been relevant had the existing density and development level of the lakeshore been considered characteristically more urban than rural. Whatcom County’s Comprehensive Plan (2009) does designate the developed area immediately surrounding Lake Samish (currently zoned RR2) as a “Suburban Enclave.” Per that plan, Suburban Enclaves are rural areas with development densities averaging 1 unit/acre and served by public roads, sewer, water, or other public services or facilities. The Comprehensive Plan definition for Suburban Enclave states that they are “comprised of rural residential areas that are neither urban nor likely to develop into urban areas during the planning period.” It is unlikely that the Lake Samish area will ever attain an urban development status that would require coverage under the current NPDES Phase II permit.

However, the current zoned development density of 2 units/acre (RR-2) around Lake Samish represents a density capable of developing “urban quality” stormwater runoff. For this reason, work for the Technical Memo included stormwater management evaluation and gap analysis using the Phase II permit requirements as a basis of comparison.

In order to comply with the Phase II permit requirements - for other areas of the County - Whatcom County has developed the *Whatcom County NPDES Phase II Stormwater Management Program (SWMP)*. The SWMP spells out the procedures for compliance with the Minimum Control Measures of the Phase II permit. Many of the programmatic strategies included in the County's SWMP might become more useful in the Lake Samish Basin in the future, but they are not required and are not being put forth as implementable at this time due to funding scarcity that will be discussed in Chapter 7.

3.5 Recommendations Based Upon the Review of Whatcom County Codes, Plans, Programs, and Standards

The following recommendations for code modifications and planning updates are intended to support stormwater and lake management within the Lake Samish Basin.

3.5.1 Encourage All to Value Lake Protection

Residents attending the public meetings expressed concern that a future new subdivision might have negative impacts on stormwater as a result of the application having vested many years prior to adoption of the most recent stormwater management regulations. Members of the public suggested that County Council should legislatively address this subject as an outcome of the Comprehensive Stormwater Plan process.

In 2009, the Whatcom County Council modified WCC Title 21 to include specific review guidelines and timetables regarding preliminary long subdivision approvals. WCC 21.05.039 dictates that approval of a preliminary subdivision shall expire unless a final plat is submitted in proper form for final plat approval within five years of the date of preliminary subdivision approval. The code goes on to establish the criteria for extension requests and sets limits on the number and duration of extensions granted. Those new rules apply to future applications and are not retroactive.

The recommendation of this plan is for resident stakeholders to collaborate with and encourage development applicants to provide the best low impact designs for each project. All parties have the same incentive to protect the aesthetic integrity of the lake water quality.

3.5.2 Await Countywide Approach to Subarea Plan Updates

The current version of the Chuckanut Lake Samish Subarea Comprehensive Plan was adopted in 1986. Despite the passage of more than 25 years, the plan may not need to be updated due to numerous land use and environmental regulatory actions that have occurred in the meantime, specifically the adoption of the overarching Whatcom County Comprehensive Plan in 2009. Relevant regulatory changes implemented since 1986 include the following:

- Adoption of the State Growth Management Act.
- Adoption of Title 16.16 Critical Areas Ordinance (1997).
- Significant downzone modifications to zoning within the Lake Samish Basin (2002).

- Designation of the Lake Samish Basin as a:
 - Water Resource Protection Overlay District (2001).
 - Stormwater Special District (2001).
 - Water Resources Special Management Area (2008).
- Adoption of updated Title 23 Whatcom County Shoreline Management Program (2008).
- Adoption of Whatcom County Comprehensive Plan (2009).

The Lake Samish community has participated in a series of public forums over the last twenty years considering in turn drinking water, sewage treatment and stormwater. These forums did not generally involve property owners and residents from the Chuckanut portion of the land use subarea to the west. Recombining the Chuckanut and Lake Samish communities for a subarea plan update would probably not be constructive since the communities do not share essential water, sewer, stormwater, major access, or recreational infrastructure. It is recommended that County Public Works and Planning staff advise the Lake Samish Association of any future changes in the County's approach to subareas.

4 Stormwater Related Maintenance and Operations Programs

The purpose of this chapter is to provide an overview of the current maintenance and operations (M&O) programs for all facilities or activities that affect stormwater quality and quantity in the Lake Samish Basin. Jurisdictional responsibility for M&O is identified for each type of facility, and perceived gaps in coverage or activity level are the subject of recommendations in Chapter 5. Enforcement of regulations and best management practices (BMP's) is also an important element of effective M&O by government.

Many public comments made at the first two public meetings focused on increasing the frequency or effectiveness of certain M&O requirements (particularly County roads and drainage, the WSDOT vault, and forest practices). Hearing the public requests, confirming actual (not just intended) agency practices, and balancing the two with pragmatism should result in improved communication as well as physical results. The different jurisdictions and categories of stormwater-impacting facilities requiring M&O or enforcement activity are grouped for discussion in this chapter as follows:

Whatcom County (multiple departments)

- Lake-level management M&O
- Public road-related drainage M&O (culverts, pipes, catch basins, road ditches)
- Private stormwater facilities - enforcement
- Private onsite sewer systems (OSS)- enforcement
- Public parks M&O

Samish Water District

- Public sewer infrastructure M&O

Washington Department of Fish and Wildlife

- Boat launch M&O

Washington Department of Transportation

- I-5 corridor drainage culverts, ditches, catch basins M&O
- Stormwater treatment vault M&O

Washington Department of Natural Resources

- Forestry roads, ditches, clearings and equipment areas - enforcement

Private Property Owners

- Private stormwater facilities M&O
- Private onsite sewer systems (OSS) M&O

After the overview of requirements, intentions, and actual practices is given, ideas for improvement are outlined and critiqued. Recommendations for changes to the M&O practices are then included in Chapter 6 along with other types of programmatic changes to achieve the goals and objectives of the comprehensive stormwater plan. A more detailed

write up (with example photos) of the complete M&O workup is included in the maintenance and operations Technical Memorandum No. 4 (Appendix A-4).

4.1 M&O Responsibilities and Activities by Jurisdiction

4.1.1 Whatcom County (multiple departments)

Stormwater and Roads M&O

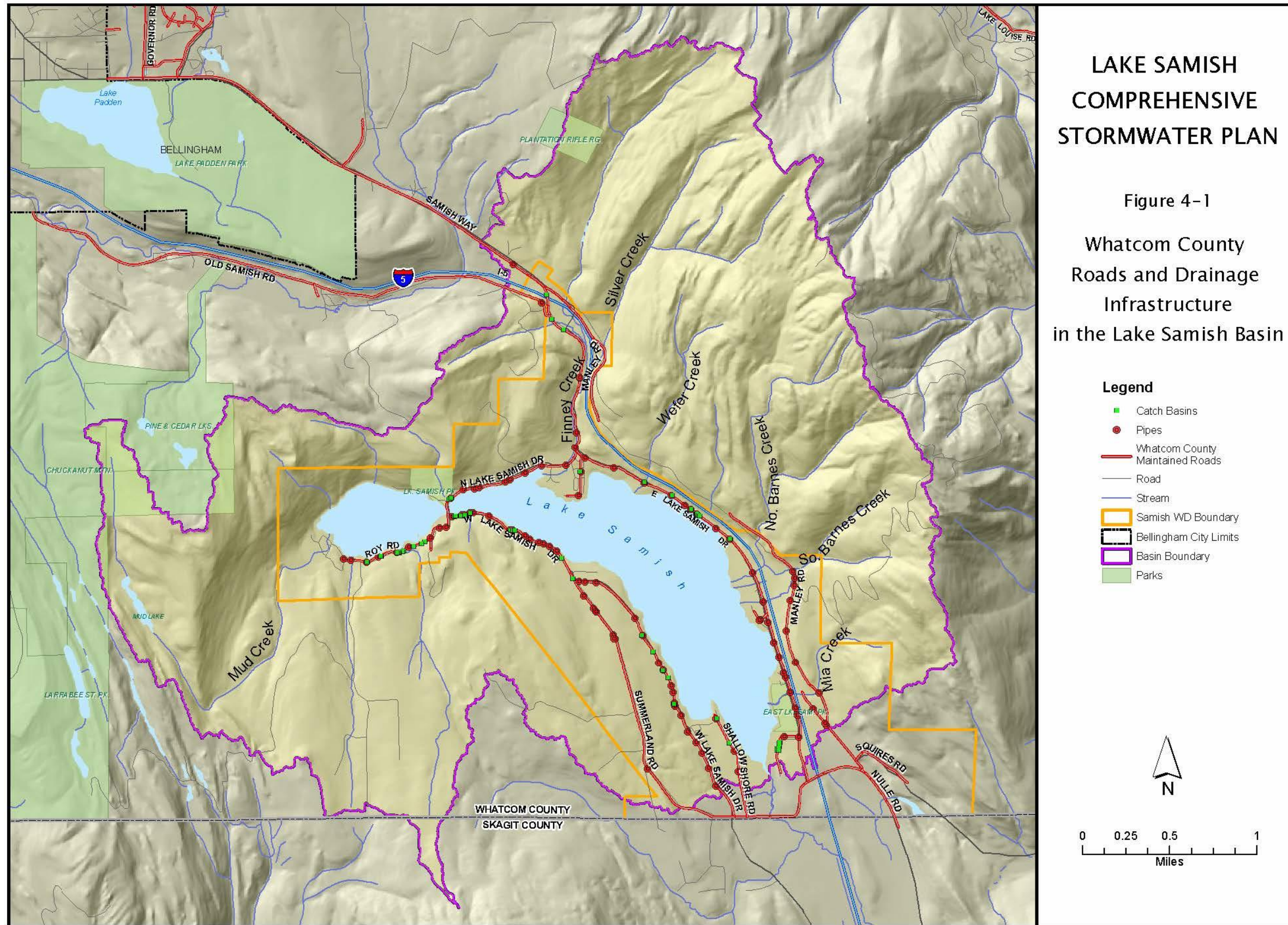
Whatcom County Public Works is responsible for M&O of all stormwater infrastructure within Whatcom County road right-of-ways. Responsibilities include assuring proper functioning of culverts, ditches, outfalls, pavement, and shoulders to provide proper drainage, prevent flooding, prevent road damage, and provide safe driving surfaces. Public Works assures that proper environmental measures are implemented for M&O and new construction. Figure 4-1 highlights the public roads within the Lake Samish Basin for which Whatcom County has M&O responsibility. The County is not responsible for M&O activities outside the right-of-way or on private property.

Table 4-1 provides an inventory of the existing Whatcom County Public Works stormwater infrastructure within the Lake Samish Basin. The data were obtained from Whatcom County's existing GIS database and the County's recent, countywide culvert and catch basin inventory, each of which need additional attention.

Table 4-1. Whatcom County Stormwater Infrastructure in Lake Samish Basin

Type of Structure/Facility	Quantity*
Drainage Ditches (length in feet)	60,100
Culverts (length in feet)	5,750
Catch Basins (number)	50
Drainage Pipe (length in feet)	3,700
Biofiltration Swales (length in feet)	None noted
Facilities (e.g., ponds, tanks, vaults)	None noted
County Roads (length in feet)	47,700 (approx. 9 miles)
* All quantities are approximate.	

Figure 4-1. Whatcom County Roads & Drainage Infrastructure



Whatcom County Public Works is currently staffed below historic norms due to a hiring freeze and normal attrition. (Source: Whatcom County 2011-2012 Budget at a Glance, Vol. 1, pg. 27) Only certain required activities are thus routinely scheduled, and others are performed in response to observed emergent problems or citizen complaints. The following M&O activities are currently performed in the Lake Samish Basin:

- Non-stormwater M&O (routine)
 - Brush and vegetation control annually
 - Road spot repairs

- Stormwater M&O (*as needed basis*)
 - Ditch cleaning
 - Road spot repairs
 - Catch basin cleaning
 - Culvert maintenance
 - Miscellaneous

Lake-level Management M&O

Whatcom County Public Works (WCPW) is, by default, currently operating the retention dam located at the outlet to Friday Creek. Lake Management District No. 1 (LMD1) legally sunsetted on January 28, 2012 and a new governance structure for this role has yet to be fully implemented. Activities include:

- Annual installation in April and removal in September of the Friday Creek retention dam weir and fish ladder
- Daily visual monitoring of the dam
- Mitigation of beaver activity that could affect normal operation of the dam

WCPW employees install and remove the weir and fish ladder. Local residents who live nearby perform daily monitoring of the dam and maintenance activities associated with beaver control, on a paid contract basis for the County.

Enforcement of Private Stormwater M&O

Whatcom County Planning and Development Services (WCPDS) is responsible for code enforcement relative to proper M&O of private stormwater facilities that have been designed and approved as part of an approved plat, or building permit application.

Unfortunately, WCPDS currently has no centralized comprehensive records (GIS-based or otherwise) outlining where these private facilities have been installed. This hinders the ability of the County to monitor and inspect these facilities on a routine basis. Enforcement of inspections and maintenance is now only being done in response to observed problems or complaints from the public. If requested, WCPW can provide technical expertise to assist WCPDS with detection of problems and enforcement of code-compliant M&O of private stormwater installations.

Enforcement of Private Onsite Sewage Systems (OSS) M&O by Others

Whatcom County Health Department (WCHD) is responsible for requiring regular inspection and regulatory compliance of the existing private on-site septic systems (OSS) within the basin. The M&O of such systems is a private cost. There are an estimated 70 systems within the Lake Samish Basin (Source: County GIS 2008).

WCC 24.05.050 requires WCHD, within its Local Management Plan, to identify any “sensitive areas” where OSS can pose increased risk to public health. Many areas around Lake Samish meet one or more of three State Department of Health criteria: 1) shoreline management area of a lake with surface area greater than 20 acres; 2) wellhead protection area for Group A water system, and 3) recreational surface water usage within 200 feet of the shoreline. These Lake Samish areas have not been designated as sensitive areas under the Whatcom County OSS Local Management Plan. Public sewer service is generally available in the areas closest to the lake. WCHD is not currently performing any routine M&O enforcement activities in the Lake Samish Basin, but would respond to any observed failure or a complaint from the public.

M&O at Samish Park

Whatcom County Parks and Recreation Department is responsible for M&O of the community building, restrooms, parking lot and for garbage disposal. A general public comment was made that parking and garbage control were perceived to be inadequate for the number of visitors to the lake in the summer months (speculatively applicable to both the County parks and the WDFW boat launch). Indirectly, both problems could lead to water quality degradation (sediment runoff from parking on unpaved shoulders and trash from overflowing waste receptacles blowing into the lake).

4.1.2 Samish Water District (SWD)

Public Wastewater System M&O

Samish Water District operates and maintains a public sewer system, which encircles the lake and provides sewer service to approximately 400 properties around the lake. The District was organized under RCW Title 57 as a water and sewer district and is administered by a three-person elected board of commissioners and operated by three paid staff. The M&O program for the sewer system is contained in the District’s current Comprehensive Sewer Plan. Records of M&O are kept on file at the District’s office and are accessible for public review. The District’s M&O program was developed in accordance with Ecology’s *Criteria for Sewage Works Design*. The District’s primary wastewater treatment pond is south of the lake in the Friday Creek sub-basin (i.e. not in the Lake Samish Basin.) Samish Water District’s current M&O program includes the following activities.

- Real-time SCADA monitoring of pump station levels and operations.
- 24-hr emergency callout capability for SCADA alarms or calls from the public.
- Annual smoke testing and closed circuit television (CCTV) sewer inspection program.
- Daily inspections of pump station facilities.
- Maintenance and repair of damaged sewer facilities as necessary.



Photo 4-1. Sewer Pump Station Adjacent to the Lake

4.1.3 Washington Department of Fish and Wildlife (WDFW)

The public boat launch and parking area on East Lake Samish Drive is a WDFW facility. The agency has proposed a scaled back upgrade of the boat launch (one launch lane instead of two) which will address stormwater runoff by paving the ramp and parking area and providing a vegetative form of runoff treatment. This project is underway again as of March 2012. WDFW also runs an “Adopt an Access” program to allow volunteers to take care of water access sites throughout the state. That opportunity for community involvement is listed in Chapter 6 – Programmatic and Capital Recommendations.

4.1.4 Washington Department of Transportation (WSDOT)

Figure 4-2 shows the extent of I-5 right-of-way and general locations of WSDOT stormwater infrastructure. Table 4-2 provides an itemized inventory of the existing WSDOT stormwater infrastructure maintained within the basin. The most recent upgrade occurred in 2002, when the agency installed a stormwater retrofit project to treat stormwater originating from the I-5 corridor between Nulle Road (Exit 242, SR5 MP 243.03) and North Lake Samish Drive (Exit 246, SR5 MP 245.95).

WSDOT is required to follow its very detailed *Highway Runoff Manual (HRM)* in the planning, design, construction, and maintenance of stormwater management facilities for new or redevelopment projects throughout Washington. Ecology has approved the *HRM* as the equivalent of Ecology’s 2005 Stormwater Management Manual for Western Washington. Relevant excerpts of the *HRM* are included as an attachment to Technical Memorandum No. 4, and are not repeated here.

WSDOT is responsible for routine M&O for ditches, culverts, and catch basins in the I-5 right of-way, and for the routine M&O, including full-scale periodic cleaning, of an existing stormwater treatment vault installed under East Lake Samish Drive, south of I-5 within the basin. They are also responsible for emergency incident response and cleanup of any spills that may occur because of traffic accidents on I-5.

The Local Maintenance Superintendent of WSDOT’s Bellingham office indicated that, while the local office is aware of the elevated level of M&O required under the NPDES permit and the WSDOT HRM, they have insufficient budget and staff to perform that additional work. Their budget provides only for more essential M&O activities such as mowing and vegetation control, roadway/shoulder and median repair, emergency drainage repair, and snow removal. No additional state funds were allocated for M&O of the new, enhanced stormwater installations. The Bellingham office faces increased pressure from Olympia to perform this new M&O work under the current funding levels.

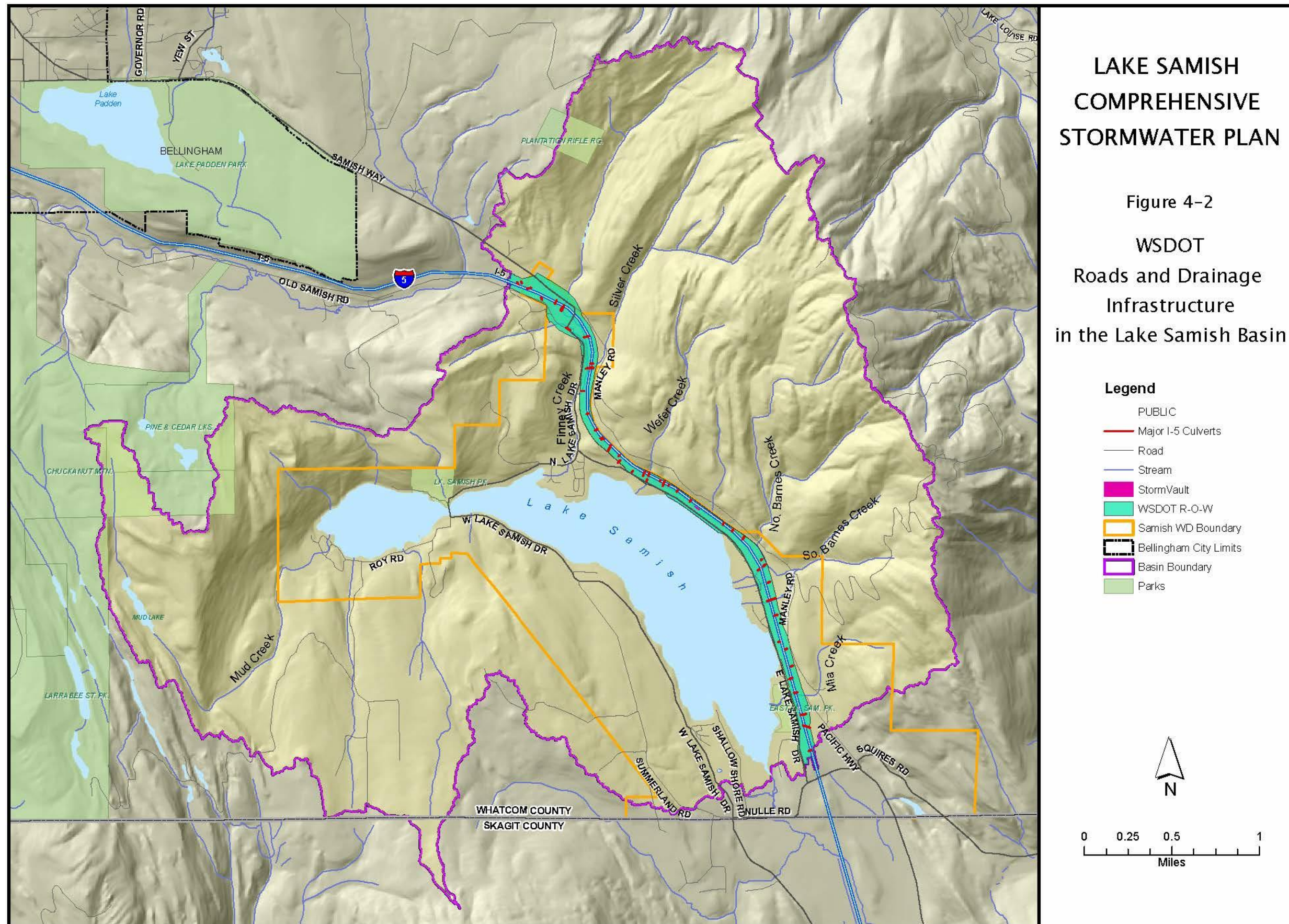
WSDOT reports that it has not inspected or performed any maintenance on the stormwater treatment vault, located in East Lake Samish Drive, subsequent to its installation in 1995.

Table 4-2. WSDOT Stormwater Infrastructure within the Lake Samish Watershed

Type of Structure/Facility	Quantity* / Description
Drainage Ditches & Biofiltration Swales (length in feet)	40,800
Culverts (length in feet)	7,000
Catch Basins	10-15
Drainage Pipe (length in feet)	1300-1400
Facilities (e.g., ponds, tanks, vaults)	1 Water Quality Vault (about 75,000 gallons)
Interstate 5 (length in feet) (includes ramps)	40,400
<ul style="list-style-type: none"> • Northbound (length in feet) 	19,300
<ul style="list-style-type: none"> • Southbound (length in feet) 	21,100

* All quantities are approximate, and taken from engineered drawings for 2002 stormwater retrofit.

Figure 4-2. WSDOT Roads and Drainage Infrastructure



4.1.5 Washington Department of Natural Resources (WDNR)

WDNR is responsible for administration, inspection and enforcement of the stormwater regulations included in the Forest Practices Act (RCW 76.09) and Title 222 WAC Forest Practices Board on all of the Lake Samish Basin lands zoned either Commercial Forestry (CF) or Rural Forestry (RF).

Enforceable Standards

RCW 76.09 and WAC Title 222 (specifically Chapter 222-24 Road Construction and Maintenance and Chapter 222-30 Timber Harvesting), represent the only enforceable regulations controlling stormwater management from forestry and timber harvesting activities. Rules within Chapters 222-24 and 222-30 (WAC Title 222) that are marked with an asterisk (*) pertain to water quality protection and have been adopted or amended by the Forest Practices Board with agreement from Ecology per WAC 222-12-010. (Attachment 2 to Technical Memo No. 4, Appendix A-4)

Non-Enforceable Standards

The Forest Practices Manual, developed by the Forest Practices Board, identifies the stormwater standards and practices recommended for compliance with RCW 76.09 and WAC Title 222; however, the standards are not enforceable. There is nothing in the current WAC or RCW that requires the timber interests or the WDNR staff to coordinate or notify the County regarding ongoing forestry activities. However, local WDNR employees recognize that voluntary coordination between WDNR enforcement and the counties can be very useful.

Approximately 66 percent of the Lake Samish Basin (5,370 acres) is zoned as either CF (4,889 acres) or RF (462 acres) with most of the forestry and timber harvesting activities occurring at the higher elevations of the basin east of I-5 and north and west of the lake. Table 4-3 gives the estimated quantity of major logging roads and associated drainage ditches and cross culverts that must be maintained by private timber interests. These estimated quantities are derived from County GIS data and aerial photos. The major cross-culverts, shown in are presumed to be located where logging roads cross streams. Figure 4-3 also shows the locations and extents of forestry zoning, major (but not all) forest roads, and probable forestry culvert locations.

Table 4-3. Forest Land Stormwater Infrastructure within the Lake Samish Watershed

Type of Structure/Facility	Very Approximate Quantity
Roads (length in feet)	236,917 (45 miles)
Drainage Ditches (length in feet)	Unknown
Culverts (length in feet) (probably underestimated by GIS)	475

Enforcement Activities

For WDNR inspection purposes, the Lake Samish Basin is divided into two separate enforcement areas. I-5 is the approximate north/south boundary between these two areas. Timber interests under the Commercial Forestry and Rural Forestry zoning designations are not required to file long-term harvest plans with WDNR.

Timberland property owners are required to file an application for harvesting timber (WDNR Western Washington Forest Practice Application/Notification). Upon receipt of application approval from WDNR, the property owner has two years to complete the harvest. The application process requires the property owner to address:

- Requirements for a watershed analysis
- Impact to historic sites and/or Native American cultural resources
- Development of a Road Maintenance and Abandonment Plan (RMAP)
- Harvest areas within 200 feet of Type “S” waters (streams and water bodies that are designated “shorelines of the state” as defined in chapter 90.58.030 RCW)
- Harvest areas within 200 feet of wetlands (as defined by WAC 222-16-035)
- Harvest methods
- Reforestation Plan or Natural Regeneration Plan
- WDFW HPA requirements

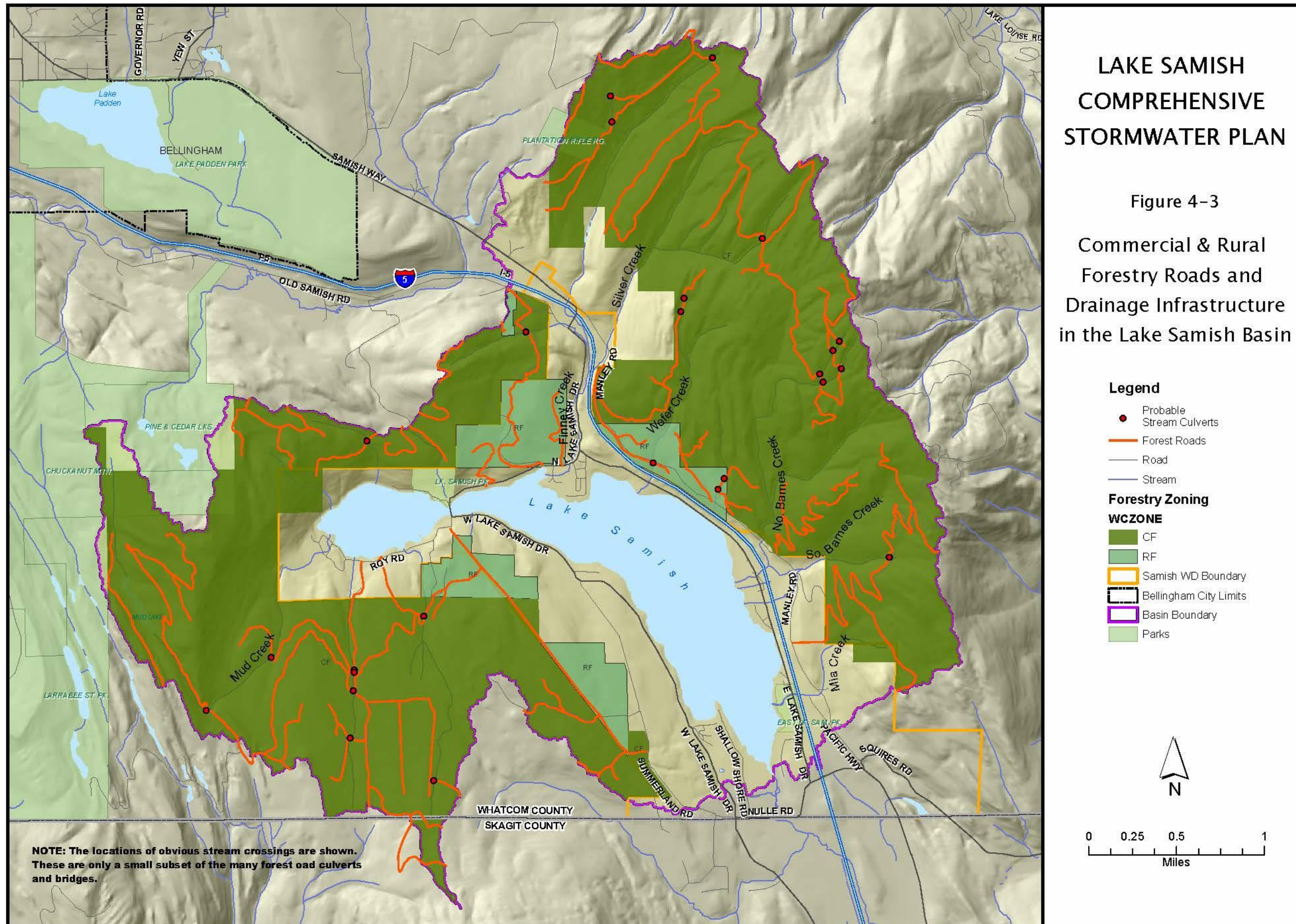
WDNR has five forest practice districts in the Northwest Region with six forest practice foresters in the field to administer the region. The Northwest Region includes the five most northwest counties in the state. Enforcement strategies for a particular harvest are developed in consideration of (1) the water resources involved at the site, (2) the amount of logging road required for harvest, (3) the steepness of the slopes at the site, and (4) the proximity of the work to critical areas. WDNR enforcement efforts vary depending upon the circumstances of each harvest. The forest practices forester relies upon the property owner to notify WDNR when work commences, and the forester then performs periodic inspections at critical junctures in the work.

4.1.6 Private Forestry-land Owners

The above description of enforceable and so-called non-enforceable forestry practice standards illustrates the importance of a thorough understanding and application of these requirements by logging and road building crews on a daily basis if critical local resources are going to be preserved and protected.

These individuals, from the newest crewmember to the owners, should be welcomed to the stakeholder discussion table to work together to prevent sediment transport and slow down runoff. Extra “eyes” immediately reporting problems to the forestry company (an erosive washout, for example) should be helpful and not punitive if the educated parties understood each other’s challenges, responsibilities, and intentions from meeting at the stakeholder table.

Figure 4-3. Commercial & Rural Forestry Roads & Drainage Infrastructure



4.1.7 Private Property Owners

This categorization of stakeholders for M&O discussion could include property owners of developed residential zoned-land (R 10A, R 5A, R1A, RR2), Tourist Commercial and Commercial-zoned property. Although forestry interests are “private property”, this section refers only to those properties that have urban-quality runoff from development, and/or an onsite septic system. Figure 4-4 shows the location of known private wells, onsite sewage systems (OSS), and private driveway culverts.

Private Stormwater Systems

Private property owners within the basin are responsible for the M&O of all privately owned stormwater infrastructure including, but not limited to: driveway culverts, private on-site drainage ditches, foundation drains, french drains, perforated pipe drains, catch basins, bioswales, rain gardens and detention ponds/structures. More-recently constructed houses might have a Low Impact Development (LID) feature such as a raingarden, filtration strip, bioswale, infiltration bioswale, or small detention pond.

Whatcom County’s 2003-2005 countywide culvert and catch basin inventory tabulated the number of privately owned driveway culverts within the Lake Samish Basin. The inventory also determined the number of stormwater catch basins within the watershed, but did not identify how many of those catch basins were privately owned.

Stormwater facilities for flow control or runoff treatment require specific regular maintenance to ensure normal operation. Despite this fact, the County currently has no centralized comprehensive records (GIS-based or otherwise) outlining where these facilities have been installed. This hinders the ability of the County to monitor and inspect these facilities. Table 4-4 summarizes the known, privately owned stormwater and sewer infrastructure within the basin.

Table 4-4. Private Stormwater and Sewer Infrastructure in the Lake Samish Basin

Type of Structure/Facility	Quantity/Description
RESIDENTIAL/PRIVATE STORMWATER FACILITIES	
Driveway Culverts	Approx. 162 (21 of these culverts are tied into catch basins)
Catch Basins	Unknown
Flow Control or Treatment Facilities	Unknown
RESIDENTIAL / PRIVATELY OWNED OSS FACILITIES	
On-site Sewer Systems	Approx. 70 systems ;(County GIS, 2008)

Private Onsite Sewer Systems (OSS)

Private property owners are also responsible for regular M&O of their existing on-site sewage systems. Applicants for OSS permits receive the following M&O packet at permit issuance:

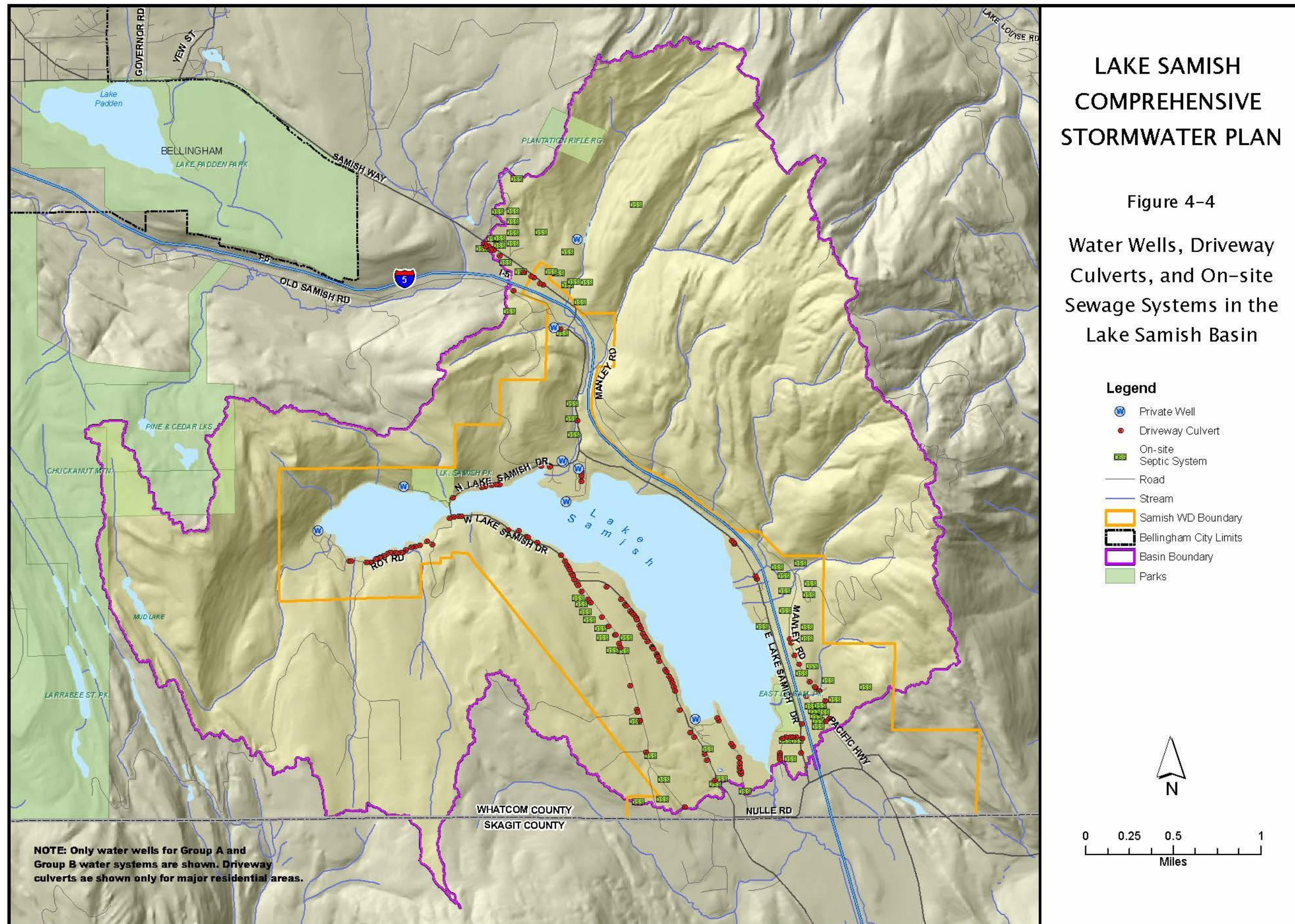
- A Whatcom County Health Department (WCHD) publication entitled “7 Ways to Save Thousands of Dollars in Septic System Repairs”.
- List of WCHD licensed M&O specialists, pumpers, designers, and installers.
- A WCHD publication entitled “Take Care of Your Septic System and Well Water”.
- An information flier with specific maintenance information related to their system type (i.e., conventional gravity, pressure mound, etc.).

The above referenced information makes the OSS owner aware of his/her obligation to properly operate and maintain the OSS. Maintenance providers for proprietary treatment devices (listed on the Washington State Health Department list of registered on-site treatment and distribution products) are required to submit maintenance reports to WCHD.

WCC 24.05.160 requires a complete evaluation of the OSS by a licensed M&O specialist or certified homeowner to verify proper functioning and determine maintenance needs. A Report of System Status (ROSS) form must be completed and submitted after the evaluation. A ROSS must be filed:

- At least once every three years for all systems consisting solely of a septic tank and gravity drainfield.
- Annually for all other systems, unless more frequent inspections are specified by WCHD.
- At the time of property transfer, unless a current ROSS performed by a licensed M&O specialist is already on file with WCHD.

Figure 4-4. Private Wells, Driveway Culverts and On-Site Sewage Systems



4.2 Summary of M&O

This review of M&O duties in concert with public comments from residents has identified perceived gaps between intended M&O and what is occurring in practice. The constructive approach generally demonstrated by the people attending public meetings (as taxpayers, community members, and volunteers) has been to ask, “How can we help?” In answer to the goals and objectives of this plan, the following is one framework for moving the most productive M&O practices forward within the constraints of limited public funding.

4.2.1 Defining Expectations for Basic versus Special Services

For each public agency, some stormwater-protective M&O activities should be considered first-tier, “basic services”, or what all taxpayers in the class are supposedly already paying for with their current tax dollars. Whatcom County Council has previously encouraged residents of other watersheds to recognize and take on the duties that can best be carried out by private citizens without the costly intervention of government taxation, administration and enforcement. Defining what is included in “basic” services is a conversation between government and governed that this comprehensive stormwater plan has helped to inform. If the basic services are not provided as intended by the tacit agreement between government and governed, then government should improve its performance or renegotiate those services down across all parts of the jurisdiction.

A second tier of M&O activities that may be Lake Samish Basin-specific are defined as “special”. Those M&O needs result from the special circumstances of having homes adjacent to a forested, recreational lake on I-5, which lake serves as a private water supply to enough people to constitute “a public water system”. These special circumstances are not generally applicable to other taxpayers in the jurisdictions. Thus, Lake Samish Basin residents may be willing to pay as a class for additional public services made necessary by the special circumstances of location. Unique residential locales, such as Lake Samish Basin, are sometimes described as “lifestyle choices” in that residents decide that the unique benefits of place outweigh the disadvantages, otherwise they would not choose to live there.

The M&O improvement suggestions for each jurisdiction and for private property owners have been classified using this two-tiered approach to basic and special. The M&O recommendations stemming from this Chapter 4 analysis *and* the M&O related public comments are presented in chart form in Chapter 6 Programmatic and Capital Recommendations.

4.2.2 Prioritizing Local Efforts

While this planning effort has surveyed all of the stormwater-protective M&O responsibilities of local and state agencies and private property interests, this plan is most likely to bring about positive change sooner at the local level.

Higher priority for action has been placed on suggestions geared toward Whatcom County and private property owners (including forestry), ahead of the suggestions for state agencies. If a role for volunteers is reasonable in a particular M&O process, that has also been noted as another inducement for early implementation and success.

4.2.3 Intersection of Programmatic and Capital Recommendations

Improving and protecting the water quality of Lake Samish will be an ongoing process of collaboration and action on the part of many stakeholders for years to come. Public education will need to be consistent and continue into the future (at lowest possible cost) to reach new residents, new visitors to the lake, and new government employees in relevant positions. If a capital improvement is made, it must, of course, then be maintained, at net increase or decrease to the M&O budget based on site-specific circumstances. If a public cost for M&O can be reduced by the actions of private citizens (e.g. raking leaves so yard debris does not reach and plug a public catch basin or culvert), then each stakeholder can recognize and step up for the particular role that this plan has helped identify.

Chapters 1 through 4 have integrated research, analysis, experience and current public comment to arrive at recommendations for action. Chapter 5 contains a list and description of needed capital improvement projects. Chapter 6 organizes and ranks the programmatic and capital project needs in terms of basic or special characteristics, and what can be accomplished soonest. A slightly more rigorous governance and funding strategy will be necessary to accomplish the works that cannot feasibly be managed at current levels of public, private and volunteer effort. Chapter 7 identifies one governance and funding concept that can be used to move the stormwater management plan forward in another phase after this plan has been adopted.

5 Capital Improvements

This chapter presents descriptions and lists of recommended structural stormwater and lake-level management improvements identified as a part of this planning effort. These projects are recommended (with varying priority) because incident- and site-specific M&O has not relieved or prevented re-occurrence of the observed problems. In addition, programmatic efforts either cannot or will not timely result in better physical conditions at these locations.

A priority ranking of highest, high, or low was assigned to each identified project in consideration of four factors:

- Public safety
- Potential for private or public property damage if not addressed
- Sedimentation, scour, or erosion and resulting water quality impacts
- Amount of public interest in the issue

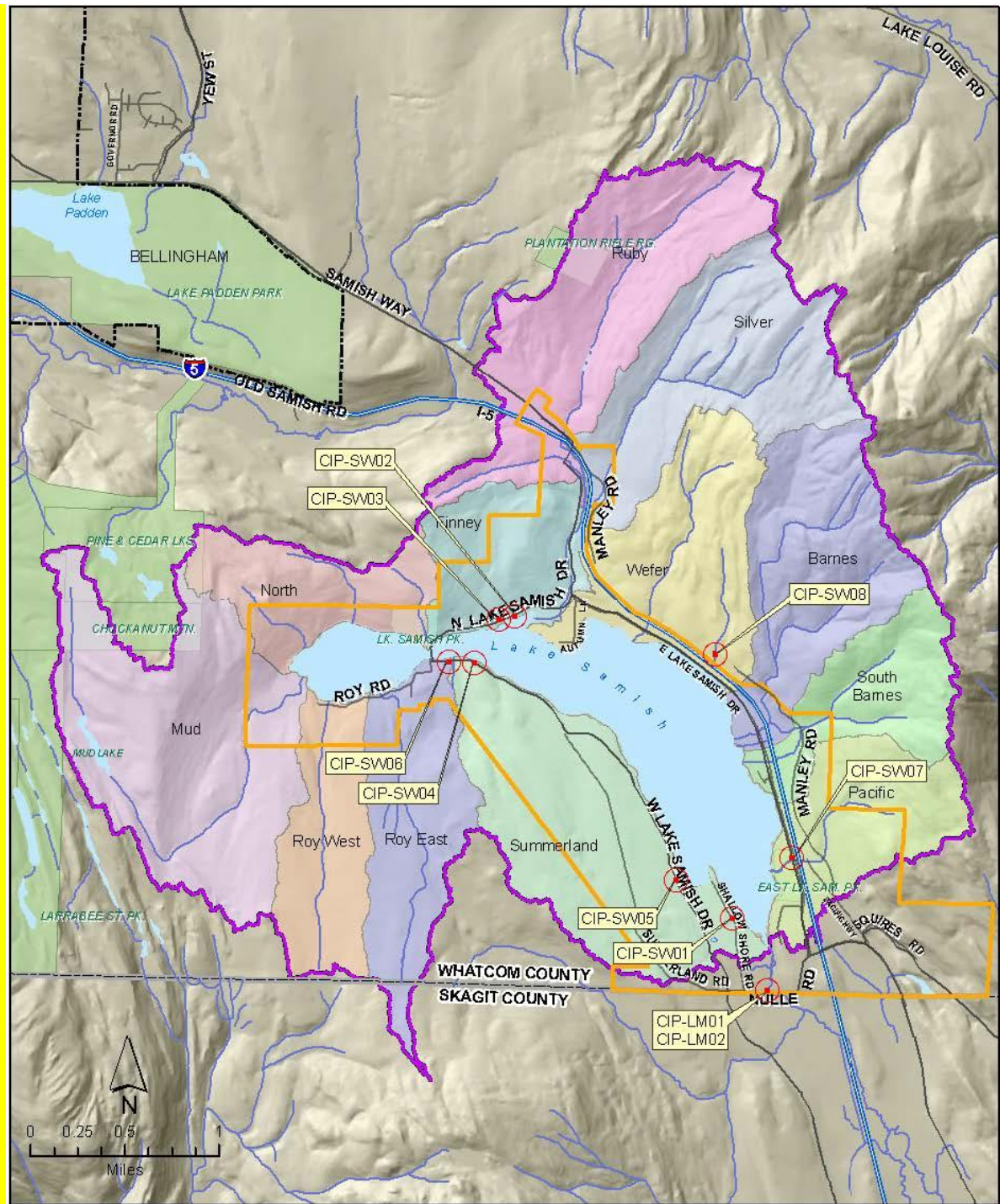
The public (via Technical Memo No. 6) has already reviewed these project priorities, so they remain unchanged in the final plan.

A low ranking project will most likely not be constructed within the six-year planning horizon. Removing sediment around the dam at Friday Creek (CIP-LM01) was initially given a “highest” priority because of public interest, but it may be difficult to obtain permits for that activity. Two low priority projects are still listed in various parts of the plan so that the public work of identifying and scoping the project will not be lost from the long-term horizon.

At present, standalone stormwater projects are not placed onto the Countywide Road Improvement Plan (funded from the Road Fund) unless they are road-related and come with reliable funds from an external source, for example, a grant or supplemented funds from a dedicated source such as a subzone or enterprise fund. In spite of that typical process, the County’s CIP coordinator was asked to assess relative priority of these projects compared to other needs within the County. There were too many projects ahead of the highest priority project on the Samish list. Even if the currently large list was completed within the next six years, there are always emergent needs countywide with which the Samish projects would have to compete in the future. Placing the Samish projects on a capital improvement list in this stormwater plan is still a first and essential step to ever constructing them with public funds, such as Public Works Trust Fund loans.

Individual fact sheets with photos for each project are located in Appendix C. The approximate locations of the ten identified capital projects are shown on the basin-wide map in Figure 5-1. There are two projects associated with the lake-level management, and eight with stormwater management. Table 5-1 summarizes each of the recommended capital projects with a concept-level estimate of costs to complete in 2011 dollars. One of each category was ranked as low priority (CIP-SW-08 and CIP-LM-02) and those two are not included in the cost estimates in Table 5-1 or Chapter 7 because they will not occur before 2019.

Figure 5-1. Lake Samish Basin – Capital Improvement Projects



Legend

- Stream
- Road
- Bellingham City Limits
- Parks
- Samish WD Boundary
- Basin Boundary
- Capital Improvement Projects

**Figure 5-1
Lake Samish Basin
Capital Improvement Projects**

Table 5-1. Summary of Lake Samish Basin Capital Improvements

Capital Improvement Description	Dollar Basis	Cost	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019
Stormwater Management CIP								
CI-SW01 – Relocate Culvert at 326 Shallow Shore Drive	2013	\$172,000	\$172,000					
CI-SW02 – Replace Cross-Culvert on North Lake Samish Drive; ~1,000 LF W. of Greene Point Lane	2013	\$53,000		\$53,000				
CI-SW03 - Replace Cross-Culvert on North Lake Samish Drive; ~1,400 LF W. of Greene Point Lane	2013	\$53,000		\$53,000				
CI-SW04 - Ditch Regrading and Culvert Installation on W. Lake Samish Drive; ~2,600 LF E. of the Bridge	2013	\$92,000			\$92,000			
CI-SW05 - Roadway Drainage Reconfiguration Adjacent to Calmor Cove Club Mobile Home Park at 316 West Lake Samish Drive	2013	\$250,000					\$250,000	
CI-SW06 - Water Quality Treatment Options for Catch Basins on W. Lake Samish Dr.; ~1,000 LF E. of the Bridge	2013	\$19,000			\$19,000			
CI-SW07 - Energy Dissipation at Pacific Creek Crossing on East Lake Samish Drive	2013	\$93,000						\$93,000
CI-SW08 - Energy Dissipation Solutions and Erosion Controls for Creek Crossing on Manley Road; West of Wefer Creek, East of Barnes Creek	2013	NA	NA	NA	NA	NA	NA	NA
Total Annual Capital Projects			\$172,000	\$106,000	\$111,000	\$0	\$250,000	\$93,000
Adjusted for Inflation (4% per year)			\$180,000	\$114,000	\$126,000		\$304,000	\$118,000
Lake-level Management CIP								
CI-LM01 - Friday Creek Dredging	2013	\$105,000				\$105,000		
CI-LM02 - Friday Creek Flow Meter	2013	NA	NA	NA	NA	NA	NA	NA
Total Annual Capital Projects						\$105,000		
Adjusted for Inflation (4% per year)						\$123,000		

5.1 Stormwater Management Capital Improvements

5.1.1 CI-SW01 – Relocate Culvert at 326 Shallow Shore Dr (Highest Priority)

Project Description

A County owned culvert discharges onto the western edge of the property at 326 Shallow Shore Drive, which is a lake shoreline property. During heavy storm events, discharge from this culvert overwhelms an existing private culvert leading to the lake and floods the eastern portion of the property. The County M&O Division has received numerous complaints from the property owner regarding this issue over the past several years. The property owner is currently employing makeshift dams and other obstructions in an attempt to block the stormwater flow onto his property.

The County owns an access easement to the lake approximately 300 feet to the north (along Shallow Shore Drive) that could be used as an alternative route for this stormwater drainage. A stormwater treatment facility could be installed in the easement as well.

The design objectives are to relocate roadway storm flows away from the property to eliminate periodic flooding of the property and provide basic treatment for area runoff.

Permitting, regulatory, and other issues affecting this project include proximity to the lake shoreline, space constraints, traffic control concerns, and Whatcom County limitations on seasonal clearing.

Potential Alternatives

Potential alternatives to address this problem include:

- Regrade the ditch and relocate the cross-culvert to discharge along an existing County easement located approximately 300 feet north of the site
- Obtain utility easement from property owner at 326 Shallow Shore Drive and install a treatment bioswale at the existing discharge locations
- No structural improvements

Preferred Solution

The preferred solution is to regrade the ditch along the west side of Shallow Shore Drive to drain to a point approximately 300 feet north of existing cross-culvert and install a cross-culvert to direct the flow to the existing Whatcom County easement and thence to the lake. The project would include construction of a treatment bioswale or rain garden within the County easement to provide treatment for the stormwater flows.

The primary benefit of this project will be to eliminate the current flooding problem at 326 Shallow Shore Drive. Construction of the bioswale will provide treatment of stormwater now discharging directly to the lake untreated.

CI-SW01 is a “highest” priority project. Implementation is recommended within the current six-year planning period.

The concept-level cost estimate is \$160,000 (2011 dollars, subsequently inflated in various tables in this plan.) This assumes a 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design.

5.1.2 CI-SW02 – Replace Cross-Culvert on North Lake Samish Drive (Highest Priority)

Project Description

A culvert located approximately 1,000 feet west of Greene Point Lane is undersized for storm conditions. The culvert capacity needs to be increased in order to pass flows from an unnamed creek draining out of the North sub-basin and road runoff.

The design objectives for this project include: (1) protect public health and safety by providing an adequately sized conveyance system to safely convey storm flows under the roadway, (2) protecting slope stability along the north side of the roadway, and (3) preserving the aesthetic integrity of the area.

Permitting, regulatory, and other issues affecting this project include proximity to the lake shoreline, space constraints, and Whatcom County limitations on seasonal clearing.

Potential Alternatives

Potential alternatives to address this problem include:

- Replace the undersized culvert with a larger culvert
- No structural improvements

Preferred Solution

The preferred alternative is to replace the undersized culvert with a culvert sized to convey storm flows safely under the roadway with no flooding. The primary benefit of this project will be protection of public safety by eliminating roadway flooding during storm events. CI-SW02 is a “highest” priority project, and implementation is recommended within the current six-year planning period.

The concept-level cost estimate is \$50,000 (2011 dollars, subsequently inflated in various tables in this plan.) This assumes a 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design.

5.1.3 CI-SW03 - Replace Cross-Culvert on North Lake Samish Drive, Located 1,400 LF West of Greene Point Lane (Highest Priority)

Project Description

A culvert located approximately 1,400 feet west of Greene Point Lane is undersized for storm conditions. The culvert capacity needs to be increased in order to pass flows from an unnamed creek draining out of the North sub-basin and road runoff.

The design objectives for this project include: (1) protect public health and safety by providing an adequately sized conveyance system to safely convey storm flows under the roadway, (2) protecting slope stability along the north side of the roadway, and (3) preserving the aesthetic integrity of the area.

Permitting, regulatory, and other issues affecting this project include proximity to the lake shoreline, space constraints, traffic control concerns, and Whatcom County limitations on seasonal clearing.

Potential Alternatives

Potential alternatives to address this problem include:

- Replace the undersized culvert with a larger culvert
- No structural improvements

Preferred Solution

The preferred alternative to address this issue is to replace the undersized culvert with a culvert sized to convey storm flows safely under the roadway with no flooding. The primary benefit of this project will be the protection of public safety by eliminating roadway flooding during storm events. CI-SW03 is a “highest” priority project, and is recommended for implementation within the current six-year planning period.

The concept-level cost estimate is \$50,000 (2011 dollars, subsequently inflated in various tables in this plan). This assumes a 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design.

5.1.4 CI-SW04 - Ditch Regrading and Culvert Installation on West Lake Samish Drive, Located 2,600 LF East of the Bridge (Highest Priority)

Project Description

A culvert located approximately 2,600 feet east of the bridge is undersized for storm conditions. The culvert capacity needs to be increased provide adequate drainage for the roadway drainage flows and the overland flows originating from the slope south of the roadway (Roy East sub-basin). Additionally, the capacity of the south-side road ditch drainage is insufficient to convey runoff to the culvert inlet.

The design objectives for this project include: (1) protect public health and safety by providing road ditch grading and an adequately sized conveyance system to safely convey storm flows under the roadway, (2) protect slope stability along the south side of the roadway, and (2) preserve the aesthetic integrity of the area.

Permitting, regulatory, and other issues affecting this project include proximity to the lake shoreline, space constraints, and Whatcom County limitations on seasonal clearing.

Potential Alternatives

- Regrade the south-side road ditch and replace the undersized culvert with a larger culvert
- No structural improvements

Preferred Solution

The preferred alternative is to regrade the drainage of the adjacent south-side road ditch and replace the undersized culvert with a culvert sized to convey storm flows safely under

the roadway with no flooding. The primary benefit of this project will be the protection of public safety by eliminating roadway flooding during storm events. CI-SW04 is a “highest” priority project, and implementation is recommended within the current six-year planning period.

The concept-level cost estimate is \$85,000 (2011 dollars, subsequently inflated in various tables in this plan). This assumes a 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design.

5.1.5 CI-SW05 - Roadway Drainage Reconfiguration Adjacent to Calmor Cove Mobile Home Park at 316 West Lake Samish Drive (High Priority)

Project Description

West Lake Samish Road stormwater currently flows into the Calmor Cove Mobile Home Park stormwater system. Stormwater flows through a County Road culvert into a ditch directly upstream of the inlet of Calmor Cove Mobile Home Park’s [private] storm drainpipe. The 12-inch storm drainpipe is approximately 300 feet in length and runs under the existing mobile homes to an open channel within the park. This storm drainpipe is tremendously difficult to service and has backed up in the past, flooding portions of the park.

The design objectives for this project include: (1) relocate the County culvert to downstream of the mobile home park storm drain pipe (farther north along West Lake Samish Drive), (2) develop a water treatment strategy for the new discharge location, and (3) preserve the existing aesthetic quality of the area.

Permitting, regulatory, and other issues affecting this project include proximity to the lake shoreline, potential easement requirements, space constraints, traffic control, and Whatcom County limitations on seasonal clearing.

Potential Alternatives

- Regrade the west-side road ditch and relocate the cross culvert to a point farther north along West Lake Samish Drive
- Install a manhole structure at the current culvert discharge to connect directly to the private storm drainpipe under the mobile home park

Preferred Solution

The preferred solution for this issue is to regrade the west-side road ditch and relocate the cross culvert to a point north along West Lake Samish Drive. A new storm drainpipe alignment will need to be identified to carry flows from the new culvert discharge to Lake Samish. The project should include evaluating the feasibility of stormwater treatment at the discharge site. A new utility easement may be required for the project. Potential benefits from the project include the elimination of the flooding potential within the park and implementation of stormwater treatment.

CI-SW05 is a “high” rated priority project. Implementation is recommended within the current six-year planning period or the following six-year planning period. Prior to implementation, the project’s execution strategy, value, and potential stormwater benefits should be further evaluated.

The concept-level cost estimate is \$232,000 (2011 dollars, subsequently inflated in various tables in this plan). This assumes a 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design.

5.1.6 CI-SW06 - Water Quality Treatment Options for Catch Basins on West Lake Samish Drive, Located 1,000 LF East of the Bridge (High Priority)

Project Description

On the south side of West Lake Samish Drive, approximately 1,000 LF east of the bridge, four storm drain catch basins are located within an expanse of gravel paving. The gravel area is used for parking and as driveway entrances to the homes located south of West Lake Samish Drive at that location. Sediment regularly washes into the catch basins. The design objective is to treat runoff from the gravel surfaces while still providing good drainage facilities.

Permitting, regulatory, and other issues affecting this project include proximity to the lake shoreline, space constraints, traffic control issues, and the Whatcom County limitations on seasonal clearing.

Potential Alternatives

- Install individual catch basin filter inserts
- Redirect all catch basin flow to a centralized canister vault treatment system
- No structural improvements

Preferred Solution

The preferred alternative is the installation of individual catch basin filter inserts at each catch basin. The expected benefit of this solution is reduced discharge of stormwater pollutants to Lake Samish. CI-SW06 is a “high” rated priority project. Implementation is recommended within the current six-year planning window or the next six-year planning window. Prior to implementation, the project’s execution strategy, value, and potential stormwater benefits should be further evaluated.

The concept-level cost estimate is \$17,000 (2011 dollars, subsequently inflated in various tables in this plan). This assumes a 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design.

5.1.7 CI-SW07 - Energy Dissipation at Pacific Creek Crossing on East Lake Samish Drive (High Priority)

Project Description

WSDOT’s Pacific Creek culvert (under I-5) is a hanging pipe discharging into a plunge pool just east of East Lake Samish Drive. The streambanks surrounding the plunge pool show significant signs of scour erosion from heavy storm events. The creek flows from the plunge pool to the inlet end of a County cross-culvert under East Lake Samish Drive. The design objectives for this project include: (1) energy dissipation and flow redirection to reduce scour erosion adjacent to the roadway, (2) elimination of the hanging outlet of the WSDOT culvert, and (3) revegetation/restoration of the impacted site.

Permitting, regulatory, and other issues affecting this project include proximity to the lake shoreline, WSDOT permitting, space constraints, traffic control concerns, and the Whatcom County limitations on seasonal clearing.

Potential Alternatives

- Install channel armoring with weir walls for energy dissipation
- Install a manhole structure to connect the outlet of the WSDOT culvert to the inlet of the cross culvert under East Lake Samish Drive
- No structural improvements

Preferred Solution

The preferred solution for this problem is construction of an armored channel equipped with weir structures for energy dissipation. The project should include revegetation/restoration of the existing scoured area adjacent to East Lake Samish Drive. The anticipated benefits from this solution include reduction of sediment discharge to the lake, stabilization of the eroded area adjacent to the roadway, and elimination of a potential flooding hazard during large storm events.

CI-SW07 is a “high” rated priority project. Implementation is recommended within the current or following six-year planning period. The project’s execution strategy, value, and potential stormwater benefits should be further evaluated prior to implementation.

The concept-level cost estimate is \$87,000 in 2011 dollars. A 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design were assumed.

5.1.8 CI-SW08 - Energy Dissipation and Erosion Controls for Creek Crossing on Manley Road, Between Wefer and Barnes Creeks (Low Priority)

Project Description

A 36-inch culvert (120-150 feet in length) conveys an unnamed creek in the Wefer sub-basin under Manley Road. The unnamed creek is located west of Wefer Creek and east of Barnes Creek. The culvert slope is 30-40 percent and the outlet is 10-15 feet above the stream channel. During storm events, flow velocity in the culvert is high enough to project a stream of water 15-20 feet beyond the end of the culvert. The design objectives for this project include: (1) energy dissipation and flow redirection to reduce scour erosion at the culvert outlet, (2) elimination of the hanging culvert discharge and plunge pool at the discharge outlet, and (3) revegetation/restoration of the eroded streambank.

Permitting, regulatory, and other issues affecting this project include work within the stream channel, site access, and the Whatcom County limitations on seasonal clearing.

Potential Alternatives

- Extend the culvert downward to the creek bed at outlet end
- No improvements

Preferred Solution

The preferred solution for this issue is to extend the existing culvert at a downward angle to a point of direct discharge into the creek. Project implementation will require an armored splash pad at the discharge point, restoration of the downstream channel utilizing natural methods such as amended soils, constructed step-pools, and revegetation with native plants.

CI-SW08 is a “low” rated priority project, and implementation is recommended for the next six-year planning period. A concept-level cost estimate was not prepared for this capital project because the project is not scheduled for early implementation and because additional study is needed to determine feasible strategies for implementation.

5.2 Lake-Level Management Capital Improvements

5.2.1 CI-LM01 - Friday Creek Dredging (Highest Priority)

Project Description

Since its installation in the 1990s, the Friday Creek retention dam has experienced a buildup of stream-deposited sediment both on the upstream and downstream sides of the dam. Questions and concerns have arisen regarding the impact this sedimentation is having on the normal operation of the retention structure. Programmatic recommendations included in this planning effort call for the preparation of a dredging feasibility study including consideration of the following elements:

- Required limits of dredging
- Dredging schedule (periodic)
- Permitting strategy
- Dredging means and methods
- Cost comparison between periodic dredging and annual removal of the entire dam structure
- Funding options

Based upon the results of the feasibility study, a dredging program may be recommended for the creek. The design objectives for this project include removal of sediment build-up adjacent to the retention structure, while minimizing the adverse impacts to the aquatic ecosystem. Permitting, regulatory, and other issues affecting this project include work within the stream channel, maintenance of the retention dam function, and Whatcom County limitations on seasonal clearing.

Potential Alternatives

- Dredge the channel
- Seasonal removal of the complete retention dam structure
- Leave the channel sedimentation as is

Preferred Solution

The preferred alternative for this project is to dredge and restore the Friday Creek channel immediately upstream and downstream of the retention dam. Benefits expected from

implementation of this alternative include increased water storage behind the dam, easier maintenance, and operation, and enhanced aquatic habitat. Prior to implementation, a dredging feasibility study should be performed to determine the practicality of dredging and to assess the lake management benefits of the project. CI-LM01 is a “highest” priority project. Implementation is recommended within the current six-year planning period.

The concept-level cost estimate is \$97,000 (2011 dollars, subsequently inflated to future dates in various tables in this plan). This assumes a 30 percent contingency on construction costs and a 50 percent contingency on soft costs and engineering/design.

5.2.2 CI-LM02 - Friday Creek Flow Gauging Station - (Low Priority)

Project Description

Currently, the only method for estimating Friday Creek flow rate is from the depth of the water over the weir. This flow measurement method has inherent inaccuracies and is hard to verify. For these reasons, a proposal has been made to install a calibrated flow meter structure (stream gauging station) in Friday Creek. Due to the irregular nature of the existing stream channel, the amount of instream debris in the creek, and the historical beaver activity in the area, a stream gauging station may be impractical. Programmatic recommendations included in this planning effort call for the preparation of a feasibility study to address or provide recommendations for the following:

- Applicable stream gauging methods.
- Channel considerations.
- Expected environmental effects and permitting strategy.
- Options for addressing beaver activity.
- Project costs and funding options.

Based upon the results of this feasibility study, stream flow gauging options may be recommended for the creek. The design objective for this project is to implement an accurate, instream flow metering strategy for Friday Creek.

Permitting, regulatory, and other issues affecting this project include permitting for work within the stream channel, irregularities in the channel cross-section, space constraints, and Whatcom County limitations on seasonal clearing.

Potential Alternatives

- Modify the existing retention dam to provide more reliable flow data
- Install an instream flow gauging station
- Do not install flow gauging station

Preferred Solution

The preferred solution is to modify the existing retention dam to provide more reliable flow data year round. Accurate flow measurement for the creek will help guide operation of the retention dam to provide the maximum instream flows possible during the summer months. This will, in turn, benefit downstream aquatic habitat and provide more reliable flow to the Samish River.

CI-LM02 is a “low” rated priority project, and its implementation would be dependent upon the results of the feasibility study. A concept-level cost estimate was not prepared for this capital project because additional study is needed to determine feasible strategies for implementation, and it will most likely be performed in the second six-year planning period .

6 Programmatic and Capital Project Recommendations

Many of the identified stormwater problems might be reduced through programmatic solutions as opposed to structural capital improvement projects. As has been demonstrated throughout earlier chapters, the term “programmatic solutions” broadly includes many tools such as additional research, stakeholder education, stakeholder behavior change, improvement in management and execution of M&O, use of Low Impact Development methods in new and remodeled construction, and administrative changes for information sharing.

The County is already implementing many of the same non-structural solutions described in this plan in other areas (NPDES Phase II jurisdictions) as part of the County Stormwater Management Program (SWMP). Although the Lake Samish Basin is not now, and probably never will be, under NPDES Phase II jurisdiction, basin residents can still easily avail themselves of much of the very relevant planning and programmatic materials developed for other watersheds.

6.1 Grouping and Ranking the Recommendations

From a variety of possible ways to rank and recommend the identified stormwater solutions of the Lake Samish Basin, an action-oriented framework has been selected. Two levels of recommended actions are named the “Basic / Now” level and the “Special / Later” level for clear messaging about needs versus wants, and a call to action for all stakeholders.

- Basic / Now - That which can be accomplished now under present levels of funding and governance.
- Special / Later – That which requires either greater basin resident acceptance of higher taxation or fees on the stakeholder class, and/or rebalancing of scarce County funding toward special circumstances in this area.

Within the two levels of service the recommended actions are further grouped by related programmatic or capital improvement topic, for example, Monitoring and Modeling, Codes and Regulations, M&O, General Programmatic Recommendations, Public Participation Opportunities, Stormwater Capital Improvements, and Lake-level Capital Improvements.

Using Birch Bay watershed planning as an informative experience, a simpler value judgment matrix was used to weight the issues and prioritize the recommendations into highest, high and low priorities. The plan places highest priority on recommendations that protect public safety, prevent flooding-induced private and public property damage, prevent acute water quality problems, and can be locally influenced and completed within a reasonable time. To qualify for a Basic / Now ranking an activity should be achievable within a maximum of three years from the date of plan adoption by Council.

The multifaceted Tables 6-1 through 6-6 are intended to serve as the Stormwater Management Plan for the Lake Samish Basin once the County Council adopts this Comprehensive Stormwater Plan. They represent the distillation of all the public comments and the research and analysis presented in Chapters 2 through 5 into an actionable guideline. However, this plan does not definitively establish the methods by which any actions in the Special / Later category will be funded. Chapter 7 contains examples and

recommendations for governance and funding, but the implementation of any funding stream will be a separate and succeeding process to County Council adoption of this Comprehensive Stormwater Plan.

6.2 Programmatic and Capital Recommendations

Basic / Now

These are recommendations that can be implemented using an existing governance form and current funding levels for the basin.

The recommendations included in the Basic / Now category can be implemented under the combination of existing County budgets for Public Works, Planning and Development, Health, or Parks and Recreation Departments annual budgets, and the existing funding levels and governance structure of the Samish Watershed Subzone of the Whatcom County Flood Control Zone District.

Special / Later

These are recommendations that can be implemented using an existing governance form, but with additional County Council authorizations and an increase in taxing or user fees assessed on stakeholders in the basin.

The recommendations classified as the Special / Later category can be implemented in phases according to prioritization and stakeholder acceptance of paying more as a class (higher taxation or fees) to have these recommendations implemented.

The comprehensive stormwater plan has provided a forum for raising questions and concerns from many viewpoints. With recommended work now identified, the next step is to have a smaller “public” (not countywide) agree to step up and pay more for the recommended solutions. This will require buy-in from more, and possibly different, stakeholders than those individuals who participated in the public meetings on the plan.

It is envisioned that additional objective-specific funding could be obtained in modest increments through a series of County Council ordinances pertaining to the Subzone. This incremental basis would allow actions to be completed and results assessed before proceeding on to the next project(s). All affected constituents will be able to give Whatcom County Council their feedback about higher taxation or user fees and Council will make its decision(s) with a thorough understanding of the basin’s challenges. In any event, this pragmatic recognition of next steps for funding is not meant to discourage the process.

The following Tables 6-1 through 6-6 characterize each programmatic and capital project recommendation as Basic/Now or Special/Later. The recommendations are organized in numerical order by the unique item number each issue was assigned during public review of the Technical Memos. The recommendations are not sorted by priority for action in Tables 6-1 through 6-6; that ranking and prioritization appears in Table 6-7.

Table 6-1. Monitoring & Modeling Recommendations

Item ID	Recommendation Description	Implementing Agent(s)	Priority
A. MONITORING – WEATHER AND WATER QUALITY (LAKE & TRIBUTARY)			
Basic / Now Activities			
MON- 1	Coordinate with Samish Water District to continue daily weather monitoring at the District's offices on Nulle Road.	Whatcom County PW – Stormwater	Low
MON-2	Plantation Rifle Range – Water Quality Monitoring – Continue to sample surface water in Ruby Creek for the heavy metal lead per WAC 173.201.A (Toxic Substances). (Initial sample 6/9/2011 was well below standard.)	Whatcom County Parks & Rec.	Low
Special / Later Activities			
MON-3	<p>Lake and Tributary Monitoring (Existing Degree) - Continue existing level of lake and tributary monitoring that includes quarterly lake monitoring (four stations) and twice yearly tributary monitoring (four streams).</p> <p>1. Lake monitoring includes:</p> <ul style="list-style-type: none"> • Temperature and dissolved oxygen profiles at 1-meter intervals from the surface to the lake bottom • pH, conductivity, phosphorus (total and soluble reactive), nitrogen (total, nitrate-nitrite, & ammonia), turbidity, and alkalinity in surface and bottom samples • Fecal coliform in surface samples • Chlorophyll <i>a</i> at 5-meter increments to a 20-meter depth (where deep enough) • Secchi depth (transparency) <p>2. Tributary monitoring includes:</p> <ul style="list-style-type: none"> • Temperature and dissolved oxygen (field measurements) <p>pH, conductivity, phosphorus (total and soluble reactive), nitrogen (total, nitrate-nitrite, & ammonia), turbidity, and alkalinity.</p>	Whatcom County PW – Stormwater	Low
MON-4	<p>Develop and Implement an Expanded Comprehensive Lake and Tributary Water Quality Monitoring Plan – The monitoring plan should be designed to provide data that can be analyzed statistically to give baseline water quality and trends with statistical confidence. The comprehensive monitoring program should include:</p> <ol style="list-style-type: none"> 1. Standardization of monitoring locations, sampling frequency and seasons, and monitoring parameters 2. Tributary monitoring for total and soluble phosphorus and total nitrogen, in all major sub-basins, to determine the external nutrient loads; this data will be crucial for the development of any future lake water quality models 3. Fecal coliform monitoring in the lake and tributaries coupled with field investigations into the sources of the elevated fecal coliform (i.e. on-site sewage systems, public sewer, animals, etc.) <p>Tributary monitoring during storm events to determine sub-basins with high sediment transport followed by inspections in the field to determine the sediment sources.</p>	Whatcom County PW – Stormwater	Low

Table 6-1. Monitoring & Modeling Recommendations

Item ID	Recommendation Description	Implementing Agent(s)	Priority
B. MODELING - HYDROLOGIC AND HYDRAULIC			
Special / Later Activities			
MOD-1	Develop a targeted, sub-area hydrologic – model for analysis of any future development of significance such as the planned Sleepy Hollow Project (46-unit residential development on 20 acres) on the west side of Lake Samish.	Whatcom County PW – Stormwater and Private	Low
MOD-2	Develop a targeted sub-basin hydraulic model. A hydraulic model will quantify the flow capacity of stream, ditches, culverts, and pipes. The output from the hydrologic model in MOD-1 above would be used as input for the hydraulic model. The US Army Corps of Engineers HEC-RAS (Hydrologic Engineering Center’s River Analysis System) would have the ability to import the current HEC-HMS data output to produce a hydraulic model that could include: (1) steady-flow water surface profile, (2) unsteady-flow simulation, (3) movable-boundary sediment transport simulation, and (4) water quality analysis.	Whatcom County PW-Stormwater and Private	Not Ranked
MOD-3	Develop basin-wide and sub-basin hydraulic models. A hydraulic model will quantify the flow capacity of stream, ditches, culverts, and pipes. The output from the hydrologic model would be used as input for the hydraulic model. The US Army Corps of Engineers HEC-RAS (Hydrologic Engineering Center’s River Analysis System) would have the ability to import the current HEC-HMS data output to produce a hydraulic model that could include: (1) steady-flow water surface profile, (2) unsteady-flow simulation, (3) movable-boundary sediment transport simulation, and (4) water quality analysis.	Whatcom County PW-Stormwater	Not Ranked

Table 6-2. Code and Planning Recommendations (C&P)

Item ID	Recommendation Description	Implementing Agent(s)	Priority
A. CODE AND PLANNING RECOMMENDATIONS			
Basic / Now Activities			
C&P-1	Engage vested development applicants in voluntary watershed protective values through this comprehensive stormwater plan.	Whatcom County PW Stormwater and PDS	Low
C&P-2	Upgrade regulations – for stormwater planning, design, and maintenance & operation to require compliance with the current <i>Stormwater Management Manual for Western Washington</i>	Whatcom County PDS	Low
C&P-3	Determine advisability or necessity of upgrading 1986 subarea plan in view of already existing regulations and decrease in County's emphasis on subarea planning as efficient tool.	Whatcom County PDS	Not Ranked
Special / Later Activities			
C&P-4	Investigate the need for modifications to current WCC 11.36 for the following lake recreational activities: 1. Placing restrictions to two stroke powered personal watercraft 2. Regulating watercraft speed and wake creation 3. Regulating proximity of watercraft to shorelines	Whatcom County PW – Stormwater	Not Ranked

Table 6-3. Maintenance & Operations Recommendations (M&O)

Item ID	Recommendation Description	Implementing Agent(s)	Priority
A. STORMWATER MANAGEMENT M&O RECOMMENDATIONS			
Basic / Now Activities			
M&O-1	Annual Culvert and Catch Basin Inspection - Develop and implement an annual culvert and catch basin inspection program for county-owned facilities within the basin.	<i>Whatcom County M&O</i>	Highest
M&O-2	Annual Roadway, Shoulder, and Drainage Ditch Assessment & Repair – Develop and implement an annual program for field assessment and repair of damaged or impaired roadway surfaces, shoulders, and drainage ditches.	<i>Whatcom County M&O</i>	Highest
M&O-3	Coordinate with Samish Water District to determine if vault water removed for inspections may be discharged into the District’s primary treatment lagoons.	Whatcom County PW – Stormwater	Highest
Special / Later Activities			
M&O-4	Provide Whatcom County staff time to coordinate with WSDOT for annual inspections of the water quality vault system. Coordination work would involve: <ul style="list-style-type: none"> • Public education regarding the function and condition of existing water quality vault • Provide public notification of upcoming inspection work 	<i>Whatcom County PW – Stormwater</i>	Highest
M&O-5	Assist WSDOT in annual inspections and ongoing maintenance through road closures, flagging assistance (if necessary), and equipment sharing.	Whatcom County M&O	Highest
M&O-6	Provide technical assistance to local WSDOT staff (as necessary) regarding common maintenance procedures used in this type of vault inspection and maintenance work.	Whatcom County PW – Stormwater	Highest
M&O-7	Identify a County liaison with WDNR to coordinate with office and field staff, and act as a go-between to aid communication between the public and WDNR. Management activities for this liaison staff position are shown in the following recommendations (M&O-8 - M&O-12)	Whatcom County PW – Stormwater	High
M&O-8	Develop and Maintain a Searchable Database – (preferably GIS-based and available to the Public) that identifies ongoing and future projected forest practices within the Lake Samish Basin. Information regarding ongoing logging operations within the State is available through the WDNR website	Whatcom County PW – Stormwater	High
M&O-9	Establish a system to receive record and address public concerns and/or comments regarding forestry activity within the basin.	Whatcom County PW – Stormwater	High

Table 6-3. Maintenance & Operations Recommendations (M&O)

Item ID	Recommendation Description	Implementing Agent(s)	Priority
M&O-10	Liaison to Act as spokesperson for the public – as the public’s agent, the County liaison should coordinate with WDNR to address the public concerns/comments received.	Whatcom County PW – Stormwater	Low
M&O-11	Coordinate with the Local WDNR Office to provide updates on forestry activity and issues within the watershed – In addition, coordinate with WDNR inspection/enforcement personnel to develop an educational/informational program to provide basin residents with a better understanding of “standard forestry practices” within the basin. Updates and educational information can be presented in the form of website information, newsletters, presentations at community/public meetings, or any other suitable forum.	Whatcom County PW – Stormwater	Low
M&O-12	Work with Local WDNR Personnel to identify opportunities for public involvement in the protection of forestlands within the basin.	Whatcom County PW – Stormwater	Low
Special / Later Activities			
M&O-13	Refine Existing GIS Culvert/Catch Basin Inventory to Determine Ownership of Catch Basins – By determining the extent of county-owned versus privately owned catch basin facilities, the County will be able to concentrate M&O budget on maintenance of County facilities.	Whatcom County PW – Stormwater	High
M&O-14	Develop a GIS Database of All Privately Owned Stormwater Infrastructure in the Basin – Development of this GIS database will aid in inspection and enforcement of M&O for private stormwater facilities.	Whatcom County PDS	Low
M&O-15	Complete a GIS Databases of Public and Private Stormwater Facilities and Develop and Maintain a Stormwater Facilities Map for the Lake Samish Basin – A comprehensive GIS-based stormwater database will be crucial to coordinating and documenting the required M&O activities of the different County departments and the different agency interests, and will be indispensable for coordinating responses to emergency scenarios.	Whatcom County PW – Stormwater	High
M&O-16	Institute a Notification, Education, and Inspection/Enforcement Program Aimed at Encouraging Private Property Owners to Inspect and Maintain Private Stormwater Facilities – Program should address the following issues: <ol style="list-style-type: none"> 1. Notification to property owners based upon a seasonal calendar that addresses which M&O activities should be performed at certain times of the year. 2. Public education that targets M&O activities available from multiple outlets such as: website, flyers, newsletters, notifications at community meetings, etc. 3. Inform public that follow-up inspections may occur to verify compliance of private stormwater facilities. In the event that a facility requires maintenance and/or repair, the property owner will be notified in writing of the deficiencies and maintenance/repairs required. 4. In the event the property owner fails to adequately maintain and/or repair violating stormwater facilities, the County shall have the right of enforcement to perform the repairs and bill the property owner for reimbursement of those costs. 	Whatcom County PW - Stormwater and Whatcom County PDS	Low

Table 6-3. Maintenance & Operations Recommendations (M&O)

Item ID	Recommendation Description	Implementing Agent(s)	Priority
B. LAKE-LEVEL M&O RECOMMENDATIONS			
Basic / Now Activities			
M&O-17	Continue M&O of Friday Creek dam through the Samish Subzone of Flood Control Zone District	Whatcom County PW M&O and Subzone	High
M&O-18	Experiment with different plank configurations during the winter season to see how these alternative configurations affect the deposition of sediment behind the dam.	Whatcom County PW M&O and Subzone	Low
M&O-19	Coordinate directly with WDFW – to ensure that the maintenance and operations procedures for the dam comply with the best management practices for preservation of the habitat and aquatic life of Friday Creek.	Whatcom County PW M&O and Subzone	Low
M&O-20	Enhance public education about water conservation within the Lake Samish Basin.	Ecology	Low
Special / Later Activities			
M&O-21	Perform Dredging Feasibility Study for Dredging Around the Dam Structure at Friday Creek – The dredging feasibility study should provide recommendations on: <ol style="list-style-type: none"> 1. Required limits of dredging 2. Dredging schedule (periodic) 3. Permitting strategy 4. Dredging means and methods 5. Cost comparison between periodic dredging and annual removal of the entire dam structure 6. Funding options 	Subzone	Not Ranked
M&O-22	Perform Feasibility Study for Placing a Flow Gauging Station in Friday Creek – The feasibility study should address and/or provide recommendations regarding the following: <ol style="list-style-type: none"> 1. Applicable metering methods 2. Channel considerations 3. Expected environmental effects and permitting strategy 4. Options for addressing beaver activity 5. Project costs and funding options 	Subzone	Not Ranked

Table 6-3. Maintenance & Operations Recommendations (M&O)

Item ID	Recommendation Description	Implementing Agent(s)	Priority
C. WASTEWATER MANAGEMENT M&O RECOMMENDATIONS			
Basic / Now Activities			
M&O-23	Update County's OSS Local Management to Include Lake Samish as a "Sensitive Area."	WCHD	Low
M&O-24	Samish Water District should continue its aggressive inspection and sewer rehabilitation program.	SWD	Low
Special / Later Activities			
M&O-25	Implement the County's OSS Local Management Plan for Education, Auditing & Enforcement – Use the model being developed for implementation of the OSS Local Management Plan in "Marine Recovery Areas"	WCHD	Low

Table 6-4. General Programmatic Recommendations (GPR)

Item ID	Recommendation Description	Implementing Agent(s)	Priority		
A. WHATCOM COUNTY MANAGEMENT AND STAFFING DESIGNATION					
Special / Later Activities					
GPR-1	Designate a Whatcom County staff person (1/4 FTE) to act as the watershed coordinator in charge of the implementation of the highest priority programmatic and capital improvement activities.	Whatcom County PW – Stormwater	High		
GPR-2	Designate a Whatcom County staff person (1/2 FTE) to act as the watershed coordinator in charge of the implementation of the High Priority programmatic and capital improvement activities.	Whatcom County PW – Stormwater	High		
Basic / Now Activities					
GPR-3	Administer/Update Lake Samish CIP annually.	Whatcom County PW – Stormwater	Low		
Special / Later Activities					
GPR-4	Identify and pursue grant opportunities for implementation of plan activities.	Whatcom County PW – Stormwater	Highest		
B. STAKEHOLDER COMMUNICATION, COORDINATION, AND OUTREACH					
Basic / Now Activities					
GPR-5	Maintain an informational website dedicated to the Lake Samish Stormwater Management Program.	Whatcom County PW – Stormwater	Low		
GPR-6	Use currently available watershed public education programs and materials from other watersheds: <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <ol style="list-style-type: none"> 1. Gardening and Landscaping 2. Automobile Usage & Car Washing 3. Boats and Recreation 4. Construction </td> <td style="width: 50%; vertical-align: top;"> <ol style="list-style-type: none"> 5. Water Conservation 6. Pet Waste & Hobby Farm Impacts 7. OSS 8. Invasive Species (Clean, Drain & Dry); Noxious Weeds </td> </tr> </table>	<ol style="list-style-type: none"> 1. Gardening and Landscaping 2. Automobile Usage & Car Washing 3. Boats and Recreation 4. Construction 	<ol style="list-style-type: none"> 5. Water Conservation 6. Pet Waste & Hobby Farm Impacts 7. OSS 8. Invasive Species (Clean, Drain & Dry); Noxious Weeds 	Private	Not Ranked
<ol style="list-style-type: none"> 1. Gardening and Landscaping 2. Automobile Usage & Car Washing 3. Boats and Recreation 4. Construction 	<ol style="list-style-type: none"> 5. Water Conservation 6. Pet Waste & Hobby Farm Impacts 7. OSS 8. Invasive Species (Clean, Drain & Dry); Noxious Weeds 				
GPR-7	Use County educational material regarding illicit discharges and solid & hazardous waste handling. Post on the project website and distribute to the public.	Whatcom County PW – Stormwater	Not Ranked		
GPR-8	Coordinate/Communicate with major basin stakeholders. <ol style="list-style-type: none"> 1. Public comments & concerns 	<ol style="list-style-type: none"> 2. Schedule stakeholder presentations at public meetings. 3. Pass on stakeholder current activities to the public. 	Lake Samish Association	High	

Table 6-4. General Programmatic Recommendations (GPR)

Item ID	Recommendation Description	Implementing Agent(s)	Priority
GPR-9	Voluntary private use of activities outlined in the newly developed Whatcom County Phase II Management Plan.	Private	Not Ranked
GPR-10	Prepare annual updates to public /County Council outlining progress implementing stormwater management plan.	Whatcom County PW – Stormwater	Low

Table 6-5. Public Participation Opportunities (PPO)

Item ID	Recommendation Description	Implementing Agent(s)	Rating
Basic / Now Activities			
A. SPONSOR COMMUNITY EDUCATIONS			
PPO-1	Through the Lake Samish Association or other community-based organizations, sponsor informational presentations from Whatcom County, State agency stakeholders (WDNR, WSDOT, Ecology, WDFW, etc.), timber and development interests to facilitate public education and communication.	Basin Stakeholders	Not Ranked
PPO-2	Sponsor workshops with Whatcom County to educate the public regarding basin-friendly stormwater practices and regular maintenance and operation of private on-site stormwater and sewer facilities.	Whatcom County	Not Ranked
B. LAKE STEWARDSHIP – FACILITIES MAINTENANCE			
PPO-3	Participation in WA Dept. of Fish and Wildlife’s “Adopt an Access” boat launch program.	WDFW	Not Ranked
PPO-4	Lake Samish Adopt-A-Road Litter Pickup Program – Referencing the Lake Samish Association website, cleanup is usually scheduled for the spring and fall.	Whatcom County	Not Ranked
PPO-5	Annual Maintenance of Private Stormwater and OSS Facilities – Approach Whatcom County M&O Division about coordinating an annual catch basin & driveway “clean-out” day where residents perform annual maintenance and the County provides for disposal of the debris and material removed.	Whatcom County	Not Ranked
C. LAKE STEWARDSHIP – NATURAL RESOURCE CONSERVATION AND HABITAT RESTORATION			
PPO-6	Volunteer opportunities with the Skagit Fisheries Enhancement Group (SFEG), a private, non-profit organization working to protect and enhance salmon resources in the Skagit and Samish River watersheds. The SFEG’s mission is to build partnerships that educate and engage the community in habitat restoration and watershed stewardship. The group has already completed several habitat enhancement projects within the Lake Samish Basin.	Skagit Fisheries Enhancement Group	Not Ranked
PPO-7	Volunteer opportunities with WWU for ongoing water sampling in the watershed.	WWU	Not Ranked
PPO-8	Whatcom County Parks “Adopt-A-Trail”	Whatcom County	Not Ranked

Table 6-6. Capital Improvement Projects (CIP)

Item ID	Recommendation Description	Implementing Agent(s)	Priority Rating
A. STORMWATER CAPITAL IMPROVEMENT PROJECTS			
	Special /Later Activities		
CIP-SW01	Relocate Culvert at 326 Shallow Shore Drive	Whatcom County M&O	Highest
CIP-SW02	Replace Cross-Culvert on North Lake Samish Drive; ~1,000 LF W. of Greene Point Lane	"	Highest
CIP-SW03	Replace Cross-Culvert on North Lake Samish Drive; ~1,400 LF W. of Greene Point Lane	"	Highest
CIP-SW04	Ditch Regrading and Culvert Installation on W. Lake Samish Drive; ~2,600 LF E. of the Bridge	"	Highest
CIP-SW05	Roadway Drainage Reconfiguration Adjacent to Calmor Cove Club Mobile Home Park at 316 West Lake Samish Drive	"	High
CIP-SW06	Water Quality Treatment Options for Catch Basins on W. Lake Samish Dr.; ~1,000 LF E. of the Bridge	Whatcom County PW Stormwater"	High
CIP-SW07	Energy Dissipation at Pacific Creek Crossing on East Lake Samish Drive	"	High
CIP-SW08	Energy Dissipation Solutions and Erosion Controls for Creek Crossing on Manley Road; West of Wefer Creek, East of Barnes Creek	Whatcom County PW Stormwater"	Low
B. LAKE-LEVEL CAPITAL IMPROVEMENT PROJECTS			
	Special /Later Activities		
CIP- LM01	Friday Creek Dredging	Whatcom County PW Stormwater	Highest
CIP-LM02	Friday Creek Flow Meter	Whatcom County PW Stormwater	Low

6.3 Relative Ranking of Programmatic Activities

Similar to the ranking system first discussed in Chapter 5, a priority ranking of highest, high, or low has been assigned to each identified programmatic activity in consideration of the following four factors:

- public safety (1-5 point scale with 5 being the high score, 50% weight).
- potential for private or public property damage if not addressed (1-5 point scale, 30% weight).
- acute (versus chronic) water quality impacts (1-5 point scale, 10% weight).
- immediacy, or ability to complete the activity (1-5 point scale, 10% weight).

Table 6-7 includes programmatic recommendations in both the Basic/Now and Special/Later groupings, ranked and sorted by this scoring system. The maximum score of any programmatic activity could be 500, and the lowest 100. Any programmatic activity scoring less than 150 points was ranked “Low Priority” and will most likely not occur within the six-year planning horizon. The low priority activities are still listed in various parts of the plan so that the public effort to identify and scope the work will not be lost from the long-term horizon. Programmatic recommendations that would conceivably be performed by a new County full-time-equivalent position are not separately given a line item cost in Table 6-7.

Clearly many other iterations of ranking criteria, weights, and individual scoring could be carried out to excess. The relative ranking system and results presented in Table 6-7 are intended to capture public feedback and focus on activities which can be completed. The ranking chart is but one example, and should not be viewed as a rejection of lower priority activities. Any or all of the recommendations could be worth pursuing if circumstances align.

Table 6-7 is a “roll-up” of a very detailed cost and scheduling table that uses an inflation factor of 4% per year and an estimate of when each programmatic activity would be performed. The last column on the right in Table 6-7 is titled “Cumulative Costs if Performed”. This column contains cumulative and inflated costs to perform the prioritized activities across the six-year planning period of 2014-2019 as one proceeds from highest priority to lowest. In Row 16, for example, we see that all of the Highest and High Priority programmatic activities scoring more than 150 points could be performed for approximately \$427,000. Table 6-7 should be considered an order-of-magnitude planning tool, and helps to inform the funding and governance discussion following in Chapter 7.

Table 6-7. Example Ranking System for Programmatic Recommendations

Row No.	PROGRAMMATIC RECOMMENDATIONS	Public Safety	Prevent Property Damage	Acute Water Quality Issue	Immediacy - Ability to Complete	Total Score	Total Costs	Cumulative Costs if Performed (Rounded)
	Weight	50	30	10	10			
HIGHEST PRIORITY >300 POINTS								
1	M&O-1 - Annual Culvert and Catch Basin Inspection	5	5	3	3	460	\$0	\$0
2	M&O-2 - Annual Roadway, Shoulder and Drainage Ditch Assessment & Repair	5	5	1	3	440	\$0	\$0
3	M&O-3 - County Staff to Coordinate with SWD for Disposal of Water from Dewatering of the Water Quality Vault	5	1	5	5	380	\$0	\$0
4	M&O-4 - County Staff to Coordinate with WSDOT on Annual Inspection of E. Lake Samish Dr. Water Quality Vault	5	1	5	4	370	\$7,960	\$8,000
5	M&O-6 - County Staff to Provide Technical Assistance to WSDOT	5	1	5	4	370	\$2,500	\$11,000
6	M&O-5 - County Staff to Assist WSDOT During Inspections With Road Closures, Flagging & Equipment Sharing	5	1	3	4	350	\$7,960	\$19,000
7	GPR-4 - Identify and pursue grant opportunities for implementation of the recommended management activities from this planning effort.	4	4	1	1	340	\$33,190	\$52,000
HIGH PRIORITY 150-300 POINTS								
8	GPR-8 - Coordinate/Communicate with major basin stakeholders-	2	4	4	3	290	\$31,600	\$84,000
9	M&O-13 - Refine Existing GIS Culvert/Catch Basin Inventory of the Basin to Determine Ownership of Catch Basins	3	3	1	4	290	\$1,000	\$85,000

Table 6-7. Example Ranking System for Programmatic Recommendations

Row No.	PROGRAMMATIC RECOMMENDATIONS	Public Safety	Prevent Property Damage	Acute Water Quality Issue	Immediacy - Ability to Complete	Total Score	Total Costs	Cumulative Costs if Performed (Rounded)
10	M&O-15 - Develop/Maintain a Stormwater Utility Map for the Lake Samish Basin.	3	3	1	4	290	\$10,800	\$96,000
11	GPR-1 - Designate a Whatcom County staff person (1/4 FTE) to act as the watershed coordinator in charge of the implementation of the Highest priority programmatic and capital improvement activities.	3	3	2	3	290	\$94,780	\$191,000
12	GPR-2 - Designate a Whatcom County staff person(1/2 FTE) to act as the watershed coordinator in charge of the implementation of the High Priority programmatic and capital improvement activities.	3	3	2	3	290	\$189,570	\$381,000
13	M&O-7 - County Staff Time to Coordinate With WDNR Office	1	3	3	5	220	\$1,960	\$383,000
14	M&O-9 - Establish System to Receive, Record, & Address Public Comments/Concerns About Forestry Activity in Basin	1	3	3	3	200	\$1,960	\$385,000
15	M&O-8 - Develop/Maintain GIS Forestry Activity Database	1	3	1	3	180	\$10,400	\$395,000
16	M&O-17 - Maintain Responsibility for M&O of Friday Creek Retention Dam with the Subzone	1	2	1	4	160	\$31,600	\$427,000
LOW PRIORITY - ≤150 POINTS								
17	GPR-7 - Use County educational material regarding illicit discharges and solid & hazardous waste handling. Post on project website.	1	1	3	4	150	\$0	\$427,000
18	M&O-24 - Coordinate w/ SWD to Implement Inspection & Sewer Rehabilitation Program.	1	1	4	2	140	\$8,610	\$436,000

Table 6-7. Example Ranking System for Programmatic Recommendations

Row No.	PROGRAMMATIC RECOMMENDATIONS	Public Safety	Prevent Property Damage	Acute Water Quality Issue	Immediacy - Ability to Complete	Total Score	Total Costs	Cumulative Costs if Performed (Rounded)
19	M&O-10 - County Staff to Act as Spokesperson for Public to WDNR	1	1	1	5	140	\$1,960	\$438,000
20	M&O-11 - Coordinate With Local WDNR Office to Provide Updates Regarding Forestry Activities/Issues in the Basin	1	1	1	5	140	\$1,960	\$440,000
21	M&O-12 - Work With Local WDNR to Identify Public Participation Opportunities	1	1	1	5	140	\$1,960	\$442,000
22	Mon-1 - Coordination with SWD.	1	1	2	3	130	\$0	\$442,000
23	Mon-2 - Plantation Rifle Range - Monitoring	1	1	2	3	130	\$0	\$442,000
24	M&O-23 - Update County's OSS Local Management to Include Lake Samish as a "Sensitive Area"	1	1	1	4	130	\$0	\$442,000
25	GPR-5 - Develop and maintain an informational website dedicated to the Lake Samish Stormwater Management Program.	1	1	2	3	130	\$20,000	\$462,000
26	M&O-18 - Experiment with Different Plank Configurations / Assess Alternate Dam Configurations	1	1	1	4	130	\$3,000	\$465,000
27	M&O-19 - Coordinate directly with WDFW	1	1	1	4	130	\$4,800	\$470,000
28	M&O-20 - Coordinate and assist the WDOE	1	1	1	4	130	\$4,800	\$475,000
29	M&O-14 - Develop/Maintain a GIS Database of All Private Stormwater Infrastructure in the Basin	1	1	1	4	130	\$10,900	\$486,000

Table 6-7. Example Ranking System for Programmatic Recommendations

Row No.	PROGRAMMATIC RECOMMENDATIONS	Public Safety	Prevent Property Damage	Acute Water Quality Issue	Immediacy - Ability to Complete	Total Score	Total Costs	Cumulative Costs if Performed (Rounded)
30	M&O-16 - Institute a Notification, Education, and Inspection/Enforcement Program Aimed at Encouraging Private Property Owners to Inspect and Maintain Private Stormwater Facilities	1	1	1	4	130	\$10,430	\$496,000
31	M&O-25 - Implement the County's OSS Local Management Plan With Regard to Education, Auditing & Enforcement.	1	1	1	4	130	\$11,820	\$508,000
32	GPR-3 - Administer/Update Lake Samish CIP annually.	1	1	1	3	120	\$19,730	\$528,000
33	GPR-9- Voluntary private use of activities outlined in the newly developed Whatcom County Phase II Management Plan	1	1	1	3	120	\$0	\$528,000
34	GPR-10 - Prepare annual progress reports and provide annual updates to both the public and the County Council outlining the progress implementing the stormwater management plan.-	1	1	1	3	120	\$39,520	\$568,000
35	MON-3 - Lake & Tributary Monitoring - 2011 Levels	1	1	3	1	120	\$47,390	\$615,000
36	MON 4 - Develop/Implement Expanded Lake & Tributary Monitoring	1	1	3	1	120	\$170,810	\$786,000
37	GPR-3 - Administer/Update Lake Samish CIP annually.	1	1	1	3	120	\$19,730	\$806,000
38	C&P-4 - Investigate the need for modifications to current WCC 11.36 regarding boating on the lake.	1	1	2	1	110	\$5,000	\$811,000
39	M&O-21 - Perform Dredging Feasibility Study	1	1	1	2	110	\$10,000	\$821,000
40	M&O-22- Perform Feasibility Study for Placing a Flowmeter in Friday Creek	1	1	1	2	110	\$10,000	\$831,000

Table 6-7. Example Ranking System for Programmatic Recommendations

Row No.	PROGRAMMATIC RECOMMENDATIONS	Public Safety	Prevent Property Damage	Acute Water Quality Issue	Immediacy - Ability to Complete	Total Score	Total Costs	Cumulative Costs if Performed (Rounded)
41	C&P-1 - Modify Vesting Conditions in WCC Title 21	1	1	1	1	100	\$0	\$831,000
42	C&P-2 - Modify Regulations to Require Use of 2005 DOE Stormwater Management Manual	1	1	1	1	100	\$0	\$831,000
43	GPR-6 - Use current watershed public education programs to cover the Lake Samish Basin;	1	1	1	1	100	\$18,830	\$850,000
44	MOD-1 - Sub-Area Hydrologic Modeling for New Development	1	1	1	1	100	\$47,100	\$897,000
45	C&P-3 Determine advisability of updating Subarea Plan	1	1	1	1	100	\$0	\$897,000
Weight	Rating System:							
50	Public Safety: 1 (low score) to 5 (high score) points for activities likely to prevent accidents caused by flooding							
30	Prevent Property Damage: 1-5 points for activities likely to prevent property damage from flooding or acute scour and erosion							
10	Acute Water Quality Issue: 1-5 points for activities likely to reduce acute pollution or water quality impacts.							
10	Immediacy, Ability to Complete: 1-5 points for ability to obtain permits and fund activity from appropriate sources.							

7 Governance and Funding

Building on earlier chapters of this plan, Chapter 7 now presents analysis of potential governance structures and funding strategies for carrying out the recommendations of the comprehensive stormwater plan. As briefly mentioned in earlier chapters, there is a feasible governance structure in place that should allow immediate action on many of the “Basic / Now” activities once the County Council adopts this plan. Stakeholders will continue to be engaged at each new increment of requested commitment, especially concerning the raising of basin-specific revenues.

7.1 Governance for Stormwater and Lake-Level Management in Lake Samish Basin

When Technical Memo No. 7 on governance was prepared for public review in March 2011, several key situations affecting the topic were in transition. As of January 28, 2012, of five potential governance alternatives researched, only one – the subzone of the flood control zone district - remains a likely and good option for governance of both stormwater and lake-level management. The five alternatives are briefly described below, along with the currently prohibitive circumstances eliminating four of them from further consideration. A reason for discounting each of four alternatives is described as “currently disqualifying circumstances”, since in each case a different outcome *might* be possible if changed future conditions warranted further consideration.

7.1.1 Samish Water District

Samish Water District (SWD) was formed in 1972 under RCW 57 and provides public sewer service to the residents around Lake Samish. RCW 57 currently confers the following additional powers to water and sewer districts:

- To construct, condemn and purchase, add to, maintain, and operate systems of drainage for the benefit and use of the district, the inhabitants thereof, and persons outside the district with an adequate system of drainage (RCW 57.08.005(7)(a));
- In instances where a district contains within its borders, abuts, or is located adjacent to any lake, stream, groundwater, or other waterway within the state of Washington, to provide for the reduction, minimization, or elimination of pollutants from those waters in accordance with the district's comprehensive plan (RCW 57.08.005(10));
- To issue general obligation bonds, revenue bonds, local improvement district bonds, or utility local improvement bonds for the purpose of paying all or any part of the cost of reducing, minimizing, or eliminating the pollutants from these waters (RCW 57.08.005(10)).

Conclusion: In discussions during the planning phase of this project, SWD officials indicated, with advice of counsel, that RCW 57 did not provide a broad enough statutory mandate for SWD to assume governance and funding authority for stormwater and lake-level management within the basin.

7.1.2 Cooperative Watershed Management

RCW 36.89.130 allows that a county may, as a part of maintaining a system of stormwater control facilities, participate in and expend revenue on cooperative watershed management actions, including watershed management partnerships under RCW 39.34.210 and other intergovernmental agreements, for purposes of water supply, water quality, and water resource and habitat protection and management. Under RCW 39.34.210, any two or more public agencies may enter into agreements with one another to form a watershed management partnership for implementing any portion or all elements of a watershed management plan, including the coordination and oversight of plan implementation. Cooperative management would require the execution of a watershed partnership agreement that included the provisions required of all interlocal agreements under RCW 39.34.030(3). The watershed partnership agreement can establish a separate legal entity to conduct the cooperative undertaking of the partnership, such legal entity would be authorized to contract indebtedness and to issue and sell general obligation bonds and to issue revenue bonds.

Conclusion: At present, there are no other agencies interested in entering into a cooperative watershed management agreement with Whatcom County for comprehensive stormwater and lake-level management in the Lake Samish Basin.

7.1.3 Whatcom County – Countywide Stormwater Utility

In recent years, Whatcom County has investigated the possible establishment of a stormwater utility as a means to plan, provide, and fund a countywide stormwater program. Such a utility could provide a baseline level of stormwater services throughout the county, ensure compliance with Western Washington Phase II NPDES Permit (Phase II) regulations, and protect various sensitive watersheds and water resources within the County.

RCW 36.89 allows for municipal stormwater management through the establishment of community-based stormwater utilities. Stormwater utility funding is typically accomplished through user fees based upon a property's percentage of impervious surface. User fees charged must establish a connection between the fee amount and the benefit received. The utility's funding plan must decide if both developed and undeveloped properties will be assessed and what fees will be assessed for public roadways and other public properties.

Conclusion: Whatcom County does not envision adding non-jurisdictional rural residential areas (such as Lake Samish, Lake Padden and the Nooksack River area) to the NPDES Phase II permit program. Thus, even if Whatcom County Council does ultimately form a countywide stormwater utility, it would only apply to urban areas in the County for the foreseeable future. It would not apply to rural areas with "urban-quality" runoff.

7.1.4 Lake Management District No. 1 (LMD)

In 1992, Whatcom County Council formed Lake Management District No. 1 at the request of citizens to provide administration, maintenance, and operation of a retention dam structure located at the Lake Samish outlet to Friday Creek (Ordinance No. 92-006). The District was administered under RCW 36.61 with the Whatcom County Council serving as the supervising board. In response to a request from landowners within the District, the Whatcom County Council created a Lake Management District No. 1 Advisory Committee (Resolution 95-032) which worked directly with the County Engineering Division in an

advisory capacity with its primary responsibility being to review the operations and management of projects funded by the LMD. Appointed by the Whatcom County Executive, the five-member committee was comprised of landowners within the District, who were geographically representative of the District area.

At the LMD's formation, properties were assessed based upon water withdrawal and lake frontage resulting in a total assessment of approximately \$71,000 (\$42,000 for the retention dam project and \$29,000 for a stream channel clearance project). The funds were used to build the original retention dam and for some annual costs to adjust the structure and maintain the surrounding stream channel area. The original assessment was a one-time levy and all funds were fully utilized years ago.

In 2006, Whatcom County Public Works Department initiated the formation of the Samish Watershed Subzone, which is subordinate to the countywide Flood Control Zone District. The subzone was created to provide a long-term stable funding source to maintain and operate the dam, and provide a base level of funding for stormwater projects. Whatcom County passed Ordinance 2006-027 on June 20, 2006 establishing the Samish Watershed Subzone. Ordinance 2006-034 (August 8, 2006) then authorized an assessment to provide annual M&O revenue for the new subzone. The subzone does not currently have an advisory committee. The LMD continued to serve as a committee in a strictly advisory role to County Council for a number of years until citizen interest waned.

Conclusion: The LMD and its associated Advisory Committee were allowed to sunset as a district on January 28, 2012 in accordance with County Ordinance No. 2001-033.

7.1.5 Samish Watershed Subzone (Samish Subzone)

The genesis of the Samish Watershed Subzone is described in Section 7.14 immediately above. Formed under RCW 86.15.020, the Samish Watershed Subzone is granted the same general powers as a flood control zone district (RCW 86.15.080) including the powers to:

- “Plan, construct, acquire, repair, maintain, and operate all necessary equipment, facilities, improvements, and works to control, conserve, and remove flood waters and stormwaters and to otherwise carry out the purposes of this chapter (RCW 86.15.080) including, but not limited to, protection of the quality of water sources;
- Control, conserve, retain, reclaim, and remove flood waters and storm waters, including waters of lakes and ponds within the district, and dispose of the same for beneficial or useful purposes under such terms and conditions as the board may deem appropriate, subject to the acquisition by the board of appropriate water rights in accordance with the statutes.”

Flood control subzones in general provide simple and effective governance and funding mechanisms for implementation of a comprehensive stormwater management program, *and* lake-level management. Currently, the Samish Subzone operates only as a funding mechanism for the ongoing M&O activities at the Friday Creek retention dam. County Council would need to adopt additional ordinances to document a new mandate for stormwater management and to change the tax or fee structure to cover additional activities developed as recommendations of this plan.

Recommendation: The existing Samish Watershed Subzone is the recommended governance structure to carry out the goals and objectives of the Lake Samish Basin comprehensive stormwater plan. Additional ordinance(s) will be required from Whatcom County Council to specify expanded activities and raise additional revenue. It may be advisable for the County Executive to appoint a Samish Watershed Subzone Advisory Committee consisting of five representatives of basin stakeholder interests. This Committee should report directly to the Board of Supervisors (County Council) on a semiannual basis and would recommend passage of enabling and/or funding ordinances as necessary to carry out the activities of the stormwater management plan.

7.2 Funding Strategies and Rate Projections for the Lake Samish Basin

The discussion of funding strategies and rate projections is separated between stormwater and lake-level management, even though both can be funded and administered by the Samish Watershed Subzone.

7.2.1 Stormwater Management Funding Strategy

An analysis was performed of the current countywide taxing structure and the percentage of existing tax rates and tax collections that might be relevant to stormwater management. By reviewing the County's 2011-2012 Budget at a Glance report, it was determined that approximately 29.31% of the County's total revenues are spent on functions directly relevant to this plan (flood control, roads, public works, planning, health, parks and recreation, etc.) Once this stormwater-relevant percentage was determined, we identified a per capita share of countywide expenses and tax revenues and multiplied the per capita figure by population in the basin to determine a broad monetary baseline for what all residents in the Lake Samish Basin should be contributing in the way of taxes to pay for these functions.

Table 7-1 lays out the numerical case for consideration. Briefly, on a per capita basis, each person's share of county tax revenues to pay is \$367. The portion of tax revenues that are devoted to stormwater relevant functions is estimated at 29.31%, so each person pays an estimated \$107 per year toward these functions on a countywide basis. With approximately 1,300 people living around the lake and represented on the existing Samish Subzone assessment roll, the Lake Samish basin could be contributing approximately \$140,000 each year toward stormwater management on a countywide basis. This rough per capita calculation was then cross-checked against actual assessed values on the Subzone assessment role. Lake Samish Basin residents on the Subzone roll are paying roughly \$190,000 per year in general county taxes toward stormwater-relevant functions (in the WC, FC, and RD categories on the tax statement). The difference between the \$140,000 hypothetical calculation and \$190,000 actual reflects higher than average property values because of the proximity to the lake. It also indicates that Lake Samish Basin residents may already be paying for incrementally more County services due to the denser residential land use.

This example analysis clearly does not mean that every tax dollar originating from the basin is expected to be spent in the basin; the County maintains the authority to generally collect, pool, and disburse taxes, fees and grants countywide in consideration of departmental budgets, and many ongoing plans not unlike this stormwater plan. This strategy

nevertheless provides an equitable overview of what funding levels will be needed to accomplish some or all of the recommendations in the plan.

It is suggested that whatever additional funding is necessary (and supported by the residents) be collected in the form of a uniform stormwater management tax assessment through the Samish Watershed Subzone. The uniform tax assessment (as opposed to a user fee) could be used to accomplish any of the myriad, intertwined activities that generally impact stormwater in the Basin.

The populace contributes to the impacts in many different ways, and not every individual in the same ways. Thus, an impervious surface area fee strategy was determined to be unnecessarily complex and did not relate to more than half of the water quality and quantity issues identified in the Lake Samish Basin. The general public benefits that will result from the tax will be societal, environmental, and aesthetic. The tax assessment should be shared equally as a millage rate per \$1,000 of fair market value as determined by the County assessor, or it could be levied as a “per domestic unit” tax as is the current structure for a portion of the lake-level management assessment. This is comparable to how other types of general taxes are levied, especially for general benefits so directly tied to stormwater impacts such as flood control, roads, and public works. More justification for a tax versus a user fee is contained in Section 7.4.3.

Table 7-1. Samish Watershed Subzone - Strategies to Fund Stormwater and Lake-level Programmatic Activities

Row No.	Description	Formulas	Result
1	Source: Whatcom County 2011-2012 Final Budget;2011-2012 Budget at a Glance, Vol. 1, pages 27-34		
2	2012 Countywide Budget Projected Revenues from All Sources		\$166,632,789
3	45.84% of Revenues are from Taxes	$45.84\% \times \$166,632,789 =$	\$76,384,470
4	2012 Countywide Budget Projected Expenditures		\$171,645,288
5	2012 Countywide Population		208,323
6	Estimated Lake Samish Basin Population		1,300
7	Average revenues from all sources Countywide, per capita	$\$166,632,789 / 208,323 =$	\$800
8	Average countywide revenues from Taxes, per capita	$45.84\% \times \$800 =$	\$367
9	Average Countywide Expenditures, per capita	$\$171,645,288 / 208,323 =$	\$824
10	Calculate percentage of Countywide expenditures in 2011-2012 relevant to stormwater	% of Expenditures	Expenditures Countywide
11	Physical Environment (Water Resources, Solid Waste, Planning, Flood Control, Animal Control)	5.06%	\$8,685,252
12	Transportation (Public Works except Solid Waste and Flood Control)	17.71%	\$30,398,381
13	Culture and Recreation (Extension, Parks and Recreation)	2.51%	\$4,308,297
14	Capital Outlay (including capital road and street construction)	4.03%	\$6,917,305
15	Sum Total Countywide expenditure budget percentage for functions affecting or relevant to stormwater	29.31%	\$50,309,234
16	Discretionary Adjustment Factor for Expenditure Category %'s	none used	
17	Portion of Countywide per capita expenditures relevant to stormwater factors	$\$824 \times 29.31\% =$	\$240
18	Estimate of Countywide stormwater relevant expenditures attributed to Lake Samish Basin by population. Includes Countywide revenues from other non-tax sources.	$1,300 \times \$240 =$	\$312,000

Table 7-1. Samish Watershed Subzone - Strategies to Fund Stormwater and Lake-level Programmatic Activities

Row No.	Description	Formulas	Result
19	Estimated portion of taxes paid toward stormwater relevant functions, by population within Lake Samish Basin	$1,300 \times \$367 \times 29.31\% =$	\$139,710
20	Actual Taxes paid by those on the 2011 Subzone Roll, and assumed percentage related to stormwater relevant functions	$\$235,103,205 \times 0.00276$ (Tax Rate for WC, RD, and FC) $\times 29.31\% =$	\$190,188
Revenue Generation Examples			
21	Current Subzone Lake-level Assessment Schedule		Current Revenues for Lake-level Management
22	Total 2011 Assessed Value on Existing Subzone Roll		\$235,103,205
23	Annual Water Withdrawal Assessment (per domestic unit)		\$14.94/Dom. Unit
24	Annual Lake Front Fee (per LF)		\$0.23/LF
25	Actual Annual Revenues Produced by Existing 2011 Subzone Roll		\$17,723
26	Examples for New Subzone Stormwater Management Assessment - for assumed general benefits (water quality and water quantity) for residential property owners in Basin and currently on Subzone Roll.		Estimate of New Annual Tax Revenues Produced for Stormwater Management
27	Example A - Accomplish +/- 50% of the Special/Later Programmatic Recommendations List by 2019		
28	Assumed assessment rate \$0.35/\$1000 of Assessed Value	\$0.000350	\$82,000
29	Annual Impact to \$100,000 Property Owner		\$35
30	Annual Impact to \$200,000 Property Owner		\$70
31	Annual Impact to \$400,000 Property Owner		\$158
32	Annual Impact to \$800,000 Property Owner		\$280

Table 7-1. Samish Watershed Subzone - Strategies to Fund Stormwater and Lake-level Programmatic Activities

Row No.	Description	Formulas	Result
33	Example B - Accomplish +/- 100% of the Special/Later Programmatic Recommendations list by 2019		
34	Assumed general benefit assessment rate \$0.68/\$1000 of Assessed Value	\$0.000680	\$160,000
35	Annual Impact to \$100,000 Property Owner		\$68
36	Annual Impact to \$200,000 Property Owner		\$136
37	Annual Impact to \$400,000 Property Owner		\$272
38	Annual Impact to \$800,000 Property Owner		\$544
39	Example C - Accomplish +/- 30% of Special /Later Programmatic Recommendations list by 2019		
40	Assumed monthly rate of \$7/month per typical residence w/ impervious surfaces. Not related to Assessed Value.	586	\$49,000
41	Annual Impact to \$100,000 Property Owner		\$84
42	Annual Impact to \$200,000 Property Owner		\$84
43	Annual Impact to \$400,000 Property Owner		\$84
44	Annual Impact to \$800,000 Property Owner		\$84
Comparison to Other Watershed Funding Efforts			
45	Comparison to Lake Whatcom Watershed Rate Estimate Source: Lake Whatcom Comprehensive Stormwater Plan , pg 8-18	\$84 per year per equivalent residential unit , not related to Assessed Value, and not yet implemented.	
46	Comparison to Birch Bay Surface Water Rate (2012) Source: WCC 100.07	\$60.24 -\$104.64 per year, not related to Assessed Value	

7.2.2 Rate Examples

All of the Basic / Now activities were considered achievable under the present level of funding (County taxes and other sources plus the Samish Watershed Subzone assessments for the dam M&O.) Though some of the County's efforts might be redirected or made more efficient because of collaboration stemming from this plan, no additional funding would be required for the Basic / Now programmatic activities (Table 7-2).

For the remaining recommended activities, Tables 7-3 and 7-4 summarize the projected annual costs and the revenues needed to implement the Special / Later programmatic activities and the Capital Improvement Projects identified in earlier chapters. Table 7-4 shows that a capital projects "savings account" will be difficult to muster unless tax assessments are higher, grants are obtained, and/or County government operates at peak efficiency in all relevant departments.

Utilizing the Subzone assessment roll as an approximation of taxpayers who would pay these new taxes, Table 7-3 shows a new subzone tax of \$0.68 per \$1000 of assessed value as an example of a new tax sufficient to accomplish 100% of the programmatic recommendations in the Special / Later category. For a typical lot owner with one domestic residential unit, the new annual assessment might range between \$100 and \$550 depending upon assessed value of the individual property (refer back to Table 7-1). The example \$0.68 per \$1,000 of assessed value rate for new benefits represents a 5.9% increase in total state, county, port and school district taxes paid by owners currently on the Subzone assessment roll. Smaller dollar value assessments are also included as examples in Table 7-1.

These are examples upon which to continue the conversations among basin residents, County staff, and County Council. Another future public process (notification and hearing before County Council) should occur to ascertain resident support for any new taxes and new authorities for the Subzone.

Table 7-2. - Summary of Costs and Potential Revenue Sources for Programmatic “Basic / Now” Activities

Row No.	"BASIC / NOW" PROGRAMMATIC RECOMMENDATIONS	Implementation Timeline / Costs							
		Setup Costs Projected 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Total
1	Monitoring and Modeling (M&M)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	Code and Planning Recommendations (C&P)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3	Maintenance & Operations Recommendations (M&O)	\$2,000	\$1,000	\$1,040	\$1,080	\$1,120	\$1,160	\$1,210	\$8,610
4	General Programmatic Recommendations (GPR)	\$15,500	\$25,960	\$16,440	\$17,020	\$17,620	\$18,250	\$18,890	\$129,680
5	Lake-level Maintenance and Operations Recommendations (M&O)	\$14,000	\$16,660	\$17,230	\$17,880	\$17,550	\$18,250	\$18,970	\$120,540
6	PROGRAMMETRIC BUDGET FOR "BASIC / NOW" ACTIVITIES (ROUNDED)	\$30,000	\$40,000	\$30,000	\$40,000	\$40,000	\$40,000	\$40,000	\$260,000
7	Revenue Source 1: Current Subzone Tax Rate on Subzone Assessment Roll provides annual revenues. (See Table 7-1, Row 25)	\$17,723	\$17,723	\$17,723	\$17,723	\$17,723	\$17,723	\$17,723	\$124,059
8	Revenue Source 2: Current County Tax Rates (WC, RD, FC) on Subzone Assessment Roll provides estimated (29.31%) Stormwater Relevant Revenues of: (See Table 7-1, Row 20)	\$190,188	\$190,188	\$190,188	\$190,188	\$190,188	\$190,188	\$190,188	\$1,331,317
9	Net Difference that County already collects for all other "Basic / Now" services not estimated by consultant. (Rounded)	\$180,000	\$170,000	\$180,000	\$180,000	\$180,000	\$180,000	\$170,000	\$1,220,000
10	Capital Improvement Plan Requires an average of \$160,000 per year for six years. (See Table 7-4, Row 11.)								

Table 7-3. - Summary of Costs and Potential Revenue Sources for Programmatic "Special / Later" Activities

Row No.	"SPECIAL / LATER" PROGRAMMATIC RECOMMENDATIONS	Implementation Timeline / Costs							
		Setup Costs Projected 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Total
1	Monitoring and Modeling (M&M)	\$11,000	\$51,240	\$37,490	\$38,990	\$40,550	\$42,170	\$43,860	\$265,300
2	Code and Planning Recommendations (C&P)	\$0	\$2,500	\$2,500	\$0	\$0	\$0	\$0	\$5,000
3	Stormwater Maintenance & Operations Recommendations (M&O)	\$14,750	\$17,260	\$9,550	\$9,920	\$10,300	\$10,690	\$11,100	\$83,570
4	General Programmatic Recommendations (GPR)	\$63,500	\$71,040	\$73,880	\$76,840	\$79,910	\$83,110	\$86,430	\$534,710
5	Lake-level Maintenance & Operations Recommendations (M&O)	\$4,000	\$2,500	\$7,500	\$7,560	\$6,620	\$6,680	\$1,740	\$36,600
6	BUDGET FOR PROGRAMMATIC "SPECIAL / LATER" ACTIVITIES (ROUNDED)	\$90,000	\$140,000	\$130,000	\$130,000	\$140,000	\$140,000	\$140,000	\$930,000
7	Average Annual Programmatic "Special / Later" Budget per year for six years		\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$960,000
8	Additional Subzone Tax Rate of \$0.68 per \$1,000 of Assessed Value would produce new annual tax revenue of:		\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$960,000
9	Net Annual Excess for Subzone Capital Project Savings Account (See Table 7-4, Row 13), i.e. not significant source of funding		\$0	\$0	\$0	\$0	\$0	\$0	\$0

Table 7-4. - Summary of Costs and Potential Revenue Sources for Capital Improvements

Row No.	ID	Capital Project Recommendations	2013 Dollars	Implementation Timeline / Costs					
				Cost if Performed in 2014	Cost if Performed in 2015	Cost if Performed in 2016	Cost if Performed in 2017	Cost if Performed in 2018	Cost if Performed in 2019
1	CIP SW-01	Relocate culvert, 326 Shallow Shore Dr.	\$172,000	\$180,000	\$190,000	\$200,000	\$210,000	\$220,000	\$172,000
2	CIP SW-02	Replace culvert, North Lake Samish Drive (01)	\$53,000	\$55,000	\$57,000	\$59,000	\$61,000	\$63,000	\$53,000
3	CIP SW-03	Replace culvert, North Lake Samish Drive (02)	\$53,000	\$55,000	\$57,000	\$59,000	\$61,000	\$63,000	\$53,000
4	CIP SW-04	Ditchline rehab and culvert install, W. Lk Samish Dr.	\$92,000	\$96,000	\$100,000	\$104,000	\$108,000	\$112,000	\$92,000
5	CIP SW-05	Reconfigure road drainage, Calmor Cove, W. Lk Samish Dr.	\$250,000	\$260,000	\$270,000	\$281,000	\$292,000	\$304,000	\$250,000
6	CIP SW-06	WQ treatment options for catch basins, W. Lk Samish Drive	\$19,000	\$20,000	\$21,000	\$22,000	\$23,000	\$24,000	\$25,000
7	CIP SW-07	Energy dissipation, Pacific Creek, E. Lk Samish Dr.	\$93,000	\$97,000	\$101,000	\$105,000	\$109,000	\$113,000	\$118,000
8	CIP LM-01	Friday Creek dredging near dam	\$105,000	\$109,000	\$113,000	\$118,000	\$123,000	\$128,000	\$133,000
9	Total cost of all capital projects if performed in Year 1 (2014)			\$872,000					
10	Total cost of all capital projects (inflated) if performed in Year 6 (2019)								\$1,074,000
11	Average revenues needed per year if projects pursued evenly over six years ($\$872,000 + \$1,074,000 / 2 / 6$) = +/- \$160,000			\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000
12									
13	Excess from Potential Additional Subzone Tax for "Special/Later" activities (see Table 7-3, Row 9)			\$0	\$0	\$0	\$0	\$0	\$0
14	Net Annual Excess or Shortfall using these example revenue source			-\$160,000	-\$160,000	-\$160,000	-\$160,000	-\$160,000	-\$160,000
15	Cumulative External Funds (example grants or loans) needed for Capital Improvement Projects			-\$160,000	-\$320,000	-\$480,000	-\$640,000	-\$800,000	-\$960,000

7.2.3 Lake Level Management Funding Strategy

Currently under the Samish Subzone, dam maintenance is paid for with an annual base assessment of \$14.94 per domestic unit (habitable structure) plus a lake front fee of \$0.23 per linear foot of a parcel's lake frontage. On this basis, the current annual revenues are approximately \$17,773. In order to fund any different or additional lake-level management activities, an increase in the assessment would be needed. The origin of the LMD No. 1 assessment was very particular. Moving forward, it may not be necessary to segregate the dam maintenance revenues and functions from the rest of the interrelated stormwater/flood control/ drinking water protection issues, if roles can be indemnified. As a local government, Whatcom County would not want to incur new involvement or liability with regard to Friday Creek and the already complex WRIA 3 planning. Future operation of the dam must be clarified in this context. In Tables 7-2, 7-3, and 7-4, lake-level maintenance is a separate line item but is not segregated for analysis of the funds collected and expended to accomplish the Basic / Now, Special / Later, and capital projects under the Subzone auspices.

7.3 Capital Project Funding Recommendations

The example tax assessment ranges in Tables 7-1, 7-2, and 7-3 were directed toward programmatic activities in this analysis. As Table 7-4 demonstrates, the eight recommended capital improvement projects would require a range of \$872,000 - \$1,074,000 of new funding for completion during the period 2014-2019.

There is a potential for sharing some of these projects with County road funds, or applying for competitive Public Works Trust Fund monies or other environmental grant programs (see Table 6-4, GPR-4). An additional Subzone tax assessment such as those shown as examples in Table 7-1 could also be directed toward capital projects instead of some of the more costly programmatic recommendations.

Table 7-5. - Capital Improvement Plan and Suggested Timeline

Capital Improvement Description	2013 Dollar Basis	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019
Stormwater Management CIP							
CIP-SW01 – Relocate Culvert at 326 Shallow Shore Drive	\$172,000	\$180,000					
CIP-SW02 – Replace Cross-Culvert on North Lake Samish Drive; ~1,000 LF W. of Greene Point Lane	\$53,000		\$57,000				
CIP-SW03 - Replace Cross-Culvert on North Lake Samish Drive; ~1,400 LF W. of Greene Point Lane	\$53,000		\$57,000				
CIP-SW04 - Ditch Regrading and Culvert Installation on W. Lake Samish Drive; ~2,600 LF E. of the Bridge	\$92,000			\$104,000			
CIP-SW05 - Roadway Drainage Reconfiguration Adjacent to Calmor Cove Club Mobile Home Park at 316 West Lake Samish Drive	\$250,000					\$304,000	
CIP-SW06 - Water Quality Treatment Options for Catch Basins on W. Lake Samish Dr.; ~1,000 LF E. of the Bridge	\$19,000			\$22,000			
CIP-SW07 - Energy Dissipation at Pacific Creek Crossing on East Lake Samish Drive	\$93,000						\$118,000
CIP-SW08 - Energy Dissipation Solutions and Erosion Controls for Creek Crossing on Manley Road; West of Wefer Creek, East of Barnes Creek	NA	NA	NA	NA	NA	NA	NA
Total Annual Stormwater Capital Projects Adjusted for Inflation (4% per year)		\$180,000	\$114,000	\$126,000	\$0	\$304,000	\$118,000
Lake-level Management CIP							
CIP-LM01 - Friday Creek Dredging	\$105,000				\$123,000		
CIP-LM02 - Friday Creek Flow Meter	NA	NA	NA	NA	NA	NA	NA
Total Annual LM Capital Projects Adjusted for Inflation (4% per year)					\$123,000		

Items marked "NA" would occur beyond the 6-year planning cycle

7.4 Summary of Governance and Funding Recommendations

7.4.1 Stormwater and Lake-level Management Program

It is recommended that both the stormwater management and lake-level management activities be administered and funded through the Subzone, initially using the current assessment roll that was established for the retired LMD No. 1 and is now being used for the Samish Watershed Subzone assessments related to lake-level management.

7.4.2 Basic / Now

Funding for Basic / Now activities is a continuation of several County Department budgets potentially allocatable to Lake Samish Basin activities, plus current subzone assessments for lake-level management as of 2012 and authorized through 2016. The tax and budget analysis in Table 7-1 supports a view that basin residents are fairly taxed now for the density of their residential environment. It is incumbent upon the County to assure that a commensurate level of service is provided, and this plan should aid that delivery.

7.4.3 Special / Later

It is recommended that additional public notice and conversations be held with both proposed new and current taxpayers of the Samish Watershed Subzone during the first six months after Council adoption of this comprehensive stormwater plan. Based on the outcome of that proposed outreach process:

- County Council may want to authorize additional properties to be added to the Subzone assessment roll to help fund Special / Later basin-wide stormwater management activities important to public health (water supply), public safety (reduction of road flooding), recreation, and aquatic habitat. Conservatively, no such additional properties were considered in the projections of revenues in this plan.
- It may be recommended that increased uniform stormwater management tax assessments or user fees be authorized for all Subzone taxpayers (current and any new) by County Council to help fund Special / Later basin-wide stormwater management activities important to public health (water supply), public safety (drainage of roads), recreation, and aquatic habitat.
- Because the Samish Watershed Subzone is already established, County Council acting as the Board of Supervisors of the Flood Control Zone District may set Subzone user fees without a vote of the residents in the Subzone. However, the recommended method of revenue generation is a new tax assessment specifically for stormwater management in the basin. Public notice, hearings, and a vote of those affected by the tax would be required before a new assessment exceeding 50 cents per thousand of assessed value could be levied in compliance with RCW 86.15.160. The tax could be levied as an *ad valorem* tax, or a “per domestic unit” assessment similar to that for the existing lake-level management function. The goal is to collect the revenue needed to carry out the plan with an absolute minimum of County administrative cost.

The justification for a tax as opposed to a user fee is as follows.

1. A tax can pay for any government service, and taxes collected could be used to pay for collaborative actions (via interlocal agreements) among any of several County departments, WSDOT, WDFW, WDNR, and/or Samish Water District.
2. The general public residing around Lake Samish, using the water for domestic supply, and enjoying the aesthetic integrity of a clean lake near their properties receive general benefits.
3. Payment of a tax is mandatory once levied, but property owners on the Subzone assessment roll have the opportunity to advocate for or against the tax to the County Council (acting in their role as the Board of Supervisors of the Flood Control Zone District).
4. The taxes for general benefits relative to stormwater management and lake-level management may be levied in any amount. While the purpose of the tax would be to pay for various recommended activities, the tax does not have to represent the exact proportional impact or extent of activity, as it would with a user fee.
5. The tax is levied equally on all similar payers. This leaves open the option to have the tax be *ad valorem* (based on Assessed Value determined by County Assessor), or “per domestic unit” as is the case with a portion of the current lake-level assessment.
6. Similar to other general taxes such as roads and flood control, a tax for stormwater management is appropriate due to:
 - The public nature of the sources of stormwater problems (i.e. not only impervious surfaces, not only forestry, not only lawns and pets, not only I-5, etc.) ,
 - the combination of public programmatic actions that should bring positive change, and
 - the general public benefits that will accrue as a result of these programmatic and capital projects.

7.4.4 Private Incentives for Action

Many self-directed and volunteer group activities have been identified by the public and included in this plan in order to encourage private action (Table 6-5, Public Participation Opportunities). Residents may avail themselves of the abundant public information available on State and County websites relevant to the issues of this basin. Making the small but cumulatively important changes should produce positive results over time. By doing so, the community will reserve the taxing, spending, and enforcement capacity of County government for the efforts that need attention and which cannot be accomplished privately.

8 References

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