Contents

Executive Summary **1**
Acronyms and Abbreviations ..... **vii**
1 Introduction and Background **1-1**
1.1 Goals and Objectives of this Lake Whatcom Comprehensive Stormwater Plan 1-1
1.1.1 Previously Defined Goals for Lake Whatcom 1-1
1.1.2 Goals and Objectives of this Comprehensive Stormwater Plan 1-4
1.1.3 Limitations on and Scope of this Plan 1-5
1.2 Previous and Ongoing Work within the Lake Whatcom Watershed 1-6
1.2.1 Planning Efforts 1-6
1.2.2 Education, Public Involvement, and Other Ongoing Programmatic Efforts 1-7
1.2.3 Monitoring, Modeling, and Other Ongoing Studies 1-7
1.2.4 Ongoing or Completed Capital Improvement Projects 1-8
1.3 Factors Driving Plan Development 1-8
1.3.1 Phosphorus Inputs to Lake Whatcom 1-9
1.3.2 Water Quality Degradation 1-9
1.3.3 Altered Hydrology (Water Quality) 1-9
1.3.4 Aquatic Habitat Degradation 1-10
1.4 Key Issues 1-10
1.5 Whatcom County Council Involvement in Plan Development 1-13
1.6 Public Involvement in Lake Whatcom Comprehensive Stormwater Plan Development 1-14
1.7 Elements of this Comprehensive Stormwater Plan 1-14
2 Lake Whatcom Watershed Characteristics and Conditions Assessment **2-1**
2.1 Introduction 2-1
2.2 Watershed Characteristics 2-1
2.2.1 Watershed Description 2-1
2.2.2 Watershed Drainage Sub-basins 2-6
2.3 Conditions Assessment 2-13
2.3.1 Natural Resources 2-13
2.3.2 Built Environment 2-28
2.4 Summary and Limitations 2-42
3 Regulatory Requirements and Planning Documents **3-1**
3.1 Introduction 3-1
3.2 Relevant Whatcom County Ordinances, Plans, Programs, and Standards 3-1
3.3 NPDES Phase II Regulatory Requirements and Gap Analysis 3-4
3.3.1 NPDES Phase II Requirements 3-4
3.3.2 NPDES Phase II Gap Analysis 3-6
3.4 Total Maximum Daily Load 6-6
3.5 State of Washington Requirements and Gap Analysis 3-6
3.6 Recommendations Based on Gap Analysis 3-7
4 Maintenance and Operations **4-1**

4.1 Introduction 4-1
4.2 Stormwater Maintenance and Operations Program Purpose....4-1
4.3 Five-Year Program Plan for NPDES Phase II Compliance....4-2
4.4 Published Guidelines for Maintenance and Operations....4-3
4.4.1 Ecology Requirements....4-3
4.4.2 Other Requirements....4-6
4.5 Drainage System Inventory and Maintenance Costs....4-10
4.5.1 Baseline Drainage System Inventory....4-10
4.5.2 Existing County M&O Resources....4-11
4.5.3 Costs of M&O Activities....4-12
4.6 Permit Implementation....4-13
4.6.1 Early Steps in Permit Implementation....4-13
4.6.2 Later Steps in Permit Implementation....4-13
4.6.3 Final Steps in Permit Implementation....4-15
4.7 Recommendations for Maintenance and Operations....4-15
5 Surface Water Problems Identified in the Lake Whatcom Watershed....5-1
5.1 Introduction....5-1
5.2 Sources of Information....5-1
5.3 Identified Surface Water Problems....5-1
5.3.1 Surface Water Problems Identified at Specific Locations....5-14
5.3.2 Watershed-Wide Problems....5-24
5.4 Sources of Problems and Their Relative Significance....5-26
5.5 Prioritization of Problems....5-28
6 Identification of Alternative Solutions....6-1
6.1 Introduction....6-1
6.2 Importance of Source....6-1
6.3 Alternative Solutions – Descriptions and Expectations....6-1
6.3.1 Programmatic Solutions....6-5
6.3.2 Structural Solutions....6-12
6.4 Opportunities and Constraints for LID Implementation in the Lake Whatcom Watershed....6-15
6.5 Rating of Identified Alternative Solutions....6-16
7 Recommended Solutions....7-1
7.1 Introduction....7-1
7.2 Opportunities and Limitations....7-1
7.3 Priority Problems and Appropriate Solutions....7-2
7.4 Recommendations for Programmatic Solutions....7-2
7.4.1 Education....7-2
7.4.2 Public Involvement....7-8
7.4.3 Regulatory....7-8
7.4.4 Maintenance....7-11
7.4.5 Inspection and Enforcement....7-13
7.4.6 Illicit Discharge Detection and Elimination....7-13
7.4.7 Monitoring....7-14
7.4.8 Record-Keeping and Annual Reporting....7-17
7.4.9 Watershed Keeper....7-17
7.4.10 Planning....7-17

7.4.11 Administration 7-18
7.4.12 Summary of Programmatic Solutions 7-18
7.5 Recommendations Structural Solutions (Capital Projects) 7-18
7.5.1 Priority Capital Projects 7-20
7.5.2 Other Capital Projects 7-23
7.6 Problems Addressed with Recommended Solutions 7-26
7.7 Estimated Costs of Recommended Programmatic and Structural Recommendations 7-26
8 Financial Analysis and Funding Recommendations 8-1
8.1 Introduction 8-1
8.2 Program Description and Revenue Needs 8-2
8.2.1 Public Expectations for Surface Water Program 8-2
8.2.2 Program Elements and Level of Effort 8-3
8.3 Evaluation of Available Financing Mechanisms 8-3
8.3.1 Special Service Districts 8-3
8.3.2 Lake Whatcom Water and Sewer District 8-6
8.3.3 Stormwater Utility 8-6
8.3.4 Debt 8-7
8.3.5 Grant Programs 8-8
8.3.6 Developer Financing and Latecomers Agreements 8-8
8.3.7 Taxes and Other County Funds 8-8
8.3.8 System Development Charges 8-9
8.3.9 Miscellaneous Charges and Fees 8-9
8.3.10 Public Support 8-9
8.3.11 Governance 8-9
8.3.12 Service Delivery 8-10
8.3.13 Implementation 8-10
8.4 Planning Data 8-11
8.4.1 Equivalent Residential Units 8-11
8.4.2 Projected Service Area Growth 8-11
8.4.3 Recommendations 8-11
8.5 Sub-Flood Control Zone District Rate Development 8-13
8.5.1 Administrative Policy Considerations 8-13
8.5.2 Surface Water Rate Projection 8-18
8.6 Summary of Funding Recommendations for Lake Whatcom 8-22
9 Plan Implementation: Recommendations, Next Steps, and Schedule 9-1
9.1 Plan Recommendations 9-1
9.1.1 Programmatic Solutions 9-1
9.1.2 Structural Solutions (Capital Projects) 9-2
9.1.3 Funding 9-2
9.2 Recommended Next Steps 9-2
9.3 Recommended Schedule for Plan Implementation 9-3
10 References 10-1

Appendix A Surface Water Problems – Photograph Log
Appendix B Identified Capital Projects
Appendix C Impervious Surface Calculation, Lake Whatcom Watershed

Tables

1-1 Objectives and Actions

2-1 Lake Whatcom Watershed Sub-Basins

2-2 Lake Whatcom Monitoring Project Dry Weather Tributary Monitoring Data, September 2004 – December 2006

2-3 Land Use Designations within Lake Whatcom Watershed and Sub-Basins

2-4 Privately Owned Stormwater Facilities

2-5 Publicly Owned Stormwater Facilities

3-1 NPDES Phase II Requirements and Corresponding Whatcom County Regulations, Plans, and Programs

4-1 Drainage Infrastructure in Lake Whatcom Watershed

4-2 Drainage M&O Activities

4-3 Lake Whatcom Watershed M&O Program Estimating Tool

4-4 Summary of Pre-Permit, Early Steps, Later Steps, and Final Steps Towards NPDES Phase II Compliance for M&O Through 2012

5-1 Identified Problems

5-2 Influence of Source on Driving Factors

5-3 Problem Priority Matrix – Phosphorus

5-4 Problem Priority Matrix – Water Quantity (Hydrology)

6-1 Alternative Solutions to Address Sources

6-2 Benefit-Cost Matrix – Phosphorus (42 Solutions)

6-3 Benefit-Cost Matrix – Water Quantity (42 Solutions)

7-1 Proposed Lake Whatcom Watershed Education Program

7-2 Lake Whatcom Watershed Additional Monitoring Needs

7-3 Driving Factors Addressed by Programmatic Recommendations

7-4 Estimated Costs of Programmatic Recommendations

7-5 Estimated Costs of Priority Capital Projects

7-6 Summary of Annual FTE

8-1 Selected Special Districts and a Stormwater Utility in Washington State and Their Key Components

8-2 Program Expense Projections

8-3 Capital Improvement Plan

8-4 Projected Rate Schedule and Rate Revenue for SFCZD

8-5 Financial Plan

9-1 Schedule for Lake Whatcom Comprehensive Stormwater Plan Implementation

Figures

1-1 Lake Whatcom Watershed
1-2 Lake Whatcom Phosphorus Sources
2-1 Lake Whatcom Watershed
2-2 Lake Whatcom Watershed Drainage Sub-basins
2-3 Soil Drainage Classification for Lake Whatcom Watershed
2-4 Lake Whatcom Watershed Soil Drainage Classifications
2-5 Lake Whatcom Lake and Tributary Sampling Sites
2-6 Estimates of Flow Inputs to Lake Whatcom
2-7 Historical Kokanee and Cutthroat Habitat in the Lake Whatcom Watershed
2-8 Watershed Land Use Designations
2-9 Watershed Zoning Designations
2-10 Percent Impervious Surface within Unincorporated Lake Whatcom Watershed outside of Bellingham
2-11 Lake Whatcom Watershed Percent Impervious Surfaces
2-12 Road Density within Lake Whatcom Watershed
2-13 Known Onsite Septic System Locations
2-14 Stormwater Facilities, Public and Private
5-1 Lake Whatcom Watershed Identified Surface Water Problem Locations
5-2 Lake Whatcom Watershed Surface Water Problem Locations - Group 5
5-3 Lake Whatcom Watershed Surface Water Problem Locations - Group 2
5-4 Lake Whatcom Watershed Surface Water Problem Locations - Group 1
5-5 Lake Whatcom Watershed Surface Water Problem Locations - Group 3
5-6 Lake Whatcom Watershed Surface Water Problem Locations - Group 4
5-7 Problem Prioritization Summary
6-1 Mean Effluent Total Phosphorus Concentrations by BMP category
7-1 Identified Capital Projects
7-2 Problems Addressed By Recommended Solutions

Acronyms and Abbreviations

µg/l	micrograms per liter
µm	microns
AKART	all known, available, and reasonable methods of prevention, control and treatment
BMPs	best management practices
BPA	Bonneville Power Administration
CAO	Critical Areas Ordinance
CDP	Census-Designed Place
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
DNR	Washington State Department of Natural Resources
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EIA	effective impervious area
EPA	U.S. Environmental Protection Agency
ERU	equivalent residential unit
ESA	Endangered Species Act
FCZD	flood control zone district
FTE	full-time equivalent
G.O.	general obligation
GIS	geographic information system
GPS	Global Positioning System
HSPF	Hydrologic Simulation Program - Fortran

ICT	Interjurisdictional Coordinating Team
kg	kilograms
LID	low-impact development
LWD	large woody debris
M&O	maintenance and operations
MEP	maximum extent practicable
mg/L	milligrams per liter
mL	milliliters
MRSC	Municipal Research & Services Center
MS4	municipal separate storm sewer system
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
ORV	off-road vehicle
P	phosphorus
PCBs	polychlorinated biphenyls
PDS	Whatcom County Planning and Development Services
PIE	public involvement and education
P-loading	phosphorus loading
PO_4^{3-}	orthophosphate
PSU	Portland State University
PWTF	Public Works Trust Fund
RCW	Revised Code of Washington
REET	real estate excise tax
ROW	right of way
SDC	system development charge
SEPA	State Environmental Policy Act
SFR	single-family residence
SRF	State Revolving Fund
SSURGO	Soil Survey Geographic

SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
TDS	total dissolved solids
TIA	total impervious surface
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
USU	Utah State University
WCC	Whatcom County Code
WDFW	Washington Department of Fish and Wildlife
WERF	Water Environmental Research Foundation
WRIA	Water Resource Inventory Area
WTA	Whatcom Transportation Authority
WWU	Western Washington University