



City of Black Diamond

Grant No. G100014

Shoreline Analysis Report *Including Shoreline Inventory and Characterization for City of Black Diamond's Shoreline: Lake Sawyer*

Prepared by:

Otak, Inc.
10230 NE Points Drive, Suite 400
Kirkland, WA 98033
Otak Project No. 31544

AHBL
11200 6th Avenue, Suite 1620
Seattle, WA 98101-3117

August 6, 2010



City of Black Diamond

Grant No. GI000014

Shoreline Analysis Report

*Including Shoreline Inventory and Characterization for
City of Black Diamond's Shoreline: Lake Sawyer*

Acknowledgements



This report was funded in part through a grant from the Washington Department of Ecology.



This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration.

The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies.

TABLE OF CONTENTS

<u>Section</u>	<u>Page No.</u>
1.0 INTRODUCTION	1
1.1 Background and Purpose.....	1
1.2 Shoreline Jurisdiction.....	1
1.3 Study Area.....	2
1.4 Duwamish/Green River Watershed (WRIA 9)	2
1.4.1 Geographic Context	2
1.4.2 Historic Geology, Topography, and Drainage Patterns	3
1.4.3 Major Land Use Changes and Current Shoreline Condition	4
1.4.4 Development History	6
1.4.5 ESA Listings.....	9
2.0 CURRENT REGULATORY FRAMEWORK SUMMARY	11
2.1 City of Black Diamond.....	11
2.2 State and Federal Regulations.....	11
3.0 ELEMENTS OF THE SHORELINE INVENTORY.....	14
3.1 Land Use Patterns	14
3.2 Transportation.....	15
3.3 Wastewater and Stormwater Utilities.....	15
3.3.1 Wastewater Utilities	16
3.3.2 Stormwater Utilities	17
3.4 Impervious Surfaces	18
3.5 Shoreline Modifications	19
3.6 Existing and Potential Public Access Sites.....	20
3.7 Critical Areas	20
3.7.1 Geologically Hazardous Areas	21
3.7.2 Wetlands	22
3.7.3 Streams.....	23
3.7.4 Other Fish and Wildlife Habitat Conservation Areas	23
3.7.5 Critical Aquifer Recharge Areas	23
3.8 Floodplain and Channel Migration Zone.....	24
3.8.1 Floodplain.....	24
3.8.2 Flood Hazard Areas	24
3.8.3 Channel Migration Zone	24
3.9 Historical or Archaeological Sites	25
3.10 Other Areas of Special Interest	25
3.10.1 Water-Oriented Uses.....	25
3.10.2 Toxic or Hazardous Waste Sites	25
3.11 Opportunity Areas.....	26
4.0 CONDITIONS BY INVENTORY SEGMENT at LAKE SAWYER	29
4.1 Segment A: Residential.....	29

4.1.1	Land Use.....	29
4.1.2	Critical Areas.....	29
4.1.3	Wastewater and Stormwater Utilities.....	30
4.1.4	Shoreline Modifications.....	30
4.1.5	Opportunity Areas.....	31
4.2	SEgment B: Sake Sawyer Park Boat Launch.....	31
4.2.1	Land Use.....	31
4.2.2	Shoreline Modifications.....	31
4.2.3	Stormwater Utilities.....	31
4.2.4	Opportunity Areas.....	32
4.3	Segment C: Forested Single Family Parcel.....	32
4.3.1	Land Use.....	32
4.3.2	Shoreline Modifications.....	32
4.3.3	Opportunity Areas.....	32
4.4	Segment D: Islands.....	33
4.4.1	Land Use.....	33
4.4.2	Shoreline Modifications.....	33
4.4.3	Opportunity Areas.....	33
4.5	Segment E: Lake Sawyer Regional Park.....	34
4.5.1	Land Use.....	34
4.5.2	Shoreline Modifications.....	34
4.5.3	Opportunity Areas.....	34
4.6	Segment F: Lake Sawyer Regional Park Wetland.....	34
4.6.1	Land Use.....	34
4.6.2	Critical Areas.....	35
4.6.3	Opportunity Areas.....	35
4.7	General Opportunity Areas.....	35
4.7.1	Water Quality Improvements.....	35
4.7.2	Shoreline Modifications.....	36
4.7.3	Educational Opportunities.....	36
4.7.4	Lake Aquatic Invasive Species.....	37
5.0	ANALYSIS of ECOLOGICAL FUNCTIONS and ECOSYSTEM WIDE PROCESSES.....	39
5.1	Overview of Landscape-Scale Processes.....	39
5.2	Processes and functions for Lake Sawyer.....	41
6.0	LAND USE ANALYSIS.....	57
6.1	Likely Changes in Land Uses.....	58
6.2	Implications for Shoreline Management.....	59
7.0	SHORELINE MANAGEMENT RECOMMENDATIONS.....	61
7.1	Shoreline Master Program.....	61
7.1.1	Environment Designation Provisions.....	61
7.1.2	General Policies and Regulations.....	63
7.1.3	Shoreline Modification Provisions.....	66

7.1.4	Shoreline Uses	67
7.2	Restoration Plan	68
8.0	DATA GAPS	69
9.0	REFERENCES	70

Figures

- Figure 1—Green River Watershed
- Figure 2—Duwamish Drainage and White River Diversion
- Figure 3—1936 Aerial Photo
- Figure 4—1998 Aerial Photo
- Figure 5—2007 Aerial Photo

Tables

- Table 1—Shoreline Permit History
- Table 2—Shoreline Planning Segments
- Table 3—Land Use, Zoning, and Shoreline Environments
- Table 4—Land Use Designations
- Table 5—Functions Summary
- Table 6—Function Score by Segment

Appendices

- Appendix A—List of Data Sources
- Appendix B—Information Request Letter and Distribution List
- Appendix C—Assessment of Jurisdiction
- Appendix D—Photographs
- Appendix E—Map Folio

1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

The City of Black Diamond (City) obtained a grant from the Washington Department of Ecology (Ecology) to conduct a comprehensive Shoreline Master Program (SMP) update. The first step of the update process is to inventory the City’s shorelines as defined by the State’s Shoreline Management Act (SMA) (RCW 90.58). The inventory was conducted according to direction provided in the Shoreline Master Program Guidelines (WAC 173-26-201) and includes areas within current City limits. The shoreline inventory included in this Report describes existing biological and physical conditions, and uses Ecology’s guidance to assess the baseline conditions for the qualitative extent of ecological functions provided via landscape-scale processes. Threats to these functions are provided, where evident, as well as recommendations for restoring processes and functions, where feasible. Ecology’s Guidelines require that the City demonstrate that its updated SMP results in “no net loss” in ecological functions in the shoreline relative to the baseline.

A list of potential information sources relative to shorelines within the City was compiled and an information request letter was distributed to potential interested parties and agencies that may have relevant information (Appendix B). Collected information was supplemented with other resources such as City documents, GIS information, scientific literature, aerial photographs, internet data, and a brief site visit. The analysis follows the guidance established by Ecology. All maps are located in Appendix E.

1.2 SHORELINE JURISDICTION

As defined by the Shoreline Management Act of 1971, lands subject to Shoreline jurisdiction include “waters of the state plus their associated “shorelands”. At a minimum, waters of the state are streams whose mean annual flow is 20 cubic feet per second (cfs) or greater, and lakes whose area is greater than 20 acres. In RCW 90.58.030, Shorelands are defined as:

“Those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter...Any county or city may determine that portion of a one-hundred-year-floodplain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet there from... Any city or county may also include in its master program land necessary for buffers for critical areas”

Lake Sawyer was originally part of King County’s Shoreline Master Program that was first adopted in 1978 prior to the Lake Sawyer area being incorporated into the City of Black Diamond. Prior to 1998, the City of Black Diamond did not have any shorelines of the state in its jurisdiction. At the time of incorporation, all of the lake’s shoreline was designated as Rural Environment.

The shoreline areas in the City of Black Diamond are made up of the shore of Lake Sawyer and its associated wetlands. There are no streams or rivers in the City that are under shoreline jurisdiction. Ravensdale Creek and Rock Creek enter Lake Sawyer from the south/southeast end of Lake Sawyer; however neither is within City's shoreline jurisdiction because their mean annual flow is less than the minimum requirement of 20 cubic feet per second (cfs) (RCW 90.58.030). Covington Creek, flows out of Lake Sawyer on the west side of the City boundary within unincorporated King County. Covington Creek is in the Shoreline jurisdiction for King County; however a small portion (approximately 200 feet) of its buffer is located within Black Diamond's shoreline jurisdiction.

There is a wetland near the northeast corner of Lake Sawyer that is physically separated from the lake by houses and a road (229th Avenue SE and SE 292nd Place). Residents of the Lake Sawyer neighborhood have confirmed that this wetland does not have a surface water connection to the lake. Therefore it is not considered to be an associated wetland to a jurisdictional water body and has not been included in the City's shoreline jurisdiction.

I.3 STUDY AREA

The City of Black Diamond is located in south King County, and has been incorporated since 1959; the annexation of the Lake Sawyer area occurred in 1998. The City is bordered by Kent and Maple Valley to the north, and King County to the east, west and south. State Route 169 (SR 169 or Maple Valley-Black Diamond Road) passes through the City along the eastern border, and a number of other arterials cross the City, particularly through the southeastern section. The City encompasses approximately 6.6 square miles. The City's Potential Annexation Areas (PAAs) encompass another 700 acres. The study area for this report includes all land currently within the City's existing shoreline jurisdiction (Figure 1b), including Lake Sawyer and its associated wetlands. The total shoreline area subject to the City's updated SMP is approximately 177 acres, and encompasses approximately 35,000 lineal feet (6.6 miles) of lakeshore. The lake itself has a surface area of approximately 286 acres (King County).

I.4 DUWAMISH/GREEN RIVER WATERSHED (WRIA 9)

I.4.1 Geographic Context

The City of Black Diamond and Lake Sawyer are located within Water Resource Inventory Area (WRIA) 9 with all areas draining to the Green-Duwamish River. Lake Sawyer is the fourth largest lake in King County with a surface area of 286 acres and a watershed area of 8,300 acres (Lake Sawyer Management Plan 2000, note discrepancy in lake size between King County and Lake Sawyer Management Plan 2000). The lake is natural; however an outlet control dam was built in 1952 to stabilize the lake levels (Lake Sawyer Community Club notes). The Green River watershed is divided into five discrete sub-watersheds (Figure 1). The entire City of Black Diamond is located within the Middle Green River Subwatershed and is part of the Big Soos Creek Basin. Lake Sawyer is located in the Covington Creek subbasin of the Big Soos Creek Basin. The outlet of Lake Sawyer is a fish-passable structure that forms the headwaters of Covington Creek, which drains to Soos Creek, a tributary of the Green-Duwamish River.

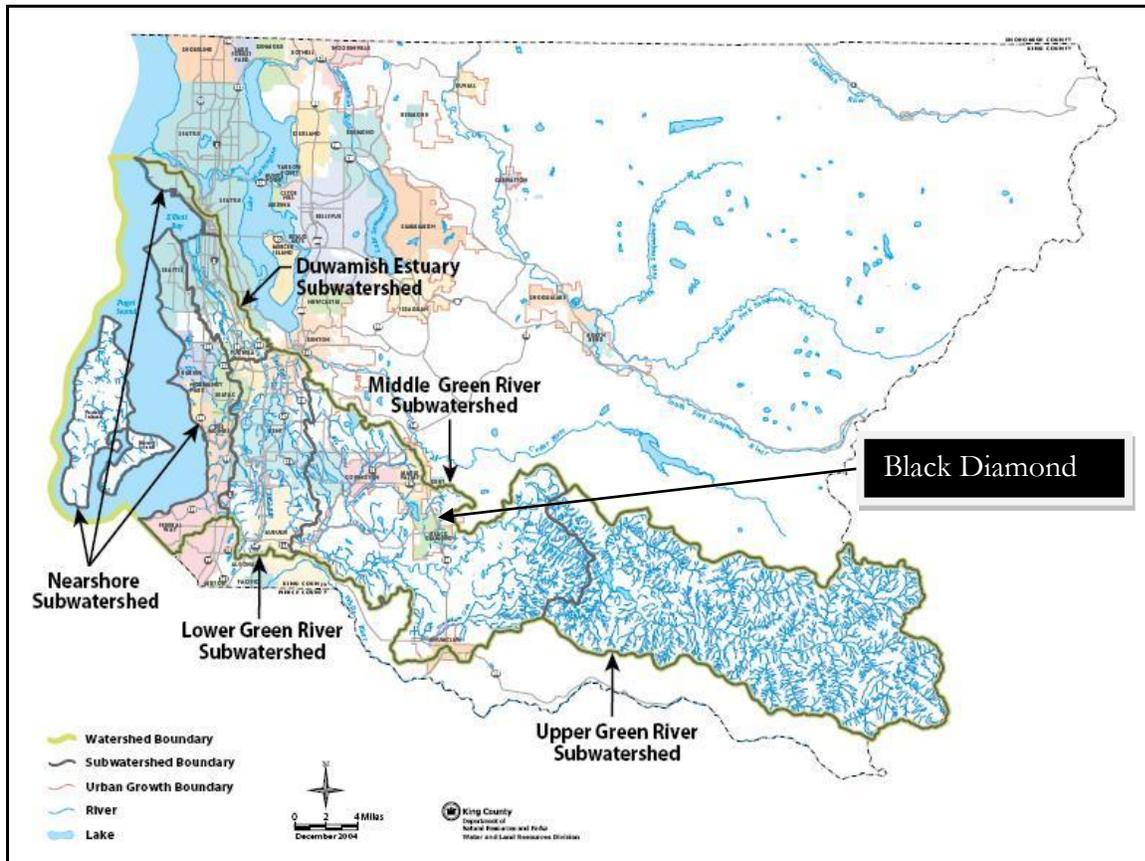


Figure I—Overview of the Green River watershed and its subwatershed boundaries (King County 2010).

1.4.2 Historic Geology, Topography, and Drainage Patterns

Extensive ancient landscape modification by repeated glacial scouring and deposition has shaped the Soos Creek Basin. Distinct geographic features include bedrock covered hills to the north and the Cascade foothills to the east, as well as the valleys of the Green River and the Duwamish waterway to the west and south (King County 1990). From the east and central portions of the basin, drainage patterns typically drain towards the northwest before heading west/southwest to the Green River.

The City is located an upland plateau of gravel and glacial till approximately 300 feet above the Green River Gorge and not particularly beneficial for agricultural uses. Geologic events in the Black Diamond area created high-quality coal beds, their development and structure influenced future uses of the land. The City's elevation ranges from approximately 525 feet to 750 feet, with a hillside area east of the City that is approximately 1,180 feet in elevation.

I.4.3 Major Land Use Changes and Current Shoreline Condition

In the mid-to-late 1800's, the high-quality coal shaped the future of Black Diamond as the City of Seattle grew in size and had a high demand for coal. This made Black Diamond one of the earliest and largest employment-centered towns outside of Seattle. The early 1900's were peak years for coal production and the City's population reached approximately 3,500 residents (City of Black Diamond Comprehensive Plan 2009).

The early 1900's brought numerous changes to the Green River basin, including the diversion of the White River out of the basin and into the Puyallup River, and the diversion of the Cedar/Black River into Lake Washington. The diversions on the White River were constructed for the stated purpose of flood control. The elimination of the Black river and the re-routing of the Cedar River to flow *into* Lake Washington were conducted to provide the necessary flows of fresh water to run the Chittendon Locks which allowed passage of ships from Puget Sound through the Ship Canal into Lake Union and the Seattle shipyards (Figure 2).

As is the case with the majority lands east of the Puget Sound, the Green River basin has undergone dramatic land-use changes, particularly in the mid-to-latter half of the 1900's. Many areas that were historically agricultural in the early 1900's became small hobby farms in the mid-century and have become housing developments, with supporting roads and infrastructure in the latter 1/2 of the 20th century. The streams and rivers were first modified to protect farmlands from flooding and they have been further modified through channelization, dredging, stream-bank armoring to manage flows and floodwaters away from 'developable lands' while expansion of , and construction of flood control levees isolated more of the floodplains from the rivers to facilitate the expansion of housing and other uses.

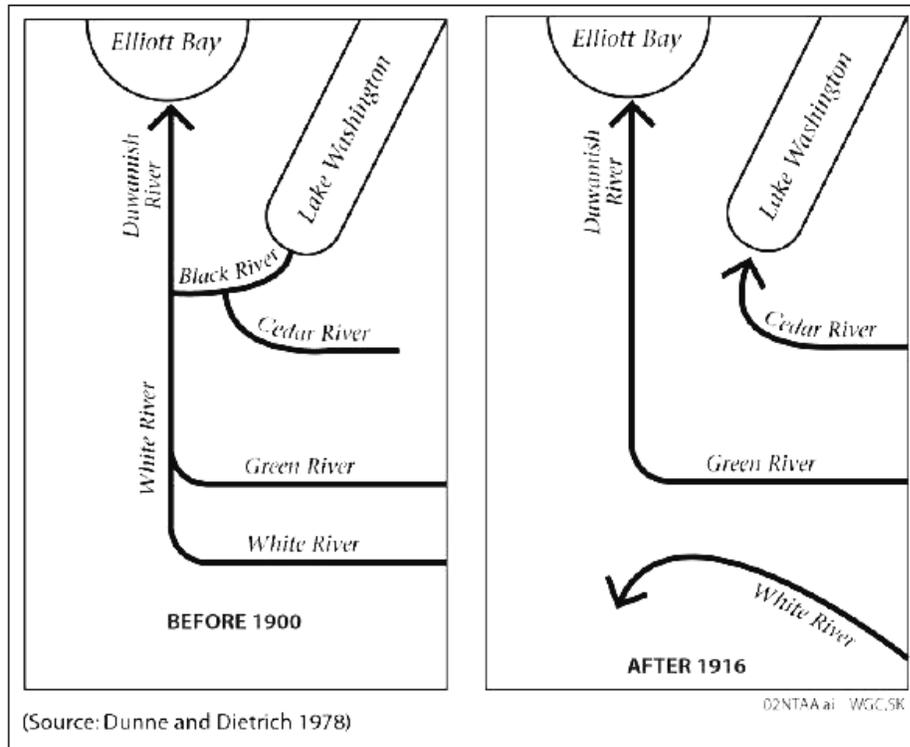


Figure 2—Duwamish drainage before and after White River diversion.

Forestry removed much of the mature forest canopy in greater King County at the turn of the 20th century. Conversion to agriculture and mining activities after the forest removal kept the extent of forest in a reduced state. In the last 100 years, increased development and associated infrastructure (e.g. roads, parking, roofs, etc.) has increased impervious surface and subsequent run-off. Black Diamond is typical of the remainder of the Puget Sound region where residential and commercial development has increased rapidly from the 1970's to the turn of the 21st century. Black Diamond also has continuing mining operations. These mining operations result in large cleared areas that become heavily compacted due to machinery. In addition, mining practices leave large open pits in the landscape. Review of historical aerial photographs shows areas of Black Diamond, some just south of Lake Sawyer, where there are wetlands or ponds that appear to have been former pit mines which have naturally become vegetated after many years.

The City of Black Diamond will continue to see development and an increase in impervious surface. Based on City Planning documents, it is predicted that the City will see a four-fold increase in population by the year 2025. The 2006 population was estimated at 4,085, in 1,578 households. The 2025 population estimate is 16,980 and 6,302 households (City of Black Diamond, 2008). There are two large master-planned developments (MPD) in the planning stages in the City, both proposing residential and commercial construction. The Villages development will be largely located in the southwest corner of the City and proposes up to 4,800 residential units (multi-and single family); 775,000 square feet of commercial/retail/office uses, public and civic uses; school sites; and a minimum of 481 acres of open space. The Lawson Hills development will be located east of the

town center and proposes up to 1,250 residential units (multi-and single family); 390,000 square feet of destination, office and neighborhood retail uses; 10-acre elementary school site; and approximately 138 acres of open space. These two MPDs have been slow to materialize in the early 2000's, however it is expected that if a moderate economic recovery is achieved these projects may well be developed in the next decade. Both of these developments are located in the Covington Creek subbasin.

Around the shoreline of Lake Sawyer only 14 percent (approximately) of the lakeshore parcels were vacant in 2009. It is not anticipated to see an appreciable growth in density over existing conditions because the majority of the properties are already significantly built out and some large open parcels may not be converted to high density uses. It is expected that the size and nature of housing surrounding the lake may shift in the coming years, following a pattern of larger single-family residences replacing the smaller more modest homes left around the lake.

I.4.4 Development History

The City of Black Diamond was first established as a community in the late 1880s for the mining of coal. Early construction on the lake shore consisted mostly of small homes or cabins. The 1936 aerial photo in Figure 3 shows roads leading to the lake edge and areas of clearing, for construction of homes or weekend use cabins. Areas to the east and west of the lake appear to have been clear cut.

In 1956 King County Boating Regulations were adopted for Lake Sawyer, indicating its long history of water-oriented use. Population growth between the 1960s, when coal mining in the area was in decline, and the 1990s was relatively slow, with the city gaining a mere 400 residents in the three decades. The city's population grew substantially in the 1990s, increasing by 64% to a total population of 3,970 in the year 2000. Much of this growth was due to the annexation of the Lake Sawyer area in 1998.

As evident in Figure 4, by 1998 the lake shore is nearly built to capacity and is essentially very similar to the current conditions today. In Figure 5, we see that by 2007 there is additional development in the area surrounding the lake. There are large areas of unvegetated ground located south of the lake evident in the 1998 and 2007 photos which are due to the ongoing mining operations.

In 1952 or 1953 the outlet (Covington Creek) from Lake Sawyer was modified and a dam and fish ladder was constructed (Lake Sawyer Community Club). The dam created a new lake elevation above the historic level and a canal-like feature was dredged through a wetland that formed part of the previous outlet. The canal feature has since been lined with more water-front homes.

The two master-planned developments previously mentioned are located in the same sub-watershed as the City of Black Diamond, but not in the City's shoreline jurisdiction. With the two developments on the horizon, the City will see continued growth in the residential and commercial development, as well as the supporting infrastructure.



Figure 3—Lake Sawyer and surrounding area in 1936 aerial photo (King County iMap 2010).



Figure 4—Lake Sawyer and surrounding area in 1998 aerial photo (King County iMap 2010).



Figure 5—Lake Sawyer and surrounding area in 2007 aerial photo (King County iMap 2010).

The following table (Table 1) summarizes available permit data for the last 12 years. This corresponds with the time period since 1998 that the Lake Sawyer area has been incorporated in the City of Black Diamond. Note that data was not available for 2004.

Table I. Shoreline Permit History in the City of Black Diamond Since Incorporation

Year	Pier		Bulkhead Mod.	Upland Residential Structure	Upland Com/MF Structures	Utilities	Other	Permit Type			
	Extension / Mod.	New/ Replace						Exemption	SDP	CUP	Variance
1998	4	2	1	4				11			
1999	1	3		13				17			
2000	4	3	1	9		1	1	20			
2001	2	2		5		1	1	11			
2002	3			2				5			
2003	1	1		6			4	12			
2004											
2005		1	1	8				8	1		
2006	3	4		8			1	16			
2007			1	1				2			
2008		1		2			2	5			
2009		2	1	4			3	9			
TOTAL	18	19	5	62		2	12	116	1		

Several obvious trends in shoreline permit activity are evident from the data above. The dominance of shoreline permit activity related to residential development is expected based on the existing land use. Notably, the vast majority of projects qualified for Shoreline Exemptions, with only one project in 2005 requiring a Shoreline Substantial Development Permit (SDP). This means that for docks and piers for example, the total cost of the new, modified or expanded dock or pier was less than \$10,000 (approximately, figure is adjusted annually). Permits for bulkhead modifications were relatively rare, with just 5 recorded in the 12 year period. All bulkhead permits are Shoreline Exemptions based on state law. Most other Shoreline Exemptions must be less than (approximately) \$2,500 to qualify. Permits associated with docks were more common, with 18 extended or modified and 19 new. Permits for utility projects were also rare, with just 2 permits recorded. Sixty-two (62) permits were issued for new, modified or expanded upland residential structures. There are 391 parcels in the Lake Sawyer, so upland structure activities occurred on approximately 16% of shoreline properties over the last 12 years. No Variances or Conditional Use Permits were recorded.

I.4.5 ESA Listings

Three federally listed salmonid species occur in the Green River Watershed: (1) Chinook salmon, Puget Sound Evolutionary Significant Unit (ESU), (Reaffirmed as Threatened, U.S. Federal Register, 28 June 2005); (2) bull trout, Coastal-Puget Sound Distinct Population Segment (DPS), (threatened, U.S. Federal Register, 1 November 1999); and (3) steelhead of the Puget Sound DPS (U.S. Federal Register, 11 May 2007). Puget Sound-Strait of Georgia coho salmon also occur in the basin and are listed as a Species of Concern (U.S. Federal Register, 15 April 2004), indicating that they are under less active consideration for formal listing. These three species may occur in City of Black Diamond

Section I—Introduction

shoreline areas within the Soos Creek basin portion of the Green River Watershed, though less so for bull trout. Bull trout typically require colder, higher-elevation waters for spawning, and are unlikely to be in Lake Sawyer. Chinook are mapped as occurring in Covington Creek, downstream of Lake Sawyer. Steelhead are mapped as occurring in Covington Creek for spawning, and their presence is documented in Lake Sawyer and Rock Creek. Coho are mapped as occurring in Lake Sawyer as well as Covington (spawning), Ravensdale, and Rock Creeks (WDFW SalmonScape 2009).

The Green River Watershed also contains formally designated critical habitat for Puget Sound Chinook salmon and Coastal-Puget Sound bull trout. Critical habitat for Puget Sound steelhead has not yet been designated but is under development. Critical habitat for Chinook salmon includes the Upper, Middle, and Lower Green River Subwatersheds (Watershed Codes 17110013, 01-03) of the Puget Sound ESU (U.S. Federal Register, 2 September 2005). Covington Creek (to Lake Sawyer) is designated critical habitat for Puget Sound Chinook salmon. The designated critical habitat is located just outside of the shoreline jurisdiction (StreamNet Database 2010).

2.0 CURRENT REGULATORY FRAMEWORK SUMMARY

2.1 CITY OF BLACK DIAMOND

In 1998 the Lake Sawyer area was incorporated into the City of Black Diamond. Chapter 19.08 of the Black Diamond Municipal Code outlines the City's current SMP. The chapter outlines use regulations, conditional uses, variances, and requirements for Substantial Development Permits. Most uses, developments, and activities regulated in the City's SMP are also subject to the City's Comprehensive Plan, Zoning Code, and various other city, state and federal laws. State statute requires periodic updates of the City's Comprehensive Plan, and the City of Black Diamond ensures consistency between the SMP and other City codes, plans and programs by reviewing each for consistency during these periodic updates.

In 1996, the City adopted its first Comprehensive Plan pursuant to Growth Management Act requirements and completed a major update of the Black Diamond Comprehensive Plan in 2009. Minor updates to the Comprehensive Plan are made annually through the comprehensive plan amendment process. The most recent Comprehensive Plan amendments went into effect in 2009. The City's most recent Sensitive Areas Ordinance (Chapter 19.10) was adopted in 2008.

2.2 STATE AND FEDERAL REGULATIONS

State and federal regulations most pertinent to development activities on lands subject to the City's Shoreline provisions include:

- Section 404 of the Clean Water Act;
- the Endangered Species Act;
- Section 401 Water Quality Certification; and
- Washington State Hydraulic Code.

In addition to those listed above, there are other federal regulations which may be applicable on lands within the Shoreline zone of the City. These regulations could include the National Environmental Policy Act (NEPA), the Anadromous Fish Conservation Act, the Clean Air Act, or the Migratory Bird Treaty Act. In most instances these Federal regulations would only be implemented if an action was either federally initiated, federally funded, or required some other Federal permit.

In addition to federal regulations, there are other Washington State laws that are applicable to the City and its planning process such as the Growth Management Act; however it is not directly initiated by a proposed land-use action within the City's Shorelines. The City does implement the State Environmental Policy Act (SEPA) directly through its own SEPA official. The lead agency (in most cases, the City) is responsible for identifying and evaluating the potential adverse environmental impacts of a proposal. This evaluation is documented and, in most cases, sent to other agencies and the public for their review and comment. Where reasonable and prudent, the

Section 2—Current Regulatory Framework Summary

update to the City’s Shoreline Master Program will incorporate some of the relevant aspects of these regulations to assure clarity for applicants. However an applicant remains legally responsible to assure a proposed action within the City that triggers state and federal regulations also obtains those relevant permits in addition to applicable City permits.

In general, an application within the City’s Shoreline zone will trigger a permit or review from the U.S. Army Corps of Engineers, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Ecology, or Washington Department of Fish and Wildlife only if the action is below the Ordinary High Water Mark of a Water of the U.S. or a Water of the State; or it poses some risk to a federally listed species or it’s critical habitat. Involvement by these state and federal agencies would be most often be triggered by discharge of fill or pollutants into water or wetlands. State and federal regulations also apply to the construction (or reconstruction) of docks, bulkheads, and other over-water structures.

Provided below is a summary of the key state and federal regulations pertaining to water or habitat within Shoreline zones within the City. An applicant may be subject to one or more of these regulations, in addition to the City’s Shoreline program.

Section 404 of the Federal Clean Water Act

The Army Corps of Engineers (the Corps), regulates the “discharge of dredged or fill material into waters of the United States, including wetlands”. The Seattle District of the Corps has an extensive regulatory program with multiple sources of guidance located here: (http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=Home_Page). The Corps’ legal authority to regulate fill or discharges in “waters of the U.S.” overlaps some of the City’s Shoreline provisions; there may be instances of actions that the City’s Shoreline code allows but which the Corps implementation of Section 404 of the Clean Water Act may preclude or severely limit. An applicant who is proposing any fill or discharge in Lake Sawyer or its associated wetlands or tributary streams (upstream of Shoreline jurisdiction) will have a high probability of requiring an application and review by the Corps. Examples of common activities within Shoreline jurisdiction that will also trigger the need for a Corps permit would include placement or replacement of a bulkhead, placement or replacement of a dock over-water; repair or installation of discharge pipes or fill for drainage systems, filling or grading wetlands, floodplains, or streams associated with the lake. Even activities that are undertaken to restore or create habitat improvements in these aquatic settings may require review and approval by the Corps of Engineers.

The Corps requires applicants to document in sequence, the following actions: avoidance of adverse impacts to “waters”, re-design of projects to minimize impacts to “waters”, restoration of impacts to waters after the project is completed, and finally compensation of unavoidable adverse impacts. If a Corps permit is required for a project, the applicant may also be required to submit documentation to the National Marine Fisheries and/or NOAA Fisheries Service relative to the potential of their project to effect federally listed endangered species (see below for more detail). In addition, the requirement of a Corps permit also would trigger the need for the project to meet the provisions of the Section 106 of the Historical Preservation Act.

Section 2—Current Regulatory Framework Summary

Endangered Species Act (ESA)

The Endangered Species Act (<http://www.epa.gov/lawsregs/laws/esa.html>) is carried out by the National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) (together known as The Services); each Service is responsible for a sub-set of the listed species. The ESA prohibits “take” of listed species or habitat critical to that species survival. “Take” within the ESA is defined as: “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” In general, the provisions of the ESA are triggered when an activity has the potential to affect federally listed species; or the action requires a federal permit (e.g., a Corps permit); or the project receives federal funding (e.g., FHWA funding of public road project), is proposed by a federal agency; or occurs on federal land. Within the City of Black Diamond, it is most likely that a project within Shoreline jurisdiction would trigger the provisions of the ESA (and require consultation with the Services) if it also triggered a Section 404 permit from the Corps.

Section 401 Water Quality Certification

Washington State has been delegated authority to implement Section 401 of the Federal Clean Water Act by the Corps of Engineers (<http://apps.ecy.wa.gov/permithandbook/permitdetail.asp?id=43>). The Department of Ecology reviews, conditions, approves or denies certain actions that may result in discharges to “state waters”, which includes wetlands. Washington State has state water quality standards that must be met; and actions which result in impacts to waters of the state can be subject to the provisions of Section 401 standards. Discharge of pollutants (or the potential there-of), filling, grading, or other alterations to Lake Sawyer or it’s associated wetlands (and tributary streams above Shoreline jurisdiction) may be subject to review and approval to meet Ecology’s 401 provisions.

Hydraulic Code

Washington Department of Fish and Wildlife (WDFW) (<http://wdfw.wa.gov/hab/hpapage.htm>) regulates aquatic habitats through Chapter 77.55 RCW (Revised Code of Washington) (the Hydraulic Code). The code gives the state the authority to review, condition, approve or deny “any construction activity that will use, divert, obstruct, or change the bed or flow of state waters.” As applicable to the City of Black Diamond’s shoreline jurisdiction, actions that occur below the Ordinary High Water Mark (OHWM) of Lake Sawyer or its associated wetlands (or their tributaries outside Shoreline jurisdiction) will trigger the need to obtain a Hydraulic Project Approval (HPA) from the WDFW. Examples of activities include: stream alteration, culvert installation or replacement, pier and bulkhead repair or construction, dock repair or construction, etc.

3.0 ELEMENTS OF THE SHORELINE INVENTORY

The following discussion identifies each of the required inventory elements for the jurisdictional shoreline (Table 1), sources of information for each element, and provides a City-wide narrative for each element. Shoreline-specific discussions are found in Chapter 4.0. Photographs are included in Appendix E.

Table 2. Shoreline Planning Segments

Segment	Approximate Length (feet)	Approximate Area (acres)
A—Residential Area	24,738.4	115.2
B—Boat Launch Park	539.7	2.1
C—North Parcel	1,814.0	7.7
D—Islands	2,415.1	2.5
E—Regional Park	5,497.8	24.4
F—Regional Park Wetland	N/A	24.9
TOTAL	35,005.0 feet (circumference)	176.8 acres

3.1 LAND USE PATTERNS

Land use patterns were derived from GIS mapping of assessor land use data, City zoning classifications, future land use designations from the City’s most recent Comprehensive Plan (City of Black Diamond 2009), and from review of aerial photography from 2006. Table 2 identifies the relative percentages of existing land uses, zoning classifications, and future land use designations within the shoreline jurisdiction.

Table 3. Land Use, Zoning, and Shoreline Environments

Shoreline Area	Existing Land Use (acres)		Zoning Classification (acres)		Comprehensive Plan Designation (acres)		Existing Shoreline Designation
Lake Sawyer	P	42.1					Rural
	RES	2.1					
	SF	101.7	P	42.1	P	40.5	
	VAC	13.7	R4	136.9	R4	136.9	
	M	1.2					
	Unknown	18.3					

Key:

Existing Land Use (i.e. what is on the ground today)

- P: Park, Public
- RES: Resort/Lodge/Retreat
- SF: Single Family
- VAC : Vacant land
- M : Mobile Home

Zoning Classifications / Comprehensive Plan Designations

- R4: Residential, 4 DU/acre
- P: Park, Public

Section 3—Elements of the Shoreline Inventory

NOTE: Minor discrepancies in total acreage between Tables 1 and 2 are a result of slight differences in Geographic Information System (GIS) shape file layers for land use and zoning, as well as rounding of area figures.

Existing Land Use

The vast majority of existing land use within the City's shoreland area around Lake Sawyer is single-family housing. Approximately 86 percent of the parcels around the lake are built out, leaving very little of the lake in natural condition. According to the King County Assessor, less than 8 percent of the land in shoreline jurisdiction is classified as vacant. A large piece of land (comprising three parcels and approximately 142 acres) at the southern end of Lake Sawyer is an undeveloped City park. There is also a small city park with a boat ramp at the northwest side of the lake that is approximately 1.8 acres (one parcel). There are a few other parcels around the lake that are distinct from the typical single-family houses. At the north end of the lake there is a large parcel (12.9 acres) that has remained largely undeveloped and has three or four homes and/or cabins; and on the western shore there is a group of parcels (totaling 9.13 acres) used as an RV Park with park amenities (Sunrise Lake Sawyer Resort), but zoned as residential. The median setback on Lake Sawyer is approximately 57 feet based on GIS and aerial photo analysis.

Zoning Classifications and Comprehensive Plan Land Use Designations

The entire shoreline area of Lake Sawyer is zoned as R4 Residential, 4 RU/acre (four residential units per acre), except for the two City-owned parks (located on a total of four parcels) mentioned above. Approximately 77 percent of the land in shoreline jurisdiction is zoned R4 Residential and 23 percent is zoned Park. Similarly, the Comprehensive Plan (Future) Land Use Designations closely match zoning, with similar percentages designated as Single Family Residential and Park, respectively.

3.2 TRANSPORTATION

A short section (approximately 800 feet) of Lake Sawyer Road SE is located on the western edge of the shoreline jurisdiction. Otherwise, the majority of roadways within the shoreline jurisdiction are minor roads that provide access to homes. The Proposed Draft Six Year Transportation Improvement Program for 2010-2015 (City of Black Diamond 2009a) includes improvements within the shoreline jurisdiction along Lake Sawyer Road SE. The improvements include a total of 1.2 miles of overlaying the existing roadway, of which approximately 800 feet is within the shoreline jurisdiction.

3.3 WASTEWATER AND STORMWATER UTILITIES

Two primary utilities have the ability to significantly impact (directly and indirectly) jurisdictional shorelines: wastewater and stormwater. The Lake Sawyer area of the City is served by the Covington Water District, while the remainder of the City is served by the City of Black Diamond Water Utility, smaller water systems and private wells (PacWest Engineering 2009). The City provides sewer collection services to all portions of the City that are currently developed, except

Section 3—Elements of the Shoreline Inventory

around Lake Sawyer, which is within the Soos Creek Water and Sewer District. The City of Black Diamond operates and maintains the City’s stormwater collection system and facilities. Information about existing and proposed surface water facilities was drawn from the City’s stormwater GIS layers and from the City’s Public Works department staff. Additional utility information is described in greater detail for the shoreline in Chapter 4.0 and illustrated on Figure 3 in Appendix E.

3.3.1 Wastewater Utilities

The entire SMA is within the Soos Creek Sewer District, however, only a small portion of this area is currently served. With the exception of approximately 30 homes located on 218th Place SE at the northwest corner of Lake Sawyer that are connected to the regional sewer system, all properties within the SMA are served by on-site sewage systems (OSS). Wastewater from the small area currently served by the Soos Creek Water and Sewer District is treated by King County Wastewater Treatment Division’s treatment plant in Renton, with deep-water disposal in Puget Sound.

In 2000, when the Lake Sawyer Management Plan was written, there were more than 270 nearshore on-site sewage systems (OSS), commonly known as septic systems. Historic wastewater management in Black Diamond led to excessive nutrient loading in Lake Sawyer. Failing septic systems in the watershed resulted in the decline of water quality of Rock Creek, Ginder Creek, and Lake Sawyer in the 1970s, leading the City to acquire funding and build a wastewater treatment plant. The plant began operating in 1981 and discharged to a natural wetland next to Rock Creek, which eventually drains to Lake Sawyer. When the system failed, excessive nutrient loading in Lake Sawyer caused algae blooms through high concentrations of phosphorus. By 1992, all wastewater from the treatment plant was diverted through the King County sewer line. Nutrient levels in the lake have been managed through the TMDL since it was approved by the EPA in 1993 (Lake Sawyer Water Quality Implementation Plan 2009). Due to the high use of septic systems around the lake, input from stormwater runoff, and sources of phosphorus within the lake itself, phosphorus levels continue to be monitored.

Connection to the public sewer system may be required in specific circumstances. The City of Black Diamond sewer regulations state:

13.20.020 Sewer connections required– Use of sewer.

A. The owner of each lot or parcel of real property within the city limits served by the sanitary sewerage disposal system of the city as it is constructed and as it may be improved or extended in the future, upon which such lot or parcel of real property there is situated any building or structure for human occupation or use for any purpose, shall, within thirty days from receipt of written notice from the city clerk-treasurer mailed to the owners of the premises at the street address of the premises (or to the address to which real estate tax statements are mailed as disclosed in the records of the office of the county treasurer), cause a connection to be made between the sewerage system in each such building or structure; provided, where one building is located at the rear of another on the same lot and the building in the rear has no frontage on an alley or street in which a sewer is located, the building sewer from the front buildings may be extended to the rear building and the whole considered as one building sewer provided a cleanout is constructed to the ground surface beyond the connection from the rear building. No existing septic tanks are to be connected into the collection system. Abandoned septic tanks are to be bypassed and backfilled or removed.

Section 3—Elements of the Shoreline Inventory

B. No building, house or other structure for which sewer connection shall have been made mandatory by this chapter, shall hereinafter be occupied, resided in, nor shall any business be operated therefrom unless and until the building, house or structure has been connected to the city's sanitary sewerage system and its owner or occupier has paid all connection charges to the city in accord with the provisions of this chapter.

The City of Black Diamond will send a “Notice to Connect to Sewer” when:

- The sewer line is located adjacent to the property frontage and it is low enough to service the property by gravity, or
- A new lot is created, a new home is being built or a substantial remodel is proposed and the lot is within 300 feet of a sewer line.

If the property is beyond the end of the sewer main but within 300 feet, the OSS is functioning properly and no substantial improvement is proposed, the property owner will not be sent a notice to connect.

Based on the current rules, current sewer system location and proposed improvements, we do not expect a significant number of connections in the short or medium term. However, because the entire SMA is within the Soos Creek Water and Sewer District boundaries, we expect eventual conversion from OSS to public sewer over the long term as the system is constructed. Areas in the City or areas upstream where sanitary sewer service is not available present a risk to the water bodies in terms of failure of the onsite septic systems. An increase use of the septic systems also presents a risk to the water bodies—such increases occur when homes transition from weekend/vacation use to year-round residences and when small homes or cabins are redeveloped into larger homes. Additionally, depending on discharge points and overflow structures, untreated waste can impact local water bodies. At this time, the location, status, and condition of any discharge points and overflow structures associated with the sanitary sewer trunk line leading to the Renton treatment plant are being mapped by the City. The existing sewer line is shown on Figure 3 in Appendix E.

3.3.2 Stormwater Utilities

The City of Black Diamond is currently developing its Stormwater Comprehensive Plan. The City is currently mapping all of its storm drain structures, storm pipe locations, and outfalls to water bodies. Figure 3 in Appendix E shows the location of storm drain pipes, catch basins, and ditches in and around the shoreline jurisdiction area. Information regarding outfalls is not yet available, and therefore is not shown on the map. Because the City is currently surveying and mapping these features, not all features may be depicted at the time of this report. Existing stormwater facilities are illustrated in Figure 3 located in Appendix E.

The City received its National Pollutant Discharge Elimination System (NPDES) Phase II permit in January 2007 from Ecology, as did many small towns and cities in the Puget Sound area (Regulated Small Municipal Separate Storm Sewer Systems). The NPDES Phase II permit is required to cover the City’s stormwater discharges into surface water of the state. As part of compliance with the permit, cities are required to develop and implement a Stormwater Management Program (SWMP).

Section 3—Elements of the Shoreline Inventory

A SWMP is a set of actions and activities necessary to meet the requirements of the Phase II permit, including reducing discharge of pollutants from the regulated small sewer systems to the maximum extent practicable; implement all known, available and reasonable technologies (AKART) to prevent, reduce and treat pollution; and protect water quality (Washington Department of Ecology 2007). The SWMP includes provisions for public education, outreach, and involvement; detection and elimination of illicit discharges; runoff control for construction and new development; and a pollution prevention and operation and maintenance program for municipal operations. The SWMP must also include any additional actions necessary to meet the requirements of any applicable TMDLs issued by Ecology. Compliance with the permit is phased over five years, with full compliance required by 2012.

As part of the NPDES Phase II permit compliance, the City currently has various programs to control stormwater pollution through maintenance of public facilities and inspection of private facilities, as well as conducting construction site inspections and requiring appropriate spill control and response measures. The City has also prepared a draft, updated Storm Drainage standards report for adoption (PWE, 2009). Monitoring has been required in Lake Sawyer in association with a Total Maximum Daily Load (TMDL) Plan for phosphorus in the lake that was developed by Ecology in 1991, and the water quality has generally improved since 1993 when the TMDL was approved by the EPA. In 2002, Ecology produced a document titled *Effectiveness Monitoring for Total Phosphorus Total Maximum Daily Loads for Fennick and Sawyer Lakes*. The report concluded that the lake is meeting the long-term goal of reducing phosphorus. However, the anticipated growth in the watershed could have a negative impact on the health of the lake. Ecology has produced a follow-up document titled *Lake Sawyer Total Phosphorus Total Maximum Daily Load Water Quality Implementation Plan* (2009), which provides a framework for corrective actions to address ongoing and future sources of phosphorus pollution in Lake Sawyer and the surrounding watershed. The TMDL was originally issued relating to phosphorus levels as a result of the failed management of wastewater utilities, but is now managed through stormwater facilities because the primary source of phosphorus is from stormwater runoff. The City is continuing to work towards meeting the requirements of the NPDES permit by 2012. Some of the current goals the City is working towards include establishing updated maintenance standards for facility function, performing maintenance within required timeframes, annual inspection of all municipally owned or operated permanent stormwater treatment and flow control facilities, conducting checks of potentially damaged stormwater facilities after major storm events, and several activities and educational opportunities relating to public involvement and participation (PacWest Engineering 2009).

3.4 IMPERVIOUS SURFACES

Impervious surface is a surface which either prevents or retards the entry of water into the soil mantle compared to natural conditions prior to development; and/or a surface which causes water to run off the surface in greater quantities or at an increased rate of flow compared to the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earth (e.g. lawns, heavily grazed pasture, athletic fields, etc.), and

Section 3—Elements of the Shoreline Inventory

oiled, macadam, or other surfaces which similarly impede the natural infiltration of surface and storm water runoff (King County Stormwater Manual Glossary).

While changes in impervious surface coverage within the shoreline area can impact Lake Sawyer, increases in the larger contributing basin have the greatest potential to impact Lake Sawyer and other waterbodies. There is substantial documentation on the effects and implication of increase imperviousness on natural aquatic systems. Increases in impervious surface can cause greater quantities of water to be directed towards natural conveyances and receiving bodies (e.g., lakes, streams, and wetlands), flooding, as well as an increased water velocity in streams. Increases in water volume may change the hydroperiod of natural water bodies: meaning that storm events may cause lakes/wetlands to have greater water level fluctuations for a given storm event. Increased water velocity can cause an increase in erosion, sediment deposition, and movement of pollutants associated with stormwater and sediment. Flooding can cause damage to human infrastructure and public/private properties, as well as the deposition of sediment and debris within the floodplain. Storm water carries pollutants and sediment which can eventually reach water bodies such as Lake Sawyer. When the water velocity slows, the pollutants and sediment drop out of the water column and settle in the water. Increased sedimentation adversely affects water quality which may impair habitat for aquatic organisms as well as physically change the configuration of the lakeshore causing loss or change in shoreline habitats. In addition, Lake Sawyer currently has elevated phosphorous levels which may be attributed to a combination of the failure of a historic wetland treatment system plus increased loading from the surrounding watershed. Continued development in Black Diamond as well as in the greater Lake Sawyer Watershed contributes to stormwater runoff that will continue to affect the hydroperiod and habitats of Lake Sawyer.

The readily available public data was insufficient to calculate the amount of impervious surface within the shoreline jurisdiction. The City's Comprehensive Plan (2009) identifies that 86 percent of the parcels surrounding the shores of Lake Sawyer are built out; however this only implies the extent of imperviousness. Given the extent of parcel development, the removal of natural forest cover and extent of lawn (which functions as "effective" impervious surface) it can be assumed that the percent of effective imperviousness exceeds 20%. Twenty percent imperviousness has been identified by King County as the threshold, above which, adverse changes in hydroperiod should be expected. Even parcels that are undeveloped, such as the regional park, have areas of impervious surface in the way of parking lots, access roads, lawn and compacted trails. Knowing the percentage of parcels that are built out and by looking at Figure 7 in Appendix E, it can be estimated that at least 90 percent (conservative estimate) of the parcels have greater than 20% effective of impervious surface.

3.5 SHORELINE MODIFICATIONS

Shoreline modifications can include features such as levees, dikes, bridges, dredging, road embankments, utility crossings, bulkheads, docks or piers, a variety of armoring types (some associated with fill), and other in-water structures such as boatlifts, boathouses, and moorage covers. In lake environments, these types of modifications strongly influence the landscape-scale processes which then alter the functions of lake edges. Shoreline modifications influence functions by

Section 3—Elements of the Shoreline Inventory

changing erosion patterns and sediment movement; affect or limit the presence or distribution of over-hanging or aquatic vegetation; and are often accompanied by upland vegetation loss. Information about shoreline modifications on Lake Sawyer was derived from interpretation and mapping based on aerial photographs and two brief site visits.

Known shoreline modifications on and around Lake Sawyer include extensive bulkheading around the perimeter shoreline, docks, and boatlifts. To a lesser extent there are boathouses over the lake. Large corrugated metal culverts allow water to pass from Ravensdale and Rock Creeks and their associated wetlands into Lake Sawyer. Within Segment A, which includes most of the areas zoned for single family development, approximately 80 percent of the shoreline edge is armored (e.g. bulkheads) at or near the Ordinary High Water Mark (OHWM). Within the entire SMA, it is estimated that approximately 66 percent of the shoreline edge is armored and approximately 89 percent of the shoreline parcels have an overwater structure such as a boat-dock or swim platform. There are several islands in the lake. The semi-natural shoreline edge length associated with these islands lowers the overall percentage of the shoreline edge that is armored. One of the islands is divided into seven parcels, six of which have homes or cabins as well as docks. The seventh and largest parcel, has one small dock, but appears to have an otherwise natural shoreline and is completely forested. One of the other islands appears to have just a small boat dock.

There are few areas with a natural shoreline and in general, those natural shorelines are bound by those with modified shorelines. The northern forested parcel has the largest amount of natural shoreline with only a small portion of the overall property having boat docks. Even the regional park at the south end of the lake has a significant amount of shoreline modification in the way of bulkheading.

3.6 EXISTING AND POTENTIAL PUBLIC ACCESS SITES

Existing public access to the lake is limited to two existing parks located on the shores of Lake Sawyer. The smaller (1.8 acres) of the two parks is a public boat launch facility on the northwest shore of the lake. The second, Lake Sawyer Regional Park, is a 142-acre undeveloped park on the southern shores of the lake, designated as open space. The regional park was originally established by King County in 1999, and transferred to the City in 2005. During the transfer the County retained an easement for a regional trail.

Plans for enhanced public access exist at both parks along Lake Sawyer including enhancement of trails and other Park facilities. Information about public shoreline access in the City was obtained from the City's Parks, Recreation and Open Space Plan (City of Black Diamond 2008). Future public access opportunities are described in greater detail for the shoreline area in Chapter 6.0, Section 6.1, and the location of existing public access sites are shown in Figure 10 in Appendix E.

3.7 CRITICAL AREAS

The inventory of critical areas was based on a wide range of information sources. A complete listing of citations used to compile information on critical areas is included in Section 8.0. The primary source for GIS data relating to critical areas was from King County and Washington Department of

Section 3—Elements of the Shoreline Inventory

Natural Resources. Critical areas mapping and identification includes geologically hazardous areas, wetlands, streams, habitat conservation areas, and critical aquifer recharge areas. This information was supplemented with maps or reports obtained from the Washington Department of Fish and Wildlife (WDFW), DNR, and Ecology. Soils mapped by the Natural Resource Conservation Service (NRCS) are shown on Figure 6a and 6b in Appendix E.

Critical areas are described as they relate to the project segments in Chapter 4.0 and illustrated on Figure 2a in Appendix E.

3.7.1 Geologically Hazardous Areas

The City of Black Diamond regulations address three types of hazards: erosion, landslide, mine, and seismic. They are defined in the City's Sensitive Areas Ordinance 08-875 as follows:

Erosion Hazard Areas: *“Erosion hazard areas are those areas with soils identified by the U.S. Department of Agriculture’s Natural Resources Conservation Service as having a “moderate to severe,” “severe,” or “very severe” rill and inter-rill erosion hazard.”*

Landslide Hazard Areas: *“Landslide hazard areas are areas potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible due to any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors. These may include the following:*

- a.) *Areas of historic failures, such as areas that have shown evidence of historic failure or instability, including but not limited to back-rotated benches on slopes; areas with structures that exhibit structural damage such as settling and racking of building foundations; and areas that have toppling, leaning, or bowed trees caused by ground surface movement;*
- b.) *Those areas delineated by the U.S. Department of Agriculture’s Natural Resources Conservation Service as having a “severe” limitation for building site development;*
- c.) *Those areas mapped by the Washington State Department of Natural Resources (slope stability mapping) as unstable (U or class 3), unstable old slides (UOS or class 4), or unstable recent slides (URS or class 5);*
- d.) *Areas with all three of the following characteristics:*
 - i. *Slopes steeper than fifteen percent (15%); and*
 - ii. *Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and*
 - iii. *Springs or ground water seepage;*
- e.) *Areas potentially unstable because of rapid stream incision, stream bank erosion, and undercutting;*
- f.) *Any area with a slope of forty percent (40%) or steeper and with a vertical relief of ten (10) or more feet except areas composed of consolidated rock. A slope is delineated by establishing its toe and top and is measure by averaging the inclination over at least ten (10) feet of vertical relief.*
- g.) *Areas that are at risk of mass wasting due to seismic forces.”*

Mine Hazard Areas: *“Mine hazard areas are those areas underlain by or affected by mine workings such as adits, gangways, tunnels, drifts, or airshafts, and those areas of probably sink holes, gas releases, or subsidence due to mine workings.”*

Section 3—Elements of the Shoreline Inventory

Seismic Hazard Areas: “Areas subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, soil liquefaction or surface faulting including:

a.) Areas subject to surface faulting during a seismic event;

b.) Areas with underlying deposits indicative of a risk of liquefaction during a seismic event;

c.) Areas subject to slope failure during a seismic event;

Seismic hazards shall be as identified in Washington State Department of Natural Resources seismic hazard maps for Western Washington and other geologic resources.”

The City has mapped erosion, landslide, mine, and seismic hazard areas based on King County (iMAP) GIS data. Geologically hazardous areas for the shoreline jurisdiction are discussed further in Chapter 4.0 and identified on Figure 2b.

3.7.2 Wetlands

City, King County, NWI, and WDFW PHS (2007) wetland mapping show that there is a wetland complex located at the south end of Lake Sawyer and is in the shoreline jurisdiction area (Figure 2a). The wetland boundaries in Figure 2a (in Appendix E) are approximate as they were not formally delineated for this project. Additional wetlands may be found as development occurs on currently undeveloped properties. Soils mapped in and around the shoreline area are shown on Figure 6a and 6b (NRCS 2009). Soil types classified as “hydric” may be indicative of wetlands; two hydric soils were identified in portions of shoreline jurisdiction in the City limits and are associated with the large wetland complex at the south end of Lake Sawyer.

The City has established a Core Stream and Wetland Complex designation to be regulated by the City. The streams, lakes, ponds and wetland complex associated with Rock Creek, Jones Lake, Jones Creek, Black Diamond Lake, Black Diamond Creek, and Ravensdale Creek are designated as the Core Stream and Wetland Complex. These water bodies that are included in the core wetland and stream complex are those that provide the most important ecological functions.

There is a large wetland complex located on the southern shore of Lake Sawyer that is located in the City’s shoreline jurisdiction. This wetland is rated as a Category I and is approximately 15 acres in size. Its dominant vegetation communities are aquatic bed, open water, and scrub-shrub. This wetland complex is associated with Rock Creek. Between Lake Sawyer and the wetland there is a gravel access road with culverts that allow water from Rock Creek and the wetland to enter Lake Sawyer. This wetland is also associated with the Core Stream and Wetland Complex.

While researching what constitutes the City’s shoreline jurisdiction, a wetland located northeast of the lake was considered. The wetland is separated from the lake shore by a road and houses and it was thought that it may have a surface water connection to Lake Sawyer. However, several area residents confirmed that they were unable to find a culvert that hydrologically connects the wetland and the lake. Wetlands that have surface water connections to jurisdictional water bodies are included as part of the shoreline jurisdiction. However, the lack of surface water connection for this wetland precludes it from being included in shoreline jurisdiction for the City of Black Diamond.

3.7.3 Streams

Information regarding streams was gathered from WDFW’s Priority Habitats and Species (PHS) maps and reports (WDFW 2007) and other resources. Streams are regulated by the City of Black Diamond under the Sensitive Areas Ordinance, Chapter 19.10.300 Fish and Wildlife Habitat Conservation Areas. There are no streams within the City of Black Diamond that are under the shoreline jurisdiction.

The three streams associated with Lake Sawyer are Rock Creek, Ravensdale Creek, and Covington Creek. Rock Creek and Ravensdale Creek are associated with the Core Stream and Wetland Complex. Rock and Ravensdale Creeks drain into Lake Sawyer and are considered Type F, and Covington Creek is the outlet from Lake Sawyer and is considered Type S. At the lake outlet to Covington Creek there is a small dam and fish ladder. Rock Creek and Ravensdale Creek enter Lake Sawyer through culverts that are located under an access road.

Type S by Washington State Department of Natural Resources Forest Practices are designated as “shorelines of the state” as defined in Chapter 90.58 RCW. Type F streams are streams that are known to be used by fish or meet the physical criteria to be potentially used by fish. While Covington Creek does meet the shoreline definition, it is located immediately outside of the City limits and is regulated under King County’s SMP.

3.7.4 Other Fish and Wildlife Habitat Conservation Areas

Fish and Wildlife Habitat

Shorelines such as Lake Sawyer that are considered a shoreline of the state, as well as other fish and wildlife conservation areas are regulated by the City of Black Diamond through the Sensitive Areas Ordinance 19.10.300. Other fish and wildlife conservation areas are areas outside of the Core stream and Wetland Complex that are within the City which state or federally designated endangered, threatened, and sensitive species have a known primary association. Some primary associations (as listed in BDMC 19.10.310B) include but are not limited to bald eagle habitat; lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity; habitats and species of local importance as may be determined by the city; endangered, threatened, or sensitive species as listed in the WAC; and state natural area preserves and natural resource conservation areas.

Fish and wildlife habitat conservation areas in Black Diamond include the core wetlands and streams mentioned above. Additionally, there are known bald eagle nests and associated habitat in the vicinity of Lake Sawyer and its shoreline. Priority Habitat and Species (PHS) are included on Figure 2C in Appendix E.

3.7.5 Critical Aquifer Recharge Areas

The City of Black Diamond has mapped critical aquifer recharge areas with data from King County Department of Natural Resources (King County iMap 2010). According to the maps (Figure 4), there are no critical aquifer recharge areas or areas of high recharge potential located in the City limits. There are two areas that are mapped as well head protection areas (WHPA). One is located

Section 3—Elements of the Shoreline Inventory

on the east side of the lake, and one is located on the west side of the lake. Only small portions of the WHPAs are located within the shoreline jurisdiction. As categorized in its sensitive areas ordinance (19.10.500), critical aquifer recharge areas are categorized as follows:

1. *“Category I – Severe Aquifer Sensitivity. “Category I – Severe aquifer sensitivity” are those areas which provide rapid recharge with little protection, having highly permeable soils. The predominant soil series and types are those listed in Category I in Table 19.10.500.B of the Sensitive Areas Ordinance;*
2. *Category II – Moderate Aquifer Sensitivity. “Category II – Moderate aquifer sensitivity” are those areas with aquifers present, but which have a surface soil material that encourages run-off and slows water entry into the ground. The predominant soil series and types are those listed as Category II in 19.10.500.B of the Sensitive Areas Ordinance;*
3. *Category III – Slight Aquifer Sensitivity. “Category III – Slight aquifer sensitivity” are those areas of low ground water availability and whose soil series are derived from basaltic, andesitic, or sedimentary rock or ancient glacial till which are parent material for soils with more clays at the surface, these geological formations do not provide abundant ground water. The predominant soil series and types are those listed as Category III in Table 19.10.500.B of the Sensitive Areas Ordinance.”*

3.8 FLOODPLAIN AND CHANNEL MIGRATION ZONE

While there are no mapped floodplains or flood hazard areas within the City’s shoreline jurisdiction, it has been noted through personal communication with Lake Sawyer residents that during major storm events the lake level rises. The rise in lake level has lead to several low-bank properties being flooded, including some damage to homes. Residents state that these events occur a few times each decade.

3.8.1 Floodplain

Floodplains are “synonymous with one hundred-year flood plain and means that land area susceptible to inundation with a one percent chance of being equaled or exceeded in any given year. The limit of this area shall be based upon flood ordinance regulation maps or a reasonable method which meets the objectives of the act” (WAC 173-26-020). The City has mapped the floodplains via data from the Federal Emergency Management Agency (FEMA). There are no mapped floodplains within the shoreline jurisdiction for the City of Black Diamond.

3.8.2 Flood Hazard Areas

“Frequently flooded areas” are those areas within the 100-year floodplain and any other areas subject to flooding (WAC 365-195-090(4)). Flood hazard areas are not included in the City of Black Diamond’s Sensitive Areas Ordinance. No flood hazard areas are mapped within the City’s shoreline jurisdiction.

3.8.3 Channel Migration Zone

According to definitions in Ecology’s Shoreline Master Program Guidelines (WAC 173-26-020), “Channel migration zone (CMZ)’ means the area along a river within which the channel(s) can be

Section 3—Elements of the Shoreline Inventory

reasonably predicted to migrate over time as a result of natural and normally occurring hydrological and related processes when considered with the characteristics of the river and its surroundings.”

Channel migration zones do not apply to lakes, and there are no streams that meet the definition of shoreline of the state within the City limits, therefore, there are not any channel migration concerns within the shoreline jurisdiction for the City of Black Diamond.

3.9 HISTORICAL OR ARCHAEOLOGICAL SITES

The Washington State Office of Archaeology and Historic Preservation (OAHP) WISAARD website was searched to identify known historical or archaeological features (<https://fortress.wa.gov/dahp/wisaard/>). The OAHP does not have record of any historic sites or structures in Black Diamond’s shoreline jurisdiction.

Internet search results reveal that a village called Soos was located near the confluence of the Green River with Big Soos Creek, outside of City jurisdiction, as recently as the mid-1800s (<http://coastsalishmap.org/>). The village, which may only have contained two buildings, was occupied by a people that called themselves the *skwohp-absh* or Green (‘fluctuating’) River people (<http://coastsalishmap.org/>). Numerous other villages were located along the Green River, but there were no known villages in the shoreline jurisdiction in the City of Black Diamond.

There are very few, if any areas within Black Diamond’s shoreline area that have not been previously graded or excavated. This does not preclude the possibility of finding artifacts and the Shoreline Master Program should provide clear direction regarding circumstances when a special study may be necessary, and what action to undertake in the event of an unexpected discovery.

3.10 OTHER AREAS OF SPECIAL INTEREST

Areas of special interest not included in the other elements of the inventory, such as rapidly developing waterfronts, eroding shorelines, or other degraded sites with potential for ecological restoration were identified based on the references described above, through aerial photos, and other information gathering.

3.10.1 Water-Oriented Uses

According to Ecology’s SMP Guidelines (173-26-020 WAC), “water-oriented use means a use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses.” Lake Sawyer provides extensive boating, fishing, and other water-related activities. The boat launch park in particular provides water access for boaters, swimmers, and other passive shoreline use. When the park is upgraded as planned, it will also provide improved access for fishing from the shore.

3.10.2 Toxic or Hazardous Waste Sites

Two hazardous sites were identified in Black Diamond on the Washington Department of Ecology’s *Hazardous Sites List* (dated August 20, 2009). One site, associated with Palmer Coking Coal Company, has a ranking of 3 on a scale of 1 to 5, with 1 representing the highest risk. The other

Section 3—Elements of the Shoreline Inventory

site, with a site name of “Old Lawson Road”, was ranked as a 1. For both of the sites, the responsible party is “awaiting further remedial action,” meaning “only a Site hazardous Assessment has been completed at the site” (Ecology 2009). It does not appear that either of these sites are within the shoreline jurisdiction area.

According to the U.S. Environmental Protection Agency’s (EPA) Envirofacts Data Warehouse website (<http://www.epa.gov/enviro/>), ten sites (not including the Ecology site discussed above) in Black Diamond (note that some of these may be outside of City limits but have a Black Diamond address) are listed as being regulated by EPA. Four of these sites are authorized to discharge into waters, and seven of the sites handle hazardous waste. None of these sites are in the shoreline jurisdiction.

3.11 OPPORTUNITY AREAS

Ecology’s *Shoreline Master Program Guidelines* (173-26 WAC) includes the following definition:

“Restore,” “Restoration” or “ecological restoration” means the reestablishment or upgrading of impaired ecological shoreline processes or functions. This may be accomplished through measures including but not limited to re-vegetation, removal of intrusive shoreline structures and removal or treatment of toxic materials. Restoration does not imply a requirement for returning the shoreline area to aboriginal or pre-European settlement conditions.

Consistent with Ecology’s definition, use of the word “restore,” or any variations, in this document is not intended to encompass actions that re-establish historic conditions. Instead, it encompasses a range of actions that can be approximately delineated into three categories: creation (of a new resource), restoration (of a converted or substantially degraded resource), and enhancement (of an existing degraded resource).

There is a critical distinction between restoration and mitigation. Applicants whose shoreline proposals will have adverse impacts to ecological functions are required to mitigate those impacts. However, the City cannot require applicants to go beyond returning the impacted area (or otherwise compensating for lost functions) to the condition it was in at the time of this inventory or as further detailed at the time of application. Restoration, on the other hand, is largely achieved through non-regulatory means, volunteer efforts, capital improvements and ongoing programs. The City is expected to engage in restoration actions and can encourage applicants to implement restoration actions that will improve ecological functions relative to the applicant’s pre-project condition. As stated in WAC 173-26-201(2)(c):

It is intended that local government, through the master program, along with other regulatory and nonregulatory programs, contribute to restoration by planning for and fostering restoration and that such restoration occur through a combination of public and private programs and actions. Local government should identify restoration opportunities through the shoreline inventory process and authorize, coordinate and facilitate appropriate publicly and privately initiated restoration

Section 3—Elements of the Shoreline Inventory

projects within their master programs. The goal of this effort is master programs which include planning elements that, when implemented, serve to improve the overall condition of habitat and resources within the shoreline area of each city and county.”

The Opportunity Areas discussions in Chapter 4 present options for “restoration” that would improve ecological functions. Enhancement of lakeshore vegetation, reductions or modifications to shoreline hardening, and minimization of in- and over-water structures would each increase one or more ecological parameters of the City’s shoreline. These options could be implemented voluntarily by the City or City residents or, depending on specific project details, could be required to mitigate adverse impacts of new shoreline projects.

The *Habitat Limiting Factors and Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound Watershed (Water Resource Inventory Area 9)* (Kerwin and Nelson 2000) identifies the numerous limiting habitat factors and impacts in WRIA 9, many of which are particularly important in Black Diamond’s shoreline jurisdiction:

- Dams which block upstream and downstream passage for salmonids, change the natural flow, cause gravel starvation and scouring and reduce amount and size of large woody debris (e.g. the fish way dam at Lake Sawyer’s outlet);
- Logging practices which create reduced riparian habitat, fish passage barriers, excessive sedimentation, decreased water quality and altered stream hydrology (e.g. logging practices upstream of Lake Sawyer may contribute to increase sediment and reduced water quality in the lake);
- Reduced forest cover and increased impervious surface from land development which disrupts hydrologic stream flow, decreases water quality and increases sedimentation (e.g. continued development and impervious surfaces in Black Diamond);
- Urbanization, water diversions, and revetments that are lowering the floodplain and disconnecting off-channel habitats, reducing large woody debris, causing chronic water quality problems and severely reducing riparian habitats and associated functions (e.g. these events upstream of Lake Sawyer can impact the lake and its associated streams and wetlands); and
- Introduction of non-native plant and animal species (non-native plants and animals are associated with Lake Sawyer and its associated streams and wetlands).

Opportunity areas were initially identified during the review of the reference materials, review of aerial photographs, and a brief site visit in December 2009. More detailed descriptions of each area can be found in Section 4.0 below. Restoration opportunities on public lands exist at the two City-owned parks in the shoreline jurisdiction. Opportunities on private property would likely occur only through voluntary means or through re-development proposals.

A Restoration Plan document will be prepared in 2010 or 2011 as a later phase of the Shoreline Master Program update process, consistent with WAC 173-26-201(2)(f). The Restoration Plan will “include goals, policies and actions for restoration of impaired shoreline ecological functions. These

Section 3—Elements of the Shoreline Inventory

master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program.”

Restoration opportunities for each of the shoreline segments are further discussed in Section 4.0. Many of the restoration opportunities are similar for each of the segments and include:

- Replacement of non-native invasive plants, such as purple loosestrife, which is found onshore (Lake Sawyer Management Plan 2000), with appropriate native species;
- Educational opportunities for lakeshore residents that include topics such as the use of fertilizers and pesticides, the installation of native plant species, and the use LID and green building techniques.
- Removal or modification of bulkheads and limiting the number of new or replacement docks to one dock per two parcels.
- The use of LID and green building techniques for the redevelopment of the City parks in shoreline jurisdiction.
- Consider active monitoring of septic systems and required conversion of homes on septic systems to the public sewer system when sewer is available within 300 feet, and significant new development is proposed or the current septic system is not functioning properly.
- In areas of natural or semi-natural shoreline condition, education regarding the preservation and maintenance of these features is highly encouraged.

4.0 CONDITIONS BY INVENTORY SEGMENT at LAKE SAWYER

To categorize distinct segments of Lake Sawyer, the shoreline jurisdiction was classified into six segments (A through F) based broadly on the level of ecological functions provided by each segment, as well as existing land uses and zoning as directed in the guidance from Ecology (http://www.ecy.wa.gov/programs/sea/sma/st_guide/SMP/env_designations/index.html). The current shoreline designation for all of Lake Sawyer is Rural. Recommendations for potential future environmental designations are provided in Section 6.0.

For each shoreline planning segment, a summary discussion is followed by a discussion of specific elements of the shoreline inventory for those elements that are not covered in sufficient detail in Section 3 above. Please see Figure 12 in the Map Folio in Appendix E for a map of inventory segments.

Table 4. Lake Sawyer Inventory and Planning Segments

Segment	Approximate Area (acres)	Percent of Shoreline Area
A—Residential Area	115.22	65.1%
B—Boat Launch Park	2.14	1.2%
C—North Parcel	7.67	4.3%
D—Islands	2.48	1.4%
E—Regional Park and adjacent undeveloped area	24.39	13.8%
F—Regional Park Wetlands	24.93	14.1%
TOTALS	176.83 acres	

4.1 SEGMENT A: RESIDENTIAL

4.1.1 Land Use

This segment of Lake Sawyer is comprised of single family residential housing along the shore and the vast majority of the waterfront lots are currently developed. There are approximately 23 vacant lots in this shoreline segment, however, many of these lots are small and/or are owned by adjacent parcels and appear to be used as yard areas. The median setback of homes on Lake Sawyer is approximately 57 feet from the OHWM based on GIS and aerial photo analysis. All of the land in this shoreline segment is zoned single family (Table 2). Approximately 89 percent of the single family houses that surround the lake have a boat pier or floating dock over the water. There are no major highways in the shoreline jurisdiction of Lake Sawyer. There are numerous minor side streets connecting to the residential homes.

4.1.2 Critical Areas

There are no documented wetlands in Segment A. A small portion of the buffer of Covington Creek is located in Segment A along the northwestern edge. As shown in Figure 4 of the Map Folio

Section 4—Conditions by Inventory Segment

in Appendix E, portions of Segment A are located within well head protection areas. Shorelines along the southern portion of the Lake in Segment A are located within Bald Eagle nest buffers, as shown in Figure 2c in Appendix E.

4.1.3 Wastewater and Stormwater Utilities

Wastewater Utilities

When the Lake Sawyer Management Plan was written in 2000, all of the homes around Lake Sawyer were on septic systems. Approximately 100 homes at the north end of the lake fall within the Soos Creek sewer service area and have sewer service available to them. There are approximately 30 homes that are connected to sewer along 218th Place NE in the northwest corner of Lake Sawyer. There are no plans to provide homes around the remaining portion of Lake Sawyer with sewer service in the immediate future. Properties may be required to connect to the public sewer under certain circumstances. The entire SMA is within the sewer service area of the Soos Creek Water and Sewer District and eventual conversion to sewer is expected over the long term as the system is constructed. Please see Section 3.3.1 for more information.

Stormwater Utilities

Documented evidence of external loading of phosphorus during the winter months into Lake Sawyer is indicative of untreated stormwater making its way into the lake (Lake Sawyer Management Plan 2000) or of natural sources such as the adjacent wetlands. The likely sources of untreated stormwater include input from incoming streams, possible stormwater outfalls into Lake Sawyer, and run-off from shoreline properties. In addition, it has been documented in other planning areas within King County (Pine Lake Water Quality, King County) that dissolved phosphorous loading into water bodies may sometimes be influenced by input from adjacent wetlands with high organic soil components.

4.1.4 Shoreline Modifications

Shoreline modifications around Lake Sawyer are extensive, primarily due to housing. Many homes have bulkheads to protect their property from wave action on the lake. The bulkheads are constructed of concrete or concrete blocks, boulders, and occasionally of wood. Approximately 80 percent of the shoreline edge in this segment has been significantly armored at or near the ordinary high water mark (OHWM). Also common, are floating swim platforms and small docks and piers built to accommodate boats. Figures 11 and 11b in Appendix E show docks and swim platforms and Figure 13 shows shoreline armoring. Wave action is common throughout the year on Lake Sawyer from boats during the summer and storms in the winter. Boating activity is heavy during the summer months. Lake Sawyer's proximity to the Cascade foothills subjects the lake and surrounding area to strong windstorms during the winter months, resulting in wave action.

The median setback on Lake Sawyer is approximately 57 feet based on GIS and aerial photo analysis. However there are many structures that are located much closer, including some that are located ten feet or less from the lake edge. Without bulkheads, structures that are located within ten

Section 4—Conditions by Inventory Segment

feet of the lake edge would be at greater risk to damage by erosion over time. There are no known erosion studies pertaining to Lake Sawyer.

4.1.5 Opportunity Areas

Approximately 95 percent of the lake is surrounded by private parcels; consequently, the majority of opportunity areas for restoration are on private properties. These areas could be enhanced by encouraging private homeowners to implement bulkhead removal and shoreline enhancement projects (including installation of native vegetation) and replace deteriorating piers. New construction should discourage the installation of bulkheads or other forms of shoreline modification. Regulations can also address the installation or replacement of one dock for use by two parcels. Homeowner education should also focus on discouraging the use of chemicals on lawns and shrubs.

This segment also contains the Sunrise Lake Sawyer Resort, a private RV Resort with campground style amenities. The City may wish to consider the potential acquisition or other mechanism to gain public access at this site in the event it is proposed for conversion to a non-recreational use in the future.

4.2 SEGMENT B: SAKE SAWYER PARK BOAT LAUNCH

4.2.1 Land Use

The boat launch park is located on the northwest shore of Lake Sawyer and is approximately 1.8 acres. Currently, the park provides a boat launch, parking for vehicles with trailers, and picnic and barbecue facilities. During the summer, the boat launch has high volume of park users for launching and removing boats from the water, as this park provides the only public boat launch on the lake. The north portion of the park has grass and trees and shrubs. Lake access to park users is somewhat limited.

4.2.2 Shoreline Modifications

The boat launch park has shoreline modifications along portions of its shoreline. The most noticeable modification is the boat launch itself which is a wide sloping ramp extending into the lake. Modifications associated with the boat ramp comprise approximately 12% of the shoreline. Other portions of the shoreline are modified with timber, including bulkheads upland of the OHWM, steps, and retaining walls. The majority of the shoreline is semi-natural but is protected by logs which appear to be tethered together and placed at or floating just beyond the OHWM.

4.2.3 Stormwater Utilities

Due to the sloping nature of the boat ramp and approach, untreated stormwater enters the lake from the road and ramp. This is likely a significant source of pollution during periods of high boat ramp use.

4.2.4 Opportunity Areas

The City has a conceptual design for improvements at the boat launch park. Proposed improvements include a new concrete boat ramp and the addition of a floating dock for fishing and for boat users to tie up to. Other improvements include restoration of the shoreline buffer vegetation and removal of timber steps and retaining wall, additional parking, and installation of restroom facilities and playground equipment. Towards the north end of the park new beaches are proposed as well as the removal of a timber bulkhead. Overall, the project design removes retaining walls and timber bulkheads; however, the design does include a small amount of log toe protection near the beach areas.

Other improvement opportunities to consider include the use of LID techniques when replacing the boat ramp and construction of the dock; LID and green building techniques when constructing the restroom facilities; improved signage for the park leading users to the shore; and stormwater treatment for runoff from the road, parking areas, and boat ramp.

4.3 SEGMENT C: FORESTED SINGLE FAMILY PARCEL

4.3.1 Land Use

On the northern shore of Lake Sawyer there is a large parcel zoned as single family that is approximately 12.9 acres. The majority of the parcel is forested. Information about this parcel was obtained from aerial photos and other public information through King County. The parcel appears to have a road that branches into two roads or driveways that lead to separate homes or outbuildings. There appears to be three significant structures on the parcel, as well as additional outbuildings. Personal communication with neighboring residents and visitors indicates that there is a larger historic house, a caretaker's house and a new cabin or conference building, plus small out buildings located on the site.

4.3.2 Shoreline Modifications

The property comes to a point out into the lake where there appears to be some very limited areas of armoring (approximately 2% of the total shoreline); however, the majority of the property has a natural shoreline with abundant, overhanging vegetation. There are three docks on the property that are visible in aerial photos.

4.3.3 Opportunity Areas

Working with the landowner to protect the upland vegetation on this parcel would be the best opportunity to provide upland habitat adjacent to the shoreline. Maintaining the shoreline in terms of vegetation and armoring will also provide protective shoreline habitat for small fish, invertebrates, and amphibians. In the long term, this property should be considered for potential acquisition or other mechanism to gain public access in the event the property is proposed for future conversion or subdivision.

4.4 SEGMENT D: ISLANDS

4.4.1 Land Use

There are three islands located in Lake Sawyer that are platted with parcels. The islands are accessible by boat only and do not have roads and appear to be largely free of utilities based on available information. Two of the islands are considered one parcel each. Of these two parcels, one does not appear to have any structures, while the other appears to have a small dock.

The third and largest island has seven parcels. This island has six parcels taking up the southern half of the island, while the seventh parcel comprises the northern half of the island. The southern half is developed with homes, decks, and boat docks. All of the buildings and/or decks appear to be constructed very close to the shoreline, with the majority appearing to have been constructed at the water's edge. Using aerial photography, it appears that several structures (cabins and decks) may be built over the lake. The northern parcel has a small cabin and dock built at the water's edge and is otherwise heavily forested.

There is no evidence that the parcels on the islands have access to electric or water utilities. It is likely that residents use generators for power and have constructed a well or pump from the lake. It is also likely that these properties use unpermitted septic systems or outhouses.

4.4.2 Shoreline Modifications

The majority of the island shorelines are in natural condition with the exception of the southern end of the island with seven parcels that has been heavily modified. Approximately 14% of the total shoreline length of Segment D has been modified. The modifications include the edges of cabins that appear to be built at the water's edge or even overhang the water, as well as docks and possibly some bulkheads. The remaining natural shorelines are heavily forested and have overhanging vegetation.

4.4.3 Opportunity Areas

It is likely that these homes were originally very small fishing cabins with infrequent visitors that may have generated very little waste. These now appear to be larger cabins or homes that likely support more than one bathroom, as well as a kitchen. Due to the apparent lack of utilities, namely sewer/septic service, the City should consider the possible need for additional regulations regarding the use of composting toilets and how to treat wastewater at the homes on the island if legal on-site sewage systems (OSS) are not possible due to parcel size and proximity to water. Additionally, an applicant must demonstrate that legal water and wastewater services are available in order to obtain a building permit. Regulations should also address appropriate limits on modification and expansion of these non-conforming structures.

4.5 SEGMENT E: LAKE SAWYER REGIONAL PARK

4.5.1 Land Use

Lake Sawyer Regional Park has been previously modified with land clearing, road construction and shoreline armoring. It is now a passive park, providing walking trails and non-motorized access to the lake. There is limited parking on the side of the road leading to the park. The majority of the shoreline is armored with either boulders or timbers. There are two streams that enter Lake Sawyer through the park property; these streams make their way through extensive wetlands that are located on the south side of the park before they outlet through culverts that are located under trails. Additional information regarding the wetlands is provided below in 4.7 Segment F. This Park has great potential for public access and recreation improvements.

4.5.2 Shoreline Modifications

Portions of the park parcels have been heavily modified and there is armoring along a significant portion of the shoreline. Approximately 50% of the shoreline edge in Segment E has been modified. Generally, the armoring materials consist of timber or boulders. Other modifications include three large corrugated metal culverts that allow Rock Creek and Ravensdale Creek to enter Lake Sawyer under an access road that has been lined with quarry spalls.

4.5.3 Opportunity Areas

Conceptual improvements for this area of the regional park include the enhancement of the existing trail system; improved access and parking; restrooms; and athletic fields. In the conceptual designs the western portion of the park that is adjacent to Lake Sawyer Road is where the athletic fields would be placed. This is the furthest location from the lake and is an appropriate placement consideration. Areas closest to the lake should be encouraged to be enhanced or developed for the purpose of water access. Due to the high value habitat at the southern end of the lake, it is suggested that the City consider a ban on motor boats and jet skis in this area in order to protect the habitat.

Other improvement opportunities to consider include the use of LID and green building techniques when building the restroom facilities, trails, and parking areas; signage for the park (currently no signage); removal of non-native invasive vegetation; removal of bulkheads and armoring along the shoreline and stabilization with vegetation or “softer” shoreline stabilization such as regraded slopes with logs; and improved water access.

4.6 SEGMENT F: LAKE SAWYER REGIONAL PARK WETLAND

4.6.1 Land Use

This portion of the regional park is a large wetland complex located on the southern shore of Lake Sawyer and it is separated from the lake shore by the passive use areas of the park described in Section 4.6 above.

4.6.2 Critical Areas

Wetlands

This wetland is rated as a Category I and is approximately 15 acres in size. Its dominant vegetation communities are aquatic bed, open water, and scrub-shrub. This wetland complex is associated with Rock Creek. Between Lake Sawyer and the wetland there is a gravel access road with culverts that allow water from Rock Creek and the wetland to enter Lake Sawyer. This wetland is associated with the Core Stream and Wetland Complex.

Other Fish and Wildlife Habitat Conservation Areas

Priority Habitats: WDFW mapping of Priority Habitat and Species classifies the large wetland complex south of the lake as a Priority Habitat and maps it as palustrine (WDFW 2007). To be considered a “Priority” wetland, it must have met the following criteria in WDFW’s estimation: “Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration.”

The streams coming into and out of Lake Sawyer have associated riparian habitat zones located just outside of the shoreline jurisdiction. Rock Creek and Ravensdale Creek are part of the Core Stream and Wetland Complex.

Priority Species: The priority species identified in the Lake Sawyer shoreline jurisdiction are fish, including: Chinook and coho salmon, steelhead, and coastal cutthroat trout (WDFW 2007). Bald eagles are also considered priority species by WDFW and their nests are mapped as being located at the southern end of the lake.

4.6.3 Opportunity Areas

As the regional park is designed for improved access and use, careful consideration of the wetlands should be taken. Opportunities to integrate the wetlands with the park plan include adding trails near the wetland or wetland buffer for wildlife viewing, interpretive signage regarding the importance of wetlands, and the restoration of degraded buffer areas. The opportunity for buffer restoration with native vegetation is significant, as there are areas where there is little or no buffer vegetation, or the vegetation that is present is dominated by non-native invasive species. Other restoration opportunities include the replacement of the culverts with a box culvert or a foot bridge and removal of rip rap that is located around the existing culverts (for Rock and Ravensdale Creeks).

4.7 GENERAL OPPORTUNITY AREAS

4.7.1 Water Quality Improvements

Water quality in Lake Sawyer will continue to be monitored through the requirements of the TMDL. Two significant opportunities exist for water quality improvement in Lake Sawyer. one is by addressing pollutants that enter Lake Sawyer through Rock Creek. This includes stormwater runoff

Section 4—Conditions by Inventory Segment

from roadways as well as upstream septic systems that are failing and adding excess nutrients. The second opportunity is through the conversion of OSS to sewer use for homes that are located on or near the lakeshore. As part of the City's NPDES permit, Ecology requires educational outreach; therefore, other water quality improvements may come by way of educational opportunities with lakeshore residents to discontinue the use of fertilizers and pesticides in yards.

Another source of pollutants to Lake Sawyer is from Lake 12 by way of Ravensdale Creek. Lake 12 is a potential annexation area; however, in the City's Comprehensive Plan conditions for the annexation to include extending sewer and water service to the area and that the lake meet or exceed state water quality standards. Many of the homes surrounding Lake 12 are documented as having aging and/or failing septic systems, which as stated previously, is a source of phosphorus as well as other toxins/pollutants.

4.7.2 Shoreline Modifications

The City should implement regulations regarding the installation of shoreline modifications, including bulkheads and boat docks. It is recommended that bulkheads be limited to repair of existing structures. Lakeshore residents should be educated and given incentives to remove existing bulkheads and enhance the shoreline with native vegetation. Where potential for significant new development exists, City regulations should also address the use of joint docks for use between two parcels where possible rather than each parcel having a separate dock.

4.7.3 Educational Opportunities

Educational opportunities allow lakeshore citizens to make educated decisions that affect many facets of the lake. For those that do not live directly on the lake, many of these educational topics are still pertinent because the lake is affected by those actions that take place upstream. Many of the educational topics listed below overlap with the educational outreach required by the NPDES permit.

- Proper disposal of chemicals and petroleum products;
- Limiting use of pesticides and fertilizers;
- Maintenance of septic tanks and the conversion to City sewer system;
- Habitat value of Lake Sawyer and surrounding streams and wetlands;
- Educational signage at parks regarding wetlands and plant and fish species found in Lake Sawyer;
- Proper boat maintenance and cleaning for boats that use Lake Sawyer;
- Removal on non-native invasive species in and around the lake; and
- Maintenance of failing bulkheads and docks; replacement of creosote timbers used in bulkheads and docks; removal of bulkheads and downsizing of docks that are replaced.

Educational materials can be sent out as fliers to Black Diamond citizens or included in utility bills, and posted in public areas throughout the community. Educational seminars can be held at

Section 4—Conditions by Inventory Segment

community centers or other public venues. Educational seminars should be encouraged to be held outdoors at the Regional Park when such topics as wetlands and habitat are discussed.

4.7.4 Lake Aquatic Invasive Species

The most common invasive plant to impact Lake Sawyer is Eurasian milfoil (*Myriophyllum spicatum*). Eurasian milfoil was first found in the lake in the early 1970's and has dominated the plant community on occasion (Lake Sawyer Management Plan 2000). Two species of non-native water-lilies are also present, but have been less of a problem than Eurasian milfoil. Eurasian milfoil is considered a Class B noxious weed and fragrant water-lily (*Nymphaea odorata*) is considered a Class C noxious weed. Yellow pond-lily (*Nuphar luteum*) is not a listed noxious weed in Washington State but still has invasive tendencies.

Noxious weeds of Washington State are non-native, invasive plants defined by law as a plant that when established is highly destructive, competitive, or difficult to control by cultural or chemical practices (RCW 17.10). These plants have been introduced intentionally and unintentionally by human actions and are brought in to areas without any natural enemies, such as insects or diseases, to help keep their populations in check. As a result, these plants can often multiply rapidly (Ecology and Washington State Department of Agriculture 2004).

The problem areas with these plant species are generally found in shallow bays. It is rightly noted in the Lake Sawyer Management Plan (2000), that if the waterlily are not controlled they will take over in the areas where the milfoil is controlled because the water is generally shallow in these areas. Therefore control of both species is recommended.

Eurasian milfoil appears to fairly well controlled due to the presence of milfoil weevils which feed on the milfoil. Because of the presence of the weevils, there has not been a need to further control the milfoil (i.e. through chemical or mechanical means). The control of the milfoil by the weevils has caused Lake Sawyer to be well studied as scientists try to better understand how the weevil population is sustained and how it might be applied to other lakes in the region that suffer from Eurasian milfoil infestations.

King County has educated several residents around the lake to engage in the weed watcher program. Each summer these volunteers survey the lake for Brazilian elodea, a noxious weed that occurs in other lakes in King County but which has not yet spread to Lake Sawyer. Volunteers also make note of other noxious or non-native plant species as well as identifying desirable native species.

As previously noted, non-native water lily is also present in Lake Sawyer. It is wide spread in the lake and throughout the county and there has not been a County effort to control it. King County is not certain if residents remove small amounts of the lily from around their boat dock areas, but it appears this may be the case from aerial photography (Personal Communication with Katie Messick, 3/3/10 King County Noxious Weed Control).

There is a growing number of non-native aquatic plant and animal species whose current or potential impacts on native species and habitats are known to be significant. Potential negative

Section 4—Conditions by Inventory Segment

impacts related to the presence of invasive species in Lake Sawyer include: loss of biodiversity; threaten ESA-listed species such as salmon; alterations in nutrient cycling pathways; decreased habitat value of infested waters; decreased water quality; decreased recreational opportunities; increased safety concerns for swimmers; and decrease in property values.

The Washington Department of Fish and Wildlife has set guidelines for aquatic plant control and removal in the pamphlet *Aquatic Plants and Fish*. Washington Department of Ecology issues coverage for aquatic herbicide use under the National Pollutant Discharge Elimination System (NPDES) permit to qualified applicants. The applicant must be a licensed pesticide applicator in the state of Washington and have an aquatic endorsement. Other city rules and regulations may apply for the control of aquatic plant species.

5.0 ANALYSIS of ECOLOGICAL FUNCTIONS and ECOSYSTEM WIDE PROCESSES

Ecology requires a three step process to determine what ecological processes are occurring within the Shoreline jurisdiction, determine the existing relationship between those landscape-scale processes and the performance of ecological functions (to qualitatively assess which functions are present, degraded or not present); and then based on existing conditions and potential future conditions, to recommend measures to maintain and/or restore the functions associated with the ecosystem-wide processes. Described below are those three ‘steps’: an overview of the landscape-scale processes provided at Lake Sawyer under existing conditions, a qualitative assessment of functions (presence/absence or degree of performance) under existing conditions (summarized by Shoreline Segment in Table 5); and lastly recommendations for management actions to maintain or restore landscape-scale processes to positively influence functions performed.

5.1 OVERVIEW OF LANDSCAPE-SCALE PROCESSES

Ecology provides direction on the four landscape-scale processes that are to be assessed in relation to provision or impairment of functions by Shoreline segment. The four processes are presented and summarized below in terms of their performance under existing conditions within the shoreline zone of Lake Sawyer. Questions to consider for ascertaining the degree to which these processes have been impaired are:

- Is there presence/absence of dams or outlet structures on the lake which have changed the hydroperiod?
- What extent (percentage) of imperviousness (effective) is in the Lake’s contributing watershed?
- Is there presence/absence of flooding problems or connectivity between the shoreline and its floodplain?
- Does the shoreline area contain habitat for listed and priority species?
- Are there identified or documented water quality problems?
- Do conditions in the contributing area to the lake imply the potential for significant sediment or pollutant loading?
- Is there evidence of the presence of contaminated sediments?

Water Flow: Water flow relates to the natural movement of water into the lake, the physical complexity of vegetation overhanging the lake shore, and the presence/absence of physical structures that influence water movement in/through the shoreline environments.

For Lake Sawyer the presence of the outlet dam/weir has created a relatively stable lake water elevation and because of the size of the opening of the flat weir, it has reduced the floodplain of the lake as normal flows into the lake simply pass through it. However, during major storm events, there have been instances of flooding of low-lying properties. Increase in the density of development in the watershed of the Lake should be assumed to have had impacts on the volume

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

and quality of water entering the lake, and the loss of long-term recharge into the lake from input from the watershed over time.

Vegetation: The presence and the condition of native vegetation within the Shoreline zone relates to its ability to filter sediments, influence water temperature, provide structure for wildlife use; provide food sources for wildlife; provide bank stabilization, provide a source for large woody debris (LWD) recruitment.

The review of background data and current aerial photographs documents that the vast majority of the shoreline of Lake Sawyer has been armored with bulkheads of some type; and that nearly 90% of the single family residences have some type of on-water dock or swimming platform in the lake. Natural vegetation within the shoreline zone or overhanging the edges of the lake is significantly absent on the lake margin with the exception of the large private property on the north end. Even the wetland habitats and the undeveloped lots on the southern portion of the lake have bulkheads and armoring, indicating some past use of these areas. In-water vegetation is present in a few small patches; dominated by non-native water lily (*Nuphar spp*). Although the water lily is non-native it still provides some excellent physical habitat elements that would otherwise be lacking in the lake (thin-stemmed vegetation for some amphibian egg masses; floating leaves for some aquatic invertebrates and amphibian egg surfaces; food for some aquatic herbivores, and shading and cooling (relatively) small discrete patches of the otherwise totally exposed lake surface. Natural vegetation within the riparian fringe is probably so altered by lawns and habitation that it probably serves little function for erosion/sediment control through filtering or entrapment. Upland habitats in the vicinity of Lake Sawyer have been altered through forest practices, agricultural and mining practices, and subsequent development activities to such an extent that forest functions are likely quite impaired from a habitat perspective. Compared to many dense urban settings the habitats in the vicinity of Lake Sawyer are in moderate condition and would provide some, although limited, habitat linkage between more mature habitat fragments (upland or wetland). The major exception to this is the forested parcel at the north end of the Lake which has nearly a closed canopy forest present on it; and portions of the wetland present in the southern end of the lake which is again, fully vegetated but not with mature (old) stands of forest.

Groundwater – Surface Water Connections: In order to assess how the lake functions in relation to groundwater and surface water connections the following need to be determined: the extent of connectivity that remains between the shoreline water and the surrounding shallow groundwater in the immediate vicinity of the lake relative to late summer recharge; influence on shallow groundwater, and water quality.

Approximately 66% of the Lake Sawyer shoreline is has bulkheads or armoring. These physical structures can reduce the influence of shallow groundwater on the lake and limit the lake's influence on shallow groundwater because of the shear inability of the water to enter the hyporheic zone. Shallow groundwater may still work its way from within the basin down and into the lake, but it should be assumed that the process is significantly reduced from any former (natural) linkage and benefit.

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Sediment: This function assesses the extent to which the shoreline is subject to inputs of sediment, or conversely, the extent to which the shoreline water body may benefit downstream resources by functioning as a sediment entrapment zone.

Lake Sawyer, as a large water body that is relatively deep, has a significant potential to impound sediment that enters the system. The extent of power boat usage has some influence on keeping those sediments in suspension; however it could be assumed that the diurnal use of power boats may allow some settlement of some sediment over night. The lake likely entraps the majority of large sediment that enters it; however it does seem to receive elevated phosphorous inputs from surface discharges into the Lake. It is assumed these dissolved components enter from the large wetland complex to the south and/or from failed sanitary systems on lakefront parcels.

5.2 PROCESSES AND FUNCTIONS FOR LAKE SAWYER

Ecological processes and functions of Lake Sawyer and its associated wetland within the City of Black Diamond are summarized in Table 5, below. Ecology recommends assessing the relative ecological functions that each segment provides for Hydrologic, Vegetation, Hyporheic, and Habitat processes at the landscape scale. We have provided that assessment for each Segment, providing a qualitative rating of Low, Low/Moderate, Moderate, Moderate/High, and High when compared to the other Shoreline Segments of Lake Sawyer, not County-wide. We then assigned a numeric value of 1-5 (low to high) to those qualitative values for each function assessed. Finally, in Table 6, we compare the function “scores” between each Segment to illustrate, in a very qualitative way, the relative degree to which each segment may provide a particular function compared to another Segment on the Lake.

Lake Sawyer was divided into six segments based on existing ecological function, level of human influence, current land use and planned future land use and management objectives:

- Segment A— the largest of the four and is made up of the single-family residential areas that surround the majority of the perimeter of the lake;
- Segment B— boat launch park in the northwest quadrant of the lake;
- Segment C— the forested 12-acre (mostly undeveloped) parcel at the north end of the lake;
- Segment D— the islands located in the lake;
- Segment E— the Regional Park;
- Segment F— wetlands associated with the Regional Park.

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Table 5. Functions Summary for Lake Sawyer

Function	Performance	Score ¹
Hydrologic		
<p>Hydrologic Storing water and sediment</p>	<p>Summary: Lakes can provide water storage, depending on the configuration of the outlet and how much storage capacity the physical basin provides. Lake Sawyer has a broad flat weir outlet, therefore it does not have the capacity to store floodwater or moderate out flows. This means that flows into the lake likely equal flows out of the lake in typical winter conditions. All lakes have the potential to improve water quality by entrapping sediments and associated toxics that flow into the water body from the surrounding uplands. Activities on the lake and surrounding land uses can be the source of adverse impacts to water quality from run-off of pollutants, influences on temperature and stratification, and shallow surface water mixing. For Lake Sawyer we assume that there are some direct discharges of stormwater into the lake (the City’s drainage culvert inventory is not yet complete); plus run-off from landscaped lawns may carry fertilizers and heavy metals into the water.</p> <p>Upland habitats surrounding the lake may provide some attenuation to runoff into the lake, and therefore provide some modest storage potential. However, uplands which are converted to a high degree of imperviousness (e.g., roofs, parking lots, driveways, compacted lawns, etc) provide little or no opportunity for water to infiltrate and function as <i>de facto</i> impervious surface. In general the majority of the uplands surrounding Lake Sawyer are developed into residential uses including homes, driveways, accompanying structures and manicured lawns: these conditions provide little to no opportunity for storage of water. Three areas of the lake shore however are in more naturally vegetated conditions (Segments C, D, and F), and these areas would help attenuate rainfall and surface run-off through native vegetation and natural wetland conditions compared to the rest of the Lake perimeter. In addition, Segment F, the regional park, has wetland areas which drain through small culverts through a road crossing; and that culvert/road configuration may provide some surface storage. Conversely, the uplands have moderate water and sediment storage functions resulting from moderate to high amounts of impervious surfaces, reduced vegetative cover, and compacted lawns and soils. The relative low grade of the entire lake basin and naturally pervious soil types should maintain moderate amounts of water infiltration and storage function, despite the anthropogenic alterations to the landscape.</p> <p>Segment A: LOW: The residential segment contains high amounts of impervious surface from roofs, patios, compact lawns, and reduced vegetative cover which interferes with water infiltration and promotes overland flow of water and sediments toward the lake. Presence of dogs, and associated waste, and potential use of chemicals (e.g. fertilizers, pesticides, herbicides) to maintain lawns may run directly into the water with rainfall events.</p>	<p>Segment A: 1</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Function	Performance	Score ¹
	<p>Segment B: LOW/MODERATE: Other than the access road, parking, and boat ramp, the park as a whole has a good amount of natural vegetative cover. However, a significant portion of the vegetative cover below the tree canopy is grass lawn that is likely compacted and functions effectively as an impervious surface rather than allowing infiltration as would a more natural forested condition.</p> <p>Segment C: MODERATE: The water and sediment storage function of the forested single family property is high compared to the rest of the Lake perimeter due to the low slopes, pervious soils, limited amount of impervious surfaces and abundant vegetative cover. The property appears to contain high amounts of evergreen and deciduous trees, shrubs, and under story vegetation which promote water infiltration and sediment storage. The condition of the forest allows the assumption that native soils predominate which facilitate infiltration and storage potential.</p> <p>Segment D: LOW/MODERATE: The majority of the island areas are in a natural forested condition with undisturbed soils. These features allow infiltration of precipitation; however, there is no opportunity for stormwater and sediment to get to the islands for this function to be performed. Additionally, the development on one of the islands is all along the shoreline, causing any runoff to go directly into the lake, rather than having the opportunity to infiltrate before reaching lake. Finally, due to the topography and size of the islands (lack of low points), the water runs off of the islands into the lake.</p> <p>Segment E: LOW/MODERATE: While the majority of this park is in a natural and undeveloped condition, the areas closest to the shoreline are compacted lawn and compacted trails; both of which function effectively as impervious surface, impede infiltration, and cause water and sediment to flow toward the lake.</p> <p>Segment F: MODERATE/HIGH: The wetland portion of the Regional Park has moderate to high function for water and sediment storage due to the natural pervious soils, forested canopy and vegetated understory, and wetlands.</p>	<p>Segment B: 2 Segment C: 3 Segment D: 2 Segment E: 2 Segment F: 4</p>
<p>Hydrologic Attenuating wave energy</p>	<p>Summary: The nearly completely armored condition of the shoreline means that there is little to no opportunity to attenuate wave energy in the lake. It would be assumed that any “unprotected” shoreline of the lake probably experiences a high degree of erosive wave action as wave energy generated from winds or boat wakes, simply amplify as they move around the perimeter of the lake ricocheting off of bulkheads and not finding a zone to release their stored energy. The lake is heavily used by boaters, causing a significant amount of wave action during the summer months.</p> <p>Segment A: LOW/MODERATE: Approximately 80% percent of the shoreline in this segment has bulkheads or some kind of armoring. Additionally, the removal of woody debris along the shore has minimized this important component of shoreline roughness and energy attenuation resulting in a reduction in the natural wave attenuation function.</p>	<p>Segment A: 2 Segment B: 1</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Function	Performance	Score ¹
	<p>Segment B: LOW: While the vegetation along the shoreline has generally been kept intact in this section, the shoreline has mostly been modified with timber bulkheads, steps, and retaining walls, which negates the function of shoreline vegetation to help attenuate wave energy. Also, given the overall size of this parcel in relation to the size of the lake, this segment provides little in the way of providing wave attenuation.</p> <p>Segment C: MODERATE/HIGH: A small portion of this large shoreline area has been modified while significant portions have native vegetation down to the shoreline. Due to the unusual shape of this parcel creating a large point out into the lake, providing over 1,500 LF of shoreline, and the majority of it being unmodified, this segment provides high function for attenuating wave energy.</p> <p>Segment D: LOW/MODERATE: Of the three islands, one has significant shoreline modifications on the south shore, while the remainder of the island shorelines is in a natural condition that helps attenuate wave energy. Similar to Segment B, given the overall size of islands in relation to the size of the lake, this segment provides little in the way of providing wave attenuation.</p> <p>Segment E: LOW/MODERATE: While the shoreline vegetation is present along a significant portion of the park, a majority of the shoreline has timber or boulder bulkheads, negating the wave attenuation opportunity of the vegetation.</p> <p>Segment F: Not applicable for this function.</p>	<p>Segment C: 4 Segment D: 2 Segment E: 2 Segment F: NA</p>
<p>Hydrologic Removing excess nutrients and toxic compounds</p>	<p>Summary: The upland shoreline areas are often a source of nutrients and toxic compounds, via lawn treatment runoff (pesticides, fertilizers, herbicides), road runoff (hydrocarbons, metals), and septic systems. The lack of native vegetative cover and few wetlands diminishes the natural filtration potential of the landscape. Even though the lake is surrounded by a generally low gradient, low filtration function is expected.</p> <p>Segment A: LOW: Single family residential development dominates this segment and the majority of the lake. The residential segment contains a moderate to high amount of impervious surfaces, reduced vegetative cover, and compacted lawns, all of which inhibit the infiltration and filtering of storm water. Similarly, residential areas are often sources for nutrient and toxic compounds that enter lakes. Additionally, the majority of the homes on Lake Sawyer use septic systems which increase nutrient loading when they fail.</p> <p>Segment B: LOW/MODERATE: Overall, this park has a moderate amount of impervious surface. The high amount of grass on this parcel likely causes runoff rather than infiltration. While it has a lower percentage of imperviousness and pollution generating surfaces than the roads and driveways/parking areas associated with the residential land uses, the driveway and boat ramp provide a direct route for stormwater and toxins to discharge directly into the lake.</p> <p>Segment C: MODERATE: The forested single family property on the lake's northern shore contains significant vegetative cover promoting moderate to high filtration function. The nearshore tree and shrub</p>	<p>Segment A: 1 Segment B: 2 Segment C: 3 Segment D: 1 Segment E: 2 Segment F: 4</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Function	Performance	Score ¹
	<p>vegetation as well as the extensive upland vegetation likely take up nutrients and other pollutants, however, this parcel does not have much opportunity to provide the function.</p> <p>Segment D: LOW: The islands do not have the opportunity to infiltrate stormwater because they do not receive stormwater runoff. Additionally, any runoff from the developed areas goes directly into the lake because the development has taken place directly on the shore.</p> <p>Segment E: LOW/MODERATE: The areas of the park closest to the shoreline have low function for removing excess nutrients and toxic compounds due to the compacted trails and lawn.</p> <p>Segment F: MODERATE/HIGH: The natural forested and wetland areas of the park can provide natural filtration functions.</p>	
<p>Hydrologic Recruitment of LWD and other organic material</p>	<p>Summary: The lake likely receives a low amount of organic material input from hydrologic processes due to the limited amount of vegetative cover along the shoreline, except from the wetlands to the south. It is not likely that the inflowing streams provide a significant amount of LWD recruitment as it would most often get trapped in the culverts prior to entering the lake. Organic matter recruitment likely occurs during larger storm events capable of producing overland flow to the lake as well as organic matter that is brought in by the streams. In general, large woody debris recruitment is extremely limited by the relative absence of trees along the shoreline except for the north end or a random tree from the residential areas.</p> <p>Segment A: LOW/MODERATE: Organic matter and LWD recruitment in the single family residential areas is limited by the absence of appropriate vegetative cover in close proximity to the water. Similarly, the low rate of shore erosion (otherwise considered to be beneficial) and upland shoreline modifications result in a lower standing crop of trees and vegetation along the shore.</p> <p>Segment B: LOW/MODERATE: The modified shoreline likely precludes the input of vegetative or organic materials along this portion of the shoreline.</p> <p>Segment C: MODERATE/HIGH: The forested single family property on the lake's northern shore contains significant amounts of vegetation in close proximity to the shoreline and likely contributes organic material to the lake. LWD can be seen in the lake, adjacent to the shore in aerial photos.</p> <p>Segment D: MODERATE/HIGH: The majority of the islands have a naturally forested shoreline providing the opportunity to input LWD and other organic material into the lake.</p> <p>Segment E: MODERATE: The vegetated and natural portions of the shoreline likely provide some recruitment of LWD and moderate amount of organic material.</p> <p>Segment F: MODERATE/HIGH: The two creeks flowing through the adjacent wetlands likely provide more small organic material input than the actual shoreline in the Regional Park. However, it is likely that the wetlands do not provide LWD to the lake because it would be trapped in the culverts before reaching the lake.</p>	<p>Segment A: 2 Segment B: 2 Segment C: 4 Segment D: 4 Segment E: 3 Segment F: 4</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Function	Performance	Score ¹
Vegetation		
Vegetation Temperature regulation	<p>Summary: Limited upland portions of the lake are densely vegetated; there is very little vegetation over-hanging the lake margins; and the amount of floating-leaved or emergent wetland vegetation is extremely limited relative to the overall size of the lake and the potential for solar gain. Given the overall size and depth of the lake, the degree to which its shorefront lacks vegetation, and the low percentage of its overall surface area subject to potential shading from the shore, the vegetation that is present likely does not have a measurable effect on lake water temperature. The summer months is when the lake will benefit most from receiving cool water from the adjacent wetlands, however, the amount of water that flows from either wetland into the lake during the summer months is probably quite low.</p> <p>Segment A: LOW: Lack of dense shoreline vegetation throughout most of this segment eliminates the potential for some shading of the shallow-water nearshore area greatly limiting the temperature regulation function of this shoreline.</p> <p>Segment B: LOW/MODERATE: Moderate vegetation densities provide some potential shading, but the armoring along the shore holding back the vegetation likely reduce how much lake temperatures are regulated by this shoreline segment.</p> <p>Segment C: LOW/MODERATE: The shoreline of the forested single family property has high amounts of vegetative cover and some potential for shading, however, due to the south facing shoreline, the constant sun exposure likely reduces the shorelines ability to influence temperatures.</p> <p>Segment D: LOW/MODERATE: While the islands generally have dense vegetation along the shoreline; however, due to the size of the islands in comparison to the size of the lake, the area subject to potential shading likely does not have a measurable effect on the lake water temperature.</p> <p>Segment E: LOW: The lack of dense shoreline vegetation along large stretches of the park shoreline eliminates the potential for some shading of the shallow-water nearshore area.</p> <p>Segment F: MODERATE: The scrub shrub vegetation shades the water, particularly during spring and summer when the vegetation has leaves. This in turn provides cooler water to the lake.</p>	<p>Segment A: 1 Segment B: 2 Segment C: 2 Segment D: 2 Segment E: 1 Segment F: 3</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Function	Performance	Score ¹
<p>Vegetation Water quality improvement</p>	<p>Summary: Residential and park areas are dominated by lawn, landscaping, and impervious surfaces that typically lack dense native vegetation. As such, the lawns are assumed to be potential sources of water quality contaminants such as fertilizers, herbicides and pesticides. Runoff from the urban impervious surfaces is typically not filtered through vegetation. In addition to the residential pollutants, runoff from roads, driveways and parking lots carries hydrocarbons, metals, sediments and other pollutants.</p> <p>Segment A: LOW: Residential developments with limited vegetative buffer along the shoreline dominate this segment and provide limited opportunities for water quality improvement. Similarly, the lack of nearshore aquatic vegetation also limits the filtering capability of the lake.</p> <p>Segment B: LOW/MODERATE: The boat launch park shoreline segment is moderately vegetated and contains a fairly dense shrub layer along the shoreline providing moderate amounts of water filtration. However the moderate percentage of impervious surfaces in this segment greatly reduces water infiltration leading to overland flow of storm water and contaminants directly into the lake.</p> <p>Segment C: MODERATE: The shoreline along the forested single family parcel contains high amounts of vegetative cover which likely provide a moderate to high amount of water filtration and water quality improvement.</p> <p>Segment D: LOW: The islands do not receive stormwater runoff. Any runoff that is generated by the development that has occurred on the south end of one island goes directly into the lake due to the development being situated directly on the shoreline.</p> <p>Segment E: LOW/MODERATE: While overall the park has high amounts of vegetative cover, the areas closest to the shoreline are generally compact lawn and trails. The low grade of the lawn area may provide some infiltration, but generally lawn is not considered to be very pervious.</p> <p>Segment F: MODERATE/HIGH: The wetlands receive stormwater runoff by way of the incoming streams. The high amounts of vegetation provide water filtration and water quality improvement.</p>	<p>Segment A: 1 Segment B: 2 Segment C: 3 Segment D: 1 Segment E: 2 Segment F: 4</p>
<p>Vegetation Attenuating wave energy</p>	<p>Summary: Dense aquatic macrophyte beds are present in very limited locations in some shallow portions of the lake shoreline and this submerged vegetation, along with the gradual shoreline grades, could possibly attenuate boat and wind-driven waves in select areas. However, nearly complete shoreline armoring eliminates the opportunity for energy dissipation and in fact results in concentrating wave energy in waves rebounding from the bulkheads. The lakeshore, in the built environments, will have little potential for reducing the natural wave attenuating function of the shoreline.</p> <p>Segment A: LOW: The heavily armored shorelines, lack of in-water structure, and limited shoreline vegetation provide low wave attenuation function in this segment.</p> <p>Segment B: LOW: This portion of the shoreline is rather steep, and combined with the armoring provides low wave attenuation.</p>	<p>Segment A: 1 Segment B: 1 Segment C: 4</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Function	Performance	Score ¹
	<p>Segment C: MODERATE/HIGH: The vegetated and mostly unmodified shoreline along the forested single family parcel functionally has the potential to attenuate wave energy.</p> <p>Segment D: MODERATE: The vegetated and mostly unmodified shoreline along most of the islands has the moderate potential to attenuate wave energy.</p> <p>Segment E: LOW/MODERATE: While this portion of the shoreline is gradual, the presence of shoreline armoring along much of the shore provides low to moderate wave attenuation.</p> <p>Segment F: Not applicable for this function.</p>	<p>Segment D: 3 Segment E: 2 Segment F: NA</p>
<p>Vegetation Sediment removal and bank stabilization</p>	<p>Summary: Under natural conditions, there would be an ongoing, underlying rate of shoreline erosion, which would contribute to maintaining substrate conditions. Instead, the lake shore around most of the lake now has little shoreline vegetation and a significant proportion of it is armored. While this “stabilizes” the banks, it also limits natural recruitment of lakebed materials.</p> <p>Segment A: LOW: Heavily armored shores and absence of LWD and dense vegetation results in a reduction of natural bank stabilization and sediment removal function.</p> <p>Segment B: LOW/MODERATE: The shoreline in this section is relatively steep and in combination of the heavily used boat ramp, likely causes rapid erosion. However it is not armored therefore there is more potential for appropriate sediment to be accumulated.</p> <p>Segment C: MODERATE: The dense shoreline vegetation and semi-natural shorelines that tend to promote natural lake and substrate conditions are present along the forested single family parcel. The moderate amount of erosion likely promotes natural substrate conditions in this shoreline.</p> <p>Segment D: MODERATE: The dense shoreline vegetation and semi-natural shorelines that tend to promote natural lake and substrate conditions are present along the majority of the island shorelines. The moderate amount of erosion likely promotes natural substrate conditions in this shoreline area.</p> <p>Segment E: LOW/MODERATE: The presence of bank armoring along much of this shoreline segment does little to facilitate stable sediments and bank function for this shoreline segment. The areas without armoring likely have natural substrate conditions.</p> <p>Segment F: MODERATE/HIGH: When water enters this wetland it spreads out across the landscape, causing the water to slow down and the sediment to drop out in the water column, as well as get trapped by the woody vegetation. Due to the separation from the lake shore, this wetland does not provide for bank stabilization.</p>	<p>Segment A: 1 Segment B: 2 Segment C: 3 Segment D: 3 Segment E: 2 Segment F: 4</p>
<p>Vegetation LWD and organic matter recruitment</p>	<p>Summary: Much of the lake shore is developed as single family housing with limited amounts of vegetative cover. The loss of natural, forested shoreline vegetation and its replacement, primarily with lawn and other types of landscaping, has nearly eliminated large woody debris and organic matter recruitment potential along the majority of the lake shore. Any trees or large woody debris that does enter the lake is likely to be quickly removed out of concern for safety to</p>	<p>Segment A: 2 Segment B: 1 Segment C: 4 Segment D: 3 Segment E: 2 Segment F: 4</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Function	Performance	Score ¹
	<p>boaters or to reduce the risk of property damage.</p> <p>Segment A: LOW/MODERATE: Organic recruitment around the single family homes primarily consists of deciduous leaf input from a limited number of ornamental trees and shrubs. Lawn and other types of landscaping, as well as bank armoring has nearly eliminated large woody debris and organic matter recruitment potential along the lake shore.</p> <p>Segment B: LOW: Moderate amounts of vegetative cover are present along the armored shoreline providing opportunities for organic matter recruitment, north of the boat ramp. The trees along the shore are predominantly shrubs with an over story of conifers. Potential organic inputs primarily consist of leaves and conifer needles. However, the small size of this segment does not contribute significantly to the function of the lake for LWD and organic matter recruitment.</p> <p>Segment C: MODERATE/HIGH: The shoreline along the forested north parcel contains moderate to high amounts vegetative cover with a mix of second and third growth conifers and deciduous trees as well as shrubs, offering the potential for a substantial amount of LWD potential organic recruitment, some of which can be seen from aerial photos.</p> <p>Segment D: MODERATE: The majority of the islands have a naturally forested shoreline providing the opportunity to input LWD and other organic material into the lake.</p> <p>Segment E: LOW/MODERATE: Some portions of the park have significant amounts of shoreline vegetation (mainly shrubs), however, due to the bank armoring LWD and organic matter recruitment is limited.</p> <p>Segment F: MODERATE/HIGH: Some organic matter may come through the culverts from the wetlands, via incoming streams. LWD that is recruited in the wetland stays in the wetland.</p>	

Groundwater – Surface Water Connections		
<p>Groundwater – Surface Water Connections Removing excess nutrients and toxic compounds</p>	<p>Summary: The zone along the lake shore where groundwater and surface water exchange may have the potential to provide moderate nutrient and toxicant removal, however that potential cannot be assessed given the data available. The shoreline area of the lake is mapped by NRCS as Everett Gravelly Sandy Loam soil which is relatively permeable in the top few feet and is then underlain by till. The potential to filter runoff is low to moderate in undisturbed conditions based on the mapped soil conditions. However in disturbed conditions (grading for lawns or backfilling behind bulkheads) the soil permeability should be assumed to be low. It is also not possible to discern what loading is associated with runoff from the residential land-uses. In cases where active chemical management of various pests, weeds, or fertilizers are regularly applied, the soils may lose their capacity to bind or filter excess loading. Bulk-heading has several implications on this function: the</p>	

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

	<p>shallow grades between upland/water surfaces are replaced with abrupt changes; and, lawns and their active treatment regimes can therefore be created/maintained virtually up to the water's edge on soils that are backfilled behind the bulkheads. It should be assumed that areas with bulkheads and active residential lawn establishment cannot provide more than a LOW rate of this function. Natural shorelines, where the slope gradient is rather gentle and native soils are still present and in a forested condition have a much higher potential for filtering pollutants through the native soils.</p> <p>Segment A: LOW: Residential landscapes containing managed lawn and reduced native vegetative cover may be sources of increased pollutant loading. Similarly, the extensive shoreline armoring disconnects portions of the groundwater flow, resulting in diminished water exchange and natural process of the groundwater and surface water exchange zone.</p> <p>Segment B: LOW/MODERATE: The moderate amount of impervious surfaces in this segment has the potential to generate more pollutant loading; it greatly inhibits the opportunity for infiltration; and eliminates the potential of the groundwater and surface water exchange areas to remove water-borne compounds. However, the somewhat natural shoreline and moderate vegetated shore may provide some infiltration and exchange between the lake and groundwater area, resulting in some filtering function.</p> <p>Segment C: MODERATE: The forested parcels contain a high amount of vegetative cover and a natural gently sloping shoreline that should increase the ability of the groundwater – surface water exchange zone to function to filter storm water. Compared to the other Segments around the lake, this Segment has the opportunity to perform this function at a higher rate. However, it is also true that these forested lands have the least probability of generating pollutants to be filtered by the intact slopes/soils.</p> <p>Segment D: LOW/MODERATE: There is little pollution generating surfaces on the islands. Those that are present are clustered on the south end of the island and likely drain directly into the lake because the surfaces (houses, patios, and docks) are right on the shoreline.</p> <p>Segment E: LOW/MODERATE: The uplands of the park are managed lawn, assumed to be moderately compacted and have little native vegetation that would aid in slowing surface water and infiltration. Given the gentler slope of these shores and the lack of as much pollution generating surfaces as Segment A or B, it is assumed that this function may be low/moderate.</p> <p>Segment F: MODERATE/HIGH: The hyporheic zone associated with this large wetland likely function quite high for the removal of excess nutrients and toxic compounds, particularly since stormwater runoff from upstream discharges into the wetland and eventually into Lake Sawyer.</p>	<p>Segment A: 1 Segment B: 2 Segment C: 3 Segment D: 2 Segment E: 2 Segment F: 4</p>
<p>Groundwater – Surface Water Connections</p>	<p>Summary: Storage of water within the groundwater – surface water exchange zone is dependent upon appropriate soil types and a lack of effective impervious surfaces within the areas feeding to Lake Sawyer. In natural conditions there would be a seasonal exchange</p>	

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Water storage	<p>of sub-surface shallow groundwater between the uplands and the lake: early summer having a discharge of groundwater stored in the soils moving down gradient into the lake; while by late summer/fall, the lake would be recharging to a limited degree the shallow groundwater table as water seeped into the available surrounding groundwater – surface water exchange zone. In existing conditions the presence of extensive bank armoring (and assuming grading/backfilling) limits the connectivity between the native soils and the lake water. In addition, the presence of effective impervious surfaces precludes infiltration and the recharge of the shallow groundwater to bleed into the lake: surface flows do not infiltrate effectively, as they remain on the surface. Lack of native vegetative cover hastens run-off and inhibits infiltration into the area of groundwater and surface water exchange.</p> <p>Segment A: LOW: The natural function of this shoreline segment is lacking due to the disconnect between the native soils and the water within the lake by the interceding bulkheads, backfilling and compacting of surfaces. In addition, the high percentage of effective impervious surface limits the opportunity for infiltration.</p> <p>Segment B: LOW: Although the boat launch retains some open space, it is primarily lawn and effectively imperviousness because it is heavily compacted and therefore compromised in its ability to infiltrate water and create/maintain a seasonal connectivity to shallow groundwater.</p> <p>Segment C: HIGH: Relative to the other Segments around the Lake, this naturally forested parcel retains native soils and vegetation over the majority of the area; this would facilitate the natural infiltration of surface waters and maintain a seasonal connectivity between the lake and the surrounding shallow groundwater zone.</p> <p>Segment D: MODERATE/HIGH: As with Segment C, relative to the other Segments around the Lake, these mostly naturally forested islands retain native soils and vegetation over the majority of the area; this facilitates the natural infiltration of surface waters and maintain a seasonal connectivity between the lake and the surrounding shallow groundwater zone.</p> <p>Segment E: LOW/MODERATE: The Regional Park is mostly bulk-headed, thereby limiting the natural exchange in the water's edge.</p> <p>Segment F: MODERATE: The extensive wetland system located in this area may be directly linked to the shallow groundwater zone of the lake and may have an effective connectivity. The presence of the road crossing through the wetland with the culverts to convey stream flows implies that shallow groundwater either would have to move through or under the road fill; or else surface as stream flow to connect to the Lake.</p>	<p>Segment A: 1 Segment B: 2 Segment C: 5 Segment D: 4 Segment E: 2 Segment F: 3</p>
Groundwater – Surface Water Connections Support of	<p>Summary: In a natural condition, the area surrounding a lake may often support a vegetation community that ranges from upland dominants away from the shore; moist-tolerant species just “up” from the water's edge, and wetland vegetation at and out into the lake margin (given appropriate grades and substrates). The shallow</p>	

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

<p>vegetation</p>	<p>groundwater will support moist to wet tolerant species up above the lake level, where saturated soils (caused by shallow groundwater moving down towards the lake) are present in the growing season. However, in Lake Sawyer extensive shoreline armoring, backfilling, and compacting has isolated the nearshore from the shallow groundwater and therefore, if vegetation is present at the bulkhead it is not maintained there by the presence of groundwater. The physical presence of the bulkhead also precludes the establishment of native riparian vegetation.</p> <p>Segment A: LOW: Residential landscaping and bulk-heading precludes the establishment of native species maintained by shallow groundwater flows.</p> <p>Segment B: LOW: The lawn grass present in this area is there due to existing use and soil conditions. This could be an area where modest improvement in function could be achieved through intentional plantings and maintenance activities.</p> <p>Segment C: MODERATE/HIGH: The privately owned forest would be expected to sustain moderate to high amount of groundwater and surface water connection for native vegetation in the natural shoreline area.</p> <p>Segment D: MODERATE/HIGH: The areas of the islands that have not had shoreline modification would be expected to sustain moderate to high amount of groundwater – surface water connection for native vegetation in the natural shoreline areas.</p> <p>Segment E: LOW/MODERATE: Presence of the bulkheads precludes the establishment of native riparian vegetation along much of the lake shore.</p> <p>Segment F: LOW/MODERATE: The extensive wetland system present at the Regional Park may be connected to the hyporheic zone of the lake; however it has to be assumed that the majority of the shallow groundwater input to the wetland comes from the surrounding basin and stream flow input, not necessarily from the lake.</p>	<p>Segment A: 1 Segment B: 1 Segment C: 4 Segment D: 4 Segment E: 2 Segment F: 2</p>
<p>Groundwater – Surface Water Connections Sediment storage and maintenance of base flows</p>	<p>Summary: Lake Sawyer has a large capacity to store sediments that work their way into the lake given the outlet control structure that sets the lake level for flows exiting to Covington Creek. It is not known if waters from the lake support baseflows in Covington Creek once flows stop leaving the outlet in a typical summer; no existing baseline data was identified. Flows from the two creeks to the south/southeast maintain baseflows into the Lake and help to maintain summer lake levels.</p> <p>Segment A: LOW: Shoreline armoring restricts groundwater – surface water exchange with the lake. It is assumed that little or no baseflows are present from the disturbed and compacted Everett sandy loam soils in the uplands into the lake.</p> <p>Segment B: LOW: The condition of these lands (compact lawns) probably inhibits the movement of shallow groundwater into the near shoreline. It is assumed the base flow function is low.</p> <p>Segment C: MODERATE/HIGH: The natural shoreline and soils of the mostly naturally forested property would lead to the assumption</p>	<p>Segment A: 1 Segment B: 1 Segment C: 4 Segment D: 1 Segment E: 2 Segment F: 4</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

	<p>that this Segment maintains its natural level of sediment storage and provides base flow to the lake seasonally.</p> <p>Segment D: LOW: There is little in the way of sediment, other than the built out area on the south end of the island, which can make their way into the lake from the islands. There is unlikely to be any base flows from the islands that support the lake, as the only water that could flow from the islands to the lake is from precipitation.</p> <p>Segment E: LOW/MODERATE: Given the condition of the Park there is some modest potential for modest movement of water from the uplands to the lake; but only modest in comparison to the opportunity of this function in other segments of Lake Sawyer.</p> <p>Segment F: MODERATE/HIGH: The water that flows through the wetlands is from Rock and Ravensdale Creeks, both of which provide base flows to Lake Sawyer. The wetlands also provide sediment storage.</p>	
Habitat		
<p>Habitat Physical space and conditions for life history</p>	<p>Summary: Lake Sawyer with its extensive shoreline armoring likely has little beneficial habitat for near-shore aquatic species. Shallow nearshore areas can provide critical rearing and foraging habitat for fish, as well as rearing/breeding habitat for a variety of aquatic organisms. Shoreline armoring, creates deeper, turbulent nearshore conditions that are inhospitable to aquatic organisms which rely upon emergent aquatic floating leaved vegetation, structural complexity, or just shallow waters. Shoreline armoring can also reduce upwelling/down-welling areas, which are optimal for spawning for some fish. Deep water along the shore allows larger predatory fish to prey on the small/young fish. Aquatic mammals, like muskrats, seem to have adapted to the armored shoreline, and still find den sites in the looser boulder bulkheads. The absence of dense shoreline vegetation is a limiting factor in terrestrial species (birds, mammals, amphibians) use of the shoreline, since cover, food, nesting sites, travel corridors, etc. are absent.</p> <p>Segment A: LOW: The heavy shoreline armoring and lack of vegetative cover in the residential areas of the lake provide limited amounts of physical space and conditions for the life histories of most native aquatic and water associated species.</p> <p>Segment B: LOW/MODERATE: The moderate vegetative cover should provide some needed physical habitat, primarily for terrestrial species, but the shoreline armoring can be a barrier for some species, limiting the movement between terrestrial and aquatic habitats.</p> <p>Segment C: MODERATE/HIGH: The mostly natural shoreline and high vegetative cover containing different canopy levels should provide important physical habitat for a variety of terrestrial animals. The overhanging vegetation likely provides good habitat for small fish.</p> <p>Segment D: MODERATE/HIGH: The mostly natural shoreline and high vegetative cover containing different canopy levels should provide important physical habitat for a variety of terrestrial animals. The overhanging vegetation likely provides good habitat for small</p>	<p>Segment A: 1 Segment B: 2 Segment C: 4 Segment D: 4 Segment E: 3 Segment F: 4</p>

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

	<p>fish.</p> <p>Segment E: MODERATE: The low gradient and vegetated shoreline likely provides good habitat for smaller bodied fishes (where there is overhanging vegetation), but the shoreline armoring limits the utility of the terrestrial habitat for birds and mammals and may create deeper water habitat to encourage the predation on small fish.</p> <p>Segment F: MODERATE/HIGH: The gradient and size of the culverts allows fish passage from the lake into the adjoining wetlands and eventually to the streams. The wetlands also provide excellent habitat for birds and amphibians.</p>	
--	--	--

<p>Habitat Food production and delivery</p>	<p>Summary: Food production from the uplands is limited by the extensive bulk-heading which eliminates the presence of native riparian species along the shoreline and therefore forms a physical barrier for some species. Some domestic fruit trees and other non-native vegetation in yards can supply food for wildlife. The absence of emergent wetland areas that provide productive foraging areas for small mammals, wading birds and waterfowl combined with shoreline armoring also limits the food production and delivery function of the shoreline.</p> <p>Segment A: LOW/MODERATE: The shoreline armoring and residential density limits the amount of suitable habitat for primary production in the form of aquatic plants and dense terrestrial vegetation. Similarly, the primary consumers who utilize shoreline vegetation for food and shelter are absent, thus limiting the availability, production, and delivery of food resources for use farther up the food chain.</p> <p>Segment B: LOW/MODERATE: The vegetated shoreline and layered canopy likely provide moderate amounts of food for terrestrial animals. However, during high use times of the year at the park, the terrestrial animals may not use the park.</p> <p>Segment C: MODERATE/HIGH: The forested single family parcel likely provides high food production for aquatic and terrestrial mammals due to native vegetation, minimal shoreline modification, and the layered canopy.</p> <p>Segment D: MODERATE: The unmodified shoreline area of the islands likely provides moderate to high productivity and delivery of food and shelter for birds and fish.</p> <p>Segment E: LOW/MODERATE: The armoring of the shoreline limits the food production and delivery function of this shoreline.</p> <p>Segment F: MODERATE/HIGH: The wetlands likely provide high productivity and delivery for birds, fish, amphibians, and mammals.</p>	<p>Segment A: 2 Segment B: 2 Segment C: 4 Segment D: 3 Segment E: 3 Segment F: 4</p>
--	--	--

In Table 5 below, the resulting function scores are separated by segment and by function. As mentioned previously, the qualitative scores range from 1 through 5 (1 being low and 5 being high). Because the scores were qualitatively assigned, no sums or averages were used to conclude the outcome. However, after reviewing the scores, we have assigned each segment an overall functional rating that is displayed in the map contained Figure 12 in Appendix E.

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

By looking down the columns, it is easy to see that Segment A (residential) has a score of 1 for most functions. Based on these scores, this segment is assigned an overall functional rating of **Low**. Segment B, the City boat launch, has a score of mostly 2 and in some cases 1, and is rated overall as **Low/Moderate**. Segment C, the large forested peninsula, is rated **Moderate/High**, based largely on its mostly natural shoreline and extensive upland vegetation. The islands that comprise Segment D are given a **Moderate** score. Segment E is given a **Low/Moderate** summary score, largely as a result of the extensive shoreline armoring and past history of disturbance and land clearing. Segment F, the Core Wetland complex at the south end of shoreline jurisdiction, is given the composite rating of **Moderate/High** and contains the least amount of human disturbance.

In summary, Segment A has the highest level of modification and the lowest overall function. Segment C (north forested parcel) and Segment F (Regional Park wetland) score the highest based largely on their more natural conditions; while the remainder of the Segments have scores in the middle range. In some cases, the wetlands at the Regional Park and the wetland located northeast of the lake were ranked as NA (not applicable) because they are physically separated from the lakeshore and are unable to perform some of the functions.

Section 5—Analysis of Ecological Functions and Ecosystem Wide Processes

Table 6. Function Score by Segment

Function	Segment Score					
	A	B	C	D	E	F
Hydrologic						
Storing water & sediment	1	2	3	2	2	4
Attenuating wave energy	2	1	4	2	2	NA
Removing excess nutrients & toxins	1	2	3	1	2	4
Recruitment of LWD & other organics	2	2	4	4	3	4
Vegetation						
Temperature regulation	1	2	2	2	1	3
Water quality improvement	1	2	3	1	2	4
Attenuating Energy	1	1	4	3	2	NA
Sediment removal & bank stabilization	1	2	3	3	2	4
LWD & organic matter recruitment	2	1	4	3	2	4
Hyporheic						
Removing excess nutrients & toxic compounds	1	2	3	2	2	4
Water storage	1	2	5	4	2	3
Support of vegetation	1	1	4	4	2	2
Sediment storage & maintenance of base flows	1	1	4	1	2	4
Habitat						
Physical space & conditions for life history	1	2	4	4	3	4
Food production and delivery	2	2	4	3	3	4

6.0 LAND USE ANALYSIS

As noted in Section 3.1, land use patterns are an important consideration in SMP analysis because such analysis can identify opportunities for “preferred uses,” especially water-dependent, water-oriented and water-enjoyment uses. Land uses adjacent to the water are also a determinant in assigning environment designations to specific sections of the shoreline. Additionally, an analysis of land use conditions is necessary to determine potential land use changes and their effect on shorelines with respect to SMA objectives. The existing land uses and proposed environment designation boundaries and provisions must be mutually consistent with Black Diamond’s Comprehensive Plan. It is also particularly important to look at current zoning of shorelands within the City.

Based on the guidance provided in WAC 173-26-211 a range of Shoreline Environment designations would appear to be appropriate in Black Diamond’s shoreline jurisdiction. Environment designations must be based on existing land use patterns, the biological and physical character of the shoreline, the goals and aspirations of the community as expressed in the Comprehensive Plan as well as the criteria provided in WAC 173-26-211(4) and (5). In delineating environment designations Black Diamond should assure that existing shoreline ecological functions are protected with the proposed pattern and intensity of development. Figure 12 in Appendix E shows the preliminary shoreline segments.

In areas currently dominated by single family homes at urban or suburban densities (Segment A), the Shoreline Residential Environment appears to be the clear choice when examining the Purpose and Designation Criteria contained in WAC 173-26-211(5)(f). The one exception is the private recreation area known as Sunrise Lake Sawyer RV Resort, where Urban Conservancy or a locally unique designation may be appropriate. In areas such as Lake Sawyer Regional Park (Segment F), Lake Sawyer Boat Launch Park (Segment B), and possibly the large parcel on the north end of the lake (Segment C), where existing land use, future land use and existing physical character support the protection and restoration of the “ecological functions of open space, floodplain and other sensitive lands”, the Urban Conservancy Designation appears to be appropriate.

In the wetland areas (Segment F) associated with the lake that are “relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use”, the Natural designation appears to be appropriate.

This report provides a strong basis for designation, but it cannot fully capture “the goals and aspirations of the community” without additional public input. The City will further investigate potential designations during the public involvement process. The following section examines the data gathered in the inventory and describes likely land uses and Comprehensive Plan designations, and implications for shoreline management for each segment.

6.1 LIKELY CHANGES IN LAND USES

The majority of the Lake Sawyer shoreline is designated as Low Density Residential in the City's Comprehensive Plan and zoned for single family densities of up to four units per acre. These properties are generally developed as single-family homes under current land use regulations, and therefore changes would generally be limited to remodels, additions and teardown/rebuilds. With the possible exception of a large vacant parcel north of the Regional Park, the few vacant or underdeveloped parcels that could be built out would not significantly change the developed character of the lake. The changes that are likely to continue around the lake include the transition from smaller homes being rebuilt or remodeled into much larger homes. The other change that is likely around the lake is the transition of the homes from weekend or vacation homes to permanent residences. This type of development generally increases impervious surface and the transition to permanent residences means an increase use of water and the septic systems, many of which are aging. Finally, there is the potential for some existing single family homes to move closer to the lake than they currently are. The median setback on Lake Sawyer is approximately 57 feet based on GIS and aerial photo analysis. Current regulations allow structures within 25 feet of the Ordinary High Water Mark (OHWM).

We do not expect a significant additional conversion of private residential property to public ownership and/or recreational use. Public uses and facilities are a conditional use in residential zones in Black Diamond under the zoning code. Recreational uses are not a permitted or conditional primary use for residential zones.

Given that the vast majority of the Lake Sawyer shoreline area is zoned and developed for single family development, there appears to be a high demand for this use.

The Regional Park is currently undeveloped open space and will see additional development in the near future as there is significant opportunity to expand public access opportunities and recreation facilities at this location. In addition to passive recreation such as walking trails that connect to other regional trails, other potential uses outlined in the conceptual design include ball fields, parking lots, and bathroom facilities. If the large parcel north of the park is not eventually included as part of the park, this area is likely to be developed for single family development.

The Regional Park appears to be the highest priority and most suitable location to improve public access to Lake Sawyer. Much of the existing Lake Sawyer shoreline in the regional park has been impacted by past activities, including shoreline stabilization, loss of vegetation and compaction of soils. Development of additional public access and recreation at this site could be done in conjunction with restoration and enhancement activities. Given this potential and current improvement plans, we believe that this existing park area can accommodate demand for recreational activities for the foreseeable future. However, with the City's significant potential for future population growth, the need for additional park facilities should be continually evaluated as the SMP is updated in the future.

The western park parcel with the boat launch is also likely to see modest changes. Due to the size of the park, the options are limited. Current proposed park improvements include additional parking, bathroom facilities, and vegetation and shoreline restoration.

Sunrise Lake Sawyer Resort, located on the western shore at 30250 224th Ave. SE, could also see additional improvements or redevelopment over the long term. However, the property is expected to remain as a timeshare resort property geared towards recreational vehicle users for the foreseeable future, in part due to the current level of use and ownership structure. In the longer term, this property could be suitable for public recreation. Currently the land is valued significantly greater than the improvements, indicating potential for future redevelopment (King County Tax Assessor, 2010).

Based on current regulations, including significant issues with the lack of sanitary sewers, adequate suitable area for on-site systems and the lack of electricity, it is generally not possible to legally develop new homes or significantly expand existing homes on islands in Lake Sawyer. An applicant must demonstrate water and sewer availability (or OSS approval under King County and State Health Department regulations) to get a building permit to develop or improve a property under the current City of Black Diamond building and zoning regulations. Therefore, significant new legal development on the islands is unlikely and the focus should be on enforcing existing regulations.

The heavily forested large parcel at the north end of the lake is currently in private ownership. The redevelopment of this parcel is not expected in the near term based on local knowledge of the owner's intent. However, in the future, significant new development could occur on this site. Such development would likely be single family residential development. The site is highly suitable for use by a non-profit or corporate retreat and should at least be considered as a potential site for future public acquisition if the both the City and seller are willing.

There does not appear to be significant demand or suitable areas for additional commercial uses on the lake, with the exception of water oriented recreational uses or other very specific water oriented uses, such as a water oriented restaurant or potentially future aquaculture related to fish production. There does not appear to be suitable areas or demand for mining or significant agriculture in the SMA.

6.2 IMPLICATIONS FOR SHORELINE MANAGEMENT

The overall ecological function (summarized in Section 5 above) of the Low Density Residential area is generally low. The continued use of this area for single family development is appropriate. The current low function is due to the predominance of yards and other effective impervious areas, the clearing of both shoreline and upland vegetation, and extensive shoreline modifications. As build-out of the few remaining vacant parcels and redevelopment of existing smaller homes with larger structures occurs, the ecological function of this area could be expected to diminish further absent additional regulations. Based on observed regional trends, additions and rebuilds can generally be expected to increase the size of homes, the amount of vegetation cleared and the amount of impervious surface created over time, absent specific restrictions. In addition, the transition from

Section 6—Land Use Analysis

vacation cabins to permanent residences means an increase water use and septic systems, many of which are aging. Shoreline regulations should address limits on impervious surface and clearing and preservation of vegetation. Consideration should also be given to offering incentives to implement low impact development stormwater practices and increase shoreline and upland vegetation in order to improve functions such as habitat, wave attenuation, water temperature regulation, removal of excess nutrients and toxins, and recruitment of organic matter.

The Regional Park facility provides moderate ecological functions in those portions west of the old access road due to the amount of shoreline armoring, disturbance and compaction of soils, and clearing of vegetation that has occurred there. Portions of the park east of the old access road have seen less extensive and less recent human disturbance and provide greater ecological function, particularly habitat and functions associated with this Core Wetland. Planned development at the Regional Park facility and previous maintenance practices could result in further increases in the amount of impervious surface, and clearing of upland vegetation. These impacts should be limited to previously disturbed areas. Shoreline regulations that include low impact development techniques to address stormwater flow and quality should be considered. In addition, significant opportunity exists to restore native vegetation, improve soils that have been mixed and compacted and remove significant amounts of old armoring along the shoreline.

The Lake Sawyer Boat Launch Park has low to low/moderate ecological function due to high amounts of impervious surface, clearing of vegetation, and shoreline modification. Planned improvements at the park will likely result in further decline in ecological function, absent regulation and development approaches that include more low impact development techniques and enhancement of vegetation.

7.0 SHORELINE MANAGEMENT RECOMMENDATIONS

The following are recommended actions for translating inventory and characterization findings into proposed SMP policies, regulations, environment designation boundaries and restoration strategies.

7.1 SHORELINE MASTER PROGRAM

7.1.1 Environment Designation Provisions

Segment A

Consider the Shoreline Residential designation for Segment A given the current, allowed and planned future use of this area. All portions of this segment are zoned for single family development and the vast majority of this area is developed with single family detached homes and yards. Shoreline provisions applicable to this area should address single family development and redevelopment, including the development and modification of structures, landscaping, appurtenances and stormwater facilities, among other issues. In particular, the regulations should have an emphasis on shoreline modifications, such as docks and piers, shoreline stabilization, and vegetation conservation. Provisions relating to nonconforming development are also very important to assuring shoreline management objectives are met in Segment A.

A portion of Segment A is currently developed as an RV Resort with campground style amenities. This portion of Segment A may be appropriate for designation as Urban Conservancy given the recreational use of this property. Alternatively, the City may wish to develop a locally unique shoreline management designation for this property to reflect the current use and the community vision for this area, or designate it as Shoreline Residential if conversion to residential use is desired. Due to the intensive nature of developed recreation activities occurring on this property, shoreline provisions applicable to this area should address the location and design of parking facilities, non-water oriented recreation facilities, placement of structures, landscaping, boat ramps, moorage facilities, shoreline stabilization, vegetation conservation, storage of fuel, storage and disposal of sanitary waste, vehicle and equipment wash areas and the use of landscaping and maintenance chemicals.

Segment B

Urban Conservancy is the most appropriate designation for Lake Sawyer Park Boat Launch (Segment B). Shoreline regulations for the Urban Conservancy designation should focus on protection and restoration of the ecological functions and values of the park while still allowing public access to the shoreline.

Segment C

Further consideration and discussion with the City and stakeholders is necessary to determine an appropriate designation for Segment C. This is a large parcel that is designated as Low Density

Section 7—Recommendations

Residential in the Comprehensive Plan. In addition to having several homes or cabins on this property, it has a relatively natural shoreline and high amounts of both shoreline and upland vegetation. The majority of the shoreline is natural, apart from the 2 or 3 small docks on the property.

A Shoreline Residential designation might be appropriate for this segment, given the current use of the property and current zoning and planned future land use. However, because of its relatively high ecological function and current use as a retreat center, Urban Conservancy or a locally unique designation might be considered for this segment. The current level of development (e.g. three significant structures, plus smaller outbuildings and understory clearing) at this site may preclude Natural designation. Because this is a privately-owned property, a designation as Natural or Urban Conservancy may preclude some typical activities associated with single family development and almost certainly would preclude further subdivision. A Natural designation could also preclude the types of uses and activities associated with a retreat center or future developed public facility. A Shoreline Residential designation, which would allow for certain amounts of shoreline modifications and upland development activity, may not adequately maintain the shoreline functions this segment currently provides unless special considerations were include in the regulations to address the potential impacts on this property. An Urban Conservancy designation would be generally less restrictive than a Natural designation, but implies that this area might be considered for permanent protection in the future as open space or as a retreat center. If this is determined to be appropriate by the City and stakeholders, an Urban Conservancy designation would provide a greater level of protection of shoreline ecological functions than a Shoreline Residential designation, but would be less restrictive than the Natural designation and would allow flexibility for continued use as a retreat center.

Segment D

Segment D, which consists of four islands may be most appropriately designated as Natural given their relatively natural state and the high potential for additional development to result in water quality impacts. One island in the central western portion of the lake contains seven residential structures and associated overwater structures, but no roads or utilities. Shoreline provisions under a Natural designation would generally restrict expansion of these uses and associated shoreline modifications.

Segment E

An Urban Conservancy designation may be most appropriate for Lake Sawyer Regional Park (Segment E). Shoreline provisions should address protection and restoration of the ecological functions and values of the park while enhancing public access to the shoreline.

Segment F

A Natural designation is most appropriate for Segment F, a large wetland complex within the Lake Sawyer Regional Park, given the important ecological functions it provides as a large wetland complex.

7.1.2 General Policies and Regulations

Shorelines of Statewide Significance

There are no Shorelines of Statewide Significance within the Shoreline Management Area in the City of Black Diamond.

Archaeological and Historic Resources

There are very few areas within Black Diamond's shoreline area that have not been previously graded or excavated. The areas most likely to have been undisturbed are the northern forested parcel and the wetland areas associated with the Regional Park. This does not preclude the possibility of finding artifacts and the Shoreline Master Program should provide clear direction regarding circumstances when a special study may be necessary, and what action to undertake in the event of an unexpected discovery. Per Ecology's SMP guidelines, the following standards shall be incorporated into the City's SMP:

- Require that developers and property owners immediately stop work and notify the local government, the office of archaeology and historic preservation and affected Indian tribes if archaeological resources are uncovered during excavation.
- Require that permits issued in areas documented to contain archaeological resources require a site inspection or evaluation by a professional archaeologist in coordination with affected Indian tribes.

Critical Areas Regulations

- Provide for critical area regulations within the Shoreline Management Area that provide at least an equal level of protection to the current City-wide critical area regulations.
- Incorporate or reference the City's critical areas regulations, watershed plans, and state, tribal and federal programs in the Master Program.

Flood Hazard Management Regulations

- If flood hazard mapping is updated and includes areas within the shoreline jurisdiction, the City should include policies and regulations that address the protection of properties located along the City's floodplain/floodways.

Parking Regulations

- During the planning stages for the regional park (or other parks around the lake), policies should be put in place that consider the placement of parking lots. Parking lots should be placed away from the shoreline and vegetative planting strips or other vegetated areas should be placed between the shore and the parking area. Other low impact development ideas are discussed below.

Public Access

- Public access to the shoreline within the Black Diamond SMA is currently provided at the boat launch park and the regional park. There appears to be significant opportunity to expand public access opportunities and facilities at the undeveloped regional park at the south end of the Lake. This location appears to be the highest priority and most suitable location to improve public access to Lake Sawyer. Much of the existing Lake Sawyer shoreline in the regional park has been impacted by past activities, including shoreline stabilization, loss of vegetation and compaction of soils. Development of additional public access and recreation at this site could be done in conjunction with restoration and enhancement activities. Given the potential for significant additional recreational opportunities at the undeveloped regional park site, we believe that this existing park area can accommodate demand for recreational activities for the foreseeable future. Given the City's significant potential for future population growth, the need for additional park facilities should be continually evaluated as the SMP is updated.
- Updates to the City's comprehensive plan should include an investigation into whether or not there is demand for additional public access and whether there are additional suitable sites available around the lake to add a public access point.
- In the long term, potential public access sites could include the large lot single family property at the north end of the Lake (Segment C) and the current Sunrise Lake Sawyer Resort property. There appears to a potential public street end at the terminus of 227th Place SE, however, our initial investigation indicates this area has only limited potential for public access due to a bridge that connects the public roadway to a private island parcel.
- Guidance should be provided for the construction of trails at the Lake Sawyer Regional Park, particularly trails that are near the shore or the associated wetlands.
- Policies and regulations should address the location and design of recreational facilities and appurtenances, such as parking. Limits should be placed on non-water dependent recreational development in the shoreline management area.
- During the planning stages for the Lake Sawyer Regional Park certain objectives and policies for the management of shoreline access sites should be considered. The regional park provides great potential to provide access for swimming and non-motorized boating, passive recreation (such as regional trail connections) and habitat enhancement and preservation (including vegetation enhancement and removal of the bulkheads).

Water Quality

- Continue to follow the guidelines in the TMDL and the Lake Sawyer Water Quality Implementation Plan. The Lake Sawyer Water Quality Implementation Plan also addresses corrective actions to address ongoing and future sources of phosphorus pollution in the surrounding watershed, including several waterbodies that drain to Lake Sawyer.
- Incorporate as appropriate any goals, policies or regulations that result from the City's efforts to comply with its NPDES Phase II stormwater permit requirements.
- Lake Sawyer is on the 303(d) list for total phosphorus impairment, fecal coliform, and PCBs. Include appropriate goals, policies and regulations in the SMP targeting improvements in these water quality parameters.

Section 7—Recommendations

- Existing single family residences with OSS, commonly known as septic systems, pose a continued source and risk of pollution to Lake Sawyer. Required connection to sewer facilities when they are available will address this risk.
- Consider active monitoring of septic systems and required conversion of homes on these systems to the public sewer system when sewer is available within 300 feet, and significant new development is proposed or the current septic system is not functioning properly.

Vegetation Management

- Conservation of existing native vegetation during land development and ongoing use is critical to maintaining the ecological processes and natural functions of shoreline areas.
- The removal of mature trees and native vegetation should be regulated in a manner that provides protection that is equal to or greater than current Sensitive Area Regulations.
- Vegetation removal in wetland areas and associated buffers within the Black Diamond Regional Park and Boat Launch Park of the shoreline areas should also be restricted to only allow the removal of hazardous trees.
- Owners of currently undeveloped parcels should be encouraged to retain as much native vegetation as possible, particularly along areas closest to the shoreline.
- The amount of vegetation allowed to be removed could depend on the shoreline designation. The Shoreline Residential environment might allow greater flexibility for vegetation removal to reflect the developed nature and use of properties within this area. The Natural shoreline environment would have greater restrictions on the amount of vegetation that can be removed. The Urban Conservancy environment would more restrictive than the Shoreline Residential, but less restrictive than the Natural shoreline environments to allow developed recreation facilities.
- Incentives and education should be provided for the retention and planting of native vegetation, particularly in areas recommended for designation as Shoreline Residential.
- Include provisions for continued monitoring and control of aquatic invasive species in the lake and prevent establishment of other aquatic invasive species.

Low Impact Development and “Green Building” Practices

- Incentives should be provided for the use of Low Impact Development techniques and Green Building practices within the Shoreline Management Area. Requirement of Green Building practices should be required for portions of the home that affect water use and water quality of the lake.
- Low impact development and green building practices, such as those promoted through the Leadership in Energy and Environmental Design (LEED) and Green Built programs should be encouraged, particularly to properties that are replacing a small cabin with a larger home.
- Use LID techniques and Green Building practices on the park parcels to set an example for the citizens.

7.1.3 Shoreline Modification Provisions

Shoreline Stabilization

- Explore a range of solutions to reduce the amount of bulkheads and shoreline armoring over time around Lake Sawyer. Alternative methods to typical shoreline armoring using native vegetation and other natural shoreline features should be considered.
- Implement policies that require new construction on vacant properties to use alternative methods for shoreline armoring.
- Use Lake Sawyer Regional Park as a case study for removing bulkheads that can be used to encourage existing homeowner to remove the bulkheads on their properties.

Piers and Docks/Boating Facilities

- Provide clear dimensional standards for new piers and replacement/modified piers. Consider special standards for any public access docks or swim platforms that may be proposed at public access points.
- Pier regulations should be consistent with Washington Department of Fish and Wildlife design standards, and recognize any special local issues or circumstances.
- Piers and other overwater structure regulations should also be consistent with the permitting requirements of the U.S. Army Corps of Engineers.

Fill

- As directed by the SMP Guidelines, provide appropriate limitations on placement of fill in shoreline areas, including areas waterward of the ordinary high water mark. Restoration fills should be encouraged as needed to implement lakeshore restoration. Federal and state laws allow fill under certain permit conditions which apply regardless of the Shoreline Master Program.

Breakwaters, Jetties, Groins and Weirs

- Some internet research indicates that an instream structure is located at the mouth of Covington Creek that may be a fish barrier, but this was not field verified. While this structure may be out of the City's jurisdiction, coordination of the City with King County to remove or improve this structure could benefit fish access to and from Lake Sawyer.
- Policies should be put in place to limit these types of structures, and remove them when feasible.

Dredging and Dredge Material Disposal

- However, as directed by the SMP Guidelines, provide limitations on dredging (excavation) in shoreline areas. Dredging activities are not expected to occur on a frequent basis, but may be conducted as part of certain conveyance maintenance activities or to implement restoration projects. Federal and state laws allow dredging and material disposal under certain permit conditions which apply regardless of the Shoreline Master Program.

Shoreline Habitat and Natural Systems Enhancement Projects

- To the maximum extent feasible, the SMP should include provisions to encourage restoration projects, particularly in areas identified as having low function and high potential. This would include shoreline restoration (including bulkhead removal) at the Black Diamond Regional Park.

7.1.4 Shoreline Uses

Boating Facilities

- There is only one public boating facility located on Lake Sawyer. All others with lake access with a boat are at private docks. If possible, the SMP should include provisions to provide for reasonable development of these facilities, while protecting the high ecological function of the shoreline. In the case of Lake Sawyer, this may mean providing an additional public facility for non-motorized boats only.

Industry

- Generally, shoreline master programs must give first preference to water-dependent industrial uses over non-water-dependent industrial uses; and second, give preference to water-related industrial uses over non-water-oriented industrial uses. Lands designated for industrial uses should not include shoreline areas with severe environmental limitations, such as critical areas. The City of Black Diamond does not have any areas in its shoreline area that are zoned for industrial use, nor does it have any plans to include industrial areas in its future land use around Lake Sawyer.

Recreation

- The SMP should give shoreline recreational development priority and assure the activities are primarily related to the public access and enjoyment of the water and shoreline area. In addition to emphasizing water-oriented recreational uses, appropriate limits should be established for non-water oriented activities and facilities, such as the proximity and location of parking areas and ball fields.
- The SMP provisions must protect the ecological functions of the shoreline area and associated wetland, particularly important at the Black Diamond Regional Park.
- The SMP should specifically address trail location, design and construction at the Black Diamond Regional Park. Trail and other construction should emphasize the use of low impact development methods.

Residential Development

- The SMP must address continued shoreline residential development, particularly redevelopment, replacement, and expansion of existing homes, especially because only four percent of the parcels remain vacant. The SMP should address the redevelopment to be consistent with control of pollution and prevention of damage to the natural environment.

- The SMP should include provisions which address and educate homeowner regarding shoreline armoring, storm water runoff, septic systems, introduction of pollutants, and vegetation modification and removal. Provisions should be put in place (if not already) to begin converting homes from septic systems to the City’s sewer system.

Commercial Development

- Generally, the SMP must give preference to water-dependent commercial uses over non-water dependent commercial uses; and second, give preference to water-related and water-enjoyment commercial uses over non-water oriented commercial uses. The City of Black Diamond does not have any areas in its shoreline area that are zoned for commercial use, nor does it have any plans to include commercial areas in its future land use around Lake Sawyer.

7.2 RESTORATION PLAN

The Restoration Plan should be prepared consistent with 173-26-201(2)(f)(i-vi) by addressing the following six subjects:

- (i) Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;*
- (ii) Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;*
- (iii) Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;*
- (iv) Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;*

Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals; and

Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

8.0 DATA GAPS

During the course of the inventory and analysis, the following information gaps were noted:

1. The City does not have impervious surface data. Data obtained from DOE is very coarse and is not suitable for accurate calculations of impervious surface coverage of the shoreline area. This information would be useful in better understanding the condition of the shoreline area and in the assessment of future cumulative impacts.
2. Data regarding pier size and location was obtained from Washington DNR and is from 2007. Our visual inspection of this data compared to an air photo reveals that there are some errors and omissions in this information, but it is largely accurate.
3. Data regarding shoreline armoring was created and mapped by the consultant based on aerial photo interpretation – errors may exist.
4. There are no known erosion studies regarding Lake Sawyer.
5. The City does not have detailed information on building location, setbacks or subdivision potential. Additional analysis of single family development potential will occur during the cumulative impacts analysis.
6. Information about development on islands in Lake Sawyer (Segment D) is limited to King County Property Records, aerial photo interpretation and the input from City staff and stakeholders.

9.0 REFERENCES

- City of Black Diamond. 2009. City of Black Diamond Comprehensive Plan. June 2009.
- City of Black Diamond. 2009a. Proposed Draft Six Year Transportation Improvement Program for 2010-2015.
<http://www.ci.blackdiamond.wa.us/Depts/PubWorks/Docs/six%20year%20TIP%202010%20-2015.pdf>
- City of Black Diamond. 2010. 2009 Building Statistics.
<http://www.ci.blackdiamond.wa.us/Depts/CommDev/building/forms/Stats%20Dec%202009.pdf>
- City of Black Diamond. Lake Sawyer Park Boat Launch Improvements – Draft Conceptual Plan (Undated).
<http://www.ci.blackdiamond.wa.us/Depts/PubWorks/Docs/Conceptual%20Plan%20with%20Updated%20Parking.pdf>
- City of Black Diamond. 2008. Parks, Recreation, and Open Space Plan. Adopted December 23, 2008.
<http://www.ci.blackdiamond.wa.us/Depts/NaturalResources/docs/Revised%20Park%20Comp%20Plan.pdf>
- Green/Duwamish and Central Puget Sound Watershed Water Resource Inventory Area 9 (WRIA 9) Steering Committee. 2005. *Salmon Habitat Plan – Making Our Watershed Fit for a King*. Prepared for the WRIA 9 Forum. August 2005. <http://dnr.metrokc.gov/Wrias/9/HabitatPlan.htm>
- Kerwin, John and Nelson, Tom S. (Eds.). December 2000. *Habitat Limiting Factors and Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound Watersheds (WRIA 9 and Vashon Island)*. Washington Conservation Commission and the King County Department of Natural Resources. <http://dnr.metrokc.gov/Wrias/9/Recon.htm>
- King County Surface Water Management. 2000. Lake Sawyer and Its Watershed Management Plan. July 2000.
- King County Surface Water Management. 1999. Soos Creek Basin Plan and Final Environmental Impact Statement.
- King County. 2004. King County Comprehensive Plan.
- King County Wetland Inventory. 1983.
- Lake Sawyer Community Club. 2010. <http://www.lakesawyer.org/index.html>

Section 9—References

PacWest Engineering (PWE). 2009. City of Black Diamond Stormwater Management Program 2008 Annual Update.

PacWest Engineering (PWE). 2009. City of Black Diamond Water System Comprehensive Plan..

Revised Code of Washington. Shoreline Management Act of 1971 Chapter 90.58.

<http://apps.leg.wa.gov/RCW/default.aspx?cite=90.58>

Washington Department of Ecology (Ecology). 2007. Western Washington Phase II municipal Stormwater Permit. January 17, 2007.

<http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/phaseiiwwa0107/waphiipermitfinal.pdf>

APPENDIX A

List of Data Sources

DRAFT

Black Diamond Shoreline Master Program Update Task 2.1 Deliverable: Draft List of Inventory Data Sources Revised January 8, 2009

Table 1: Working Bibliography

Report or Document Title	Date and Author	Location
2008 SWMP Update	City of Black Diamond, 2008	http://www.ci.blackdiamond.wa.us/Docs/Documents/SWMP2008_update.pdf
Comprehensive Plan	City of Black Diamond, 2009	http://www.ci.blackdiamond.wa.us/Depts/CommDev/planning/FinalPlan_092209.pdf
Zoning Code	City of Black Diamond, 2009	http://www.ci.blackdiamond.wa.us/Depts/CommDev/planning/2009%20Zoning%20Code.pdf
Capital Improvement Plan	City of Black Diamond, 2009	Hard Copy will be provided by City.
All Existing Shoreline Master Program Documents	King County Code, Title 25, Shoreline Management, June, 2008	Hard Copy provided by City.
Parks, Recreation and Open Space Plan	City of Black Diamond, 2008	http://www.ci.blackdiamond.wa.us/Depts/NaturalResources/docs/Revised%20Park%20Comp%20Plan.pdf
30% Construction Documents – Lake Sawyer Park Boat Launch & Shoreline Improvements	Anchor QEA, for City of Black Diamond, October 2008	Hard Copy provided by City
Sensitive Areas Ordinance	City of Black Diamond, 2008	http://www.ci.blackdiamond.wa.us/Depts/NaturalResources/docs/Ordinance%20No%20%2008-875%20Sensitive%20Areas.pdf
303(d) List	Department of Ecology, 2008	http://www.ecy.wa.gov/Programs/wq/303d/index.html

Lake Sawyer TMDL Summary – Water Quality Improvement Project	Department of Ecology, 1998	http://www.ecy.wa.gov/pubs/982022wq.pdf and http://www.ecy.wa.gov/programs/wq/tmdl/LkSawyerTMDL.html and related links.
Lake Sawyer Water Quality Report	Brown and Caldwell, 1989	Hard copy provided by City.
WRIA 9 Duwamish-Green Watershed Planning	Department of Ecology	http://www.ecy.wa.gov/apps/watersheds/wria/pages/09.html (Links to multiple documents/reports)
Diagnostic Study of Lake Sawyer	Department of Ecology, 1989-1990	http://www.ecy.wa.gov/pubs/91e05.pdf
King County Water and Land – King County Lake Monitoring Reports	King County, 2000 through 2006	http://www.kingcounty.gov/environment/waterland/lakes/documents.aspx
WRIA 9 Habitat Limiting Factors and Reconnaissance Assessment for Salmon Habitat	King County, 2000	http://www.govlink.org/watersheds/9/reports/Recon.aspx
Salmon Habitat Plan (August 2005) for the Green/Duwamish and Central Puget Sound Watershed	King County, 2005	http://www.govlink.org/watersheds/9/plan-implementation/HabitatPlan.aspx
Soos Creek Basin Plan and Final EIS	King County, 1990	Hard copy to be provided by City and King County
Lake Sawyer Management Plan and Technical Appendices	King County, 2000	Hard copy provided by City and King County
Black Diamond Pump Stations and Trunk Location Map	King County, 2009	Hard copy provided by King County Wastewater Treatment Division
Lake Sawyer Watershed Bioassessment – 1995 Case Study	King County, 2006	Hard copy provided by City and King County
Priority Habitats and Species database	Washington Department of Fish and Wildlife	http://wdfw.wa.gov/hab/phspage.htm
StreamNet database	Washington Department of Fish and Wildlife	http://wdfw.wa.gov/mapping/salmonscape/
Salmonid Stock Inventory (SaSI) 2002 database	Washington Department of Fish and Wildlife	http://wdfw.wa.gov/fish/sasi/index.htm

Catalog of Washington Streams and Salmon Utilization – Volume 1, Puget Sound Region	Williams, R. W., R. M. Laramie, and J. J. Ames. 1975	Otak Library
Middle Green River Coalition		http://www.mgrc.org/
National Wetlands Inventory	US Fish & Wildlife Service	http://www.fws.gov/wetlands/Data/Mapper.html
Soil Survey of King County	USDA/NRCS	http://websoilsurvey.nrcs.usda.gov/app/
A Short History of Section 10-21-6 and the South End of Lake Sawyer	Unknown	Hard copy provided by Palmer Coking Coal Company

Table 2: GIS Data – Mapping Data Sources

Data Theme	Data Source	Location
Boundaries (city limits and UGA)	King County 2004	City of Black Diamond GIS Data CD
Soils	USDA NRCS 2008	City of Black Diamond GIS Data CD
Steep Slopes	King County, no data	City of Black Diamond GIS Data CD
Landslide Hazard/Erosion Areas	King County SAO 1990	City of Black Diamond GIS Data CD
Lakes	King County 2007	City of Black Diamond GIS Data CD
Streams	WA DNR 2006	City of Black Diamond GIS Data CD
Wetlands	King County CAO Wetlands 2004	City of Black Diamond GIS Data CD
Floodways and Floodplains	Preliminary DFIRM Data for King County 2007 (same as 1995 FIRM data)	FEMA- Shapefile emailed from Kelly Durst, FEMA Region X, Bothell Office
Drainage Basin boundaries	King County 2005	City of Black Diamond GIS Data CD
Topography	King County 2007	City of Black Diamond GIS Data CD
Aerial Photos/Orthophotography	USDA – FSA Aerial Photography Field Office, 2006	In-house
Parcels	City of Black Diamond	City of Black Diamond GIS Data CD
Zoning	City of Black Diamond, 2008-2009	City of Black Diamond GIS Data CD
Future Land Use/Comp Plan Designations	City of Black Diamond, 2008-2009	City of Black Diamond GIS Data CD
Existing Land Use	King County Assessor, 2009	Downloaded and in-house
Impervious Area	DOE/ Sanborn Mapping Solutions 2005	In-House http://www.ecy.wa.gov/services/gis/data/impervious/basins.htm
Vegetation / Land Cover	DOE/ Sanborn Mapping Solutions	In-House

	2005	http://www.ecy.wa.gov/services/gis/data/impervious/basins.htm
Stormwater and wastewater pipes and outfalls	King County 2004, Data Gap: No stormwater outfalls. Updates to be provided by City by prior to 2/09.	City of Black Diamond GIS Data CD
Other utility lines (water, electric, natural gas, etc.)	City of Black Diamond (Pace Disk 2)	City of Black Diamond GIS Data CD
Existing Environment Designations	King County, 2009	http://your.kingcounty.gov/shorelines/mapping-lookup.aspx No shapefiles, viewing only
Priority Habitat	We have requested this data from WDFW, we are using 2007 data obtained for the City of Covington project until we receive the new data	2007 data in house and awaiting 2009 data from WDFW
Aquifer Recharge Areas	King County 2005	City of Black Diamond GIS Data CD
Streets	King County 2005	City of Black Diamond GIS Data CD
Parks	City of Black Diamond, 2009-2009	City of Black Diamond GIS Data CD
Shoreline modifications (overwater structures only)	WA DNR 2007	http://fortress.wa.gov/dnr/app1/dataweb/dmmatrix.html
Toxic or hazardous materials clean-up sites	Dept of Ecology, (Query "State Cleanup Sites")	ftp://www.ecy.wa.gov/gis_a/enviro/facility.zip

APPENDIX B

Information Request Letter and Distribution List



CITY OF BLACK DIAMOND

24301 Roberts Drive
PO Box 599
Black Diamond, WA 98010

Phone: (360) 886-2560
Fax: (360) 886-2592
www.ci.blackdiamond.wa.us

November 6, 2009

RE: City of Black Diamond Shoreline Inventory and Assessment, Request for Existing Information: Lake Sawyer and Associated Wetlands

Dear Stakeholders:

The City of Black Diamond is in the early stages of examining the shorelines of Lake Sawyer and associated wetlands for the purposes of updating its Shoreline Master Program (SMP) per the requirements of the Washington State Department of Ecology. We have recently hired AHBL, Inc. and OTAK, Inc. to assist with shoreline analysis and characterization, regulatory review and restoration plan development. A shoreline inventory, where we compile all pertinent and reasonably available data, plans, studies, inventories, maps and other applicable information, will be the first step. The inventory will be used to develop a map portfolio and a report characterizing ecological functions and ecosystem-wide processes, among other things.

The City is requesting your help in obtaining all existing physical and biological information regarding Lake Sawyer and associated wetland areas, and other relevant watershed or basin information. We are interested in any and all inventories, assessments, water quality analyses, and/or fish and wildlife distribution and habitat information. A map identifying the City's preliminary shoreline jurisdiction is attached.

We hope to assemble our inventory by November 26, 2009, in order to complete the necessary characterization, analysis, and resultant recommendations in a timely manner. A response would be appreciated by November 20, 2009. If possible, please provide hard copies or electronic files of any studies instead of a list of citations; contact the City if a copy fee is required. If you believe that another individual within your organization would be a more appropriate contact for this solicitation, please forward this letter to that individual, and notify us of the change in contact.

If you have any questions or need additional information, please feel free to contact Aaron Nix, Natural Resources/Parks Director, at (360)886-2560, extension 220, or ANix@ci.blackdiamond.wa.us.

Sincerely,

Aaron Nix
Natural Resources/Parks Director

Encl.

STEVE TAYLOR, PLANNING
MUCKLESHOOT INDIAN TRIBE
39015 172ND AVE SE
AUBURN WA 98092

PUGET SOUND CLEAN AIR AGENCY
SEPA REVIEW
1904 THIRD AVE
SEATTLE WA 98101-3317

PAUL REITENBACH
KING COUNTY DDES
900 OAKSDALE AVE SW
RENTON WA 98055-5212

KING COUNTY SOLID WASTE DIV
201 S JACKSON ST, STE 701
SEATTLE WA 98104

MARK ISAACSON, DIRECTOR
WATER/LAND RESOURCES DIV
KC DEPT OF NATURAL RESOURCES
201 S JACKSON ST, STE 600
SEATTLE WA 98104

RAUL RAMOS, AICP
PLANNING AND LAND SERVICES
PUYALLUP TRIBE OF INDIANS
3009 E PORTLAND AVE
TACOMA WA 98404

RICK ROBERTS
KING AREA TRAFFIC ENGINEER
WSDOT NW REGION
PO BOX 330310, MS 240
SEATTLE WA 98155

MIKE MARYANSKI, SUPT
TAHOMA SCHOOL DISTRICT
25720 MPL VLY-BLK DIAMODN RD SE
MAPLE VALLEY WA 98038

REGULATORY BRANCH
US ARMY CORPS OF ENGINEERS
SEATTLE DISTRICT
4735 E MARGINAL WAY S
PO BOX 3755
SEATTLE WA 98124-3755

KENT SCHOOL DISTRICT
ATTN: GWEN DERDOWSKI
12033 SE 256TH ST, STE A-600
KENT WA 98031

DOUG CORBIN
MUNICIPAL LIASON MGR
PUGET SOUND ENERGY
6905 S 228TH ST
KENT WA 98032

COVINGTON WATER DISTRICT
18631 SE 300TH PL
KENT WA 98042-9299

MARK BUSCHER
KC WASTEWATER TREATMENT DIV
201 S JACKSON ST, STE 500
SEATTLE WA 98104

PERRY WEINBERG
SEPA RESPONSIBLE OFFICIAL
SOUND TRANSIT
401 S JACKSON ST
SEATTLE WA 98104-2628

RHONDA STRAUCH
KC ROADS DIVISION
201 S JACKSON ST, KSC-TR-0231
SEATTLE WA 98104-3855

MIKE NELSON, SUPERINTENDENT
ENUMCLAW SCHOOL DISTRICT
2929 MC DOUGALL AVE
ENUMCLAW WA 98022

FRIENDS OF ROCK CREEK
PO BOX 8
RAVENSDALE WA 98051

MIKE NEWMAN, ASSOC SUPT
AUBURN SCHOOL DISTRICT
915 FOURTH ST NE
AUBURN WA 98002

SOOS CREEK WATER & SEWER DIST
PO BOX 58039
RENTON WA 98058-1039

KAREN WALTER, FISHERIES OFFICE
MUCKLESHOOT INDIAN TRIBE
39015 172ND AVE SE
AUBURN WA 98092
KAREN.WALTER@MUCKLESHOOT.NSN.US

CITY OF MAPLE VALLEY
DEPT OF COMM DEVELOPMENT
22035 SE WAX RD, STE 5
PO BOX 320
MAPLE VALLEY WA 98038
TY.PETERSON@CI.MAPLE-VALLEY.WA.US

DEPT OF ECOLOGY
ENVIRONMENTAL REVIEW SECTION
PO BOX 47703
OLYMPIA WA 98504-7703
SEPAUNIT@ECY.WA.GOV

DNR SEPA CENTER
PO BOX 47015
OLYMPIA WA 98504-7015
SEPACENTER@DNR.WA.GOV

US SOIL CONSERVATION SERVICE
SEPA RESPONSIBLE OFFICIAL
935 POWELL
RENTON WA 98055
DISTRICT@KINGCD.ORG

LK SAWYER COMMUNITY CLUB
PO BOX 191
BLACK DIAMOND WA 98010
JOE@EJMAY.COM

OFFICE OF ARCHAEOLOGY &
HISTORIC PRESERVATION
PO BOX 48343
OLYMPIA WA 98504-8343
GRETCHEN.KAEHLER@DAH.P.WA.GOV

CITY OF KENT
PLANNING DEPARTMENT
220 S 4TH ST
KENT WA 98032
PLANNING@CI.KENT.WA.US

DEPT OF FISH & WILDLIFE
3190 160TH AVE SE
BELLEVUE WA 98008
FISHELDF@DFW.WA.GOV

CITY OF COVINGTON
DEPT OF COMM DEVELOPMENT
16720 SE 271ST ST, STE 100
COVINGTON WA 98042-4964
DNEMENS@CI.COVINGTON.WA.US

JOE CUSHMAN, DIRECTOR
NISQUALLY INDIAN TRIBE
PLANNING DEPARTMENT
4820 SHE-NAH-NUM DR SE
OLYMPIA WA 98513
CUSHMAN.JOE@NISQUALLY-NSN.GOV

KING COUNTY FIRE DISTRICT #44
32316 148TH AVE SE
AUBURN WA 98092
INFO@KCFD44.ORG

CITY OF AUBURN
PLANNING, BLDG & COMM DEV
25 W MAIN ST
AUBURN WA 98001-4998
CBAKER@AUBURN.WA.GOV

CITY OF ENUMCLAW
DEPT OF COMM DEVELOPMENT
1339 GRIFFIN AVE
ENUMCLAW WA 98022
MIKET@CI.ENUMCLAW.WA.US

RICK ROBERTS
KING AREA TRAFFIC ENGINEER
WSDOT
PO BOX 330310
SEATTLE WA 98133-9710
ROBERRI@WSDOT.WA.GOV

SOUTH KC REGIONAL WATER ASSN
27224 144TH AVE
KENT WA 98042
DON@DC-WRIGHT.COM

APPENDIX C

Assessment of Jurisdiction



August 18, 2010

Aaron Nix, Director, Natural Resources Dept.
City of Black Diamond
24301 Roberts Drive
Black Diamond, WA 98010

Re: Proposed Black Diamond Shoreline Jurisdiction (Revised)

Dear Aaron:

AHBL, in collaboration with OTAK, Inc. and City of Black Diamond staff, have developed the attached proposed map of shoreline jurisdiction. Under the City's current Shoreline Master Program, Lake Sawyer is the only regulated shoreline, in addition to shorelands extending 200 feet from the ordinary high water mark. Associated wetlands also fall within the existing definition of regulated shorelines, but have not historically been specifically identified as shorelines or included in previous shoreline boundary mapping.

The first step in updating the map of shoreline jurisdiction was to review the precise shoreline and associated wetlands definitions found in the WAC and in Washington Department of Ecology's (Ecology) rules and guidance documents. Portions of these definitions that apply to the City of Black Diamond revolve around the size threshold for water bodies meeting Shoreline criteria, the State Ordinary High Water Mark (OHWM) definition, and when to consider critical areas (wetlands) as "associated" with the shoreline.

Streams/River

The publication entitled *Determination of Upstream Boundaries on Western Washington Streams and Rivers Under the Requirements of the Shoreline Management Act of 1971* (USGS/WDOE, 1998) as well as the more recently updated Washington Department of Ecology's Digital Atlas (<http://www.ecy.wa.gov/services/gis/data/data.htm#m>) were consulted to verify the upstream limits of stream and river shoreline jurisdiction based on USGS' recent study of the 20 cubic feet per second (cfs) cut-off. As in the original SMP work, all portions of Rock Creek and Ravensdale Creek that are within the City limits do not meet jurisdictional shoreline thresholds. The documented flow in Covington Creek does exceed the 20 cfs threshold, but only a small portion of the creek (approximately 160 feet in length) is within City limits. The historic creek channel upstream of the weir is considered part of Lake Sawyer. Both areas are included within the proposed shoreline jurisdiction.

Lakes

The minimum size limit for lakes to be designated as shoreline is 20 acres. Thus, as in the original SMP work, Lake Sawyer is identified as a shoreline jurisdictional lake. No other lakes within the City boundary exceed 20 acres. Pursuant to our discussion with DOE, we did not include Lake No. 12, located outside of the City but within the UGA. This lake meets the minimum size limit and is included in the King County SMP and related Update work.

Civil Engineers

Structural Engineers

Landscape Architects

Community Planners

Land Surveyors

Neighbors

SEATTLE

1200 6th Avenue

Suite 1620

Seattle, WA 98101-3117

206.267.2425 TEL

206.267.2429 FAX

www.ahbl.com



Floodway and Associated Wetlands

Existing King County and City of Black Diamond wetland inventory information was reviewed to identify associated wetlands. FEMA's most recent floodplain maps (2007) were used to determine the floodplain and floodway extent. There is no mapped floodplain or floodway associated with Lake Sawyer. Ecology guidance states that an entire wetland is associated if any part of it lies within the area 200 feet from the OHWM (or contiguous floodplain located within 200 feet of the floodway in riverine environments) of a State Shoreline. Further guidance states that wetlands that are hydraulically connected to a Shoreline also would be considered associated, as well as wetlands within the 100-year floodplain. Wetlands that are separated by an obvious topographic break from the shoreline are not associated, provided they are outside the shoreland zone and provided that the break is not an artificial feature such as a berm or road.

After a discussion with DOE, it was agreed the wetland complexes around the inlets of Ravensdale and Rock Creeks in the southeast portion of Lake Sawyer are associated wetlands. It was also agreed that the wetland complexes further upstream on Rock Creek are not associated. Initially, the wetland complex northeast of Lake Sawyer was thought to be associated due to a mapped surface connection to the lake. However, subsequent investigation revealed that there is in fact no surface connection between the wetland and Lake Sawyer and that the water levels appear to rise and fall independently. Based on this new information we have determined that this wetland northeast of Lake Sawyer does not meet the definition of an associated wetland and we have revised the jurisdiction map accordingly.

Revised Jurisdiction Summary

The following are proposed areas of shoreline jurisdiction:

- Lake Sawyer
- Shorelands within 200 feet of the OHWM of Lake Sawyer
- Associated wetlands south of Lake Sawyer
- Small portion of Covington Creek from the weir just east of 224th Ave. SE to the City boundary at 224th Ave. SE.
- Shorelands within 200 feet of the aforementioned portion of Covington Creek

Please call if you have any questions.

Sincerely,

Gabe Snedeker, AICP
Project Manager/Lead Shoreline Planner

Enclosures:

Proposed Shoreline Jurisdiction Map (See Map Folio, Figure 1a)

Optional Jurisdiction (See Map Folio, Figure 1b)

Critical Areas: Water bodies, Streams and Wetlands (See Map Folio, Figure 2a)

APPENDIX D

Photographs



PHOTO 1—Looking North/Northeast at armoring along a portion of the Regional Park property. Rock Creek enters Lake Sawyer off of photo right.



PHOTO 2—Looking west. Photo taken from access road over the Ravensdale Creek culverts that outlet into Lake Sawyer in the Regional Park.