



**CITY OF BLACK DIAMOND**  
**May 20, 2010 Meeting Agenda**  
25510 Lawson St., Black Diamond, Washington

**7:00 P.M. – CALL TO ORDER, FLAG SALUTE, ROLL CALL**

**PUBLIC COMMENTS:** Persons wishing to address the City Council regarding items of new business are encouraged to do so at this time. When recognized by the Mayor, please come to the podium and clearly state your name and address. Please limit your comments to 3 minutes. If you desire a formal agenda placement, please contact the City Clerk at 253-631-0351. Thank you for attending this evening.

**PUBLIC HEARINGS:**

- |   |               |
|---|---------------|
| 1.) AB10-034 – Stormwater Comprehensive Plan  | Mr. Boettcher |
| 2.) AB10-035 – Stormwater Management Plan     | Mr. Boettcher |
| (No Council Action to follow Public Hearings) |               |

**APPOINTMENTS, PRESENTATIONS, ANNOUNCEMENTS: None**  
**UNFINISHED BUSINESS: None**

**NEW BUSINESS:**

- |  |               |
|--|---------------|
| 3.) AB10-036 – Resolution Establishing Date for Closed Record Hearing on<br>The Villages MPD Application | Mr. Pilcher   |
| 4.) AB10-037 – Resolution Establishing Date for Closed Record Hearing on<br>Lawson Hills MPD Application | Mr. Pilcher   |
| 5.) AB10-038 – Resolution Authorizing Capital Facility Charge Analysis for<br>Water and Sewer            | Mr. Boettcher |

**DEPARTMENT REPORTS:**

**MAYOR'S REPORT:**

**COUNCIL REPORTS:**

**ATTORNEY REPORT:**

**PUBLIC COMMENTS:**

**CONSENT AGENDA:**

- 6.) **Claim Checks** – May 20, 2010 No. 35547 through 35553 (voided checks No. 35554 through No. 35610) No. 35611 through No. 35667 in the amount of \$506,702.91
- 7.) **Payroll** – April 30, 2010 No. 17042 through No. 17112 in the amount of \$250,750.05
- 8.) **Minutes** – Council Meeting of May 6, 2010 and Workstudy of May 13, 2010

**EXECUTIVE SESSION:**

**ADJOURNMENT:**

# CITY COUNCIL AGENDA BILL

City of Black Diamond  
Post Office Box 599  
Black Diamond, WA 98010

ITEM INFORMATION			
<b>SUBJECT:</b> <b>PUBLIC HEARING-</b> <b>Storm and Surface Water Plan</b>	<b>Agenda Date: May 20, 2010</b>		<b>AB10-034</b>
	Department/Committee/Individual	Created	Reviewed
	Mayor Rebecca Olness		
	City Administrator –		
	City Attorney –Chris Bacha		
	City Clerk – Brenda L. Martinez		X
	Finance – May Miller		
	Public Works – Seth Boettcher	X	
	Economic Devel. – Andy Williamson		
Cost Impact: none- Planning Consideration	Police – Jamey Kiblinger		
Fund Source:	Court – Stephanie Metcalf		
Timeline: Summer	Comm. Dev. – Steve Pilcher		
<b>Attachments: Main body of the Storm and Surface Water Plan with Maps</b>			
<p><b>SUMMARY STATEMENT:</b></p> <p>In 2008 the City hired PacWest to prepare a Storm and Surface Water Comprehensive Plan. Part of this contract was to assist the city with establishing stormwater rates and setting up the stormwater utility. The City needed assistance in preparing for the future requirements of the Phase II stormwater discharge permit requirements as mandated by the Department of Ecology.</p> <p>The major tasks of the planning effort were to:</p> <ol style="list-style-type: none"> <li>1. Inventory all of the city maintained stormwater facilities</li> <li>2. Identify the distinct basins within the City</li> <li>3. Modeling of various storm flows through the existing system</li> <li>4. Development of an operation and maintenance program, illicit discharge detection and elimination program, public education and outreach program, and low impact development guidelines.</li> </ol> <p>The Council will hear public comments related to the Storm and Surface Water Plan. The Council may discuss the plan further at future workshops or Council meetings and give direction to staff for changes or edits within the contract scope of work.</p>			
<b>COMMITTEE REVIEW AND RECOMMENDATION:</b>			
<b>RECOMMENDED ACTION: Public Hearing only no action will follow.</b>			
RECORD OF COUNCIL ACTION			
Meeting Date	Action	Vote	
May 20, 2010			

# ***STORM AND SURFACE WATER PLAN***



**Prepared For:  
City of Black Diamond**



**Prepared by:  
PacWest Engineering, LLC  
5009 Pacific Hwy E, Unit 9-0  
Fife, WA 98424  
(253) 926-3400**



**PACWEST ENGINEERING LLC**

**DECEMBER 2009**

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**CITY OF BLACK DIAMOND**

**STORM AND SURFACE  
WATER PLAN**

**PREPARED BY:**

**PACWEST ENGINEERING, LLC**

L. Brandon Smith, PE  
Christine J. Smith, PE

**APPROVED BY:**

**CITY OFFICIALS & STAFF**

Howard Botts, Mayor  
Seth Boettcher, PE, Public Works Director

**CITY COUNCIL MEMBERS**

Bill Boston  
Geoff Bowie  
Kristine Hanson  
Leih Mulvihill  
Rebecca Olness

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**Storm and Surface Water Plan  
City of Black Diamond, WA**

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**APPENDIX M – LID MAP**

**APPENDIX N – LID STANDARDS**





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# ENGINEER'S CERTIFICATION

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I hereby certify that this Storm and Surface Water Plan for the City of Black Diamond, Washington has been prepared under the supervision and direction of the undersigned, whose seals as Licensed Professional Engineers of the State of Washington are affixed below.

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L. Brandon Smith, PE

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Christine J. Smith, PE



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***City of Black Diamond***  
***Storm and Surface Water Plan (SSWP)***  
***I***



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# EXECUTIVE SUMMARY

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The City of Black Diamond Storm and Surface Water Plan (SSWP) provides a long-term outlook for the City's stormwater system. It has been developed consistent with the City-wide Comprehensive Plan and other long range planning documents. This plan has also been developed to outline strategies and recommendations to support the City's compliance with their NPDES Phase II permit requirements.

The study area for the Black Diamond Storm and Surface Water Plan consists of ten stormwater runoff basins ranging in size from 45 acres to almost 2,400 acres. Within these basins, the majority of the City drains to Lake Sawyer, either directly or through one of three major streams -- Rock Creek, Ginder Creek, or Ravensdale Creek.

The City of Black Diamond's stormwater system consists of a mixture of enclosed pipes, as well as open channels and ditches. A snapshot look at the stormwater system indicates: 572 catch basins; 12.1 miles of streams; 6 lakes; and over 49,000 feet of pipe ranging in size from 8-inch to 72-inch.

Capital improvement projects were developed as a result of hydrologic and hydraulic analyses that were conducted. Additional projects were identified by staff in areas where drainage and/or maintenance problems have been identified. In total, twenty five projects were identified for the stormwater system with an assigned priority of high, medium, or low.

The City established a stormwater utility in November 2008 and began imposing rate charges to its customers in February 2009. Since that time, the City has adopted a reduced stormwater rate in order to minimize the impact on customers who have also been financially affected by the national economic recession and an emergency long-term closure of the Green River Bridge. Due to the reduction in revenue in the stormwater utility, it is recommended that no capital improvement projects be completed until the utility is operating without a budget deficit and capital reserves are established as per City goals.

The City of Black Diamond Storm and Surface Water Plan (SSWP) also includes recommendations for the City's illicit discharge detection and elimination program and the public education and outreach component of the NPDES Phase II permit requirements. The final chapter of the Storm and Surface Water Plan includes recommended standards for Low Impact Development.

The City of Black Diamond is anticipating substantial growth in population over the next several decades. This plan provides a means for ensuring that the City storm system is able to accommodate current and future customers.



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# ACRONYMS & DEFINITIONS

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<b>Allowable Discharge</b>	The rate at which runoff may be released from a project.
<b>Basin</b>	An area in which surface runoff is concentrated, usually to a single point, such as the mouth of a stream.
<b>BMP</b>	Best Management Practice
<b>Best Management Practice</b>	Structures, conservation practices and/or regulations that improve runoff quality or reduce the impact of development on runoff quantity
<b>Biofilter</b>	A plane, vegetated surface over which runoff traverses at a uniform depth and velocity.
<b>Buffer</b>	A zone which is an integral part of a stream or wetland ecosystem and which protects aquatic resources by providing: 1) protection of slope stability; 2) attenuation of runoff; 3) reduction of landslide hazards; 4) shading, input or organic debris and coarse sediments to streams; 5) room for variation in stream or wetland boundaries; and 6) habitat for wildlife and protection from harmful intrusion.
<b>Bypass</b>	The diversion of stormwater from any portion of a stormwater treatment facility.
<b>cfs</b>	Cubic Feet per Second
<b>Check Structure</b>	A rock, earthen, or log dam used in channels to reduce water velocities, promote sediment deposition and/or enhance infiltration.
<b>CIP</b>	Capital Improvement Plan
<b>City</b>	City of Black Diamond
<b>Clean Impervious Surface</b>	An impervious surface on which the frequency or probability of contamination from motor vehicles or from the routine handling of hazardous materials is minimal. Such surfaces may include, but are not limited to: rooftops, sidewalks, dedicated play areas, and emergency fire lanes.
<b>Closed Basin</b>	A basin for which there is no surface water outlet.



## ACRONYMS & DEFINITIONS

<b>Connection Charge</b>	The fee charged by the stormwater utility to property which is developed which reflects a proportionate share of the utility's capital costs attributable to the newly developed property.
<b>Conveyance</b>	A mechanism or device for transporting water including but not limited to, pipes, natural and/or manmade channels, culverts, gutters, and manholes.
<b>Corps</b>	U.S. Army Corps of Engineers
<b>CWA</b>	Clean Water Act
<b>Dead Storage</b>	The volume of storage in a facility below an outlet which does not drain after a storm event.
<b>Design Event</b>	An amount of rainfall in a specified period of time and occurring in specified volume increments over time which is used in the design of facilities.
<b>Detention Facilities</b>	A facility such as a pond, vault, or pipe in which surface and stormwater is temporarily stored.
<b>DOE</b>	Washington State Department of Ecology
<b>EIS</b>	Environmental Impact Statement
<b>EPA</b>	U.S. Environmental Protection Agency
<b>ESA</b>	Endangered Species Act
<b>FEMA</b>	Federal Emergency Management Agency
<b>FIRM</b>	Flood Insurance Rate Map
<b>GMA</b>	Growth Management Act
<b>Ground Water</b>	Water in a saturated zone or stratum beneath the surface of the land or below a surface water body.
<b>Illicit Connection</b>	Any man-made conveyance that is connected to a municipal separate storm sewer without a permit, excluding roof drains and other similar type connections.
<b>Illicit Discharge</b>	Any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.
<b>JARPA</b>	Joint Aquatic Resources Permit Application





## ACRONYMS & DEFINITIONS

<b>KCSWDM</b>	King County Surface Water Design Manual
<b>LID</b>	Low Impact Development
<b>Low Impact Development</b>	A stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrologic functions.
<b>MS4</b>	Municipal Separate Storm Sewer System
<b>Municipal Separate Storm Sewer System</b>	A conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) that is (1) owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State Law) having jurisdiction over disposal of wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (2) designed or used for collecting or conveying stormwater; (3) which is not a combined sewer; and (4) which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.
<b>National Pollutant Discharge Elimination System</b>	The national program for issuing, modifying, revoking, and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the state from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington Department of Ecology.
<b>Natural Channel</b>	A stream, creek, river, lake, wetland, estuary, gully, swale, ravine or any open conduit in which water concentrates and flows intermittently or continuously.
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>O&amp;M</b>	Operations and Maintenance
<b>Outfall</b>	Point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the State and does not include open conveyances connecting two municipal separate storm sewer systems, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State.



## ACRONYMS & DEFINITIONS

<b>PGIS</b>	Pollutant Generating Impervious Surfaces
<b>Pollutant Generating Impervious Surfaces</b>	Surfaces considered to be significant sources of pollutants in stormwater runoff. Such surfaces include those that are subject to vehicular use, industrial activities, or storage of erodible or leachable materials that receive direct rainfall or run-on or blow-in of rainfall. Metal roofs are considered to be PGIS unless coated with an inert, non-leachable material. A surface, whether paved or not, shall be considered PGIS if it is regularly used by motor vehicles. The following are considered regularly-used surfaces: roads, un-vegetated road shoulders, bike lanes within the traveled lane of a roadway, driveways, parking lots, unfenced fire lanes, vehicular equipment storage yards, and airport runways.
<b>Pothole</b>	A closed basin.
<b>RCW</b>	Revised Code of Washington
<b>Receiving Waters</b>	Waters of the United States including but not limited to wetlands, lakes, intermittent streams, and natural swales and gullies.
<b>Retention Facility</b>	A facility with no outlet to surface water and which is intended to discharge accumulated stormwater to groundwater
<b>Runoff</b>	Water that travels across the land surface and discharges to water bodies either directly or through a collection and conveyance system.
<b>SEPA</b>	State Environmental Policy Act
<b>SMA</b>	Shoreline Management Act
<b>SSWP</b>	Storm and Surface Water Plan
<b>Stormwater</b>	Runoff during and following precipitation and snowmelt events, including surface runoff and drainage.
<b>Sub-basin</b>	A drainage area which drains to a point contained within a larger basin.
<b>SWMMWW</b>	Stormwater Management Manual for Western Washington
<b>SWMP</b>	Stormwater Management Program
<b>SWPPP</b>	Stormwater Pollution Prevention Plan
<b>TMDL</b>	Total Maximum Daily Load



## ACRONYMS & DEFINITIONS

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<b>Total Maximum Daily Load</b>	A water cleanup plan. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated. The calculation must also account for seasonable variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. The Clean Water Act, section 303, established the water quality standards and TMDL programs.
<b>WAC</b>	Washington Administrative Code
<b>Water Quality Standards</b>	Surface Water Quality Standards, Chapter 173-201A WAC, Ground Water Quality Standards, Chapter 173-200 WAC, and Sediment Management Standards, Chapter 173-204 WAC.
<b>WRIA</b>	Water Resource Inventory Area
<b>40 CFR</b>	Title 40 of the Code of Federal Regulations, which is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.



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# 1.0 INTRODUCTION

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## **1.1 BACKGROUND AND PURPOSE**

This “Storm and Surface Water Plan” provides information on the City’s existing stormwater management program and recommends a comprehensive stormwater management plan for the City. This plan presents capital facilities needed to accommodate existing and future growth, and proposes strategies to address compliance with Federal and State stormwater requirements.

The following are some of the primary topics covered within this plan:

- Stormwater System Inventory and Basin Identification
- Stormwater Model of Existing Conditions
- Stormwater Model of Future Conditions
- Identification of System Deficiencies and Recommendation of Capital Improvements
- Operations and Maintenance Program
- Illicit Discharge Detection and Elimination Program Recommendations
- Public Education and Outreach Program Recommendations
- Low Impact Development Guidelines

## **1.2 FEDERAL REGULATIONS & PROGRAMS**

### **CLEAN WATER ACT<sup>1</sup>**

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1977. Under the CWA, EPA has implemented pollution control programs such as setting wastewater standards for industry. They have also set water quality standards for all contaminants in surface waters.

The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. EPA's National Pollutant Discharge Elimination System (NPDES) permit program controls discharges. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters

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<sup>1</sup> Environmental Protection Agency, “Summary of the Clean Water Act”, Nov. 11, 2008, <<http://www.epa.gov/regulations/laws/cwa.html>>.



The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water or with water quantity issues.) The statute employs a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

For many years following the passage of CWA in 1972, EPA, states, and Indian tribes focused mainly on the chemical aspects of the "integrity" goal. During the last decade, however, more attention has been given to physical and biological integrity. Also, in the early decades of the Act's implementation, efforts focused on regulating discharges from traditional "point source" facilities, such as municipal sewage plants and industrial facilities, with little attention paid to runoff from streets, construction sites, farms, and other "wet-weather" sources. Starting in the late 1980s, efforts to address polluted runoff have increased significantly. For "nonpoint" runoff, voluntary programs, including cost-sharing with landowners are the key tool. For "wet weather point sources" like urban storm sewer systems and construction sites, a regulatory approach is being employed.

Evolution of CWA programs over the last decade has also included something of a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of this approach.

### **NPDES PERMITS<sup>2</sup>**

Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In Washington State, the NPDES permit program is administered by the Washington Department of Ecology. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

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<sup>2</sup> Environmental Protection Agency, "National Pollutant Discharge Elimination System (NPDES) Overview", Nov. 11, 2008, <<http://cfpub.epa.gov/npdes/>>.





### **ENDANGERED SPECIES ACT<sup>3</sup>**

When the Endangered Species Act (ESA) was passed in 1973, it represented America's concern about the decline of many wildlife species around the world. It is regarded as one of the most comprehensive wildlife conservation laws in the world. The purpose of the ESA is to conserve "the ecosystems upon which endangered and threatened species depend" and to conserve and recover listed species. Under the law, species may be listed as either "endangered" or "threatened". Endangered means a species is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened.

The species listed include U.S. and foreign species and covers mammals, birds, reptiles, amphibians, fishes, snails, clams/ mussels, crustaceans, insects, arachnids, and plants.

The law is administered by the Interior Department's U.S. Fish and Wildlife Service (FWS) and the Commerce Department's National Marine Fisheries Service. The FWS has primary responsibility for terrestrial and freshwater organisms, while the National Marine Fisheries Service's responsibilities are mainly for marine species such as salmon and whales.

Appropriate use and development impacting the creeks, streams, rivers, lakes within the City of Black Diamond is important to ensure protection of the habitat for species included on the federal Endangered Species list. A listing of endangered species can be found on the U.S. Fish and Wildlife Service website at [www.fws.gov/endangered](http://www.fws.gov/endangered).

## **1.4 STATE REGULATIONS & PROGRAMS**

### **PUGET SOUND WATER QUALITY MANAGEMENT PLAN<sup>4</sup>**

The Puget Sound Water Quality Management Plan is Washington State's long-term strategy for protecting and restoring Puget Sound. The management plan provides the framework for managing and protecting the Sound and coordinating the roles and responsibilities of federal, state, tribal and local governments. To coordinate government actions for protecting and restoring the Sound, the 1996 legislature established the Puget Sound Water Quality Action Team, the Puget Sound Council and a governor-appointed chair who manages both of these. Together, the Action Team and Council periodically review and update the management plan to reflect changing issues, advances in technology, public expectations, and political and budgetary concerns.

The management plan also serves as the federally approved Comprehensive Conservation and Management Plan (CCMP) for Puget Sound under Section 320 of the federal Clean Water Act, which established the National Estuary Program.

The goal of the Puget Sound Management Plan is to restore and protect the biological health and diversity of Puget Sound by:

<sup>3</sup> US Fish and Wildlife, "ESA Basics", Nov. 12, 2008, <<http://www.fws.gov/endangered/>>

<sup>4</sup> "Puget Sound Water Quality Management Plan", Puget Sound Water Quality Action Team, Dec. 14, 2000.





- preserving and restoring wetlands and aquatic habitats and the natural processes and functions that created them;
- preventing increases in the introduction of pollutants to the Sound and its watersheds; and
- reducing and ultimately eliminating harm from the entry of pollutants to the waters, sediments and shorelines of Puget Sound.

The management plan's emphasis on prevention recognizes that it will cost us far more to clean up pollution later than to prevent it now. The management plan recognizes that we all share responsibility for the Puget Sound region and that fish, wildlife, water and pollutants cross jurisdictional lines. It establishes a framework based on a partnership among levels of government, each having a defined set of responsibilities in different program areas. And it recognizes and includes actions of federal, state, local and tribal governments, the private sector and citizens.

### **MUNICIPAL NPDES STORMWATER PERMITS**

The City of Black Diamond is covered under the Western Washington Phase II Municipal Stormwater Permit, National Pollutant Discharge Elimination System and State Waste Discharge General Permit for Discharges from Small Municipal Separate Storm Sewers in Western Washington (effective date February 15, 2007). The City is required to comply with all conditions of this permit identified for primary permittees.

One of the requirements of the NPDES Phase II Permit is that the City develop a Stormwater Management Program (SWMP). Required components of this program include:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Controlling Runoff from New Development, Redevelopment, and Construction Sites
- Pollution Prevention and Operation and Maintenance for Municipal Operations

Additional requirements of the NPDES Phase II Permit include: Compliance with Total Maximum Daily Load (TMDL) requirements, as well as monitoring and reporting responsibilities.

One of the intents of this Storm and Surface Water Plan is to provide a documented plan of action and guidance for the City to support conformance with NPDES Phase II requirements.

### **GROWTH MANAGEMENT ACT<sup>5</sup>**

The Washington State Growth Management Act was adopted because the Washington State Legislature found that uncoordinated and unplanned growth posed a threat to the environment, sustainable economic development and the quality of life in Washington.

<sup>5</sup> "The Growth Management Act", Washington State Department of Community, Trade, and Economic Development, Nov. 11, 2008, <<http://cted.wa.gov/site/375/default.aspx>>.



## 1.0 INTRODUCTION

Known as the GMA, the Act (Chapter 36.70A RCW) was adopted by the Legislature in 1990. In 1991 the GMA was amended to create the Growth Management Hearings Boards to hear and determine allegations of non-compliance with the GMA.

The GMA has been amended several times since, including 1996, when the boards' jurisdiction was expanded to include allegations of non-compliance with certain provisions of the Shoreline Management Act (SMA, Chapter 90.58 RCW).

The GMA requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive plans and implementing them through capital investments and development regulations. This approach to growth management is unique among states. Rather than centralize planning and decision-making at the state level, the GMA built on Washington's strong traditions of local government control and regional diversity. The GMA established state goals, set deadlines for compliance, offered direction on how to prepare local comprehensive plans and regulations and set forth requirements for early and continuous public participation. Within the framework provided by the mandates of the Act, local governments have many choices regarding the specific content of comprehensive plans and implementing development regulations.

Additionally, the Growth Management Act requires that the City include a Capital Facilities Element as a component of the Comprehensive Plan. The Capital Facilities element is required to consist of the following:

1. An inventory of existing capital facilities owned by the City, showing the locations and capacities of the facilities;
2. A forecast of the future needs for the above capital facilities;
3. The proposed locations and capacities of expanded or new capital facilities;
4. At least a six-year plan to finance capital facilities within projected funding capacities, which plan clearly identifies sources of public money for such purposes;
5. A requirement to reassess the land use element if probable funding falls short of meeting existing needs and to ensure that the land use element, capital facilities plan element and financing plan within the capital facilities plan element are coordinated and consistent.

### **TOTAL MAXIMUM DAILY LOAD (TMDL) PROGRAM<sup>6</sup>**

The Total Maximum Daily Load (TMDL) or Water Quality Improvement Project process was established by Section 303(d) of the Clean Water Act (CWA). Federal law requires states to identify sources of pollution in waters that fail to meet state water quality standards, and to develop Water Quality Improvement Reports to address those pollutants. The Water Quality Improvement Project establishes limits on pollutants that can be discharged to a body of water and still allow state standards to be met.

In January 1998, the Washington Department of Ecology (Ecology), U.S. Environmental Protection Agency (EPA), Northwest Environmental Advocates, and Northwest Environmental Defense Center agreed to a clean up schedule directing how Washington

<sup>6</sup> "TMDL – Overview", Washington State Department of Ecology, Nov. 11, 2008, <<http://www.ecy.wa.gov/programs/wq/tmdl/overview.html>>.



## 1.0 INTRODUCTION

state will improve the health of nearly 700 water segments. Ecology's Memorandum of Agreement (MOA) outlines a plan and schedule to improve polluted waters while expanding public involvement in Water Quality Improvement Reports.

Lake Sawyer within the City of Black Diamond has experienced water quality issues for several decades. In the 1970's, the lake's water quality declined as a result of failing septic systems in the watershed. The City constructed a wastewater treatment plant that began operating in 1981. This plant was designed to discharge to a natural wetland next to Rock Creek, ultimately draining to Lake Sawyer. This resulted in excessive nutrient loading to Lake Sawyer. In response, in 1991 the Department of Ecology developed a Total Maximum Daily Load (TMDL) with a total phosphorus target concentration for Lake Sawyer at 16 µg/L. In 1992 all wastewater from the treatment plant was diverted to the King County treatment plant located in Renton.

Since diverting the City's wastewater flows away from Lake Sawyer, there has been a consistent decline in phosphorus, although the levels are still too high. The Department of Ecology developed the "Lake Sawyer Total Phosphorus Total Maximum Daily Load – Water Quality Implementation Plan" in June 2009. This plan provides for corrective actions to address sources of phosphorus pollution in Lake Sawyer and the surrounding watershed. A copy of this plan can be found in **APPENDIX A – Lake Sawyer Total Phosphorus TMDL**.

## 1.5 LOCAL REGULATIONS & PROGRAMS

### **CITY OF BLACK DIAMOND COMPREHENSIVE PLAN<sup>7</sup>**

The City of Black Diamond adopted an updated City Comprehensive Plan in June of 2009. The City anticipates a significant increase in population in the near future as a result of several potential master planned developments. The Comprehensive Plan helps to provide guidance for the City as it grows to accommodate new growth.

The City of Black Diamond Comprehensive Plan is based upon the premise that sustainable development is based upon a trinity of ecology, sociology and economics. The plan embodies a holistic approach to treatment of nature and the human spirit. The extensive natural beauty and intricate ecosystem that comprise the planning area have been considered in determining lands that are appropriate for development at different intensities.

Planning for natural resources and open space are the cornerstone of the City of Black Diamond Comprehensive Plan. The plan supports recognition and protection of quality habitat including: the protection of key riparian corridors, wetlands and the design of green spaces between habitats; water quality protection measures and support for an environmental education area and program to build a strong community commitment to conservation and habitat improvement. Stewardship of the environment is supported by the plan.

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<sup>7</sup> "Comprehensive Plan Features", City of Black Diamond Draft Comprehensive Plan, Sept. 2008



## 1.0 INTRODUCTION

The City's developed areas will be compact, preserving 35% to 40% of the entire City as open space. Interspersed among the built areas will be large connected areas of open space that act as a green necklace. Creeks, wetlands and significant animal habitat will be protected as part of the open space network. Trails, parks, community facilities will also define the open space network.

### **STORMWATER TECHNICAL MANUAL**<sup>8</sup>

The City of Black Diamond has adopted the "Stormwater Management Manual for Western Washington", as published by the Department of Ecology and as modified by the "Black Diamond Development Standards". These standards establish the minimum requirements for stormwater control and site development requirements for all new development and redevelopment. The manuals outline water quantity design criteria, water quality controls, erosion and sediment control practices, and site development.

### **SEPA**

The City of Black Diamond's Environmental Policies and Procedures have been adopted as Chapter 19.094 of the Black Diamond Municipal Code. This section of the code was developed in conformance with the State Environmental Policy Act (SEPA) and applicable State regulations.

### **SHORELINE MASTER PROGRAM**

The City of Black Diamond's Shoreline Master Program has been adopted as Chapter 19.08 of the Black Diamond Municipal Code. The Shoreline Master Program was developed pursuant to the Shoreline Management Act of 1971 and applicable State regulations. It is in the process of being updated as required.

### **SENSITIVE AREAS ORDINANCE**<sup>9</sup>

The City of Black Diamond has recently adopted a Sensitive Areas Ordinance. This ordinance identifies protection measures for the City's wetlands, streams, wildlife habitat, and other ecological systems. Development must adhere to these protection and mitigation guidelines.

The City of Black Diamond's approach to Sensitive Areas is to provide the highest level of protection for the natural systems that contribute the highest ecological functions. This is accompanied by a lower level of protection for resources that provide less critical function. This method is unique to the specific environmental characteristics of the City, and allows for a balance of natural systems protection and urban and economic development.

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<sup>8</sup> The recently updated "Black Diamond Development Standards" identify the Department of Ecology's 2005 "Stormwater Management Manual for Western Washington" as the City's standard with minor modifications as included in the City's Development Standards. The "Black Diamond Development Standards" are in draft format as of April 2009. References included herein may refer to the Standards as an adopted document as it is reasonably assumed that adoption of this document will occur prior to adoption of this "Storm and Surface Water Plan".

<sup>9</sup> "Draft BAS Report and Sensitive Areas Summary", City of Black Diamond, August 2008.



### **STORMWATER REGULATIONS**

Title 14 of the Black Diamond Municipal Code is entitled Stormwater Regulations and covers such topics as Stormwater Management and Drainage Design, as well as the City's Stormwater Utility.

### **SWMP**

The City of Black Diamond has developed a Stormwater Management Program (SWMP) as required by the conditions of the Western Washington Phase II Municipal Stormwater Permit (NPDES Phase II Permit). This document details the actions that the City of Black Diamond has taken or will take to maintain compliance with the conditions in the permit. A copy of the City's Stormwater Management Program has been included in **APPENDIX B – Stormwater Management Program (SWMP)**.



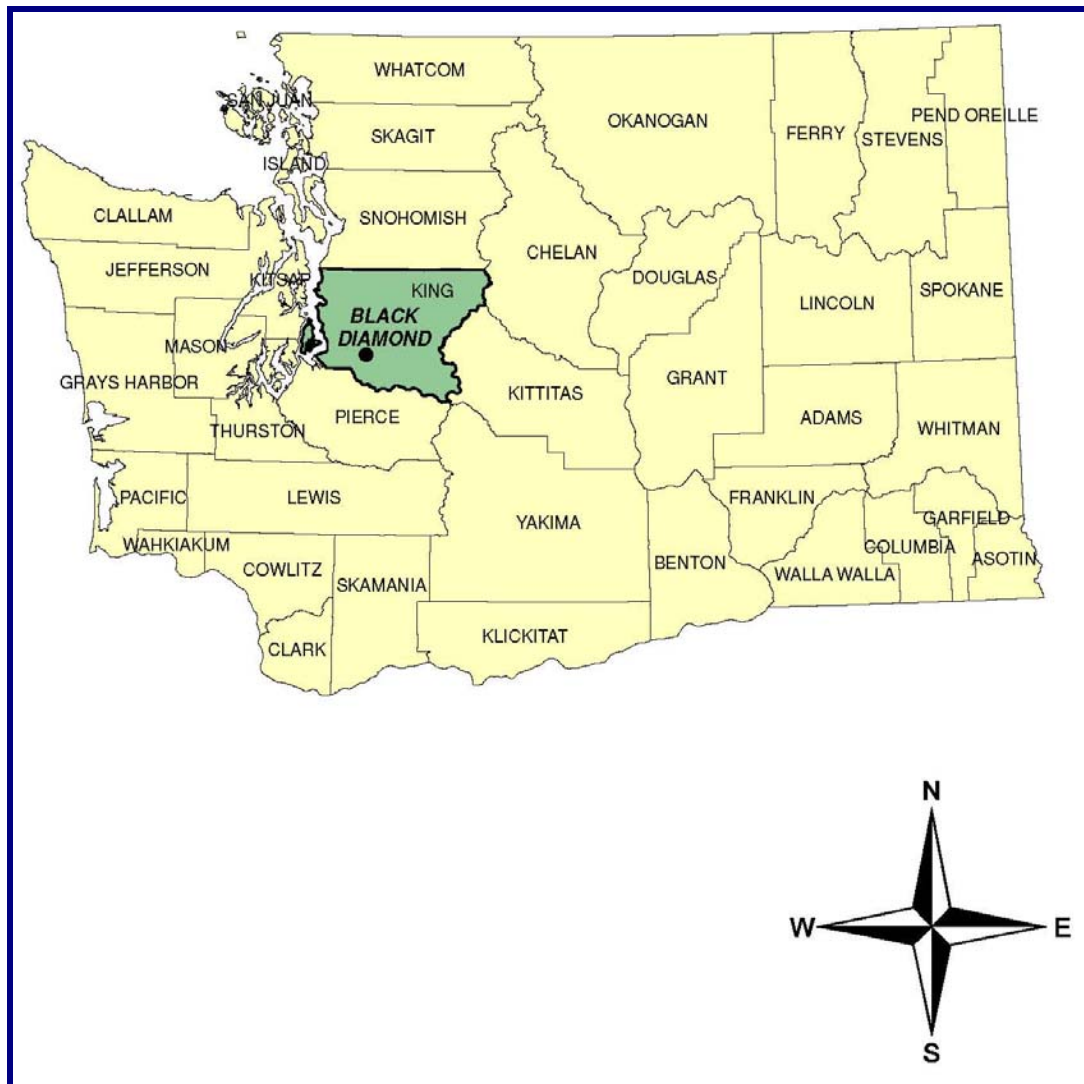


## 2.0 DRAINAGE AREA CHARACTERISTICS

### 2.1 LOCATION

The City of Black Diamond is located approximately 30 miles southeast of Seattle, Washington. Black Diamond was established in 1880 and developed as a coal mining town over the next fifty years. The City is located along Highway 169 (also known as Maple Valley-Black Diamond Road), just west of the Cascade Mountains. **Figure 2.1**

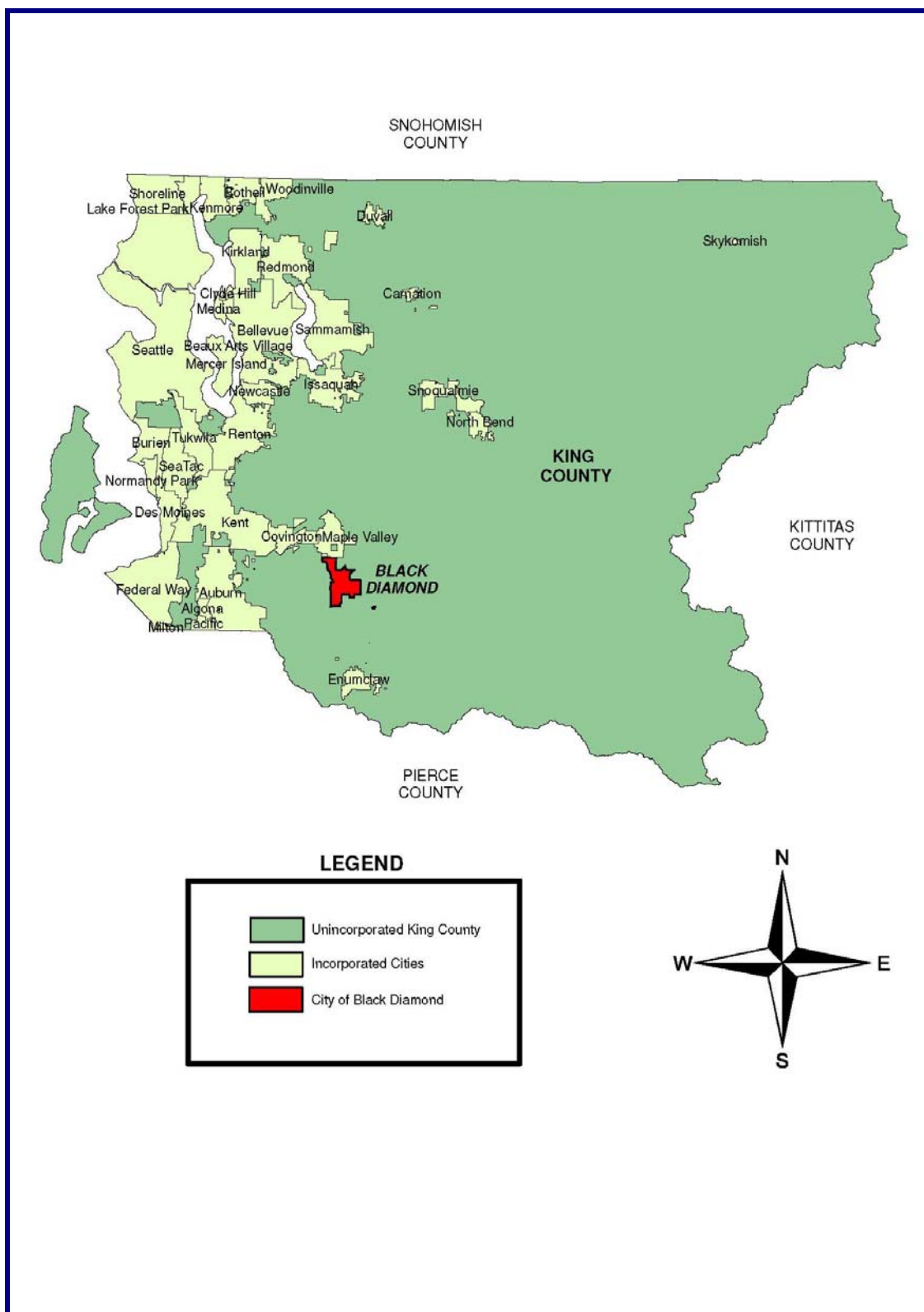
**Vicinity Map (Washington State)** illustrates the location of Black Diamond in the State of Washington. **Figure 2.2 Vicinity Map (King County)** illustrates the location of Black Diamond within King County.



**Figure 2.1 Vicinity Map (Washington State)**



## 2.0 DRAINAGE AREA CHARACTERISTICS



**Figure 2.2 Vicinity Map (King County)**





## 2.0 DRAINAGE AREA CHARACTERISTICS

The City of Black Diamond is located entirely within the Water Resource Inventory Area (WRIA) 9 – Duwamish-Green as shown in **Figure 2.3 Water Resource Inventory Areas (King County)**.



**Figure 2.3 Water Resource Inventory Areas (King County)**



## 2.0 DRAINAGE AREA CHARACTERISTICS

### 2.2 PHYSICAL ENVIRONMENT<sup>10</sup>

Planning for the future storm drainage system requires a basic understanding of the physical environment of the area. A working knowledge is useful in identifying any constraints which may affect the development of the storm system. Physical characteristics which influence planning and design include topography, geology and soils, surface water, groundwater, and climate. Descriptions of these characteristics, as well as a summary of environmentally sensitive areas in the City are as follows:

#### **TOPOGRAPHY**

The City is situated on an upland plateau bounded on the south and southeast by the Green River and on the northeast by the Cascade Range. Depressions and hummocks characterize the rolling glacial terrain.

The plateau is dotted with lakes and cut by numerous streams which drain to the Green River. The plateau is deeply incised by the Green River gorge located approximately two miles south of the City. The descent to the River is steep with a maximum slope of approximately 55%.

Elevations within the existing City limits vary between approximately 500 feet at Morganville to 1,000 feet at the eastern perimeter. Most of the existing buildings within the City are located at lower elevations, between approximately 500 and 700 feet.

Elevations within the study area range from approximately 300 feet in the southwestern corner of the study area near the banks of the Green River, to over 1,200 feet in the eastern part of the study area outside the City limits. Elevations of at least 1,000 feet are also found in the northeast corner of the study area, northeast of Lake No. 12.

#### **GEOLOGY AND SOILS**

The surficial geology and landforms in the Black Diamond area, located on the Covington Drift Plain, are the result of the most recent regional glaciation, the Vashon Stade of the Fraser glaciation. The Vashon ice sheet completely melted from the Black Diamond area approximately 10,000 years ago. During the maximum extent of the Vashon Stade, the planning area was covered with up to 2,000 feet of ice.

Since the last glaciation, urbanization, rural development, logging, gravel mining activities, erosion, and sedimentation have modified the land surface. Weathering and erosion of native soils has resulted in the development of topsoil and colluvium at the ground surface. The topsoil in undeveloped areas consists of a few inches of silt and sand with decayed roots and leaves. The weathered soils underlying the topsoil consists of silty sand and gravel with roots, generally extending 2 to 6 feet. Topographic depressions and low gradient stream channels have accumulated soft organic silt and peat. In general, the areas underlain by organic silt and peat are within wetland areas.

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<sup>10</sup> City of Black Diamond, City of Black Diamond Water System Plan, 2008.



## 2.0 DRAINAGE AREA CHARACTERISTICS

Vashon recessional outwash mantels the west portion of the City. The soil consists of sand and gravel with variable amounts of silt and cobbles deposited by the rivers emanating from the melting front of the Vashon ice sheet. This soil is considered a valuable gravel resource in this area depending on its thickness and silt content.

Vashon till is at the ground surface in some areas of the east portion of the City. Till consists of unstratified silt, sand, gravel and cobbles that are in a very dense condition because of being overridden by the glacial ice. Till is usually 20 to 40 feet thick and probably underlies the recessional outwash but may be absent where eroded during deglaciation meltwater runoff episodes.

Pre-Vashon glacial and interglacial sediments underlie the Vashon till in the west portion of the City area where bedrock is deep. The pre-Vashon glacial and interglacial sediments consist of inter-bedded and/or stratified silt, gravel and till. These soils are not exposed at the ground surface in the City, but are exposed in the upper walls of the Green River gorge, south of the City, and are penetrated by water wells in the west portion of the area.

Bedrock of the Puget Group underlies the City and surrounding area. The bedrock is locally exposed at the surface in the east portion of the area and in the walls of the Green River gorge. The bedrock consists of sedimentary sandstone, mudstone, shale and coal. Based on elevations of surface exposures and the interpretation of well water logs by Icicle Creek Engineering, Inc., bedrock underlies the property at a depth of 200 feet or more in the west portion of the City.

A map depicting soil types within the City of Black Diamond has been included as **Figure 2.4a Soils** and **Figure 2.4b Soils**.

### **SURFACE WATERS**

A map showing the surface water features within and surrounding the City of Black Diamond has been included in **Figure 2.5 Surface Waters**. How these features interact as they relate to the City's drainage system is discussed in **Chapter 3.0 Existing Storm Drainage System**.

### **Rivers**

The Green River originates in the western Cascade range approximately 30 linear miles east of the City. Flows in the river result largely from rainfall runoff and snowmelt. Flows are regulated approximately 20 miles upstream of the City by a flood control structure operated by the Corps of Engineers known as the Howard Hanson Dam. Approximately three miles downstream from the dam, the City of Tacoma operates a water intake structure capable of diverting water to the McMillin Reservoir near Tacoma.

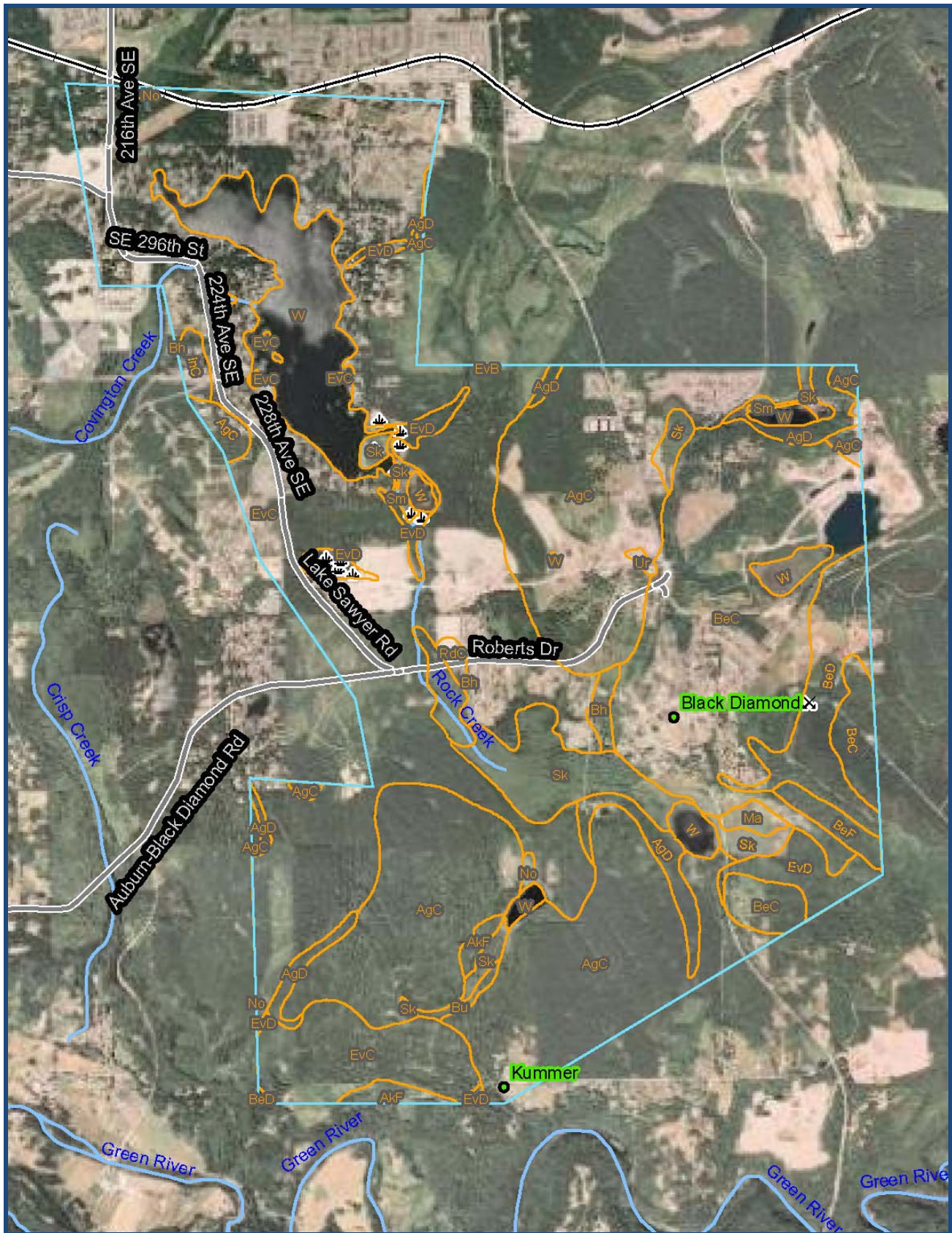
### **Streams**

There are eight creeks located in the planning area—Covington Creek, Rock Creek, Jones Lake Creek, Ginder Creek, Lawson Creek, Mud Lake Creek, an unnamed tributary to Black Diamond Lake, and Ravensdale Creek.





## 2.0 DRAINAGE AREA CHARACTERISTICS



**Figure 2.4a Soils**

(Source: Natural Resources Conservation Service)



## 2.0 DRAINAGE AREA CHARACTERISTICS

### Map Unit Legend

King County Area, Washington (WA633)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AgC	Alderwood gravelly sandy loam, 6 to 15 percent slopes	1,393.1	25.4%
AgD	Alderwood gravelly sandy loam, 15 to 30 percent slopes	120.8	2.2%
AkF	Alderwood and Kitsap soils, very steep	31.3	0.6%
BeC	Beausite gravelly sandy loam, 6 to 15 percent slopes	803.1	14.7%
BeD	Beausite gravelly sandy loam, 15 to 30 percent slopes	157.9	2.9%
BeF	Beausite gravelly sandy loam, 40 to 75 percent slopes	32.1	0.6%
Bh	Bellingham silt loam	48.3	0.9%
Bu	Buckley silt loam	8.9	0.2%
EvB	Everett gravelly sandy loam, 0 to 5 percent slopes	0.6	0.0%
EvC	Everett gravelly sandy loam, 5 to 15 percent slopes	2,118.2	38.7%
EvD	Everett gravelly sandy loam, 15 to 30 percent slopes	124.2	2.3%
InC	Indianola loamy fine sand, 4 to 15 percent slopes	19.5	0.4%
Ma	Mixed alluvial land	16.2	0.3%
No	Norma sandy loam	6.9	0.1%
RdC	Ragnar-Indianola association, sloping	9.9	0.2%
Sk	Seattle muck	209.0	3.8%
Sm	Shalcar muck	8.4	0.2%
Ur	Urban land	4.6	0.1%
W	Water	366.1	6.7%
Totals for Area of Interest		5,479.1	100.0%

**Figure 2.4b Soils**

(Source: Natural Resources Conservation Service)

Covington Creek is classified as a Shoreline of the State, subject to the Shoreline Management Act (SMA). There is only a small segment of Covington Creek where it exits Lake Sawyer within the existing city limits.

### Lakes

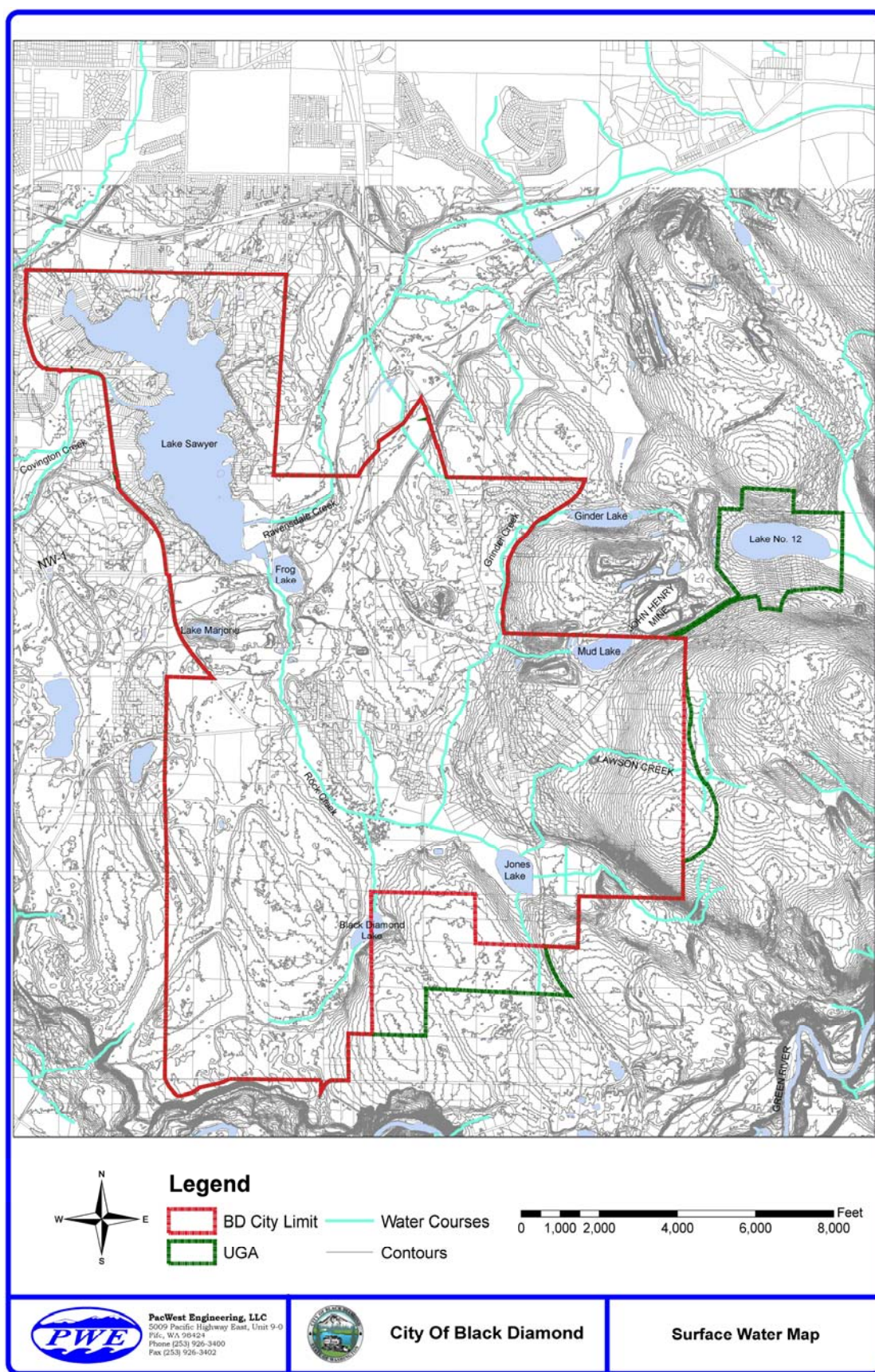
There are eight existing lakes within the planning area — Lake Sawyer, Frog Lake, Lake Marjorie, Black Diamond Lake, Jones Lake, Ginder Lake, Mud Lake, and Lake Number 12.

Lake Sawyer is the fourth largest natural lake in King County at 286 acres. Lake Sawyer is considered a “shoreline of the state” and is subject to the SMA and the City’s Shoreline Master Program. The lake is fed by Rock Creek and Ravensdale Creek. Lake Sawyer’s outlet is Covington Creek which flows west into the Soos Creek Drainage System. Lake Sawyer has experienced water quality problems from various sources, including discharge of inadequately treated sewage from the decommissioned City of Black Diamond sewage treatment plant. A lake management plan for Lake Sawyer was completed by King County in 2000. The City and King County have conducted stormwater monitoring in the lake’s watershed to help identify sources of phosphorus. Data collected by volunteer lake





## 2.0 DRAINAGE AREA CHARACTERISTICS



**Figure 2.5 Surface Waters**



## 2.0 DRAINAGE AREA CHARACTERISTICS

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monitors indicate that Lake Sawyer is low to moderate in primary productivity with very good water quality. Lake Sawyer is an important migration corridor for a late run of Coho salmon that pass upstream shortly after Christmas. The fish spawn in upper Ravensdale Creek. Lake Sawyer also provides year-round recreational fishing for stocked rainbow trout and warm water fish. The lake is also used extensively for boating, water-skiing, and other recreation. Public access is provided at a boat launch on the northwest side of the lake. An undeveloped 168 acre park is located along the southern part of the lake.

Frog Lake is located in the northwestern part of the planning area at the southeastern portion of Lake Sawyer. Frog Lake is approximately 25 acres in size. It is largely a forested wetland with an open water area. As a wetland related to Lake Sawyer, Frog Lake is considered a shoreline of the state regulated by the SMA.

Lake Marjorie is approximately 5 acres in size. It is described as a groundwater depression or pothole.

Black Diamond Lake is approximately 11 acres in size with an average depth of 6 feet and a maximum depth of 8 feet and is fed by surface water and groundwater. Black Diamond Lake has recreational fishing values provided by bass and other warm water fish. The lake was stocked with rainbow trout by the Washington Department of Fish and Wildlife in 1958, 1963, and 1965. There is a high quality peat wetland area located upstream from the open water lake. Black Diamond Lake and its associated world-class bog have been extensively researched by the Nature Conservancy and represent a valuable natural asset for the City.

Jones Lake is 23 acres in size. It is fed by Lawson Creek and two other unnamed tributaries, but is a highly groundwater-dependent lake that displays a seasonal fluctuation in water level. Jones Lake is classified as a dystrophic lake, which means that it has too low an accumulation of dissolved nutrients to support abundant plant life. Dystrophic lakes often have highly acidic, brownish waters filled with undecayed plant materials, and eventually develop into a peat bog or marsh.

Jones Lake is characterized by relatively high concentrations of acidic organic materials in solution. These chemical conditions can reduce the rate or prevent the processes of bacterial breakdown that would otherwise recycle nutrients from dead organic material at the bottom. The bottom deposits of Jones Lake consist largely of unrated organic material which accumulates as peat. The area of Jones Lake is identified as a peat deposit in the Tahoma Raven Heights Community Plan. Jones Lake and the surrounding land have been identified and partially acquired by the City using funds from the King County Open Space Bond Fund. Jones Lake has recreational fishing values. Stocking records available for Jones Lake (previously known as Lake 14) show the following plantings: 1915 - yellow perch; 1922, 1926, 1928, 1929 and 1930 - eastern brook trout; 1932 - kokanee; 1950 - rainbow trout; and 1956 - rainbow trout. Bass, crappie and brown bullheads have also been introduced into this system. Warm water species such as yellow perch, bass, crappie, and bullheads can spawn in lakes and establish self-reproducing populations.





## 2.0 DRAINAGE AREA CHARACTERISTICS

Ginder Lake is approximately 14 acres in size. It is located northwest of Mud Lake and Lake Number 12.

Mud Lake is largely a wetland with no open water. This lake is located in an area designated as mineral resource land. It was once part of a mining plan. However, disturbance of the lake is no longer proposed.

Lake Number 12 covers 44 acres and is fed by surface runoff and shallow groundwater flow over a less permeable substrate layer. The lake is known to have an aquatic weed growth problem associated with high phosphorus concentrations. Lake 12 is considered a “shoreline of the state” and is regulated by King County’s Shoreline Master Program. Lake 12 is in the City’s Urban Growth Area (UGA) northeast of the current city limits.

### **GROUNDWATER**

Groundwater occurs in three aquifer systems beneath the City. These aquifer systems include (1) a seasonal shallow, or “perched”, unconfined aquifer in the weathered soil and recessional outwash overlying till of bedrock, (2) an intermediate depth, regional, unconfined and confined aquifer system within the pre-Vashon glacial and interglacial sediments, and (3) a confined regional aquifer system within the bedrock.

The shallow aquifer system is the primary water resource penetrated by most of the domestic wells in the service area. The intermediate depth aquifer has potential for development as a water resource based on limited available information regarding this aquifer. The deep bedrock aquifer is controlled by fractures in the bedrock. Several domestic wells penetrate the bedrock aquifer in the east portion of the area, but are typically very low in yield.

### **Groundwater Quality**

The shallow aquifer is particularly vulnerable to contamination from the surface and may dry out seasonally in some areas. The intermediate depth aquifer is recharged over a very large area and is generally protected from contamination from the surface. The bedrock aquifer often contains water with elevated levels of minerals, such as iron and sulfur, that may affect water quality.

### **Groundwater Flow Patterns**

Groundwater flow patterns have both horizontal and vertical components. In the Black Diamond area, the primary vertical component of flow is downward percolation from the shallow aquifer, through the underlying till or fractures in the bedrock, and into the intermediate or deep bedrock aquifer. Horizontal groundwater flow in the shallow aquifer discharges to surface water features Rock Creek, Ravensdale Creek and Crisp Creek.

### **Groundwater Recharge**

Groundwater recharge to the shallow aquifer is primarily from precipitation or infiltration of surface water runoff from adjacent areas. As precipitation falls on the ground surface, a portion infiltrates the soil. Precipitation that does not infiltrate remains on the surface, filling small depressions or moving down slope as surface runoff. Some shallow infiltrated water is used by plants and returns to the atmosphere by evapotranspiration. When the soil moisture content is high, such as occurs after a long period of rainfall, some water





## **2.0 DRAINAGE AREA CHARACTERISTICS**

within the soil migrates downward. Downward percolation of water is impeded by relatively impermeable till or bedrock that underlies most of the area. Where water is concentrated within topographic low areas such as wetland or streams, there is generally more recharge than in topographic high area, where the surficial aquifer is dry much of the time.

The intermediate depth and deep bedrock aquifer systems are recharged by infiltrating water over an area much larger than the City area.

Information regarding groundwater wells in the area was collected for the Brown and Caldwell hydrogeology report of the Black Diamond Springs (1989) and well log information collected by Robinson & Noble, Inc. (1990) regarding well development in the southeastern corner of the City limits.

### **CLIMATE**

The Pacific Ocean and Puget Sound moderate temperature extremes in the region while the Cascade Mountains influence the area's precipitation. Precipitation in the area occurs primarily due to cooling of moisture-laden air masses as they flow and rise over the Cascade Mountains.

Annual precipitation ranges from 45 to 70 inches, averaging approximately 55 inches. More than 80% of the precipitation occurs October through May and 50% from November through February. Total evaporation averages approximately 25 inches per year with approximately 75% occurring during the months of May through August. Precipitation and evaporation were measured at the Landsburg weather station located approximately 5 miles north northeast of the City of Black Diamond.

Available temperature data is also from the Landsburg weather station. Low temperatures in December and January average 30° to 33° F and the highs range from 41° to 46° F. In July and August the average low temperature is approximately 50° F and the high 75° F. The lowest recorded temperature from 1976 to 1993 was 0° F in February 1989 and the highest recorded temperature was 102° F in August 1981 and May 1983.

Prevailing wind direction is from the south to the southwest during the rainy season and from the west or northwest in summer. Average wind velocity is less than 10 mph.

### **MINING ACTIVITY**

Abandoned coal mines underlie at least 50,000 acres in western and central Washington. Many of the abandoned, underground mines present in the Black Diamond area have been documented by the State. Applicants for building permits in abandoned coal mine areas are required to demonstrate the safety of the proposed project. Mitigation of a mine may be required, and a horizontal buffer of 500 feet from the vertical projection of the mine is required, regardless of depth, unless otherwise recommended by a geotechnical report by a professional engineer with expertise in geotechnical engineering. High hazard areas are typically those areas underlain by mine workings shallower than 200 feet or fifteen times the knees of the coal seam for gently dipping seams. Moderate hazard areas are areas where more workings are deeper than 200 feet or deeper than fifteen times the knees of the seam or workings for gently dipping seams. The study by professional



## 2.0 DRAINAGE AREA CHARACTERISTICS

engineers should detail the presence of surface openings, potential sinkholes, depth of working, and a detailed examination of historic mine maps and records.

The John Henry Mine, as shown on **Figure 2.5 Surface Waters**, is currently permitted for active mining, although no mining is currently occurring. The John Henry Mine is not allowed to discharge pumping to Mud Lake. The John Henry Mine must be actively mined by January 2010 or it must be reclaimed.

### **ENVIRONMENTALLY SENSITIVE AREAS**

The Black Diamond Municipal Code Chapter 19.12 establishes regulations for development in environmentally sensitive areas. These regulations were developed in order to prevent action undertaken by any person or entity resulting in a substantial environmental alteration. Specific information on the location and extent of sensitive areas within the City can be obtained from the City while sensitive area information for other areas is available from King County.

Environmentally sensitive areas include wetlands, fish and wildlife habitat conservation areas and geologically hazardous areas. Geologically hazardous areas include areas that are not suitable to development due to their susceptibility to erosion, sliding, earthquake or other geological events. A geotechnical report prepared by a licensed professional engineer is required prior to any development in these areas.

Fish and wildlife conservation areas within the City include Rock Creek and Ginder Creek corridors, open water ponds, lakes and riparian forests. Geologically hazardous areas include steep slopes (greater than 25%) and past coal mine working areas. Development around wetland areas requires buffer zones in order to reduce or mitigate any adverse impact. Permitted activities within the buffer zones include passive recreation, parks, pedestrian and bicycle trails and road and utility facilities when necessary.

### **2.3 LAND USE & ZONING**

Land use and zoning play an important role in determining growth patterns, and therefore future storm drainage patterns and requirements. Future land use, variations in use, and changing population densities, as determined by applicable zoning ordinances, can significantly impact the City of Black Diamond's future storm drainage patterns and needs.

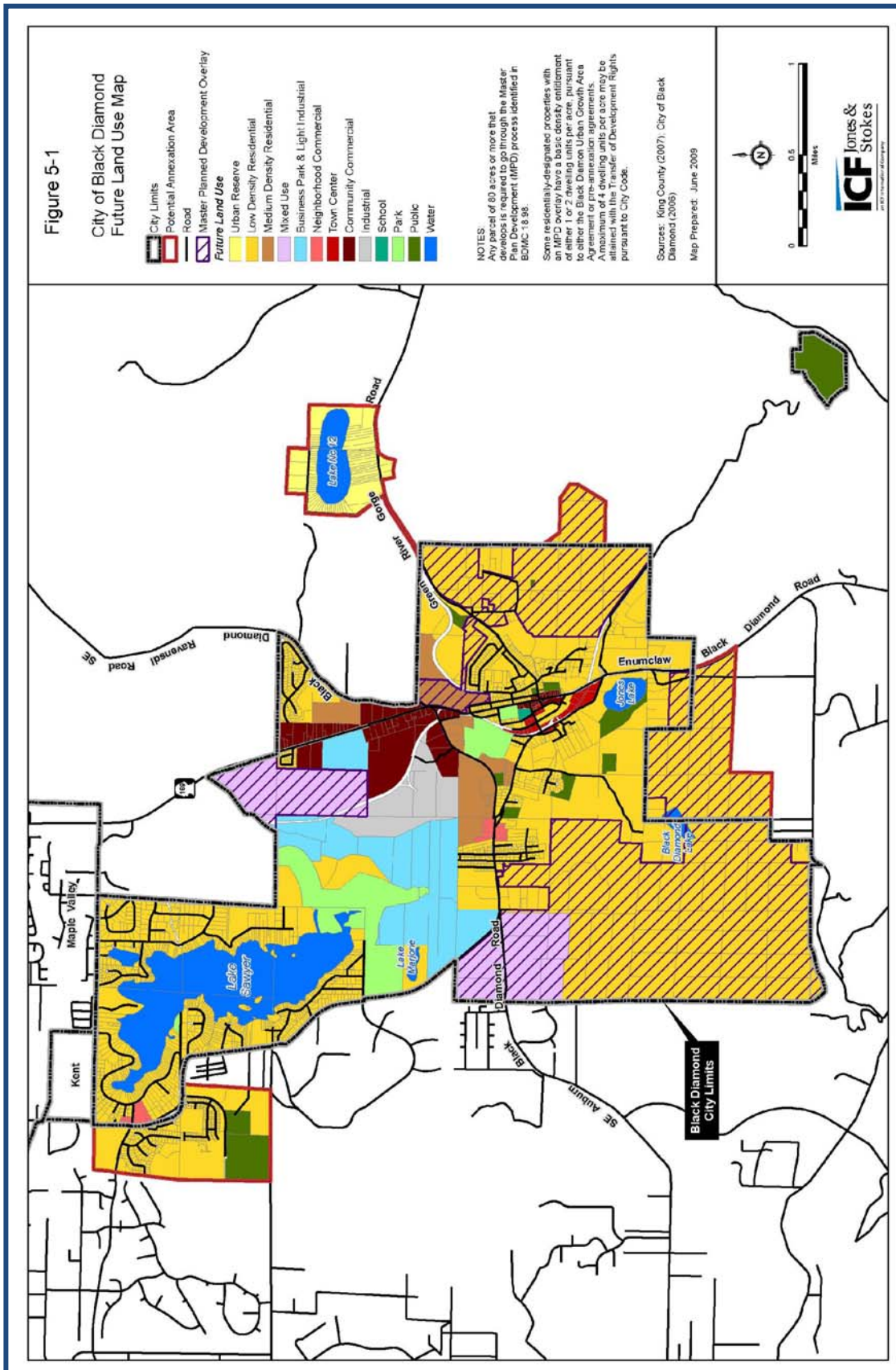
**Figure 2.6 Black Diamond Future Land Use** is the proposed land use for the City as included in the City of Black Diamond Comprehensive Plan. This figure shows designated land use within incorporated Black Diamond and the portions of unincorporated King County that are planned for master developments and may be annexed into the City in the future. Current land uses are primarily residential uses, with some light industrial and commercial areas.

**Figure 2.7 Black Diamond Zoning** includes the City's zoning as included in the City of Black Diamond Comprehensive Plan.

**Figure 2.8 King County Land Use** includes the designated land uses for the area of unincorporated King County surrounding Black Diamond.



## 2.0 DRAINAGE AREA CHARACTERISTICS

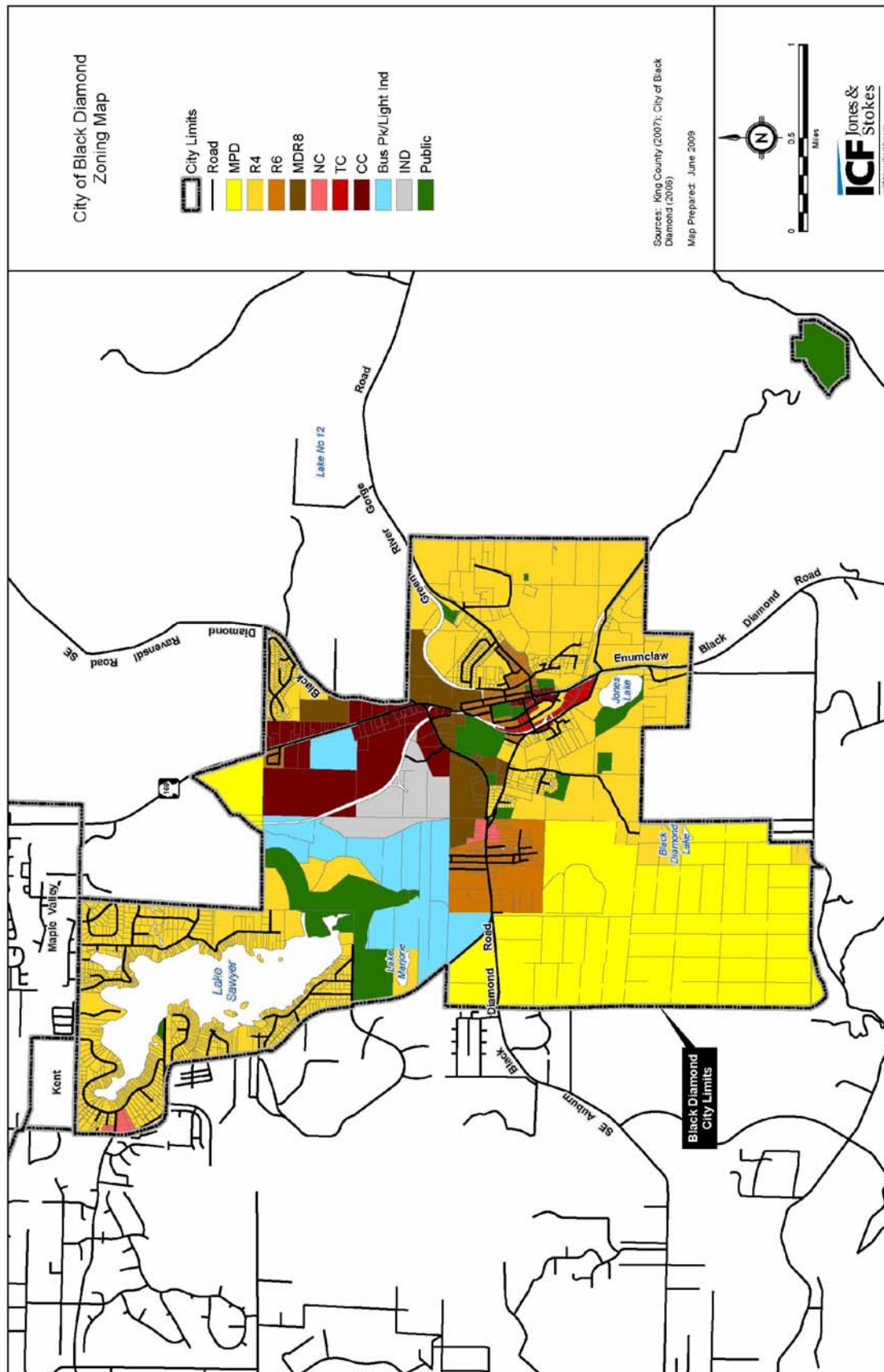


**Figure 2.6 Black Diamond Future Land Use**





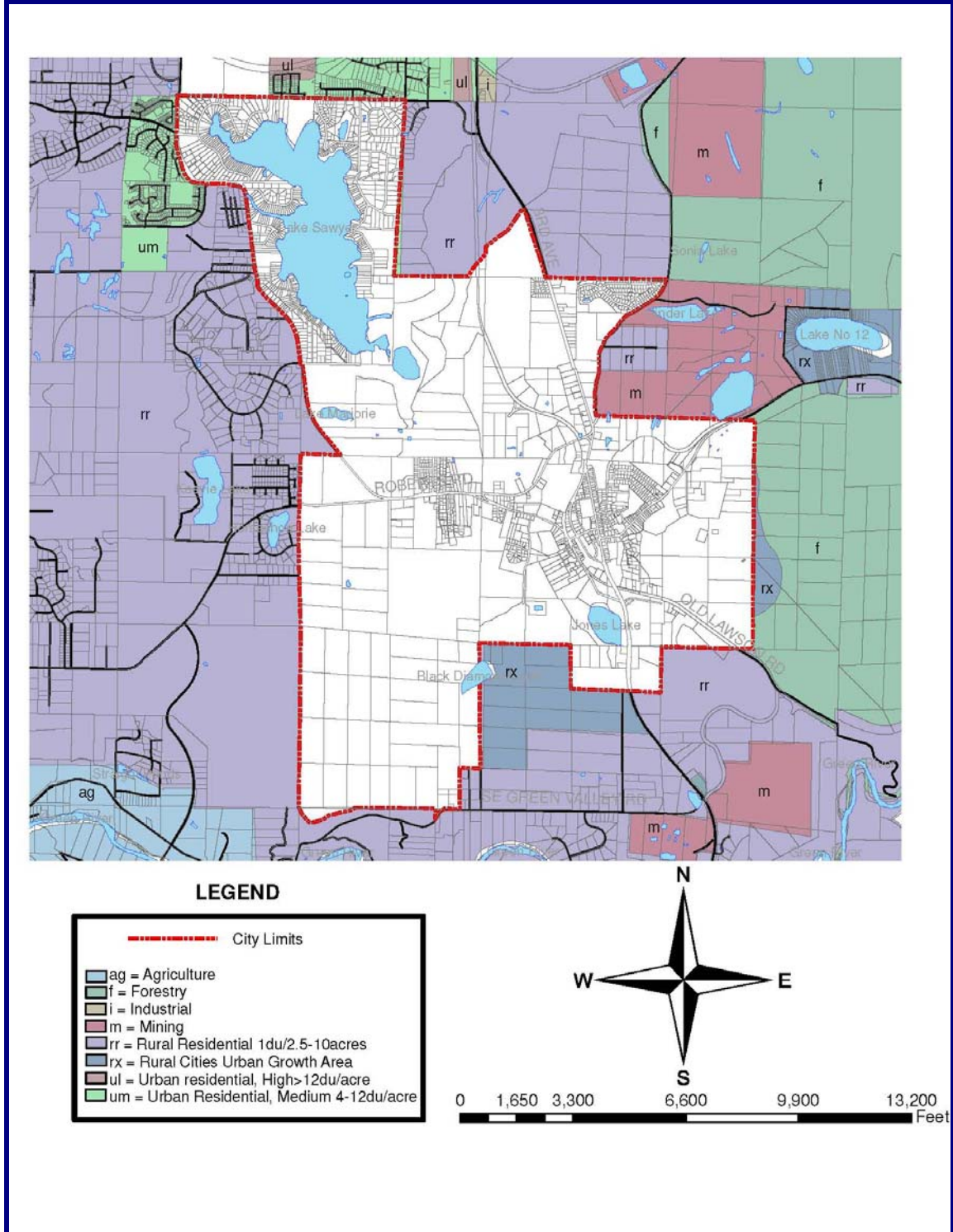
## 2.0 DRAINAGE AREA CHARACTERISTICS



**Figure 2.7 Black Diamond Zoning**



## 2.0 DRAINAGE AREA CHARACTERISTICS



**Figure 2.8 King County Land Use**



**Figure 2.9 King County Zoning** includes the zoning designations as defined by King County for the area of unincorporated King County surrounding Black Diamond.

### **2.4 POPULATION**

#### **EXISTING POPULATION & STORMWATER UTILITY CUSTOMERS**

The 2008 population within the City of Black Diamond was 4,155 per the Washington State Office of Financial Management (OFM). The City has found that developed properties contribute to an increase in surface and stormwater runoff to the surface and stormwater management system. A stormwater utility was adopted by the City of Black Diamond in November 2008. There are presently 1,478 developed parcels that are assessed the monthly stormwater utility rate. Developed properties are subject to the rates and charges of the surface water management utility based on their contribution to increased runoff based on the amount of impervious surface areas.

Properties remaining in an undeveloped condition are deemed not to make use of the services of the utility or of the facilities of the system beyond that used by such property in the natural state. Therefore, no service charge is imposed upon undeveloped real property. City, County, and/or State roadway right-of-ways are exempt from service charges and general facility charges.

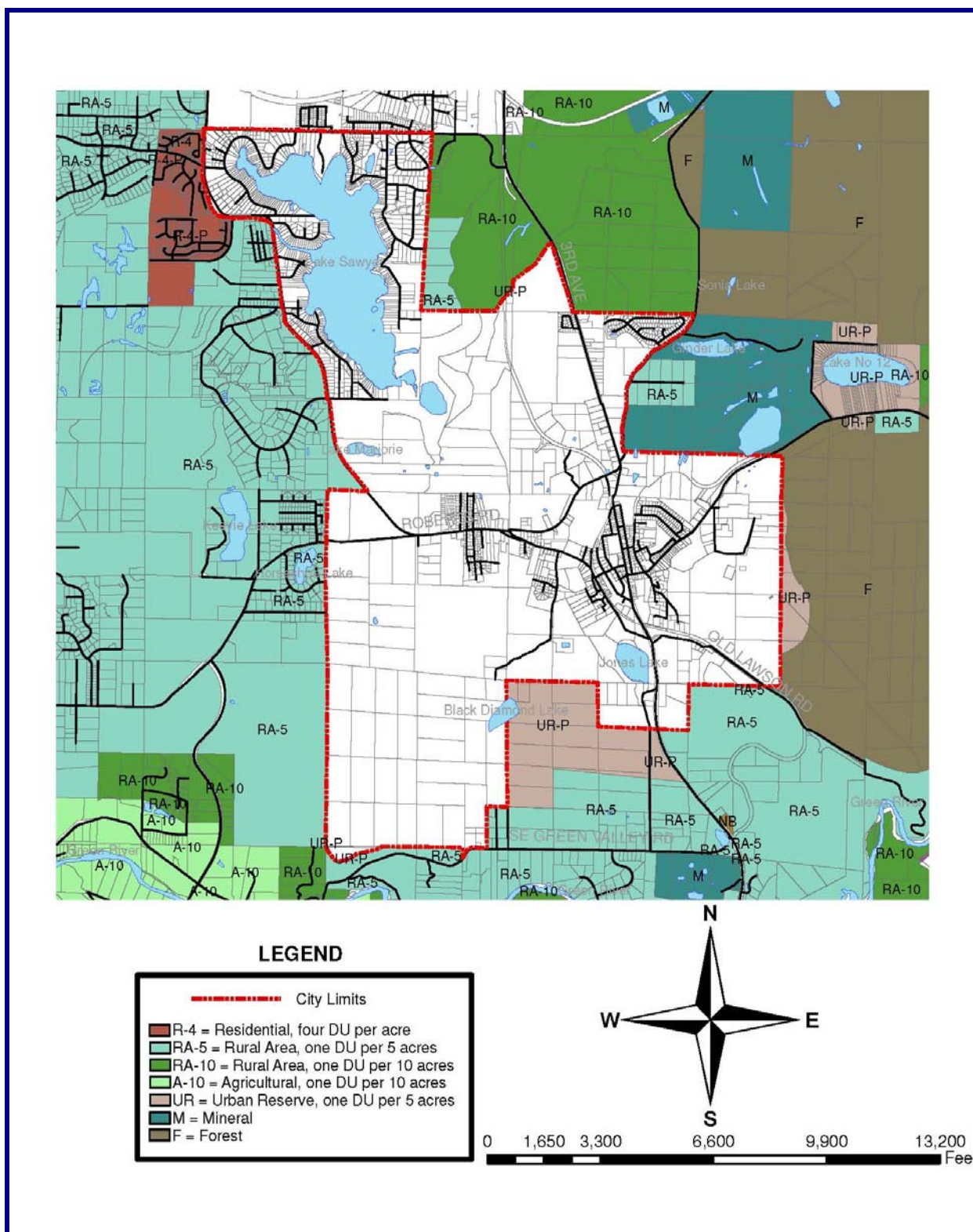
#### **EQUIVALENT RESIDENTIAL UNITS**

The City calculates the impervious ground cover of each parcel of developed real property within the boundaries of the utility to determine the number of equivalent residential units contained therein. 3,000 square feet of impervious ground cover equals one equivalent residential unit. All detached single-family residences and mobile homes are deemed to contain one equivalent residential unit; all duplexes are deemed to contain two equivalent residential units; all triplexes are deemed to contain three equivalent residential units. For all other developed real properties within the utility boundaries, the City determines the number of equivalent residential units contained thereon by dividing the number of square feet of impervious ground cover on each property by 3,000 square feet/ERU; the total thus obtained will be rounded to the nearest half representing the equivalent residential units contained on such property. Each developed parcel of property is deemed to contain a minimum of one equivalent residential unit.





## 2.0 DRAINAGE AREA CHARACTERISTICS



**Figure 2.9 King County Zoning**



## 2.0 DRAINAGE AREA CHARACTERISTICS

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### **PROJECTED POPULATION & LAND USE**

Population projections for the twenty-year planning horizon were in support of the update to the City's Comprehensive Plan. Growth projections reflect anticipated growth associated with large-scale planned developments.

The City has been under a development moratorium for several years which is expected to be removed in 2009. The City is anticipating that several large master-planned communities will submit development applications in the near future. The City is preparing to experience substantial growth. Projected land uses are based on the City of Black Diamond Land Use map as shown in the City's Comprehensive Plan and has been included previously in this Plan as **Figure 2.6 Black Diamond Future Land Use**.

Assumptions included in this Plan for these large-scale developments are based on conversations with the proposed development company and are subject to change based on the actual rate development occurs. The projections utilized in this Storm and Surface Water system analysis are the same projections utilized in the City's Comprehensive Plan and other planning documents.

The Lawson Hills Development is assumed to consist of 1,200 residential units at build-out. The Villages at Black Diamond development is assumed to consist of 4,800 residential units at build-out. It should be noted that the 6,000 proposed new residential units described above are build-out figures. Based on projected growth rates, it is anticipated that 5,000 of the proposed residential units will be constructed during the 20-year planning period of this plan.





## 3.0 EXISTING STORM DRAINAGE SYSTEM

### 3.1 INVENTORY OF EXISTING FACILITIES

The evaluation of the City's drainage facilities begins with the establishment of an inventory of the system's components. An intensive field-survey effort was undertaken to identify the extent and nature of the storm water system. This inventory concentrated on collecting the physical characteristics of the storm water management system, including sizes of pipes, materials, and their general condition. The inventory included some surface channels carrying storm water in addition to the underground pipe systems. The inventory also helped define the layout of the storm drainage system.

Since Black Diamond is a well established community, the underlying storm water infrastructure has been developed under many different programs and philosophies. As the City has undergone development and redevelopment, its storm water systems have been modified and some of the original connections were changed over time.

**Figure 3.1 Existing Storm Drainage System, Pg 1** and **Figure 3.2 Existing Storm Drainage System, Pg 2** show the location of the City's existing stormwater facilities. Large size copies of these maps have been included in **APPENDIX C – Existing Storm System Map**. A summary of major components of the City's stormwater system is summarized in **Table 3.01 Stormwater System Inventory**.

**Table 3.01 Stormwater System Inventory**

Facility	Quantity
Catch Basins	572
Stream Channel	12.1 miles
City-owned Ponds	9
Major Wetland Areas	7
Lakes	6
8-inch Pipe	918 Ft
12-inch Pipe	38,761 Ft
15-inch Pipe	3,123 Ft
18-inch Pipe	4,251 Ft
24-inch Pipe	1,024 Ft
36-inch Pipe	632 Ft
48-inch Pipe	268 Ft
54-inch Pipe	168 Ft
72-inch Pipe	213 Ft
Total Pipe (8-inch to 72-inch)	49,358 Ft

The field collected inventory of stormwater facilities was developed into a Geographic Information System Database (GIS) to create an electronic inventory. The City will be



## 3.0 EXISTING STORM DRAINAGE SYSTEM

updating this inventory as development continues to ensure that a current record of the system is maintained.

A “Stormwater Inventory Map Book” has been developed in association with the field-inventory efforts and has been produced as a stand-alone document. This set of drawings include all data included in the GIS system in an easy to read reference set for use by the City staff, it’s residents, and anyone else needing as-built information on the City’s storm drain system.

### 3.2 BASIN DESCRIPTIONS

The study area for the City of Black Diamond Storm and Surface Water Plan consists of the incorporated area of the City of Black Diamond, its Urban Growth Area (UGA), and a limited analysis of areas outside of the City’s UGA that contribute stormwater runoff to the City and it’s system. The majority of the City drains to Lake Sawyer either directly or through one of three major streams: Rock Creek, Ginder Creek (a tributary of Rock Creek), or Ravensdale Creek. Black Diamond is bounded by areas of unincorporated King County to the east, west, and south, and abuts portions of the Cities of Kent and Maple Valley to the north.

The study area for the Black Diamond Storm and Surface Water Plan consists of ten stormwater runoff basins as illustrated in **Figure 3.3 Basin Index Map**. A large scale copy of this map has been included in **APPENDIX D – Basin Index Map**. Each of these basins can be further defined by one to five sub-basins depending on tributary water course and existing topography. Individual basin maps are included as **Figure 3.4**

**Lake Sawyer Basin, Figure 3.5 Rock Creek Basin, Figure 3.6 Ginder Creek Basin, Figure 3.7 Ravensdale Basin, Figure 3.8 Jones Lake Basin, Figure 3.9 Lake Marjorie & Lake No. 12 Basin, Figure 3.10 Southern Basin, and Figure 3.11 Northwest & Southwest Basin.**

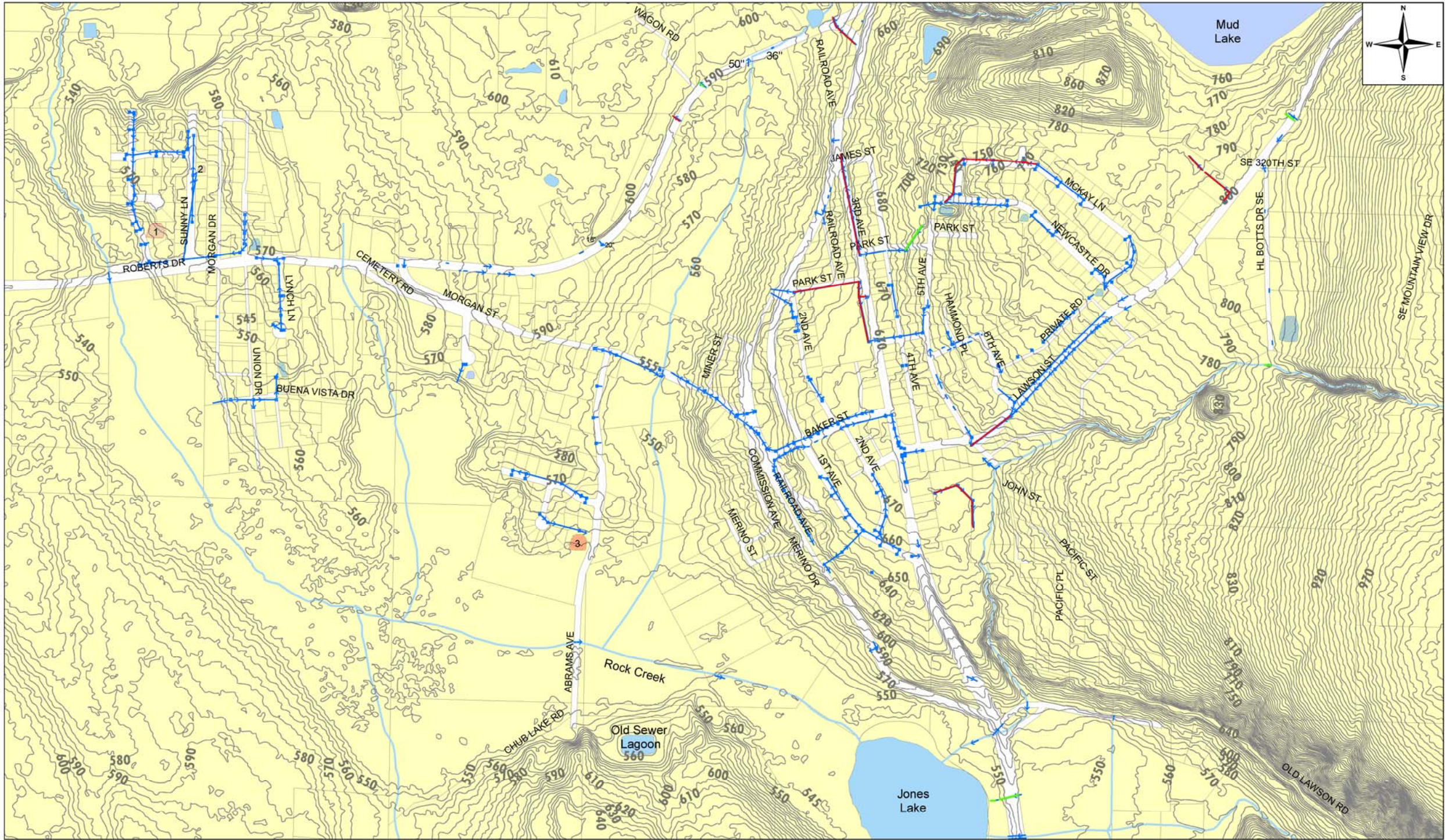
**Table 3.02 Stormwater Basins**

Basin	Size (acres)
Lake Sawyer Basin	1,360
Rock Creek Basin	1,400
Ginder Creek Basin	1,378
Ravensdale Basin	2,365
Jones Lake Basin	1,137
Lake 12 Basin	354
Lake Marjorie Basin	106
Southern Basin	45
Northwest Basin	143
Southwest Basin	622
<b>TOTAL</b>	<b>8,910</b>

Large areas outside of the City and its UGA contribute stormwater runoff to the City and the surface waters contained with in it. The Black Diamond Watershed described in this plan is entirely within the King County WRIA (Watershed Resource Inventory Area)







Sheet 1



**PacWest Engineering, LLC**  
5009 Pacific Highway East, Unit 9-0  
Pife, WA 98424  
Phone (253) 926-3400  
Fax (253) 926-3402



**City Of Black Diamond**

Legend	
	BD City Limit
	UGA
	Water Courses
	Contours
	Catch Basin
	Public Pond
	Private Pond
	15" Pipes
	18" Pipes
	6" - 12" Pipes
	24" Pipes



**Existing Storm Drainage System**





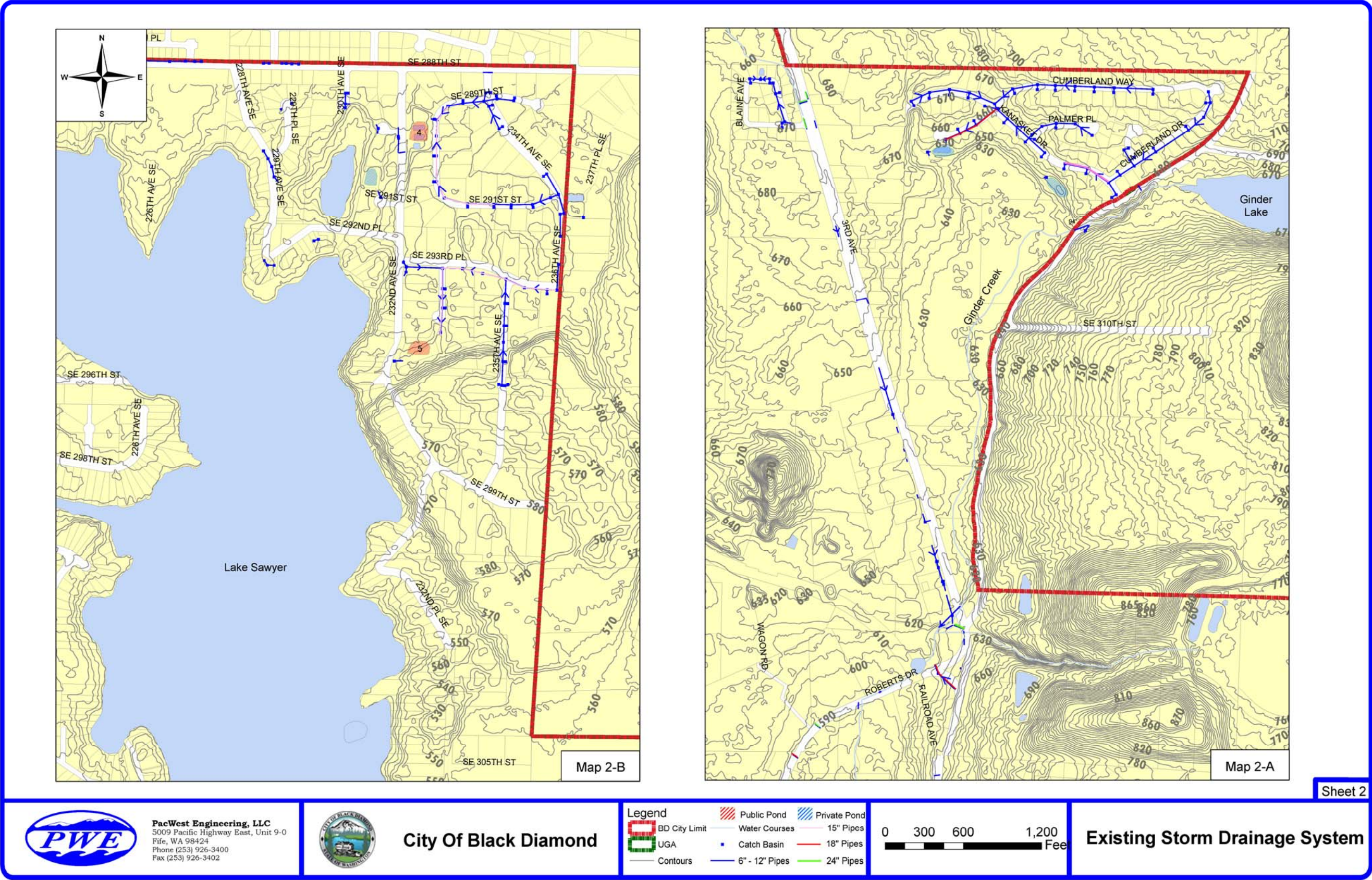
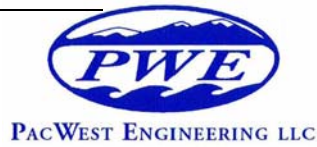


Figure 3.2 Existing Storm Drainage System, Pg 2





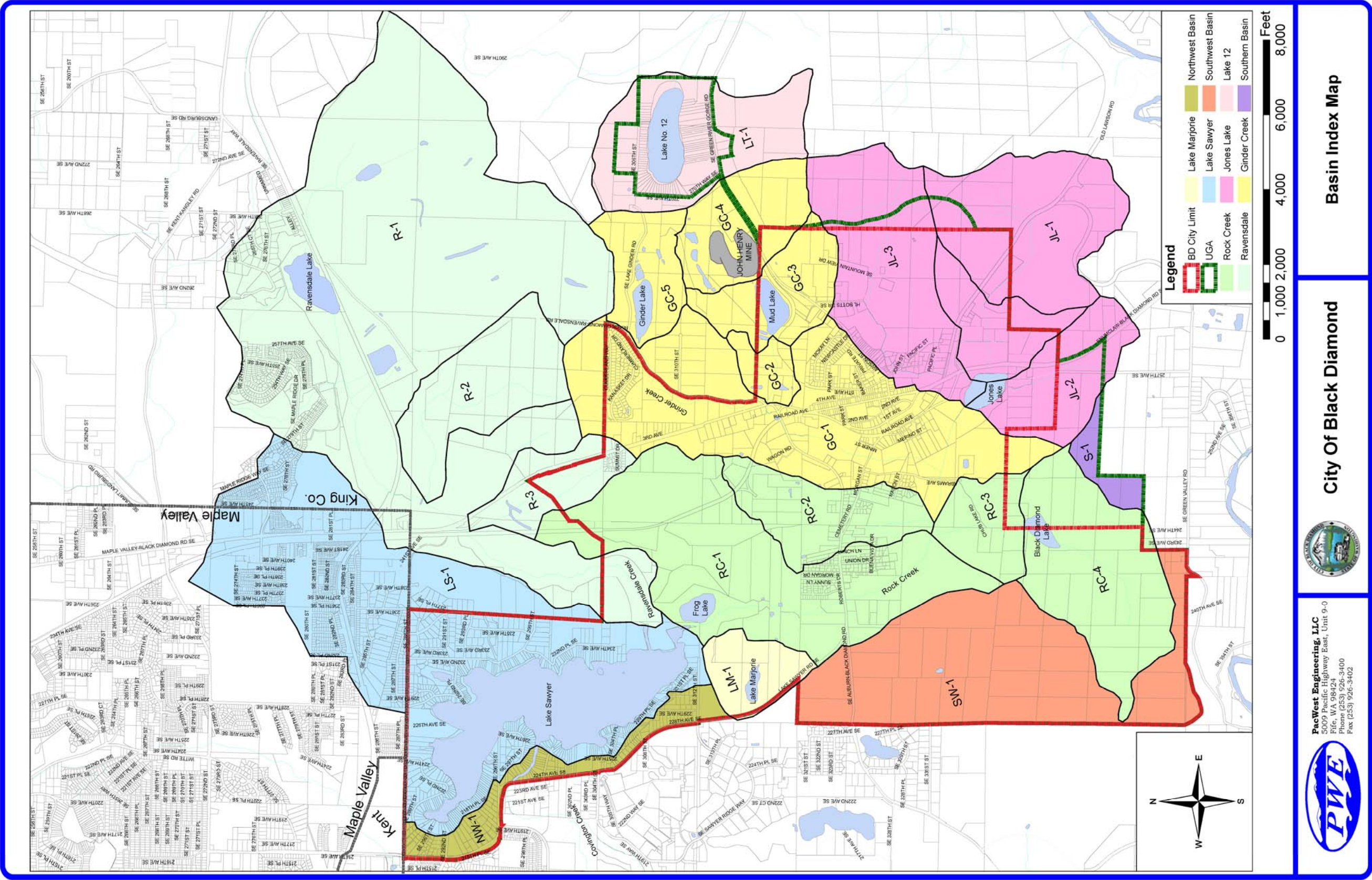


Figure 3.3 Basin Index Map



Basin Index Map

City Of Black Diamond

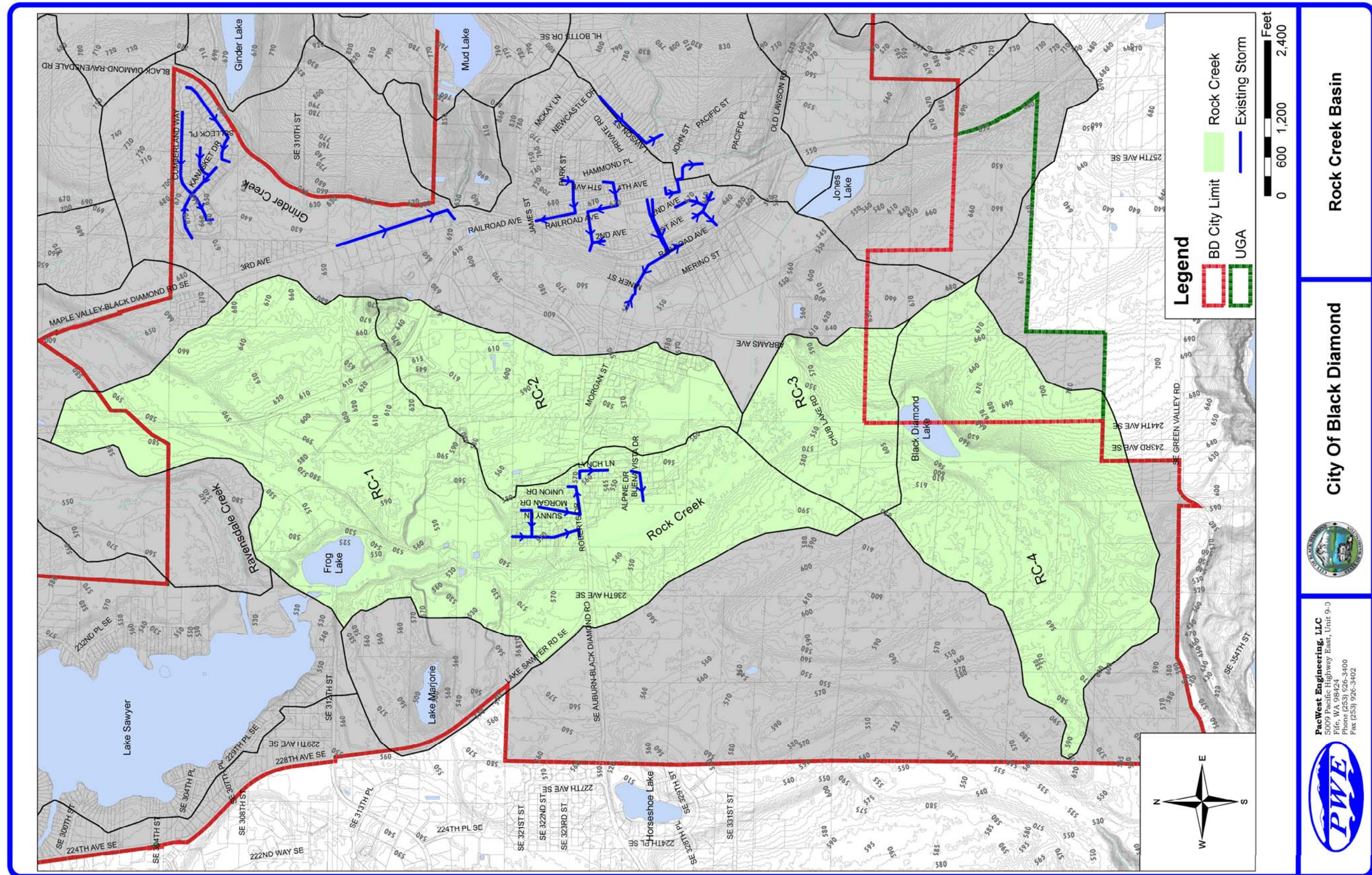
PacWest Engineering, LLC  
5009 Pacific Highway East, Unit 9-0  
Belle, WA 98424  
Phone (253) 926-3400  
Fax (253) 926-3402











**Figure 3.5 Rock Creek Basin**





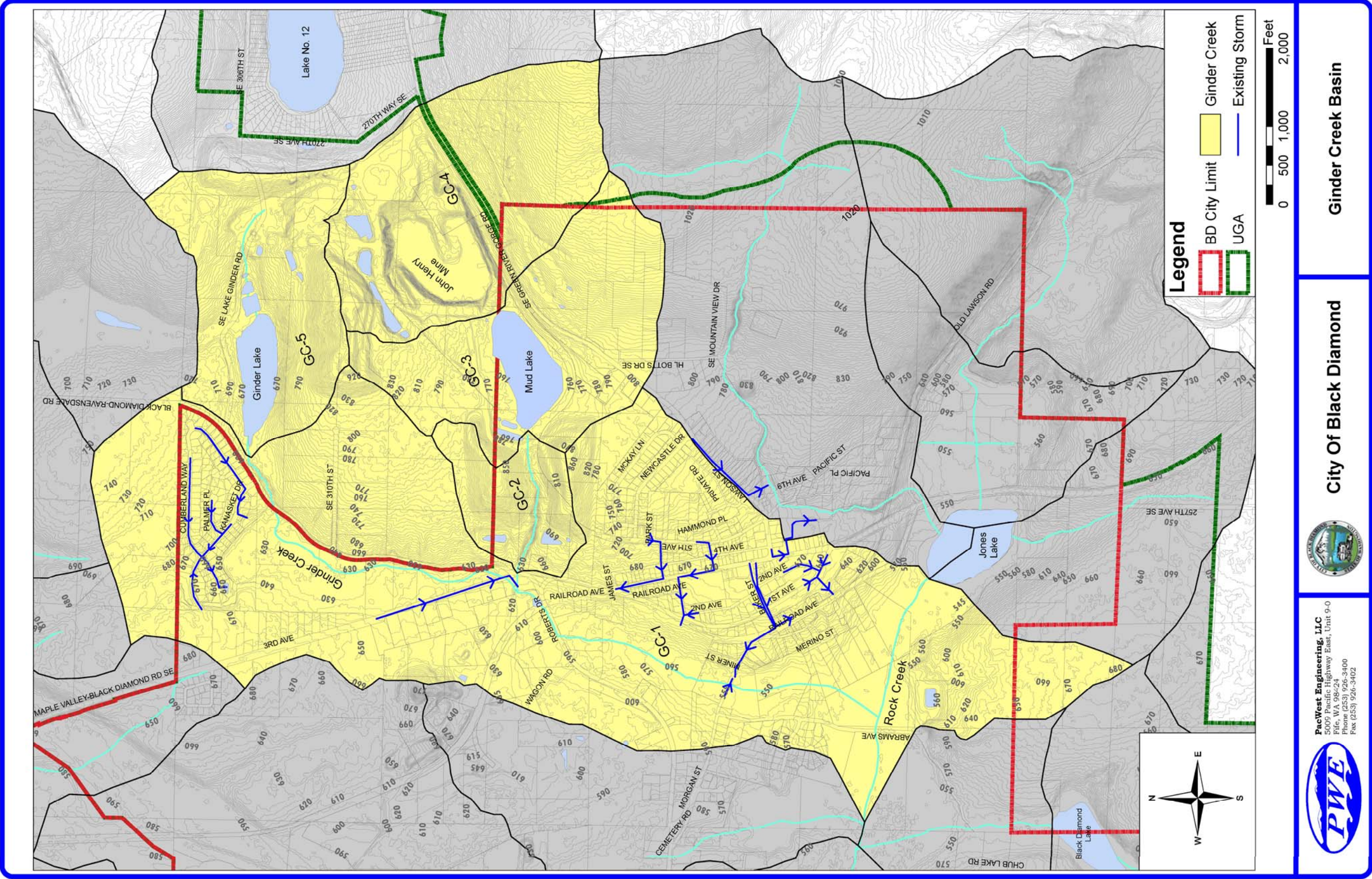


Figure 3.6 Ginder Creek Basin





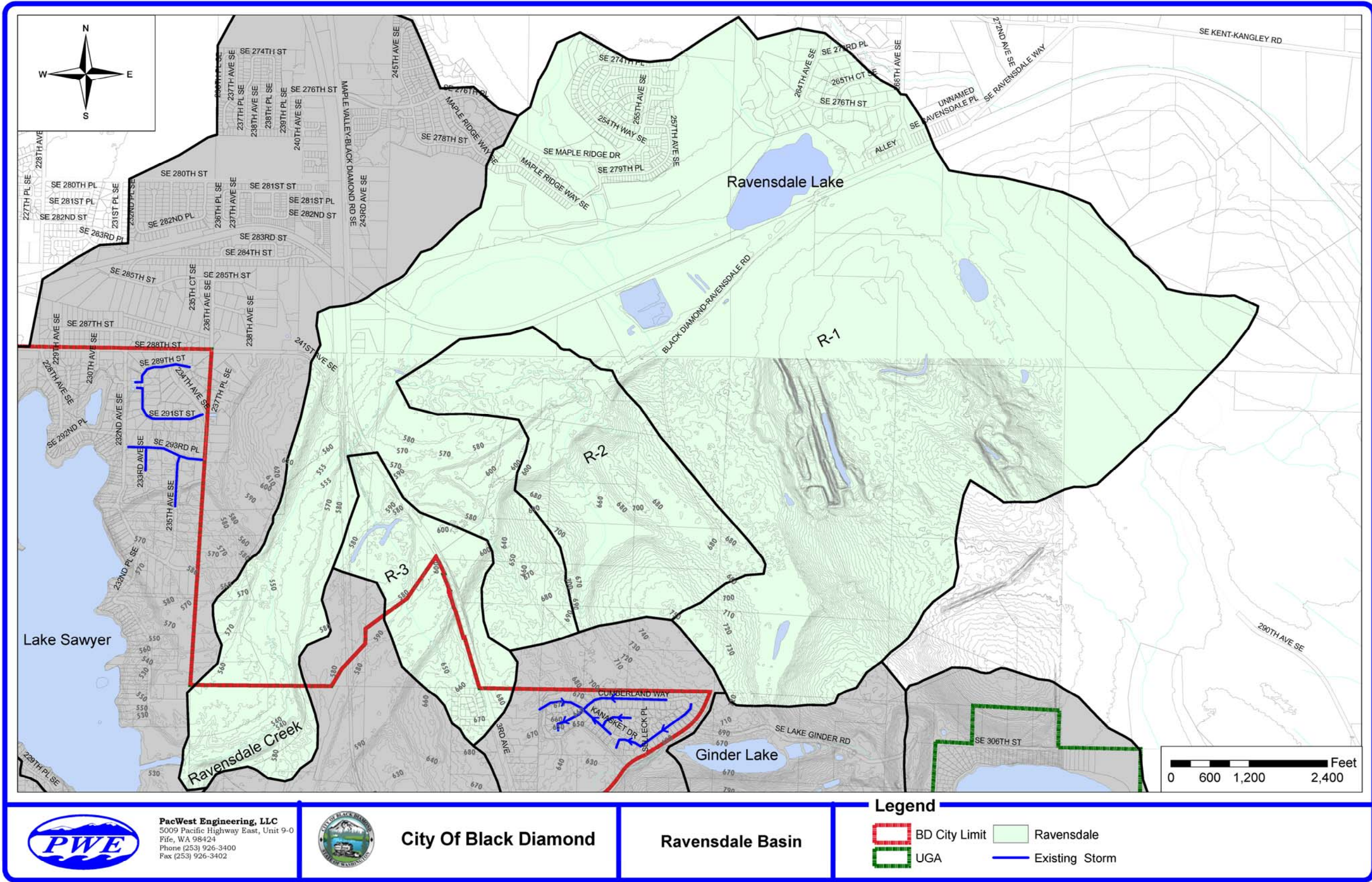


Figure 3.7 Ravensdale Basin





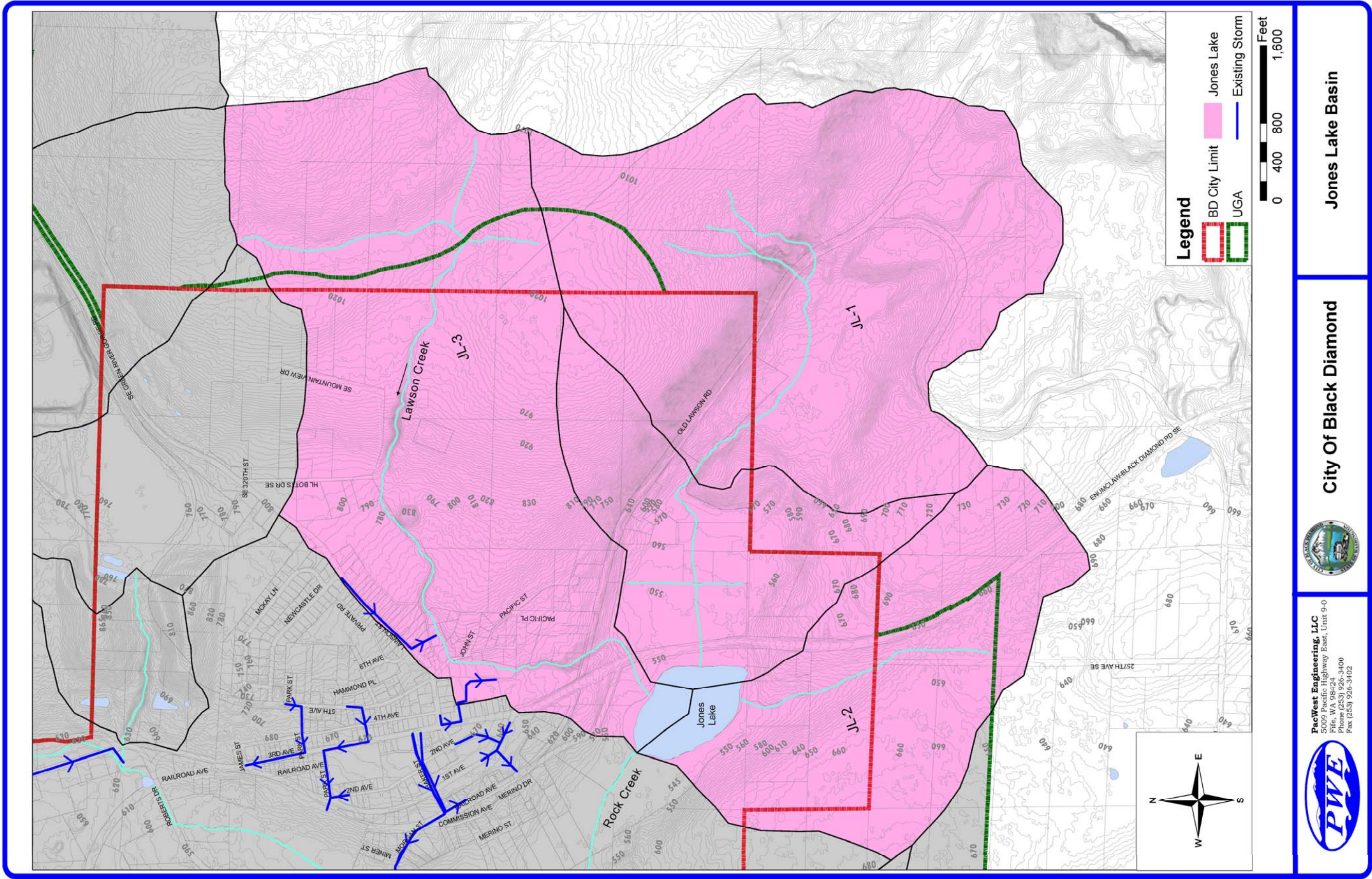


Figure 3.8 Jones Lake Basin  
City of Black Diamond  
Storm and Surface Water Plan (SSWP)  
Page 36





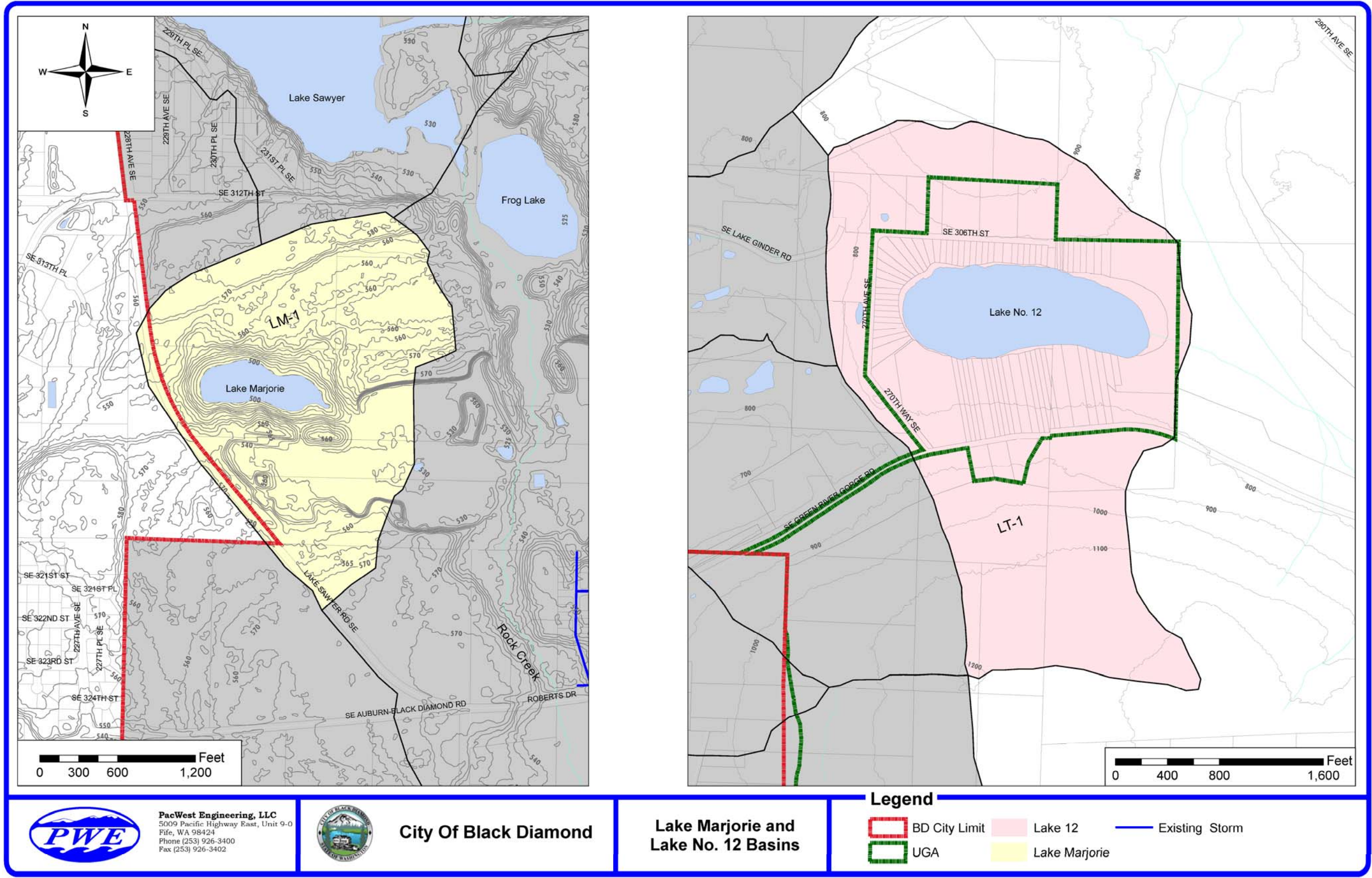


Figure 3.9 Lake Marjorie & Lake No. 12 Basins





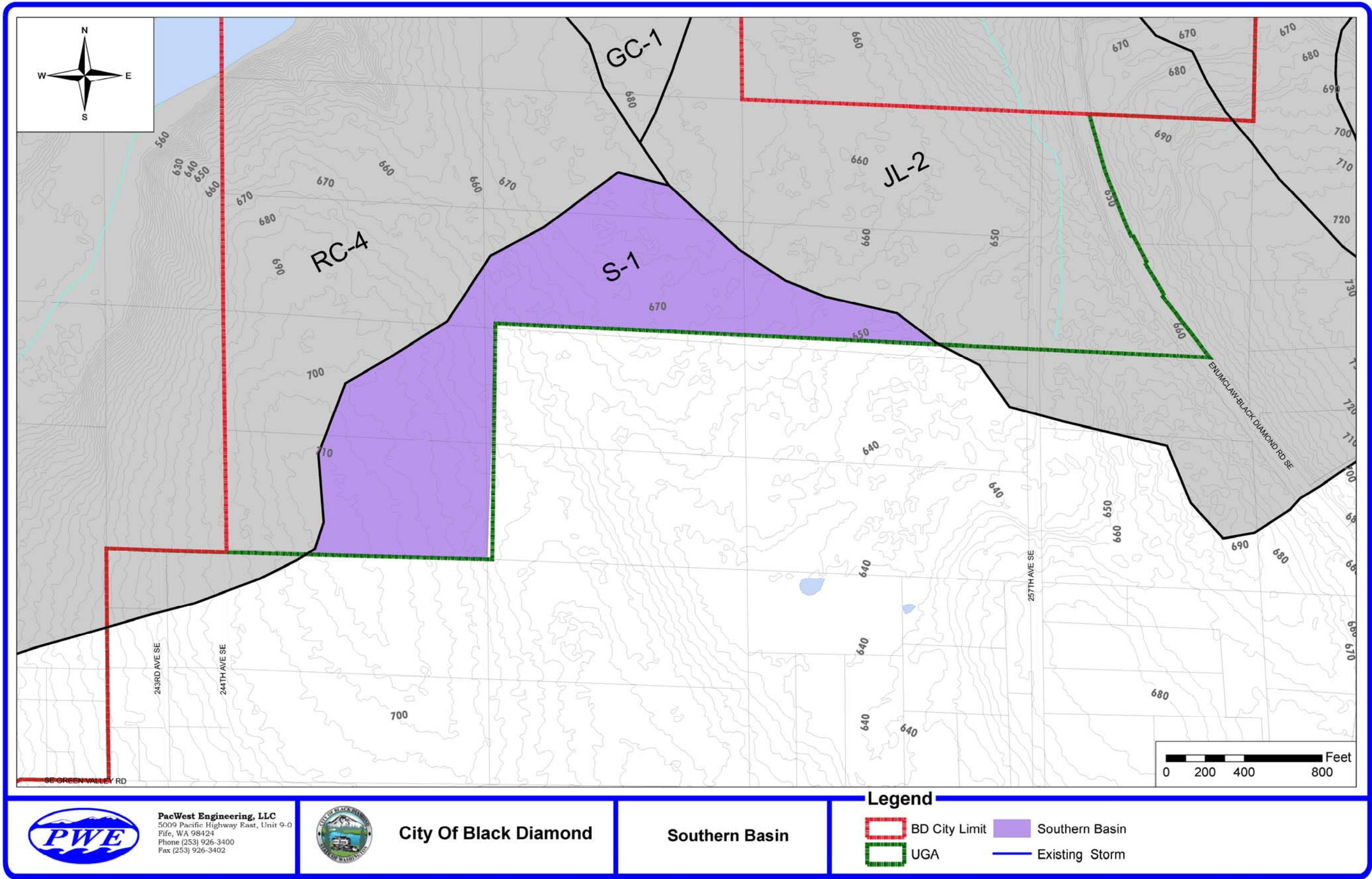


Figure 3.10 Southern Basin





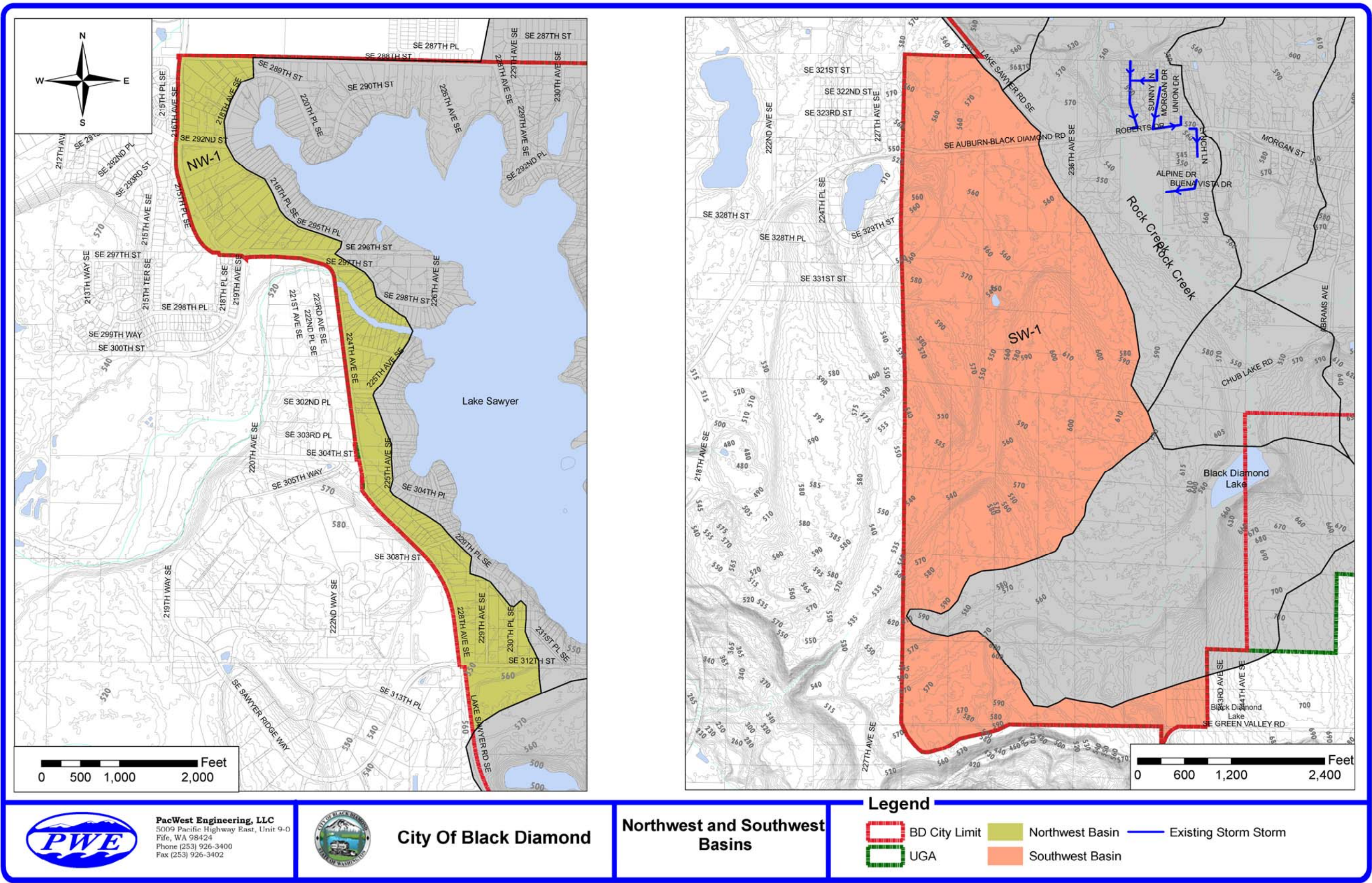


Figure 3.11 Northwest & Southwest Basins





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### 3.0 EXISTING STORM DRAINAGE SYSTEM

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Number 9, the Duwamish-Green Area. The subset King County Drainage Basin within WRIA 9 is the Covington Creek Basin. The only exception to this is the City's Lake No. 12 basin. This basin falls within WRIA Number 8, the Cedar-Sammamish and the King County Basin known as the Lower Cedar River Basin.

#### **LAKE SAWYER BASIN (LS)**

The Lake Sawyer Basin is comprised mostly of residential areas both within the City limits and in neighboring King County and Maple Valley to the north. For purposes of this study this basin was not further broken into sub-basins due to the general overland runoff and highly infiltrative soils throughout most of the basin. The basin is approximately 1,361 acres with 705 acres within the City limits of Black Diamond and the remainder in unincorporated King County and in the City of Maple Valley. The receiving body of water for this basin is Lake Sawyer.

Soils in the Lake Sawyer Basin are generally sandy and considered outwash soils. Some till soils are present in the low lying wetland areas and some of the undeveloped areas in unincorporated King County. These wetlands are located near the shores of Lake Sawyer and in the southern areas of the basin where Rock Creek and Ravensdale Creek enter Lake Sawyer.

There are a variety of zoning designations within the Lake Sawyer Basin. Zoning within the City of Black Diamond is primarily low density residential with an average density of four dwelling units per acre. Additionally there are 18 acres owned by the City which are located within the City of Black Diamond and zoned as a Park. These lands include the Lake Sawyer Regional Park at the southern end of the lake, as well as Lake Sawyer Park at the east end of SE 296<sup>th</sup> Street which includes a public boat launch site. Zoning within the City of Maple Valley is predominately low density residential with a small amount of commercial use. The portion of the Lake Sawyer Basin located in unincorporated King County is rural and mostly undeveloped.

Most of the developed areas of the Lake Sawyer basin within the City limits have little or no piped conveyance systems. Roadside ditches and driveway culverts serve the majority of the homesites around Lake Sawyer. A small portion of these ditches convey runoff directly to Lake Sawyer, but many of them retain water until it can infiltrate into groundwater. Due to the majority of this basin being in outwash soils, infiltration of this type is a successful means of dealing with the existing runoff. Some of the newer developments (such as Greenbriar Estates located northeast of Lake Sawyer) within the Lake Sawyer Basin also employ retention (infiltration) ponds to manage runoff from their curb and gutter street sections.

#### **ROCK CREEK BASIN (RC)**

The Rock Creek Basin is comprised largely of undeveloped land and large areas of wetlands. The receiving body of water for this basin is Rock Creek which flows into Lake Sawyer at its southernmost point. The developed area within the basin is an area of Black





### 3.0 EXISTING STORM DRAINAGE SYSTEM

Diamond known as Morganville. Morganville consists of a residential neighborhood located off of Roberts Drive and Morgan Street west of downtown Black Diamond.

The Rock Creek Basin is comprised of four sub-basins as listed in **Table 3.03 Rock Creek Basin**. RC-1 is a basin area contributing directly to Rock Creek and Frog Lake immediately upstream of Lake Sawyer. RC-2 contributes to an unnamed stream flowing south into Rock Creek through the Morganville area of the City. This stream crosses Roberts Drive just west of the intersection of Roberts Drive and Morgan Street. RC-3 drains to a tributary connecting Black Diamond Lake to Rock Creek and RC-4 drains to Black Diamond Lake and its tributary stream south of Lake Sawyer.

**Table 3.03 Rock Creek Basin**

Sub-Basin	Size (acres)
RC-1	685.2
RC-2	205.0
RC-3	122.3
RC-4	388.5
<b>TOTAL</b>	<b>1,401</b>

The majority of Rock Creek Basin is located within the City limits and the Urban Growth Area. Two relatively small areas are located in unincorporated King County. One is an area south of the City Limits near 243<sup>rd</sup> Ave SE (approximately 5.4 acres). The other is at the north tip of sub-basin RC-1 east of Ravensdale Creek (approximately 29.2 acres).

The tributary water for this basin is Rock Creek. Two lakes, Black Diamond Lake & Frog Lake, are located in the Rock Creek Basin as well. Black Diamond Lake, in sub-basin RC-4, is a small lake in the southwestern area of the City limits. Black Diamond Lake releases to a tributary stream of Rock Creek. Frog Lake in sub-basin RC-1 is a body of water associated with the wetlands at the south end of Lake Sawyer. Rock Creek empties into these wetlands and enters Lake Sawyer through a pipe arch at the southern tip of the lake.

Both outwash and till soils are present in the Rock Creek Basin. Outwash soils are generally located in the higher regions of the basin away from Rock Creek, and in the northwest portion of the basin near Lake Sawyer. Outwash soils are of the Everett soil series per the Natural Resources Conservation Service (NRCS) and the till soils are of several types including the following series: Alderwood, Bellingham, Buckley, Norma, Seattle Muck, and Shalcar Muck. These till soils are located around Rock Creek, the lakes and wetlands as well as undeveloped areas in the south and northeast portions of the basin.

Many different types of zoning are represented within the Rock Creek Basin. A large portion of the basin is zoned MPD and is in the preliminary stages of a master planned development called The Villages. This development has been proposed by a private developer although at this time formal applications have not yet been submitted to the City. Other zoning within the basin includes Residential (R4, R6, and MDR8), Business Park / Light Industrial, Commercial, and Public lands.



### 3.0 EXISTING STORM DRAINAGE SYSTEM

Much of the Rock Creek Basin is undeveloped. The developed regions of the basin are mainly residential and are centrally located in the Morganville area west of downtown. The Morganville area of the City is primarily served by piped conveyance systems and roadside ditches that convey runoff to a number of stormwater control ponds within individual developments. Street sections where road runoff is piped are typically asphalt raised edge section, but some of the newer developments in this basin have concrete curb and gutter sections. The soils in the Morganville area are generally outwash and therefore many of the ponds in these neighborhoods are infiltration ponds.

#### **GINDER CREEK BASIN (GC)**

The Ginder Creek Basin is the tributary area for the majority of downtown Black Diamond. This includes most of the existing commercial lands for the City as well as much of the residential areas. The receiving waters for this basin are Ginder Lake, Ginder Creek, and the upper reach of Rock Creek downstream of Jones Lake.

Ginder Creek Basin is approximately 1,378 acres with approximately 912 acres within the City limits of Black Diamond and the remainder in unincorporated King County. The area outside of the City limits is the northeast portion of the basin including Ginder Lake and the John Henry Mine.

Ginder Creek Basin is comprised of five sub-basins as listed in **Table 3.04 Ginder Creek Basin**. GC-1 is the largest sub-basin and contains nearly all of the developed area within the Ginder Creek Basin. This sub-basin collects the downtown commercial and residential areas as well as the commercial corridor north of the downtown area along 3<sup>rd</sup> Avenue. GC-2 is a relatively small catchment collecting flows contributing to Mud Lake Creek immediately east of the 3<sup>rd</sup> Ave/Roberts Dr. intersection. Mud Lake Creek connects to Ginder Creek on the west side of 3<sup>rd</sup> Ave at this intersection. The GC-3 sub-basin collects flows contributing directly to Mud Lake. The GC-4 sub-basin is the area tributary to the John Henry Mine. A portion of sub-basins GC 2 through GC-4 lie outside of the Black Diamond Urban Growth Boundary. The GC-5 sub-basin lies entirely outside of the City and its Urban Growth Boundary. This sub-basin includes areas directly tributary to Ginder Lake.

**Table 3.04 Ginder Creek Basin**

Sub-Basin	Size (acres)
GC-1	806.9
GC-2	53.1
GC-3	169.8
GC-4	200.1
GC-5	148.2
<b>TOTAL</b>	<b>1,378</b>

The Ginder Creek Basin is characterized primarily by till soils; however, some outwash Everett series soils are present in the far southwest portion of the basin. The till soils are of several types including the following series: Alderwood, Beausite, Bellingham, Seattle



### 3.0 EXISTING STORM DRAINAGE SYSTEM

Muck, and Shalcar Muck. These till soils are located throughout the basin in both the developed and undeveloped areas.

Zoning within the Ginder Creek Basin includes most types of zoning included in the City's Comprehensive Plan. The only two zones not represented are Business Park/Light Industrial and the Master Planned Development zone. Although MPD zoning is not included, a large development known as Lawson Hills is planned for portions of the basin, the majority of which lies east of the downtown area.

The Ginder Creek Basin includes areas served by both piped conveyance systems and roadside ditches. The newer outlying developments, with curb and gutter street sections, pipe runoff to ponds serving those individual developments. The downtown area within this basin is collected in a piped conveyance system which directs flows to Ginder Creek, west of downtown.

#### **RAVENSDALE BASIN (R)**

The Ravensdale Basin is located almost entirely outside of the Black Diamond City Limits and Urban Growth Area. The receiving waters for this basin are Ravensdale Creek.

The Ravensdale Basin is comprised of three sub-basins as listed in **Table 3.05**

**Ravensdale Basin.** The total basin area is approximately 2,365 acres. Two relatively small areas are located within the City limits. One is a portion of the area known as the North Triangle, west of 3<sup>rd</sup> Ave. The other is an area near the mouth of Ravensdale Creek. These two areas within the Ravensdale Creek basin are approximately 52.8 and 62.8 acres respectively.

**Table 3.05 Ravensdale Basin**

Sub-Basin	Size (acres)
R-1	1,965
R-2	264
R-3	136
<b>TOTAL</b>	<b>2,365</b>

The Ravensdale Basin is included in this plan due to its large area and runoff contribution to Lake Sawyer. Specific analysis for this basin was completed on a limited basis.

Soils in the Ravensdale Basin, per the NCRS, generally consist of a mix of both till and outwash soils. The soils within the city limits in the North Triangle are approximately 70% till soils and 30% outwash; the outwash soils lying near the western border of the triangle. The soils at the mouth of Ravensdale Creek within the city limits are primarily outwash soils. Per the NCRS, outwash soils described for this basin are of the Everett series while till soils are of the Alderwood series.

City zoning within the Ravensdale Basin is MPD within the North Triangle and R6 within an existing development off of 3<sup>rd</sup> Ave. Zoning at the basin area near the mouth of



### 3.0 EXISTING STORM DRAINAGE SYSTEM

Ravensdale Creek is R4 Residential and Public as a part of the Black Diamond Regional Park.

#### **JONES LAKE BASIN (JL)**

The Jones Lake Basin is comprised largely of undeveloped land. The receiving body of water for this basin is Jones Lake which serves as the headwaters for Rock Creek. The most heavily developed area within the basin is a portion of the downtown area south of Lawson Street. This area is a moderately dense single family neighborhood. The remaining development within the basin consists of single family homes, mostly on large parcels at very low densities. This portion of the basin also includes the City Shop.

The total acreage of the Jones Lake Basin is approximately 1,137 acres. Approximately 637 acres of the basin lie inside the City's Urban Growth Area and approximately 500 acres lie in unincorporated King County.

The Jones Lake Basin is comprised of three sub-basins as listed in **Table 3.06 Jones Lake Basin**. JL-1 drains to an unnamed stream and wetland system west of Jones Lake. This sub-basin includes most of Old Lawson Road and its associated parcels. JL-2 contributes to an unnamed stream flowing north into Jones Lake. This stream follows 257<sup>th</sup> Ave SE and connects to Jones Lake from the south. JL-3 is the northern most sub-basin and drains Lawson Creek. Lawson Creek flows west from outside the Urban Growth Area into the City where it turns south, crosses under 3<sup>rd</sup> Ave and enters the north side of Jones Lake. JL-3 is where the most concentrated development currently exists within the Jones Lake Basin.

**Table 3.06 Jones Lake Basin**

Sub-Basin	Size (acres)
JL-1	523.7
JL-2	199.3
JL-3	414.0
<b>TOTAL</b>	<b>1,137</b>

Per NCRS the majority of the Jones Lake Basin has till soils, however a small area of outwash soils are shown to be present south of Old Lawson Rd. Outwash soils are of the Everett soil series per the NRCS and the till soils are of several types including the following series: Alderwood, Beausite, and Seattle Muck.

Zoning within the Jones Lake Basin is mainly Residential R4, R6, and Urban Reserve. Small areas of Public and Town Center zoning also exist within the basin. Although MPD zoning is not included, a large development known as Lawson Hills is planned for portions of the basin, the majority of which lies east of the downtown area.

Much of the Jones Lake Basin is yet undeveloped. The developed regions of the basin are mainly residential and are centrally located in the downtown area. These areas of the City are served by piped conveyance systems and roadside ditches that convey runoff to the



### **3.0 EXISTING STORM DRAINAGE SYSTEM**

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streams within the basin or directly to Jones Lake. Street sections where road runoff is piped are typically an asphalt raised edge section.

#### **LAKE NO. 12 BASIN (LT)**

The Lake No. 12 Basin is an area of both City Urban Growth Area and unincorporated King County tributary to Lake No. 12. It is located northeast of downtown Black Diamond and abuts the previously described Ginder Creek Basin. The dividing line between these basins is also shared by the King County WRIA (Water Resource Inventory Area) Basins 8 and 9. The Lake No. 12 Basin is not tributary to Lake Sawyer as is most of the City, but lies in King County WRIA 8 and is tributary to the Lower Cedar River which feeds Lake Washington in Seattle. It was analyzed on a limited basis and included in this plan due to its inclusion in the City UGA.

The total basin area is approximately 354 acres, 168 of which are inside the City UGA. The area inside the UGA is zoned Urban Reserve and is developed with single family homes mostly on lots abutting Lake No. 12.

The NCRS describes soils in the Lake No. 12 Basin as consisting of both till and outwash soils. Approximately 30% of the basin is outwash soils which are found on the north, west, and south sides of the lake where the majority of the homes within the basin are located. The remaining 70% of the basin is made up of till soils. The NCRS describes the outwash soils in this basin as Everett series soils and the till soils are Alderwood, Beausite, and Seattle Muck series.

#### **LAKE MARJORIE BASIN (LM)**

The Lake Marjorie Basin is located in the western boundary of the Black Diamond City Limits. The basin is located along the east side of Lake Sawyer Rd, south of SE 312<sup>th</sup> St and west of Rock Creek. The basin is a closed depression or “pothole” with no natural surface discharge.

The total basin area is approximately 106 acres and is entirely located within the City limits of Black Diamond. The zoning in the basin is Public (Lake Sawyer Regional Park), Residential R4, and Business Park/Light Industrial.

The NCRS describes soils in the Lake Marjorie Basin as outwash soils of the Everett soil series.

#### **SOUTHERN BASIN (S)**

The Southern Basin is located along the southern boundary of the City's urban growth boundary. The basin is approximately 45 acres and is zoned urban reserve (1 unit per 5 acres).

The Southern basin as defined by this plan is tributary to a closed depression or “pothole” with no natural surface discharge.





### **3.0 EXISTING STORM DRAINAGE SYSTEM**

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#### **NORTHWEST BASIN (NW)**

The Northwest Basin is located along the western boundary of the City, west of the Lake Sawyer Basin. The Northwest Basin is not tributary to the Lake Sawyer system as most of the rest of the City is. The Northwest Basin is tributary to Covington Creek downstream of Lake Sawyer. Covington Creek is part of the Covington Basin within the Soos Creek Basin Plan for unincorporated King County. The boundaries for the Northwest Basin were defined by the City limits for purposes of this study.

The Northwest Basin consists of Type A & Type B soils which are supportive of infiltration. It is assumed that this basin is currently infiltrating and has minimal impact on the overall Covington Basin within unincorporated King County. Due to the small size of this basin in comparison to the entire Covington Basin, a limited analysis is included in this plan.

#### **SOUTHWEST BASIN (SW)**

The Southwest Basin is located along the western boundary of the City, west of the Rock Creek Basin. The Southwest Basin is part of the Middle Green River King County drainage basin within WRIA 9. The receiving water for this basin is the Green River. The boundary was defined by the City limits for purposes of this study. A limited analysis of this basin is included in this plan.





### 3.0 EXISTING STORM DRAINAGE SYSTEM

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## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

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### **4.1 EXISTING BASIN ANALYSES**

Hydrologic and hydraulic analyses were conducted to analyze the drainage planning area Stormwater runoff potential and to evaluate the capacity of the city's existing drainage infrastructure to deliver runoff to receiving waters. This was completed using two different methods; a continuous model for large scale sub-basin runoff calculations, and a single-event model for specific closed conveyance analysis within the more developed areas of the City.

The large scale sub-basin analysis is the basis for the culvert hydraulic analysis and is also intended to serve as a base flow generation for future stream modeling projects. The single-event model was used to analyze the capacity of specific trunk drainage lines within the City system.

### **4.2 DRAINAGE SUB-BASIN HYDROLOGY & CULVERT HYDRAULICS**

Sub-basin hydrologic modeling was used to evaluate stormwater runoff potential and to generate recurrence interval peak discharge estimates within the entire City planning area based on drainage sub-basin delineation and characterization. The highlights of the analysis approach, methods, and assumptions are included below along with a summary of the results. Modeling software data output of this assessment is contained in ***APPENDIX E – Drainage Sub-basin Hydrology and Culvert Hydraulics.***

### **MODELING APPROACH**

The approach to hydrologic analysis for the drainage basins and sub-basin areas that are tributary to the City's culvert and stream systems was focused around conducting analysis using a continuous simulation analysis approach consistent with City and Department of Ecology requirements for development and redevelopment projects. The MGS Flood computer software modeling program was selected for use due to its ability to meet the requirements, efficiencies in evaluation of system improvement effects and benefits, and its relative simplicity in use. MGS Flood is a continuous rainfall-runoff computer model developed for stormwater facility design in Western Washington. The program meets the requirements of the 2005 Ecology SWMMWW.

MGS Flood uses computational algorithms to compute a continuous time series of runoff for the calculated basins and computes flood magnitude-frequency statistics. The program includes the ability to simulate runoff hydrographs from a number of sub-basins and perform routing through stream channels and stormwater ponds if so desired. The program contains extended precipitation time series developed for stormwater analysis in western Washington. The data has a time step of 15 minutes, is 158 years in length, and represents the rainfall characteristics of the City SWMP planning area. The extended precipitation time series allows for accurate calculation of the runoff potential from floods of interest for stormwater management planning. The extended length allows for



## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

interpolation to compute 100-year recurrence interval flood flows rather than extrapolation, which is required with the use of shorter precipitation time series.

The MGS Flood model was used to compute runoff hydrographs and peak discharge magnitude frequency statistics for the sub-basin drainage areas within the drainage planning area. The MGS Flood program was ideal for this purpose because it is easy to use, provides accurate results, and allows for quick analysis of stormwater improvement options.

### **ASSUMPTIONS**

Key assumptions for the hydrologic analysis used to develop planning level estimates of sub-basin recurrence interval flood flows are as follows:

- Existing land cover (impervious area) and pervious area soils conditions were used; future land use was not evaluated for hydrologic analysis of local drainage systems because new development and redevelopment requires mitigation of peak flow effects through adequately sized detention storage facilities meeting current City standards.
- Analyses did not include any detention storage systems. Many of these systems were built to lower design standards and their performance and net effect is diminished for larger events where overflows may occur. Also, many of these on-site detention systems are private with maintenance not directly provided under the City's O&M program.
- All impervious areas were assumed fully effective in generating stormwater runoff tributary to trunk drainage systems. Losses to runoff in pervious areas were based on use of regional parameters included within the MGS Flood model considering the hydrologic soils characteristics of those pervious areas.
- Peak flows for combined sub-basin flows at points of analysis within local drainage systems were additive without need for hydrologic routing analysis within those drainage systems.

### **RESULTS**

The results of the MGS Flood hydrologic analysis conducted for the sub-basin drainage systems to generate peak flood flow estimates are reported in **Table 4.01 Sub-Basin Hydrologic Analysis**. Peak recurrence interval flood flow estimates represent the predicted flood flows at sub-basin outfalls to their respective receiving waters as noted in the basin descriptions. Corresponding sub-basin tributary areas and existing impervious land cover percentages are also reported.

The following recommendations should be noted:

- Recommend further analysis with the down stream analysis for any new development
- Recommend model calibration for any proposed culvert improvement projects

The results of the hydraulic analysis of City culverts are shown in **Table 4.02 Culvert Hydraulic Analysis**. Modeling software outputs are included in **APPENDIX E – Drainage Sub-basin Hydrology and Culvert Hydraulics**.



## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

**Table 4.01 Sub-Basin Hydrologic Analysis**

Sub-Basin	Area at Outfall (acres)	Impervious Area (%)	Simulated Runoff Peak Flows (Q) at Outfall (cfs)					
			Q <sub>2</sub>	Q <sub>5</sub>	Q <sub>10</sub>	Q <sub>25</sub>	Q <sub>50</sub>	Q <sub>100</sub>
Lake Sawyer Basin								
LS-1	1351.0	25.4	43.4	64.8	80.5	102.2	119.7	138.4
Rock Creek Basin								
RC-1	685.2	2.8	19.8	29.1	36.6	47.9	58.0	69.5
RC-2	205.0	6.0	5.8	9.1	11.8	16.0	19.8	24.3
RC-3	122.3	1.5	4.5	6.7	8.5	11.1	13.3	15.9
RC-4	388.5	2.8	15.4	22.6	28.3	36.9	44.4	52.9
Ginder Creek Basin								
GC-1	806.9	8.1	47.7	68.7	86.1	113.4	138.1	167.3
GC-2	53.1	2.1	1.9	2.8	3.5	4.6	5.6	6.7
GC-3	169.8	2.8	6.5	9.6	12.1	15.8	19.0	22.7
GC-4	200.1	17.5	8.6	13.1	16.4	21.1	25.0	29.2
GC-5	148.2	11.4	6.8	10.3	13.0	17.0	20.5	24.5
Ravensdale Basin <i>(Ravensdale Sub-basins were not individually analyzed)</i>								
R-1, R-2, & R-3	2365.4	12.5	94.2	142.9	180.5	235.4	282.1	334.2
Jones Lake Basin								
JL-1	523.0	1.5	10.0	15.0	19.1	25.5	31.2	38.0
JL-2	190.4	1.9	7.4	11.0	13.9	18.3	22.1	26.4
JL-3	413.5	1.5	16.9	25.3	32.2	42.5	51.7	62.3
Lake No. 12 Basin								
LT-1	347.3	16.5	16.1	24.2	30.5	39.5	47.1	55.5
Lake Marjorie Basin								
LM-1	106.0	9.4	1.6	2.3	2.8	3.7	4.6	5.6

**Table 4.02 Culvert Hydraulic Analysis**

Pipe No.	Culvert Location	Material	Diam. (in.)	Length (ft)	Anticipated Flow – 100 yr event) (cfs)	Modeled Capacity (cfs)
373	Crossing 3 <sup>rd</sup> Ave @ Old Lawson Rd	Concrete	36	108	62.3	70
434	Crossing Roberts Dr ~ 850' southwest of 3 <sup>rd</sup> Ave	CMP	54	51	77.9	140
471	Crossing 5 <sup>th</sup> Ave ~ 250' southeast of Lawson St	Concrete	36	36	62.3	120
528	Crossing 3 <sup>rd</sup> Ave @ Black Diamond-Ravensdale Rd	Concrete	36	232	72.2	80



## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

537	Crossing 224 <sup>th</sup> Ave @ Outlet from Lake Sawyer	CMP	72	71	* Not Modeled	160
538	Crossing 224 <sup>th</sup> Ave @ Outlet from Lake Sawyer	CMP	72	71	* Not Modeled	160
539	Crossing 224 <sup>th</sup> Ave @ Outlet from Lake Sawyer	CMP	72	71	* Not Modeled	160
542	Ravensdale Creek Inlet to Lake Sawyer (City Park)	CMP	48	52	** Not Modeled	90
543	Ravensdale Creek Inlet to Lake Sawyer (City Park)	HDPE	48	52	69.5	90
544	Inlet to Lake Sawyer from Frog Lake (City Park)	CMP	48	55	69.5	70
545	Inlet to Lake Sawyer from Rock Creek (City Park)	CMP	48	50	69.5	70
546	Box culvert (bridge) crossing Roberts Dr ~ 250' west of Bruckners Way	Concrete	16' x 6'		69.5	280
556	Crossing Morgan St ~ 400' east of Abrams Ave	Concrete	54	50	117.4	160
584	Crossing Old Lawson Rd, east of 3 <sup>rd</sup> Ave	CMP	36	67	62.3	70
586	Crossing 3 <sup>rd</sup> Ave (Enumclaw-BD Rd) @ Jones Lake	Concrete	36	80	38.0	60
587	Crossing 3 <sup>rd</sup> Ave (Enumclaw-BD Rd) @ Jones Lake	Concrete	36	80	38.0	60
588	Crossing 3 <sup>rd</sup> Ave (Enumclaw-BD Rd) @ Jones Lake	Concrete	24	90	38.0	40
597	Crossing Black Diamond-Ravensdale Rd ~ 400' southwest of Kanasket Dr	CMP	4'x8' Pipe Arch	70	24.5	140

\* Lake Sawyer outlet will require flow monitoring to predict flows to Covington Creek. Flow monitoring was not done as a part of this Comprehensive Plan.

\*\* The majority of this basin producing these flows is outside the City limits and was not studied in detail for the Comprehensive Plan.

## 4.3 TRUNK DRAINAGE SYSTEM HYDROLOGIC & HYDRAULIC ANALYSIS

Small scale basin hydrologic modeling analysis was used to evaluate stormwater runoff directly relating to the City's limited trunk line drainage systems based on small drainage subareas delineation and characterization. This was done using the Santa Barbara Urban Hydrograph (SBUH) within the StormShed 2G modeling software. The highlights of the analysis approach, methods, and assumptions are included below along with a summary





## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

of the results of that analysis. Modeling software data output of this assessment is contained in ***APPENDIX F – Trunk-line Drainage Hydrology and Hydraulics***.

### **MODELING APPROACH**

The approach to hydrologic analysis to evaluate the areas that are tributary to the City's trunk-line piped conveyance systems was focused around conducting analysis using an instantaneous model (SBUH) for specific hydrologic modeling. The modeling done at the sub-basin level was found to be too large a scale to accurately route flows through most of the City's drainage system. Individual investigation areas were analyzed at each point of entrance into the trunk system.

The Santa Barbara Urban Hydrograph model and StormShed 2G software were selected for use due to their accuracy and efficiency in estimating stormwater runoff flows at relatively small intervals and cumulatively routing these flows through a conveyance system. With the routing of runoff, StormShed 2G also provides a backwater analysis of the modeled system providing an accurate accounting of the cumulative flows modeled in the system.

### **ASSUMPTIONS**

Key assumptions from the hydrologic analysis used to develop planning level estimates of trunk drainage system recurrence interval flood flows are as follows:

- Existing land cover (impervious area) and pervious area soils conditions were used; future land use was not evaluated for hydrologic analysis of local drainage systems because new development and redevelopment requires mitigation of peak flow effects through adequately sized detention storage facilities meeting current City standards. However, the developed model will be useful in determining the effects of future development flows on the City system.
- Analyses were performed at a 10 minute simulation time-step to allow capture of appropriate peak flows considering the relatively small drainage sub-catchment areas being analyzed.
- Analyses did not include any detention storage systems. Many of these systems were built to lower design standards, and their performance and net effect is diminished for larger events where overflows may occur. Also, many of these on-site detention systems are private with maintenance not directly provided under the City's O&M program.
- All impervious areas are assumed fully effective in generating stormwater runoff tributary to trunk drainage systems; losses to runoff in pervious areas are based on use of CN values associated with the Santa Barbara Urban Hydrograph model considering the hydrologic soils characteristics of those pervious areas.

### **RESULTS**

The results of the hydrologic and hydraulic analysis conducted for the trunk-line drainage systems are included in ***APPENDIX F – Trunk-line Drainage Hydrology and Hydraulics***.

This analysis was conducted at the catchment level of drainage area. Peak recurrence interval flood flow estimates reported here represent the predicted flood flows within the City's trunk line drainage systems and estimate outfalls to their respective receiving



## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

waters. Corresponding tributary areas and existing impervious land cover percentages are also reported.

### 4.4 EXISTING SYSTEM DEFICIENCIES

The stormwater hydraulic modeling identified existing drainage problem areas throughout the system. Three areas were identified where stormwater conveyance is constricted by the existing piped storm drainage system and are included in **Table 4.03 Deficiencies Identified by Hydraulic Modeling**.

**Table 4.03 Deficiencies Identified by Hydraulic Modeling**

Location	Description
5 <sup>th</sup> Avenue (Baker St to Lawson St)	Modeling indicates overtopping of shallow roadside ditches with a 25 year storm event
Railroad Avenue (Baker St to Merino St)	Modeling indicates overtopping of storm drain system with a 10 year storm event
1 <sup>st</sup> Avenue (Southeast of Baker St)	Modeling indicates catch basin overtopping with a 25 year storm event

Additional projects are included in the Capital Improvement Program in **Chapter 6.0 Capital Improvement Plan**. These additional projects are located in areas where drainage and/or maintenance problems have been identified by the City.

### 4.5 SYSTEM RECOMMENDATIONS

Proposed capital improvement projects are discussed in **Chapter 6.0 Capital Improvement Plan**. Additional recommendations concerning the City's storm drainage system are listed below.

#### **CULVERT PASSAGE**

Culverts analyzed at the basin flow level appear to be adequate for stormwater conveyance as reflected in **Table 4.02 Culvert Hydraulic Analysis** and **APPENDIX E – Drainage Sub-basin Hydrology and Culvert Hydraulics**. However, further analysis on the needs for fish passage, habitat accommodations, and/or structural integrity on these culverts is recommended.

#### **FLOOD MONITORING**

No flooding has been recorded by the City in the areas identified in **Table 4.03 Deficiencies Identified by Hydraulic Modeling**. However, it is recommended that these areas be monitored and observed during heavy storms. If surcharging does occur at these locations, further analysis is recommended to develop proposed solutions.

#### **STORMWATER QUALITY**

A study was conducted by AC Kindig and Associates which recommends that all future stormwater mitigations released to the Lake Sawyer system (including Ginder Creek, Rock Creek, and all other tributaries) provide treatment for phosphorus. A copy of this study has been included in **APPENDIX G – Water Quality Technical Report**. The phosphorous



## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

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problems for Lake Sawyer are attributed to the once-failed sewage treatment plant and not to existing runoff conditions.

Phosphorous levels as of the date of this study appear to be relatively normal and stable, but given the history of Lake Sawyer, the amount of phosphorous contributed to the system should be minimized as much as possible. In order to not worsen the problem, phosphorous control standards per DOE should be enforced for future development. This is especially true given the large amount of growth anticipated for Black Diamond in the near future.



## 4.0 HYDROLOGIC & HYDRAULIC ANALYSIS

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## 5.0 FUTURE STORM DRAINAGE SYSTEM

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### 5.1 FUTURE DEVELOPMENT ANALYSIS

The City of Black Diamond is expected to experience substantial growth in the near future due to the large-scale developments that are anticipated to submit formal development applications once the development moratorium currently in place is lifted. There are two master planned developments, “Lawson Hills” and “The Villages at Black Diamond” that have undergone significant studies and analyses.

An analysis of future development potential in regards to stormwater has been analyzed on a sub-basin level. In addition, a review of the preliminary storm drainage proposals that have been prepared by the master planned developments have been reviewed and are included in **APPENDIX H – “The Villages” Stormwater Management** and **APPENDIX I – “Lawson Hills” Stormwater Management**. A map which shows the location of the Master Planned Development stormwater zones in relations to the City’s drainage basins has been included as **Figure 5.1 Future Development Stormwater Mgmt. Zones**.

### LAKE SAWYER BASIN

The Lake Sawyer Basin consists of developed low residential density properties within the City of Black Diamond, along with the Lake Sawyer Regional Park property. The portion of the Lake Sawyer Basin that is located within the City of Maple Valley has also been developed as predominately low density residential with a small amount of commercial use. The portion of the Lake Sawyer Basin located in unincorporated King County is rural and partially undeveloped.

The Lake Sawyer Basin consists of infiltrative soils throughout most of the basin. Any future development located in areas of Type A or Type B soils are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage.

However, the soils within the undeveloped portion of King County are type C & D soils which are less conducive to infiltration. Prior to development occurring in these areas, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge. Lower density developments may be appropriate.

The large Master Planned Communities (The Villages and Lawson Hills) do not have any anticipated development within the Lake Sawyer Basin, however both MPDS’s are contributory to the Lake Sawyer Basin.





## 5.0 FUTURE STORM DRAINAGE SYSTEM

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### **ROCK CREEK BASIN**

The Rock Creek Basin is comprised largely of undeveloped land and large areas of wetlands. The receiving body of water for this basin is Rock Creek which flows into Lake Sawyer at its southernmost point. The Morganville area within the City of Black Diamond is located in the Rock Creek Basin.

**RC-1:** The Rock Creek RC-1 sub-basin consists primarily of undeveloped lands, with the exception of the Morganville area. The zoning within the sub-basin consists of a variety of uses including, master planned development, residential, industrial, business park/light industrial and public lands.

The soils within the Rock Creek RC-1 sub-basin are a variety of soil types ranging from Type A & B soils which are appropriate for infiltration to Type C & D soils which are less conducive to infiltration.

Future development located in areas of Type A & B soils are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

A portion of the “Lawson Hills” Master Planned Development is located within the Rock Creek RC-1 sub-basin. The area in the Rock Creek RC-1 sub-basin is the western half of the area known as the Lawson Hills North Triangle Basin. The preliminary storm drainage proposal for the North Triangle Basin indicates that “in the developed condition, stormwater runoff from the North Triangle development will be infiltrated in the lower portion of the site along with runoff from offsite that currently infiltrates on the lower portion of the North Triangle.”

It is recommended that a detailed soils analysis be required of the developer to confirm on-site soil characteristics. Based on the NCRS soil maps, it is not anticipated that infiltration will be appropriate for this area. Additionally, an infiltration pond has been proposed by the developer in the southwest corner of the “North Triangle Basin”. The “North Triangle Basin” is located within both the Ravensdale R-3 sub-basin, as well as the Rock Creek RC-1 sub-basin. The development proposal indicates that water within Ravensdale R-3 sub-basin will be directed to the infiltration pond located in the Rock Creek RC-1 sub-basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

The Villages Stormwater Management Zone 1B is also partially located within the Rock Creek RC-1 sub-basin. The preliminary storm drainage proposal for Zone 1B indicates that “clean” stormwater will be used to recharge wetlands or infiltrated to the shallow aquifer. Stormwater from pollution generating surfaces will be treated and infiltrated. Based on a review of NCRS soil maps, it appears that infiltration would be appropriate for the area of overlap of Zone 1B along the western boundary of the Rock Creek RC-1 sub-





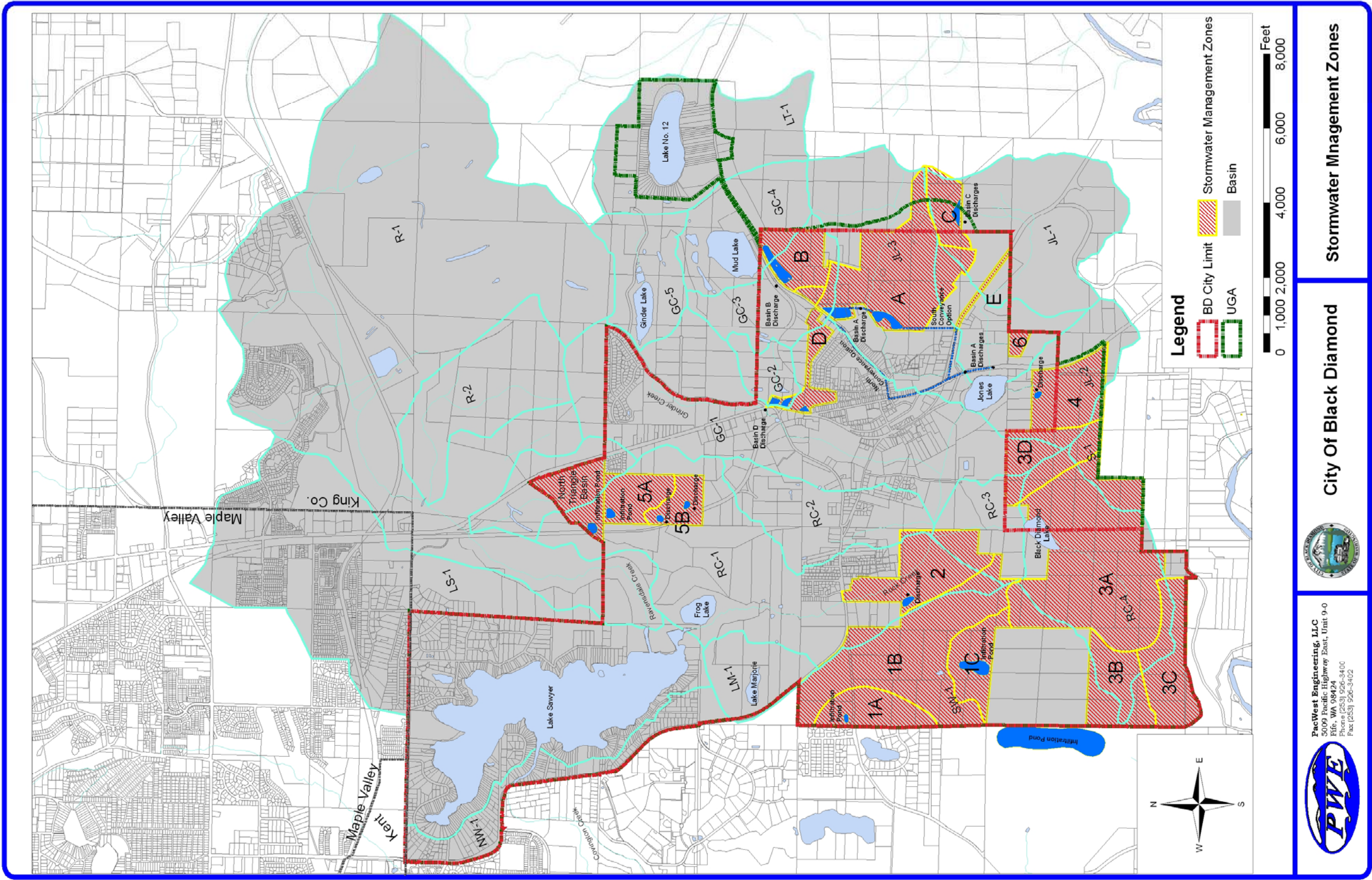


Figure 5.1 Future Development Stormwater Mgmt. Zones



PacWest Engineering, LLC  
5009 Pacific Highway East, Unit 9-0  
Bldg. WA 98424  
Phone (253) 926-3400  
Fax (253) 926-3402



City of Black Diamond

Stormwater Management Zones



PACWEST ENGINEERING LLC

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## 5.0 FUTURE STORM DRAINAGE SYSTEM

basin, however not for the southern-most portion of the Rock Creek RC-1 sub-basin. Furthermore, Zone 1B is partially located within Rock Creek RC-1 sub-basin, and primarily located within the Southwest Basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

The Villages Stormwater Management Zone 2 is located in the southern tip of the Rock Creek RC-1 sub-basin. The preliminary storm drainage proposal for Zone 2 indicates that “a detention/water quality pond will be used to manage stormwater for this zone.”. Based on the NCRS soil maps and the required phosphorous treatment, it appears that the proposed storm drainage proposal would appropriately handle the stormwater needs for this zone.

The Stormwater Management Zones 5A and 5B are located in the northern portion of the Rock Creek RC-1 sub-basin. The preliminary storm drainage proposal for Stormwater Management Zone 5 indicates that “stormwater runoff from the northern portion of Stormwater management Zone 5 drains to the north and northwest overland and through a series of wetlands and a stream to the outwash soils in the northwest corner where it infiltrates. The infiltrated stormwater flows towards Ravensdale Creek”.

It is recommended that a detailed soils analysis be completed by the developer to confirm on-site soil characteristics. Based on the NCRS soil maps, it is not anticipated that infiltration will be appropriate for this area. The boundaries of Stormwater Management Zone 5 fall within both the Rock Creek RC-1 sub-basin, as well as a small portion is located within the Ravensdale R-3 sub-basin. Stormwater should be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

**RC-2:** The Rock Creek RC-2 sub-basin consists of some developed properties in the Morganville area, but primarily consists of undeveloped lands. These lands are zoned for residential use, master planned development, neighborhood commercial, industrial, and business park/light industrial.

The soils within the Rock Creek RC-2 sub-basin are Type A/B soils through the central part of the sub-basin, while the soils located in the northern-most portion and southern-most portions of the sub-basin are Type C & D soils. Type A/B soils are appropriate for infiltration. Any future development located in these areas are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage.

Any future development located in the areas of Type C & D soils are recommended to conduct a detailed soils analysis. Based on the lesser infiltration capacities of these soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

There is a small portion of The Villages Stormwater Management Zone 2 that falls within the Rock Creek RC-2 sub-basin. The preliminary storm drainage proposal for this zone indicates that “a detention/water quality pond will be used to manage stormwater for this zone”. Based on the NCRS soil maps and the required phosphorous treatment, it appears



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that the proposed storm drainage proposal would appropriately handle the stormwater needs for this zone.

**RC-3:** The Rock Creek RC-3 sub-basin consists primarily of undeveloped lands. It is zoned residential (4 units per acre) and Master Planned development. The soils within the Rock Creek RC-3 sub-basin are a variety of soil types ranging from Type A/B soils which are appropriate for infiltration to Type C & D soils which are less conducive to infiltration.

Future development located in areas of Type A & B soils are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

Small portions of The Villages Stormwater Management Zones 1B, 2, and 3D all fall within the Rock Creek RC-3 sub-basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

**RC-4:** The Rock Creek RC-4 sub-basin consists of undeveloped lands. Black Diamond Lake is also located within its boundaries. Just to the east of Black Diamond Lake is a concentration of Type A/B soils. The remainder of the sub-basin's soils are Type C & Type D.

Future development located in areas of Type A & B soils are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

Rock Creek RC-4 sub-basin contains portions of The Villages Stormwater Management Zones 3A, 3B, 3C and 3D. The preliminary storm drainage proposal for The Villages Stormwater Management Zone 3 indicates that rooftop runoff will be used to recharge Black Diamond Lake. Wetlands will be recharged, as well as infiltration through the use of a regional water quality and infiltration facility.

It is recommended that a detailed soils analysis be completed by the developer to confirm on-site soil characteristics. Based on the NCRS soil maps, it is not anticipated that infiltration will be appropriate for this area. Furthermore, the Stormwater Management Zones overlap basin boundaries and the regional infiltration pond is located outside of the Rock Creek Basin boundaries. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.





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### **GINDER CREEK BASIN**

The Ginder Creek Basin is the tributary area for the majority of downtown Black Diamond. This includes most of the existing commercial lands for the City as well as much of the residential areas.

**GC-1:** The Ginder Creek GC-1 sub-basin consists primarily of developed properties. The soils within the Ginder Creek GC-1 sub-basin are Type C & D soils which are less conducive to infiltration. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

The Ginder Creek GC-1 sub-basin contains a portion of The Villages Stormwater Management Zone 3D. This stormwater management zone also extends into the Rock Creek Basin, the Jones Lake Basin, and the Southern Basin. The preliminary storm drainage proposal for the Villages indicates that runoff will be used to maintain pre-developed conditions for Black Diamond Lake and nearby wetlands. Excess water will be routed to the regional pond located west of the Southwest Basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

The Ginder Creek GC-1 sub-basin also contains a portion of the Lawson Hills Stormwater Basin D. The preliminary storm drainage proposal for Basin D indicates that “in the developed condition, stormwater runoff will be routed to detention and water quality facilities.” Based on the soils in this area per NCRS this appears to be an acceptable method of handling stormwater runoff.

**GC-2:** The Ginder Creek GC-2 sub-basin consists of undeveloped properties. The land is zoned for medium-density residential use (4 to 8 units per acre) in the area within City limits and as mineral lands for the area within unincorporated King County.

The soils within the Ginder Creek GC-2 sub-basin are Type C & D soils which are less conducive to infiltration. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

The Ginder Creek GC-1 sub-basin contains a small portion of the Lawson Hills Stormwater Basin D. The preliminary storm drainage proposal for Basin D indicates that “in the developed condition, stormwater runoff will be routed to detention and water quality facilities.” The aforementioned ponds are located within the Ginder Creek GC-2 sub-basin. Based on the soils in this area per NCRS, this appears to be an acceptable method of handling stormwater runoff.

**GC-3:** The Ginder Creek GC-3 sub-basin consists primarily of undeveloped lands which are zoned for residential (4 units per acre) within the City limits and as mineral lands within unincorporated King County.



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The soils within the Ginder Creek GC-3 sub-basin are Type C & D soils which are less conducive to infiltration. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

The Lawson Hills Stormwater Basin B is primarily located within the Ginder Creek GC-3 sub-basin. A small portion of Basin D is also located in the southern portion of the Ginder Creek GC-3 sub-basin. Additionally, Lawson Hills Basin A has a small region located along the southern border of the GC-3 sub-basin. Basin A is primarily located within the Jones Lake Basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

According to the preliminary storm drainage proposal for Lawson Hills, “in the developed condition, stormwater runoff from Basin B will be routed to a detention pond combined with a large wetpond to provide phosphorous removal and water quality treatment. A portion of Basin B may be too low in elevation to drain to this pond and will be routed to the Basin D stormwater facilities. Basin B & D are both located with the Ginder Creek basin.

**GC-4:** The Ginder Creek GC-4 sub-basin consists of undeveloped lands which are zoned for residential (4 units per acre) within the City limits and as mineral lands with unincorporated King County.

The soils within the Ginder Creek GC-4 sub-basin are Type C & D soils which are less conducive to infiltration. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

A portion of Lawson Hills Stormwater Basin D is located in the Ginder Creek GC-4 sub-basin. The preliminary storm drainage proposal for Basin D indicates that “in the developed condition, stormwater runoff will be routed to detention and water quality facilities.” The aforementioned ponds are located within the Ginder Creek GC-2 sub-basin. Based on the soils in this area per NCRS, this appears to be an acceptable method of handling stormwater runoff.

**GC-5:** The Ginder Creek GC-5 sub-basin consists of undeveloped lands within unincorporated King County that are zoned as mineral lands. Ginder Lake is also located within the Ginder Creek GC-5 sub-basin.

The soils within the Ginder Creek GC-5 sub-basin are Type C & D soils which are less conducive to infiltration. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.



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The large Master Planned Communities (The Villages and Lawson Hills) do not have any anticipated development within the Ginder Creek GC-5 sub-basin.

### **RAVENSDALE BASIN**

The Ravensdale Basin is almost entirely outside of the Black Diamond City Limits and Urban Growth Area. This basin is mostly undeveloped lands that are tributary to Ravensdale Creek and eventually Lake Sawyer. The lands are zoned for low-density residential (1 unit per 10 acres), forest land, and mining land.

**R-1:** The Ravensdale R-1 sub-basin consists primarily of undeveloped properties. The land is zoned for low-density residential (1 unit per 10 acres), as well as forest lands and mining lands. The soils within the Ravensdale R-1 are a variety of soil types ranging from Type A & B soils which are appropriate for infiltration to Type C & D soils which are less conducive to infiltration.

Future development located in areas of Type A & B soils are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage. For future development located in areas of Type C & D soils, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

The large Master Planned Communities (The Villages and Lawson Hills) do not have any anticipated development within the Ravensdale R-1 sub-basin.

**R-2:** The Ravensdale R-2 sub-basin consists of undeveloped properties. The land is zoned for low-density residential (1 unit per 10 acres). The soils within the Ravensdale R-2 sub-basin are Type C & D soils in the southern portion of the basin which are less conducive to infiltration. It is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge. The soils within the northern portion of the Ravensdale R-2 sub-basin are Type A & B soils which are appropriate for infiltration. Any future development in the northern portion of the sub-basin are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage.

The large Master Planned Communities (The Villages and Lawson Hills) do not have any anticipated development within the Ravensdale R-2 sub-basin.

**R-3:** The Ravensdale R-3 sub-basin consists primarily of undeveloped properties with the exception of one small residential subdivision in the southern portion of the sub-basin. The undeveloped portions of the sub-basin within the City limits are zoned for master planned development, while the undeveloped portions of the sub-basin within unincorporated King County are zoned for low-density residential use (1 unit per 10 acres).

The soils within the portion of the Ravensdale R-3 sub-basin that are located in unincorporated King County are Type A & B soils which are appropriate for infiltration. Any



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future development in the unincorporated King County portion of the sub-basin are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage.

The soils within the portion of the Ravensdale R-3 sub-basin located within City limits are Type C soils which are less conducive to infiltration. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline points of proposed discharge.

A portion of the “Lawson Hills” Master Planned Development is located within the Ravensdale R-3 sub-basin in the portion located within the City limits. The area included in the Ravensdale R-3 sub-basin is the eastern half of the area known as the Lawson Hills North Triangle Basin. The preliminary storm drainage proposal for the North Triangle Basin indicates that “in the developed condition, stormwater runoff from the North Triangle development will be infiltrated in the lower portion of the site along with runoff from offsite that currently infiltrates on the lower portion of the North Triangle.”

It is recommended that a detailed soils analysis be required of the developer to confirm on-site soil characteristics. Based on the NCRS soil maps, it is not anticipated that infiltration will be appropriate for this area. Additionally, an infiltration pond has been proposed by the developer in the southwest corner of the “North Triangle Basin”. The “North Triangle Basin” is located within both the Ravensdale R-3 sub-basin, as well as the Rock Creek RC-1 sub-basin. The development proposal indicates that water within Ravensdale R-3 sub-basin will be directed to the infiltration pond located in the Rock Creek RC-1 sub-basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

Additionally, a small corner of The Villages Stormwater Management Zone 5A is located within Ravensdale R-3 sub-basin. Again, it is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

### **JONES LAKE BASIN**

The Jones Lake Basin is located within the City limits, the Urban Growth area, and unincorporated King County. Portions of the Jones Lake Basin are developed areas east of downtown Black Diamond. The majority of the Basin consists of undeveloped lands.

**JL-1:** The Jones Lake JL-1 sub-basin consists primarily of undeveloped lands. The lands within the City of Black Diamond are zoned for residential (4 units per acre) with a small portion of Urban Reserve. The lands within unincorporated King County are zoned RA-5 (rural area, one dwelling unit per 5 acres), UR (urban reserve, one dwelling unit per 5 acres), and Forest lands.

The soils within the Jones Lake JL-1 sub-basin are a combination of soils types. The areas of Type C & D soils are less appropriate for infiltration. Prior to development occurring in these areas, it is recommended that a detailed soils analysis be conducted.





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Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge. Lower density developments may be appropriate.

The areas containing Type A & B soils are more appropriate for infiltration. Any future developments in these portions of the sub-basin are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage.

The Villages Master Planned Development includes Stormwater Management Zone 6. The preliminary storm drainage development proposal indicates that "Stormwater Management Zone 6 will remain the same in both the existing and developed conditions". This statement indicates that no construction or modification of the land and/or its natural drainage patterns will occur in this area.

The Lawson Hills Master Planned Development includes Stormwater Management Zones E, C, and a small portion of A which are located within the Jones Lake JL-1 sub-basin.

The Lawson Hills Master Planned Development includes Stormwater Basin E. The preliminary storm drainage development proposal indicates that "Stormwater Basin E consists of a strip of the railroad grade south of the main Lawson Hills project site. Basin E will be left unchanged in the developed condition." This statement indicates that no construction or modification of the land and/or its natural drainage patterns will occur in this area.

Basin C is located in a region of the Jones Lake JL-1 sub-basin where the soils are less conducive to infiltration. The preliminary storm drainage proposal for the Lawson Hills development indicates that "in the predeveloped condition, all drainage from Basin C flows to the unnamed creek to the south of the project site and ultimately to Jones Lake". The eastern portion of Basin C will be routed to a detention pond within Basin C. The development indicates that stormwater from the west and central sub-basins of Basin C will be routed to the stormwater facilities in Basin A. A portion of this water directed to Basin A will then be conveyed directly to Jones Lake in a pipeline. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

**JL-2:** The Jones Lake JL-2 sub-basin consists of undeveloped lands that are zoned for residential development (1 unit per 4 acres within the City limits and 1 unit per 5 acres within unincorporated King County). The soils within this sub-basin are primarily Type C & D soils which are less appropriate for infiltration. Prior to development occurring in these areas, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge. Moderate slopes, fine soils, and some clay content present high erosion and sediment transport risks. Lower density developments may be appropriate.

There is an area in the southern portion of the Jones Lake JL-2 sub-basin which includes Type A & B soils. These soils are more conducive to infiltration and any future





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developments in these portions of the sub-basin are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage.

The Villages Master Planned Development includes Stormwater Management Zone 4 which is primarily located within the Jones Lake JL-2 sub-basin . Additionally, the eastern portion of Stormwater Management Zone 3D extends into the Jones Lake JL-2 sub-basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

The preliminary storm drainage proposal for Stormwater Management Zone 4 indicates that all stormwater in this zone will be conveyed to a detention/water quality pond. Given the soils types, it appears that this is an appropriate method for handling the storm drainage in this area.

The preliminary storm drainage proposal for Stormwater management Zone 3D indicates that stormwater will be directed as necessary to maintain predevelopment conditions for Black Diamond Lake, as well as wetland recharge. Additional stormwater flows will be conveyed to the regional stormwater pond located west of the City limits. Again, it is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

**JL-3:** The Jones Lake JL-3 sub-basin includes developed properties located south of Lawson Road. It also includes undeveloped properties that are zoned for residential use (1 unit per 4 acres) within the city limits and zoned urban reserve (1 unit per 5 acres) and forest lands within unincorporated King County.

The soils within the Jones Lake JL-3 sub-basin are Type C & D soils which are less appropriate for infiltration. Prior to development occurring in these areas, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge. Lower density developments may be appropriate.

The Lawson Hills Master Planned Development includes Stormwater Management Zone A which is primarily located within the Jones Lake JL-3 sub-basin, although it extends into the Jones Lake JL-1 sub-basin as well as the Ginder Creek GC-3 sub-basin. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

According to the preliminary stormwater management plan for Lawson Hills, two detention ponds will be utilized for stormwater management for Stormwater Basin A. Additionally, “to minimize the erosion impact from the Lawson Hills project, one of the Basin A ponds (approximately half of the stormwater) will be conveyed directly to Jones Lake in a pipeline, bypassing Lawson Creek. The other pond will discharge to Lawson Creek to maintain flows.” The developer will need to provide additional information including detailed storm drainage calculations for it to be determined whether this proposal is in accordance with City standards.



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### **LAKE NO. 12 BASIN**

The Lake No. 12 Basin is located within the City's Urban Growth Area and unincorporated King County. The lots surrounding Lake No. 12 have been developed with single family homes. There is a small portion of the basin within unincorporated King County that have been zoned for low-density residential uses (1 unit per 5 acres). The remaining undeveloped portion of the basin is zoned as forest land.

The soils surrounding Lake No. 12 in the areas already developed are a combination of soils types, primarily those which are appropriate for infiltration. The undeveloped lands within this basin are Type C & Type D soils which are less appropriate for infiltration. Prior to development occurring in these areas, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge. Lower density developments may be appropriate.

The large Master Planned Communities (The Villages and Lawson Hills) do not have any anticipated development within the Lake No. 12 Basin.

### **LAKE MARJORIE BASIN**

The Lake Marjorie Basin is a closed depression or "pothole" with no natural surface discharge. The basin consists of Lake Sawyer Regional Park, along with residential land and land zoned as business park/light industrial.

The soils within Lake Marjorie Basin are Type A & B soils which are conducive to infiltration. It is recommended that any future development provide stormwater quality treatment and infiltration. The use of Low Impact Development or traditional infiltration techniques would be appropriate and are encouraged.

The large Master Planned Communities (The Villages and Lawson Hills) do not have any anticipated development within the Lake Marjorie Basin.

### **SOUTHERN BASIN**

The Southern Basin is located along the southern boundary of the City's urban growth boundary. It consists of undeveloped properties and is currently zoned urban reserve (1 unit per 5 acres). The Southern Basin is tributary to a "pothole".

The soils within the Southern Basin are Type C soils which are less conducive for infiltration. Prior to development occurring in these areas, it is recommended that a detailed soils analysis be conducted. Based on the lesser infiltration capacities of the soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge. Lower density developments may be appropriate.



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The Southern Basin consists of properties located within the Villages Stormwater Management Zones 3A, 3D, and 4. This is a very small basin and the majority of these zones are located in other basins. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

### **NORTHWEST BASIN**

The Northwest Basin is located along the western boundary of the City, west of the Lake Sawyer Basin. This basin is not tributary to Lake Sawyer, but rather flows to the west to Covington Creek and the Soos Creek Basin within unincorporated King County. The Northwest Basin is almost fully developed within the City of Black Diamond.

The soils within the Northwest Basin are Type A & B soils which are conducive to infiltration. It is recommended that any future development would provide stormwater quality treatment and infiltration. The use of Low Impact Development or traditional infiltration techniques would be appropriate and are encouraged.

The large Master Planned Communities (The Villages and Lawson Hills) do not have any anticipated development within the Northwest Basin.

### **SOUTHWEST BASIN**

The Southwest Basin is located along the western boundary of the City, west of the Rock Creek Basin. It consists of undeveloped properties and is currently zoned for Master Planned Development. The Southwest Basin is part of the Middle Green River King County drainage basin within WRIA 9. The receiving water for this basin is the Green River.

The soils within the Southwest Basin are Type A/B soils through most of the basin, however the soils located in the mid and southern portions of the basin are Type C & D soils. Type A/B soils are appropriate for infiltration. Any future development located in these areas are recommended to utilize low impact development or traditional infiltration techniques to accommodate storm drainage.

Any future development located in the areas of Type C & D soils are recommended to conduct a detailed soils analysis. Based on the lesser infiltration capacities of these soils, it is recommended that any development proposals within this area develop a detailed storm drainage plan and outline proposed points of discharge.

The Villages Master Planned Development includes Stormwater Management Zones 1A, 1B, 1C, 3A, 3B, & 3C that are completely or partially located within the Southwest Basin. It is important to note that it is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.

Additionally, a proposed regional infiltration pond is located west of the Southwest Basin outside of the Black Diamond city limits. The location of this pond leads to questions in





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who would be responsible for ownership and maintenance. The preliminary storm drainage plan proposed by the developer indicates that all stormwater facilities are proposed to be owned and maintained by the City of Black Diamond. However, the proposed location of the pond is not within the City's current city limits.

The preliminary stormwater proposal for Stormwater Management Zone 3 indicates that stormwater will be used to match predevelopment levels of Black Diamond Lake and wetlands. Excess stormwater flows will be directed to the regional water quality and infiltration pond located west of the Southwest Basin. Stormwater Management Zone 3 is primarily located within the Rock Creek Basin which is tributary to Black Diamond Lake which flows to Lake Sawyer via Rock Creek. The regional infiltration pond is proposed to be located in a separate drainage basin that is tributary to the Green River. It is normally advisable for stormwater to be managed within its own basin and not travel to a neighboring basin for quantity and/or quality control.



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## 6.0 CAPITAL IMPROVEMENT PLAN

### 6.1 PROJECT IDENTIFICATION

The City's Storm and Surface water capital improvement program consists of a series of projects that were identified by: 1) system deficiencies identified by hydraulic modeling; 2) system deficiencies and/or maintenance concerns identified by City staff; and 3) future development projects as identified by representatives of the anticipated development.

Project costs have been developed based on the assumption that storm drainage improvements are the only improvements being completed. Therefore, the entire cost for various items such as roadway restoration, traffic control, mobilization, etc would be funded by the stormwater utility. In some cases, the stormwater improvements may be completed in conjunction with other roadway or utility projects which may result in cost sharing.

### 6.2 SUMMARY OF RECOMMENDED PROJECTS

A map illustrating the recommended capital improvement projects has been included as **Figure 6.1 Capital Improvement Projects**. A large scale copy of the map has also been included as **APPENDIX J – CIP Map**.

**Table 6.01 Capital Improvement Projects**

Project ID	Project Name	Project Type	Sub-Basin	Est. Cost
1	224 <sup>th</sup> St Covington Creek Culvert Replacement	Culvert Replacement	NW-1	\$300,000
2	Roberts Drive – Ginder Creek Culvert Replacement	Culvert Replacement	GC-1	\$85,000
3	Lake Sawyer Park Culvert Replacements	Culvert Replacement	LS-1	\$75,000
4	3 <sup>rd</sup> Ave (SR-169) – Ginder Creek Culvert Replacement	Culvert Replacement	GC-1	\$125,000
5	3 <sup>rd</sup> Ave (SR-169) – Mud Lake Culvert Replacement	Culvert Replacement	GC-1	\$145,000
6	3 <sup>rd</sup> Ave (SR-169) Culvert Replacement at Old Lawson Road	Culvert Replacement	JL-4	\$75,000
7	Ginder Creek Culvert Replacement at Morgan Street	Culvert Replacement	GC-1	\$75,000





## 6.0 CAPITAL IMPROVEMENT PLAN

8	Rock creek Wetlands Study	Study	GC-1, RC-1	\$100,000
9	North Downtown / Ginder Creek Stormwater Facility	Treatment / Detention	GC-1	\$300,000
10	South Downtown / Jones Lake Stormwater Facility Study	Study	JL	\$50,000
11	5 <sup>th</sup> Ave Storm Drain Improvements	Conveyance	GC-1	\$28,000
12	Railroad Ave Storm Drainage Improvements	Conveyance	GC-1	\$100,000
13	1 <sup>st</sup> Ave Storm Drainage Improvements	Conveyance	GC-1	\$60,000
14	Lawson Hills Pond A North	Developer	JL-4	TBD (Developer Funded)
15	Lawson Hills Pond A South	Developer	JL-4	TBD (Developer Funded)
16	Lawson Hills Pond B	Developer	GC-4	TBD (Developer Funded)
17	Lawson Hills Pond C	Developer	JL-4	TBD (Developer Funded)
18	Lawson Hills North Triangle Pond	Developer	R-3 / RC-1	TBD (Developer Funded)
19	Lawson Hills Basin D Drainage Facilities	Developer	GC-1	TBD (Developer Funded)
20	The Villages Zone 1 Pond	Developer	SW-1	TBD (Developer Funded)
21	The Villages Zone 2 Pond	Developer	RC-1	TBD (Developer Funded)
22	The Villages Regional Pond	Developer		TBD (Developer Funded)
23	The Villages Zone 2 Pond	Developer	JL – 2	TBD (Developer Funded)
24	The Villages Zone 5 Drainage Facilities	Developer	RC-1	TBD (Developer Funded)
25	Pipeline Road Regional Facility	Developer	RC-1	TBD (Developer Funded)
26	Storm Pond Maintenance	Maintenance	Various	\$5,000
27	Public Works Shop Upgrades	Maintenance	GC-1	\$25,000



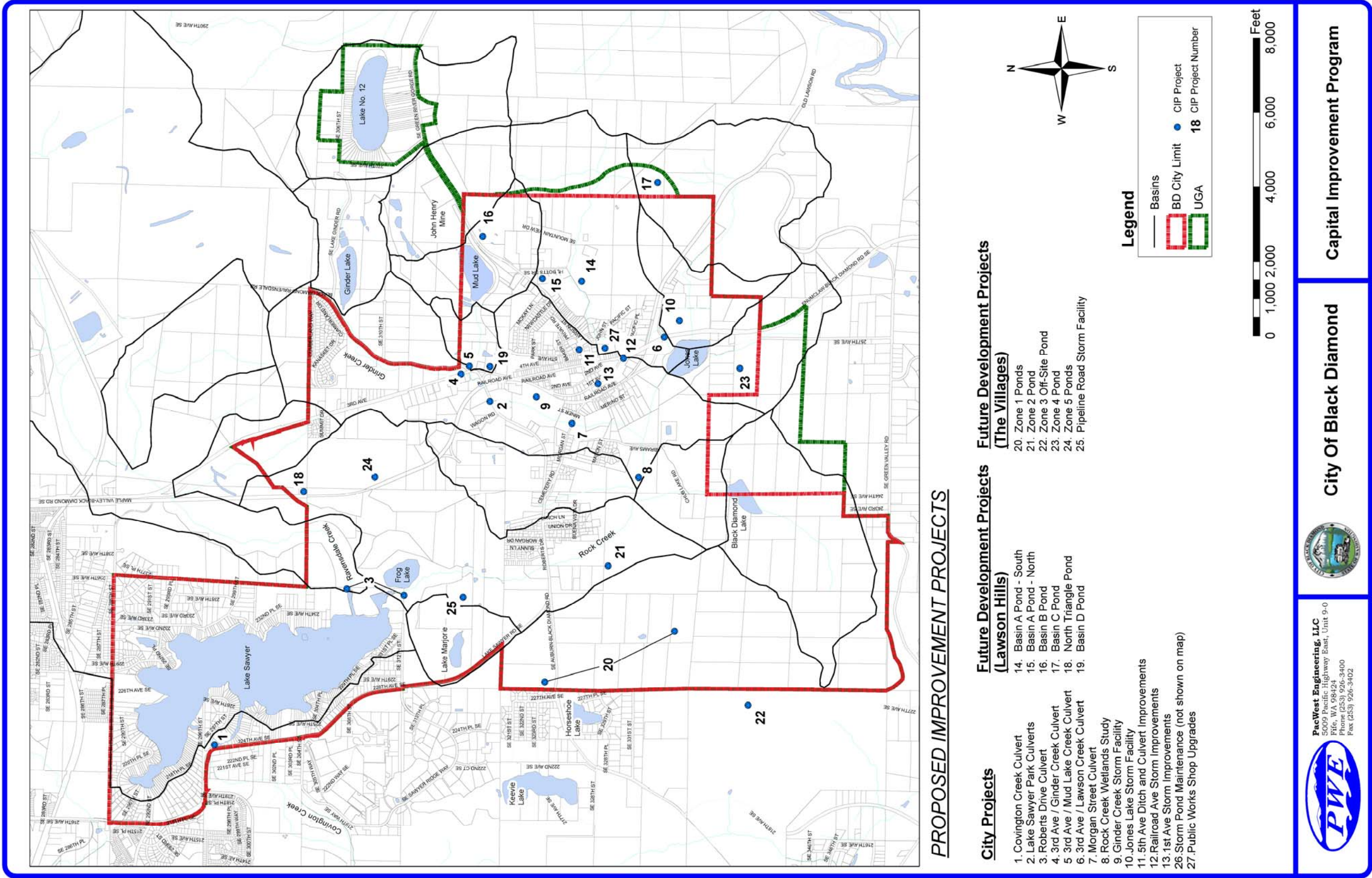


Figure 6.1 Capital Improvement Projects

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### 6.3 DETAILED PROJECT DESCRIPTIONS

Each of the identified projects is further detailed below. Detailed breakdowns of estimated project costs have been included in **APPENDIX K – Project Cost Estimates**.

**Table 6.02 224<sup>th</sup> St Covington Ck Culvert Replacements**

#### PROJECT ID #1

#### 224<sup>TH</sup> STREET COVINGTON CREEK CULVERT REPLACEMENTS

<b>Description:</b>	This project includes the removal and replacement of three 72-inch culverts under 224 <sup>th</sup> Street SE at the outlet of Lake Sawyer into Covington Creek and associated roadway restoration. Each of the three existing culverts is approximately 75-feet long and constructed of corrugated metal pipe. The project could replace the culverts either individually or with a single conveyance mechanism. Wildlife and fish passage for Covington Creek and Lake Sawyer will be considered in the design of this project.
<b>Location:</b>	224 <sup>th</sup> Ave SE, south of SE 297 <sup>th</sup> St
<b>Sub-Basin:</b>	NW-1
<b>Receiving Water:</b>	Covington Creek
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$300,000



**Table 6.03 Roberts Dr – Ginder Ck Culvert Replacement**

### PROJECT ID #2

#### **ROBERTS DRIVE – GINDER CREEK CULVERT REPLACEMENT**

<b>Description:</b>	This project includes the removal and replacement of a 54-inch culvert under Roberts Drive and associated roadway restoration. This culvert conveys Ginder Creek north to south under Roberts Drive and is located approximately 800-feet southwest of the intersection of 3 <sup>rd</sup> Ave (SR-169) and Roberts Drive. The existing culvert is constructed of corrugated metal and is approximately 60-feet in length. Wildlife and fish passage for Ginder Creek will be considered in the design of this project.
<b>Location:</b>	Roberts Dr. ~ 800' west of 3 <sup>rd</sup> Ave
<b>Sub-Basin:</b>	GL-1
<b>Receiving Water:</b>	Ginder Creek / Jones Lake
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$85,000



**Table 6.04 Lake Sawyer Park Culvert Replacement**

### PROJECT ID #3

#### LAKE SAWYER PARK CULVERT REPLACEMENTS

**Description:** There are four existing culverts conveying Rock Creek and Ravensdale Creek into Lake Sawyer at the Lake Sawyer Regional Park. All four culverts are programmed to be replaced as a part of the maintenance projects for the CIP. The southern most culvert is a 48-inch corrugated metal pipe approximately 50 feet in length that conveys flows from Rock Creek and the associated Frog Lake wetland system into Lake Sawyer at the southern tip of the lake. The second culvert also conveys Rock Creek flows from Frog Lake into Lake Sawyer and is located approximately 350-feet north of the tip of lake. This culvert is also constructed of corrugated metal and is 48-inches in diameter. Both of these culverts cross under the walking trail/maintenance access road for the park.

Approximately 1000-feet north of the Rock Creek culverts lay a pair of 48" culverts conveying flows from Ravensdale Creek into Lake Sawyer. These culverts are side by side, one corrugated metal and the other high-density polyethylene. Both culverts are approximately 55 feet in length.

The replacements for all of these culverts will include restoration of the walking trail / maintenance road and considerations for fish and wildlife. This project has a low priority, but will need to be considered sometime in the future.

**Location:** Lake Sawyer Park

**Sub-Basin:** LS-1

**Receiving Water:** Lake Sawyer

**Priority:** Low

**Estimated Cost:** \$75,000





**Table 6.05 3<sup>rd</sup> Ave – Ginder Ck Culvert Replacement**

### PROJECT ID #4

#### **3<sup>RD</sup> AVE (SR-169) – GINDER CREEK CULVERT REPLACEMENT**

<b>Description:</b>	This project includes removal, replacement and associated roadway restoration of the existing 36-inch culvert crossing under 3 <sup>rd</sup> Ave (SR-169) at the intersection of Black Diamond-Ravensdale Road and 3 <sup>rd</sup> Ave. This culvert system includes a 36-inch concrete culvert connecting to an existing concrete box culvert buried under 3 <sup>rd</sup> Ave (SR-169). Connected to the box culvert is an additional stretch of 36-inch concrete culvert pipe which discharges upstream of the pond north of Roberts Drive. The total length of this culvert system is approximately 250-feet. This system conveys Ginder Creek flows across 3 <sup>rd</sup> Ave. Wildlife and fish passage for Ginder Creek will be considered in the design of this project. This project may be a City and/or State funded project.
<b>Location:</b>	Intersection of Black Diamond / Ravensdale Road and 3 <sup>rd</sup> Ave (SR-169)
<b>Sub-Basin:</b>	GL-1
<b>Receiving Water:</b>	Ginder Creek / Jones Lake
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$125,000



**Table 6.06 3<sup>rd</sup> Ave – Mud Lake Ck Culvert Replacement**

### PROJECT ID #5

#### **3<sup>RD</sup> AVE (SR-169) – MUD LAKE CREEK CULVERT REPLACEMENT**

<b>Description:</b>	This project includes removal, replacement and associated roadway restoration of the existing 24-inch and 48-inch culverts crossing under 3 <sup>rd</sup> Ave (SR-169) at the intersection of Black Diamond-Ravensdale Road and 3 <sup>rd</sup> Ave. This culvert system includes a two side by side 24-inch culverts, one corrugated metal and one concrete, crossing under 3 <sup>rd</sup> Ave and discharging to a landscaped intersection island in the intersection. Each culvert is approximately 75-feet in length. From there flows are conveyed to a 48-inch corrugated metal culvert, 60-feet in length, flowing to the pond north of Roberts Drive. This system conveys Mud Lake Creek flows across 3 <sup>rd</sup> Ave. Wildlife and fish passage for Mud Lake Creek will be considered in the design of this project. This project may be a City and/or State funded project.
<b>Location:</b>	Intersection of Black Diamond / Ravensdale Road and 3 <sup>rd</sup> Ave (SR-169)
<b>Sub-Basin:</b>	GL-1
<b>Receiving Water:</b>	Ginder Creek / Jones Lake
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$145,000



**Table 6.07 3<sup>rd</sup> Ave Culv. Replacement at Old Lawson Rd**

### PROJECT ID #6

#### **3<sup>RD</sup> AVE (SR-169) CULVERT REPLACEMENT AT OLD LAWSON ROAD**

<b>Description:</b>	This project includes the removal and replacement of a 36-inch culvert under 3 <sup>rd</sup> Ave (SR-169) and associated roadway restoration. This culvert conveys Lawson Creek under 3 <sup>rd</sup> Ave towards Jones Lake and is located at the intersection of 3 <sup>rd</sup> Ave (SR-169) and Old Lawson Road. The existing culvert is concrete and is approximately 110-feet in length. Wildlife and fish passage for Lawson Creek and Jones Lake will be considered in the design of this project. This project may be a City and/or State funded project.
<b>Location:</b>	Intersection of 3 <sup>rd</sup> Ave (SR- 169) and Old Lawson Road
<b>Sub-Basin:</b>	JL-4
<b>Receiving Water:</b>	Jones Lake
<b>Priority:</b>	Low
<b>Estimated Cost:</b>	\$75,000





**Table 6.08 Ginder Ck Culvert Replacement at Morgan St**

### PROJECT ID #7

#### GINDER CREEK CULVERT REPLACEMENT AT MORGAN STREET

<b>Description:</b>	This project includes the removal and replacement of a 36-inch culvert under 3 <sup>rd</sup> Ave (SR-169) and associated roadway restoration. This culvert conveys Lawson Creek under 3 <sup>rd</sup> Ave towards Jones Lake and is located at the intersection of 3 <sup>rd</sup> Ave (SR-169) and Old Lawson Road. The existing culvert is concrete and is approximately 110-feet in length. Wildlife and fish passage for Lawson Creek and Jones Lake will be considered in the design of this project. This project may be a City and/or State funded project.
<b>Location:</b>	Intersection of 3 <sup>rd</sup> Ave (SR- 169) and Old Lawson Road
<b>Sub-Basin:</b>	JL-4
<b>Receiving Water:</b>	Jones Lake
<b>Priority:</b>	Low
<b>Estimated Cost:</b>	\$75,000



**Table 6.09 Rock Creek Wetlands Study**

### **PROJECT ID #8**

#### **ROCK CREEK WETLANDS STUDY**

<b>Description:</b>	The Rock Creek wetland is a large wetland system that encompasses various wetlands between Jones Lake and Lake Sawyer. The purpose of this study is to understand the hydrology and ecological function of this wetland to better protect and utilize the Rock Creek corridor and the wetland system as an asset to the City of Black Diamond. The maintenance, operations and any changes to the overall management for storm water attenuation, stream flows, and water quality needs to be addressed.
<b>Location:</b>	Rock Creek Wetlands System between Jones Lake and Lake Sawyer
<b>Sub-Basin:</b>	GL-1, RC-1
<b>Receiving Water:</b>	Lake Sawyer
<b>Priority:</b>	High
<b>Estimated Cost:</b>	\$100,000



**Table 6.10 N. Downtown / Ginder Ck Storm Facility**

### **PROJECT ID #9**

#### **NORTH DOWNTOWN / GINDER CREEK STORMWATER FACILITY**

<b>Description:</b>	This project proposes to construct a stormwater facility serving a portion of the downtown Black Diamond Area. Flows from Park Drive, 3 <sup>rd</sup> Ave, and the northern downtown area are proposed to be routed to the facility for detention and treatment prior to release to Ginder Creek. Funding for this project may include private developer funds, City funding, and/or State participation.
<b>Location:</b>	City owned Ginder Creek parcel or alternative location to be determined.
<b>Sub-Basin:</b>	GL-1
<b>Receiving Water:</b>	Ginder Creek / Rock Creek
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$300,000





**Table 6.11 S. Downtown / Jones Lk Storm Facility Study**

### **PROJECT ID #10**

#### **SOUTH DOWNTOWN / JONES LAKE STORMWATER FACILITY STUDY**

**Description:** This study will identify a feasible location or locations for stormwater facilities serving the south downtown Black Diamond area. Most of the south downtown area, also known as “Old Downtown” releases stormwater runoff uncontrolled and untreated to Ginder Creek and Jones Lake. This project’s goal would be to site a facility either on City owned property or identify potential properties for acquisition based on the suitability of the site topographically a preliminary sizing done as a part of the study. Funding may come from infill development of the downtown area.

**Sub-Basin:** JL

**Receiving Water:** Jones Lake / Rock Creek

**Priority:** Medium

**Estimated Cost:** \$50,000



**Table 6.12 5<sup>th</sup> Ave Storm Drain Improvements**

### **PROJECT ID #11**

#### **5<sup>TH</sup> AVE STORM DRAIN IMPROVEMENTS**

<b>Description:</b>	Based on stormwater modeling completed for the comprehensive plan update, shallow roadside ditches in 5 <sup>th</sup> Ave have the potential for overtopping with a 25 year storm event. This project will improve the street side ditches and upsize driveway culverts from 12-inches to 15-inches in 5 <sup>th</sup> Ave between Baker Street and Lawson Street to allow for conveyance of the 25-year event.
<b>Location:</b>	5 <sup>th</sup> Ave from Baker Street to Lawson Street
<b>Sub-Basin:</b>	GC-1
<b>Receiving Water:</b>	Jones Lake
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$28,000



**Table 6.13 Railroad Ave Storm Drain Improvements**

### **PROJECT ID #12**

#### **RAILROAD AVENUE STORM DRAINAGE IMPROVEMENTS**

<b>Description:</b>	Approximately 750-feet of storm drain in Railroad Ave south of Baker St have the potential for overtopping with a 10 year storm event due to flat grades on the pipes and street. This project will upsize those pipes from 12-inch to 18-inch to provide conveyance without overtopping catch basins in Railroad Ave to convey large storm events without overtopping catch basins. It is anticipated that these repairs will be completed in conjunction with the roadway improvements to Railroad Avenue scheduled for construction in 2010.
<b>Location:</b>	Railroad Ave from Baker Street to Merino Street
<b>Sub-Basin:</b>	GC-1
<b>Receiving Water:</b>	Jones Lake
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$100,000





**Table 6.14 1<sup>st</sup> Ave Storm Drainage Improvements**

### PROJECT ID #13

#### 1<sup>ST</sup> AVE STORM DRAINAGE IMPROVEMENTS

<b>Description:</b>	This project proposes to upsize approximately 500-feet of storm drain in 1 <sup>st</sup> Ave southeast of Baker Street to a point where the system conveys flows south west to Railroad Ave. Flat pipe grades and impervious area runoff from the adjacent mobile home park contribute to a potential for catch basin overtopping in 1 <sup>st</sup> Ave with a 25-year storm event. Upsizing from 12-inch lines to 15-inch lines is proposed.
<b>Location:</b>	1 <sup>st</sup> Ave southeast of Baker Street
<b>Sub-Basin:</b>	GC-1
<b>Receiving Water:</b>	Jones Lake
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$60,000



**Table 6.15 Lawson Hills Pond A North**

### **PROJECT ID #14**

#### **LAWSON HILLS POND A NORTH**

<b>Description:</b>	This project consists of a combined wet pond and detention pond to serve a portion of Basin A of the Lawson Hills Master Planned Development (MPD) proposed in the City. The proposed pond location is along the east side of Lawson Street, north of Lawson Creek. The natural discharge location for this basin is to Lawson Creek, however this project may provide a bypass outlet directly to Jones Lake to minimize erosion in Lawson Creek.
<b>Location:</b>	Future Development (Lawson Hills) outfall to Lawson Creek (Basin A – South)
<b>Sub-Basin:</b>	JL-4
<b>Receiving Water:</b>	Lawson Creek / Jones Lake
<b>Priority:</b>	As Needed for Development
<b>Estimated Cost:</b>	Developer Funded



**Table 6.16 Lawson Hills Pond A South**

### **PROJECT ID #15**

#### **LAWSON HILLS POND A SOUTH**

<b>Description:</b>	This project consists of a combined large wet pond and detention pond to serve a portion of Basin A of the Lawson Hills Master Planned Development (MPD) proposed in the City. The proposed pond location is south of Lawson Creek near the south end of HL Botts Drive SE. The natural discharge location for this basin is to Lawson Creek, however this project may provide a bypass outlet directly to Jones Lake to minimize erosion in Lawson Creek.
<b>Location:</b>	West boundary of Lawson Hills MPD (Basin A – North)
<b>Sub-Basin:</b>	JL-4
<b>Receiving Water:</b>	Lawson Creek / Jones Lake
<b>Priority:</b>	As Needed for Development
<b>Estimated Cost:</b>	Developer Funded





**Table 6.17 Lawson Hills Pond B**

### **PROJECT ID #16**

#### **LAWSON HILLS POND B**

<b>Description:</b>	This project consists of a combined large wet pond and detention pond to serve a portion of Basin B of the Lawson Hills MPD. The proposed location for this facility is east of Lawson Road, opposite Mud Lake. Mud Lake is the proposed discharge point for this pond however due to topographic constraints a portion of Basin B may be routed to the Basin D facility described in Project #19.
<b>Location:</b>	South side of Lawson St near Mud Lake (Basin B)
<b>Sub-Basin:</b>	GL-4
<b>Receiving Water:</b>	Mud Lake
<b>Priority:</b>	As Needed for Development
<b>Estimated Cost:</b>	Developer Funded



**Table 6.18 Lawson Hills Pond C**

**PROJECT ID #17**

**LAWSON HILLS POND C**

**Description:** This project consists of a combined large wet pond and detention pond to serve Basin C of the Lawson Hills MPD. The proposed location for this facility is at the south boundary of the proposed Lawson Hills Basin C at the east edge of the existing City Urban Growth Area. The proposed discharge point for this pond is an unnamed drainage channel tributary to Jones Lake.

**Location:** South boundary of Lawson Hills MPD (Basin C)

**Sub-Basin:** JL-4

**Receiving Water:** Jones Lake

**Priority:** As Needed for Development

**Estimated Cost:** Developer Funded



**Table 6.19 Lawson Hills North Triangle Pond**

**PROJECT ID #18**

**LAWSON HILLS NORTH TRIANGLE POND**

<b>Description:</b>	This project consists of a retention pond to serve the North Triangle Basin of the Lawson Hills MPD. The proposed location for this facility is at the southwest corner of the proposed Lawson Hills North Triangle Basin approximately 1/3 of a mile west of 3 <sup>rd</sup> Ave (SR-169). The proposed discharge for this facility is groundwater due to the infiltrative soils in this area of the City. No treatment is proposed for this facility; therefore new development tributary to this pond would need to provide private treatment on site.
<b>Location:</b>	Southwest corner of North Triangle in the Lawson Hills MPD
<b>Sub-Basin:</b>	R-3 / RC-1
<b>Receiving Water:</b>	Groundwater
<b>Priority:</b>	As Needed for Development
<b>Estimated Cost:</b>	Developer Funded





**Table 6.20 Lawson Hills Basin D Drainage Facilities**

### PROJECT ID #19

#### LAWSON HILLS BASIN D DRAINAGE FACILITIES

**Description:** This project consists of a series of treatment and detention facilities near the 3<sup>rd</sup> Ave (SR-169) and Roberts Drive intersection as needed to serve Basin D of the Lawson Hills MPD. Facilities may consist of detention ponds, detention vaults, wetponds, wetvaults, and sand filters depending on water quality needs for the proposed land uses in the basin. The proposed discharge point for these pond facilities is Ginder Creek.

**Location:** East side of 3<sup>rd</sup> Ave (SR-169) south of Roberts Dr (Basin D)

**Sub-Basin:** GC-1

**Receiving Water:** Ginder Creek

**Priority:** As Needed for Development

**Estimated Cost:** Developer Funded



**Table 6.21 The Villages Zone 1 Pond**

### **PROJECT ID #20**

#### **THE VILLAGES ZONE 1 POND**

**Description:** This project consists of a retention pond to serve the Zone 1 of The Villages MPD. The proposed location for this facility is at the south boundary of The Villages Zone 1 Basin approximately 2/3 of a mile southeast Horseshoe Lake. The proposed discharge for this facility is groundwater due to the infiltrative soils in this area of the City. No treatment is proposed for this facility; therefore new development tributary to this pond would need to provide private treatment on site.

**Location:** The Villages MPD – Zone 1

**Sub-Basin:** SW-1

**Receiving Water:** Groundwater / Horseshoe Lake

**Priority:** As Needed for Development

**Estimated Cost:** Developer Funded



**Table 6.22 The Villages Zone 2 Pond**

**PROJECT ID #21**

**THE VILLAGES ZONE 2 POND**

<b>Description:</b>	This project consists of a combined large wet pond and detention pond to serve a portion of Zone 2 of The Villages MPD. The proposed location for this facility is approximately 1/3 of a mile south of the Roberts Drive – Bruckners Way intersection west of Rock Creek. This pond is proposed to discharge to Rock Creek.
<b>Location:</b>	The Villages MPD – Zone 2
<b>Sub-Basin:</b>	RC-1
<b>Receiving Water:</b>	Rock Creek
<b>Priority:</b>	As Needed for Development
<b>Estimated Cost:</b>	Developer Funded





**Table 6.23 The Villages Regional Pond**

**PROJECT ID #22**

**THE VILLAGES REGIONAL POND**

<b>Description:</b>	The Villages MPD proposes to construct a large off-site infiltration pond west of the current City limits and approximately ½ mile south of Horseshoe Lake. This facility is not yet clearly defined, but will assist with aquifer recharge and water balance needs created by the proposed MPD
<b>Location:</b>	West of the Villages MPD – Zone 3 and south of Horseshoe Lake. Currently outside of the City limits.
<b>Sub-Basin:</b>	RC-4 / SW-1
<b>Receiving Water:</b>	Black Diamond Lake / Groundwater
<b>Priority:</b>	As Needed for Development
<b>Estimated Cost:</b>	Developer Funded



**Table 6.24 The Villages Zone 2 Pond**

**PROJECT ID #23**

**THE VILLAGES ZONE 2 POND**

<b>Description:</b>	This project consists of a combined large wet pond and detention pond to serve Zone 4 of The Villages MPD. The proposed location for this facility is approximately 1000-feet south of Jones Lake west of an unnamed tributary stream to Jones Lake. The proposed discharge point for this pond is the unnamed drainage stream tributary to Jones Lake.
<b>Location:</b>	The Villages MPD – Zone 4
<b>Sub-Basin:</b>	JL-2
<b>Receiving Water:</b>	Jones Lake
<b>Estimated Cost:</b>	Developer Funded



**Table 6.25 The Villages Zone 5 Drainage Facilities**

### **PROJECT ID #24**

#### **THE VILLAGES ZONE 5 DRAINAGE FACILITIES**

**Description:** This project consists of a series of treatment, retention, and detention facilities serving Zone 5 of The Villages MPD on King County Tax Parcel #1121069006. At this time 3 pond facilities are proposed to serve this zone.

The northwest corner of the site is located on outwash soils and is proposed to contain an infiltration pond. Treatment for flows conveyed to this pond will need to be addressed on a site-by-site basis as these soils are not sufficient for treatment through infiltration. Stormwater from the northern portions of Zone 5 will be conveyed to this facility.

The southern portion of this zone will be served by two ponds providing a large wet pond and detention for stormwater runoff mitigation.

**Location:** The Villages – Zone 5

**Priority:** As Needed for Development

**Estimated Cost:** Developer Funded





**Table 6.26 Pipeline Road Regional Facility**

### **PROJECT ID #25**

#### **PIPELINE ROAD REGIONAL FACILITY**

<b>Description:</b>	This project is proposed to serve the stormwater needs of the future Pipeline Road connecting Lake Sawyer Drive SE and 3 <sup>rd</sup> Ave (SR-169) and future development in the area. Its location is yet undetermined, but may likely lie somewhere between Lake Marjorie and Rock Creek with an outfall to Rock Creek.
<b>Location:</b>	Along Future Pipeline Rd, east of Rock Creek
<b>Sub-Basin:</b>	RC-1
<b>Receiving Water:</b>	Rock Creek
<b>Priority:</b>	As Needed for Development
<b>Estimated Cost:</b>	Developer Funded



**Table 6.27 Storm Pond Maintenance**

### **PROJECT ID #26**

#### **STORM POND MAINTENANCE**

<b>Description:</b>	This is proposed to be an ongoing maintenance program with one of the current nine City-owned detention ponds receiving any necessary improvements every six years.
<b>Location:</b>	City-owned ponds
<b>Sub-Basin:</b>	various
<b>Priority:</b>	Medium
<b>Estimated Cost:</b>	\$5,000



**Table 6.28 Public Works Shop Upgrades**

### **PROJECT ID #27**

#### **PUBLIC WORKS SHOP UPGRADES**

<b>Description:</b>	This project is proposed to upgrade the City shop area to meet NPDES Phase II permit requirements. This may include such improvements as a wash rack, improved materials storage, etc. The improvements may be phased in order to address the immediate need of a wash rack to reduce polluted runoff.
<b>Location:</b>	City shops located on Lawson Street
<b>Sub-Basin:</b>	GC-1
<b>Receiving Water:</b>	Ginder Creek
<b>Priority:</b>	High
<b>Estimated Cost:</b>	\$25,000





### **6.4 STORM UTILITY RATES**

City of Black Diamond recently adopted Ordinance No. 08-872 with an effective date of November 16, 2008. This ordinance created a stormwater utility and established rates. The service charge rate is imposed on each parcel of real property within the City served by or which is available for service by the stormwater and surface water management utility. The adopted rate was \$13.00 per Equivalent Residential Unit per month.

Subsequently, the City adopted Ordinance No. 09-901 with an effective date of May 3, 2009. This ordinance recognized that the City's recently-instituted Stormwater Utility fee went into effect at the same time that a severe economic recession affected the incomes and financial resources of the city's residents and businesses. The ordinance further recognized that although the City's Stormwater Utility fee was rationally-derived from an analysis of the cost of creating the stormwater system, the number of utility customers, and the funding sources available to the city; the original funding formula resulted in fee amounts that significantly impacted local businesses at the same time that an emergency long-term closure of the Green River Bridge and the severe economic recession has placed many local businesses under unprecedented financial strain.

Thus, Ordinance 09-901 amended the utility service charge rate for 2009 from \$13.00 to \$10.00 per ERU per month, effective April 1, 2009; provided, customers will receive a credit from the city for the difference in cost for the months of January, February, and March 2009 between the original rate and the new rate. A rate of \$11.50 per ERU per month was adopted for 2010 and a rate of \$13.00 per ERU per month for 2011.

Furthermore, a general facility charge has not been adopted for the stormwater utility. A general facility charge is a traditional source used to fund capital improvement projects.

### **6.5 PROJECT PRIORITIES, SCHEDULES, AND FUNDING**

The projects necessary to accommodate future proposed development will be completed by and funded by Development. The remaining projects (Project No. 1 through Project No. 13) have been identified with project priorities of low, medium, or high. High priority projects are those that are recommended for completion within a short-term timeframe, whereas low priority projects are recommended for completion within a long-term timeframe.

Because the City has made a conscious decision to reduce rates and not fully fund the storm utility at this time, it is not recommended that any capital improvement projects be completed until the utility is running without a budget deficit. Once the utility rates have been adjusted to a level that fully funds the storm and surface water utility and/or the City adopts a general facility charge, it would be appropriate for the City to more closely examine the timing of the program.

It is recommended that the City pursue outside funding sources in order to not burden the stormwater utility with high capital improvement costs. Grant funding availability has reduced in recent years, however low-interest loans may be an option for the City to pursue. The City may also wish to investigate additional possible funding sources such as general facility charges, debt financing, or improvement districts.



## 7.0 OPERATIONS & MAINTENANCE

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### **7.1 NPDES PHASE II REQUIREMENTS**

Section S5.C.5 of the NPDES Phase II Permit outlines specific requirements for the City to establish within an Operations and Maintenance Program. The NPDES Phase II Permit requires the City to develop and implement an operations and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. The O&M Program shall be in place by February 2010.

Major components of the O&M Program, as required by the NPDES Phase II Permit are:

- Establish maintenance standards at least as protective of facility function as those included in DOE's 2005 SWMMWW. The purpose of the maintenance standard is to determine if maintenance is required and to provide a protocol for scheduling maintenance-related activities.
- Conduct annual inspections of City owned or operated permanent stormwater facilities (other than catch basins).
- Conduct spot checks of potentially damaged permanent stormwater treatment and flow control facilities (other than catch basins) after major storm events.
- Inspect all catch basins and inlets owned or operated by the City at least once by February 2012.
- Provide cleaning and or maintenance if the above inspections indicate it is needed to comply with maintenance standards.
- Design O&M inspection program to achieve inspection of 95% of all sites.
- Implement practices to reduce stormwater impacts associated with runoff from streets, parking lots, roads, and highways owned and/or maintained by the City.
- Implement policies and procedures to reduce pollutants in discharges from lands owned or maintained by the City.
- Implement an on-going training program for City employees whose construction, operations, or maintenance job functions may impact stormwater quality.
- Implement a SWPPP for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the City.
- Maintain records of inspections and maintenance or repair activities conducted by the City.

### **7.2 O&M PROGRAM RECOMMENDATIONS**

**Table 7.01 O&M Program Review and Recommendations** contains a detailed listing of O&M Program requirements as outlined in Section S5.C.5 of the NPDES Phase II Permit. The City's O&M Program should be adjusted as necessary to ensure that these



## 7.0 OPERATIONS & MAINTENANCE

minimum requirements are being met. The City is currently utilizing the O&M Standards as published in DOE's 2005 SWMMWW and as included in **APPENDIX L – Maintenance Standards** of this document.

**Table 7.01 O&M Program Review and Recommendations**

### **NPDES Phase II Municipal Stormwater Permit Requirements**

Establish maintenance standards that are as protective, or more protective as those in Chapter 4, Volume 5 of the 2005 SWMMWW

*NPDES S5.C.5.a*

Unless there are circumstances beyond the City's control, when an inspection identifies an exceedence of the maintenance standard, maintenance shall be performed:

- Within 1 year for wet pool facilities and retention / detention ponds
- Within 6 months for typical maintenance
- Within 9 months for maintenance requiring re-vegetation
- Within 2 years for maintenance that requires capital construction of less than \$25,000

*NPDES S5.C.5.a.ii*

Annual inspection of all municipally owned or operated permanent stormwater treatment and flow control facilities, other than catch basins, and taking appropriate maintenance actions in accordance with the adopted maintenance standards.

Reducing the inspection frequency shall be based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the City may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with permit requirements.

*NPDES S5.C.5.b*

Spot checks of potentially damaged permanent treatment and flow control facilities (other than catch basins) after major (greater than 24-hour 10-year recurrence interval rainfall) storm events.

If spot checks indicate widespread damage / maintenance needs, inspect all stormwater treatment and flow control facilities that may be affected. Conduct repairs or take appropriate measures in accordance with maintenance standards.

*NPDES S5.C.5.c*





## 7.0 OPERATIONS & MAINTENANCE

Inspection of all catch basins and inlets owned or operated by the City at least once by Feb. 15, 2012. Clean catch basins if the inspection indicates cleaning is needed to comply with maintenance standards established in the 2005 SWMMWW.

Inspections may be conducted on a “circuit basis” whereby a sampling of catch basins and inlets within each circuit is inspected to identify maintenance needs. Include in the sampling an inspection of the catch basin immediately upstream of any system outfall. Clean all catch basins within a given circuit at one time if the inspection sampling indicates cleaning is needed to comply with maintenance standards.

*NPDES S5.C.5.d*

Decant water shall be disposed of in accordance with the following:

General Procedures:

- Street waste collection should emphasize retention of solids in preference to liquids.
- Street waste liquids require treatment before their discharge.
- Discharges to sanitary sewer and storm sewer systems must be approved by the entity responsible for O&M of the system

The following order of preference, for disposal of catch basin decant liquid and water removed from stormwater treatment facilities is required:

1. Discharge of catch basin decant liquids to a municipal sanitary sewer connected to a Public Owned Treatment Works (POTW) is the preferred disposal option.
2. Discharge of catch basin decant liquids may be allowed into a Basic or Enhanced Stormwater Treatment BMP, if Option 1 is not available.
3. Water removed from stormwater ponds, vaults and oversized catch basins may be returned to the storm sewer system.

*NPDES S5.C.5.d & Appendix 6*

Established inspection program designed to inspect all sites and achieve inspection of 95% of all sites.

*NPDES S5.C.5.e*



## 7.0 OPERATIONS & MAINTENANCE

Establishment and implementation of practices to reduce stormwater impacts associated with runoff from streets, parking lots, roads or highways owned or maintained by the City, and road maintenance activities conducted by the City. The following shall be addressed:

- Pipe cleaning
- Cleaning of culverts that convey stormwater in ditch systems
- Ditch maintenance
- Street cleaning
- Road repair and resurfacing, including pavement grinding
- Snow and ice control
- Utility installation
- Pavement striping maintenance
- Maintaining roadside areas, including vegetation management
- Dust control

*NPDES S5.C.5.f*

Establishment and implementation of policies and procedures to reduce pollutants in discharges from all lands owned or maintained by the City and subject to the NPDES Phase II permit, including but not limited to: parks, open space, road right-of-way, maintenance yards, and stormwater treatment and flow control facilities. These policies and procedures shall address, but are not limited to:

- Application of fertilizer, pesticides, and herbicides including the development of nutrient management and integrated pest management plans.
- Sediment and erosion control
- Landscape maintenance and vegetation disposal.
- Trash management
- Building exterior cleaning and maintenance.

*NPDES S5.C.5.g*

Develop and implement an on-going training program for employees of the City whose construction, operations or maintenance job functions may impact stormwater quality. The training program shall address the importance of protecting water quality, the requirements of the NPDES Phase II permit, operation and maintenance standards, inspection procedures, selecting appropriate BMPs, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns, including potential illicit discharges.

Follow-up training shall be provided as needed to address changes in procedures, techniques or requirements.

The City shall document and maintain records of training provided.

*NPDES S5.C.5.h*



## 7.0 OPERATIONS & MAINTENANCE

Development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the City in areas subject to the NPDES Phase II permit that are not required to have coverage under the Industrial Stormwater General Permit.

Implementation of non-structural BMPs shall begin immediately after the pollution prevention plan is developed. A schedule for implementation of structural BMPs shall be included in the SWPPP. Generic SWPPPs that can be applied at multiple sites may be used to comply with this requirement. The SWPPP shall include period visual observation of discharges from the facility to evaluate the effectiveness of the BMP.  
*NPDES S5.C.5.i*

Records of inspections and maintenance or repair activities conducted by the City shall be maintained in accordance with NPDES Phase II Permit Reporting Requirements.

All records shall be kept for at least five years.

All records shall be available to the public at reasonable times during business hours.

Records shall be incorporated into the Annual report.



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## 8.0 ILLICIT DISCHARGE DETECTION & ELIMINATION PROGRAM

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### 8.1 NPDES PHASE II PERMIT REQUIREMENTS

Section S5.C.3 of the NPDES Phase II Permit requires the City of Black Diamond to implement an ongoing illicit discharge detection and elimination program. The program must be implemented by August 2011. The City's program is outlined in this chapter.

### 8.2 DEFINITION

The NPDES Phase II Permit contains the following definition:

**"Illicit discharge** means any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

The "Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments" provides the following four-part definition:

1. Illicit discharges are defined as a storm drain that has measurable flow during dry weather containing pollutants and/or pathogens. A storm drain with measurable flow but containing no pollutants is simply considered a discharge;
2. Each illicit discharge has a unique frequency, composition and mode of entry in the storm drain system;
3. Illicit discharges are frequently caused when the sewage disposal system interacts with the storm drain system. A variety of monitoring techniques is used to locate and eliminate illegal sewage connections. These techniques trace sewage flows from the stream or outfall, and go back up the pipes or conveyances to reach the problem connection;
4. Illicit discharges of other pollutants are produced from specific source areas and operations known as "generating sites." Knowledge about these generating sites can be helpful to locate and prevent non-sewage illicit discharges. Depending on the regulatory status of specific "generating sites," education, enforcement and other pollution prevention techniques can be used to manage this class of illicit discharges.

### 8.3 ILLICIT DISCHARGES PER BDMC<sup>11</sup>

The City of Black Diamond Municipal Code details substances which are prohibited to be discharged into the City stormwater system. This section of the code lists specific items of concern, as well as references "Dangerous and Toxic wastes" as identified by WAC 173-

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<sup>11</sup> "Chapter 14.04.390 Waste Discharge into Drainage Systems", Black Diamond Municipal Code.



## 8.0 ILLICIT DISCHARGE

303. The municipal code states that it shall be a violation to “cause or permit a discharge into a drainage system or waters of the United States of a material that would cause the water quality of the receiving water to degrade below the state of Washington water quality standard for that water body.”

The current code appears to meet the minimum requirements of the NPDES Phase II Permit requirements for prohibited discharges. However, it is recommended that this section of the BDMC be amended with the following prohibited items in order to provide additional clarity to citizens:

- Discharges from potable water sources, including waterline flushing, hyperchlorinated waterline flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges shall be dechlorinated to a concentration of 0.1 ppm or less, pH-adjusted, if necessary, and volumetrically and velocity controlled to prevent re-suspension of sediments.
- Discharges from lawn watering and other irrigation runoff. These shall be minimized through, at a minimum public education activities and water conservation efforts.
- Dechlorinated swimming pool discharges. The discharges shall be dechlorinated to a concentration of 0.1 ppm or less, pH-adjusted and reoxygenized if necessary, volumetrically and velocity controlled to prevent re-suspension of sediments. Swimming pool cleaning wastewater and filter backwash shall not be discharged.
- Street and sidewalk wash water, water used to control dust, and routine external building wash down that does not use detergents. These discharges shall be reduced through, at a minimum, public education activities and/or water conservation efforts. At active construction sites, street sweeping must be performed prior to washing the street.
- Other non-stormwater discharges.

### 8.4 DISCHARGE FLOW TYPES<sup>12</sup>

Dry weather discharges are composed of one or more possible flow types:

- **Sewage and septage** flows are produced from sewer pipes and septic systems.
- **Washwater** flows are generated from a wide variety of activities and operations. Examples include discharges of gray water (laundry) from homes, commercial carwash wastewater, fleet washing, commercial laundry wastewater, and floor washing to shop drains.
- **Liquid wastes** refers to a wide variety of flows, such as oil, paint, and process water (radiator flushing water, plating bath wastewater, etc.) that enter the storm drain system.

<sup>12</sup> “Discharge Flow Types”, *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, October 2004.



## 8.0 ILLICIT DISCHARGE

- **Tap water** flows are derived from leaks and losses that occur during the distribution of drinking water in the water supply system. Tap water discharges in the storm drain system may be more prevalent in communities with high loss rates in their potable water distribution system.
- **Landscape irrigation** flows occur when excess potable water used for residential or commercial irrigation ends up in the storm drain system.
- **Groundwater and spring water** flows occur when the local water table rises above the bottom elevation of the storm drain (known as the invert) and enters the storm drain either through cracks and joints, or where open channels or pipes may intercept seeps and springs.

Water quality testing is used to conclusively identify flow types found in storm drains. Testing can distinguish illicit flow types (sewage/seepage, washwater and liquid wastes) from cleaner discharges (tap water, landscape irrigation and ground water). In practice, many storm drain discharges represent a blend of several flow types, particularly at larger outfalls that drain larger catchments. For example, groundwater flows often dilute sewage thereby masking its presence. Illicit discharges are also masked by high volumes of storm water runoff making it difficult and frequently impossible to detect them during wet weather periods.

### 8.5 DISCHARGE MODE OF ENTRY<sup>13</sup>

Illicit discharges can be further classified based on how they enter the storm drain system. The mode of entry can either be direct or indirect.

#### **DIRECT ENTRY**

Direct entry means that the discharge is directly connected to the storm drain pipe through a sewage pipe, shop drain, or other kind of pipe. Direct entry usually produces discharges that are continuous or intermittent. Direct entry usually occurs when two different kinds of “plumbing” are improperly connected. The three main situations where this occurs are:

**Sewage cross-connections:** A sewer pipe that is improperly connected to the storm drain system produces a continuous discharge of raw sewage to the pipe. Sewage cross-connections can occur in catchments where combined sewers or septic systems are converted to a separate sewer system, and a few pipes get “crossed.”

**Straight pipe:** This term refers to relatively small diameter pipes that intentionally bypass the sanitary connection or septic drain fields, producing a direct discharge into open channels or streams.

**Industrial and commercial cross-connections:** These occur when a drain pipe is improperly connected to the storm drain system producing a discharge of wash water, process water or other inappropriate flows into the storm drain pipe. Older industrial areas tend to have a higher potential for illicit cross-connections.

<sup>13</sup> “Discharge Flow Types”, *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, October 2004.



### **INDIRECT ENTRY**

Indirect entry means that flows generated outside the storm drain system enter through storm drain inlets or by infiltrating through the joints of the pipe. Generally, indirect modes of entry produce intermittent or transitory discharges, with the exception of groundwater seepage. The five main modes of indirect entry for discharges include:

**Groundwater seepage into the storm drain pipe:** Seepage frequently occurs in storm drains after long periods of above average rainfall. Seepage discharges can be either continuous or intermittent, depending on the depth of the water table and the season. Groundwater seepage usually consists of relatively clean water that is not an illicit discharge by itself, but can mask other illicit discharges. If storm drains are located close to sanitary sewers, groundwater seepage may intermingle with diluted sewage.

**Spills that enter the storm drain system at an inlet:** These transitory discharges occur when a spill travels across an impervious surface and enters a storm drain inlet. Spills can occur at many industrial, commercial and transport-related sites. A very common example is an oil or gas spill from an accident that then travels across the road and into the storm drain system.

**Dumping a liquid into a storm drain inlet:** This type of transitory discharge is created when liquid wastes such as oil, grease, paint, solvents, and various automotive fluids are dumped into the storm drain. Liquid dumping occurs intermittently at sites that improperly dispose of rinse water and wash water during maintenance and cleanup operations. A common example is cleaning deep fryers in the parking lot of fast food operations.

**Outdoor washing activities that create flow to a storm drain inlet:** Outdoor washing may or may not be an illicit discharge, depending on the nature of the generating site that produces the wash water. For example, hosing off individual sidewalks and driveways may not generate significant flows or pollutant loads. On the other hand, routine washing of fueling areas, outdoor storage areas, and parking lots (power washing), and construction equipment cleanouts may result in unacceptable pollutant loads.

**Non-target irrigation from landscaping or lawns that reaches the storm drain system:** Irrigation can produce intermittent discharges from over-watering or misdirected sprinklers that send tap water over impervious areas. In some instances, non-target irrigation can produce unacceptable loads of nutrients, organic matter or pesticides. The most common example is a discharge from commercial landscaping areas adjacent to parking lots connected to the storm drain system.

## **8.6 LAND USE AND POTENTIAL GENERATING SITES<sup>14</sup>**

Land use can predict the potential for indirect discharges, which are often intermittent or transitory. Many indirect discharges can be identified and prevented using the concept of “generating sites,” which are sites where common operations can generate indirect

<sup>14</sup> “Discharge Flow Types”, *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, October 2004.





## 8.0 ILLICIT DISCHARGE

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discharges in a community. Both research and program experience indicates that a small subset of generating sites within a broader land use category can produce most of the indirect discharges. Consequently, the density of potential generating sites within a sub-watershed may be a good indicator of the severity of local illicit discharge problems. Some common generating sites within major land use categories described below:

### **RESIDENTIAL GENERATING SITES**

Failing septic systems are the most common residential discharge. In addition, indirect residential discharges, which consist of oil dumping, irrigation overflows, swimming pool discharges, and car washing, are also frequently detected. Many indirect discharges are caused by common residential behaviors and may not be classified as “illicit” even though they can contribute to water quality problems. With the exception of failing septic systems and oil dumping, most communities have chosen education rather than enforcement as the primary tool to prevent illicit discharges from residential areas.

### **COMMERCIAL GENERATING SITES**

Typical commercial discharge generators included operations such as outdoor washing; disposal of food wastes; car fueling, repair, and washing; parking lot power washing; and poor dumpster management. Recreational areas, such as marinas and campgrounds, are a notable source of sewage discharges. It is important to note that not all businesses within a generating category actually produce illicit discharges. Generally only a relatively small fraction of businesses produce these discharges. Consequently, on-site inspections of individual businesses are needed to confirm whether a property is actually a generating site.

### **INDUSTRIAL GENERATING SITES**

Industrial sites produce a wide range of flows that can cause illicit discharges. The most common continuous discharges are operations involving the disposal of rinse water, process water, wash water and contaminated, noncontact cooling water. Spills and leaks, ruptured pipes, and leaking underground storage tanks are also a source of indirect discharges.

### **INSTITUTIONAL GENERATING SITES**

Institutions such as hospitals, corporate campuses, colleges, churches, and cemeteries can be generating sites if routine maintenance practices/operations create discharges from parking lots and other areas. Many large institutional sites have their own areas for fleet maintenance, fueling, outdoor storage, and loading/unloading that can produce indirect discharges.

### **MUNICIPAL GENERATING SITES**

Municipal generating sites include operations that handle solid waste, water, wastewater, street and storm drain maintenance, fleet washing, and yard waste disposal. Transport-related areas such as streets and highways, airports, rail yards, and ports can also generate indirect discharges from spills, accidents and dumping.



### **8.7 IMPACTS TO WATER QUALITY<sup>15</sup>**

Water quality can be significantly impacted if pollutants enter into the stormwater system. Some of the more common stormwater pollutants, as well as the potential impacts associated with them are listed below:

#### **TOTAL SUSPENDED SOLIDS**

Particulate solids such as eroded soil, heavy metal precipitates, and biological solids (all considered as conventional pollutants), can cause sedimentation in streams and turbidity in receiving surface waters. These sediments can destroy the desired habitat for fish and can impact drinking water supplies. The sediment may be carried to streams, lakes, or Puget Sound where they may be toxic to aquatic life and make dredging necessary.

#### **OIL AND GREASE**

Oil and grease can be toxic to aquatic life. Concentrations in stormwater from commercial and industrial areas often exceed the Washington Department of Ecology (Ecology) guidelines of: 10 mg/l maximum daily average, 15 mg/L maximum at any time, and no ongoing or frequently recurring visible sheen.

#### **NUTRIENTS**

Phosphorus and nitrogen compounds can cause excessive growth of aquatic vegetation in lakes and marine waters.

#### **BOD**

This represents organic, nitrogenous and other materials that are consumed by bacteria present in receiving waters. Oxygen may be depleted in the process, threatening higher organisms such as fish.

#### **HEAVY METALS**

Stormwater can contain heavy metals such as lead, zinc, cadmium, and copper at concentrations that often exceed water quality criteria and that can be toxic to fish and other aquatic life. Research in Puget Sound has shown that metals and toxic organics concentrate in sediments and at the water surface (micro-layer) where they interfere with the reproductive cycle of many biotic species as well as cause tumors and lesions in fish.

#### **PH**

This is a measure of the alkalinity or acidity and can be toxic to fish if it varies appreciably from neutral pH, which is 7.0.

#### **BACTERIA AND VIRUSES**

Stormwater can contain disease-causing bacteria and viruses, although not at concentrations found in sanitary sewage. Shellfish subjected to stormwater discharges near urban areas are usually unsafe for human consumption.

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<sup>15</sup> "Stormwater Pollutants and Their Adverse Impact", Appendix B, Stormwater Management Manual for Western Washington, Volume IV Source Control BMPs.



### 8.8 ILLICIT DISCHARGE DETECTION

Detection and removal/repair of illicit discharges throughout the system is accomplished through a three step process: (1) An assessment of illicit discharge potential; (2) Field investigation of illicit discharge problem areas; and (3) Isolation of individual discharges.

#### ASSESSMENT OF ILLICIT DISCHARGE POTENTIAL

The assessment of illicit discharge potential is typically conducted in the office and helps to provide guidance on where best to concentrate field investigations. **Table 8.01 Illicit Discharge Potential Factors** lists factors to consider in completion of the assessment. Each of the sub-basins within the City's drainage area should be evaluated for potential discharges. The discharge potential factors should be evaluated and a score assigned. Note that City staff may elect to assign more weight/importance to some factors over others in the overall assessment.

**Table 8.01 Illicit Discharge Potential Factors**

Factor	Description
Complaints	Frequency of complaints, phone calls, hotline reports, and/or spill responses.
Poor Dry Weather Water Quality	Frequency that individual samples exceed benchmark values for bacteria, nutrients, conductivity, or other predetermined indicators.
Generating Sites	Sub-basins with a high density of "generating sites" (or industrial NPDES permitted sites) indicates a high illicit discharge potential.
Storm Outfall Density	Sub-basins with a higher density of storm outfalls (measured in number per stream/creek mile) typically have a higher illicit discharge potential.
Development Age	An average age of development within the sub-basins shall be determined. A higher illicit discharge potential is typically associated with developments older than 50 years.
Sewer Conversion	Areas that were previously served by septic systems or a combined storm-sewer system, but have been connected to the sanitary sewer system have higher illicit discharge potential.
Older Industrial Facilities	Areas with more than 5% of its area in industrial sites that are more than 40 years old will typically have a higher illicit discharge potential.
Old / Failing Sewer System	High illicit discharge potential is present when the age of the sanitary sewer system exceeds its design life or when there is a presence of pipe breaks, spills,
Aging Septic Systems	Areas with a high density of older septic drain fields typically have high illicit discharge potential.



### **FIELD INVESTIGATION OF ILLICIT DISCHARGE PROBLEM AREAS**

A field investigation of illicit discharge problem areas typically begins with those that had a high ranking based on the results of the potential assessment. The primary tool used to locate drainage problems in the field is an Outfall Reconnaissance Inventory (ORI). Completion of an ORI can result in the discovery of obvious illicit discharges to the storm drainage system. Completion of an ORI is a required activity for NPDES Phase II permit holders.

An ORI is a stream walk to inventory and measure storm drainage outfalls. A thorough ORI will record basic characteristics of outfalls, evaluate suspect outfalls, and assess severity of illicit discharge problems. Spring and fall are typically the best seasons to conduct an outfall reconnaissance inventory. The investigations should be completed at least 48 hours after the last runoff-producing rain event.

Outfalls should be evaluated and basic sensory and physical data recorded such as odor, color, presence of floaters, and turbidity. Water flow and quality data should also be collected. Test strips and a quick and convenient method for testing indicators such as temperature, pH, and ammonia.

A sample form that can be used to record the results of the Outfall Reconnaissance Inventory has been included in **Figure 8.1 Outfall Reconnaissance Inventory Form (Pg 1)** and **Figure 8.2 Outfall Reconnaissance Inventory Form (Pg 2)**.

### **ISOLATION OF INDIVIDUAL DISCHARGES**

If the Outfall Reconnaissance Inventory identifies a suspected illicit discharge, the next step is to trace the illicit discharge problem back up the pipe to isolate the specific source or improper connection that generates the discharge. Finding and repairing sources of illicit discharges is the core goal of any IDDE (Illicit Discharge Detection and Elimination) Program.

There are typically four types of investigations that are conducted in order to isolate discharges: (1) storm drain network investigations; (2) drainage area investigations; (3) on-site investigations; and (4) septic system investigations.

**Storm Drain Network Investigations** are completed to try to find and isolate the problem to a single pipe segment of the storm system. Common methods to isolate the problem area include: visual inspection at manholes; sandbagging or damming trunklines; dye testing; smoke testing; and/or video testing. Once the pipe segment has been identified, on-site investigations are used to find the specific discharge or improper connection.

**Drainage Area Investigations** are essentially land use investigations. They typically begin with an office assessment of potential problem areas that require field follow-up. Drainage area investigations may be conducted with a drive-by review of suspected sites. They may also include a more detailed investigation of GIS data to identify the source of a discharge. On-site investigations are often still necessary to identify the specific plumbing or connection generating the discharge.





OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET					
<b>Section 1: Background Data</b>					
Subwatershed:		Outfall ID:			
Today's date:		Time (Military):			
Investigators:		Form completed by:			
Temperature (°F):	Rainfall (in.): Last 24 hours:		Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:		
Camera:		Photo #s:			
Land Use in Drainage Area (Check all that apply):					
<input type="checkbox"/> Industrial		<input type="checkbox"/> Open Space			
<input type="checkbox"/> Ultra-Urban Residential		<input type="checkbox"/> Institutional			
<input type="checkbox"/> Suburban Residential		Other: _____			
<input type="checkbox"/> Commercial		Known Industries: _____			
Notes (e.g., origin of outfall, if known):					
<b>Section 2: Outfall Description</b>					
LOCATION	MATERIAL	SHAPE	DIMENSIONS (IN.)	SUBMERGED	
<input type="checkbox"/> Closed Pipe	<input type="checkbox"/> RCP <input type="checkbox"/> CMP	<input type="checkbox"/> Circular	Diameter/Dimensions: _____	In Water: <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Fully  With Sediment: <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Fully	
	<input type="checkbox"/> PVC <input type="checkbox"/> HDPE	<input type="checkbox"/> Elliptical			<input type="checkbox"/> Single
	<input type="checkbox"/> Steel	<input type="checkbox"/> Box	<input type="checkbox"/> Double		
	<input type="checkbox"/> Other: _____	<input type="checkbox"/> Other: _____	<input type="checkbox"/> Triple		
		<input type="checkbox"/> Other: _____			
<input type="checkbox"/> Open drainage	<input type="checkbox"/> Concrete	<input type="checkbox"/> Trapezoid	Depth: _____ Top Width: _____ Bottom Width: _____		
	<input type="checkbox"/> Earthen				<input type="checkbox"/> Parabolic
	<input type="checkbox"/> rip-rap				<input type="checkbox"/> Other: _____
	<input type="checkbox"/> Other: _____				
<input type="checkbox"/> In-Stream	(applicable when collecting samples)				
Flow Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <i>If No, Skip to Section 5</i>				
Flow Description (If present)	<input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial				
<b>Section 3: Quantitative Characterization</b>					
FIELD DATA FOR FLOWING OUTFALLS					
PARAMETER	RESULT	UNIT	EQUIPMENT		
<input type="checkbox"/> Flow #1	Volume	Liter	Bottle		
	Time to fill	Sec			
<input type="checkbox"/> Flow #2	Flow depth	In	Tape measure		
	Flow width	____', ____"	Tape measure		
	Measured length	____', ____"	Tape measure		
	Time of travel	S	Stop watch		
Temperature		°F	Thermometer		
pH		pH Units	Test strip/Probe		
Ammonia		mg/L	Test strip		

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**Figure 8.1 Outfall Reconnaissance Inventory Form (Pg 1)**



**Outfall Reconnaissance Inventory Field Sheet**

**Section 4: Physical Indicators for Flowing Outfalls Only**  
Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No (If No, Skip to Section 5)

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	<input type="checkbox"/>	<input type="checkbox"/> Sewage <input type="checkbox"/> Rancid/sour <input type="checkbox"/> Petroleum/gas <input type="checkbox"/> Sulfide <input type="checkbox"/> Other:	<input type="checkbox"/> 1 – Faint	<input type="checkbox"/> 2 – Easily detected	<input type="checkbox"/> 3 – Noticeable from a distance
Color	<input type="checkbox"/>	<input type="checkbox"/> Clear <input type="checkbox"/> Brown <input type="checkbox"/> Gray <input type="checkbox"/> Yellow <input type="checkbox"/> Green <input type="checkbox"/> Orange <input type="checkbox"/> Red <input type="checkbox"/> Other:	<input type="checkbox"/> 1 – Faint colors in sample bottle	<input type="checkbox"/> 2 – Clearly visible in sample bottle	<input type="checkbox"/> 3 – Clearly visible in outfall flow
Turbidity	<input type="checkbox"/>	See severity	<input type="checkbox"/> 1 – Slight cloudiness	<input type="checkbox"/> 2 – Cloudy	<input type="checkbox"/> 3 – Opaque
Floatables -Does Not Include Trash!!	<input type="checkbox"/>	<input type="checkbox"/> Sewage (Toilet Paper, etc.) <input type="checkbox"/> Suds <input type="checkbox"/> Petroleum (oil sheen) <input type="checkbox"/> Other:	<input type="checkbox"/> 1 – Few/slight; origin not obvious	<input type="checkbox"/> 2 – Some; indications of origin (e.g., possible suds or oil sheen)	<input type="checkbox"/> 3 – Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

**Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls**  
Are physical indicators that are not related to flow present? ☐ Yes ☐ No (If No, Skip to Section 6)

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	<input type="checkbox"/>	<input type="checkbox"/> Spalling, Cracking or Chipping <input type="checkbox"/> Peeling Paint <input type="checkbox"/> Corrosion	
Deposits/Stains	<input type="checkbox"/>	<input type="checkbox"/> Oily <input type="checkbox"/> Flow Line <input type="checkbox"/> Paint <input type="checkbox"/> Other:	
Abnormal Vegetation	<input type="checkbox"/>	<input type="checkbox"/> Excessive <input type="checkbox"/> Inhibited	
Poor pool quality	<input type="checkbox"/>	<input type="checkbox"/> Odors <input type="checkbox"/> Colors <input type="checkbox"/> Floatables <input type="checkbox"/> Oil Sheen <input type="checkbox"/> Suds <input type="checkbox"/> Excessive Algae <input type="checkbox"/> Other:	
Pipe benthic growth	<input type="checkbox"/>	<input type="checkbox"/> Brown <input type="checkbox"/> Orange <input type="checkbox"/> Green <input type="checkbox"/> Other:	

**Section 6: Overall Outfall Characterization**

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

**Section 7: Data Collection**

1. Sample for the lab?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. If yes, collected from:	<input type="checkbox"/> Flow <input type="checkbox"/> Pool
3. Intermittent flow trap set?	<input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, type: <input type="checkbox"/> OBM <input type="checkbox"/> Caulk dam

**Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?**

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**Figure 8.2 Outfall Reconnaissance Inventory Form (Pg 2)**

**On-Site Investigations** are used to pinpoint the exact connection or source producing a discharge and are often completed by smoke testing, dye testing, or video testing. Dye testing the plumbing system of households and buildings is a relatively simple method of identifying and verifying illicit connections. If the dye is present in the storm drainage system, rather than the sanitary sewer system, an illicit connection is present. Video testing and smoke testing are also common methods of isolating the source points of illicit discharges.

**Septic System Investigations** are completed in communities with septic systems that are currently or have previously been in use. Illicit discharges may enter the storm drainage system as indirect discharges to streams, or through straight pipe discharges from bypassed septic systems. On-site septic investigations and infrared investigations are typically used to evaluate septic system performance. On-site investigations may include a survey of the homeowner, as well as a visual inspection of the site. Indicators of potential problems may include: foul odors in the yard; wet, spongy ground; algae blooms



## 8.0 ILLICIT DISCHARGE

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or excessive weed growth in adjacent ditches, ponds, and streams; cars, boats, or other heavy objects located over the field that could crush lateral pipes; and/or visible liquid on the surface of the drain field (i.e. surface breakouts). Infrared investigations can also be utilized to identify thermal irregularities in drainage flows.

### **8.9 REPAIR, MONITORING, AND ENFORCEMENT**

It is important that repairs be made to remove illicit discharges in a timely manner. Internal plumbing issues are typically the responsibility of the property owner, while repairs to the city-wide storm and/or sewer system are typically the responsibility of the City. Service laterals are typically the responsibility of the property owner as well, however the City may elect to offer assistance due to the higher cost for these type of repairs.

“Illicit Discharge Detection and Elimination: A Guidance Manual” recommends that discharges should be stopped within 7 days of notification by the City and that illicit connections should be repaired within 30 days.

The City of Black Diamond’s Municipal Code currently states that individuals are subject to a fine of one thousand dollars per day, or a jail term of up to 90 days (per day of offense), or both. It is recommended that the City modify this portion of the code to include clear timeframes which allow for the opportunity for property owner repair without penalty. Escalating levels of enforcement are also recommended such as: (1) letter of notice; (2) termination of water/sewer service; (3) fine; and (4) jail time. The City’s code shall also be clear as to when the City may elect to make the repairs and back-charge the property owner.

In all instances, it is important that follow-up monitoring is conducted for all sites where illicit discharges have identified in order to verify that corrections have been made.



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## 9.0 PUBLIC EDUCATION & OUTREACH

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### **9.1 PUBLIC EDUCATION AND OUTREACH PROGRAM GOALS**

The City of Black Diamond's goal in developing and implementing their Stormwater Public Education and Outreach Program is to reduce or eliminate behaviors and practices that cause or contribute to stormwater pollution.

### **9.2 NPDES PHASE II PERMIT REQUIREMENTS**

Section S5.C.1 of the NPDES Phase II Permit requires that the City of Black Diamond develops a public education and outreach program by February 2009. The City has quite a bit of flexibility in determining how they want to develop and implement their public education and outreach program. The NPDES Phase II Permit outlines prioritized, target audiences and topics. The Permit also requires the City to track and maintain records of public education and outreach activities. The City must measure the understanding and adoption of the targeted behaviors in order to more effectively direct their education and outreach efforts as may be necessary.

### **9.3 TARGET AUDIENCES AND SUBJECT AREAS**

The City's Public Education and Outreach Program should be prioritized to target the following audiences and subject areas:

1. General Public
  - General impacts of stormwater flows into surface water
  - Impacts from impervious surfaces
  - Source control BMPs and environmental stewardship actions and opportunities in the areas of pet waste, vehicle maintenance, landscaping and buffers
2. General Public, businesses, including home-based and mobile businesses
  - BMPs for use and storage of automotive chemicals, hazardous cleaning supplies, carwash soaps and other hazardous materials.
  - Impacts of illicit discharges and how to report them
3. Homeowners, landscapers and property managers
  - Yard care techniques protective of water quality
  - BMPs for use and storage of pesticides and fertilizers
  - BMPs for carpet cleaning and auto repair and maintenance
  - Low Impact Development techniques, including site design, pervious paving, retention of forests and mature trees.
  - Stormwater pond maintenance
4. Engineers, contractors, developers, review staff, and land use planners
  - Technical standards for stormwater site and erosion control plans
  - Low Impact Development techniques, including site design, pervious paving, retention of forests and mature trees
  - Stormwater treatment and flow control BMPs



### 9.4 PUBLIC REPORTING / SPILL HOTLINE

Section S5.C.3.d.ii of the NPDES Phase II Permit requires that the City of Black Diamond publicly list and publicize a hotline or other local telephone number for public reporting of spills and other illicit discharges which may impact the stormwater system. Spills within the City of Black Diamond should be reported to City Hall at (360) 886-2560.

The City should include this number on utility billing inserts, the City's website, and/or the City newsletter in order to publicize this number for members of the community.

The City is required to maintain a record of calls received and include this information in the annual report to the DOE regarding the NPDES implementation progress. Forms for tracking calls received and follow-up completed are included in **Figure 9.1 Illicit Discharge / Spill Tracking Form (Pg 1)** and **Figure 9.2 Illicit Discharge / Spill Tracking Form (Pg 2)**.

### 9.5 COLLABORATION

The City of Black Diamond encourages and supports collaboration efforts with other jurisdictions and agencies in educating the public on stormwater topics. The City of Black Diamond will look for opportunities to partner with neighboring jurisdictions, community organizations, or other groups. The benefits of collaborating with others to educate the public include consistent messages, as well as reduced costs for the City.

### 9.6 PROGRAM CUSTOMIZATION<sup>16</sup>

The City of Black Diamond's Public Education and Outreach Program should be customized to serve the City's population. The City can identify audiences for stormwater education in the community by using existing information, such as:

- Demographic information, such as age, income, or education
- Economic information, such as types of commercial or development activities
- Land-use data, pet licenses, population density, and home ownership statistics

The Washington State Department of Ecology recommends: "To identify behaviors to target, focus on specific local pollution problems. For example, if a stream flowing through your community has a bacteria pollution problem, you may choose to focus on encouraging pet owners to pick up their pet waste. For commercially zoned land areas and paved parking lots, you may target your efforts on reducing automotive fluid leaks on paved surfaces. In residential neighborhoods, education messages may emphasize natural yard care techniques."

### 9.7 DISTRIBUTION

There are various methods to disseminate the information to the City's target audiences. Examples that the City may wish to pursue may be:

- Publication in the City's regular City-wide newsletter
- Posting on the City's website

<sup>16</sup> "Focus on Stormwater Public Education and Outreach", Washington State Department of Ecology, 07-10-092, Oct. 2007.



Illicit Discharge Hotline Incident Tracking Sheet				
<b>Incident ID:</b>				
<b>Responder Information</b>				
Call taken by:			Call date:	
Call time:			Precipitation (inches) in past 24-48 hrs:	
<b>Reporter Information</b>				
Incident time:			Incident date:	
Caller contact information ( <i>optional</i> ):				
<b>Incident Location</b> ( <i>complete one or more below</i> )				
Latitude and longitude:				
Stream address or outfall #:				
Closest street address:				
Nearby landmark:				
<b>Primary Location Description</b>		<b>Secondary Location Description:</b>		
<input type="checkbox"/> Stream corridor ( <i>In or adjacent to stream</i> )	<input type="checkbox"/> Outfall	<input type="checkbox"/> In-stream flow	<input type="checkbox"/> Along banks	
<input type="checkbox"/> Upland area ( <i>Land not adjacent to stream</i> )	<input type="checkbox"/> Near storm drain	<input type="checkbox"/> Near other water source (storm water pond, wetland, etc.):		
Narrative description of location:				
<b>Upland Problem Indicator Description</b>				
<input type="checkbox"/> Dumping	<input type="checkbox"/> Oil/solvents/chemicals	<input type="checkbox"/> Sewage		
<input type="checkbox"/> Wash water, suds, etc.	<input type="checkbox"/> Other: _____			
<b>Stream Corridor Problem Indicator Description</b>				
Odor	<input type="checkbox"/> None	<input type="checkbox"/> Sewage	<input type="checkbox"/> Rancid/Sour	<input type="checkbox"/> Petroleum (gas)
	<input type="checkbox"/> Sulfide (rotten eggs); natural gas	<input type="checkbox"/> Other: Describe in "Narrative" section		
Appearance	<input type="checkbox"/> "Normal"	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Cloudy	<input type="checkbox"/> Suds
	<input type="checkbox"/> Other: Describe in "Narrative" section			
Floatables	<input type="checkbox"/> None:	<input type="checkbox"/> Sewage (toilet paper, etc)	<input type="checkbox"/> Algae	<input type="checkbox"/> Dead fish
	<input type="checkbox"/> Other: Describe in "Narrative" section			
Narrative description of problem indicators:				
Suspected Violator (name, personal or vehicle description, license plate #, etc.):				

**Figure 9.1 Illicit Discharge / Spill Tracking Form (Pg 1)**



## 9.0 PUBLIC EDUCATION AND OUTREACH

Investigation Notes	
Initial investigation date:	Investigators:
<input type="checkbox"/> No investigation made	Reason:
<input type="checkbox"/> Referred to different department/agency:	Department/Agency:
<input type="checkbox"/> Investigated: No action necessary	
<input type="checkbox"/> Investigated: Requires action	Description of actions:
Hours between call and investigation:	Hours to close incident:
Date case closed:	
Notes:	

**Figure 9.2 Illicit Discharge / Spill Tracking Form (Pg 2)<sup>17</sup>**

<sup>17</sup> "Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments", Appendix D, Center for Watershed Protection, October 2004.





## 9.0 PUBLIC EDUCATION AND OUTREACH

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- Distribution of materials in conjunction with utility billings
- Handouts available at community meetings and / or community fairs
- Age-appropriate materials and training through the local schools
- Work with community groups such as Boy Scouts or Girl Scouts to develop programs for stenciling catch basins
- Materials available at the City Hall
- Targeted mailing to commercial business owners
- Community workshops focusing on stormwater topics
- Coordinate hazardous waste collection days throughout the year

### **9.8 SAMPLE PROGRAM MATERIALS<sup>18</sup>**

The United States Environmental Protection Agency has a variety of materials available on their website to assist cities in developing their Public Education and Outreach programs. Many of these include copyright releases, or details on how to contact the creating agencies in order to obtain rights for use. In order to minimize initial program costs, it is recommended that the City utilize such materials. **Figure 9.3 Public Education Samples – Stormwater, Figure 9.4 Public Education Samples – Pet Care, Figure 9.5 Public Education Samples – Vehicle Maintenance, and Figure 9.6 Public Education Samples – Yard Care** contain examples of the types of materials the City may wish to consider.

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<sup>18</sup> “Nonpoint Source Outreach Toolbox”, United States Environmental Protection Agency, Nov. 13, 2008, <<http://www.epa.gov/nps/toolbox/>>.



## 9.0 PUBLIC EDUCATION AND OUTREACH

**RUNOFF FROM ROOF**

**LAWN RUNOFF**

**GUTTER RUNOFF**

**STREET RUNOFF**

**STREET RUNOFF**

**STORMWATER RUNOFF ENDS UP IN LOCAL STREAMS, CREEKS, RIVERS AND LAKES.**

Courtesy NCDENR

**up for a swim?**

Grab a beach towel and head for the closest... storm drain!

That's right! Your favorite swimming hole begins right on your street. Look along the curb and find a storm drain. It's a direct connection to your local lake or river.

Storm drains are designed to prevent flooding. Large volumes of water from heavy rains and snowmelt wash over streets and into the drains. Pipes underground transport the water rapidly into area creeks, rivers and lakes.

But there is a down side to storm drains. When water washes into the drains, pollutants are carried along for the ride. Litter, pet waste, dirt, fertilizers, antifreeze and motor oil... just a few examples of contaminants that enter our waterways through storm drains. No filters, no treatment. Swimming, anyone?

Be a water quality champion. Keep storm drains for rainwater only.

For more information on this topic, give us a call:

**Water: get it a hand!**

Developed by the Human River Watershed Council and Christensen Design with support from Pishigo DEQ and USEPA.

**Remember, it ALL drains to our lakes and rivers**

**Keep pollution out of storm drains**

Storm drains and roadside ditches lead to our lakes and streams. So, any oil, pet waste, leaves, or dirty water from washing your car or other outside activities that enters a storm drain gets into our lakes and streams.

How can you help? Simple. Use a broom instead of a hose to clean your driveway. Keep leaves, grass clippings, and trash away from the storm drain, and never dump motor oil, pet waste, or dirty, soapy water down the storm drain.

**Remember, only rain in the drain!**

Find out more at [www.semcog.org](http://www.semcog.org).

Brought to you by the Southeast Michigan Partners for Clean Water.

Support provided by SEMCOG, the Southeast Michigan Council of Governments (SEMCOG), and the People River National Wet Weather Demonstration Project.

DUMP NO WASTE

DRAINS TO RIVER

**PROTECT YOUR RIVER**

Stormwater carries polluted runoff down your local storm drain and straight to your river!

You can prevent pollution!

- Use less fertilizer on lawns
- Avoid pesticides
- Compost garden trimmings
- Recycle used oil
- Wash your car on the lawn, not driveway or street
- Pick up pet wastes
- Don't litter
- Bring your leftover paints and pesticides to HazcoHouse or Household Hazardous Waste collection days
- For more information call your local public works office at:

**Earthwater® STENCILS, LLC**

<http://www.earthwater-stencils.com>

**Rain washes oil, fertilizer and other pollutants into storm drains...**

**which flows untreated into lakes and streams.**

**DON'T DUMP** You can help prevent water pollution by volunteering to apply drain markers to storm drains in your neighborhood.

**Adopt a Stream** Also, consider adopting a stream to keep trash out of our creeks.

Call Greensboro's Environmental Helpline at 373-2812 for more information [www.ci.greensboro.nc.us/stormwater](http://www.ci.greensboro.nc.us/stormwater)

**Stormwater... A Vital Water Resource**

Figure 9.3 Public Education Samples – Stormwater

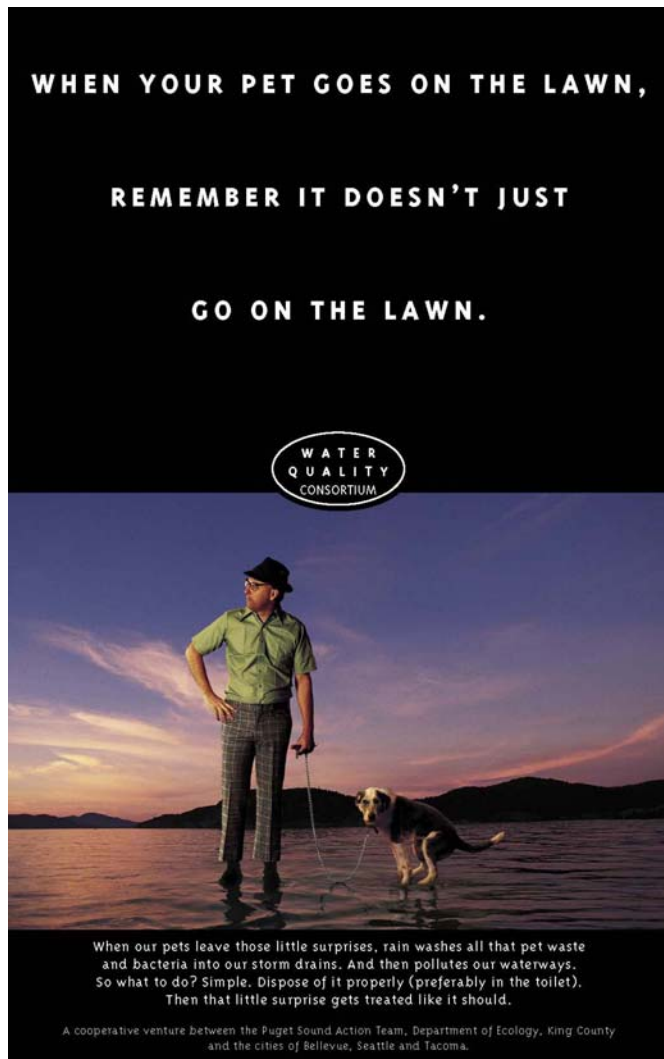


## 9.0 PUBLIC EDUCATION AND OUTREACH



Clean up after your dog every single time. Do your part to keep your neighborhood and waters clean, healthy and pollution free. For more tips, visit [www.erasethewaste.com](http://www.erasethewaste.com) or call: **1(888) CLEAN LA.**

**Erase the waste**  
Endorsed by the State Water Resources Control Board  
**PROJECT Pollution Prevention**



When our pets leave those little surprises, rain washes all that pet waste and bacteria into our storm drains. And then pollutes our waterways. So what to do? Simple. Dispose of it properly (preferably in the toilet). Then that little surprise gets treated like it should.

A cooperative venture between the Puget Sound Action Team, Department of Ecology, King County and the cities of Bellevue, Seattle and Tacoma.



In partnership with the Occurrence District of Southern Nevada, the Nevada Division of Environmental Protection, and the Clark County Regional Flood Control District.



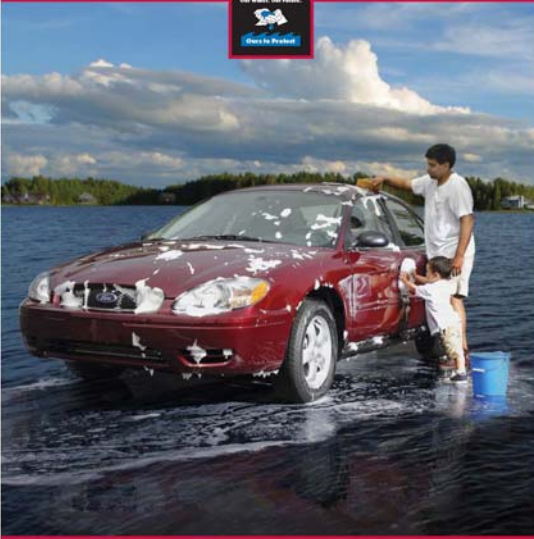
**Figure 9.4 Public Education Samples – Pet Care**





## 9.0 PUBLIC EDUCATION AND OUTREACH

**Remember, you're not just washing your car**



**Practice good car care**

Did you know there are over four million vehicles in Southeast Michigan? **Practicing good car care helps protect our lakes and streams.**

How? Storm drains and roadside ditches lead to our lakes and streams. So, if dirty water from washing our cars or motor fluids are washed or dumped into the storm drain, it pollutes our local waterways.

What can you do? Simple. **Keep your car tuned and fix leaks promptly, recycle used motor oil and other fluids, take your car to the carwash or wash your car on the grass.**

Find out more at [www.semcog.org](http://www.semcog.org).

Brought to you by the Southeast Michigan Partners for Clean Water.  
Support provided by SEMCOG, the Southeast Michigan Council of Governments, 2013-2015, and the Puget Sound National Wet Weather Demonstration Project.



**Oil and Water Really Don't Mix**

Don't dump used motor oil into storm drains, because they lead directly to streams and lakes. Please bring used motor oil to one of these free oil recycling centers:

O'Reilly Auto Parts  
Pep Boys  
Advance Auto Parts  
Auto Zone Auto Parts  
Household Hazardous Waste Collection Center



**Questions?**  
Call the City of Greensboro  
Environmental Helpline  
373-2812



**it's raining, it's pouring, toxic rainbows are forming**

The next time it rains, look down at your driveway or the nearest parking lot. See any colorful "oil rainbows" slicked across the pavement? It's a sign that someone's car is leaking fluids.

The rainbows might look pretty, but these fluid leaks are composed of highly toxic materials, such as antifreeze, motor oil, brake fluid and transmission fluid. When the toxics enter the storm drain system or leach into the soil, surface and groundwater supplies are contaminated. And that means your drinking water supplies are put at risk.

You rely on your car for safe, convenient transportation. Why not treat it right **and** protect water quality at the same time?

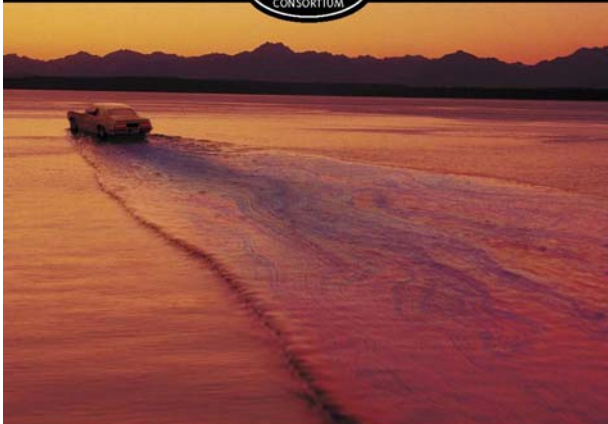
- Repair auto fluid leaks right away. Use a drip pan to catch leaks if repairs are delayed.
- Collect and dispose of fluids from routine maintenance properly.

For help with home toxics disposal, give us a call:



Developed by the Huron River Watershed Council and Christensen Design with support from Michigan DCO and USEPA.

**WHEN YOUR CAR'S LEAKING OIL ON THE STREET, REMEMBER IT'S NOT JUST LEAKING OIL ON THE STREET.**



**WATER QUALITY CONSORTIUM**

Leaking oil goes from car to street. And is washed from the street into the storm drain and into our lakes, streams and Puget Sound. Now imagine the number of cars in the area and you can imagine the amount of oil that finds its way from leaky gaskets into our water. So please, fix oil leaks.

A cooperative venture between the Puget Sound Action Team, Department of Ecology, King County and the cities of Bellevue, Seattle and Tacoma.

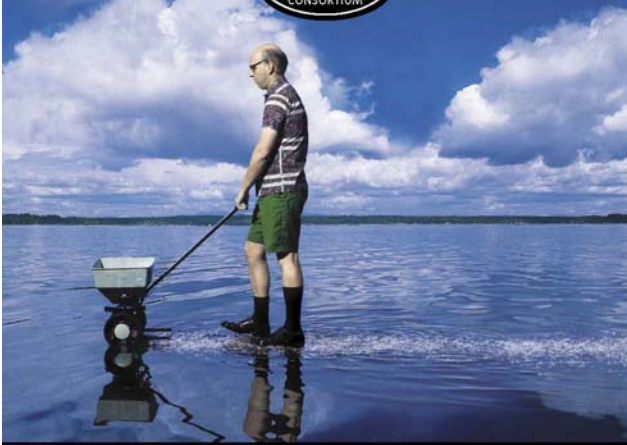
**Figure 9.5 Public Education Samples – Vehicle Maintenance**





## 9.0 PUBLIC EDUCATION AND OUTREACH

**WHEN YOU'RE FERTILIZING THE LAWN,  
REMEMBER YOU'RE NOT JUST  
FERTILIZING THE LAWN.**




**WATER QUALITY CONSORTIUM**

You fertilize the lawn. Then it rains. The rain washes the fertilizer along the curb, into the storm drain, and directly into our lakes, streams and Puget Sound. This causes algae to grow, which uses up oxygen that fish need to survive. So if you fertilize, please follow directions and use sparingly.


A cooperative venture between the Puget Sound Action Team, Department of Ecology, King County and the cities of Bellevue, Seattle and Tacoma.

**Storm Drains are for Rain...** More than 150,000 times each month, lawns and gardens throughout LA County are overwatered. This can cause fertilizers and pesticides on grass and plants to flow into storm drains and to the ocean, untreated — harming the environment.




Please use fertilizers and pesticides wisely, not before a rain, and water carefully.

**...not fertilizer.**



**Remember, you're not just getting rid of weeds and pests**



**Choose earth-friendly landscaping**

Did you know that herbicides and pesticides are harmful to our kids, pets, and the environment?

The chemicals in these materials pollute our waterways if washed from our lawns and gardens into storm drains or roadside ditches that lead directly to our lakes and rivers. Practicing earth-friendly landscaping in your yard and garden can help to protect kids, pets, and our waterways.

**So what can you do? Simple.**

- Select plants native to Michigan. These plants require less fertilizer and water, and are more disease resistant.
- Avoid over-watering your lawn — it needs about 1 inch of rain per week.
- Use mulch around trees and plants to help retain water, reduce weeds, and minimize the need for pesticides.
- Mow your lawn high — 3 inches is the rule. Follow your community's leaf pick-up guidelines. Try mowing grass clippings and leaves into your lawn — they make good fertilizers.
- Use herbicides and pesticides sparingly and limit application to problem areas only.

**Choose earth-friendly landscaping and help keep our water clean.**

Support provided by SEMCOG, the Southeast Michigan Council of Governments (313) 961-4266 and the Rouge River National Wet Weather Demonstration Project


Our Water. Our Future.

Don't Pollute


Find out more at [www.semco.org](http://www.semco.org)

Brought to you by the Southeast Michigan Partners for Clean Water

**LAWN TODAY**



**HERE TOMORROW**



Many things you put on your yard end up in the water near you. Stormwater runoff is North Carolina's #1 water pollutant. Learn more at [www.ncstormwater.org](http://www.ncstormwater.org)

Pollute Your Water, Pollute Yourself

**NCDENR**

**Figure 9.6 Public Education Samples – Yard Care**



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## 10.0 LOW IMPACT DEVELOPMENT

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### **10.1 INTRODUCTION TO LOW IMPACT DEVELOPMENT**

Low impact development (LID) is a stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic predevelopment hydrologic functions. Most LID techniques infiltrate, filter, store, evaporate, and/or detain runoff as close to its original source as possible. The use of Low Impact Development techniques benefits the local creeks, streams, rivers, lakes, as well as ultimately the Puget Sound. The use of Low Impact Development may be in addition to, or in lieu of traditional stormwater management solutions.

Conventional stormwater management techniques typically address increases in peak flows from large, infrequent events, but not the increase in annual volume or the increase in peak flows from smaller, more frequent events. Studies have shown that Low Impact Development can infiltrate and treat 95 percent or more of the annual volume. Low Impact Development techniques are conducive to implementation into both new projects as well as redevelopment projects.

### **10.2 BENEFITS AND GOALS OF LOW IMPACT DEVELOPMENT**

The City of Black Diamond encourages the use of LID techniques for stormwater management. Among other benefits, the use of LID techniques support a better-protected watershed hydrology which results in an enhanced aquatic habitat for many species.

The City recognizes the following benefits and goals of Low Impact Development:

- Maintain or restore the pre-developed condition surface water flow volumes, durations and frequencies
- Retain or restore native forest cover to capture, infiltrate and evaporate all or a portion of the rainfall on the site
- Cluster development and minimize land disturbance
- Preserve or restore the health and water-holding capacity of soils
- Incorporate natural site features that promote infiltration of stormwater
- Minimize total impervious surfaces and effective impervious surfaces
- Reduce or eliminate piped stormwater conveyance and conventional detention ponds
- Manage stormwater through infiltration, bioretention, and dispersion
- Manage stormwater runoff as close to its origin as possible

Low Impact Development often results in lower stormwater management costs. Initial construction costs are typically less for Low Impact Development due to the reduced size of the stormwater facilities and fewer control structures. Additionally, long term



## 10.0 LOW IMPACT DEVELOPMENT

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maintenance and operation costs are typically less than those for traditional stormwater facilities.

### 10.3 LOCATIONS CONDUCTIVE TO LID TECHNIQUES

The use of LID techniques is more appropriate in some locations rather than others. Low Impact Development should specifically be considered for the following:

- Sites located in a pothole sub-basin (i.e., draining to a closed depression)
- Sites that contain or are located adjacent to wetlands, riparian areas (such as rivers, streams, creeks, or swales), fish or wildlife habitat areas, or sub-basins tributary to these areas if changes in the land use will result in any negative impacts caused by the increase in volume or rate of surface water leaving or arriving to these areas
- Sites that are underlain by a critical aquifer recharge area
- Sites located within a designated open space area
- Sub-basins where preservation of trees is recommended by the City.

Furthermore, a map showing areas within the City that may be appropriate for Low Impact Development is shown in **Figure 10.1 Low Impact Development**. A large scale copy of the map has also been included in **APPENDIX M – LID Map**.

### 10.4 LID BMP'S

Some of the more common Best Management Practices (BMP's) for consideration are:

**Bioretention** – Construct landscaped areas with a special soil and plant mix that is conducive to filtering and storing runoff and is aesthetically attractive.

**Disconnectivity** – Direct runoff from impervious areas to landscaped and vegetated areas to reduce the volume of runoff, encourage groundwater recharge, and filter runoff.

**Open Swales** – Provide grass or other vegetated areas at the edges of roadways, parking lots, or other runoff-producing areas to slow and filter the runoff, promote infiltration, and remove pollutants.

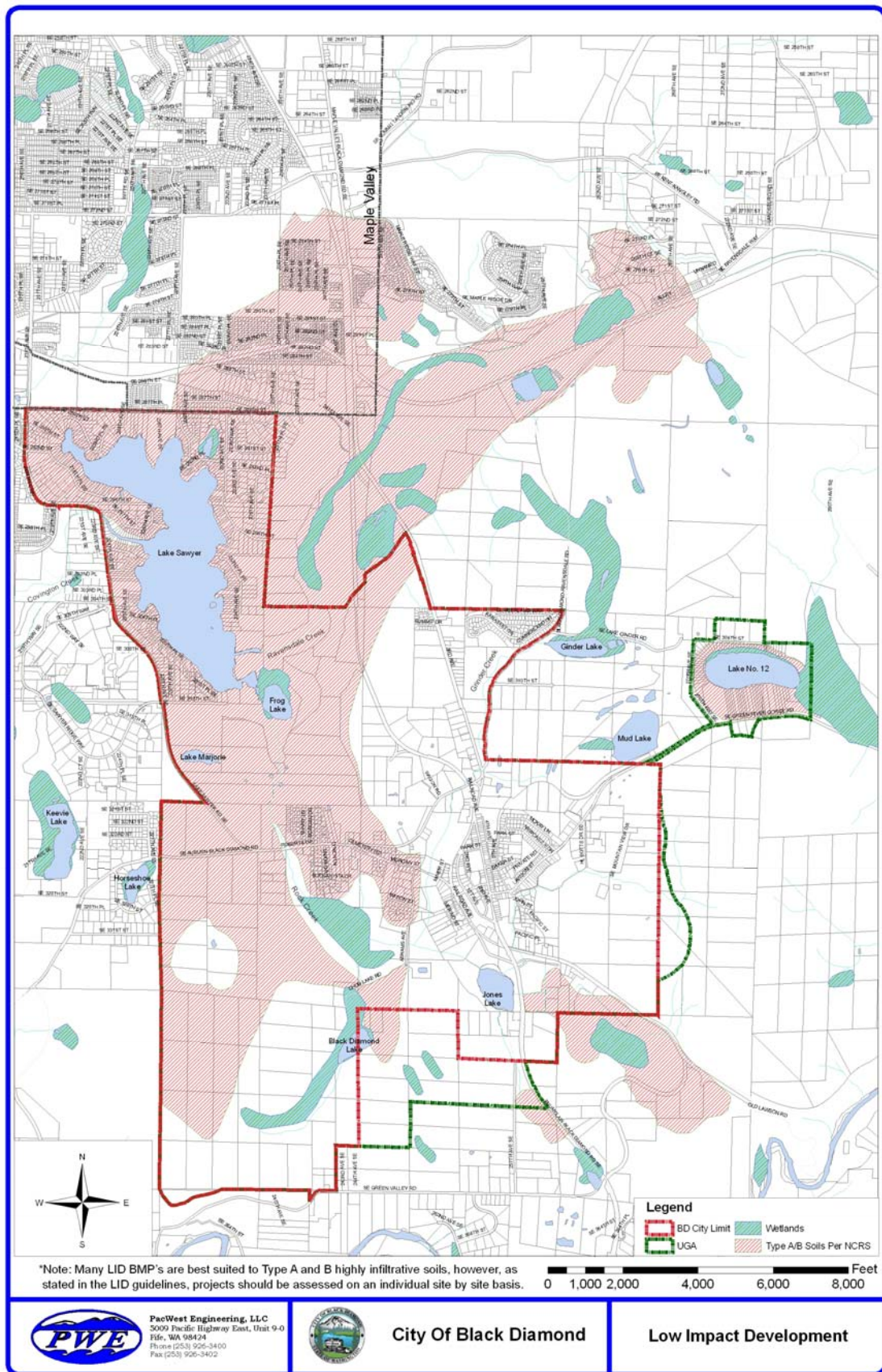
**Permeable Pavements** – Install porous concrete, porous asphalt, geo-grid, or pavement blocks that allow water to flow to an underground gravel area where water can infiltrate and/or be slowly released.

**Soil Amendment** – Amending soils is a method of regaining some of the absorption and infiltration capability of the soil, and increasing the ability to retain runoff and filter pollutants.





## 10.0 LOW IMPACT DEVELOPMENT



**Figure 10.1 Low Impact Development**

**City of Black Diamond  
 Storm and Surface Water Plan (SSWP)  
 Page 135**



PACWEST ENGINEERING LLC

### **10.5 IMPLEMENTING LOW IMPACT DEVELOPMENT**

It is recommended that the City of Black Diamond adopt LID Guidelines. A set of guidelines has been prepared and is included in ***APPENDIX N – LID Standards*** for consideration by the City. These guidelines will provide direction to land owners and developers.



# CITY COUNCIL AGENDA BILL

City of Black Diamond  
Post Office Box 599  
Black Diamond, WA 98010

ITEM INFORMATION			
<b>SUBJECT:</b> <b>PUBLIC HEARING-</b> <b>2010 Stormwater Management Plan</b>	<b>Agenda Date: May 20, 2010</b>		<b>AB10-035</b>
	Department/Committee/Individual	Created	Reviewed
	Mayor Rebecca Olness		
	City Administrator –		
	City Attorney –Chris Bacha		
	City Clerk – Brenda L. Martinez		X
	Finance – May Miller		
	Public Works – Seth Boettcher	X	
	Economic Devel. – Andy Williamson		
Cost Impact: as per budget	Police – Jamey Kiblinger		
Fund Source: Stormwater Utility	Court – Stephanie Metcalf		
Timeline: June	Comm. Dev. – Steve Pilcher		
<b>Attachments: 2010 Draft Stormwater Management Program</b>			
<p><b>SUMMARY STATEMENT:</b></p> <p>The City updates the Stormwater Management Program annually to identify how the City will meet various stormwater permit requirements.</p> <p>The Council will hear public comments related to the proposed 2010 Stormwater Management Plan.</p>			
<b>COMMITTEE REVIEW AND RECOMMENDATION:</b>			
<b>RECOMMENDED ACTION: Public Hearing only no action will follow.</b>			
<b>RECORD OF COUNCIL ACTION</b>			
<i>Meeting Date</i>	<i>Action</i>	<i>Vote</i>	
May 20, 2010			

**CITY OF BLACK DIAMOND**  
**STORMWATER MANAGEMENT PROGRAM**  
**(SWMP)**

**2010 ANNUAL UPDATE**  
**DRAFT**



**PREPARED BY**  
*Public Works Department*  
**CITY OF BLACK DIAMOND**  
**PO BOX 599**  
**BLACK DIAMOND, WA 98010**  
**(360) 886-2560**



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*THIS PLAN IS BASED ON THE REQUIREMENTS OUTLINED IN THE WESTERN WASHINGTON PHASE II MUNICIPAL STORMWATER PERMIT. MUCH OF THE LANGUAGE INCLUDED IN THIS DOCUMENT DESCRIBING PERMIT REQUIREMENTS HAS BEEN TAKEN DIRECTLY FROM THIS PERMIT AND HAS BEEN SUMMARIZED FOR EASE OF THE READER.*

*FOR COMPLETE REQUIREMENTS AND DETAILS, PLEASE REFER TO SECTION S5.C OF THE WESTERN WASHINGTON PHASE II MUNICIPAL STORMWATER PERMIT.*

## **SECTION 1 – INTRODUCTION**

---

### **1.1 INTRODUCTION**

This document constitutes the City of Black Diamond's Stormwater Management Program (SWMP) as required under Condition S5 of the Western Washington Phase II Municipal Stormwater Permit (the Permit). In addition to the City's permit, this SWMP includes the Total Maximum Daily Load (TMDL) requirements on Lake Sawyer as published in the TMDL document 09-10-053.

The purpose of SWMP is to detail actions that the City of Black Diamond has taken and will take to maintain compliance with conditions in the permit. This SWMP will be an attachment to the *Annual Report Form for Cities, Towns, and Counties* which is required to be submitted to the Department of Ecology by March 31<sup>st</sup> each year.

The City's SWMP is intended to reduce the discharge of pollutants from the City's Municipal Separate Storm Sewer System to the maximum extent practicable, meet Washington State's All Known and Reasonable Treatment requirements, and protect water quality. This goal is accomplished by the inclusion of all Permit SWMP components, minimum measures, and implementation schedules into the City's SWMP.

In compliance with Permit requirements, where the City is already implementing actions or activities called for in this document, the City will continue those actions or activities regardless of the schedule called for in this document.

The City now is active in 5 areas of permit activity including:

- Educating the public with a current focus on homeowner activities

- Involving the public in stormwater management programming
- Building an Illicit Discharge Detection and Elimination Program
- Establishing a permitting, inspection program to enforce the Department of Ecology 2005 stormwater Management Manual for Western Washington
- Reviewing all Municipal operations and Facilities and implementing new operation and maintenance practices to prevent and reduce stormwater pollutant runoff from municipal operations.

## **SECTION 2 –MONITORING AND REPORTING**

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### **2.1 PERMIT REQUIREMENTS AND DATES**

Section S5.A, S8, and S9 of the Western Washington Phase II Municipal Stormwater Permit requires the City to develop, monitor, and report the City's Stormwater Management Program (SWMP). The Stormwater Management Program shall be designed to reduce the discharge of pollutants from the City stormwater system to the maximum extent practicable and to protect water quality. The monitoring and reporting requirement helps keep the city on track with best management practices to reduce the discharge of pollutants to stormwater.

### **2.2 CURRENT ACTIVITIES**

The current city activities associated with Monitoring and reporting include:

- Submit the *Annual Report Form for Cities, Towns, and Counties* which is intended to summarize the City's compliance with the conditions of the Permit. The annual report shall be submitted by March 31 of each calendar year covering the previous calendar year.
- Prepare written documentation of the SWMP and update at least annually for submittal with the City's annual reports to the Department of Ecology.
- Include with the annual report, notification of any annexations, incorporations, or jurisdictional boundary changes resulting in an increase or decrease in the City's geographic area of permit coverage during the reporting period and the implications for the SWMP.
- Track the number of inspections, official enforcement actions and types of public education activities for inclusion in the City's annual reports to the Department of Ecology.
- Provide a description of any stormwater monitoring or studies conducted by the City during the reporting period for inclusion in the City's annual reports to the Department of Ecology.
- Track the estimated cost of development and implementation of the SWMP.



**2.3 PLANNED ACTIVITIES**

Actions recommended for continued Permit compliance include:

- Now that the City has a separate storm water utility most of the permit compliance activities can be reasonably estimated and tracked by reviewing the actual expenses within the stormwater budget. There are some activities that are expended outside the stormwater utility and those will be estimated and reported in the annual report.
- Survey a random select group from Black Diamond on any changes in car washing practices and report findings in the next annual report.
- Collect base line water quality information in the natural drainage system as surface water drains into, through and out of Black Diamond.
- Coordinate, as necessary, with other entities covered under a municipal stormwater NPDES permit to encourage coordinated stormwater-related policies, programs and projects within adjoining or shared areas.
- Complete annual update to the City's SWMP.
- Summarize annual activities for the Annual Compliance Report.

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## **SECTION 3 –PUBLIC EDUCATION AND OUTREACH**

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### **3.1 PERMIT REQUIREMENTS AND DATES**

Section S5.C.1 of the Western Washington Phase II Municipal Stormwater Permit requires the City to include an education program to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts. Specific program components are outlined below.

- Distribute stormwater education information to residents in Black Diamond by Feb 15, 2009
- Track the types of public education and outreach activities implemented; Feb. 15, 2009
- Measure the stormwater education level of the public; Feb 15, 2009

### **3.2 CURRENT ACTIVITIES**

The City currently has been educating the public in Black Diamond by direct mailing stormwater articles in the city newsletter, posting educational materials on the stormwater website, and coordinating various stormwater classes and workshops to train City staff. The first level of education has been educate the public on the need for a stormwater utility and why everyone in Black Diamond needs to assist with the effort to improve the stormwater quality in Black Diamond.

### **3.3 PLANNED ACTIVITIES**

Actions recommended for continued Permit compliance in public education and outreach include:

The City's goal for 2010 is to:

- Continue with the direct mailing of 3 to 4 education articles included in the City newsletter. Year 2010 emphasis will be on car washing and yard care. The education materials are also sent to all businesses in town as well.
- Educate the businesses, industries, landscapers and property managers; and Engineers, contractors, developers, through direct contact within the permitting processes.
- Educate the elected officials, review staff, planning staff and other City employees through workshops, in house trainings and meetings.

- Develop a short assembly curriculum to educate school children on the impacts of stormwater runoff on the environment and Best Management Practices that homeowners can implement to help protect the environment. Approach the local school district to set up regular educational outreach in the schools.
- Track and maintain records of public education and outreach activities.
- Evaluate understanding and adoption of target behaviors.
- Summarize the 2009 public education activities in the Annual Compliance Report.

## **SECTION 4 – PUBLIC INVOLVEMENT AND PARTICIPATION**

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### **4.1 PERMIT REQUIREMENTS AND DATES**

Section S5.C.2 of the Western Washington Phase II Municipal Stormwater Permit requires the City to provide ongoing opportunities for public involvement beginning in 2008.

### **4.2 CURRENT ACTIVITIES**

The current compliance activities associated with public involvement and participation include:

- The City has posted the SWMP document and Annual Compliance Report on the City website.
- The City has held various public meetings for the consideration of stormwater budget issues, stormwater grant opportunities, and consulting contracts for the development of a stormwater comprehensive plan.
- Publicized Pubic Works Committee meetings were held to discuss the Stormwater Comprehensive Plan.

### **4.3 PLANNED ACTIVITIES**

The City shall offer the public opportunities to be involved in the decision making process on stormwater issues. Actions recommended for continued compliance include:

- Provide opportunities for public involvement through encouraging participation in the review of the storm water comprehensive plan, the stormwater management plan updates, changes to the stormwater utility charges, or other stormwater codes or similar environmental policies at the early consideration stages at the public works committee level.
- Provide opportunities for the public involvement and comment in the consideration of the Stormwater Management Plan (SWMP) by holding public hearings prior to adoption.
- Hold at least 2 readings of the Stormwater Management Plan prior to adoption.
- Make the SWMP, the annual report, and all other submittals required by the Phase II Permit, available to the public.



- Post the updated SWMP and the annual report, on the City's website.

## SECTION 5 – ILLICIT DISCHARGE DETECTION AND ELIMINATION

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### **5.1 PERMIT REQUIREMENTS AND DATES**

Section S5.C.3 of the Western Washington Phase II Municipal Stormwater Permit requires the City to develop and implement an ongoing program to detect and remove illicit connections, discharges, and improper disposal, including spills, into the municipal separate storm sewers owner or operated by the City. Specific program components are outlined below.

- Publicly list and publicize a hotline or other local telephone number for public reporting of spills and other illicit discharges by February 15, 2009. The City shall keep a record of calls received and follow-up actions taken.
- Develop and implement an ordinance or other regulatory mechanism to effectively prohibit non-stormwater, illegal discharges, and/or dumping into the City's municipal separate storm sewer system by August 15<sup>th</sup>, 2009.
- Ensure municipal field staff responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges, improper disposal and illicit connections are trained to conduct these activities by August 15<sup>th</sup>, 2009.
- Provide follow-up training as needed to address changes in procedures, techniques, or requirements.
- Prioritize receiving waters for visual inspection by February 15<sup>th</sup>, 2010.
- Ensure all municipal field staff, which, as part of their normal job responsibilities, might come into contact with or otherwise observe an illicit discharge or illicit connection to the storm sewer system shall be trained on the identification of an illicit discharge/connection, and on the proper procedures for reporting and responding to the illicit discharge/connection.

The City's goal is to complete the following by **February 15, 2011**:

- Conduct field assessments of three high priority water bodies.
- Conduct field assessments on at least one high priority water body annually henceforth.

- Develop a municipal storm sewer system map, to be available upon request, that shall be periodically updated and shall include the location of all known municipal separate storm sewer outfalls and receiving waters and structural stormwater BMP's owned, operated, or maintained by the City. Include tributary conveyances, associated drainage areas, and land use for all storm sewer outfalls with a 24 inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems. The map shall include all connections to the municipal separate storm sewer authorized or allowed by the City, as well as geographic areas that do not discharge stormwater to surface waters.

The City's goal is to complete the following by **August 19, 2011**:

- Develop and fully implement an ongoing program to detect and address non-stormwater discharges, spills, illicit connections and illegal dumping into the City's municipal separate storm sewer system. Include procedures for locating priority areas likely to have illicit discharges and field assessment activities including visual inspection of priority outfalls.
- Develop and implement procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges found by or reported to the City
- Develop and implement procedures for tracing the source of an illicit discharge; including visual inspections, and when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures
- Develop and implement procedures for removing the source of the discharge, including notification of appropriate authorities; notification of the property owner; technical assistance for eliminating the discharge; follow-up inspections; and escalating enforcement actions if the discharge is not eliminated.
- Inform and distribute appropriate information to public employees, businesses, and the general public regarding the hazards associated with illegal discharges and improper disposal of waste.
- Develop and implement procedures for program evaluation and assessment, including tracking the number and type of spills or illicit discharges identified; inspections made

**5.2 CURRENT ACTIVITIES**

The City currently implements activities and programs that meet some of the Permit requirements. The current compliance activities associated with the above Permit requirements include:

- The Black Diamond City Council adopted an illicit Discharge Detection and Elimination Ordinance on August 6<sup>th</sup>, 2009. The city staff now has the ability to intervene and stop Illicit discharges and get involved to educate those that pollute unknowingly and follow up with additional enforcement actions if compliance is not afforded.
- Four staff including three public works staff and a policeman were trained in July 2009 on Illicit discharge awareness and IDDE Response and Enforcement. Additionally one of the local fire district officers also came to the training.
- Responding to reported illicit discharge reports and documenting the actions taken to eliminate them.

**5.3 PLANNED ACTIVITIES**

The City plans to:

- Continue with following up on hotline illicit discharge tips,
- Continue refining the stormwater system maps;
- Continue keeping the responsible city staff trained to recognize and detect illicit discharges and to follow up with enforcement actions.
- Develop and implement stormwater outfall illicit discharge screening program.
- Select and implement IDDE issue tracking/resolution system.
- Revise current IDDE response process into a standard, City-wide IDDE response and enforcement process.
- Identify areas of the City that have higher probability of Illicit Discharges or Connections to the Stormwater system.
- Prioritize assessment of receiving waters
- Develop a program for detecting, tracing to the source and removing the source of an illicit discharge. Also provide training for such a program.



## **SECTION 6 – CONTROLLING RUNOFF FROM NEW DEVELOPMENT, REDEVELOPMENT AND CONSTRUCTION SITES**

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### **6.1 PERMIT REQUIREMENTS AND DATES**

Section S5.C.4 of the Western Washington Phase II Municipal Stormwater Permit requires the City to develop, implement, and enforce a program to reduce pollutants in stormwater runoff from new development, redevelopment and construction site activities. Specific program components are outlined below.

The City will continue with

- A program to reduce pollutants in stormwater runoff from new development, redevelopment and construction site activities. This program shall be applied to all sites that disturb a land area 1 acre or greater, including projects less than one acre that are part of a larger common plan of the development or sale. The program shall apply to private and public development, including roads.
- The City of Black Diamond has adopted an the Department of Ecology 2005 Stormwater Management Manual to address runoff from new development, redevelopment, and construction site projects in conformance with Permit requirements. The City has retained existing local requirements to apply stormwater controls at smaller sites, or at lower thresholds. The DOE 2005 Manual includes:
  1. An enforceable mechanism that includes a site planning process and BMP selection and design criteria in conformance with Permit requirements.
  2. A BMP selection and design criteria and requirements will protect water quality, reduce the discharge of pollutants to the maximum extent practicable, and satisfy State AKART requirements.
  3. The legal authority, through the approval process for new development, to inspect private stormwater facilities that discharge to the City's stormwater system.
  4. Allows non-structural preventive actions and source reduction approaches such as Low Impact Development Techniques (LID), measures to minimize the creation of impervious surfaces and measures to minimize the disturbance of native soils and vegetation.

The city has the primary enforcing ordinances in place for the Implementation of a program to manage the proper handling of stormwater for development and redevelopment. Some permit processing needs to be reviewed and appropriate fees set. The city program will include:

- Develop and implement a permitting process with plan review, inspection and enforcement capability for both private and public projects. At a minimum, this program shall be applied to all sites that disturb a land area 1 acre or greater, including projects less than one acre that are part of a larger common plan of the development or sale.
- Review stormwater site plans for proposed development activities.
- Inspect, prior to clearing and construction, all known development sites that have a high potential for sediment transport.
- Inspect all known permitted development sites during construction to verify proper installation and maintenance of required erosion and sediment controls. Enforce as necessary based on the inspection.
- Inspect all permitted development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of permanent stormwater controls such as stormwater facilities and structural BMPs. Also, verify a maintenance plan is completed and responsibility for maintenance is assigned. Enforce as necessary based on the inspection.
- Develop and implement an enforcement strategy to respond to issues of non-compliance.
- Develop and implement a long-term operation and maintenance (O&M) program for post-construction stormwater facilities and BMPs.
- Adopt an ordinance or other enforceable mechanism that clearly identifies the party responsible for maintenance, requires inspection of facilities, and establishes enforcement procedures.
- Establish maintenance standards that are as protective or more protective of facility function than those specified in the 2005 Stormwater Management Manual for Western Washington.
- Perform maintenance within required timeframes when an inspection identifies a maintenance standard has been exceeded. For each violation of the required timeframe, the City shall document the circumstances and how they were beyond their control.

- Inspect all new flow control and water quality treatment facilities, including catch basins, for new residential developments that are a part of a larger common plan of development or sale, every 6 months during the period of heaviest house construction (i.e., 1 to 2 years following subdivision approval) to identify maintenance needs and enforce compliance with maintenance standards as needed.
- Implement a procedure for keeping records of inspections and enforcement actions by staff, including inspection reports, warning letters, notices of violations, other enforcement records, maintenance inspections and maintenance activities.
- Provide copies of the "Notice of Intent for Construction Activity" and copies of the "Notice of Intent for Industrial Activity" to representatives of proposed new development and redevelopment.
- Ensure that all staff responsible for implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including permitting, plan review, construction site inspections, and enforcement, are trained to conduct these activities.

## **6.2 CURRENT ACTIVITIES**

The City code currently implements the majority of the activities and programs to meet Permit requirements. The current compliance activities associated with the above Permit requirements include:

- The city review and inspection staff is coming up to speed on the full implementation of the Department of Ecology 2005 Stormwater Management Manual.
- The City conducts construction and stormwater site inspections during the pre-construction and construction phases.
- The City regularly inspects existing private storm water quality and detention ponds.

## **6.3 PLANNED ACTIVITIES**

The City has a program to help reduce stormwater runoff from new development and construction sites but has a goal to increase training and hire staff with expertise in the implementation of the DOE 2005 SWMM in order to maintain compliance as Permit requirements are phased in over the next several years. Actions that are recommended for continued compliance include:

- Review procedures for tracking and documenting Permit-related plan review, inspection, enforcement, and compliance activities and update as needed.
- Update and implementing process codes, fees and standards as necessary and as identified need.
- Distribute copies of the Notice of Intents for Construction Activity and Industrial Activity.
- Determine staff training needs and develop training strategies.
- Summarize annual activities for the “Controlling Runoff from New Development, Redevelopment and Construction Sites” component of the Annual Compliance Report.



## SECTION 7 – POLLUTION PREVENTION AND OPERATION AND MAINTENANCE FOR MUNICIPAL OPERATIONS

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### **7.1 PERMIT REQUIREMENTS AND DATES**

Section S5.C.5 of the Western Washington Phase II Municipal Stormwater Permit requires the City to develop and implement an operations and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. Specific program components are outlined below.

The City's goal is to complete the following by **February 15, 2010**:

- Establish maintenance standards that are as protective, or more protective, of facility function than those specified in the 2005 Stormwater Management Manual for Western Washington.
- Perform maintenance within required timeframes when an inspection identifies an exceedence of the maintenance standard. For each exceedence of the required timeframe, the City shall document the circumstances and how they were beyond their control.
- Inspect annually all municipally owned or operated permanent stormwater treatment and flow control facilities, other than catch basins, and take appropriate maintenance actions in accordance with the adopted maintenance standards. The annual inspection requirement may be reduced based on inspection records.
- Conduct spot checks of potentially damaged stormwater facilities (other than catch basins) after major storm events.
- Establish and implement practices to reduce stormwater impacts associated with runoff from streets, parking lots, roads or highways owned or maintained by the City, and road maintenance activities conducted by the City.
- Establish and implement policies and procedures to reduce pollutants in discharges from all lands owned or maintained by the City and subject to this Permit, including but not limited to: parks, open space, road right-of-way, maintenance yards, and stormwater treatment and flow control facilities.
- Develop and implement an on-going training program for City employees whose construction, operations or maintenance job functions may impact stormwater quality.

- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the City in areas subject to this Permit that are not required to have coverage under the Industrial Stormwater General Permit.

The City's goal is to complete the following by **February 15, 2012**:

- Inspect at least once, and clean if necessary, all catch basins and inlets owned or operated by the City.

## **7.2 CURRENT ACTIVITIES**

The City currently has activities and programs that meet some of the Permit requirements. The current compliance activities associated with the above Permit requirements include:

- The City has a program for catch basin inspections.
- At the time of the SWMP development the City has completed the
- The City inspects City owned stormwater treatment facilities but is formalizing and adding to the inspection criteria as identified in the DOE 2005 SWMM.
- The city has trained employees whose construction, operations or maintenance job functions may impact stormwater quality in the implementation of Best Management Practices that will reduce or eliminate pollution from entering stormwater systems from City facilities or operations.
- The city has developed and is in the process of implementing a Stormwater Pollution Prevention Plan (SWPPP) for the city heavy equipment maintenance and storage/material yard and owned by the City.

## **7.3 PLANNED ACTIVITIES**

The City has a program to limit stormwater pollution potential related to its municipal operations and maintenance program, but has a goal to expand current efforts in order to maintain compliance as Permit requirements are phased in over the 2010 year.

Actions that are recommended for continued compliance include:

- Update inspection, operation and maintenance processes and procedures for City-owned or operated stormwater catch-basins and flow control and treatment facilities.

- Develop and establish policies and procedures to reduce pollutants in stormwater discharges from lands owned or maintained by the City.
- Develop and implement training programs for staff whose work could impact stormwater quality.
- Update tracking and documentation methods and procedures associated with inspection, maintenance or repair activities.
- Implement Stormwater Pollution Prevention Plans (SWPPPs) for City Facilities.
- Summarize annual activities for the “Pollution Prevention and Operation and Maintenance for Municipal Operations” component of the Annual Compliance Report.

# CITY COUNCIL AGENDA BILL

City of Black Diamond  
Post Office Box 599  
Black Diamond, WA 98010

ITEM INFORMATION			
<b>SUBJECT:</b> <b>Resolution 10-685, which establishes a date, time and place for commencing the closed record hearing regarding the Hearing Examiner's recommendation on The Villages MPD</b>	<b>Agenda Date: May 20, 2010</b>		<b>AB10-036</b>
	Department/Committee/Individual	Created	Reviewed
	Mayor Rebecca Olness		X
	City Administrator –		
	City Attorney – Chris Bacha		X
	City Clerk – Brenda L. Martinez	X	
	Finance – May Miller		
	Public Works – Seth Boettcher		
	Economic Devel. – Andy Williamson		
	Police – Jamey Kiblinger		
Cost Impact: TBD	Parks/Nat. Resources – Aaron Nix		
Fund Source: Applicant (Yarrow Bay)	Community Develop. – Steve Pilcher	X	
Timeline: NA			
<b>Attachments: Resolution 10-685</b>			
<b>SUMMARY STATEMENT:</b>  <p>On May 10, 2010, the Hearing Examiner issued his recommendation to Council regarding The Villages Master Planned Development (PLN09-0017). The MPD Code (BDMC 18.98.160.A.6) specifies that the Council is to “schedule a time for its consideration of the MPD” at its first regular meeting following receipt of the Examiner’s recommendation.</p> <p>Given public notice requirements, the earliest date the hearing could begin is June 7, 2010. Staff has contacted Black Diamond Elementary School and confirmed its availability in the evening commencing on that date, through the end of the school year and beyond.</p> <p>Staff recommends that at the initial session of the closed record hearing, the Council establish rules of procedure for how it intends the hearing to be conducted. Following adoption of rules of procedure, the next step would be the opportunity to deal with any Appearance of Fairness issues. It is likely these two activities would require enough time to take one evening. The next step would be to allow for both staff and applicant presentations; that would likely take another evening. Therefore, public testimony would probably not occur until the third session of the closed record hearing.</p> <p>As long as the hearing is continued to a date, time and place certain, it is not required to provide continued public notice. However, staff recommends that all hearing sessions be noticed on the City’s website and at City offices.</p>			
COMMITTEE REVIEW AND RECOMMENDATION: <b>None</b>			
<b>RECOMMENDED ACTION: MOTION to adopt Resolution 10-685 establishing a date for commencing the closed record hearing concerning the Hearing Examiner’s recommendation on The Villages MPD application.</b>			
<b>RECORD OF COUNCIL ACTION</b>			
<i>Meeting Date</i>	<i>Action</i>	<i>Vote</i>	
May 20, 2010			



**RESOLUTION NO. 10-685**

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF  
BLACK DIAMOND, KING COUNTY, WASHINGTON  
ESTABLISHING A DATE, TIME AND PLACE FOR  
COMMENCING A CLOSED RECORD HEARING TO  
CONSIDER THE RECOMMENDATION OF THE HEARING  
EXAMINER ON THE VILLAGES MASTER PLANNED  
DEVELOPMENT APPLICATION**

**WHEREAS**, Section 18.98.160 of the Black Diamond Municipal Code (BDMC) establishes the Master Planned Development (MPD) Permit review process; and

**WHEREAS**, pursuant to BDMC 18.98.160.A.6, the City Council is to schedule a time for its consideration of the Hearing Examiner's recommendation at its first regular meeting following receipt of the recommendation; and

**WHEREAS**, on May 10, 2010, the Hearing Examiner issued a recommendation of conditional approval for The Villages MPD (file number PLN09-0017); and

**WHEREAS**, May 20, 2010 constitutes the first regularly-scheduled meeting of the City Council following that date; and

**WHEREAS**, advertised public notice for the closed record hearing is required by ordinance;

**NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF BLACK DIAMOND, WASHINGTON, DOES RESOLVE AS FOLLOWS:**

**Section 1.** 7:00 p.m., June XX, 2010 at the Black Diamond Elementary School gymnasium is hereby established as the date, time and place for commencing the closed record hearing on The Villages MPD.

**Section 2.** The Mayor is directed to take necessary steps to duly advertise this hearing and to provide suggested rules of procedures for Council consideration.

PASSED BY THE CITY COUNCIL OF THE CITY OF BLACK DIAMOND,  
WASHINGTON, AT A REGULAR MEETING THEREOF, THIS 20TH DAY OF MAY,  
2010.

CITY OF BLACK DIAMOND:

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Rebecca Olness, Mayor

Attest:

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Brenda L. Martinez, City Clerk

# CITY COUNCIL AGENDA BILL

City of Black Diamond  
Post Office Box 599  
Black Diamond, WA 98010

ITEM INFORMATION			
<b>SU:BJECT:</b> <b>Resolution 10-686, which establishes a date, time and place for commencing the closed record hearing regarding the Hearing Examiner's recommendation on the Lawson Hills MPD</b>	<b>Agenda Date:</b> May 20, 2010		<b>AB10-037</b>
	Department/Committee/Individual	Created	Reviewed
	Mayor Rebecca Olness		X
	City Administrator –		
	City Attorney – Chris Bacha		X
	City Clerk – Brenda L. Martinez	X	
	Finance – May Miller		
	Public Works – Seth Boettcher		
	Economic Devel. – Andy Williamson		
	Police – Jamey Kiblinger		
Cost Impact: TBD	Parks/Nat. Resources – Aaron Nix		
Fund Source: Applicant (Yarrow Bay)	Community Develop. – Steve Pilcher		
Timeline: NA		X	
<b>Attachments: Resolution 10-686</b>			
<b>SUMMARY STATEMENT:</b>  <p>On May XX, 2010, the Hearing Examiner issued his recommendation to Council regarding the Lawson Hills Master Planned Development (PLN09-0016). The MPD Code (BDMC 18.98.160.A.6) specifies that the Council is to “schedule a time for its consideration of the MPD” at its first regular meeting following receipt of the Examiner’s recommendation.</p> <p>Given public notice requirements, the earliest date the hearing could begin is June 7, 2010. Staff has contacted Black Diamond Elementary School and confirmed its availability in the evening commencing on that date, through the end of the school year and beyond.</p> <p>Staff recommends that at the initial session of the closed record hearing, the Council establish rules of procedure for how it intends the hearing to be conducted. Following adoption of rules of procedure, the next step would be the opportunity to deal with any Appearance of Fairness issues. It is likely these two activities would require enough time to take one evening. The next step would be to allow for both staff and applicant presentations; that would likely take another evening. Therefore, public testimony would probably not occur until the third session of the closed record hearing.</p> <p>As long as the hearing is continued to a date, time and place certain, it is not required to provide continued public notice. However, staff recommends that all hearing sessions be noticed on the City’s website and at City offices.</p>			
COMMITTEE REVIEW AND RECOMMENDATION: None			
<b>RECOMMENDED ACTION: MOTION to adopt Resolution 10-686, establishing a date for commencing the closed record hearing concerning the Hearing Examiner’s recommendation on the Lawson Hills MPD application.</b>			
<b>RECORD OF COUNCIL ACTION</b>			
<i>Meeting Date</i>	<i>Action</i>	<i>Vote</i>	
May 20, 2010			

**RESOLUTION NO. 10-686**

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF  
BLACK DIAMOND, KING COUNTY, WASHINGTON  
ESTABLISHING A DATE, TIME AND PLACE FOR  
COMMENCING A CLOSED RECORD HEARING TO  
CONSIDER THE RECOMMENDATION OF THE HEARING  
EXAMINER ON THE LAWSON HILLS MASTER PLANNED  
DEVELOPMENT APPLICATION**

**WHEREAS,** Section 18.98.160 of the Black Diamond Municipal Code (BDMC) establishes the Master Planned Development (MPD) Permit review process; and

**WHEREAS,** pursuant to BDMC 18.98.160.A.6, the City Council is to schedule a time for its consideration of the Hearing Examiner's recommendation at its first regular meeting following receipt of the recommendation; and

**WHEREAS,** on May XX, 2010, the Hearing Examiner issued a recommendation of conditional approval for the Lawson Hills MPD (file number PLN09-0016); and

**WHEREAS,** May 20, 2010 constitutes the first regularly-scheduled meeting of the City Council following that date; and

**WHEREAS,** advertised public notice for the closed record hearing is required by ordinance;

**NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF BLACK DIAMOND, WASHINGTON, DOES RESOLVE AS FOLLOWS:**

**Section 1.** 7:00 p.m., June XX, 2010 at the Black Diamond Elementary School gymnasium is hereby established as the date, time and place for commencing the closed record hearing on the Lawson Hills MPD.

**Section 2.** The Mayor is directed to take necessary steps to duly advertise this hearing and to provide suggested rules of procedures for Council consideration.



PASSED BY THE CITY COUNCIL OF THE CITY OF BLACK DIAMOND,  
WASHINGTON, AT A REGULAR MEETING THEREOF, THIS 20TH DAY OF MAY,  
2010.

CITY OF BLACK DIAMOND:

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Rebecca Olness, Mayor

Attest:

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Brenda L. Martinez, City Clerk

# CITY COUNCIL AGENDA BILL

City of Black Diamond  
Post Office Box 599  
Black Diamond, WA 98010

ITEM INFORMATION			
<b>SUBJECT:</b> <b>Resolution No. 10-687, authorizing the Mayor to execute a Professional Services Agreement with RH2 Engineering for technical assistance related to the pending Master Planned Developments</b> Cost Impact: \$150,000 Fund Source: YarrowBay reimbursable Timeline: as soon as practicable	<b>Agenda Date: May 20, 2010</b>		<b>AB10-038</b>
	Department/Committee/Individual	Created	Reviewed
	Mayor Rebecca Olness		
	City Administrator –		
	City Attorney –Chris Bacha		X
	City Clerk – Brenda L. Martinez		X
	Finance – May Miller		
	Public Works – Seth Boettcher	X	
	Economic Devel. – Andy Williamson		
	Police – Jamey Kiblinger		
	Court – Stephanie Metcalf		
	Community Devel. – Steve Pilcher		
<b>Attachments: Resolution No. 10-687, Agreement, Scope of Work and Rate Schedule</b>			
<b>SUMMARY STATEMENT:</b>  While the Master Planned Developments are being reviewed by the City Council, the public works staff will need assistance in preparing for the possibility of moving to the Development Agreement phase of the Master Planned Development review process. The initial effort will focus on the research, analysis and study needed to form a strong basis of information to use in decision making for the Development Agreement negotiation. Should the Master Planned Developments not be approved the City will have the benefit of infrastructure project analysis for the City's own capital program planning purposes. If the Master Planned Development application is not approved this contract will terminate. <b>The motion below limits the scope to the activities preparing for and assisting the city staff in the Development Agreement negotiation.</b>  <b>Needed for Master Planned Development processing:</b> The staff and the developer recognize that there is a need for Development agreement negotiation assistance, technical assistance in the establishment of functionally equivalent standards, infrastructure project identification and funding analysis, preliminary plat review as related to the supporting infrastructure and standards, preliminary design involvement. As the project move forward assistance will also be needed for plan review, construction documents and permitting, inspection and services during construction. The city also will need assistance with agency coordination and communication support and project management.  <b>Consultant:</b> RH2 has provided the city with good service and valuable assistance through the MPD review process. <b>City staff recently reviewed water and sewer engineering firms from the Municipal Research Services Center's list. Through that selection process a city staff panel selected RH2 to provide the city with on engineering services for water and sewer.</b>  <b>Funding:</b> Yarrow Bay has agreed to fund the cost of the technical assistance support as with pass through billing for the Master Planned Development review process. Yarrow Bay has been timely with their reimbursements of costs incurred.			

COMMITTEE REVIEW AND RECOMMENDATION: Public Works Committee reviewed on May 11, 2010. No recommendation

RECOMMENDED ACTION: **MOTION to adopt Resolution No. 10-687, authorizing the Mayor to execute a Professional Services Contract with RH2 Engineering for various technical assistance activities related to the pending Master Planned Development applications with a hold on scope items 3,6 and 7.**

**RECORD OF COUNCIL ACTION**

<i>Meeting Date</i>	<i>Action</i>	<i>Vote</i>
May 20, 2010		

**RESOLUTION NO. 10-687**

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF  
BLACK DIAMOND, KING COUNTY, WASHINGTON  
AUTHORIZING THE MAYOR TO EXECUTE A  
PROFESSIONAL SERVICES AGREEMENT WITH RH2  
ENGINEERING FOR ENGINEERING ASSISTANCE  
REGARDING THE CAPITAL FACILITY CHARGE ANALYSIS  
FOR WATER AND SEWER**

**WHEREAS**, the Villages and Lawson Hills Master Planned Developments are moving forward to the council for review; and

**WHEREAS**, the City of Black Diamond Public Works Department is very limited in staff; and needs to be prepared for the greater infrastructure project details and financial issues associated with the Master Planned Developments; and

**WHEREAS**, there is a great deal of infrastructure research, analysis, and planning that is needed to provide the City of Black Diamond with the best decision making information for the Development Agreement negotiation; and

**WHEREAS**, RH2 Engineering has demonstrated relevant Master Planned Development experience, responsive service and technically leading expertise in water and sewer systems;

**NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF BLACK DIAMOND, WASHINGTON, DOES RESOLVE AS FOLLOWS:**

**Section 1.** The Mayor is hereby authorized to execute a Professional Services Agreement with RH2 Engineering for engineering assistance regarding the Capital Facility Charge Analysis for water and sewer as attached hereto as Exhibit A.

**PASSED BY THE CITY COUNCIL OF THE CITY OF BLACK DIAMOND, WASHINGTON, AT A REGULAR MEETING THEREOF, THIS 20<sup>TH</sup> DAY OF MAY, 2010.**

CITY OF BLACK DIAMOND:

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Rebecca Olness, Mayor

Attest:

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Brenda L. Martinez, City Clerk



**CITY OF BLACK DIAMOND PROFESSIONAL SERVICES AGREEMENT  
Master Planned Developments - Engineering Assistance  
Contract**

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This Professional Services Agreement (the or this "Agreement"), for reference purposes only, is dated May 20, 2010 and is entered into by and between

CITY OF BLACK DIAMOND, WASHINGTON (the "City")

Physical Address: 24301 Roberts Drive

Mailing Address: PO Box 599

Black Diamond, WA 98010

Contact: Seth Boettcher

Phone: 360-886-2560

Fax : 360-886-2592

and

RH2 Engineering ("Consultant")

12100 NE 195<sup>th</sup> Street Suite 100

Bothell WA 98011

Contact: Dan Ervin, P.E.

Phone: 800-720-8052

Fax: 425-591-5305

Tax Id No.: 91-1108443

For professional services in connection with the following project:

**Master Planned Developments – Engineering Assistance Contract**

**TERMS AND CONDITIONS**

**1. Services by Consultant**

1.1 Consultant shall perform the services described in the Scope of Work attached to this Agreement as Exhibit "A." The services performed by Consultant shall not exceed the Scope of Work nor shall the Consultant be entitled to a greater amount of compensation as that provided in this Agreement without the prior written authorization of the City.

1.2 The City may from time to time require changes or modifications in the Scope of Work. Such changes, including any decrease or increase in the amount of compensation, shall be agreed to by the parties and incorporated in written amendments to this Agreement.

1.3 Consultant represents and warrants that it, its staff to be assigned to the Project, and its subconsultants and their staff have the requisite training, skill, and experience necessary to provide the services required by this Agreement and are appropriately accredited and licensed by all applicable agencies and governmental entities. Services provided by Consultant and its subconsultants under this Agreement will be performed in a manner consistent with that degree

of care and skill ordinarily exercised by members of the same profession currently practicing in similar circumstances.

## **2. Schedule of Work**

2.1 Consultant shall perform the services described in the Scope of Work in accordance with the Schedule attached to this contract as Exhibit "A."

2.2 Time is of the essence as to the work provided in the Scope of Work. Consultant will diligently proceed with the work and shall assure that it, and its subconsultants, will have adequate staffing at all times in order to complete the Scope of Work in a timely manner. If factors beyond Consultant's control that could not have been reasonably foreseen as of the date of this Agreement cause delay, then the parties will negotiate in good faith to determine whether an extension is appropriate. The Consultant shall provide the City with written notice of any delay, or potential delay, that may trigger the need for a time extension within 3 business days after the Consultant becomes aware of the delay or potential delay.

2.3 Consultant is authorized to proceed with services upon receipt of Notice to Proceed that may be distributed via letter or e-mail.

## **3. Compensation**

3.1 Compensation for the services provided in the Scope of Work shall be on a Time and expenses Basis not to exceed \$150,000 without the written authorization of the City and will be based on the list of billing rates and reimbursable expenses attached hereto as Exhibit "B."

## **4. Payment**

4.1 Consultant shall maintain time and expense records and provide them to the City monthly, along with monthly invoices, in a format acceptable to the City for work performed to the date of the invoice.

4.2 All invoices shall be paid by City warrant within sixty (60) days of actual receipt by the City of an invoice conforming in all respects to the terms of this Agreement.

4.3 Consultant shall keep cost records and accounts pertaining to this Agreement available for inspection by City representatives for three (3) years after final payment unless a longer period is required by a third-party agreement. Consultant shall make copies available to the City on request.

4.4 If the services rendered do not meet the requirements of the Agreement, Consultant will correct or modify the work to comply with the Agreement. The City may withhold payment for such work until the work meets the requirements of the Agreement.

## **5. Discrimination and Compliance with Laws**

5.1 Consultant agrees not to discriminate against any employee or applicant for employment or any other person in the performance of this Agreement because of race, creed, color, national origin, marital status, sex, age, disability, or other circumstance prohibited by federal, state, or local law or ordinance, except for a bona fide occupational qualification.

5.2 Consultant and its subconsultants shall comply with all federal, state, and local laws and ordinances applicable to the work to be done under this Agreement.

5.3 Any violation of this Section 5 shall be a material breach of this Agreement and grounds for immediate cancellation, termination, or suspension of the Agreement by the City, in whole or in part, and may result in Consultant's ineligibility to conduct further work for the City.

## **6. Suspension and Termination of Agreement**

6.1 The City reserves the right to terminate or suspend this Agreement at any time, without cause, by giving Consultant notice in writing ten (10) days prior to the termination or suspension date. In the event of termination, all finished or unfinished reports, or other material prepared by Consultant pursuant to this Agreement, shall be submitted to the City. In the event the City terminates this Agreement prior to completion without cause, Consultant may complete such analyses and records as may be necessary to place its files in order. Consultant shall be entitled to compensation for any satisfactory work completed on the Project prior to the date of suspension or termination.

6.2 The City will terminate this contract if the city council does not approve the Villages and Lawson Hills Master Planned Developments.

6.2 Any notice from the City to Consultant regarding the suspension of this Agreement shall specify the anticipated period of suspension. Any reimbursement for expenses incurred due to the suspension shall be limited to Consultant's reasonable expenses and shall be subject to verification. Consultant shall resume performance of services under this Agreement without delay when the suspension period ends.

## **7. Standard of Care**

7.1 Consultant represents and warrants that it has the requisite training, skill, and experience necessary to provide the services under this Agreement and is appropriately accredited and licensed by all applicable agencies and governmental entities. Services Consultant provides under this Agreement will be performed in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing in similar circumstances.

## **8. Ownership of Work Product**

8.1 Ownership of the originals of any reports, data, studies, surveys, charts, maps, drawings, specifications, figures, photographs, memoranda, and any other documents which are developed, compiled, or produced as a result of this Agreement, whether or not completed, shall be vested in the City and shall be submitted to the City upon termination of this Agreement. Any reuse of these materials by the City for projects or purposes other than those that fall within the scope of this Agreement and the Project to which it relates, without written concurrence by Consultant, will be at the sole risk of the City.

8.2 The City acknowledges Consultant's documents as instruments of professional service. Nevertheless, the documents prepared under this Agreement shall become the property of the City upon completion of the work. The City agrees to hold harmless and indemnify Consultant against all claims made against Consultant for damage or injury, including defense

costs, arising out of the City's reuse of such documents beyond the use for which they were originally intended without the written authorization of Consultant.

8.3 Methodology, software, logic, and systems developed under this Agreement are the property of Consultant and the City, and may be used as either Consultant or the City see fit, including the right to revise or publish the same without limitation.

## **9. Indemnification/Hold Harmless**

9.1 Consultant shall defend, indemnify, and hold the City, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including attorney fees, arising directly or indirectly out of or resulting from the acts, errors, or omissions of Consultant or its subconsultants in performance of this Agreement, except for injuries and damages caused by the sole negligence of the City.

## **10. Insurance**

10.1 Consultant shall procure and maintain for the duration of the Agreement, and shall provide proof satisfactory to the City that such insurance is procured and maintained by each of its subconsultants, insurance against claims for injuries to persons or damage to property which may arise from or in connection with the performance of the work hereunder by Consultant, its agents, representatives, or employees.

10.2 Consultant shall procure and maintain the following types and amounts of insurance:

a. Automobile Liability insurance covering all owned, non-owned, hired, and leased vehicles. Coverage shall be written on Insurance Services Office (ISO) form CA 00 01 or a substitute form providing equivalent liability coverage. If necessary, the policy shall be endorsed to provide contractual liability coverage. This insurance shall have a minimum combined single limit for bodily injury and property damage of \$1,000,000 per accident.

b. Commercial General Liability insurance shall be written on ISO occurrence form CG 00 01 or a substitute form providing equivalent liability coverage and shall cover liability arising from premises, operations, independent contractors, personal injury, and advertising injury. This insurance shall be written with limits no less than \$1,000,000 each occurrence, \$2,000,000 general aggregate.

c. Workers' Compensation coverage as required by the Industrial Insurance laws of the State of Washington.

d. Professional Liability insurance appropriate to Consultant's profession, with limits no less than \$1,000,000 per claim and \$1,000,000 policy aggregate limit.

10.3 The Automobile Liability, Commercial General Liability, and Professional Liability insurance policies are to contain, or be endorsed to contain, the following provisions:

a. Consultant's insurance coverage shall be primary insurance vis-à-vis the City. Any insurance, self-insurance, or insurance pool coverage maintained by the City shall be excess over Consultant's insurance and shall not contribute with it.



b. Consultant's insurance shall be endorsed to state that coverage shall not be cancelled, except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the City.

10.4 The City shall be named as an additional insured under Consultant's Automobile Liability and Commercial General Liability insurance policies with respect to the work to be performed for the City pursuant to this Agreement.

10.5 Insurance shall be placed with insurers with a current A.M. Best rating of not less than A:VII.

10.6 Declaration pages issued by the insurance carriers for the policies mentioned in this Section 10 showing such insurance to be in force shall be filed with the City not less than ten (10) days following both parties signing this Agreement and before commencement of the work. In addition, the City may request, in writing, a full copy from Consultant of any insurance policy Consultant must procure and maintain pursuant to this Agreement and Consultant must provide such copy to the City within ten (10) days of Consultant's receipt of the City's request. Any policy or required insurance written on a claims-made basis shall provide coverage as to all claims arising out of the services performed under this Agreement and for three (3) years following completion of the services to be performed. It shall be a material breach of this Agreement for Consultant to fail to procure and maintain the insurance required by this Section 10 or to provide the proof of such insurance to the City as provided for in this Agreement.

## **11. Assigning or Subcontracting**

11.1 Consultant shall not assign, transfer, subcontract, or encumber any rights, duties, or interests accruing from this Agreement without the express prior written consent of the City, which consent may be withheld at the sole discretion of the City.

## **12. Independent Contractor**

12.1 Consultant and its subconsultants are, and shall be at all times during the term of this Agreement, independent contractors.

## **13. Notice**

13.1 All notices required by this Agreement shall be considered properly delivered when personally delivered, when received by facsimile, or on the third day following mailing, postage prepaid, certified mail, return receipt requested to:

City: City Administrator  
City of Black Diamond  
P.O. Box 599  
Black Diamond, WA 98010  
Fax: 360-886-2592

Consultant: Dan Ervin  
c/o RH2 Engineering  
12100 NE 195<sup>th</sup> Street Suite 200  
Bothell WA 98011  
Fax: 425-951-5305

**14. Disputes**

14.1 Any action for claims arising out of or relating to this Agreement shall be governed by the laws of the State of Washington. Venue shall be in King County Superior Court, Kent, Washington.

**15. Attorney Fees**

15.1 In any suit or action instituted to enforce any right granted in this Agreement, the substantially prevailing party shall be entitled to recover its costs, disbursements, and reasonable attorney fees from the other party.

**16. General Administration and Management on Behalf of the City**

16.1 The City Administrator for the City, or his designee, shall review and approve Consultant's invoices to the City under this Agreement and shall have primary responsibility for overseeing and approving work or services to be performed by Consultant.

**17. Extent of Agreement/Modification**

17.1 This Agreement, together with any attachments or addenda, represents the entire and integrated Agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral. This Agreement may only be amended, modified, or added to by written instrument properly signed by both parties. The parties acknowledge the general contract rule that a clause in a contract, such as this one, prohibiting oral modifications is itself generally subject to oral modification. However, in order to ensure certainty as to the terms and conditions of this Agreement, the parties waive this general contract rule.

CITY OF BLACK DIAMOND

CONSULTANT

By: \_\_\_\_\_

By: \_\_\_\_\_

Rebecca Olness  
Its: Mayor

Printed Name: \_\_\_\_\_  
Its: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Attest:

By:

\_\_\_\_\_  
Brenda L. Martinez  
City Clerk

**EXHIBIT A**  
**Master Planned Developments - Engineering Assistance**  
**Contract**  
**SCOPE OF WORK**

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The Scope of Work is a general description of the types of services and activities where the City staff expects to need additional support to continue to process the Master Planned Development applications. This scope of work is not intended to be all inclusive and it is expected that the staff will request other technical assistance services not listed below, except that they must be related to the Master Planned Development application review process. This Scope of Work is broadly defined to allow the City's Project Managers to adapt the scope to meet the needs of the City. It is not anticipated that all of these services will be required, but they are included in the scope so that they can be assigned and completed as needed to meet the City's delivery schedules.

At all times the Scope of Work will be under the control of the City of Black Diamond. The Consultant is not at liberty to begin or complete work items unless specifically requested to do so by the City in the manner described and as authorized by the City.

**1) Development Agreement (DA) Assistance**

- Assist PWE and Planning with Project infrastructure planning
- Analyze the impacts of various infrastructure scenarios for constructability, maintainability, sustainability, reliability, community impacts, and capital costs
- Develop and analyze financing/equity/funding alternatives
- Develop standards consistent with the EIS and City requirements
- Write text as necessary to implement the EIS and MPD Ordinance
- Write and process amendments from time to time (as necessary) to react to the maturation of the project
- Maintain records that would allow the basis for Development Agreement decisions to be tracked and enforced.
- Prepare and print graphics as necessary to illustrate DA requirements
- Perform other tasks requested by the city to develop, approve and implement the Development Agreement

**2) Infrastructure Project Identification and Funding**

- Prepare a comprehensive list of improvements and projects anticipated to serve development ("projects")
- Identify the projects that the city will fund through capital facility charges
- Identify the projects that are exclusively developer extensions with no reimbursement or credit
- Identify the projects that are eligible for late comers reimbursement
- Perform a Capital Facility Charge analysis to set an appropriate CFC fee.

**3) Preliminary Plat**

- Review preliminary Plat submittals for compliance with DA requirements; sewer, water, stormwater, LID, streets and critical areas. Provide comments and meet with applicants as necessary to ensure compliance with DA and City codes.
- Check survey data and closure data for accuracy
- Check for compliance with County codes and recording requirements
- Prepare necessary documentation to facilitate City approval and acceptance (bond check, bond certification, staff reports, etc)

#### **4) Preliminary Design Elements**

- Attend meetings with City and applicants to reach consensus on design concepts and implement special opportunities
- Meet with design team from time to time to assist in implementing decisions and designs that meet the DA requirements

#### **5) Technical Assistance**

- Hydraulic analysis of water extension proposals and verification of fire flow needs using the City's water system hydraulic model.
- Research basin issues and line capacity issues using the City's sewer hydraulic model
- Check engineering calculations submitted by others in conjunction with planning, design and permitting.
- Perform Value Engineering Analyses when appropriate to ensure the proposed improvements are reasonable and sustainable
- Analyze rate and O&M impacts when appropriate to ensure the City is able to operate and maintain the permitted improvements
- Provide bonding, rate and financing analyses as necessary to support the City's utilities and administration
- Review codes, standards and procedures from other cities and other utilities for briefing and alternative analyses
- Prepare design plans as requested by the city

#### **6) Construction Documents/Permitting**

- Review plans submitted by project applicants for compliance with applicable codes, standards and criteria. These are likely to include; clearing and grading, mass grading, Temporary Erosion and Sedimentation Control, Traffic Control, Utilities (both wet and dry), Roadways, Intersections, Signalization, Channelization, Landscaping, Automatic Control, Reservoirs, Pump Stations, Lift Stations, Pressure Reducing Valves, Detention and Treatment Ponds, and Treatment Systems.
- Prepare comments using standard city forms and procedures or using custom forms and procedures
- Meet with City and applicants as necessary to present the comments and answer questions. Meet with applicants as necessary to optimize plans and capitalize on unique design or operation opportunities
- Maintain records of the plan submittals and the plan review comments
- Approve final permits and comply with State Standards for engineering review and approval
- Prepare reports necessary to obtain DOH and METRO approval of applicable construction projects

#### **7) Assistance during Construction**

- Prepare for and attend pre-construction conferences as requested by the City
- Review shop drawing submittals, change orders, field changes and design changes as requested
- Review and certify bond amounts and quantity take-offs as requested
- Assist inspection staff with questions, revisions and construction related questions
- Provide field inspection staff as requested to meet short-term scheduling needs
- Provide staff for on-site reconnaissance and field measurements (environmental monitoring) as requested



- Review and approve as-built drawings and markups
- Process the necessary documents to transfer ownership of the facilities to the city and ensure they are operable and complete
- Process the necessary documents to accept and own Right of Way

#### **8) Agency coordination and communication support**

- Prepare for and meet with other agencies as necessary to support the planning, design and permitting efforts of the applicants and as requested by the City.
- Represent the City as requested at regional or inter-governmental venues
- Maintain minutes and action summaries of all meetings
- Maintain a data-base of all required agency approvals and process all permits appropriately to obtain and comply with other agency approval requirements

#### **9) Meeting attendance/consultation**

- Prepare for and attend weekly meetings with staff and applicants. Maintain minutes and action items. Follow-through on action items as requested by the City
- Obtain copies of and review minutes, actions and other documents from Council and Committee meetings.
- Prepare for and attend presentations to the public, special interest groups and other agencies as requested by the City
- Attend Council Meetings, Administrative Meetings and staff meetings as requested by the City. Represent the city in a professional and rational manner in all venues.

#### **10) Project Management**

- Develop and maintain the processes necessary to work efficiently and provide timely feedback regarding progress and billing
- Maintain billing records and provide invoices in a timely and unambiguous format using methods that allow the City to track and allocate professional costs
- Maintain equipment and processes so that staff can readily and efficiently approach, communicate with and share documents with the consultants' staff
- Maintain all records in a format that supports efficiency and organization
- Provide progress and billing updates when requested by City
- Make administrative staff available to the City to assist with overflow administrative tasks or assistance with project management

# EXHIBIT B

## Master Planned Developments - Engineering Assistance

### Contract

### RATE SCHEDULE

#### EXHIBIT B RH2 Engineering SCHEDULE OF RATES AND CHARGES

##### 2010 HOURLY RATES

CLASSIFICATION		RATE	CLASSIFICATION		RATE
Professional	IX	\$188.00	Technician	IV	\$120.00
Professional	VIII	\$188.00	Technician	III	\$112.00
Professional	VII	\$180.00	Technician	II	\$83.00
			Technician	I	\$78.00
Professional	VI	\$167.00			
Professional	V	\$139.00	Administrative	V	\$111.00
Professional	IV	\$149.00	Administrative	IV	\$93.00
			Administrative	III	\$79.00
Professional	III	\$139.00	Administrative	II	\$64.00
Professional	II	\$130.00	Administrative	I	\$54.00
Professional	I	\$118.00			

##### IN-HOUSE SERVICES

In-house copies (each)	8 1/2" X 11"	\$0.07	CAD Plots	Large	\$10.00
In-house copies (each)	8 1/2" X 14"	\$0.08	CAD Plots	Full Size	\$5.00
In-house copies (each)	11" X 17"	\$0.14	CAD Plots	Half Size	\$2.00
In-house copies (color) (each)	8 1/2" X 11"	\$0.85	GIS System	Per Hour	\$10.00
In-house copies (color) (each)	8 1/2" X 14"	\$1.50	GIS Plots	Per Plot	\$5.00
In-house copies (color) (each)	11" X 17"	\$1.70	In-house Computer	Per Hour	\$9.00
			Mileage	Per Mile	\$0.50
FAX (each sheet)		\$1.00	Digital Camera	Per Day	\$10.00
In-house CAD System	Per Hour	\$25.00	Digital Camera	Per Week	\$30.00
			Digital Camera	Per Month	\$90.00

\*Note: At project completion all digital photos can be supplied to the client on CD, upon request.

##### PURCHASED SERVICES

All subconsultant services are billed at cost plus 15%.

##### CHANGES IN RATES

Rates listed here are adjusted annually. The current, most recent schedule of hourly rates are used for billing purposes. Payment for work accomplished shall be on the basis of hourly rates in effect at the time of billing plus direct expenses and outside services as stated in this Exhibit.