1.0 INTRODUCTION

The Bowker Creek Urban Watershed Renewal Initiative is a pilot project that is leading the way in watershed management in the Capital Region. This *Bowker Creek Blueprint: A 100-year action plan to restore the Bowker Creek Watershed* (Blueprint) is developed to support the multiple jurisdictions and land stewards within the Bowker Creek Watershed in taking a watershed perspective to improving the health of Bowker Creek and supporting restoration and greenway development along the creek corridor.

1.1 BACKGROUND

The Bowker Creek Initiative (BCI) is a unique multi-jurisdictional effort to improve watershed management efforts in the Capital Region on Vancouver Island, British Columbia. In 2003, a watershed management plan was completed for Bowker Creek with the aim of protecting and improving the overall health of the watershed and the creek corridor. The Bowker Creek Watershed Management Plan (BCWMP) defined a watershed vision, goals, objectives, and actions. To guide the implementation of the BCWMP, a steering committee was formed in 2004 that included representatives from the three municipalities in the watershed (Saanich, Victoria and Oak Bay), the Capital Regional District (CRD), and community groups.

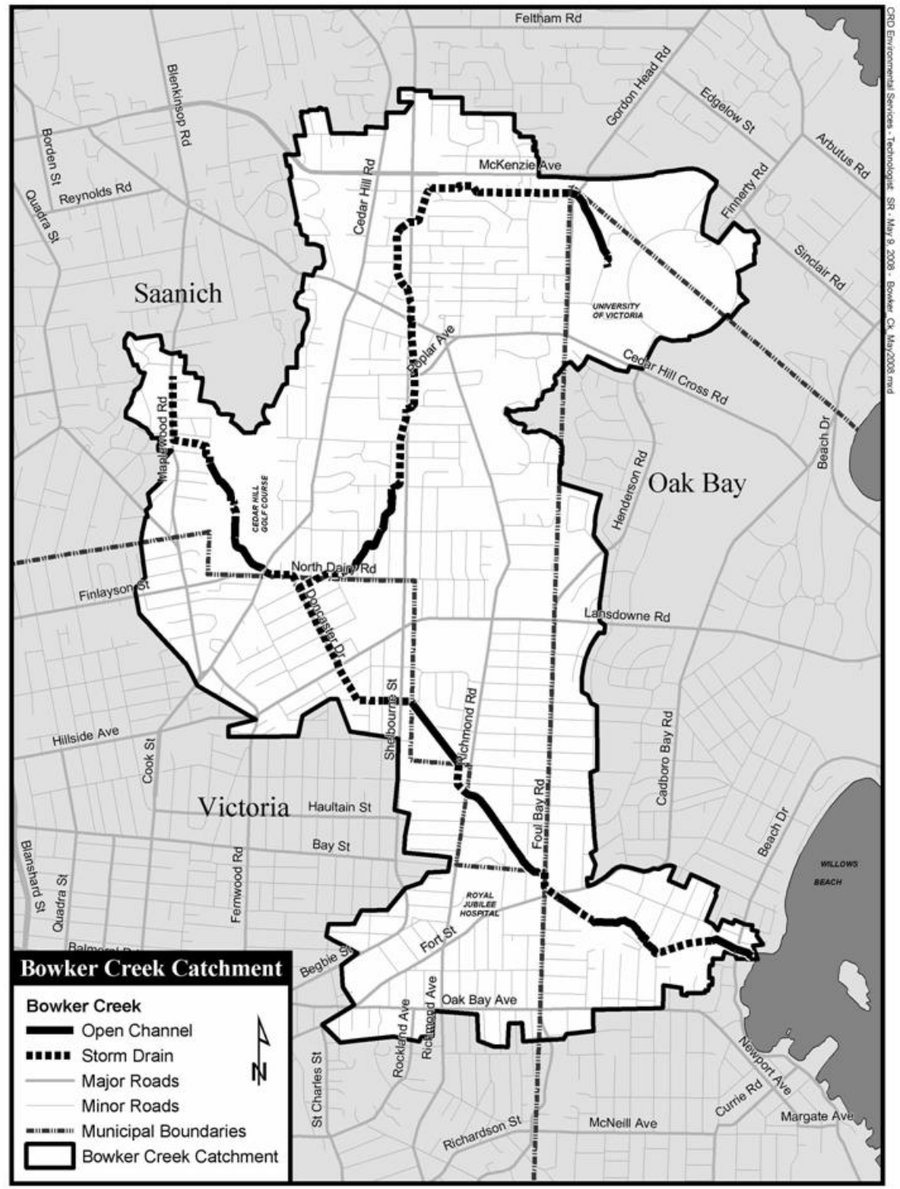
Since 2004, the Initiative has made considerable progress in implementing the BCWMP. In a 2008 progress review, the municipal partners and community groups confirmed that an action plan that provided detailed, watershed wide and reach-specific actions was needed to continue to move forward with implementing the BCWMP. Westland Resource Group was hired in 2009 to work with committee members to draft the *Blueprit.*

The *Blueprint* was developed to assist municipalities, land stewards and community groups in meeting the goals of the BCWMP. Many of the recommended actions can take place in the short- and medium-term, and others will need to occur opportunistically or through long-term efforts. The time horizon for completing actions in this plan can be as long as 50–100 years from now, recognizing the time required for significant change in the urban environment. This plan will allow the three municipalities and other land stewards to coordinate their efforts to manage the watershed so that over the long term the watershed vision can be achieved.

1.2 DESCRIPTION OF THE WATERSHED

The Bowker Creek watershed (Map 1) covers an area of 1,028 hectares (2,540 acres). The total creek, including the main tributary, measures 9.4 kilometres (km) long; of that 3.4 km remain as open channel and the remaining length flows underground through pipes and culverts (Reid Crowther & Partners Ltd. and SHIP Environmental Consultants Ltd., 2000). The creek mainstream (7.9 km) flows northwest from its headwaters at the University of Victoria, west and then south through Saanich in the Shelbourne Valley, and generally southeast through Victoria and Oak Bay to the outlet in Oak Bay. A major tributary (1.5 km) of Bowker Creek flows southeast through the Cedar Hill Golf Course and enters the main channel near Doncaster Drive and North Dairy Road.

The majority of the underlying soil in the watershed is clay with some areas of sand and gravels, and bedrock outcrops (Kerr Wood Leidal, 2007)—see Map 2. The ground is generally flat (gradients less than 5%) with a few isolated steep areas such as Mount Tolmie (Kerr Wood Leidal, 2007).



Map 1. Bowker Creek Watershed municipal boundaries and above- and below-ground creek sections

Historically, Bowker Creek was a meandering, low gradient creek with numerous small tributaries and wetland areas. The watershed supported extensive Garry Oak meadows and woodlands, and the creek would have supported coho and chum salmon and cutthroat trout. Local First Nations derived food and fresh water from the creek, and nutrients transported from the watershed helped support a rich marine ecosystem in Oak Bay (Westland Resource Group, 2003). As agricultural and urban development spread, the mainstem and tributaries were altered and buried, with 63% of the channel now confined to culverts—see Map 1. These culverts now form the backbone of the municipal stormwater drainage system.

Today, the Bowker Creek watershed is highly urbanized, predominantly with residential, commercial and institutional land uses—see Map 2. An estimated 50% of the Bowker Creek watershed is composed of impervious surfaces such as roads, parking areas and roofs (Kerr Wood Leidal, 2007). Surfaces that are covered with roads, buildings, and pavement prevent rainwater from naturally filtering into the ground. Instead stormwater runs off into the storm drain system and rapidly enters Bowker Creek, picking up pollutants on the way. Impervious surfaces, the elimination of wetland and floodplain areas, and the piping of most of the mainstem and tributaries have led to an increase in the volume of peak flows during storm events, exacerbating flooding along the open channels and flooding upcreek of some of the underground sections. Impervious surfaces also cause low summer base flows, and reduced water quality for aquatic habitat (Westland Resource Group, 2003).

Despite the changes that have occurred in the watershed, Bowker Creek is still used by people and wildlife. Open portions and the adjacent riparian area provide habitat for plants and animals. The local community values these areas for recreation and for their intrinsic value. The Cedar Hill Park and Golf Course, the headwaters at the University of Victoria, Browning Park in Saanich, the Bowker Creek Park in Oak Bay, and the vacant BC Hydro property near the Royal Jubilee Hospital are popular recreation areas (Westland Resource Group, 2003). Although the watershed probably won't be restored to its pre-European contact condition, some natural characteristics remain that can be protected and enhanced. Sections of the creek that are currently underground or in poor condition can also be improved. Across the watershed, pollution and flooding can be minimized by bringing in 'low impact development' measures to mimic the pre-development hydrology.

1.3 SCOPE OF THE STUDY

Starting in 2006, the Bowker Creek Initiative steering committee worked towards the development of an Integrated Stormwater Management Plan (ISMP) to advance the goals and objectives in the BCWMP. The Bowker Creek Master Drainage Plan, completed in 2007, was the first phase of this work. In 2008, the ISMP terms of reference were developed and the plan was later renamed to the *"Bowker Creek Blueprint: A 100-year action plan to restore the Bowker Creek Watershed"* to better reflect its intent.

This Blueprint builds on the vision, goals, objectives, and actions in the BCWMP. It builds on the technical recommendations in the Bowker Creek Watershed Assessment (Reid Crowther & Partners Ltd. and SHIP Environmental Consultants Ltd., 2000), the Bowker Creek Master Drainage Plan (Kerr Wood Leidal, 2007), and other work done to date, including a creek restoration assessment (Appendix C) (Gower, 2009), the Bowker Creek Proper Functioning Condition Assessment (Barraclough, et al., 2007), and proposed greenways routing.

The purpose of the Blueprint is to:

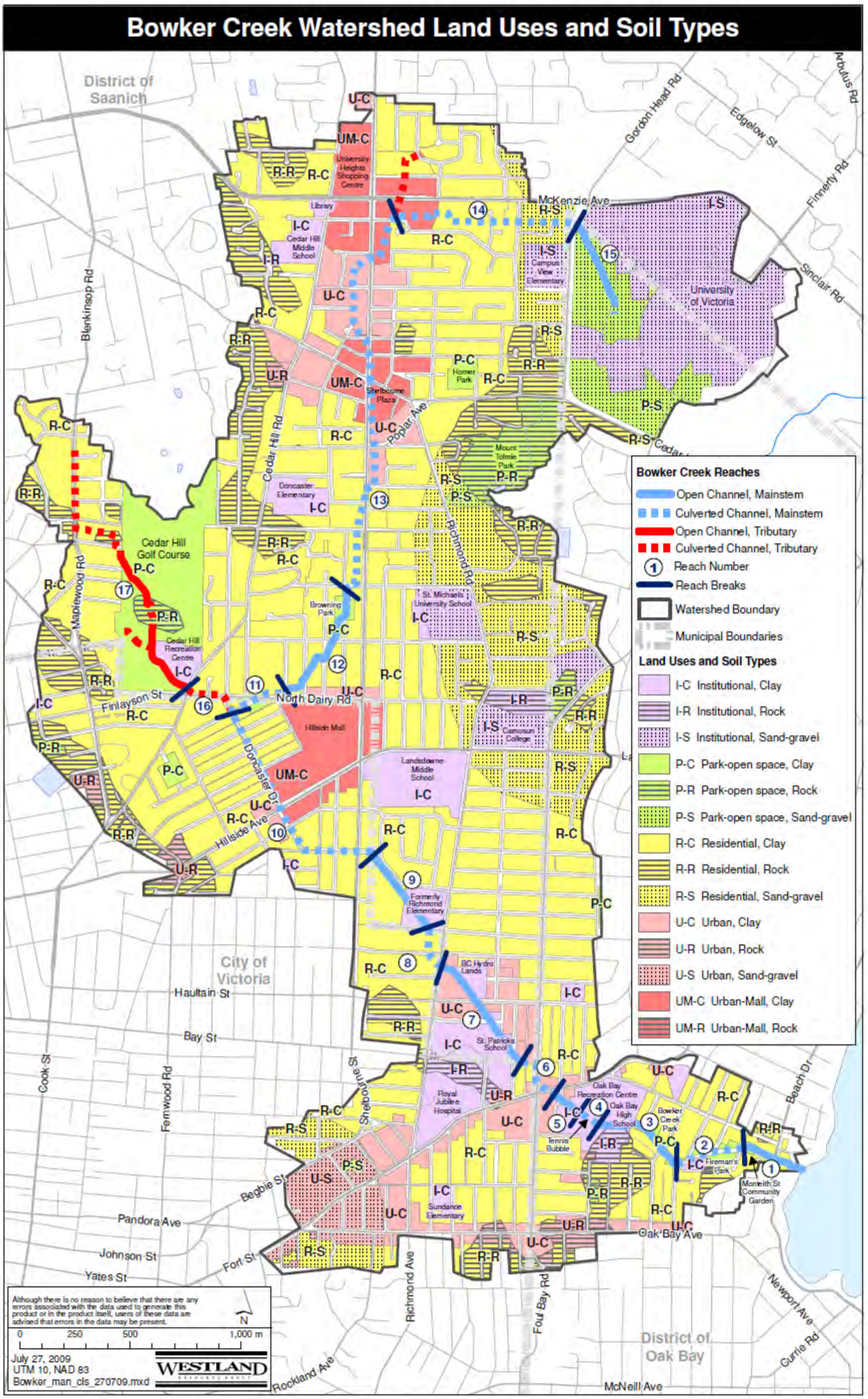
- recommend watershed management policies, planning and other stewardship actions to improve watershed health.
- recommend reach-specific actions for each creek section.
- provide support and information to municipalities and other land stewards to achieve the goals and objectives in the Bowker Creek Watershed Management Plan.

This Blueprint includes:

1. Recommendations for watershed management actions and supporting policy and planning approaches to advance the implementation of the BCWMP.
2. Recommendations for reach-specific actions along the creek corridor that describe:
    - mitigation strategies for flooding, erosion and climate change;
    - protection and restoration of riparian and aquatic habitats through site-specific actions; and
    - a multi-use greenway corridor, public greenspace, and habitat connectivity in accordance with the regional greenway system.
3. Key actions for short-term implementation.
4. Priorities, budget categories, and responsibilities.
5. A description of the methods used to develop the plan.
6. Relevant background information and data that is not already available in existing documents.
7. A recommended monitoring program that will allow for adaptive management over time.

Figure 1. Watershed tour with municipal elected representatives, May 2009

Figure 2. Blueprint public consultation, February 2010


Bowker Creek Watershed Land Uses and Soil Types
District of Saanich
City of Victoria
District of Oak Bay
Bowker Creek Reaches
Open Channel, Mainstem
Culverted Channel, Mainstem
Open Channel, Tributary
Culverted Channel, Tributary
Reach Number
Reach Breaks
Watershed Boundary
Municipal Boundaries
Land Uses and Soil Types
I-C Institutional, Clay
I-R Institutional, Rock
I-S Institutional, Sand-gravel
P-C Park-open space, Clay
P-R Park-open space, Rock
P-S Park-open space, Sand-gravel
R-C Residential, Clay
R-R Residential, Rock
R-S Residential, Sand-gravel
U-C Urban, Clay
U-R Urban, Rock
U-S Urban, Sand-gravel
UM-C Urban-Mall, Clay
UM-R Urban-Mall, Rock
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.
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July 27, 2009
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WESTLAND
Gordon Head Rd
Arbutus Rd
Edgelow St
Finnerty Rd
Sinclair Rd
McKenzie Ave
Blenkinsop Rd
Cedar Hill Rd
Poplar Ave
Richmond Rd
Maplewood Rd
Finlayson St
North Dairy Rd
Dorcaster Dr
Hillside Ave
Haultain St
Bay St
Cook St
Fernwood Rd
Shelbourne St
Begbie St
Pandora Ave
Johnson St
Fort St
Yates St
Rockland Ave
Foul Bay Rd
Beach Dr
Oak Bay Ave
Newport Ave
Currie Rd
McNeill Ave
University of Victoria
Cedar Hill Golf Course
Hillside Mall
Camosun College
Royal Jubilee Hospital
Oak Bay High School
Bowker Creek Park
Monteith St Community Garden
Fireman's Park
Tennis Bubble
Oak Bay Recreation Centre
Sundance Elementary
Formerly Richmond Elementary
Landsdowne Middle School
St. Patricks School
St. Michaels University School
Campus View Elementary
Cedar Hill Middle School
University Heights Shopping Centre
Shelbourne Plaza
Mount Tolmie Park
Cedar Hill Recreation Centre
Browning Park
Doncaster Elementary
Homer Park
BC Hydro Lands
Library

1.4 PROJECT TEAM

Bowker Creek Initiative Steering Committee and subcommittee members and municipal staff that contributed to plan development are as follows:

FIRST NAME	LAST NAME	ORGANIZATION	POSITION
Natalie	Bandringa	Bowker Creek Initiative	Co-ordinator
Tanis	Gower	Bowker Creek Initiative	Co-ordinator (2006-2009)
David	Blundon	Camosun College	Professor
Andrea	Gleichauf	Camosun Community Association	Outreach Committee member
Steven	Fifield	City of Victoria	Manager, Underground Utilities
Jamie	Ramsay	Community Association of Oak Bay	
Jody	Watson	CRD	BCI Chair
Richard	Ding	District of Oak Bay	Design Engineer
Dave	Marshall	District of Oak Bay	Director, Engineering Services
Dwayne	Halldorson	District of Saanich	Manager, Underground Services
Adriane	Pollard	District of Saanich	Manager, Environmental Services
Anne	Topp	District of Saanich	Manager, Community Planning
Lise	Townsend	Environmental Consultant and community member	
Ian	Graeme	Friends of Bowker Creek Society	
Chris	Jensen	Friends of Bowker Creek Society	
Jim	Kirby	Friends of Bowker Creek Society	
Soren	Henrich	North Jubilee Neighbourhood Association	Outreach Subcommitte member
Ken	Whitcroft	Quadra-Cedar Hill Neighbourhood Association	
Gerald	Harris	Resident	Outreach Subcommitte member
Carolyn	Knight	Resident	Outreach Subcommitte member
Sarah	Webb	University of Victoria	Campus Sustainability Co-ordinator
Ian	Swan	University of Victoria	Outreach Subcommitte member

In addition to the Bowker Creek Initiative representatives, the following individuals contributed to key studies and plans that were incorporated into the Blueprint:

FIRST NAME	LAST NAME	ORGANIZATION	POSITION
Dalia	Hull-Thor	Capital Regional District	Environmental Technician
Barri	Rudolph	Capital Regional District	Environmental Science Officer
Gary	Darrah	City of Victoria	Manager, Park Development
Joe	Daly	City of Victoria	Manager, Parks Services
Ed	Robertson	City of Victoria	Assistant Director, Public Works
Ken	Silvester	City of Victoria	Manager, Water & Environment
Grace	Esposito	District of Oak Bay	Engineer Assistant
Lorne	Middleton	District of Oak Bay	Manager, Parks Services
Stuart	Pitt	District of Oak Bay	Municipal Engineer
Roy	Thompson	District of Oak Bay	Planner
Gerald	Fleming	District of Saanich	Manager, Park Planning and Design
Becky	Goodall	District of Saanich	Park Planner/Designer
Rob	Miller	Downstream Environmental Consulting Ltd.	Biologist
Sara	Stallard	Fish Kissing Weasels Environmental	Biologist
Jeff	Howard	Kerr Wood Leidal Associates Ltd.	Project Engineer
Dave	Murray	Kerr Wood Leidal Associates Ltd.	Project Engineer
Scott	Murdoch	Murdoch and de Greeff Inc.	
Lehna	Malmkvist	Swell Environmental Consulting	Biologist/Previous BCI Coordinator
David	Harper	Westland Resource Group	Project Manager
Tara	Lindsay	Westland Resource Group	Assistant Environmental Planner
Steve	Young	Westland Resource Group	Geographical Information Systems Specialist

1.5 REPORT FORMAT

This report has the following format:

- Section 1 provides the background, describes the geography of Bowker Creek and scope of study and describes the report.
- Section 2 describes the methods used to develop the Blueprint.
- Section 3 summarizes vision, goals, and objectives of the Bowker Creek Watershed Management Plan.
- Section 4 presents a summary of watershed principles and actions.
- Section 5 presents a summary of recommended actions to improve the entire creek corridor.
- Section 6 presents key actions for short-term implementation (three to five years).
- Section 7 outlines the monitoring program and presents 2009 Baseline data.
- Section 8 contains references.
- Appendix A presents a detailed list of actions for watershed management.
- Appendix B presents detailed, reach specific actions to improve the creek corridor.
- Appendix C presents detailed restoration prescriptions for the open sections of Bowker Creek.
- Appendix D presents detailed methodology of the Blueprint Monitoring Program.

Figure 3. The Bowker Creek committees at work on the draft Blueprint