

Integrating the Site with the Watershed and the Stream

Primer for Integrated Rainwater and Groundwater Management

1. Background / Context

This Primer introduces building blocks that can inform 'water-centric' policy development by BC municipalities. Embedding a science-based understanding in an Official Community Plan, for example, can make a difference on the ground. Thus, the Primer objectives are three-fold:

- provide insight into the regulatory and educational context for moving from awareness to action in order to **protect watershed and stream health** in BC;
- explain how introduction of the Rainfall Spectrum concept a decade ago led us to look at rainfall differently in BC;
- foreshadow how pioneer research in the Englishman River watershed can similarly lead us to look at groundwater differently.

The City of Parksville OCP is a demonstration application for the Primer. The learning captured in this Primer will also be shared with other local governments on Vancouver Island. Knowledge-transfer will be facilitated through the current *Inter-Regional Education Initiative*.

Companion Documents

This Primer is the third in the latest series of guidance documents released by the Partnership for Water Sustainability. The first two Primers were released in November 2011:

- Primer on Rainwater Management in an Urban Watershed Context:**
Provides engineers and non-engineers with a common understanding of how a science-based approach to rainwater management has evolved since the mid-1990s.
- Primer on Urban Watershed Modelling to Inform Local Government Decision Processes:**
Provides engineers and non-engineers with guidance in three areas: setting performance targets, defining levels-of-service, and application of screening / scenario tools.

The core concepts presented in these companion documents provide an educational foundation for rainwater management in a watershed context.

A Call to Action

In 2008, the Province put in place a policy framework that is a 'call to action' on the part of local governments (refer to image below). This call to action is underpinned by the notion of **shared responsibility** – that is, everyone needs to understand and care about THE GOAL. If all the players know their role in relation to the goal, then together British Columbians can create the future that we all want.

A Call to Action

Living Water Smart, BC's Water Plan
and the **Green Communities Initiative**
provide a vision of what the regions of our province can look like if local governments.....

- prepare communities for climate change,
- choose to live water smart, and
- strive to build greener communities

Inter-Regional Education Initiative: Figure 1 references regions where watershed-based strategies and programs for integrating the site with the watershed and stream are being advanced. Inter-regional sharing, collaboration, alignment and consistency will accelerate effective implementation of watershed protection objectives within each region. The focus of the *Inter-Regional Educational Initiative* is on the 'how-to' details of integration and implementation.

Everyone needs to agree on expectations and how all the players will work together, and after that each community can reach its goals in its own way

"The 'regional team approach' is founded on partnerships and collaboration; and seeks to align actions at three scales – provincial, regional and local."

Glen Brown, Executive Director
BC Ministry of Community, Sport & Cultural Development
& Deputy Inspector of Municipalities
September 2009

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Inter-Regional Education Initiative

Figure 1

Explanatory Notes – Provincial Significance

1. The Province intervened in the Comox Valley to both create a new regional district and mandate regional plans. The *Comox Valley Sustainability Strategy* and *Comox Valley Regional Growth Strategy* provide the planning framework for implementing **An Integrated Watershed Approach to Settlement**.
2. The Nanaimo Region's **Drinking Water & Watershed Protection Plan** created a drinking water and watershed protection service area with taxation authority in the region's electoral areas. Because the scope has been expanded to include the member municipalities, this means the plan has more of a regional function.
3. The **Cowichan Basin Water Management Plan** is a provincial case study for watershed governance changes being contemplated as part of *Water Act Modernization*.
4. In the Capital Region, the Bowker Creek Watershed Blueprint and District of Sooke Rainwater Management Plan are demonstration initiatives for **Integrated Watershed Management**. Both are founded on partnerships that have enabled community groups and municipal staffs to coalesce around a shared vision: *What do we want this watershed to look like in 100 years, and what steps will we take to get there?*
5. Metro Vancouver's **Integrated Liquid Waste & Resource Management Plan** established the framework for moving beyond regulatory compliance to transitioning the region to an approach where management of liquid discharges and rainwater resources is planned and implemented within a broader, sustainability framework.

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Linking Rainfall, the Landscape, Groundwater and Streamflow

The purpose of this Primer is to provide the reader with a *science-based understanding* of factors that impact on watershed and stream health, either for better or worse. Building blocks in a science-based understanding are:

- Rainfall (precipitation);
- the ability of the landscape to absorb rainfall;
- movement of water through the ground; and
- the resulting flow in streams.

As illustrated on Figure 2, these elements are part of a system that we call the Water Balance. Land development short-circuits this system when the land surface is hardened and below-ground flow paths to streams are eliminated. By describing the linkages and connecting dots, the ultimate goal of the Primer is to foster responsible decisions about use and development of land.

What 'Science-Based Understanding' Means:

The foundation document for this Primer is *Stormwater Planning: A Guidebook for British Columbia*, released by the Province in 2002.

The Guidebook describes what "science-based understanding" means in practice. Also, it draws on work completed in 1999 for King County in Washington State as part of the Tri-County response to the listing of Chinook salmon as an endangered species. "A significant finding was that scientists and managers think and operate differently," states the Guidebook.

The Guidebook provides this definition: "An interface is needed to translate the complex products of science into achievable goals and implementable solutions for practical resource management. This interface is what we now call a science-based understanding."

Through a science-based understanding of the relationship between hydrology and aquatic ecology, the Guidebook derived watershed protection objectives that provide an over-arching framework for rainwater management. In linking the site to the watershed and the stream, this Primer builds on the Guidebook by integrating stream erosion and groundwater understanding.

Connecting Dots: Looking ahead to the sections that follow this one, a key message is that TIME is a critically important dimension in maintaining the water balance. Another key message is that water is always moving. These considerations underpin a science-based rainwater management strategy. The image below serves as a road map:



This Primer is grounded in an approach that recognizes that engineering is the 'art of applied science'. According to Dr. Peter Coombes of the University of Newcastle and the University of Melbourne in Australia, "Good engineering



practice relies on astute observation and sound deduction. Breakthroughs in practical understanding and application happen when applied scientists ask the right questions:

What are the data telling us?" Dr. Coombes is a recognized leader in Water Sensitive Urban Design in Australia. In September 2006, he was the keynote speaker at the Water in the City Conference, held in Victoria.

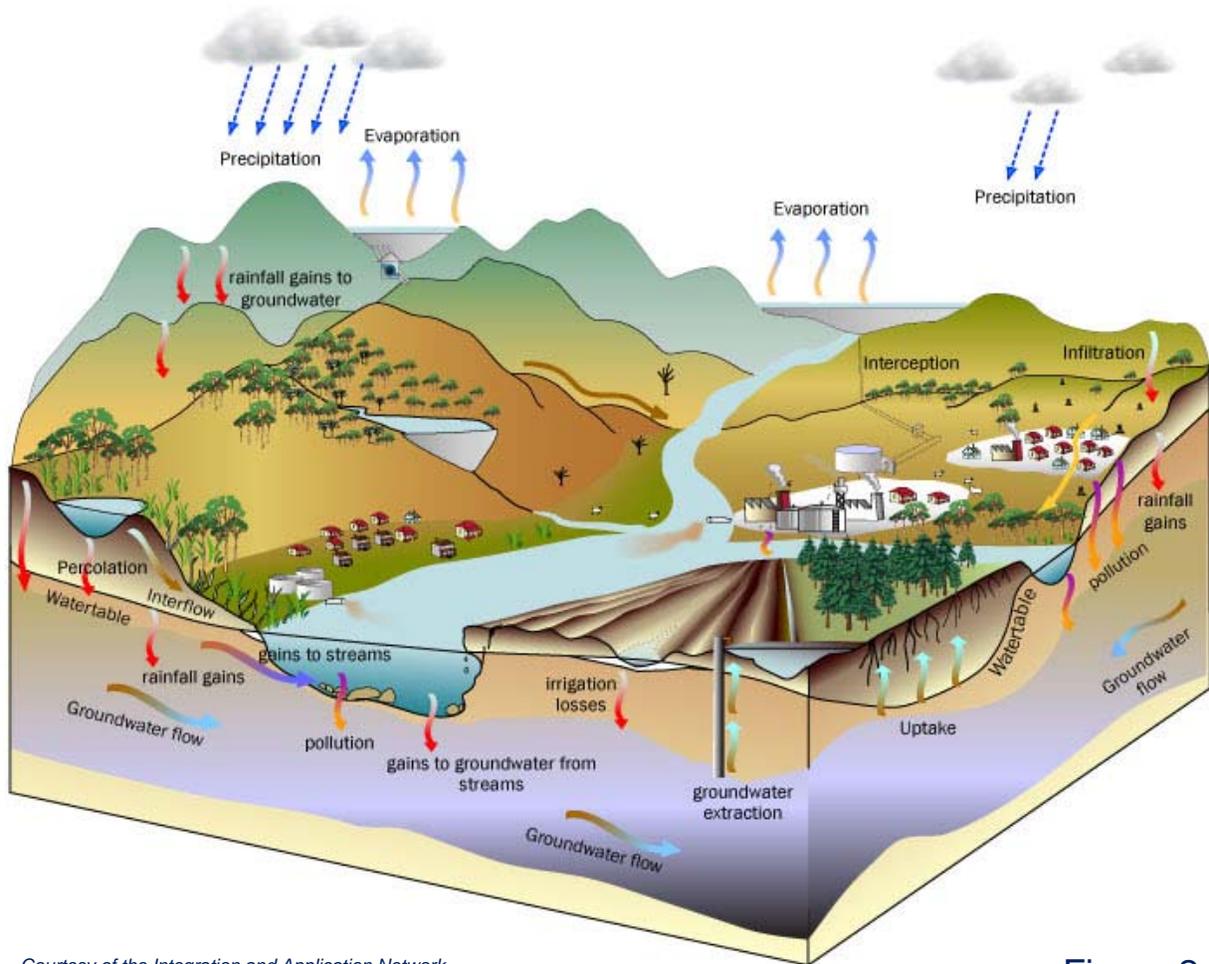
This Primer synthesizes the pioneer work of three BC engineers, namely: Kim A Stephens, Jim Dumont and Dr. Gilles Wendling. Because they looked at rainfall and groundwater differently, they were able to connect dots and develop practical applications of water balance thinking.

Looking at rainfall differently started with the *UniverCity Sustainable Community* on Burnaby Mountain in Metro Vancouver. This project was the genesis for the Water Balance Methodology that links rainfall to stream health protection.



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Courtesy of the Integration and Application Network,
University of Maryland Center for Environmental Science (ian.umces.edu/symbols/)

Figure 2

Elements of the Water Balance