

Convening for Action on Vancouver Island
Leadership in Water Sustainability



Comox Valley Local Governments Showcase “A Regional Response to Infrastructure Liability”

Sustainable Service Delivery: ‘Design with Nature’,
Protect Stream Stability, and Save Money

Convening for Action in the Comox Valley:
Visualize What We Want Our Region to Look Like in 50 years

Create a Legacy:
Settlement Change in Balance with Ecology

- 1. Influence choices by individuals and organizations*
- 2. Use the term “sustainability” as a lens for considering approaches that influence choices*

2011 Comox Valley Learning Lunch Seminar Series

A Regional Response to 'Infrastructure Liability'

Sustainable Service Delivery: 'Design with Nature', Protect Stream Stability, and Save Money

Preface

The initial capital cost of municipal infrastructure is about 20% of the life-cycle cost; the other 80% largely represents a future unfunded liability. Each year, the funding shortfall grows. Fiscal constraints provide a driver for a change in the way local governments plan, finance, implement and over time replace infrastructure.

*Through a program of professional development, the four Comox Valley local governments are striving for a consistent regional approach to **Sustainable Service Delivery**. The focus of the 2011 Seminar Series is on how all those involved in land development have a role to play.*

In April, Seminar #1 painted a picture of the 'legacy liability' of existing hard infrastructure (i.e. roads, water, sewers).

On May 19, Seminar #2 will deal with green infrastructure and 'sustainable urban drainage'. Jim Dumont will explain the water balance methodology and demonstrate how to establish performance targets for rainfall capture. A town-hall sharing session will then explore how to implement green infrastructure in Northeast Comox to protect the agricultural lowlands.

The scope of the 2011 Series is encapsulated in the image opposite. The Agenda for Seminar #2 follows on the next page.

*Kim A. Stephens, MEng, PEng, Executive Director
Partnership for Water Sustainability in British Columbia
May 2011*



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Sustainable Service Delivery

AKA: What is Asset Management?

- Integrated approach involving **planning**, engineering and finance to effectively manage existing and new municipal infrastructure in a sustainable manner to maximize benefits, reduce risk and provide satisfactory levels of service to the community user in an **environmentally and ecologically responsible manner.** (National Asset Management Working Group)

2011 Comox Valley Learning Lunch Seminar Series
A Regional Response to 'Infrastructure Liability'

**2011 Comox Valley Learning Lunch Seminar Series:
A Regional Response to Infrastructure Liability**

Water is finite. People are not.

Seminar #1

("Managing Water = Managing Growth = Managing Infrastructure")

Understand Consequences of 'Infrastructure Liability'

Strive for 'Sustainable Service Delivery'

Recognize Benefits of 'Green Infrastructure'

Regional Collaboration 🏡

Seminar #2

("Too Little Water")

Climate Change = Droughts
So, Design with Nature
Make Level of Service Choices

Adaptation 🏡

Seminar #3

("Too Much Water")

Climate Change = Floods
So, Respect Power of Nature
Make Level of Service Choices

Risk Management 🏡



**Green infrastructure
will make a difference over time!**

2011 Comox Valley Learning Lunch Seminar Series
A Regional Response to 'Infrastructure Liability'

Agenda for Seminar #2 on May 19
Adaptation – 'Design with Nature' to Achieve Rainfall Capture
and Water Conservation Goals

1000 - 1215	<p>Establishing Expectations – This is what we want our valley to look like!</p>
	<p>1. Look Beyond Our Municipal Boundaries</p> <p>(a) Regional Response to Infrastructure Liability: What We Learned At Seminar #1 <i>(Glenn Westendorp & Kim Stephens) (15 minutes)</i></p> <p>Explain the three dimensions to the unfunded 'infrastructure liability'</p> <p>(b) Nature Without Borders: Align Efforts at a Watershed Scale <i>(Jack Minard & Kevin Lorette) (15 minutes)</i></p> <p>Introduce the Tsolum River case study</p> <p>2. Rainwater Management in a Watershed Context: 'Do More With Less & Achieve Stream Health Benefits' <i>(Jim Dumont) (~1¼ hours)</i></p> <p>Explain how watershed targets can be met at the development and site scales</p>
LUNCH	<p>Take an extended break and continue the conversation! (60 minutes)</p>
1315 - 1500	<p>Delivering on Expectations – This is how we can/will get there!</p>
	<p>3. Look Within Our Municipal Boundaries</p> <p>(a) Changes to the Built Environment in the Comox Valley: Understanding Where Northeast Comox Fits Into the Big Picture <i>(Tim Pringle) (15 minutes)</i></p> <p>Examine NE Comox through the lens of the <i>Comparative Land Use Typologies & Matrix</i></p> <p>(b) Rainwater Management in Northeast Comox: Vision for Green Infrastructure <i>(Glenn Westendorp) (15 minutes)</i></p> <p>What we want to achieve through green infrastructure – "maintain the water balance"</p> <p>(c) Town-Hall Sharing Session: Rainwater Management in Northeast Comox: Implementation of Green Infrastructure to Use Less Water and Prevent Runoff <i>(facilitated by Kim Stephens) (70 minutes)</i></p> <p>Explore how the Town could establish and implement rainfall capture and runoff control targets</p> <p>4. A Look Ahead to Seminar #3 <i>(Glenn Westendorp) (5 minutes)</i></p>

2011 Comox Valley Learning Lunch Seminar Series

A Regional Response to 'Infrastructure Liability'

Sustainable Service Delivery: 'Design with Nature', Protect Stream Stability, and Save Money

Adaptation – 'Design with Nature' to Achieve Rainfall Capture and Water Conservation Goals

The focus of Seminar #2 is on urban watershed protection and restoration issues, with emphasis on a 'design with nature' approach to climate change adaptation:

These are the values of importance to everyone; and this is the community standard that we wish to build to.

A desired outcome is that participants will understand how a 'design with nature' approach integrates rainwater management and drought management.

Design with Nature

In British Columbia, a provincial goal is to advance this 'new business as usual': **settlement change that is in balance with ecology**. Commencing in 2003, consistent and repeated use of the phrase 'design with nature' has proven effective in facilitating a paradigm-shift in the local government setting.

The phrase is borrowed from the title of a seminal book by Ian McHarg, published in 1969. He was a renowned landscape architect and writer on regional planning using natural systems. His book **Design with Nature** pioneered the concept of ecological planning. Ian McHarg's premise is simple: *"that the shaping of land for human use ought to be based on an understanding of natural process."*



His philosophy was rooted in an ecological sensibility that accepted the interwoven worlds of the human and the natural, and sought to more fully and intelligently design human environments in concert with the conditions of setting, climate and environment.

Adaptation and Collaboration

"Designing with nature captures the essence of climate change adaptation. Adaptation is about responding to the changes that will inevitably occur. Adaptation is at the community level and is therefore about collaboration," states Raymond Fung, Chair of the Green Infrastructure Partnership, in a quote published in *Beyond the Guidebook 2010: Implementing a New Culture for Urban Watershed Protection and Restoration in British Columbia*.



"In May 2005, the Green Infrastructure Partnership developed a branding graphic to define 'designing with nature' in contemporary terms. We essentially adapted Smart Growth principles, albeit in action-oriented sound-bites. The catalyst for developing this mind-map was a consultation workshop with the Metro Vancouver Regional Engineers Advisory Committee."

Infrastructure Liability: The 'design with nature' branding graphic has evolved over the past six years. In 2011, the infrastructure liability issue was weaved into the storyline (see below). There are two dimensions to the goal of a 'lighter water footprint', namely: *reduce water use* to ensure sustainability of supply; and *reduce drainage runoff* to protect stream stability.



Collaboration, a 'Design with Nature' approach, and re-use of resources are keys to mitigation of unfunded infrastructure liability and adaptation to climate change

To achieve higher levels of stream, wetland and marine environment protection:

- Protect and restore urban green space
- Strive for a lighter 'water footprint'
- Re-use and recycle water, energy & nutrients from liquid wastes
- Develop compact, complete communities

2011 Comox Valley Learning Lunch Seminar Series

A Regional Response to 'Infrastructure Liability'

Sustainable Service Delivery: 'Design with Nature', Protect Stream Stability, and Save Money

Rainwater Management in a Watershed Context: Shifting from Gray to Green

Seminar #2 is structured in two parts as shown in the Agenda. In the morning, the unifying theme is "Look Beyond Our Municipal Boundaries". The focus is on aligning efforts at a watershed scale to 'design with nature', protect stream stability, and save money. In the afternoon, the theme is "Look Within Our Boundaries" because the spotlight shifts to the Northeast Comox case study and implementation of green infrastructure to achieve a 'lighter water footprint'. Participants will find that each part informs the other..

Look Beyond Our Boundaries

Glenn Westendorp, Chair of the 2011 Series, will introduce the inter-municipal Brooklyn Creek case study. In 1999, the estimated \$1.8 million cost for creek stabilization and restoration was well beyond the financial capacity of the Town of Comox; and was the driver for doing business differently. This case study provides a graphic illustration of an infrastructure liability that is the consequence of NOT designing with nature.



Nature Without Borders: Brooklyn Creek will provide the springboard for a co-presentation by Jack Minard (Comox Valley Land Trust) and Kevin Lorette (Comox Valley Regional District). They will speak to the loss of baseflow (i.e. "too little water") and the impact on stream health

Jack Minard and Kevin Lorette will introduce the Tsolum River case study that will be featured in Seminar #3; and they will refresh the vision for **An Integrated Watershed Approach to Settlement**. This was an outcome of the 2009 Series.

They will also connect the dots between land use practices and water balance management. This will provide a segue to the "course within a seminar" that Jim Dumont will deliver.

Sustainable Urban Drainage: "The need to embrace green infrastructure practices arose from the requirement to prevent further increases in damage to both the environment and the agricultural community resulting from the increase in rainwater runoff from urban areas," states Jim Dumont, Engineering Applications Authority for the Water Balance Model Partnership.



"Stream health is the elephant in the room. As the Brooklyn Creek case study illustrates, where will a municipality find the money when it has to go back in to fix a destabilized stream? From the municipal perspective, the objective should be to prevent what you are allowing now from costing you more in the future."

In a two-hour timeframe, Jim Dumont will deliver a mini-course that introduces the history, science and tools of Rainwater Management. He will:

- Provide background on "myths and misconceptions"
- Connect the dots to Sustainable Service Delivery as defined at Seminar #1
- Distinguish between BLUE solutions and GREEN solutions
- Explain why 'green solutions' can save money and create legacy benefits over time
- Explain watershed targets and how to establish them to achieve tangible objectives
- Explain how watershed targets can be met at the development and site scales
- Introduce practical screening tools that enable local governments to 'do more with less'

The mini-course informs the rationale for an inter-governmental approach to rainwater management in a watershed context, and is relevant to all land development proposed in the Comox Valley. It is especially applicable to tributary and/or small streams because they are most vulnerable to stream health impacts (e.g. as demonstrated by Brooklyn Creek).

For additional context, the reader is referred to *Green Infrastructure: Achieve More With Less*, published in Construction Business Magazine in February 2011. A copy is included at the end.

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Look Within Our Boundaries

In the afternoon session, two short presentations will provide context for a town-hall sharing session on a real-world case study, namely Northeast Comox. The purpose of the town-hall session is to provide the Town of Comox with a feedback loop for application of the 'green' approach described in the morning.

Sustainable Service Delivery: There are three dimensions to the infrastructure liability issue, with key objectives for a Sustainable Service Delivery approach synthesized as follows:

1. Pay down the legacy cost of existing hard infrastructure (water & sewer).
2. Reduce the life-cycle cost of new hard infrastructure.
3. Shift from gray to green to protect downstream values (i.e. environmental and/or agricultural).

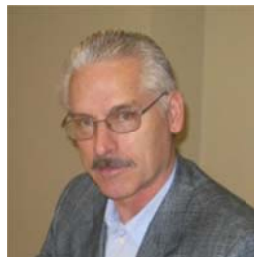
The emphasis in presenting the Northeast Comox case study is on dimension #3.

Changes to Built Environment in NE Comox:

Tim Pringle will examine NE Comox through the lens of the *Comparative Land Use Typologies & Matrix*. He showcased this evaluation tool during the 2009 Series. It can be used to determine the acceptability of developer proposals for large-scale real estate development.

Tim Pringle will explain where NE Comox development fits into the Comox Valley big picture; and he will offer his observations about integration of 'design with nature' principles so that pending development projects keep the natural hydrology intact.

"At the conclusion of my presentation," states Tim Pringle, "my hope is that the audience will have an appreciation for what this equation means: **Changes in NE Comox = Potential Assets and Liabilities (Infrastructure Deficit or Gain?)**."



Hierarchy of 'Green' Vocabulary: To develop a common understanding plus help advance a new way-of-thinking about land development, Tim Pringle co-developed the following hierarchy of 'green' vocabulary:

- **Green Value** means land use strategies will accommodate settlement needs in practical ways while protecting the ecological resources upon which communities depend.
- **Design with Nature** is one approach to achieve *Green Value*, and is supportive of community goals that relate to building social capacity.
- **Green Infrastructure** is the on-the-ground application of *Design with Nature* standards and practices.
- **Water Sustainability** is achieved through *Green Infrastructure* practices that reflect a full and proper understanding of the relationship between land and water.

This cascading vocabulary was unveiled at the *Creating Our Future Workshop* that was held in conjunction with the **Gaining Ground Summit** in Victoria in June 2007.

Vision for Green Infrastructure in NE Comox:

Glenn Westendorp will set the scene for the town-hall sharing session about implementation of green infrastructure. He will describe:

- What is there now
- What is allowable under the existing rules
- What is at risk downstream – "*cannot deprive the lowlands of water or give them too much*"
- What the Town wants to achieve through effective use of green infrastructure – "*maintain the water balance*"
- How the Water Balance Model can help make informed decisions

"My hope is that the audience will understand the challenges that the Town faces, and will be primed to contribute their practical experience and ideas during the town-hall session. We wish to explore how the Town can establish and implement achievable rainfall capture and runoff control targets," states Glenn Westendorp.

Green Infrastructure: Achieve More With Less

BY KIM A STEPHENS, RAYMOND FUNG
AND ANNA WARWICK SEARS



Local governments in British Columbia are faced with this financial challenge: the initial capital cost of infrastructure is about 20 per cent of the lifecycle cost; the other 80 per cent largely represents a future unfunded liability. Each year, the funding shortfall grows. As infrastructure ages and fails, local governments cannot keep up with renewal and/or replacement. Fiscal constraints provide a powerful impetus for doing business differently. Green infrastructure is part of a holistic approach to 'achieve more with less'.

While developers may pay the initial capital cost of municipal infrastructure, local government must assume responsibility for the lifecycle cost associated with operation, maintenance and replacement of infrastructure assets. Often this is not adequately funded through property taxation and utility charges, as various political priorities compete for limited tax dollars. In addition, local governments bear the entire financial burden to stabilize and restore watercourses impacted by increased rainwater runoff volume after land is developed.

Unfortunately, asset management is sometimes only considered after infrastructure is built. The challenge is to think about what asset management entails BEFORE the asset is built. Mitigate future financial burdens! This paradigm shift starts with land use planning. Connecting the dots between watershed health and infrastructure type is emerging as an important piece in 'sustainable drainage infrastructure', both fiscally and ecologically.

The financial burden and environmental impacts associated with 'pipe-and-convey' drainage infrastructure contrast with the benefits of 'green' infrastructure at a watershed scale: natural landscape based assets reduce runoff volumes, have lower lifecycle costs, decrease stresses applied to creeks, and enhance urban liveability.

Local governments
can protect
watershed health
by means of a
'design with nature'
approach.

Level-of-Service Approach

'Level-of-Service' is the integrator for everything that local governments do. For drainage infrastructure, it refers to the expected level of performance of municipal systems in providing flood protection. What level of service does a community wish to provide, and what level can it afford?

There are tradeoffs between drainage of land, flood protection, ecological integrity AND cost. Everyone will have to make level-of-service choices. Thus, a guiding principle for a watershed-based plan could be framed this way: Establish the level-of-service that is fiscally sustainable AND protects watershed health.

Appropriate and effective green infrastructure is a way to increase the level-of-service — for example, permeable landscapes that restore the rainfall absorption capacity of the watershed will reduce runoff. This has tangible value because it protects aquatic habitat and hence stream health. This will increase the level of ecological protection. Less runoff will also improve the level of drainage protection during wet weather.

To understand the link, think in terms of the 'Level-of-Service' an urban tree canopy provides for rainfall interception. As trees grow, the interception capability increases. There is less runoff, less wear-and-tear on creeks, and less need for creek stabilization.

Doing Business Differently

The province's Living Water Smart and Green Communities initiatives are a catalyst for doing business differently: start with effective green infrastructure and restore environmental values within the urban fabric over time. Actions and targets in Living Water Smart encourage 'green choices' that foster a holistic approach to infrastructure asset management. Two complementary strategies can green a community and its infrastructure: preserve and protect natural green infrastructure; and implement designs that soften the footprint of development.

An absorbent topsoil layer has emerged as a fundamental building block to achieve a lighter 'water footprint'. As a green infrastructure practice, topsoil is the interface between rainwater management and drought management. Soil depth creates a sponge which can limit runoff during wet-weather periods; and reduce water need during dry-weather periods. If we can show how to get the topsoil part right, then other parts of the water sustainability equation are more likely to follow.

In collaboration with three municipalities, the Green Infrastructure Partnership has developed two primers: one deals with law and policy; the other is technical in nature. Released in February 2010, the Topsoil Law and Policy and Technical Primer Set synthesizes the pioneering experiences of the City of Courtenay, City of Surrey and District of North Vancouver. This is a critically important first step in developing a suite of practical green tools for use by municipal staff and designers.

Currently, the Okanagan Basin Water Board and Green Infrastructure Partnership are collaborating to expand the two primers into a Topsoil bylaws primer. This will provide a more comprehensive and accessible resource for local governments. It will support rainwater management, water conservation, and aquifer recharge. The Topsoil bylaws primer will be available at the end of 2011.



Soil depth after land is developed for urban uses will have a bearing on...

- How water is conserved
→ sustainability of supply
- How water runs off the land
→ sustainability of aquatic habitat

Conclusion

Local governments can protect watershed health by means of a 'design with nature' approach. This uses more natural features and functions, rather than hard manmade systems, to green infrastructure practices. Through a watershed-based plan, local governments can strategically connect the dots between land use planning, development, watershed health AND asset management. And by 'designing with nature', local governments could make a very strong case for a 'sustainable drainage system', at a lower life-cycle cost. **CB**

Kim Stephens is executive director, Partnership for Water Sustainability in B.C.; Raymond Fung is chair, Green Infrastructure Partnership and director, Engineering & Transportation, District of West Vancouver; and Anna Warwick Sears is executive director, Okanagan Basin Water Board.



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