

Association of Professional Engineers & Geoscientists of BC
November 30, 2005 at Kelowna, British Columbia

Water Sustainability & “Green” Subdivision Design:

A seminar on the
Water Balance Model for British Columbia

Presentation Team: Kim Stephens, Doug Backhouse & Richard Boase

A GUIDEBOOK FOR BRITISH COLUMBIA

Stormwater Planning

The Water Balance Model has been developed as an extension of the Guidebook methodology for establishing Performance Targets for rainwater runoff reduction

BRITISH COLUMBIA
Ministry of Water, Land and Air Protection

Home About this Site WATER Balance MODEL

BRITISH COLUMBIA WATER BALANCE MODEL RESOURCES NETWORKING

Partners

City of Chilliwack

Visit City of Chilliwack

Events

Jun 2005

Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Add an event

Organizations

Recent Additions...

[British Columbia Ground Water Association](#)

[Canadian Water Resources Association](#)

The Canadian Water Resources Association is a national organization of individuals and organizations interested in the management of Canada's water resources. The membership of the Association is composed of private and public sector water resource professionals including managers, administrators, scientists, academics, students and users. It has branch organizations in eight provinces and members throughout Canada and beyond.

[Watershed Report](#)

TRY THE MODEL

1. Enter the area of your site, add existing soil conditions, and land use information.
2. Create a graph of rainwater volume summaries and see how well your site performs.
3. Add a Green Roof or a Rain Garden or similar rainwater source control and compare before and after results.

Environmental Best Management Practices for

Key Message:
Anybody with a computer and internet connection can access the model

primary purpose is to provide province-wide guidelines for the maintenance of environmental valuesMore

www.waterbalance.ca

Adapting the Australian Experience

WSUD: BASIC PROCEDURES FOR SOURCE CONTROL OF STORMWATER

A poll is not available

**Inter-Governmental Partnership:
History**

- Formed in 2002 to develop an internet-based, public-domain scenario modeling tool for rainwater management
- Has local government members from four regions
- Has evolved into a national initiative

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Inter-Governmental Partnership: Vision

To promote changes in land development practices so that:

- The built environment will preserve and/or restore the natural water balance over time
- Performance targets will be achieved for rainwater runoff volume and flow rate reduction at the source, *where rain falls*



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Inter-Governmental Partnership: Key Partnerships

Real Estate Foundation of BC

Urban Development Institute

BC Water and Waste Association

APEGBC



◆ Post Fire Hydrological Hazards

- ◆ Hydrophobicity reduces the infiltration of rainfall and snowmelt into the ground and causes over land flow to develop.



What are
your expectations for
this seminar?

Seminar Road Map

- 
- A. Context & Overview**
 - B. Make Better Decisions**
 - C. Design with Nature**
 - D. Convene for Action**

Context & Overview

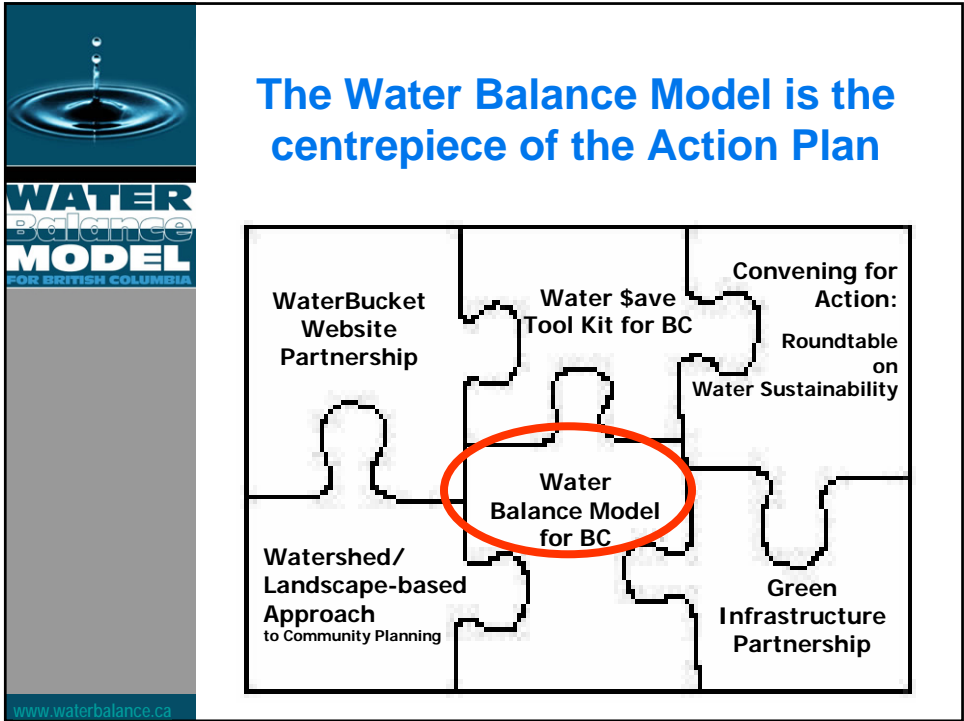
Sub-Topics

1. Water Sustainability Action Plan for British Columbia
2. Water Balance Management in the Okanagan
3. Why Design with Nature

What do you know about
the Water Sustainability
Action Plan?

The Water Sustainability Action Plan for BC....

... provides a partnership umbrella for
implementing water stewardship and
sustainable community design *on-the-ground*



Partners | Contact Us | About This Site

waterbucket

Our Vision
 The vision of WaterBucket.ca is to provide a resource-rich, highly interactive "destination location" website for information and communication related to water sustainability in the Province of B.C.
 Visit these Communities of Interest

- ▶ Water Use & Conservation
- ▶ Rainwater Management
- ▶ Green Infrastructure
- ▶ Watershed - Based Planning

We Take Our Water for Granted
 Because we undervalue our precious water...
 (...excerpt from Water Use and Conservation)

Abbotsford Speaks Out on Meters
 The 2004 Water Conservation Survey conducted...
 (...excerpt from Rainwater Management)

sustainable approaches to water resources

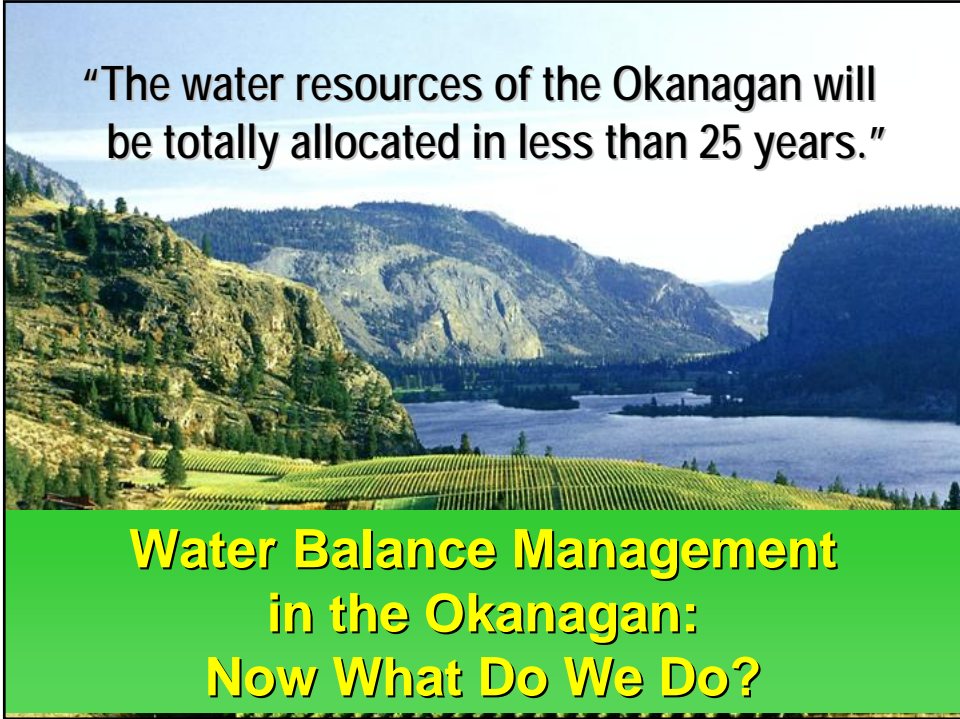
waterbucket.ca is the communication vehicle for the Action Plan

waterbucket.ca has these Communities-of-Interest



In October, the Water Sustainability
Committee launched....

**“Convening for Action in the South Okanagan:
Moving Towards a
Water Balance Way-of-Thinking and Acting”**



"The water resources of the Okanagan will be totally allocated in less than 25 years."

Water Balance Management in the Okanagan: Now What Do We Do?



Achieving an 'Okanagan Water Balance Relies' on
Changing Behaviour at the Site Scale

Over 85% is Used for Outdoor Purposes:

- ~70% for Agricultural Irrigation
- >15% for Lawn, Gardens & Open Space Irrigation
In Cities, Towns and Villages





Drainage Planning in BC Has Been Evolving Over the Decades

- 1960s: Pipe and Remove
- 1970s: Detain Peak Flows
- 1980s: Reactive Mitigation
- 1990s: Stream Stewardship
(Proactive Management)
- 2000s: Rainwater Management
(Sharing a Vision)



Building a Vision & Creating a Legacy

- **Issue:** How We Manage Population Growth
- **Impact:** Growth Resulting in Urban Densification
(Land Constraints; Smaller Lots)
- **Sustainability:** *Means Design with Nature*
- **Built Environment:** We Can Improve It
- **Natural Environment:** We Can Protect It
- **Cumulative Benefits:** Accrue Over Time
- **Outcome:** Sustain Community Livability

What Does *Design with Nature* Mean to You?



Seminar Road Map

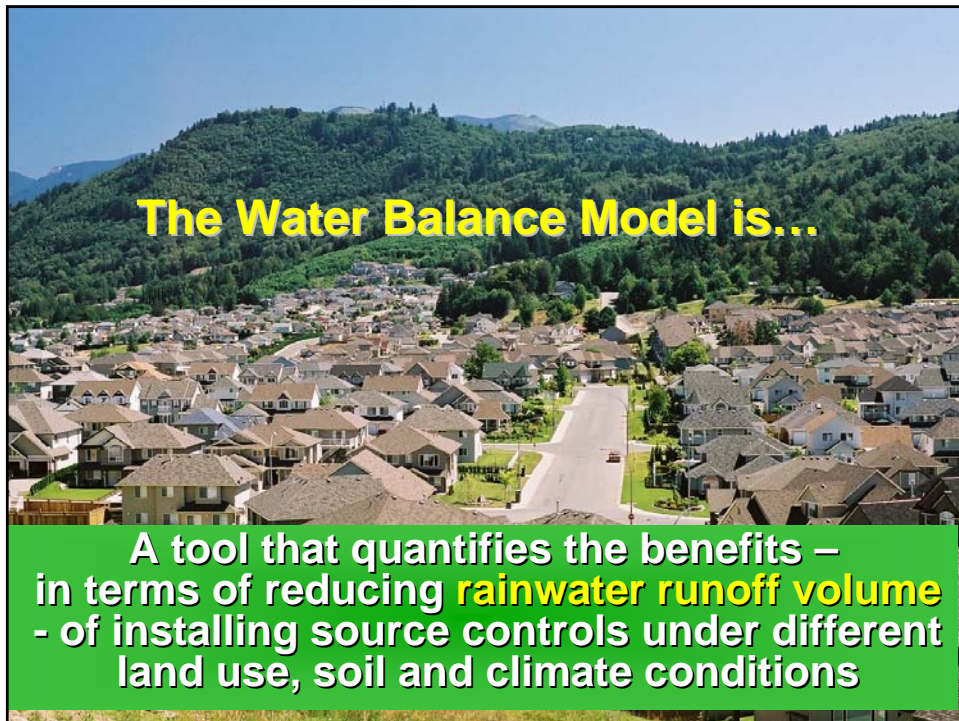
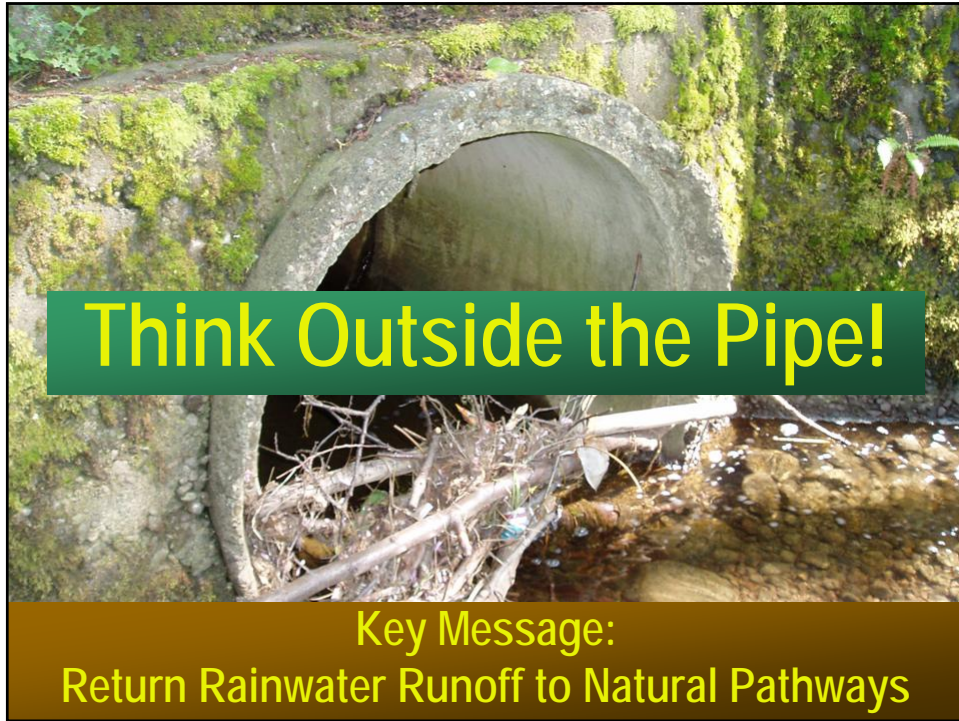


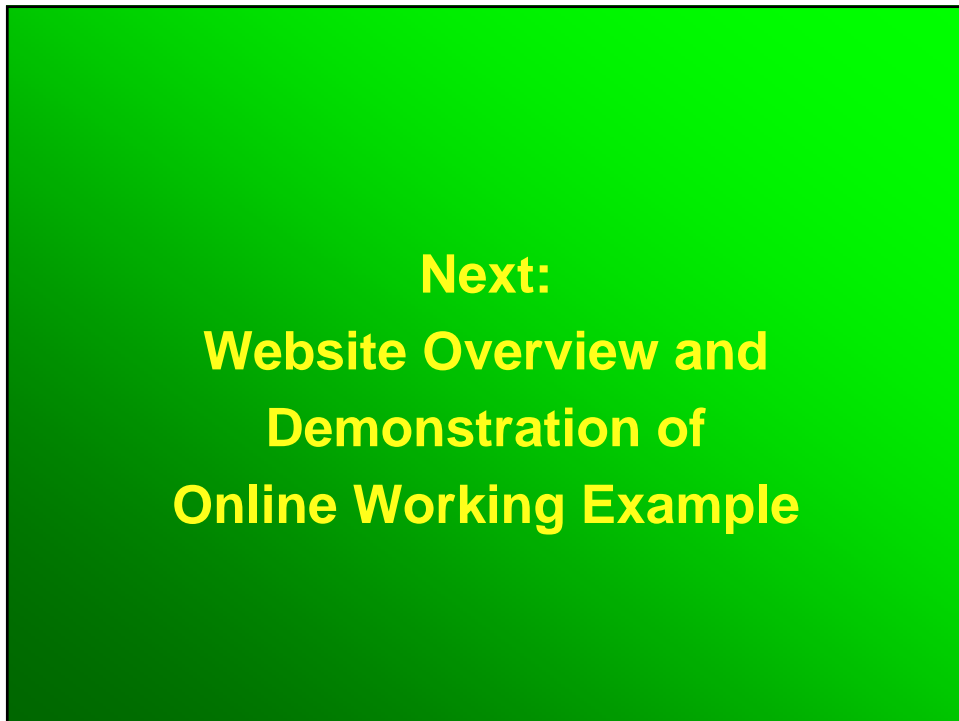
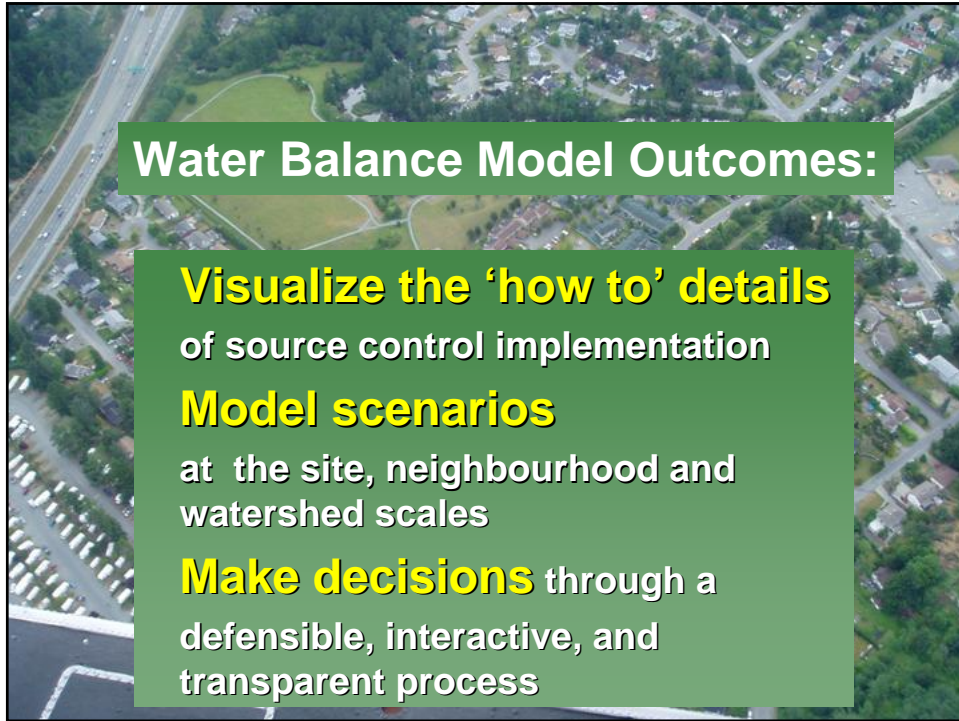
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Make Better Decisions

Sub-Topics

1. “Think Outside the Pipe”
2. Online Introduction to waterbalance.ca
3. Integration of Perspectives







Water Balance Model promotes Integration of Perspectives

- **Planners:** Tool for Better Use of Space
- **Engineers:** Tool for Pre-Design
- **Landscape Architects:** Tool for Green Solutions
- **Ecologists:** Tool for Watershed Function
- **Educators:** Tool for Social Marketing



Integration of Perspectives in Action

Right-handed
planner

Left-handed
engineer

How the Water Balance Model will be used to make better decisions:

- **Local Governments** -
when communicating with the public
- **Planners and Engineers** –
when setting performance targets
- **Developers and their Consultants** -
when testing scenarios
- **Environmental Agencies** -
when monitoring watershed health



What was a conversation...becomes interaction!

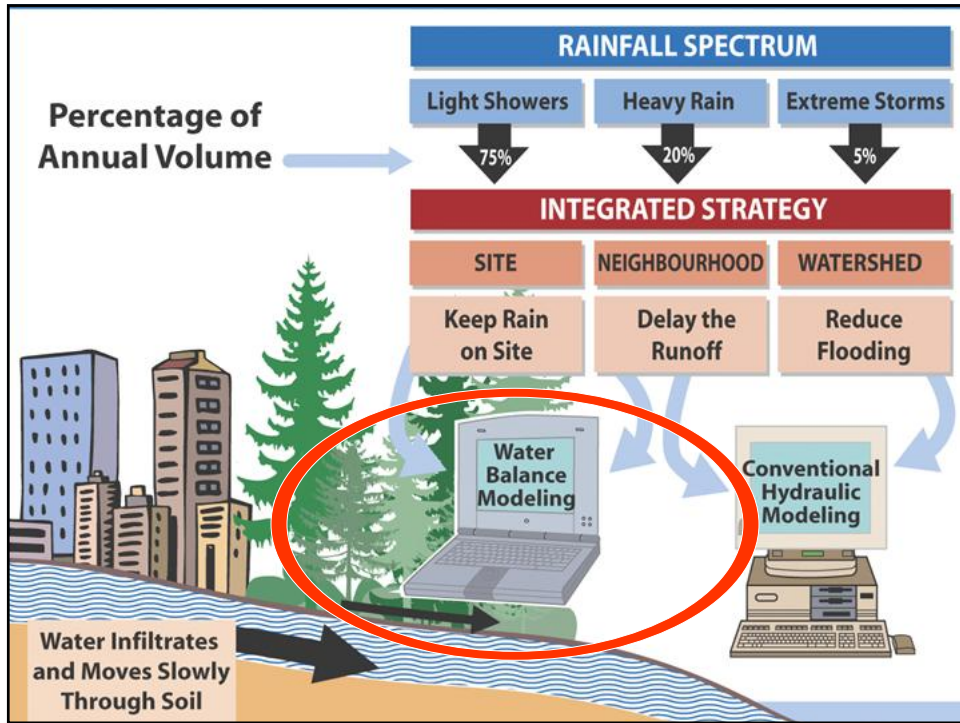
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Design with Nature

Sub-Topics

1. Solutions are Landscape-Based
2. *Online Demonstration:*
Achieving Performance Targets
3. Application at Different Scales
4. Green Streets

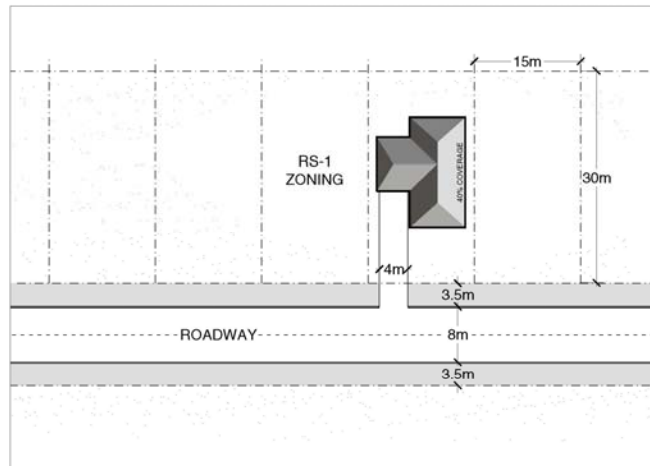




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Example Application to a Single Family Residential Site



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Key Details

Entire area is zoned RS1, each lot will have:

- roof leaders disconnected.
- roads serviced by rain gardens
- topsoil depth such that runoff volume produced over a typical year is +/- 10%.

- 502.5 sq. m. (includes road right-of-way strip)
- 40% rooftop
- 16% impervious driveway
- 44% lawn



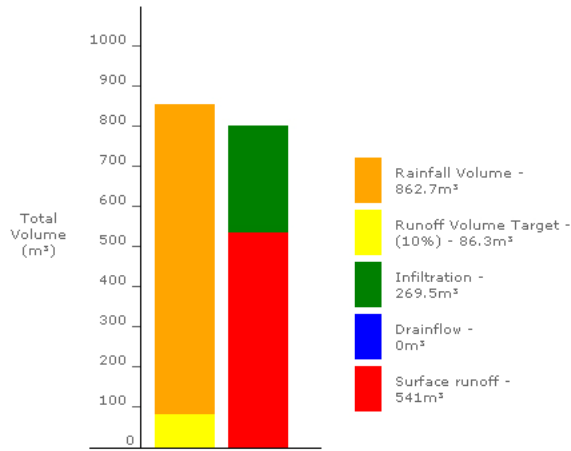
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Existing Conditions

Burnaby Example - Existing Conditions

Water Balance Volumes For Catchment
Graph for the period Jan 1 1996 to Dec 31 1996

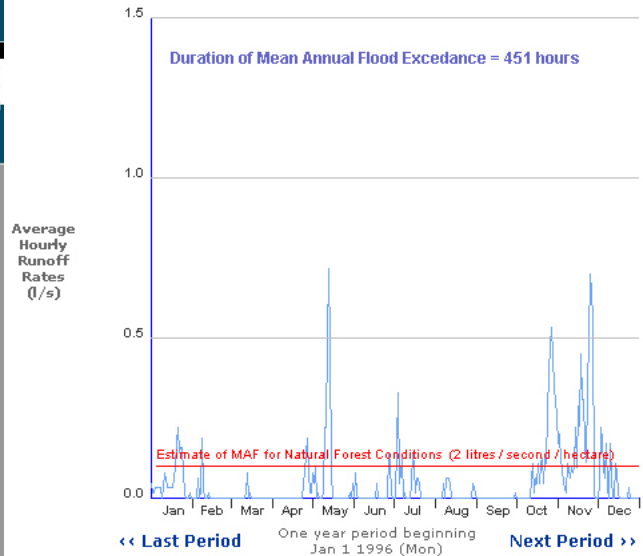


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Burnaby Example - Existing Conditions

Runoff Excedance



Note: Short periods of excedance may not be displayed on the



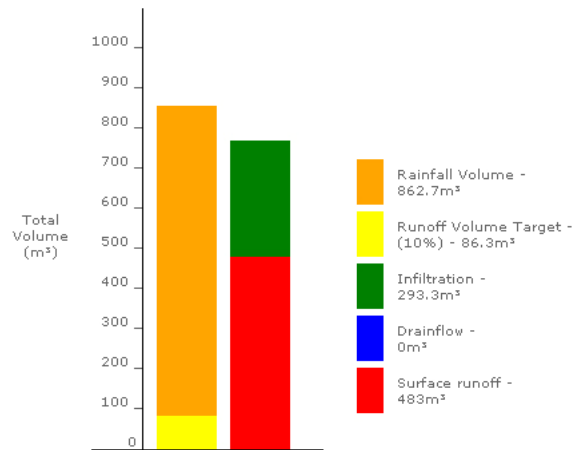
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Scenario 1

Burnaby Example - Scenario 1 Absorbent Soil

Water Balance Volumes For Catchment
Graph for the period Jan 1 1996 to Dec 31 1996

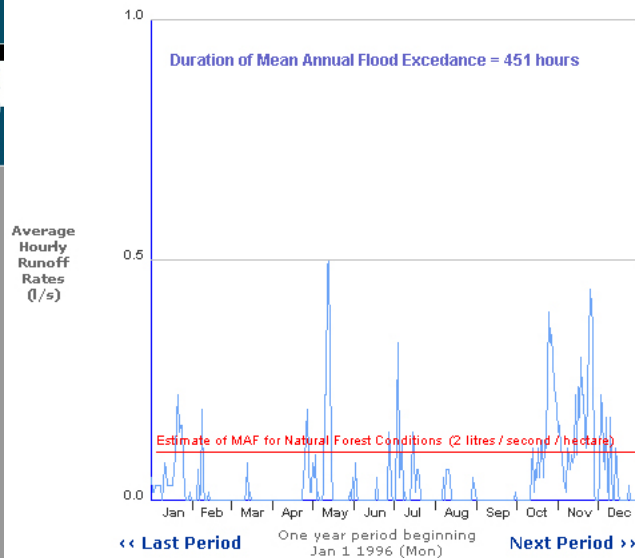


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Burnaby Example - Scenario 1 Absorbent Soil

Runoff Excedance



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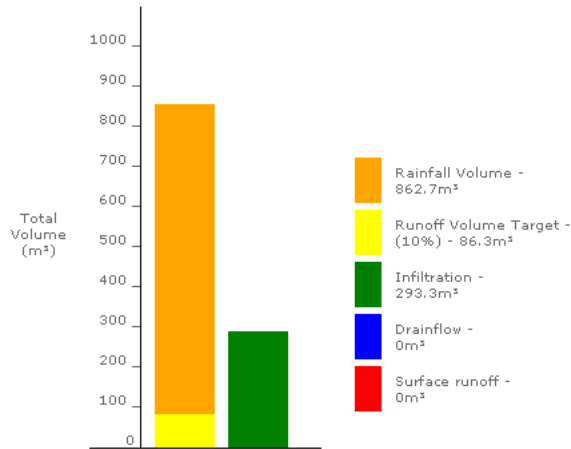
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Scenario 2

Burnaby Example - Scenario 2 With Source Control

Water Balance Volumes For Catchment
Graph for the period Jan 1 1996 to Dec 31 1996

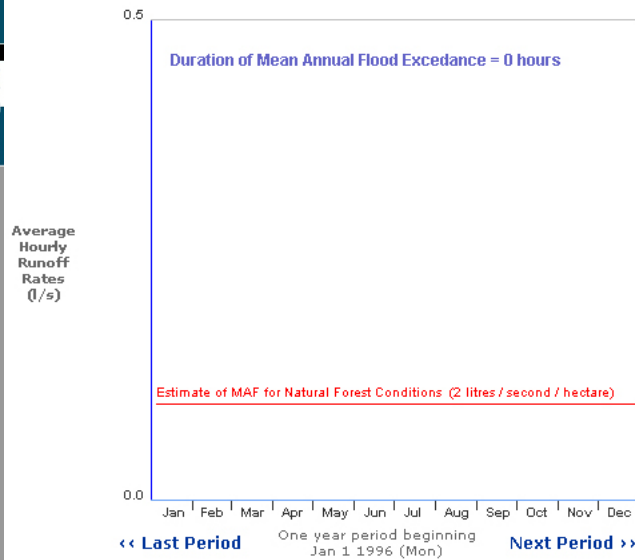


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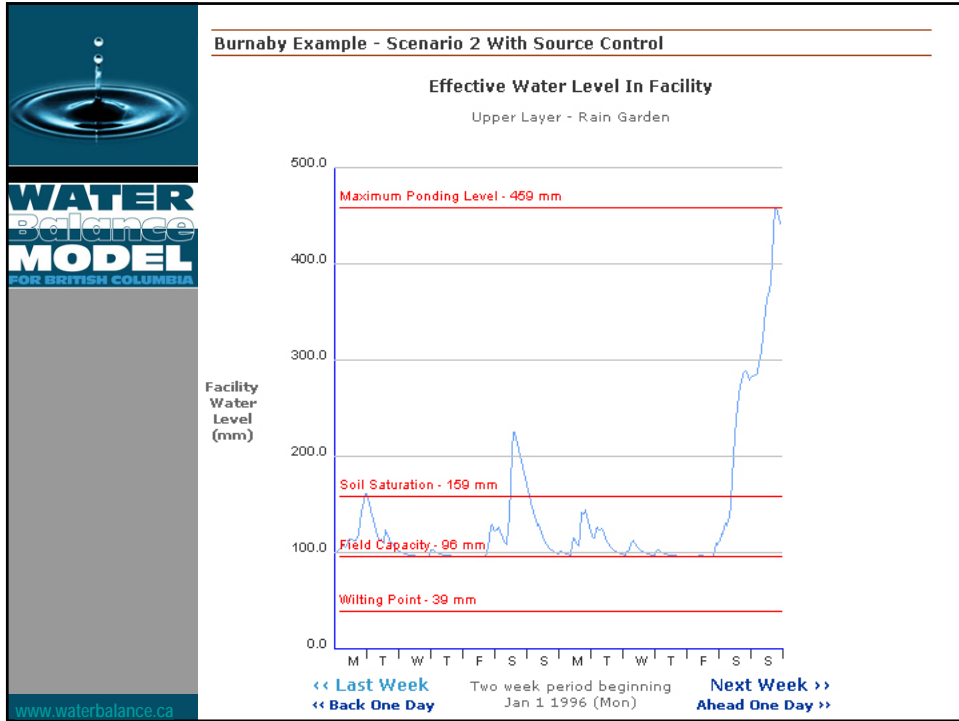
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Burnaby Example - Scenario 2 With Source Control

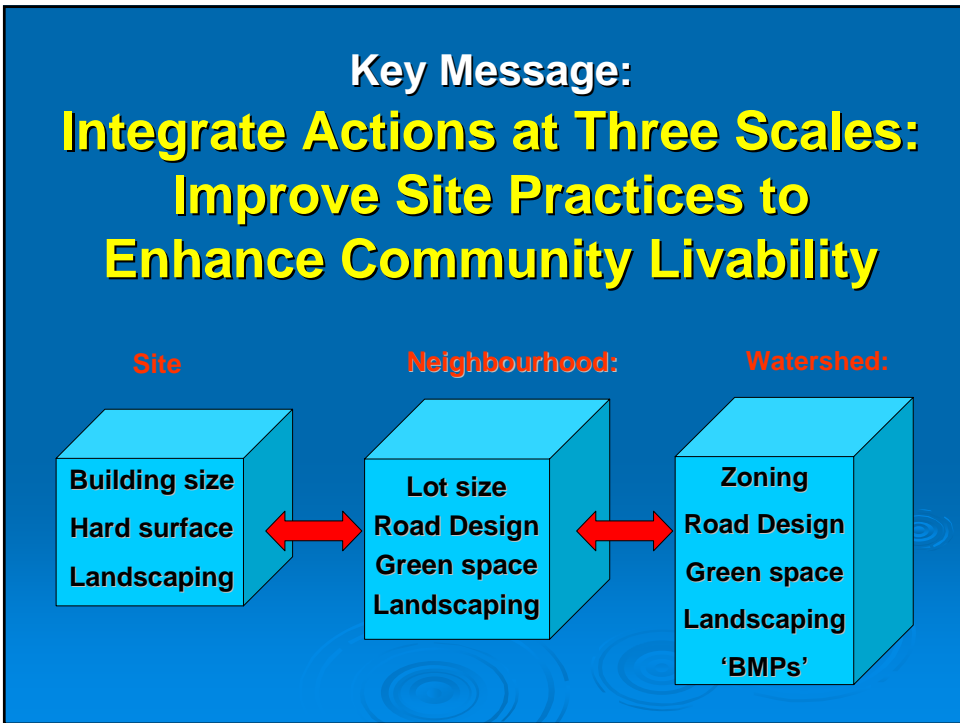
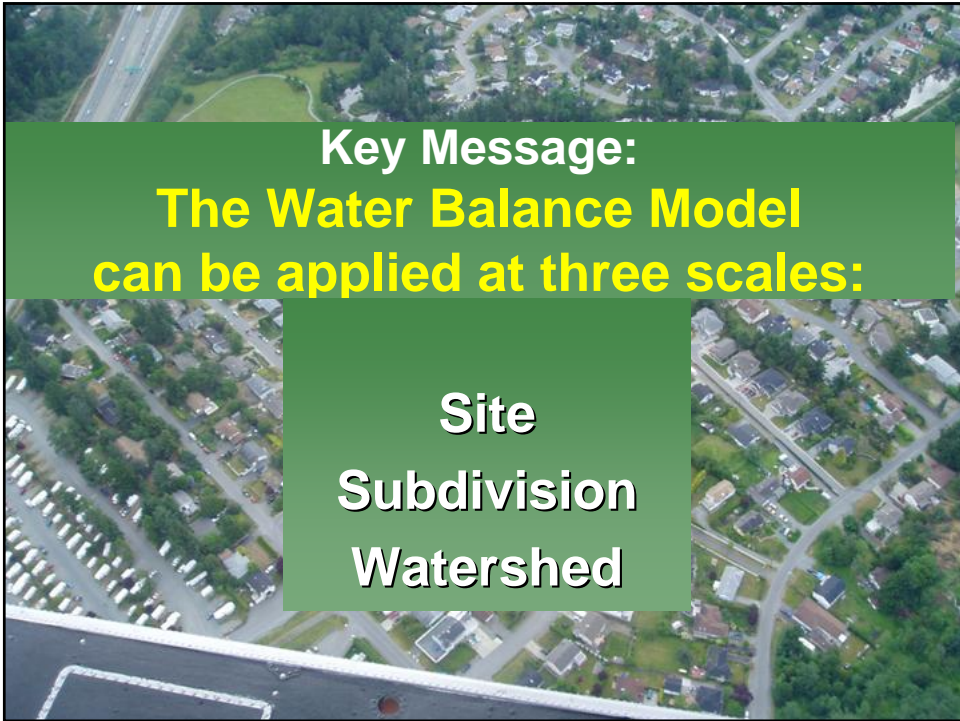
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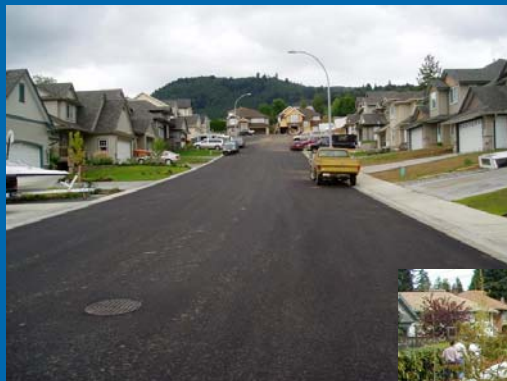
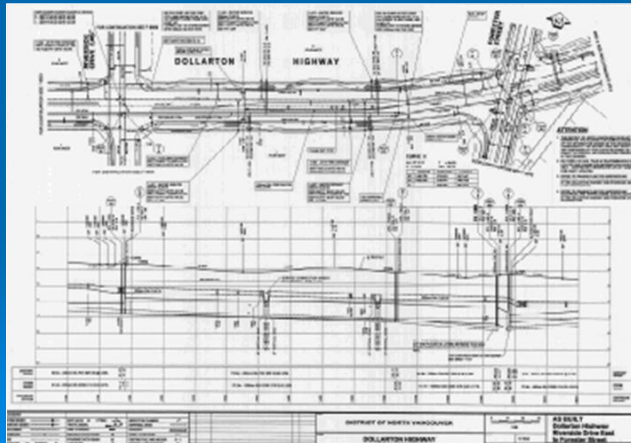


What Did You Learn from the Process?





**Translate Technical Drawings
Into Understandable Language:
Explain How Your Rainwater Plan
Will Achieve Environmental Objectives!**



**Livability and
Streetscape Design:
We Have Choices:
An Example**

**Will Streets Be
Sterile and Uninviting,
Or Green and Inviting?**



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Convening for Action

Sub-Topics

1. Turning Ideas into Action
2. WBM Training Workshop

“Convening for Action” is designed to turn ideas into action



- **What** is the problem?
- **So What** can be done about it?
- **Now What** will be done?

Turning Ideas Into Action is a 3-Step Process

We build capacity by:

- Challenging practitioners to step back from existing paradigms
- Informing them regarding alternatives
- Giving them the tools and the experience to do things differently



Having an Internet-accessible tool:

- Increases opportunities to promote widespread use
- Results in greater need to provide training in its use



Inter-Governmental Partnership: Outreach & Continuing Education Program

The program has comprised sessions for:

- Elected Officials
- Local Government Staff
- Development Community
- Municipal Advisory Committees
- Community Stewardship Groups
- Professional Associations



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Inter-Governmental Partnership: Outreach & Continuing Education Program

Training workshops have been hosted by:

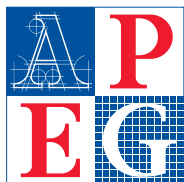
- University of Victoria
- BC Institute of Technology
- University of British Columbia
- North Island College (Courtenay)
- District of West Vancouver



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Next Training Workshop is planned for early 2006, possibly the week of Feb 13-17

It will be for a full-day in a computer lab,
co-sponsored by the City of Kelowna and APEGBC
and hosted by UBC-Okanagan



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and Geoscientists of BC
www.apeg.bc.ca



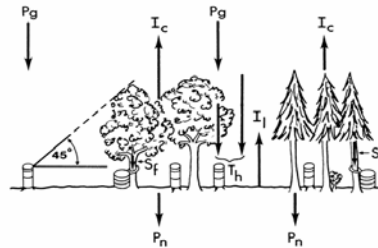


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Coming Soon.....

A **Tree Canopy Module** is currently being developed through a 3-way partnership with the **University of British Columbia** and the **Urban Forest Research Center** at the University of California (Davis)



Interception total $I = I_c + I_f$
 The amount reaching the forest floor = $T_f + S_f$
 Interception by canopy (overstory + understory) $I_c = P_g - T_f - S_f$
 Net precipitation $P_n = T_f + S_f - I_c$



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Coming Next Year.....

Integration with QUALHYMO will provide engineers with “one-stop shopping” for:

- Rainwater Storage Routing**
- Water Quality**
- Stream Erosion**
- Drainage Area Flow Routing**
- Snowmelt Runoff**

So will you be signing up
for the workshop?

And in closing....

The Water Balance Model
is about a way of thinking