



From the Georgia Basin to Georgia Street:

the challenges of smart stormwater management

Laura Maclean, M.R.M.
Pollution Prevention Coordinator
Environment Canada

Do we have a stormwater management crisis in the Georgia Basin?



Do we have a stormwater management crisis in the Georgia Basin?



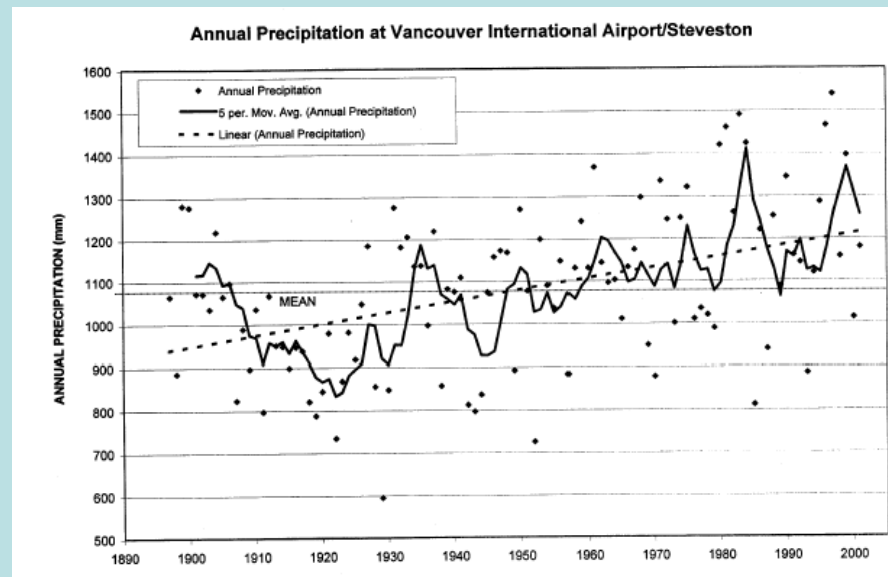
- population growth, land scarcity
- loss of habitat quantity and quality
 - rising cost of infrastructure
 - flooding and liability concerns

Do we have a stormwater management crisis in the Georgia Basin?



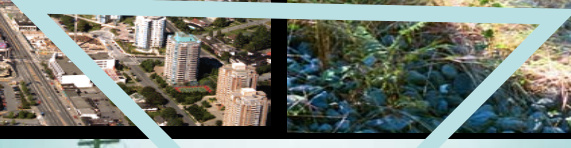
- water shortages

Do we have a stormwater management crisis in the Georgia Basin?



- climate change

The Stormwater Challenge:



Facilitate this...



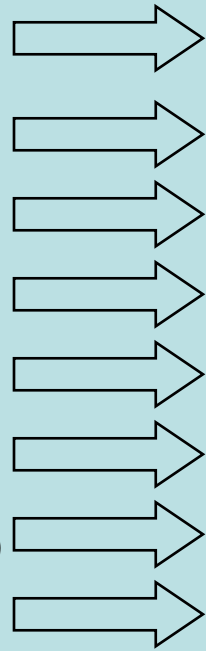
Prevent this...

Preserve this...

Integrated Stormwater Management Planning

From TRADITIONAL to

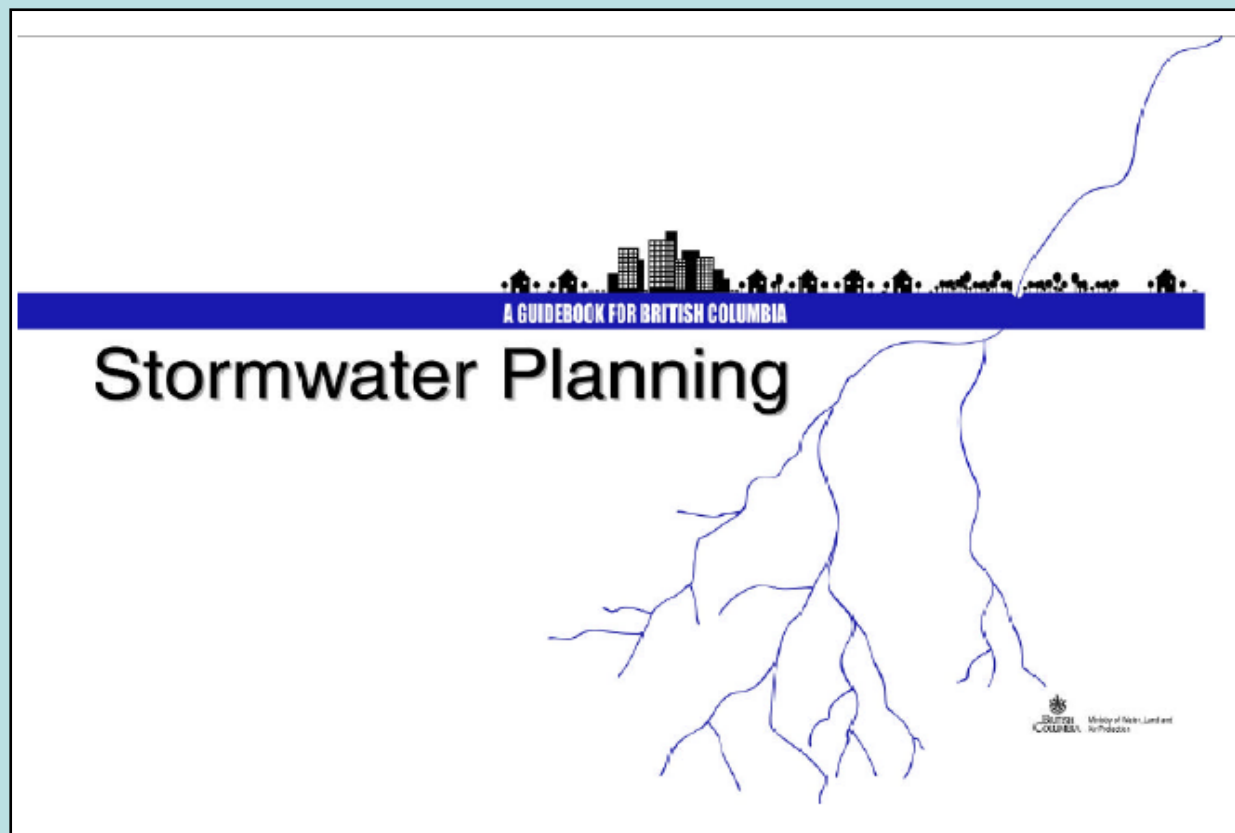
- Drainage Systems
- Reactive (Solve Problems)
- Engineer-Driven
- Protect Property
- Pipe and Convey
- Bureaucratic Decisions
- Local Government Ownership
- Drainage Focus Only



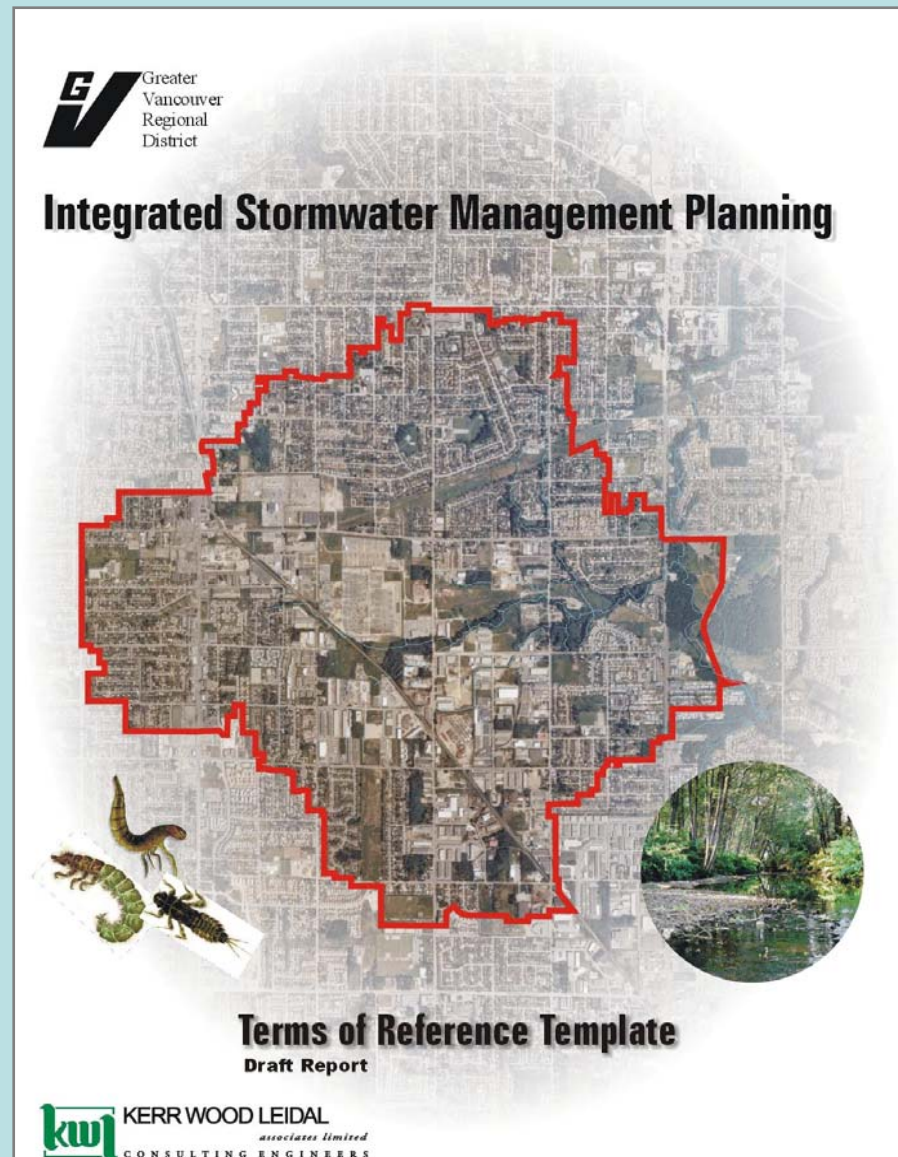
INTEGRATED:

- Ecosystems
- Proactive (Prevent Problems)
- Interdisciplinary Team-Driven
- Protect Property *and* Habitat
- Mimic Natural Processes
- Consensus-Based Decisions
- Partnerships with Others
- Stormwater Integrated with Land Use

Stormwater Planning: A Guidebook for British Columbia



GVRD Terms of Reference Template for Developing a Watershed-based Integrated Stormwater Management Plan (ISMP)



If we think of a stormwater plan as a
roadmap...

Where are we trying to get to?
How will we know when we get there?
How long should it take?



Where are we trying to get to?

- 10% target
- maintain or restore the natural water balance

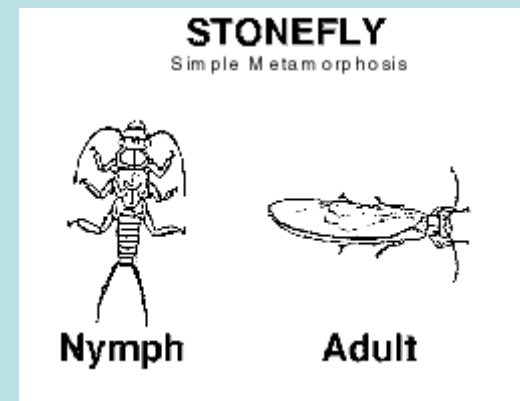


Should performance targets be the same for all watersheds? Should the solutions be the same?

How will we know when we get there?

Possible performance indicators:

- rainfall-runoff response
- stream baseflow
- benthic community health (B-IBI)
- water quality objectives



How long should it take?



- 12 years to develop ISMPs
- 50 year time horizon

Are stormwater management targets
achievable?

Is the development community ready?



Vancouver Island Technology Park Saanich, BC



- 100% on-site stormwater capture
 - grass pave parking lots
 - water efficient landscaping
- infiltration ponds built well before development

Burnaby Mountain “UniverCity” Burnaby, BC



- housing for 10,000 people
- annual rainfall >2,000 mm/yr
- 90% rainfall volume capture target

tekmar™ Control Systems Head Office Vernon, BC



- 100% on-site stormwater capture coupled with ground source heat pump
- roof flooded with rainwater saves 25% on summer cooling costs

How can we get there from here?

- change the terminology
- strengthen the link between SWM and LEED
- financial incentives: density bonuses, reduced DCCS
- stormwater utilities with imperviousness-based taxes
- green mortgages
- public education and consumer demand
- subdivision bylaws
- require SWM if removing land from the ALR
- require end-of-pipe treatment in the absence of ISMPs

Where is the “low-hanging stormwater fruit”?

- landscaping standards
- rainwater harvesting and re-use



Landscaping Solutions at the Site Scale:

1. Roof Downspout Disconnection
2. Terraced Landscaping
3. Rain Gardens
4. Infiltration Soakaways
5. Runoff Dispersal
6. Permeable Pavements
7. Soil Layer Thickness





1 – Roof Downspout Disconnection



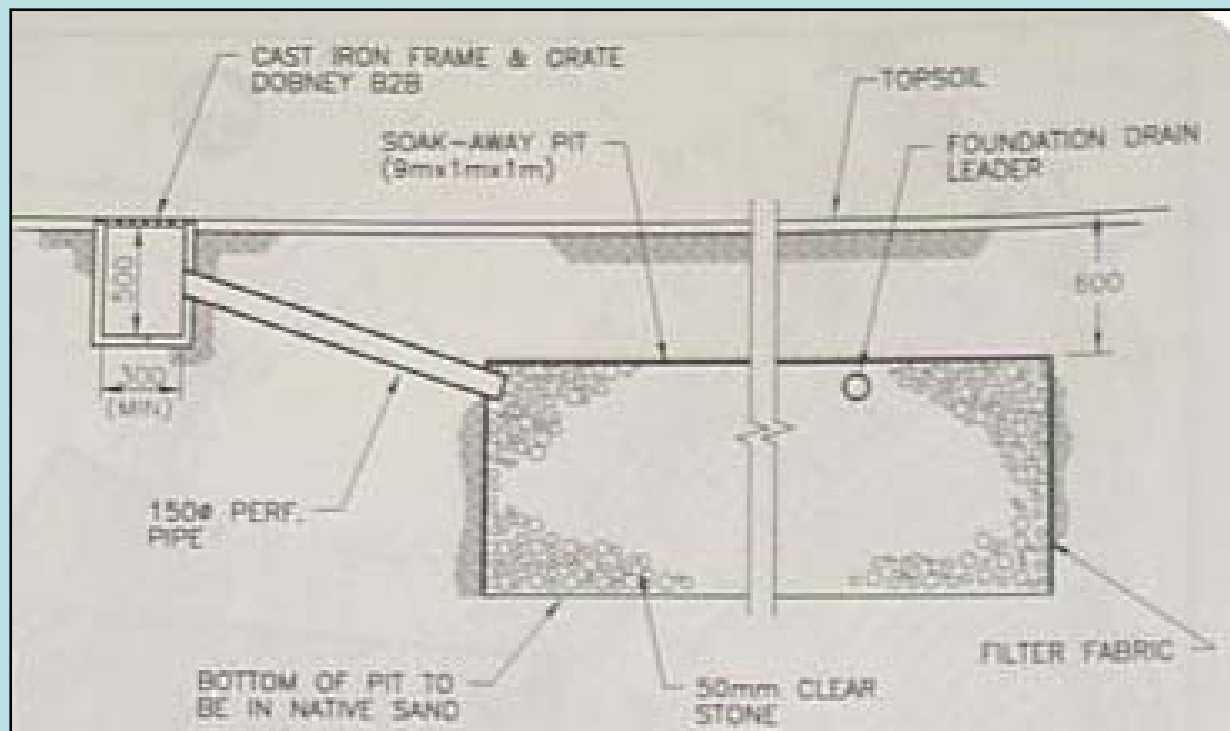
2 - Terraced Landscaping



3 - Rain Gardens



4 – Infiltration Soakaway





5 - Runoff Dispersal



6 - Permeable Pavements



7 - Healthier Lawns and Gardens

On-Site Source Controls for Stormwater Retention:

Rainwater Harvesting and Re-use



Rain Barrels, Cisterns and Storage Tanks



The Water Balance Model for BC



<http://www.waterbalance.ca>

Inter-Governmental Partnership: Steering Committee and Development Team

Co-Chairs

BC Ministry of Agriculture, Food & Fisheries
Environment Canada

Focus Group

City of Chilliwack
City of Surrey
District of North Vancouver
Greater Vancouver Regional District

Project Team

KSA Consultants Ltd
CH2M HILL Canada Ltd
Lanarc Consultants Ltd

Inter-Governmental Partnership: History

- ❑ Formed in 2002 as a result of a GVRD-sponsored project on the effectiveness of stormwater source control
- ❑ Desire was to develop an internet-based, public-domain scenario modeling tool for stormwater management

Inter-Governmental Partnership: Vision

**To promote changes in land
development practices so that:**

- sites and subdivisions will be designed to function to mimic the natural hydrologic condition to the extent possible
- performance targets will be achieved for runoff volume and flow rate reduction



A scenario modeling tool for planners, engineers and developers that can be used to...

- evaluate the effectiveness of various combinations of source controls
- visualize the 'how to' details of source control implementation
- model scenarios at the site, neighbourhood and watershed scales
- make decisions through a scientifically defensible, interactive, and transparent process

Water Balance Model Inputs:

- **continuous rainfall data**
(any time increment)
- **evapotranspiration data**
- **extent and distribution of land use types**
(road width, rooftop coverage, parking coverage, etc.)
- **site design parameters**
(vegetation rooting depth, porosity, hydraulic conductivity, water level)
- **soil and groundwater information**
- **stormwater source control design criteria**



WATER Balance MODEL FOR BRITISH COLUMBIA

[Partners](#) • [About](#) • [Home](#)

[View Prototype](#) • [Resources](#) • [Background](#)

PROJECT DESCRIPTION	SOILS	LAND USE	SOURCE CONTROL	MODEL PROJECT
----------------------------	--------------	-----------------	-----------------------	----------------------

{Sidebar}

Assign Land Use to Soil Types

You can use this section of the model to describe the native soil conditions of the area you are modeling. Identify the most appropriate soil type from the list below.

		Sandy Loam	Clay	Till				+/-
Square Metres.		4700	3800	1500				
Single Family Residential	3400	<input type="text"/>	<input type="text"/>	<input type="text"/>				
Commercial	2200	<input type="text"/>	<input type="text"/>	<input type="text"/>				
Agriculture	3100	<input type="text"/>	<input type="text"/>	<input type="text"/>				
Parks and Open Space	700	<input type="text"/>	<input type="text"/>	<input type="text"/>				
Undetermined	600	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		+/-						



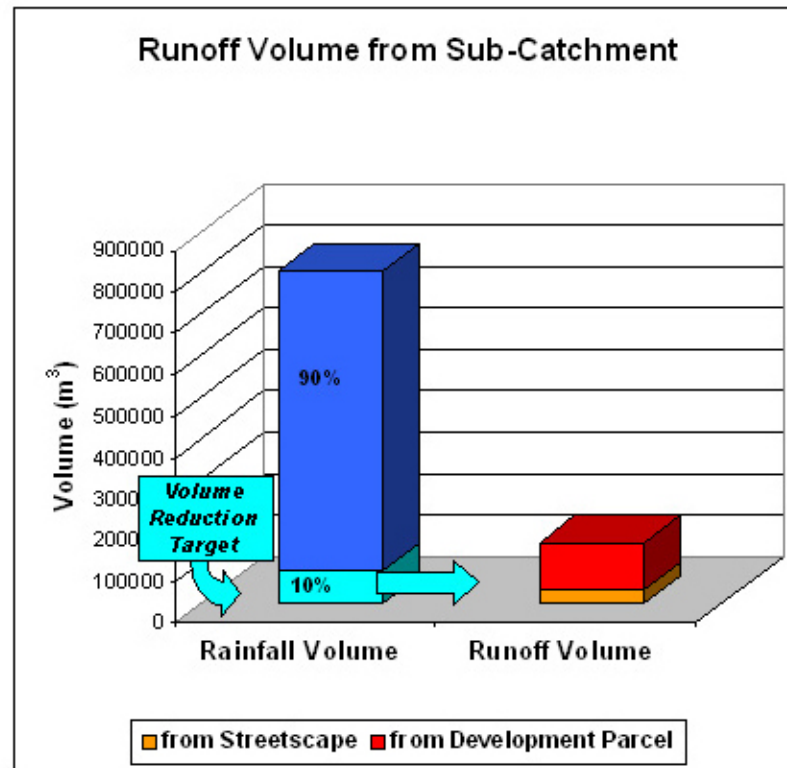
WATER Balance MODEL FOR BRITISH COLUMBIA

[Partners](#) • [About](#) • [Home](#)

[View Prototype](#) • [Resources](#) • [Background](#)

PROJECT DESCRIPTION	SOILS	LAND USE	SOURCE CONTROL	MODEL PROJECT
----------------------------	--------------	-----------------	-----------------------	----------------------

(Sidebar)





www.waterbalance.ca

Upcoming Training Workshop:
April 30, 2004
BCIT Downtown Campus

In partnership with:

