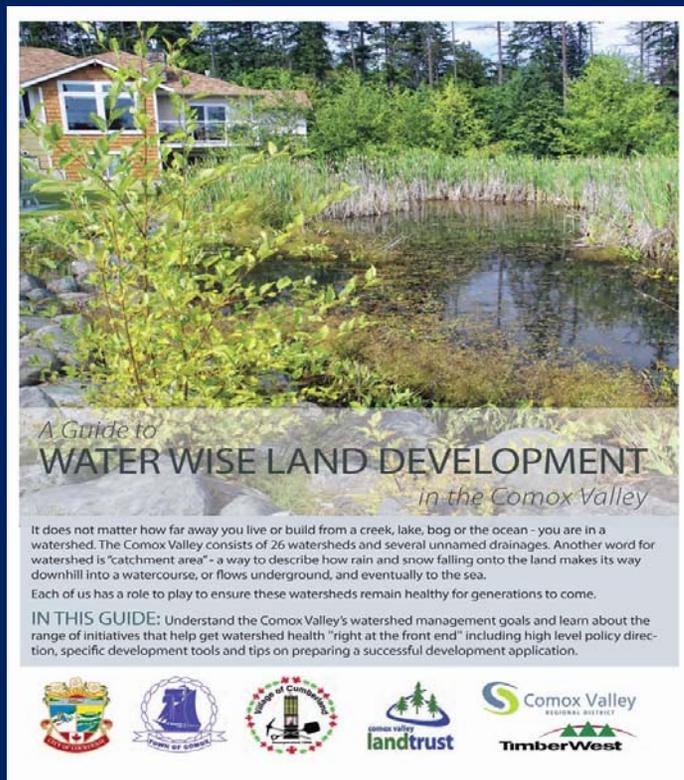


A Guide to Water-Wise Land Development in the Comox Valley

Convening for Action in the Comox Valley

Joint Staff Training Workshop on “How to Use the Guide”

Road Map for 'Sharing & Learning'



Context *(25 minutes)*

- *Local Regional Team*
- *Inter-Regional Perspective*
- *Stewardship Perspective*
- *Pin Your Location*
- *About the Guide*

Strategies & Tools *(45 minutes)*

Interactive Segment *(45 minutes)*

What Next *(5 minutes)*

Comox Valley CAVI



*Through collaboration, Comox Valley
local governments are striving for:*



- Coordinated approach across boundaries
- Consistent application of strategies & tools
- Ease & transparency in development process

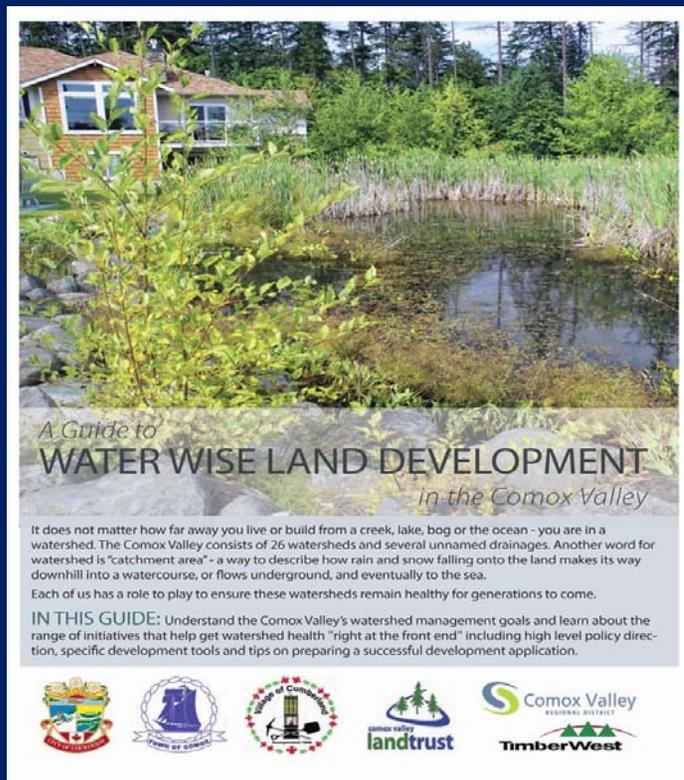
In October 2015, the CAOs approved these collaboration priorities for the 2016 Work Plan:

1. A Guide to Water-Wise Land Development in the Comox Valley – *implementation*
2. Water Balance Model Express for the Comox Valley – *implementation*
3. Comox Valley Water-Wise Website - *implementation*
4. Water conservation initiative for lawn & gardens

At the end of today's workshop....

- Each of you will be comfortable discussing/handing out the Water-Wise Guide
- We will have the beginning of a relationship with our colleagues.

Road Map for 'Sharing & Learning'



Context

- *Local Regional Team*
- *Inter-Regional Perspective*
- *Stewardship Perspective*
- *Pin Your Location*
- *About the Guide*

Strategies & Tools

Interactive Segment

What Next

Comox Valley local governments are partners in the Georgia Basin Inter-Regional Educational Initiative (IREI)...



*Metro Vancouver, Capital Region,
Cowichan Region, Nanaimo Region
and Comox Valley*

- Launched in 2012
- The Partnership is the secretariat
- In April 2015, the five Regional Boards recommitted through 2017 to work as a team
- ***By 2017***, a program goal is that all local governments would ***understand*** how to achieve '***Sustainable Watershed Systems, through Asset Management***'



The climate in BC is changing:

wetter, warmer winters; longer, drier summers

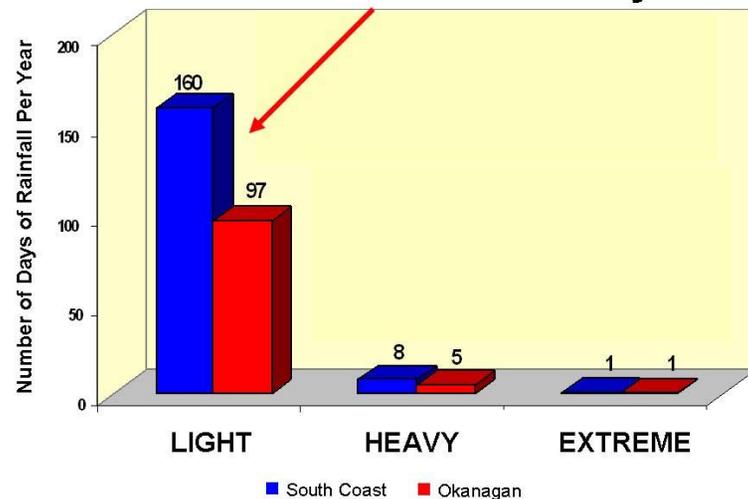
We can sustain water supply in dry weather
and limit drainage impacts in wet weather.

Alignment of mandates, roles and responsibilities is
necessary to successfully **‘Design with Nature’** and
‘restore Water Balance integrity’ in urban regions

In 2000, we went back to basics and developed the concept of a Rainfall Spectrum.

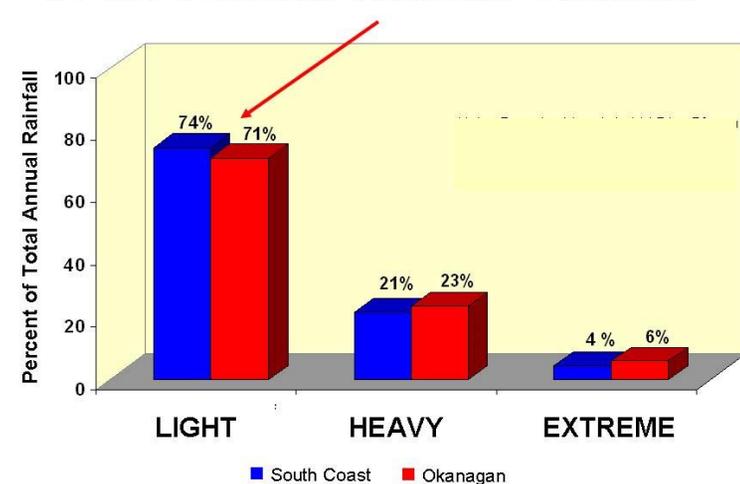
*We demonstrated the achievability of “rainfall capture”.
This helped overcome fear and doubt.*

The ‘Light Shower’ Category Accounts for Most of the Rainfall Days



Days

Light Showers Account for Most of the Annual Rainfall Volume



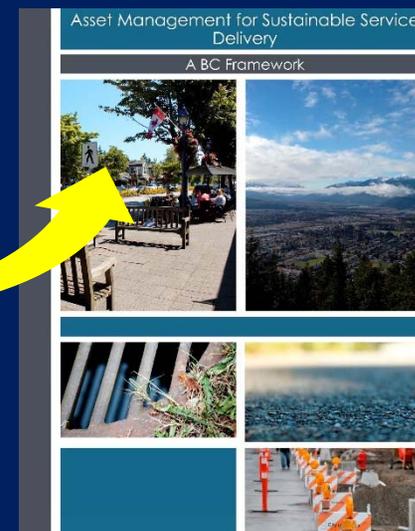
Volume

KEY MESSAGE -

What Happens on the Land Matters:

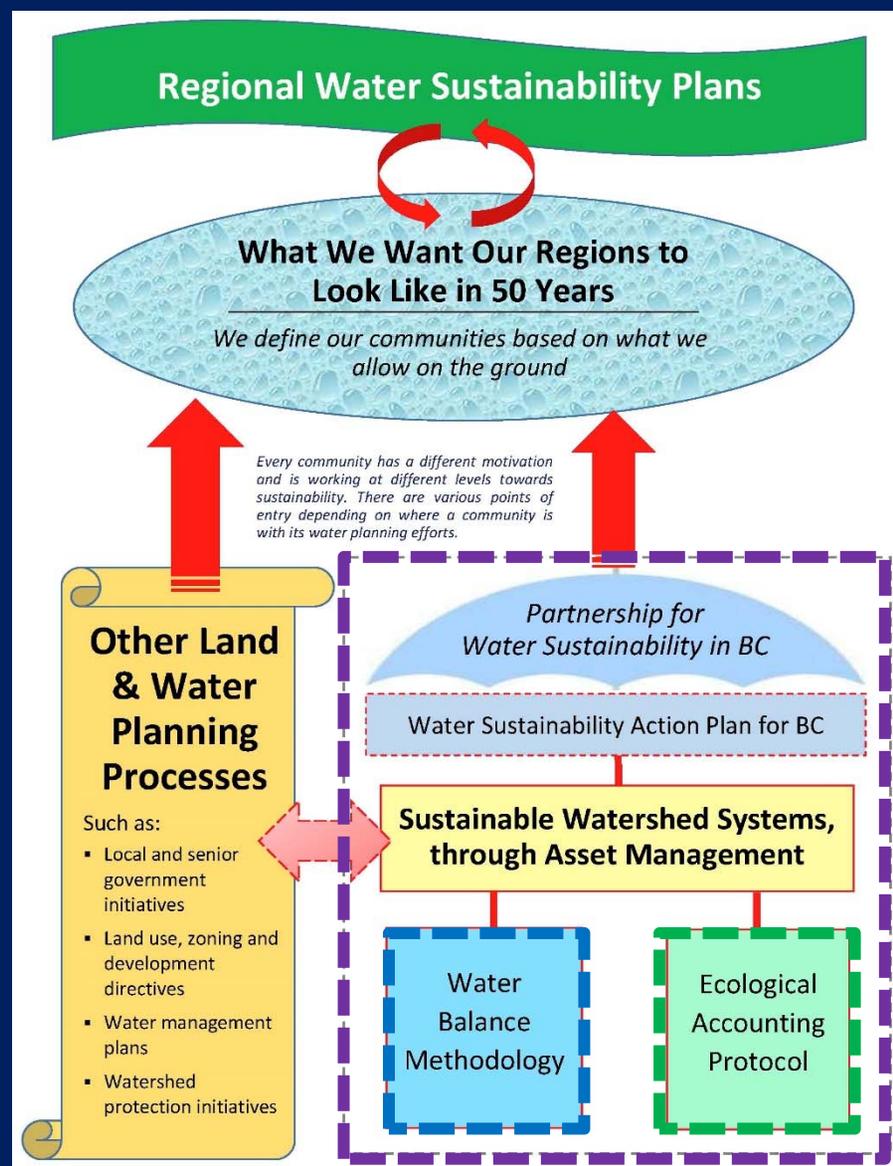
Of the three drivers for action, the **BC Framework** is the lynch-pin because....

...it provides local government with the financial incentive for integration of watershed systems thinking into asset management



INTENT -

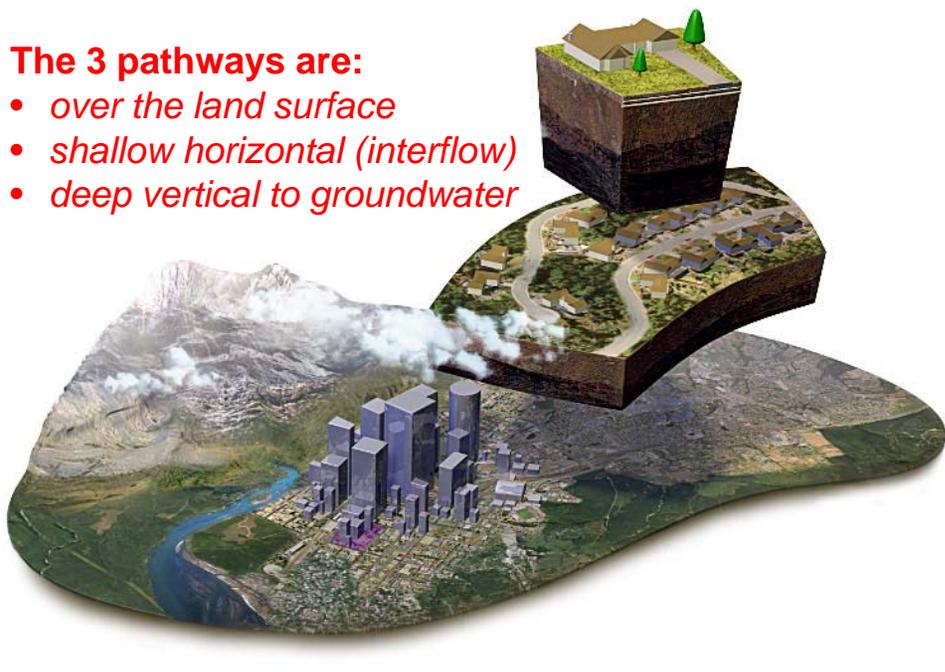
Over the next two years, the IREI program will add to the BC Framework by showing how to integrate *watershed systems thinking*, including adaptation to a changing climate, into asset management



INTRODUCING THE NEW PARADIGM – “Watersheds as Infrastructure Assets”

The 3 pathways are:

- *over the land surface*
- *shallow horizontal (interflow)*
- *deep vertical to groundwater*



A watershed is an **integrated system**.

The **three pathways** by which rainfall reaches streams are ‘infrastructure assets’.

The three pathways provide ‘**water balance services**’.

*Looking ahead, a future IREI deliverable is
“Water Balance Methodology Accreditation” to.....*



- Bridge an existing gap in practitioner education and professional development
- Create a pool of trained and qualified practitioners of the Water Balance Methodology
- Provide assurance that analyses using the Water Balance Methodology are being completed correctly



Comox Glacier
September 2015



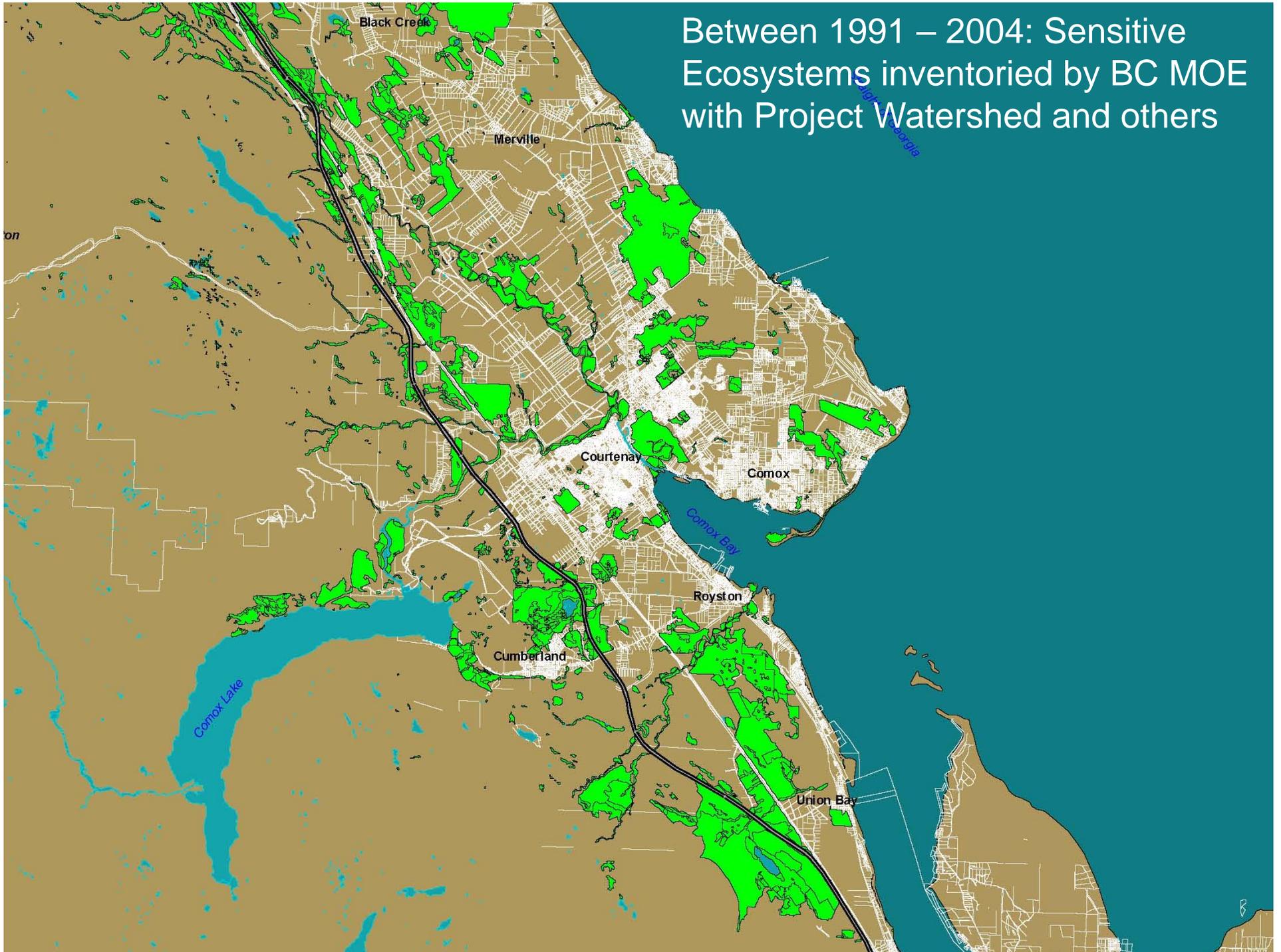




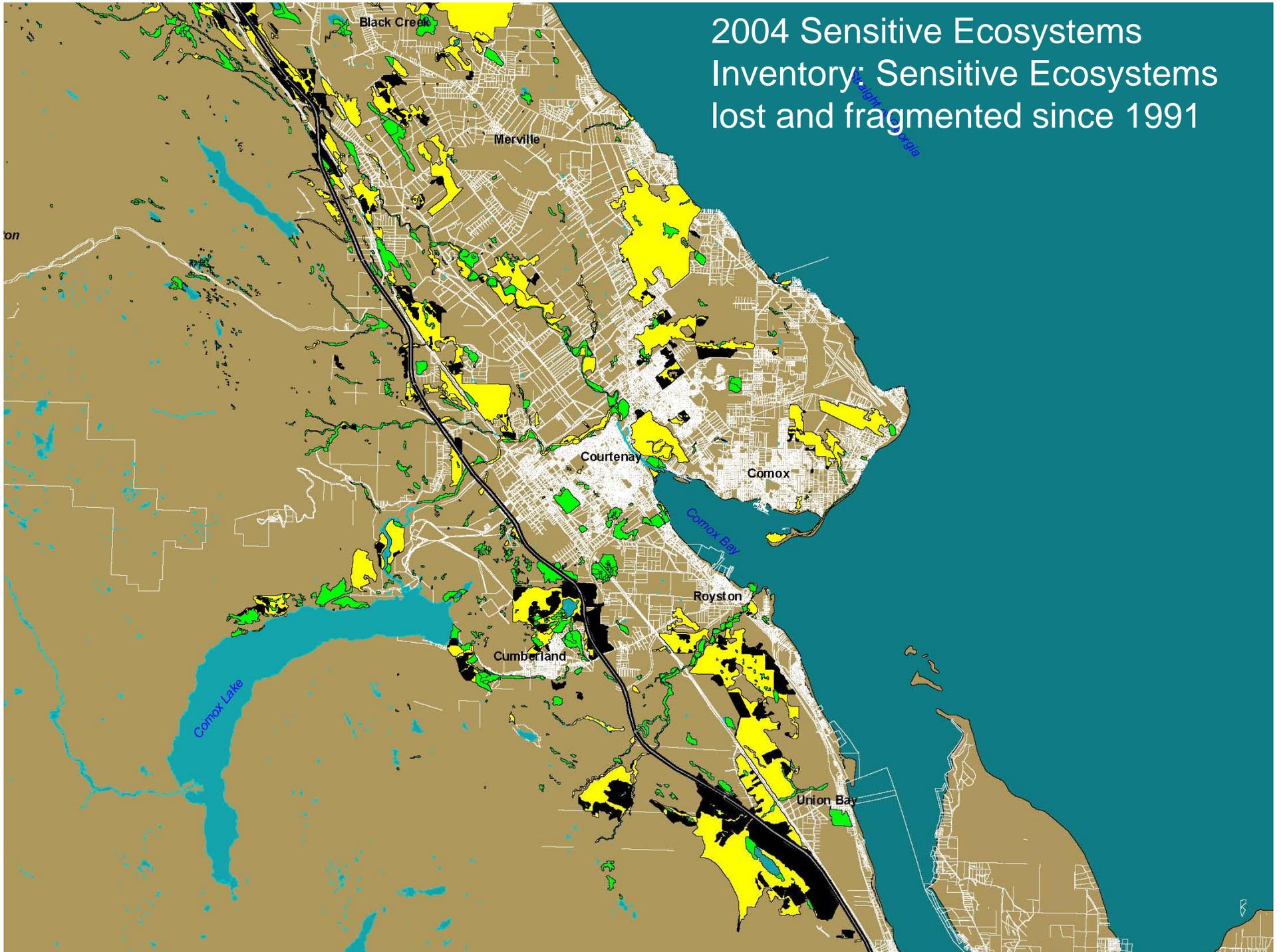




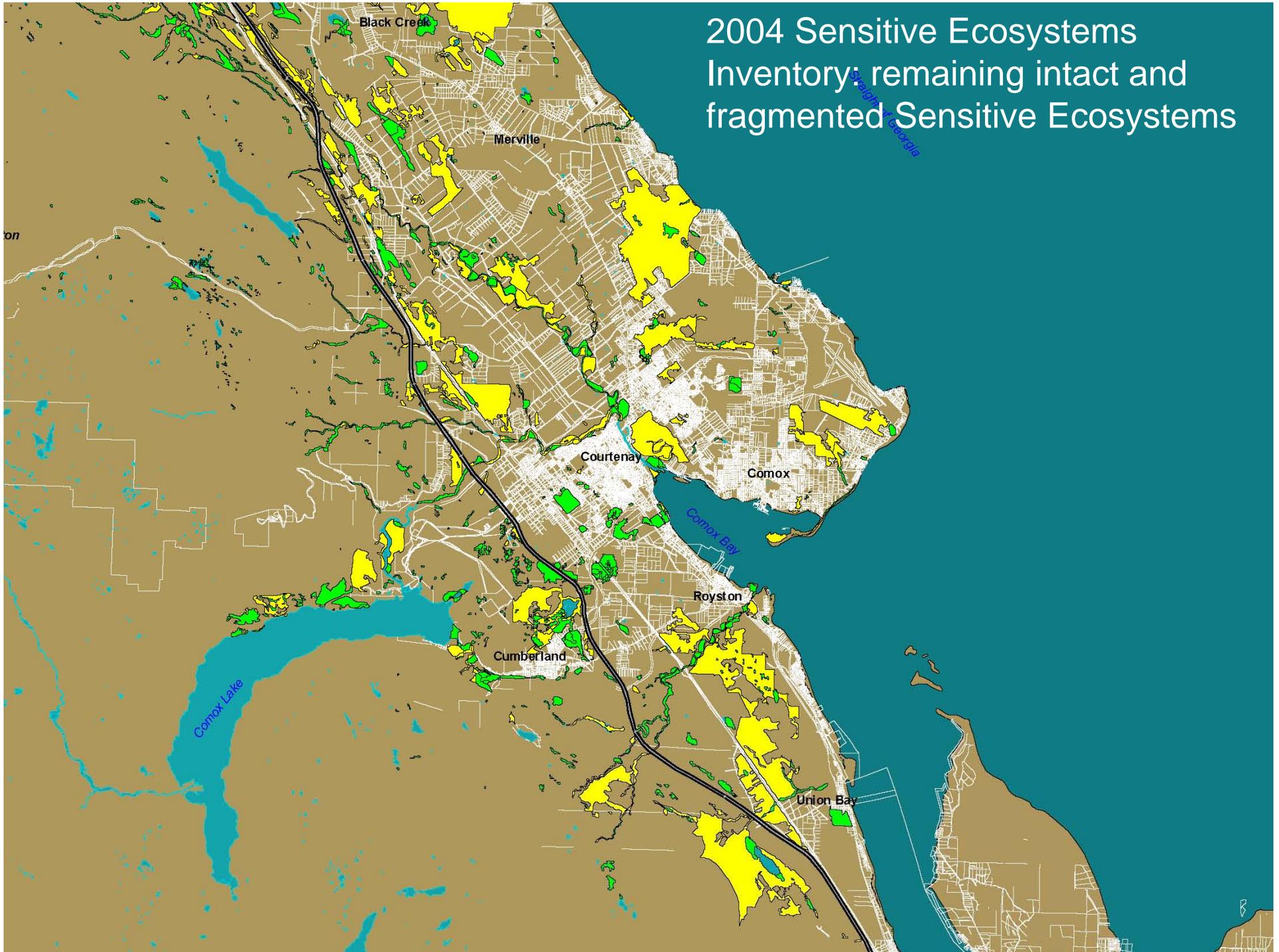
Between 1991 – 2004: Sensitive Ecosystems inventoried by BC MOE with Project Watershed and others



2004 Sensitive Ecosystems Inventory: Sensitive Ecosystems lost and fragmented since 1991



2004 Sensitive Ecosystems Inventory: remaining intact and fragmented Sensitive Ecosystems



A photograph of a stream flowing through a forest. The water is clear and flows over rocks, creating small rapids. The surrounding vegetation is dense, with many trees and bushes showing autumn colors like yellow, orange, and brown. The sky is overcast.

Impacts of Land Use 1992- 2012

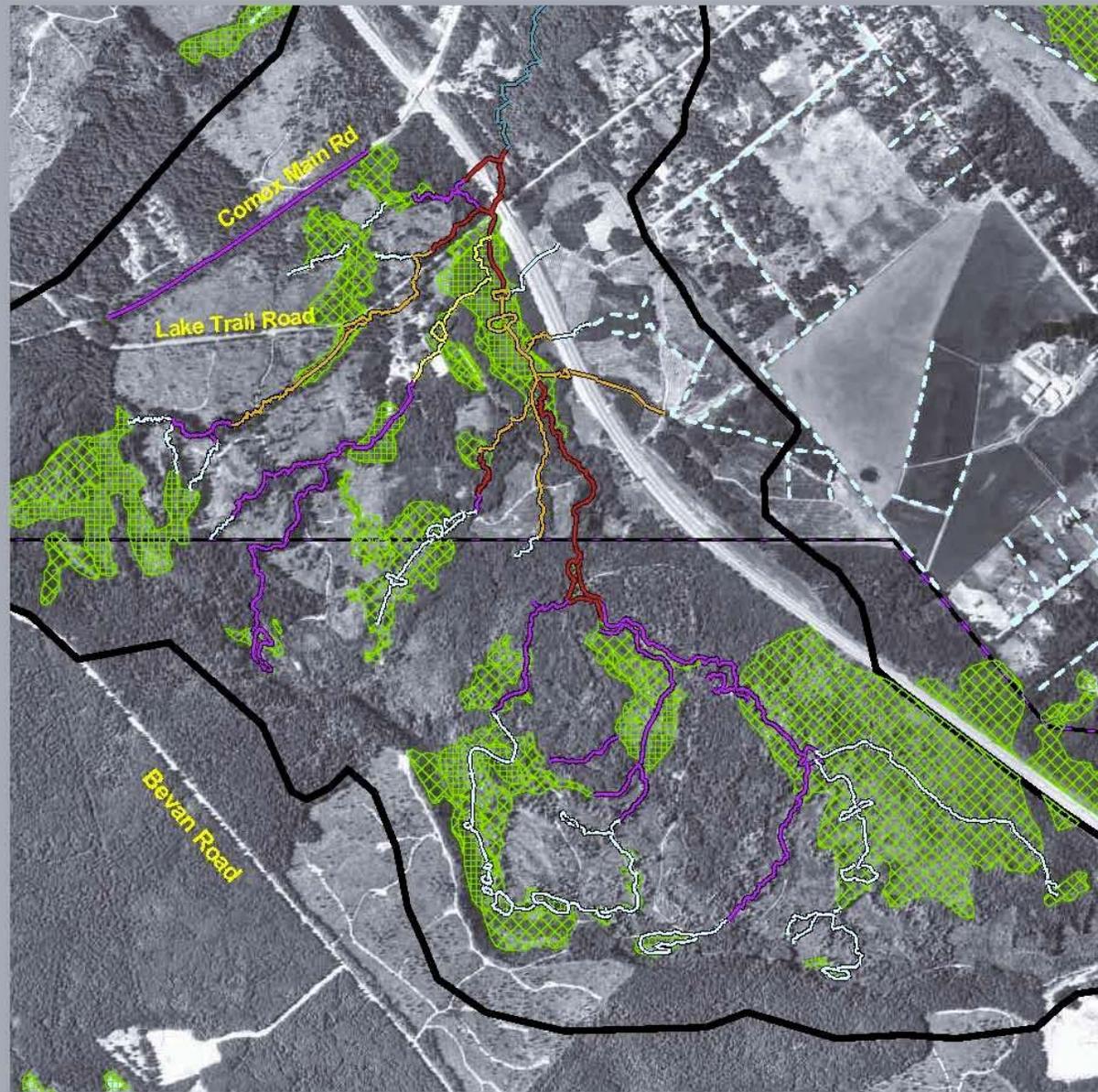
Riparian Areas: 1154 hectares

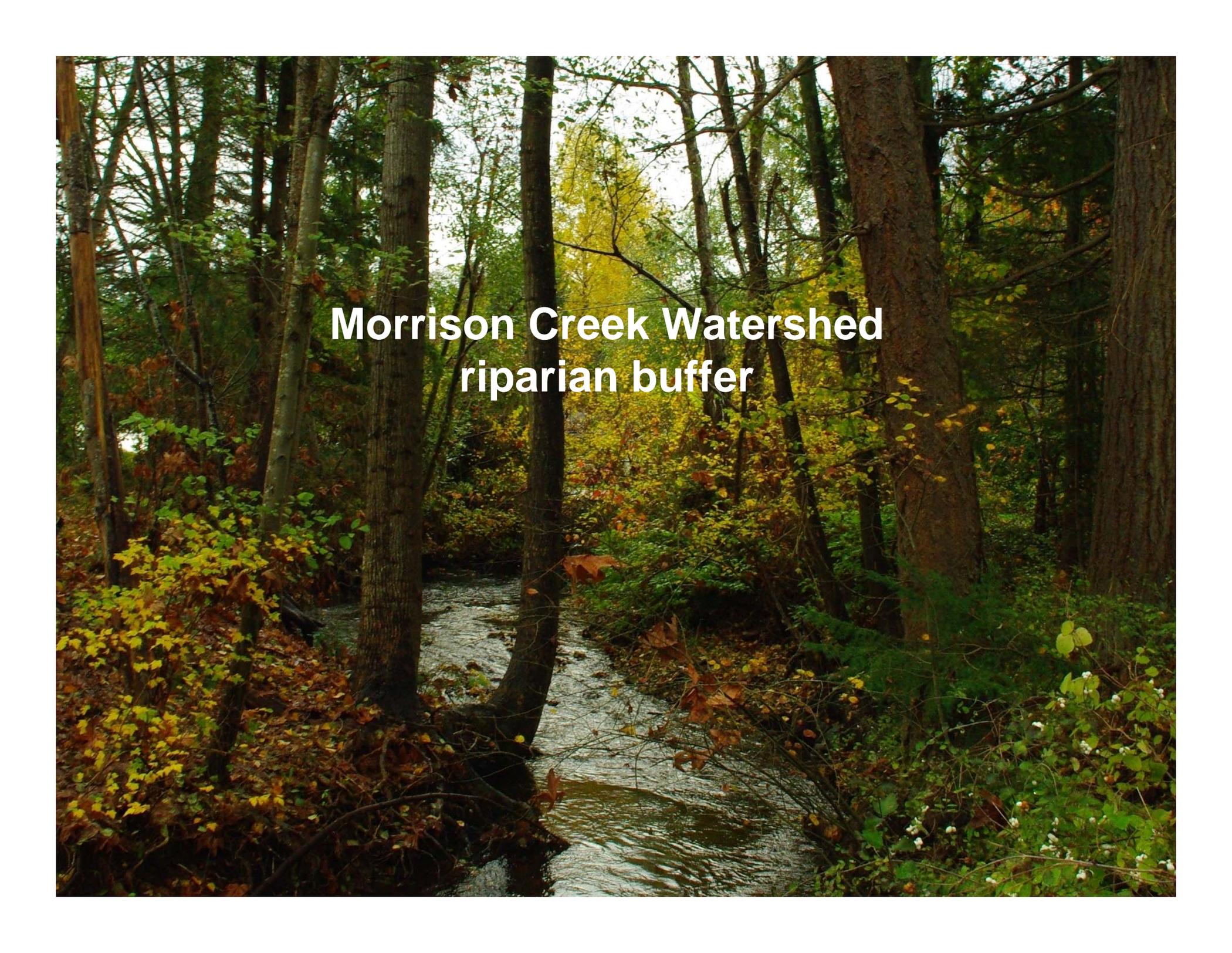
Wetlands: 649 hectares
75% of wetlands lost to development

UPPER MORRISON CREEK

FISH SPECIES DISTRIBUTION

SOUTHWEST OF THE INLAND ISLAND HIGHWAY





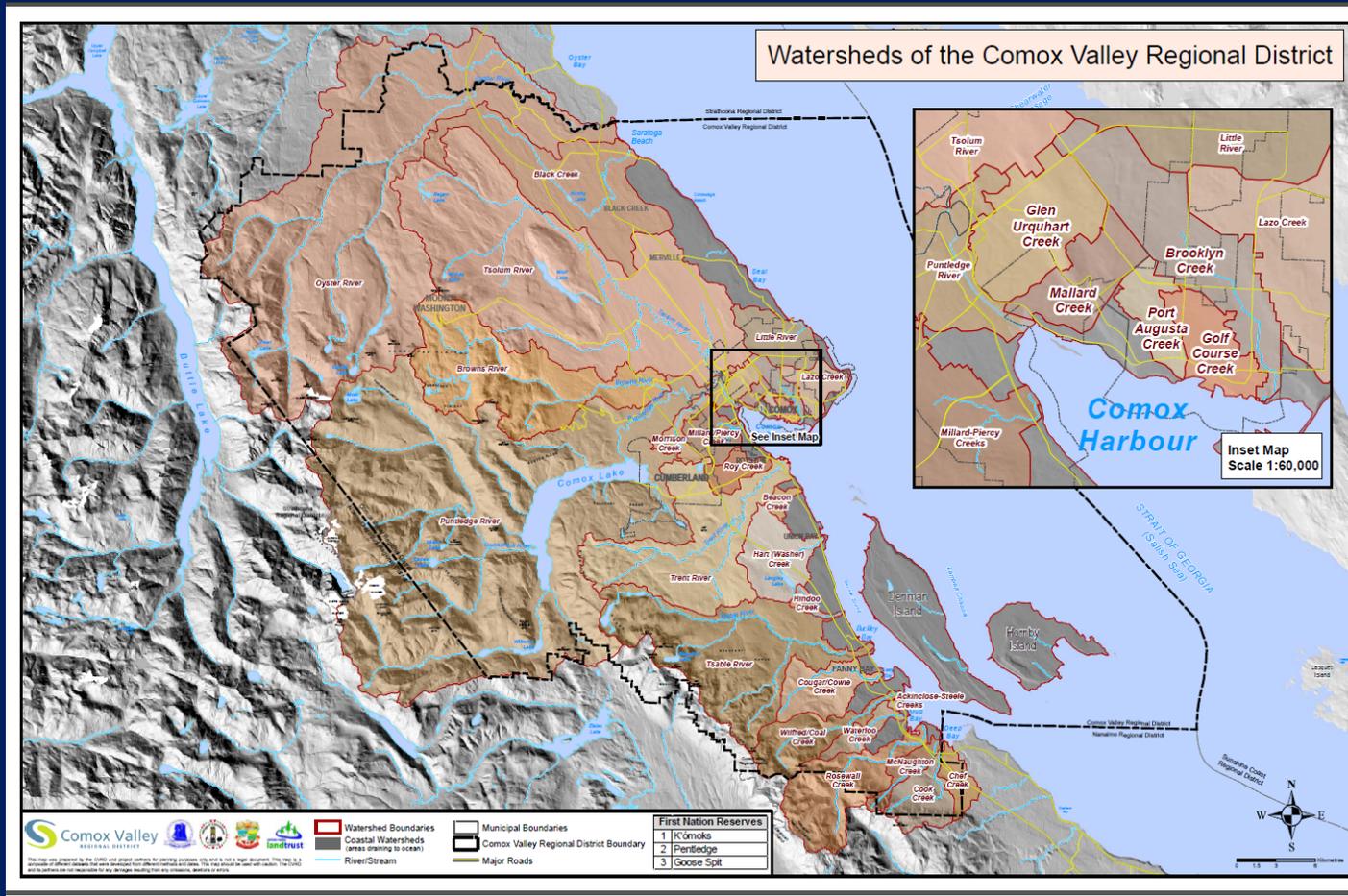
**Morrison Creek Watershed
riparian buffer**

A group of approximately ten people, including men and women, are gathered in a forest. They are standing on a structure made of large, dark grey rocks that spans across a small stream. Two green pipes are visible, protruding from the rock structure into the water. The people are dressed in outdoor or work attire, including jackets, hats, and a high-visibility yellow safety vest. The forest is dense with trees, some with green leaves and others with yellowing autumn foliage. The ground is covered with fallen leaves and rocks.

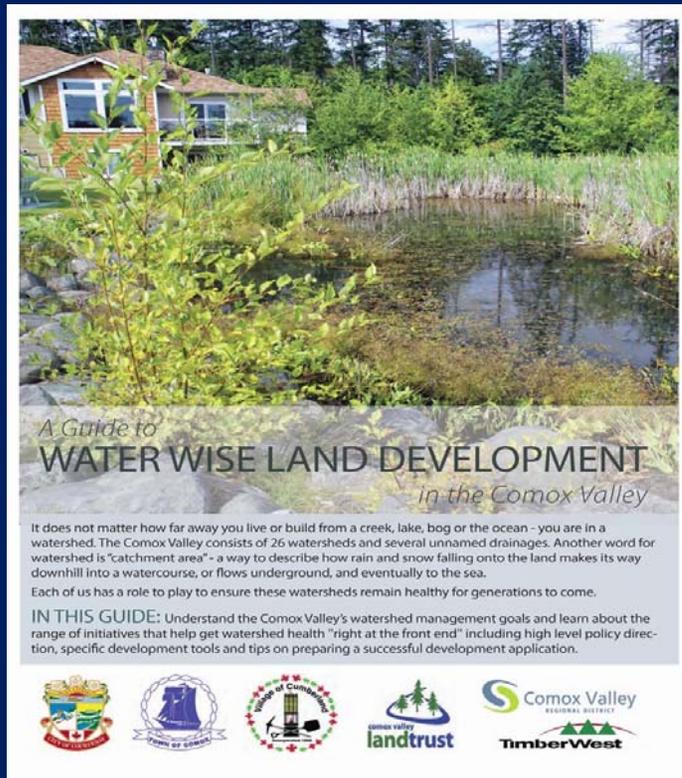
Collaboration

Involve Stewards early in the process

Pin Your Location on the Watershed Map



Road Map for 'Sharing & Learning'



Context

- *Local*
- *Inter-Regional*
- *Stewardship*
- *Pin Your Location*
- *About the Guide*

Strategies & Tools

Interactive Segment

What Next



A Guide to
WATER WISE LAND DEVELOPMENT
in the Comox Valley

It does not matter how far away you live or build from a creek, lake, bog or the ocean - you are in a watershed. The Comox Valley consists of 26 watersheds and several unnamed drainages. Another word for watershed is "catchment area" - a way to describe how rain and snow falling onto the land makes its way downhill into a watercourse, or flows underground, and eventually to the sea.

Each of us has a role to play to ensure these watersheds remain healthy for generations to come.

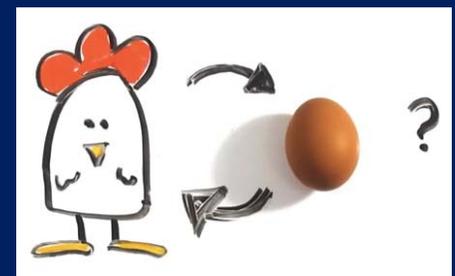
IN THIS GUIDE: Understand the Comox Valley's watershed management goals and learn about the range of initiatives that help get watershed health "right at the front end" including high level policy direction, specific development tools and tips on preparing a successful development application.



Different aspects of the work:	Big Picture – “Governance”	Development Regulatory and Operational Processes	Reaching the People	Pilot Example
Elements, tools, challenges and approaches within these areas:	Political/corporate direction – OCPs, RGS. EMS (Environmental Management Systems). Level of service expectations (“needs vs. wants”). Differences of culture in each LG. Mistrust between LGs.	Front end meetings. Design charrette. Development ‘team’ approach. Watershed library. Internal application/review processes made clear. Legislated authority.	Level of service expectations. Education. “Reach by Reach”. Simple principles to live by. “Can do in your own yard”. Market shift. Voting shift.	Tangible. Practice in working together. Relationship building through action. Vehicle to discovery. Get your hands dirty! Brooklyn a good candidate.
Desired outcomes:	Doing what we’ve said we’d do (OCPs, RGS). Strength to admit that we may have made mistakes in the past.	Watershed health achieved through evidence (science) based approach to land use, development and infrastructure management.	Wiser individual and collective choices.	First CV restored watershed! System of proposal evaluation.
Which general audiences?	Politicians and senior staff	Staff and development community	Public focus, but really everyone	Everyone
Who spearheads?	CAOs, politicians	Staff	NGOs. E.g. CV Conservation Strategy	CV CAVI Team

Where do we begin in this work?

There are many points of ‘intervention’ and leverage





Bowker Creek Developer's Guide



Bowker Creek Watershed Vision

The varied human and natural areas in the Bowker Creek watershed are managed to minimize runoff and pollution, making Bowker Creek a healthy stream that supports habitat for native vegetation and wildlife, and provides a community greenway to connect neighbourhoods.

Watershed Goals

- Take responsibility for actions that affect the watershed
- Manage flows effectively
- Improve and expand public areas, natural areas and biodiversity in the watershed
- Achieve and maintain acceptable water quality in the watershed

Watershed-Wise Development in the Bowker Creek Watershed

What Is a Watershed?

It does not matter how far away you build from a creek, lake or ocean, you are in a watershed. Another word for watershed is "catchment" – a way to describe how rain falling within a watershed's boundaries makes its way downhill into a creek or river and eventually to the ocean.

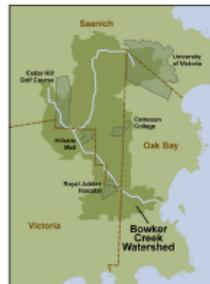
Bowker Creek extends from the University of Victoria, through the District of Saanich and City of Victoria, and out to the ocean through the District of Oak Bay (see map page 4-5). Most of the rain entering the creek runs off roofs, roads and parking lots, and is collected from curbside gutters, which are directly connected to the creek via underground pipes. Like any urban creek, Bowker Creek needs help from its development community to become clean and healthy.

The Bowker Creek Blueprint, accepted by municipalities, is a guiding document outlining how to manage and restore the watershed and the creek over the long term. For more information, see back page.

Why Should Developers Care?

The choices developers make can contribute to significant improvements in watershed health. Here are some steps developers can take:

- Talk to the right people early on to ensure no unnecessary delays
- Demonstrate leadership and take the responsibility for improving watershed health to help gain municipal and public support
- Consider using green infrastructure and Low Impact Development (LID) to reduce long-term operational costs and increase market value.



Developer's Guide / 1

Where Do I Start?

- Early in the planning process, call your municipal planning department to ask about their initiatives and expectations for development in the Bowker Creek watershed.
- Talk to the Bowker Creek Initiative (BCI) and local community associations about your project – be sure to articulate your interest in protecting and enhancing the Bowker Creek watershed.



Step 1 - Planning

Time and money can be saved with proper planning and consideration of the watershed and municipal Local Area Plans. Before spending any money or making physical alterations to the site, consider the following:

- Check to see which watershed principles of the Bowker Creek Blueprint (see back page) you can apply on-site and proximity of the creek – whether it be above ground or underground in a pipe (see map).
- Consider appropriate green infrastructure and LID strategies for your site's landuse and soil type (see map).
- Plan to make the creek a neighbourhood amenity.
- Contact the local municipal planning department to learn of any site-specific requirements.
- Conduct an inventory and analysis of your site to identify areas to be protected, such as trees, riparian areas, protected or endangered species and ecosystems, stream buffer areas, wetlands, permeable or erosive soils.
- Remember to check for streamside setbacks under the Riparian Areas Regulation or development permit area.

Step 2 - Site Design

When developing a site design, it is important to know the vision of your municipal council for future developments before submitting your design for approval. Find out where it will pay to go above and beyond in your design:

- Consider integrating green infrastructure, and LID techniques (pages 6-7), which are used to manage rainwater where it falls. These methods store, infiltrate, detain and treat rainwater runoff allowing for full development of a site.
- Hire a landscape architect to help incorporate and design features into the site that reduce the quantity and improve the quality of water that ultimately enters the creek. This may require the input of a civil engineer and should be checked with your local government officials.
- Design for projected climate impacts of increased frequency and intensity of rainfall events – this will ensure that your project is successful in managing rainwater today and in the future.



Developer's Guide / 2



A Guide to
WATER WISE LAND DEVELOPMENT
in the Comox Valley

It does not matter how far away you live or build from a creek, lake, bog or the ocean - you are in a watershed. The Comox Valley consists of 26 watersheds and several unnamed drainages. Another word for watershed is "catchment area" - a way to describe how rain and snow falling onto the land makes its way downhill into a watercourse, or flows underground, and eventually to the sea.

Each of us has a role to play to ensure these watersheds remain healthy for generations to come.

IN THIS GUIDE: Understand the Comox Valley's watershed management goals and learn about the range of initiatives that help get watershed health "right at the front end" including high level policy direction, specific development tools and tips on preparing a successful development application.



A SHARED RESPONSIBILITY

Every local government has to manage the raindrops that fall on it. The four local governments in the Comox Valley are striving for consistent application of outcome-oriented actions that will reduce financial and environmental risk, improve watershed health and fulfil regulatory objectives.



A VALLEY-WIDE VISION

"The Comox Valley will continue to evolve as a region of distinct, well-connected and well-designed urban and rural communities. As stewards of the environment, local governments, the Kómoks First Nation, public agencies, residents, businesses and community and non-governmental organizations will work collaboratively to conserve and enhance land, water and energy resources and ensure a vibrant local economy and productive working landscapes."

- Comox Valley Regional Growth Strategy, 2011



THE BENEFITS *of Green Infrastructure*

Green Infrastructure is the natural or engineered ecological processes or structures, that process, capture, and direct water, rainwater, and wastewater in a similar manner to conventional infrastructure, yet have multiple social, economic and environmental benefits.

Green Infrastructure and "Design with Nature" solutions save communities over the long-term. Benefits include:

- ✓ Reduces nuisance flooding and protects property
- ✓ Prevents erosion and sedimentation impacts in streams
- ✓ Recharges groundwater through infiltration
- ✓ Sustains dry weather flows in streams
- ✓ Protects water quality
- ✓ Enhances the livability of neighbourhoods
- ✓ Protects ecological values, such as salmon habitat

Visit waterbucket.ca to learn more about the 'design with nature' approach to land development!

THE BIGGER PICTURE: WE EACH HAVE A ROLE TO PLAY

The strategies and tools that are being used and developed in the Comox Valley to manage watershed health work together within a larger, Provincial context of valuing water as a renewable resource. This collective work is directed by the following strategies/programs.

BC's Water Plan & Green Communities

The local collaborative approach is informed by targets and actions as set out in *Living Water Smart, the Green Communities Act and the Water Sustainability Act*.

These provincial initiatives paint the vision for land and water stewardship and are a *call to action* of multiple sectors.

They establish expectations as to how land will be developed and water will be used.

Together they provide a picture of what our regions can look like if local governments build greener communities.

Learn more: www.livingwatersmart.ca

Convening for Action on Vancouver Island

CAVI provides a forum for intra and inter-regional sharing and learning, facilitates a *regional team approach*, and promotes consistent application of *design with nature* principles.

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

Learn more: www.waterbucket.ca



Comox Valley Sustainability Strategy & Regional Growth Strategy

Both the CVSS and RGS are regional in scope and aim to manage growth so that it contributes to the quality of life values that are important to the community.

Local Governments derive their powers from the Province, which encourages the *design with nature* approach. Both acknowledge that nature knows no borders, and that collaborative and diverse approaches are required to managing for watershed health. Learn more: www.comoxvalleyrd.ca

Land Owner

As a land owner you have a critical role to play to help ensure that the guiding policy and "Call to Action" is implemented on the ground.

Local Governments are here to help but we need everyone on board. Learn more about how you can part of the solution by using the tools, tips and strategies discussed on the following pages.

Local Government Plans & Regulations

Official Community Plans set the longer term vision for the community. Local Governments also have broad powers to regulate specific activities.

The OCP must be compliant with the RGS. Regulatory tools must be consistent with the OCP. All four local governments are working towards designing with nature in various forms.

Contact information for the four local governments on page 7.

SELECTED STRATEGIES *to Achieve Watershed Goals*

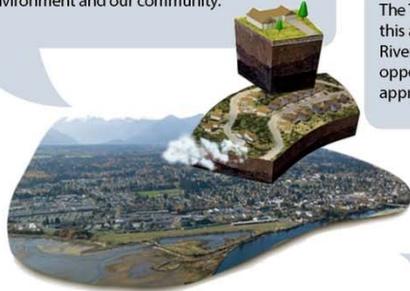
What's Happening Regionally Right Now!

A number of initiatives are on-going:

-The CVRD is working with the University of Victoria Water, Aquatic Sciences Research Program to monitor the water quality in Comox Lake. A watershed protection planning process is underway to determine the best way to ensure that drinking water continues to achieve drinking water standards.

- Local governments are working with the conservation sector on updates to the Sensitive Ecosystem Inventory mapping for the entire Valley. This will provide an updated view of the remaining sensitive ecosystems so they can better be protected.

- The CV Conservation Strategy continues to conduct scientific research to inform land use policy development on a wide range of areas affecting the health of our environment and our community.



Watershed Blueprints can help put it all together

They capture a community's vision of the desired look and feel of a future watershed condition. They answer:

1. What Do We Have?
2. What Do We Want?
3. How Do We Put This Into Action?
4. How Do We Stay on Target?

Are a catalyst for coordinated action across sectors to protect watershed health, linking policy to on the ground action.

Guide land use planning including application review, management of infrastructure assets, set achievable performance targets, identify opportunities to restore ecological function, and are implemented over decades.

The Tsolum River Restoration Society is using this approach to manage the recovering Tsolum River. The Comox Valley CAVI team is exploring opportunities to use the Watershed Blueprint approach in a wider range of contexts.

Education is at the heart of any strategy

The City of Courtenay publishes annual State of the Environment Reports as an educational tool to highlight environmental initiatives and encourage the public to get involved.

Education is at the heart of any sustainable watershed protection strategy because every single person, business and activity has a role to play. None of us can protect the watershed on our own, we need to do this together. Documents like these help to show how we can!



SELECTED TOOLS *to Achieve Watershed Goals*

Tree Protection Bylaws

Tree Protection Bylaws are used to reduce the number of trees unnecessarily removed or damaged from a site and can require replacement trees be planted when trees are removed. Regulations ensure that neighbouring trees are protected during construction.

Trees provide many benefits including beauty, shade, habitat and rainfall interception and storage.



Topsoil Bylaws Toolkit

Soil depth creates a sponge which can limit runoff during wet-weather; and reduce water need during dry weather. The Toolkit provides law, policy and technical guidance.

An absorbent topsoil layer is a fundamental building block. When sites get the topsoil part right, other parts of the water sustainability equation are easier to attain.



Water Balance Model Express

This provincial on-line user-friendly and interactive tool helps landowners incorporate landscape features such as rain gardens on their properties by using pre-set drainage targets based on local hydrology.

The tool informs landowners on actions they can take to achieve water balance on their site. The interface is colourful and easy to use.



Erosion & Sediment Control

All four local governments have tools to ensure that sediment-laden runoff does not enter the community's drainage network, including storm-sewer systems, ditches and streams.

Sediment in the drainage system is costly to remedy and is harmful to ecosystem health, including fish habitat.

The City of Courtenay is currently exploring strengthening and making more clear Erosion and Sediment control requirements for all developments.



Design Charrettes

Collaborative intensive design session in which a group collectively drafts a solution to a land use issue or development proposal, prior to any design or development plans. They are more effective than the usual "silo" review approach, help to build consensus and get the application "right at the front end".

They have been very successful for projects of many scales and is a useful tool to consider as part of a pre-development application meeting.



FOLLOW THESE TIPS for a Successful Development Proposal

This section discusses local government expectations before applying for a development proposal, and after it has been approved, in order to better protect watershed health.

Several factors are critical to the success of any project:

- ✓ Talk to the right people early on to avoid unnecessary delays.
- ✓ Communicate throughout the process with all the players, in particular the planning and building inspection departments.
- ✓ Demonstrate leadership to help gain local government and public support.
- ✓ Understand local government policy and regulations affecting the site.
- ✓ Use green infrastructure to reduce long-term operational costs

PLANNING

Before doing any physical alterations to the site, take the following steps:

1. Know how your land drains

Important questions to answer about your site

- What watershed are you in?
- Where is the project situated in the watershed (input, storage or discharge)?
- What are the topographic features of your site?
- Are there any environmentally sensitive features?
- What do you propose to do here and how will it affect these functions and features?

2. Use site design that fits the land

Preliminary research on environmentally sensitive features and hydrology can help determine a site layout and building options that respect the natural context.

Show any preliminary mapping of these features and what *Green Infrastructures* will be used.

3. Arrange a pre-application meeting

Before investing in a site plan, discuss your development with the appropriate local government planning and/or engineering departments.

4. Submit an application

By this step, site development issues will have been identified. The landowner may now decide if he/she wishes to proceed with the proposal.

IMPLEMENTATION

It is critical that the carefully prepared plans are followed throughout the entire implementation phase.

1. Implement site management plans

These could include Construction Environmental Management, Sediment and Erosion Control and Tree Protection and Management Plans.

Ensure clear communication to the entire construction team of the relevant site management plans and each player's role in achieving plan outcomes.

Ensure the appropriate professionals are on site to monitor the installation and protection of Green Infrastructure including trees and streams.

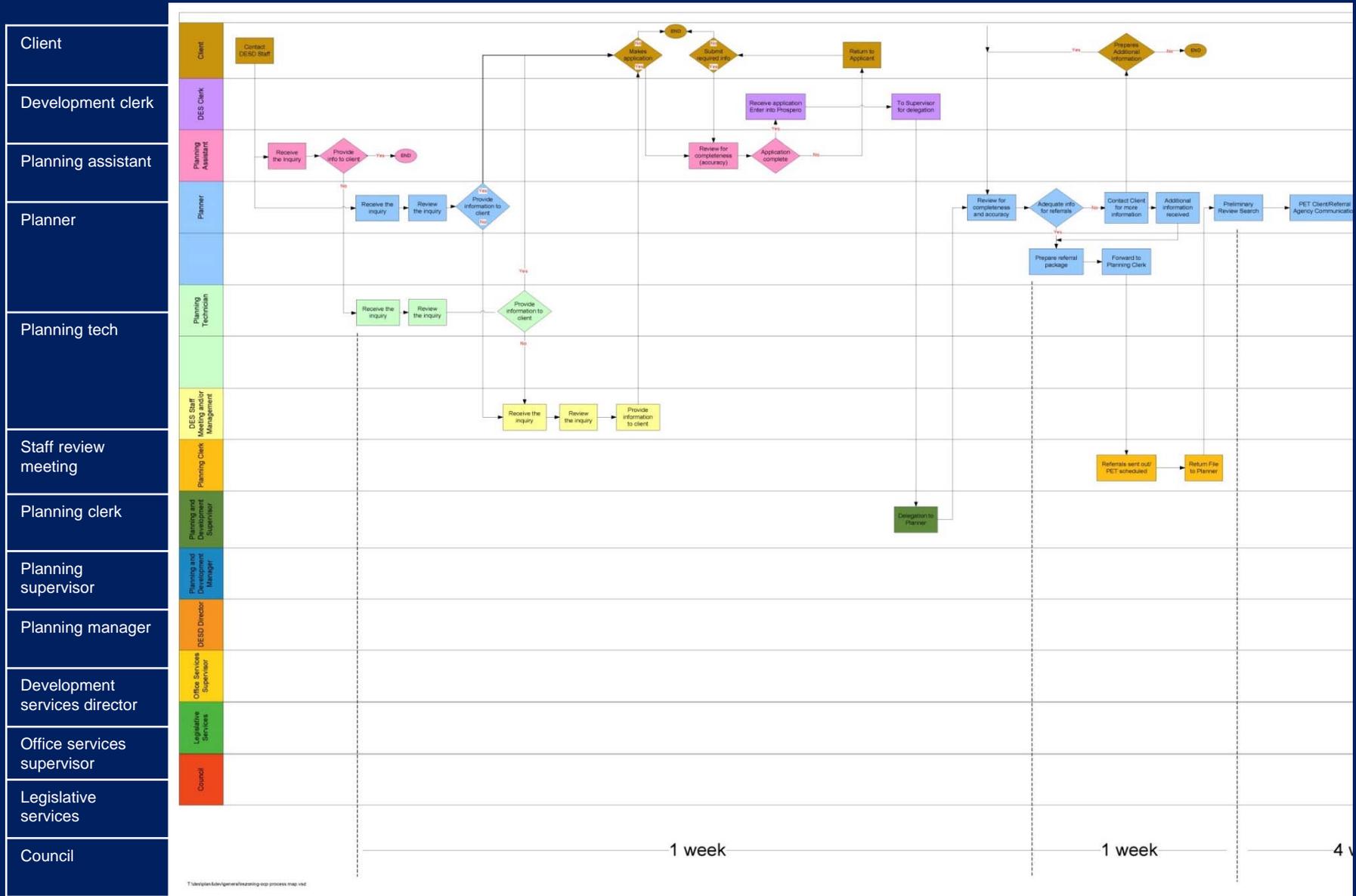
2. Inform the landowner of their Green Infrastructure

As part of the development approval process, you may be required to produce or fund a user-friendly brochure outlining the Green Infrastructure features and how a landowner is to maintain them.

Because stream stewardship groups play an important and ongoing role in providing community education on the value of Green Infrastructure, you may wish to benefit from opportunities for collaboration.



Would aligning internal review processes across Local Governments help achieve consistency? (e.g. of Rezoning/OCP review process, Kamloops)



T:\development\kln\general\rezoning\oop process map.vsd

Local Governments are Here to Help

Here's What We Do!



Local Governments provide a number of services to help protect our watersheds including:

- ✓ Regulating development to ensure it meets minimum standards of environmental protection and rainwater management
- ✓ Reviewing applications and ideas for their appropriateness within a watershed context
- ✓ Adopting regulatory tools and strategies that are appropriate to the community's context
- ✓ Answering questions from the public and helping provide information on watershed performance
- ✓ Collaborating with partner agencies

Here's What You Can Do! *Help us achieve watershed goals by taking these steps:*

- ✓ Don't pour anything down storm drains – these drains often flow untreated into local water bodies even if they don't have the yellow fish painted on them.
- ✓ Minimize your use of fertilizers and pesticides and keep your septic system in good working order to avoid ground water and surface water contamination.
- ✓ Restore local riparian areas. If it's on your property you hold the key to restoration!
- ✓ Get in touch with the local nature stewardship groups to learn more about what you can do.



- ✓ Prevent the spread of invasive species by gardening with non-invasive plants. Plant local as much as you can.
- ✓ Conserve water by using a rain barrel, reducing lawn and garden watering, planting drought-resistant native plants and installing low-flow household fixtures.
- ✓ Plant native trees, shrubs and wildflowers as part of local habitat. Bird, bee and bat boxes make nice additions too!



This pamphlet is intended for general guidance only. Applicants must consult their respective municipal planning department for additional information and requirements.

Produced by the Comox Valley Leadership Team of "Convening for Action on Vancouver Island" (CAVI), which comprises the four Comox Valley local governments, Comox Valley Land Trust, TimberWest, Ministry of Transportation & Infrastructure, and Partnership for Water Sustainability in BC.

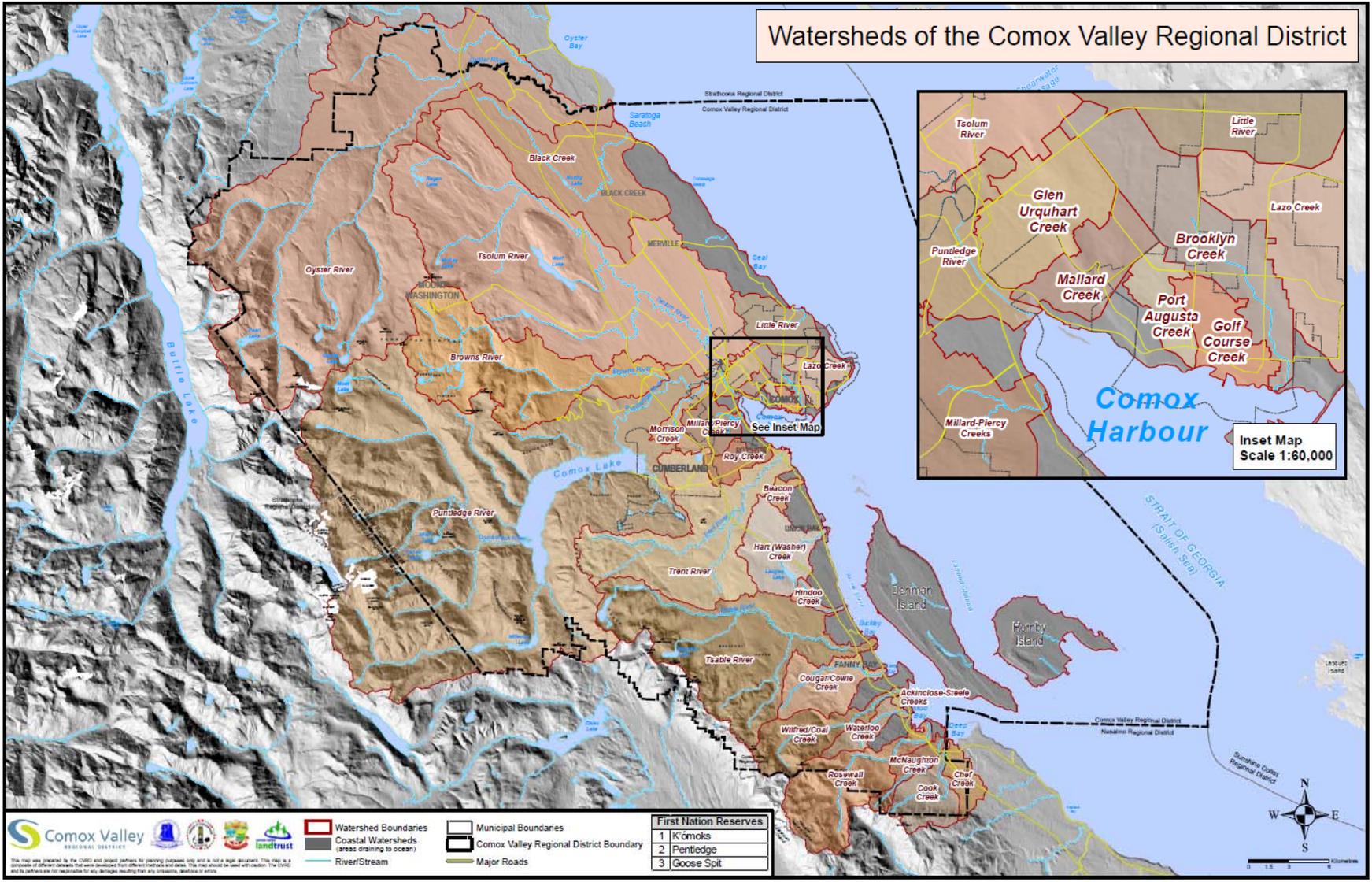
With gratitude to the Bowker Creek Initiative and the Capital Regional District.

For more information please contact your local Planning Department and visit their webpages:

City of Courtenay 250-334-4441 www.courtenay.ca
 Village of Cumberland 250-336-2291
www.cumberland.ca

Town of Comox 250-339-2202 www.comox.ca
 Comox Valley Regional District 250-334-6000
www.comoxvalleyrd.ca

Watersheds of the Comox Valley Regional District



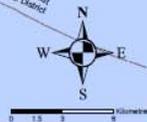
See Inset Map

Inset Map
Scale 1:60,000



- Watershed Boundaries
- Municipal Boundaries
- Coastal Watersheds (areas draining to ocean)
- Comox Valley Regional District Boundary
- River/Stream
- Major Roads

First Nation Reserves	
1	Kómoks
2	Pentledge
3	Goose Spit



This map was prepared by the CDIC and project partners for planning purposes only and is not a legal document. This map is a synthesis of different datasets that were developed from different methods and scales. The CDIC should be used with caution. The CDIC and its partners are not responsible for any damages resulting from any omissions, mistakes or errors.

State OF THE Environment 2014

Healthy natural heritage systems are the foundation for a sustainable community. This year we take a look at the ecological systems that connect our neighbourhoods and communities – our backyard streams.

The City of Courtenay State of the Environment annual report series is our way of sharing information on the ways that the City works with the environment on a daily basis, progresses and challenges in environmental protection and the role of citizens in contributing to the health and quality of life of our community.

To learn more on the City's Environmental Protection policies and achievements visit:

www.courtenay.ca/climateaction.aspx

City of Courtenay
BRITISH COLUMBIA, CANADA



**Working together, we can make a difference.
Imagine what we could accomplish if each one of us helped to restore the watershed!**



Here are some things you can do to contribute to making watershed protection a habit:

- ✓ Don't pour anything down storm drains – these drains often flow untreated into local water bodies even if they don't have the yellow fish painted on them.
- ✓ Minimize your use of fertilizers and pesticides and keep your septic system in good working order to avoid ground water and surface water contamination.
- ✓ Restore local riparian areas. If it's on your property you hold the key to restoration! Get in touch with the local nature stewardship groups to learn more about what you can do.
- ✓ Prevent the spread of invasive species by gardening with non-invasive plants. Plant local as much as you can.
- ✓ Conserve water by using a rain barrel, reducing lawn and garden watering, planting drought-resistant native plants and installing low-flow household fixtures.
- ✓ Plant native trees, shrubs and wildflowers as part of local habitat. Bird, bee and bat boxes make nice additions too!

Groups that work in Courtenay:

Morrison Creek Streamkeepers
www.morrisoncreek.org
morrisoncreek@yahoo.ca

Glen Urquhart Streamkeepers
T.W.H@shaw.ca

Millard Piercy Watershed Stewards
www.millardpiercy.org
mpws@shaw.ca

Brooklyn Creek Watershed Society
www.brooklyn creek.ca
lwjfferson@shaw.ca

Tsolum River Restoration Society
www.tsolumriver.org
tsolumriver@shaw.ca
250 897 4670

Comox Valley Land Trust
www.cvlandtrust.ca
info@cvlandtrust.ca
250 331 0670

Comox Valley Naturalists Society
www.comoxvalleynaturalists.bc.ca
coordinator@comoxvalleynaturalists.bc.ca
250 331 0143

Other resources

Visit www.courtenay.ca/climateaction.aspx for links to carbon footprint calculators, incentive programs, and much more

Project-Watershed
www.projectwatershed.ca
estuary.projectwatershed@gmail.com
250-703-2871

Mountaineer Avian Rescue Society (MARS)
www.wingtips.org
info@wingtips.org
250 337 2021

Comox Valley Conservation Strategy Partnership
www.cvconservationstrategy.org
info@cvconservationstrategy.org
250 897 1271

City of Courtenay
Tel: 250-334-4441
www.courtenay.ca

830 Cliffe Avenue
Courtenay, BC
V9N 2J7





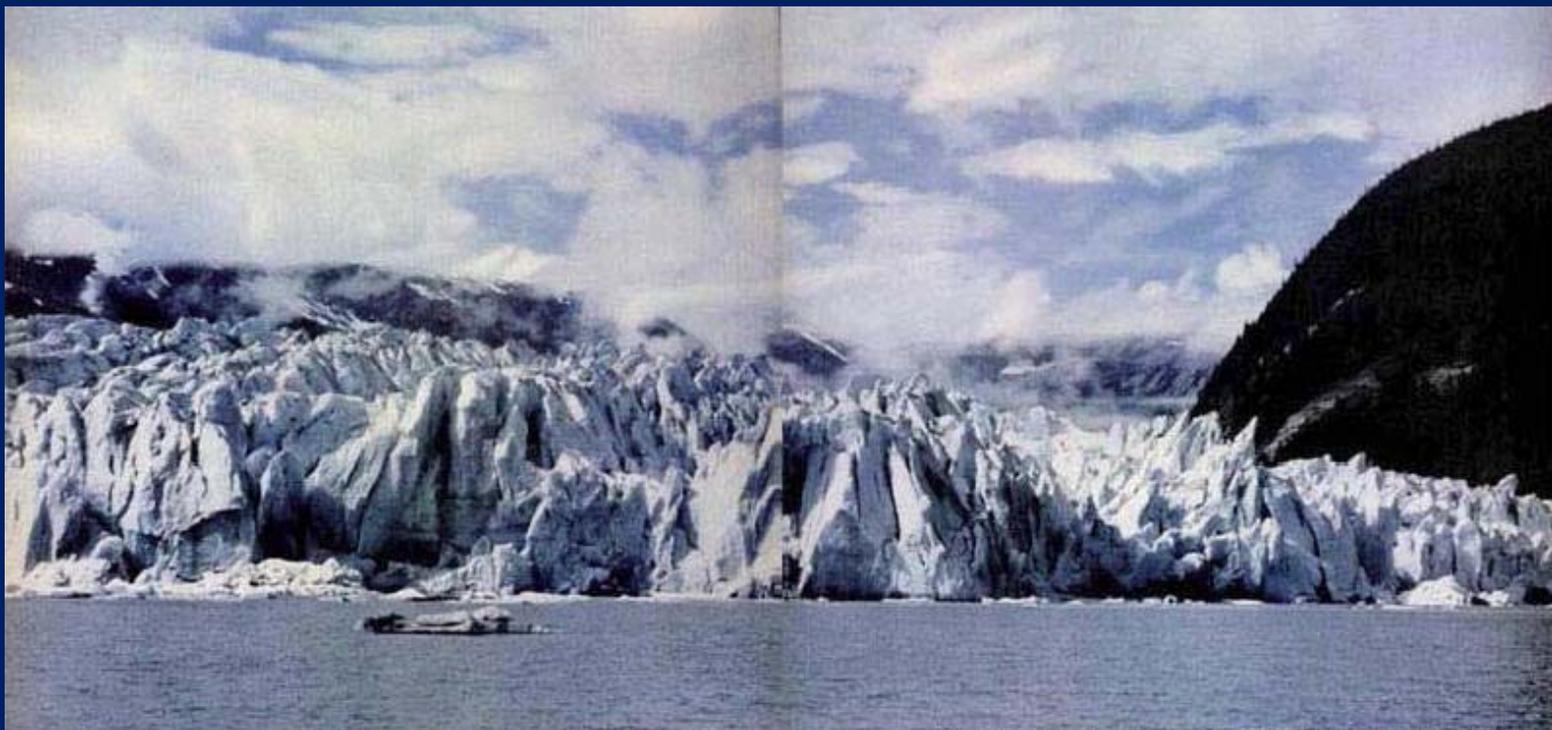
A Guide to
WATER WISE LAND DEVELOPMENT
in the Comox Valley

It does not matter how far away you live or build from a creek, lake, bog or the ocean - you are in a watershed. The Comox Valley consists of 26 watersheds and several unnamed drainages. Another word for watershed is "catchment area" - a way to describe how rain and snow falling onto the land makes its way downhill into a watercourse, or flows underground, and eventually to the sea.

Each of us has a role to play to ensure these watersheds remain healthy for generations to come.

IN THIS GUIDE: Understand the Comox Valley's watershed management goals and learn about the range of initiatives that help get watershed health "right at the front end" including high level policy direction, specific development tools and tips on preparing a successful development application.





PERITO MORENO, ARGENTINA, IS A PART OF THE GREAT WALL OF ICE. THE TONNAGE OF ICE SUPPLIED BY HUMBLE ENERGY EACH DAY IS THE RATE AT WHICH IT MELTS.

EACH DAY HUMBLE SUPPLIES ENOUGH ENERGY TO MELT 7 MILLION TONS OF GLACIER!

This giant glacier has remained unmelted for centuries. Yet, the petroleum energy Humble supplies—~~is~~ converted into heat—could melt it at the rate of 80 tons each second! To meet the nation's growing needs for energy, Humble has applied science to nature's resources to become America's Leading Energy Company. Working wonders with oil through research, Humble provides energy in many forms—to help heat our homes, power our transportation, and to furnish industry with a great variety of versatile chemicals. Stop at a Humble station for new Enco Extra gasoline, and see why the "Happy Motoring" Sign is the World's First Choice!

HUMBLE
OIL & REFINING COMPANY
America's Leading Energy company



The Enco logo features the word "ENCO" in a stylized font inside a blue oval, with a cartoon character holding a sign that says "Happy Motoring" to the right. Below the logo, the text "Energy. Guaranteed." is visible.

How DYNAMITE

streamlines streams



Straightening of Pequest River in New Jersey by CCC workers stopped its yearly floods. Location of new channel is seen at right. Note temporary dam at left to provide volume of water for scouring blasted channel.

Explosion of dynamite charge by propagation excavates new channel.

Immediately after explosion, water is entering new channel, whose banks will be smoothed and "stream-lined" by the speedier flow of water.



CROOKED STREAMS are a menace to life and crops in the areas bordering on their banks. The twisting and turning of the channel retards the flow and reduces the capacity of the stream to handle large volumes of water. Floods result. Crops are ruined. Lives are lost. Banks are undermined, causing cave-ins that steal valuable acreage.

In many instances straightening out a stream has doubled its capacity for disposing of run-off water.

DYNAMITE may be used most efficiently and economically in taking the kinks out of a crooked stream. The dynamite is loaded along the length of "cut-off" channel. When fired, the dirt and other debris is heaved high in the air and is scattered over the adjoining territory—leaving practically no spoil-banks. In addition to the material actually thrown out, much dirt is loosened and is later scoured out by the water which rushes swiftly through the straightened channel.

Du Pont Dynamite has straightened many thousands of miles of crooked streams. Du Pont engineers have worked for years to develop the best blasting methods for the cleaning out and straightening of streams. All their data is in a 48-page book, "Ditching with Dynamite." It is for your use. Write for it.

Dynamite can help you do other jobs, too. It can help you build highways, dams; fight soil erosion; work quarries. Du Pont has an explosive for every purpose.

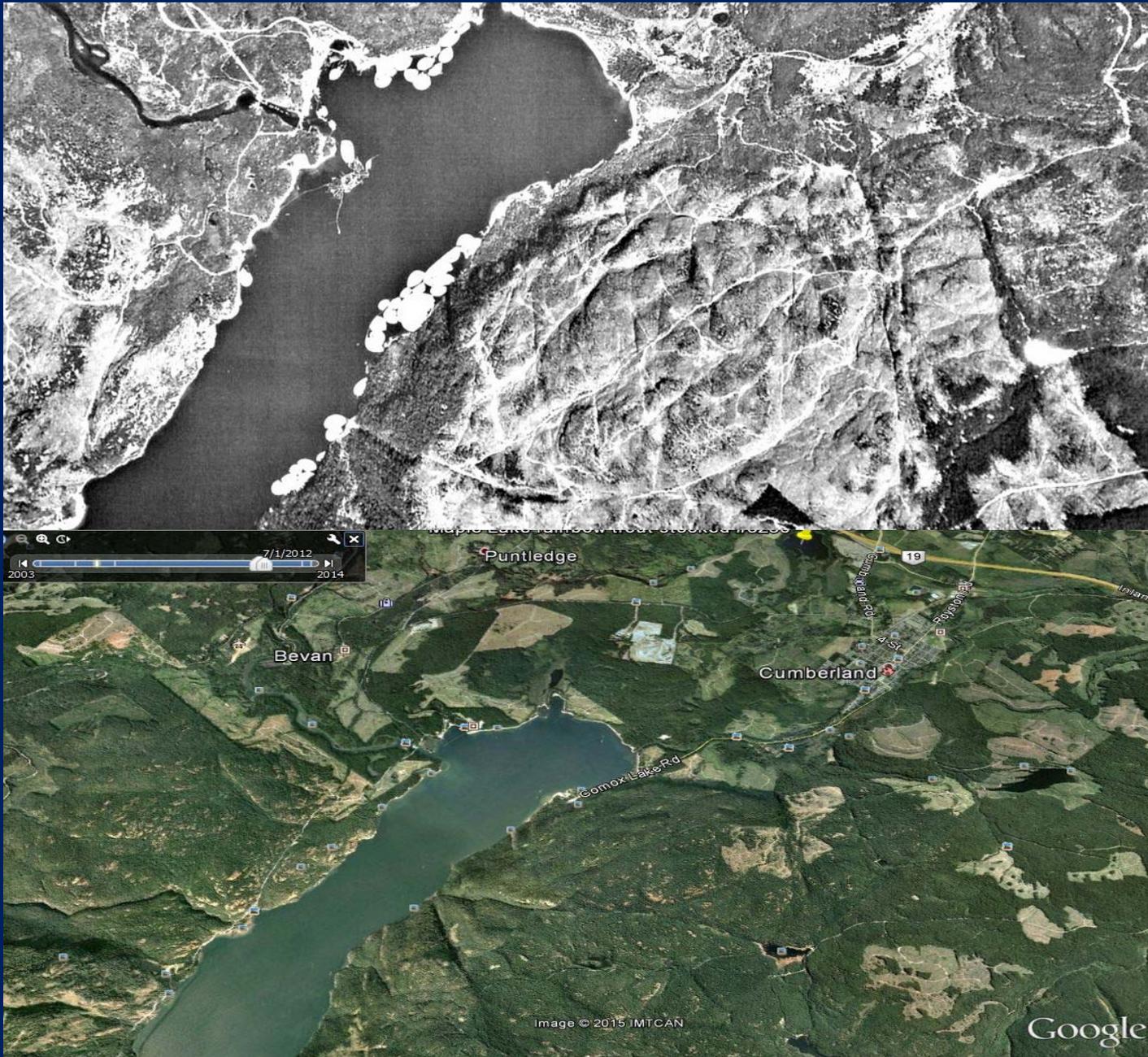


E. I. du Pont de Nemours & Co., Inc.
Explosives Department
6167 Du Pont Building
Wilmington, Del.

Comox Lake

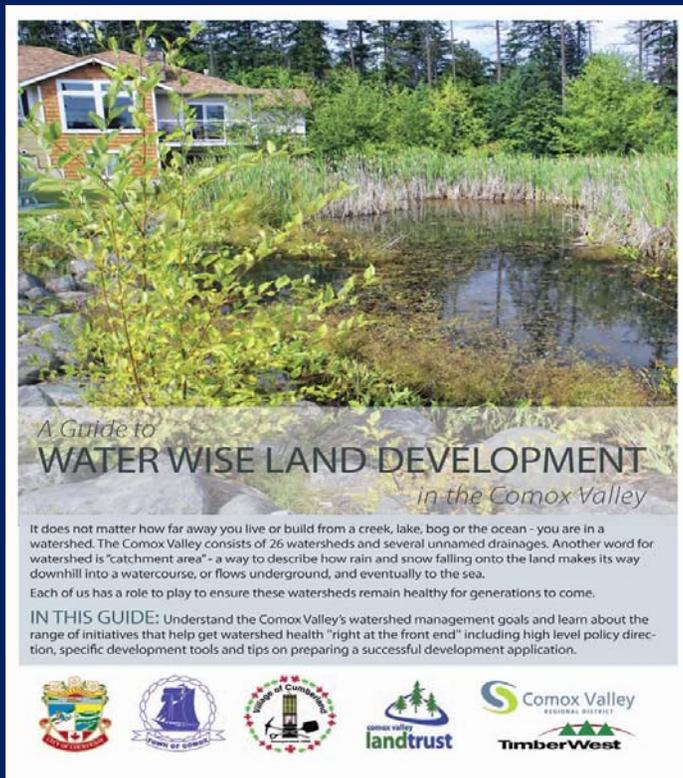
~1965

2015





Road Map for 'Sharing & Learning'



Context

Strategies & Tools

- *A Guide to the Guide*
- *Water Balance Model Express*
- *Case Study Application*

Interactive Segment

What Next

SELECTED TOOLS *to Achieve Watershed Goals*

Tree Protection Bylaws

Tree Protection Bylaws are used to reduce the number of trees unnecessarily removed or damaged from a site and can require replacement trees be planted when trees are removed. Regulations ensure that neighbouring trees are protected during construction.

Trees provide many benefits including beauty, shade, habitat and rainfall interception and storage.

Water Balance Model Express

This provincial on-line user-friendly and interactive tool helps landowners incorporate landscape features such as rain gardens on their properties by using pre-set drainage targets based on local hydrology.

The tool informs landowners on actions they can take to achieve water balance on their site. The interface is colourful and easy to use.



Topsoil Bylaws Toolkit

Soil depth creates a sponge which can limit runoff during wet-weather; and reduce water need during dry weather. The Toolkit provides law, policy and technical guidance.

An absorbent topsoil layer is a fundamental building block. When sites get the topsoil part right, other parts of the water sustainability equation are easier to attain.



Erosion & Sediment Control

All four local governments have tools to ensure that sediment-laden runoff does not enter the community's drainage network, including storm-sewer systems, ditches and streams.

Sediment in the drainage system is costly to remedy and is harmful to ecosystem health, including fish habitat.

The City of Courtenay is currently exploring strengthening and making more clear Erosion and Sediment control requirements for all developments.



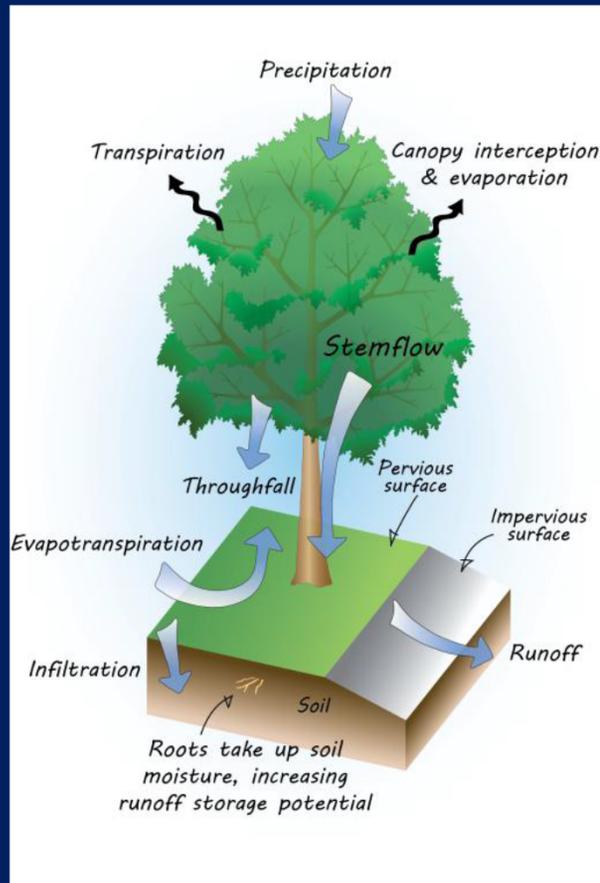
Design Charrettes

Collaborative intensive design session in which a group collectively drafts a solution to a land use issue or development proposal, prior to any design or development plans. They are more effective than the usual "silo" review approach, help to build consensus and get the application "right at the front end".

They have been very successful for projects of many scales and is a useful tool to consider as part of a pre-development application meeting.



Why a tree protection bylaw?



- Trees provide multiple services that are not considered in infrastructure costs
- Removing trees increases those costs
- Tree protection aims to decrease the loss of trees and their services

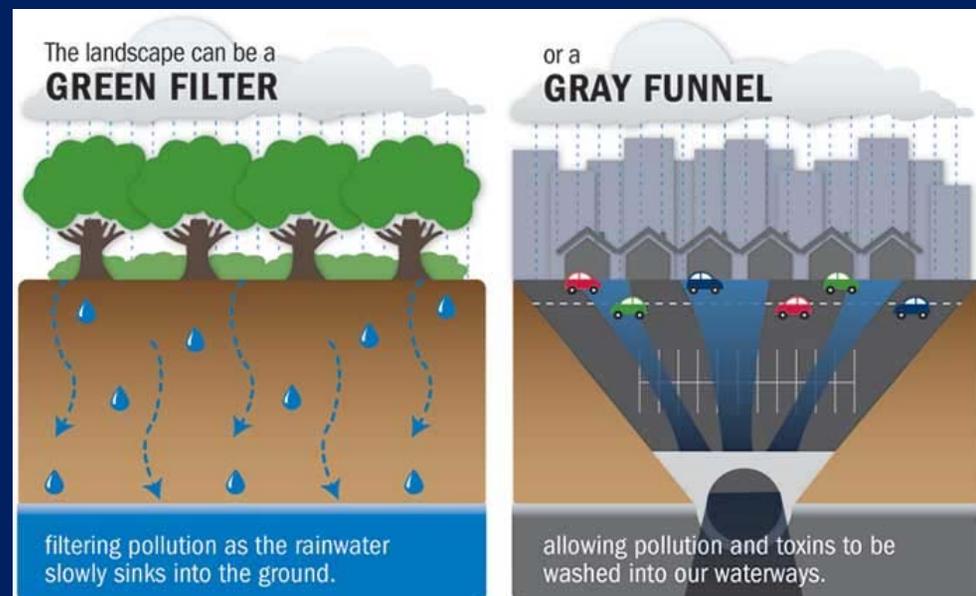
What infrastructure services?

- 5% tree cover increase = 2% rainwater runoff decrease
- Tree shade reduces summer surface temperature = 10-25 more years of life for asphalt pavement
- Forests can infiltrate 31cm. per hour of rainwater vs lawn only infiltrates 1/3 of that, and pavement, none
- One deciduous tree can intercept 2.5 cubic metres and a mature evergreen can intercept 15 cubic metres per year

This adds up to rainwater that doesn't need a pipe and repairs, with high ongoing costs to a municipality.

Further unmeasured benefits of trees:

- provide oxygen
- filter air pollution
- filter contaminants
- reduce heat island effect
- climate control
- aesthetics



- Trees need to have the same status as other essential urban infrastructure – utilities, roads and drainage
- Tree protection bylaws are one tool to provide protection for our “working trees”.
- While newly planted trees are beneficial, the real work horses are the existing mature trees and the next generation.

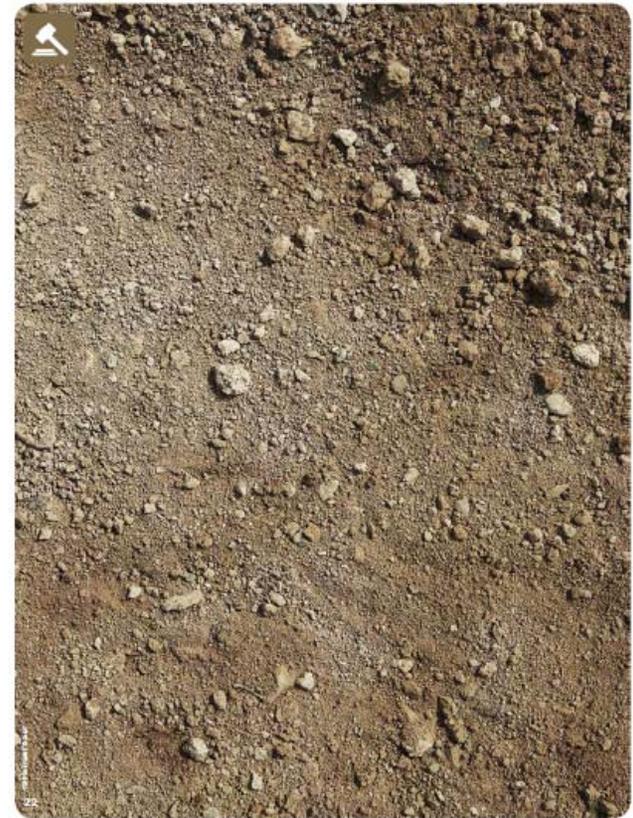


**A planner once responded to a query from a citizen as to why the young trees weren't being save in a proposed development-
“but they are too small to save” said the planner....**

**to which the citizen replied
“and how do you think we get big trees?”**



Soil is more
than just Dirt!



SELECTED TOOLS *to Achieve Watershed Goals*

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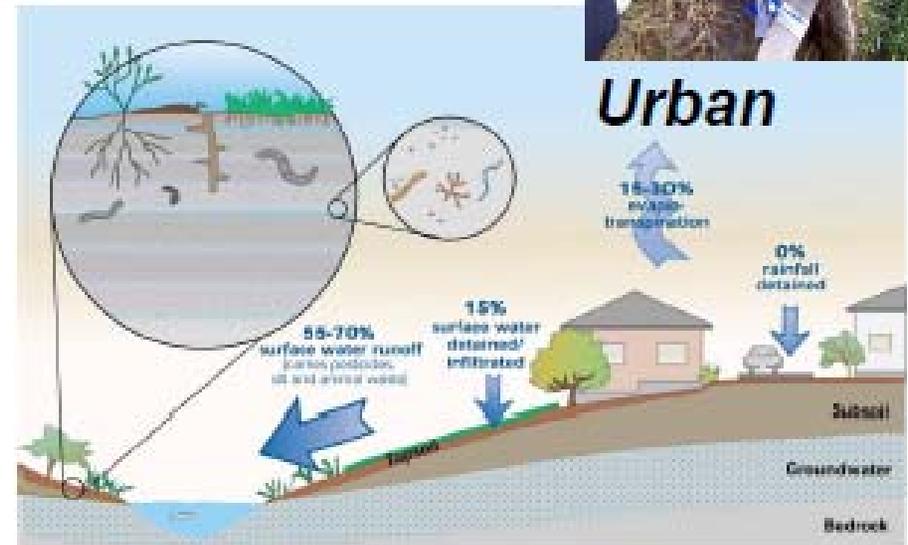
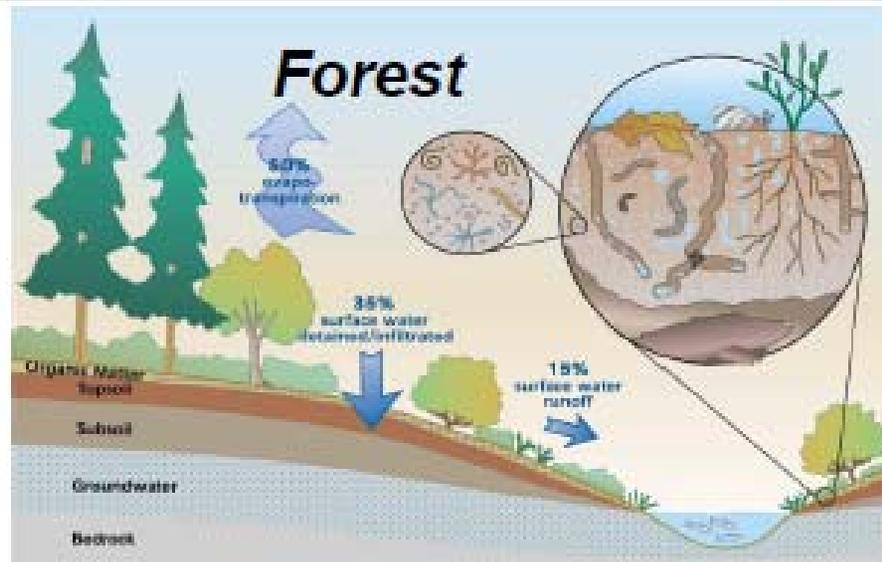
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Soil is alive
and
provides
important
rain-
retention
functions



Topsoil is especially important!

- ✓ Organic matter provides structure, holds air and water
- ✓ Good for plants - faster establishment, higher survival rates, reduced need for weed, pest control *and irrigation*
- ✓ Rainwater source control - reduces runoff by storing



Water and soil -*Slow, spread, sink!*

- ✓ Infiltration
- ✓ Percolation (drainage)
- ✓ Storage

Slow it. Spread it. Sink it!
An Okanagan Homeowner's Guide to Using Rain as a Resource

Practical and Eco-Friendly
Ways to Protect Your Property
and the Environment from the
Effects of Rainwater Runoff

 Okanagan Basin
WATER BOARD

 OKANAGAN
waterwise
One valley. One water.

TOPSOIL BYLAWS TOOLKIT

2012

An Appendix to the Green Bylaws Toolkit

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What regulations and practices can we put in place to protect soil?

- ✓ Better strategic policy (RGS, OCP) on sensitive rainwater management and role of soil
- ✓ Require more information on soils prior to development approval
- ✓ Require topsoil performance targets (retention or new)
- ✓ Enforcement – whose role?



Erosion Control Tool

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Improper rainwater management can turn a resource into a Erosion and Sediment control problem



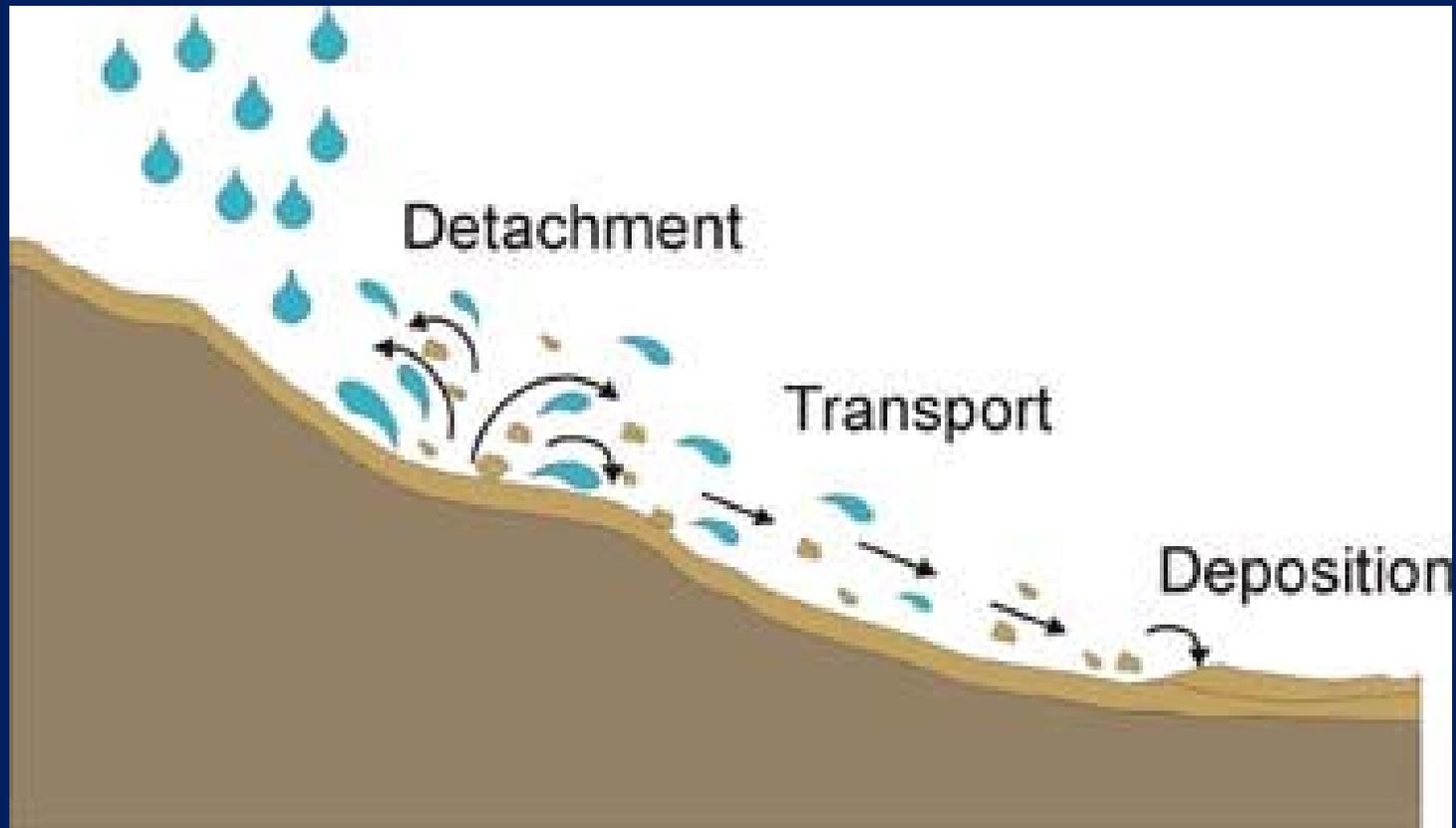
Erosion and Sediment (control)

Erosion:

- Physical removal or *detachment* of soil particles, followed by their transport to another location by the action of a mobile agent
- *Source* and *Process* that we are aiming to control

Sediment:

- Soil particles detached and mobilized by erosion
- The *substance* that we are aiming to control (not source control)



Common erosion...

...Agents

- Wind
- Water
- Construction equipment

...Factors

- Soil texture
- Soil cover and permeability (vegetation, mulch, soil texture/porosity)
- Topography
- Velocity (energy)
- Soil volumes

Group A: Erosion control – raindrop impact

Vegetation

- temporary vegetation – cover crop only
- permanent vegetation – introduced (exotic) pasture species or native (endemic) species
- see 1: sections 4.3.2, 7.1, 7.2, appendix A6 and appendix G



Batter blankets

- vegetation promotion blankets
- vegetation suppression blankets
- needle-punched geotextile membrane
- builder's plastic membrane
- see 1: section 5.4.2, SD 5-2, appendix A6 and appendix D



Soil surface mulching

- hydromulch or hydraulic bonded fibre matrix
- blown straw, hay, crop residue, with bitumen tack
- tub-ground or chipped organic mulch
- brush-matting
- rock or gravel mulch
- see 1: section 7.4, figure 7.3, appendix A6 and appendix D



What regulations and practices can we put in place to avoid erosion and sedimentation?

- ✓ Require ESC measures on ALL developments
 - Stand alone bylaw
 - As part of other regs & permits
 - Departmental and jurisdiction consistency key
- ✓ Enforcement – whose role?



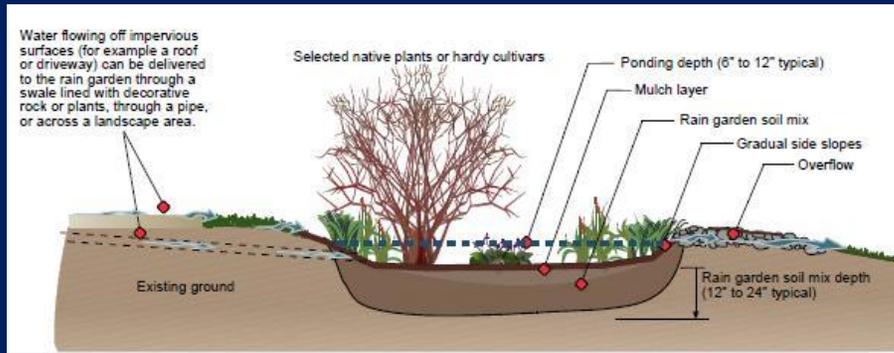
Landscape Tools – Rain Garden

A rain garden takes advantage of rainfall and runoff in its design and plant selection. It can be a small, large or linear garden which is designed to withstand



the extremes of moisture & concentrations of nutrients that are found in rainwater runoff.





- Rain gardens collect water (from paved surfaces, roof leaders) and allow the water to slowly infiltrate into the soil layer and be taken up by plants
- Rain gardens are sized based on the upstream impervious area that it services



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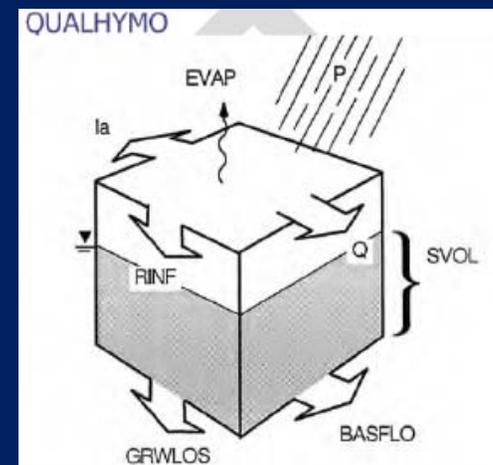
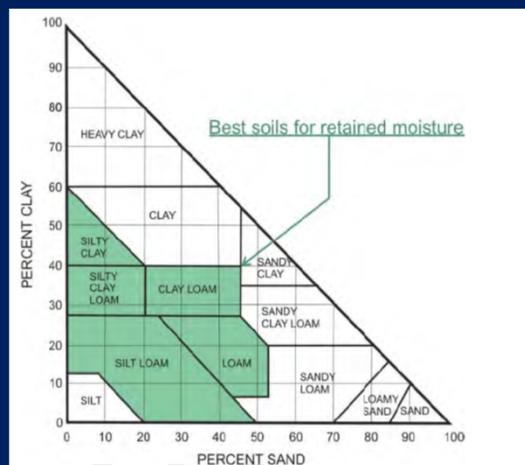


Design Charrettes & Review Teams



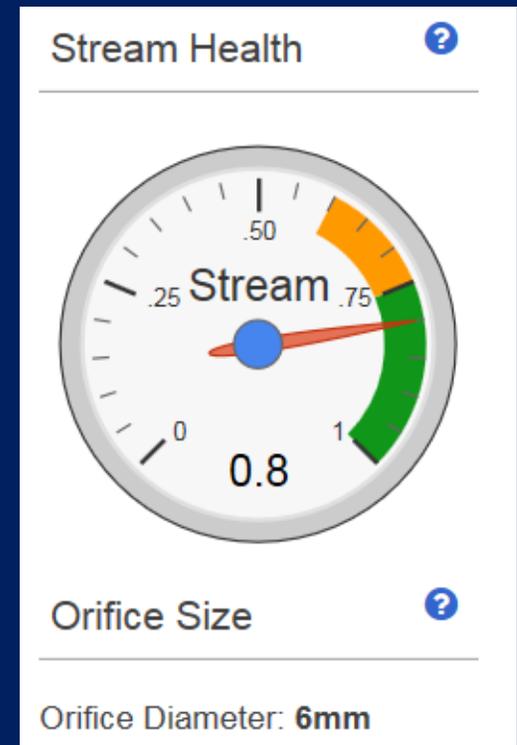
Water Balance Model Express

- User friendly online tool for designing on-site rainwater management mechanisms
- Key element of the CVRD rainwater management strategy
- Developed by the PWSBC based on their QUALHYMO water balance model (used by Courtenay and Comox)
- 1 - deep groundwater 2 - shallow groundwater and (when necessary) 3 - surface runoff



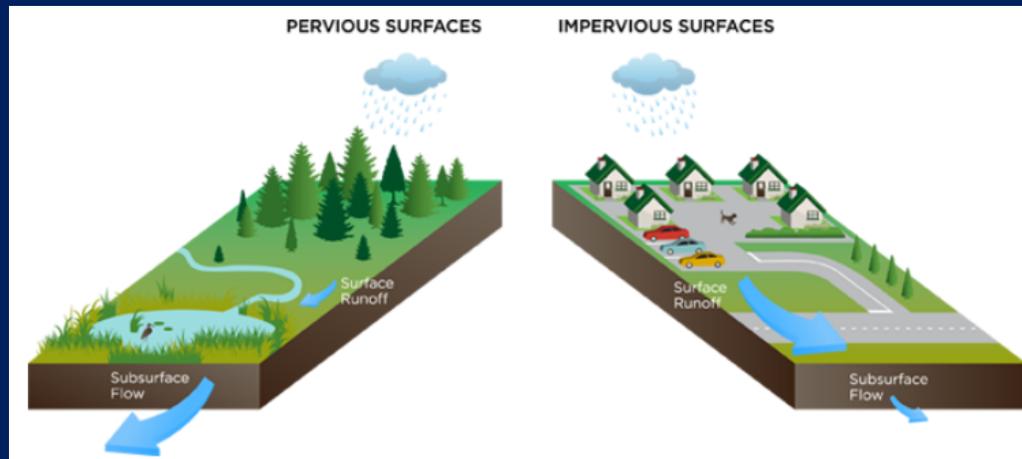
Water Balance Model Express Tool Description

- User friendly online interface
- Gauges impact of development on stream health
- WS targets + user entered info
- Demonstrates quantifiable benefits of slow release rainwater mechanisms



Water Balance Model Express Development

- Building on work in other jurisdictions
 - Surrey, North Vancouver, Delta, Cowichan Valley RD
- CV watershed specific targets
 - Combination of climactic and ground condition data
- CV contribution: assign zoning by imperviousness
- Watershed descriptions/information



Water Balance Model Express Implementation

- Launch in early to mid 2016
- In collaboration with other Vancouver Island regional districts
- At the regional/rural level
 - Could be incorporated into amended CVRD DPA
 - Could reduce dependence on professional stormwater management reports for certain single family development/redevelopment

BUILDING (HOUSE,GARAGE,SHED)	HARD SURFACE (DRIVEWAY,PATIO,PATH)	LANDSCAPING	INFILTRATION SWALE
INFILTRATION SWALE WITH STORAGE	RAIN GARDEN WITH STORAGE	CISTERN WITH STORAGE	POROUS PAVING

Project » Home Print Save Changes

Site Plan

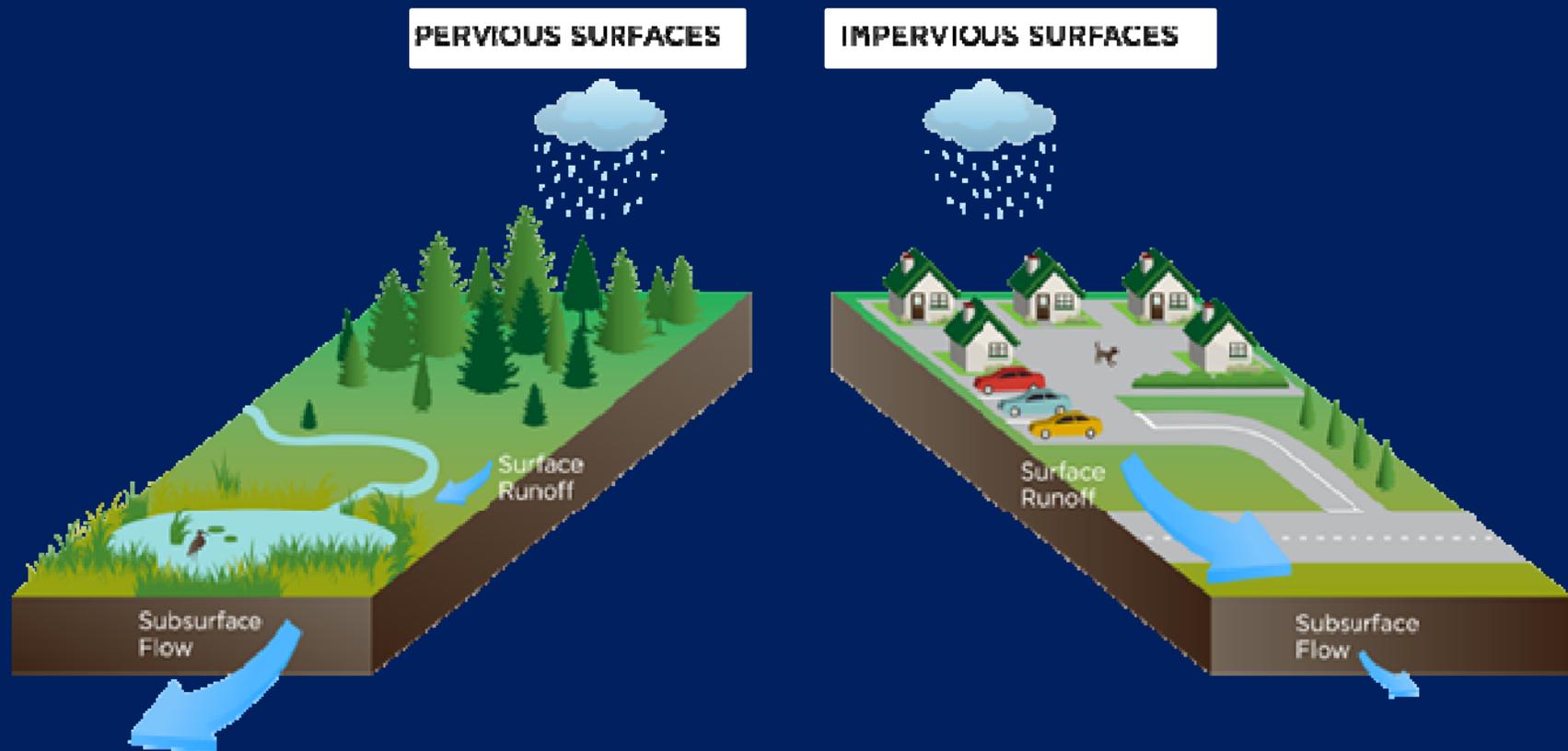
Total Area: m²

Available Area: m² 



SLOW IT – SINK IT – SPREAD IT

Site Design and the Use of
the Water Balance Model Express



WHY ARE WE HERE? APEALING FOR CHANGE!

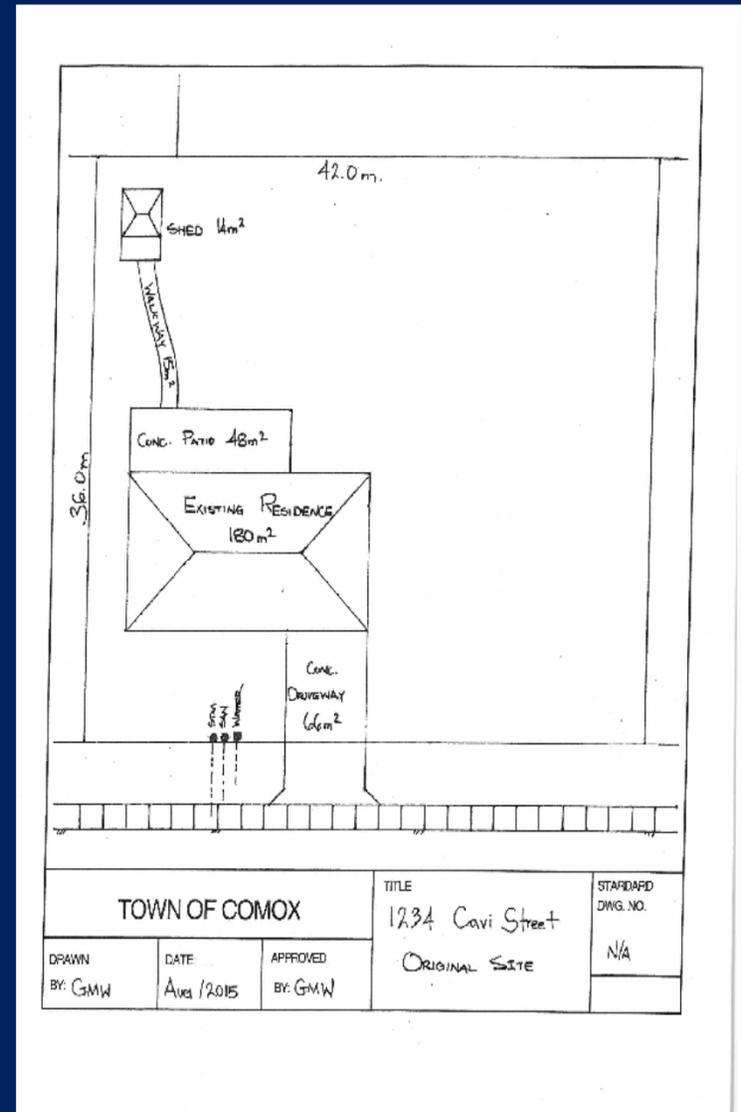
- We are now witnessing a well established pattern in our climate that swings between short, severe rain events and extended periods of drought;
- Climate change will only serve to emphasize these extremes;
- In the absence of strong regulation our tools become the information, education and encouragement we pass to the public and our peers;
- The WBMEx is one such tool allowing professionals, developers and home owners a means of judging the relative success of simple landscape features to improve stream health.

WATER BALANCE MODEL (WBM) VS WATER BALANCE MODEL EXPRESS (WBMEEX)

- Both are intended to address flooding and water conservation by imitating or restoring natural processes;
- WBM is intended for large scale developments and area planning;
- WBMEEx is intended for small scale developments and improvements to singular properties;
- WBM allows for input and assessment of a greater level of environmental, ground and development criteria; while
- WBMEEx is a simplified version that allows for the layperson to assess the effects of “landscape” scaled features to improve stream health.

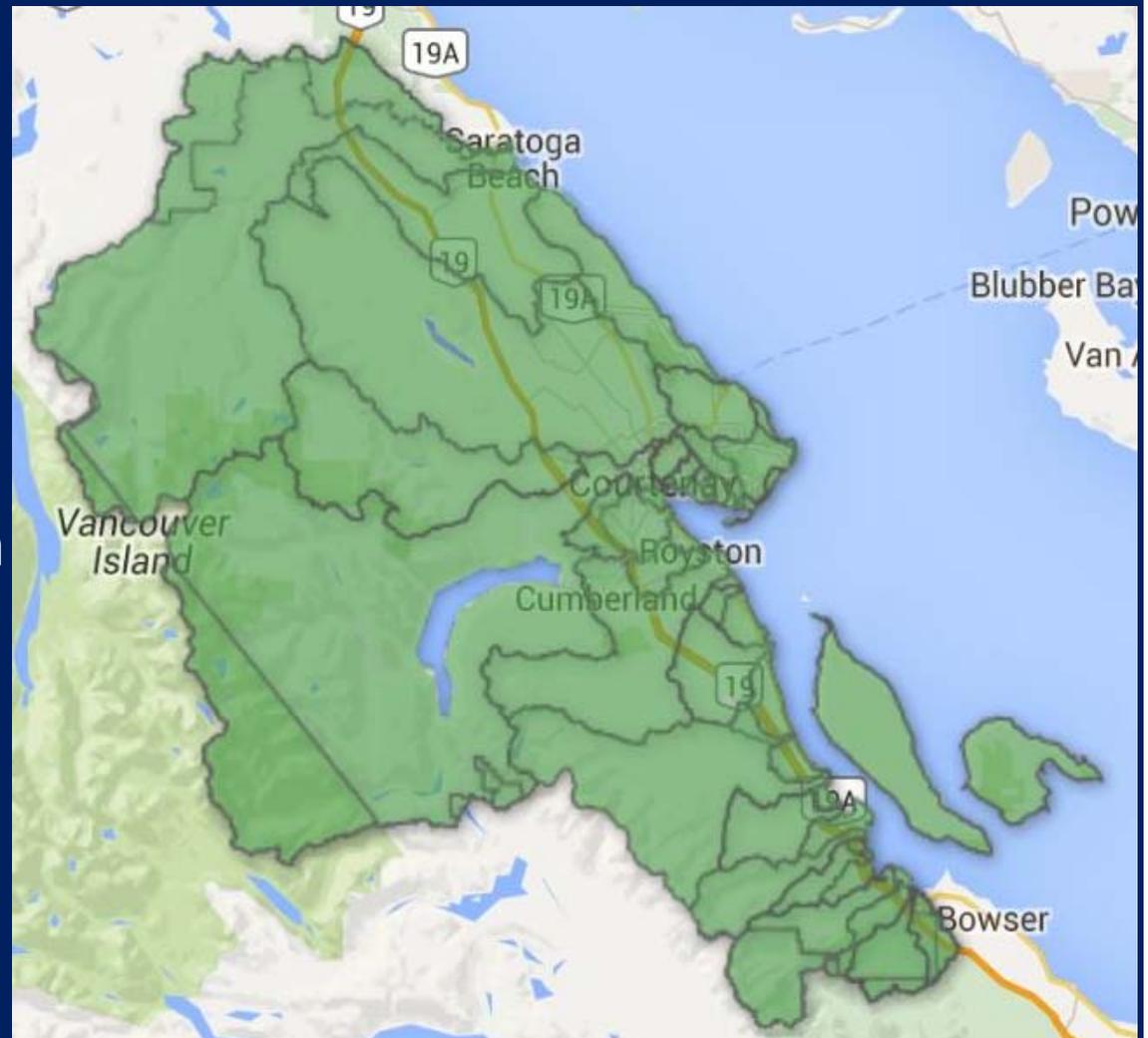
Before you start ... Information Req.

1. What watershed are you in?
2. Site condition (eg. undisturbed forest vs grass);
3. Soil type (sand, clay, loam);
4. Soil depth (the shovel test);
5. Site size;
6. Roof and driveway areas;
7. Landscape: type and area.



Step 1: Enter your address or click on you respective watershed

Your water shed and the position of your property within it, have specific natural (climate and soil) and man made (zoning and development densities) that have been pre-programmed into the Water Balance Express site.



Step 2: Create Your Project

- Site Name
- Site Condition
- Soil Type
- Soil Depth
- Lot/Site Area



Welcome,

- [Create A Project](#)
- [Log Out](#)

STEP TWO: CREATE A PROJECT

To get started, gather a few pieces of information. For this page, you will need the dimensions and characteristics of your property. For the next page (aka Step Three) you will need dimensions for all existing or proposed elements on your property: buildings, driveways, gardens, lawns, patios and swales.

Note: You can create as many projects as you want to play around with different options. Just make sure to save your project(s) before you exit the program so they will be available to play with some more the next time you log on!

Site Information (e.g. 123 Street or Lot 524)

Project Name:

Site Watershed Information

The following watershed and associated targets has been set for your site:

Puntledge River | [Change](#)

Infiltration Area: 200 m²/ha

Retention Volume: 210 m³/ha

Base Flow Release Rate: 1 L/s/ha

Site Condition (the basic characteristics of your property)

Site Condition:

Soil Type:

Worst Best

Soil Depth:

Shallow Deep

Site Size

Units:

Property Width: m

Property Length: m

OR

Property Area: m²

[CREATE MY PROJECT](#)

Begin adding Buildings

The screenshot shows a software interface for managing site plans. On the left, a 'Stream Health' gauge is visible, showing a reading of 0.49. The main area is titled 'STEP THREE: SLOW IT, SINK IT, SPREAD IT' and provides instructions on how to use the tool to manage rainwater runoff. Below the instructions, there are several colored buttons representing different site plan elements: 'Building (house, garage, shed)' (grey), 'Hard Surface (driveway, patio, path)' (grey), 'Landscaping' (green), 'Infiltration Swale' (green), 'Infiltration Swale with Storage' (blue), 'Rain Garden with Storage' (blue), 'Cistern with Storage' (blue), and 'Rain Garden' (green). A 'Site Plan' section shows 'Total Area: 1512 m²' and 'Available Area: 1512 m²'. A 3D site plan visualization is shown to the right. An 'Add new Item' dialog box is open in the foreground, titled 'Add Building'. It has a 'Reference Name' field with 'Existing Buildings' entered. Under 'Size', there are input fields for 'Width' (0 m) and 'Length' (0 m), with an 'OR' option and an 'Area' field (195 m²). 'Add' and 'Cancel' buttons are at the bottom.

The Stream Health gauge will become active when a GRAY hard surface is added to the lot.

Stream Health

0.49

STEP THREE: SLOW IT, SINK IT, SPREAD IT

Do your part: make your property act like a healthy watershed by "slowing, sinking, and spreading" water run-off.

This tool calculates the volume of **rainwater** that runs off your property's hard surfaces (like your roof, driveway and other paved areas) way too fast, and allows you to explore options to slow it down, sink it or spread it in ways that protect your home, replenish aquifers, streams and rivers and help restore the natural balance of the region's water.

The **Stream Health** dial tells you whether the slow-release options you are choosing will get the job done. The dial will not move until you have completed the following three steps, and hooked up all of your site's hard surfaces to rainwater collection devices. Don't forget to save your session so you can go back and fine-tune it as you play with the tool. At the end of your session you will be able to print out your results for your records.

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Step 3: Drag GREEN blocks into the SITE PLAN box to represent the different kinds of landscaping (absorbent surfaces) on your site.

Building (house, garage, shed) | Hard Surface (driveway, patio, path) | Landscaping | Infiltration Swale

Infiltration Swale with Storage | Rain Garden with Storage | Cistern with Storage | Rain Garden

Project = 1234 Cavil Street

Site Plan

Total Area: 1512 m²

Available Area: 1512 m²

4.01

Add new Item

Add Building

Reference Name
Existing Buildings

Size

Units: metres

Width: 0 m

Length: 0 m

OR

Area: 195 m²

Add Cancel

Click and drag the grey "Building" block into the dialogue area and add the dimensions or area .

Hard Surfaces

- Note how the use of the lower slider allows you to adjust for the level of imperviousness by choosing gravel vs asphalt or concrete.
- Click and drag the Hard surfaces block to the dialogue box.
- **Stream Health at 0.39**
- Stream Health is also a measure of our success in addressing flooding and drought.

Stream Health

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Building (house, garage, shed)	Hard Surface (driveway, patio, path)	Landscaping	Infiltration Swale
Infiltration Swale with Storage	Rain Garden with Storage	Cistern with Storage	Rain Garden

Project » 1234 Cavi Street

Site Plan

Total Area: 1512 m²

Available Area: 1187 m²

Building | Existing Buildings

Hard Surface | Existing Drive and Walks

The defining characteristic of a GRAY HARD SURFACE block (e.g. driveway, patio, path) is that it is usually impervious - meaning no water can get through it. Common examples of impervious surfaces are concrete patios and asphalt driveways. The larger the hard surface area, the greater volume and/or speed of rainwater runoff.

Hard Surface Properties

Target Volume: 4.16m³ of rainwater volume is generated (shed) from this GRAY hard surface, and needs to be directed to a BLUE storage (collection) device that can handle this volume.

Reference Name: Existing Drive and Walks

Percentage Lot: 8.6%

Surface Type: Standard Asphalt

4.01

Add Landscaping

- Sliders can be used to adjust for landscape area, soil type, and soil depth.
- Note that any adjustment to the area, soil type, or depth has a marginal effect on stream health.
- While generally positive, a lawn does not address the effects of other impervious surfaces.

Stream Health remains at 0.39

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Stream Health 0.39

Building (house, garage, shed) | Hard Surface (driveway, patio, path) | Landscaping | Infiltration Swale
Infiltration Swale with Storage | Rain Garden with Storage | Cistern with Storage | Rain Garden

Project » 1234 Cavi Street

Site Plan
Total Area: 1512 m²
Available Area: 0 m²

Building | Existing Buildings
Hard Surface | Existing Drive and Walks
Landscaping | Lawn

Basic landscaping features such as a lawn or flower garden acts like a sponge - soaking up, storing and then slowly releasing rainfall. Soil type and soil depth plays a huge role in how well this 'sponge' works! A compacted lawn on a thin base of soil will not be able to absorb much water at all, while a lawn or garden with a base of rich, thick loam acts as an ideal sponge.

Landscape Properties

Device Volume | Reference Name: Lawn

Percentage Lots: Small 78.51% Large

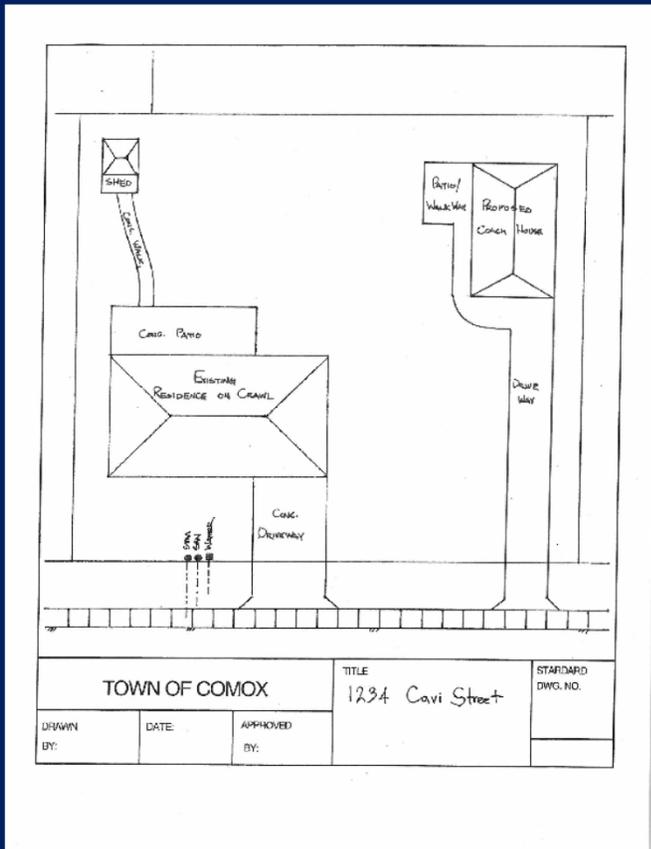
Soil Type: Worst Heavy Clay Best

Soil Depth: Shallow 300 mm [11.8"] Deep

37.39 m³ of rainwater volume is absorbed by the GREEN landscaping device. Absorbent surfaces are natural slow-release devices, and can only handle the rain that falls on them - which is why they are called neutral.

4.01

Add a Coach House



Stream Health

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Building (House, garage, shed) | Hard Surface (driveway, patio, path) | Landscaping | Infiltration Swales
Infiltration Swales with Storage | Rain Garden with Storage | Storms with Storage | Rain Garden

Project = 1234 Cavi Street

Site Plan

Total Area: 1512 m²
Available Area: 1 m²

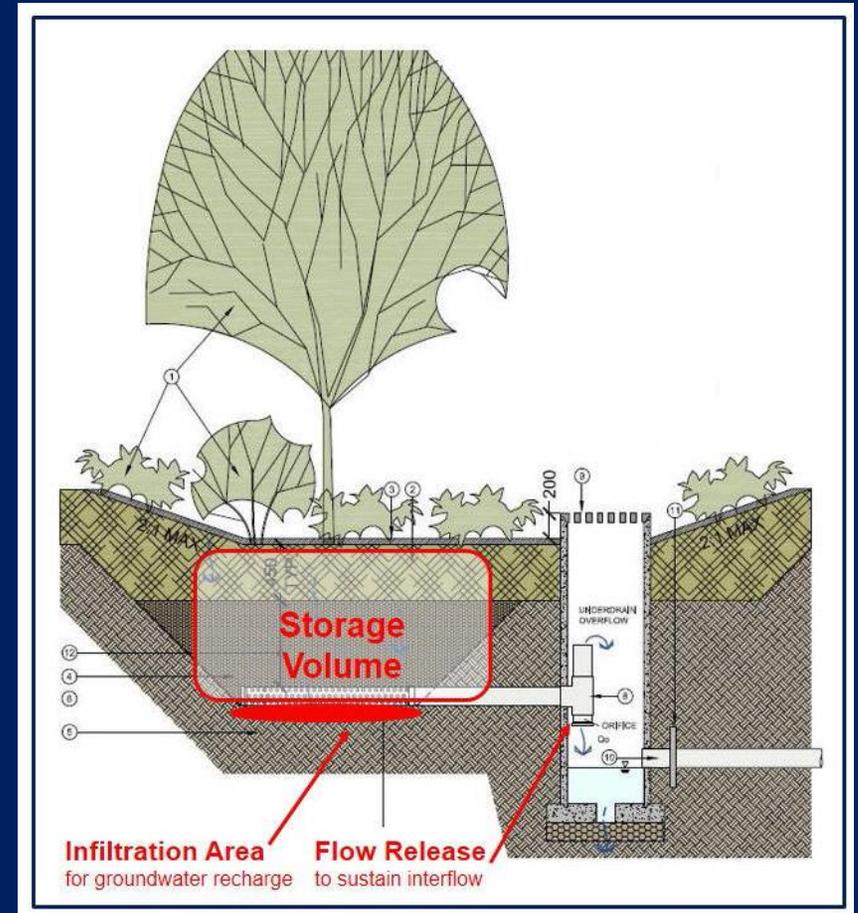
Building | Existing Buildings
Hard Surface | Existing Drive and Walks
Building | Prop. Coach House
Hard Surface | Prop. Drive and Walks
Landscaping | Lawn

4/21

Adding the impervious areas from a coach house (75m²) and the associated drive and walk ways (130m²) results in a reduction to **Stream Health of 0.32.**

Using WBMEx to improve Stream Health

- Click and drag “rain garden” to the dialogue box;
- Enter dimensions or area of proposed rain garden;
- Pick which building or hard surface will be connected;
- Adjust for rain garden depth;
- Soil type (previous clay);
- Soil depth (previous 300mm);
- Base material (river sand used for rain garden);
- Base material depth (200).



Effects of Rain Garden (with storage)

- By directing the roof drains from the proposed Coach House to a 4m² rain garden, we raise the Stream Health Gauge to 0.38.
- Note: Our original value was 0.39.
- By introducing this one minor landscape feature we have addressed the increased runoff from the Coach House

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Building (house, garage, shed)	Hard Surface (driveway, patio, path)	Landscaping	Infiltration Swale
Infiltration Swale with Storage	Rain Garden with Storage	Cistern with Storage	Rain Garden

Project » 1234 Cavi Street

Site Plan

Total Area: 1512 m²

Available Area: 576 m²

Building | Existing Buildings

Hard Surface | Existing Drive and Walks

Building | Prop. Coach House

Hard Surface | Prop. Drive and Walks

Rain Garden - With Storage | Coach Rain Garden & Storage

Stream Health 0.38

Orifice Size Orifice Diameter: 5mm

Volume 1.1 m³

1.1 m³ of rainwater volume can be collected in this BLUE device, including rainwater that falls on the rain garden and rainwater that sheds from a GRAY hard surface on your property.

Infiltration Area

Rain Garden - With Storage

Reference Name: Coach Rain Garden & Storage

Device Connections:
Select one of the GRAY hard surfaces you would like to connect to this rain garden.

None

Existing Buildings

Existing Drive and Walks

Prop. Coach House

Prop. Drive and Walks

Percentage Lot: 0.26 %

Rain Garden Depth: 200 mm [7.9"]

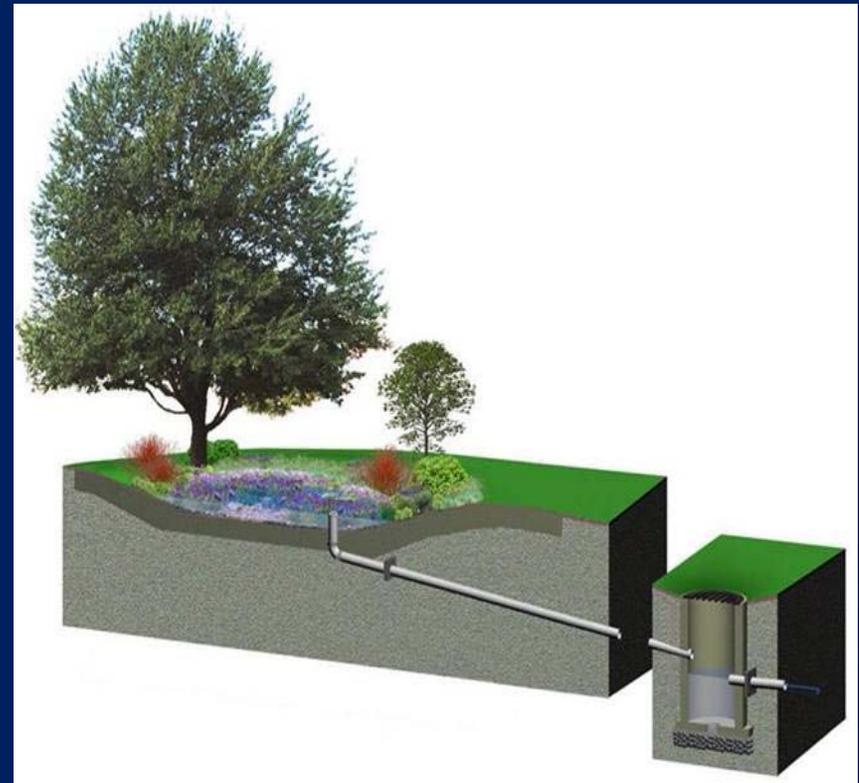
Soil Type: Heavy Clay

A rain garden is a dished landscaped area covered with flowers and grasses that has deeper top soil than a regular garden, and built-in storage. It is made up of two layers - a top layer of garden soil that acts like a sponge, and a base layer of porous granular material (e.g. rock pit, drain rock, sand) that quickly absorbs water. There the water is stored in void spaces while both infiltrating into the native soil below, and discharging horizontally through a controlled outlet and ultimately to a stream as baseflow.

The benefit of this kind of rain garden is that the base layer can absorb rainwater that falls on it and water from a GRAY element on your property (e.g. roofs or driveways) - and then release it in a controlled manner.

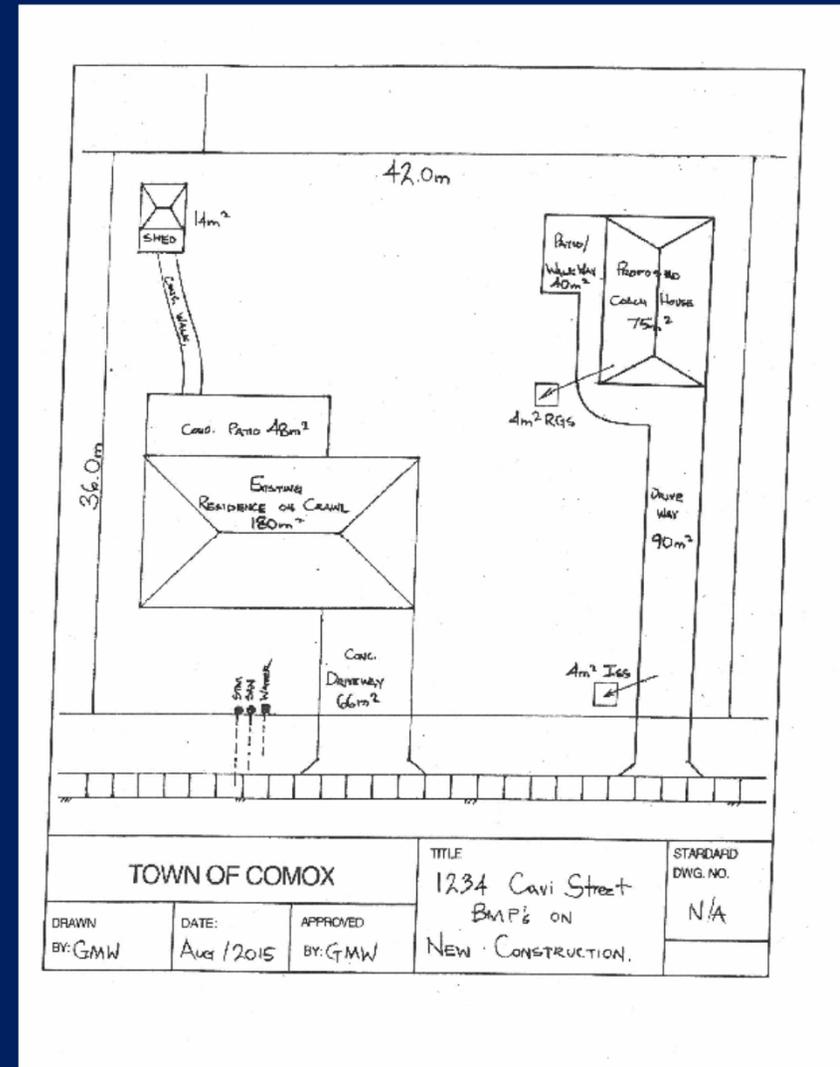
Effects of Infiltration Swale (with storage)

- Click and drag “infiltration swale” to the dialogue box;
- Enter dimensions or area of proposed swale (4m²);
- Pick which building or hard surface will be connected;
- Adjust for infiltration swale depth;
- Soil type (previous clay);
- Soil depth (previous 300mm);
- Base material (river sand used for infiltration swale);
- Base material depth (200mm).

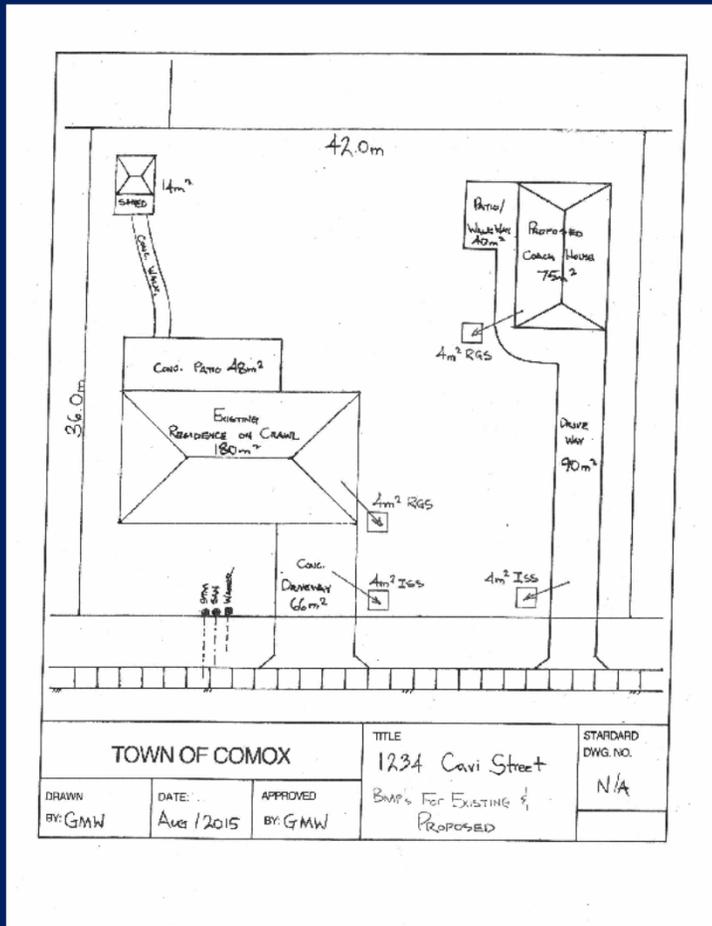


Effects of Rain Garden and Swale

- The effects of a 4m² rain garden in combination with a 4m² infiltration swale improves Stream Health to 0.45.
- This represents an improvement over the original site (0.39) a significant improvement over the proposed site (0.32).



Additional Rain Gardens and Infiltration Swales for Existing Residence



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Stream Health 0.58

Orifice Size Orifice Diameter: 5mm

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Building (house, garage, shed) | Hard Surface (concrete, patio, path) | Landscaping | Infiltration Swale

Infiltration Swale with Storage | Rain Garden with Storage | Cistern with Storage | Rain Garden

Project: 1234 Cavi Street

Site Plan

Total Area: 1512 m²

Available Area: 1 m²

Building | Existing Buildings

Hard Surface | Existing Drive and Walk

Building | Prop. Coach House

Hard Surface | Prop. Drive and Walk

Rain Garden - With Storage | Coach Rain Garden and Storage

Infiltration Swale - With Storage | Prop Drive Swale and Storage

Rain Garden - With Storage | Ex Building Rain Garden and Storage

Infiltration Swale - With Storage | Existing Drive Swales with Storage

Landscaping | Lawn

4/01

Stream Health Improves to 0.58

Water Balance Model Express Conclusions

- The WBME_x is a simple online tool that permits homeowners to gauge the effects of their site on the local environment;
- The WBME_x also permits homeowners to estimate the effects of simple landscaped based features to restore stream health, conserve water and reduce our dependence on large capital storm water infrastructure;
- The size of these landscaped features is minor. Four features totaling 16m² were sufficient to return this property to an acceptable environmental level.

A look at larger Developments



Larger developments also benefit from the use of rainwater management tools similar to those used on smaller sites.

Detention Ponds



Larger developments can also use detention ponds to reduce peak discharge, improving water quality and providing green-space amenities.

Infiltration Swales



Infiltration swales can reduce flooding, recharge the ground water table and provide a level of filtration and treatment for runoff from parking areas.

Capital Cost of Rainwater Management

Lancaster Heights 27 Lot SFR

Exfiltration Galleries and Piping	57,160
Infiltration Swales	12,750
Rain Garden	7,500
Storm Control Manholes	9,600
Engineering and Admin.	<u>13,050</u>
Total	\$100,060
Total per Lot	\$3,705

Development Cost Charges (DCC)

- Until recently, Comox applied a storm water DCC on all single family lots;
- The value of this DCC was \$3,432.00;
- This DCC was used to finance large drainage works constructed to address the unintended effects of traditional development;
- Expensive and intrusive, these projects rarely dealt with anything more than increased conveyance to address flooding.

Cost Comparison

Rainwater Management vs. Big Pipe

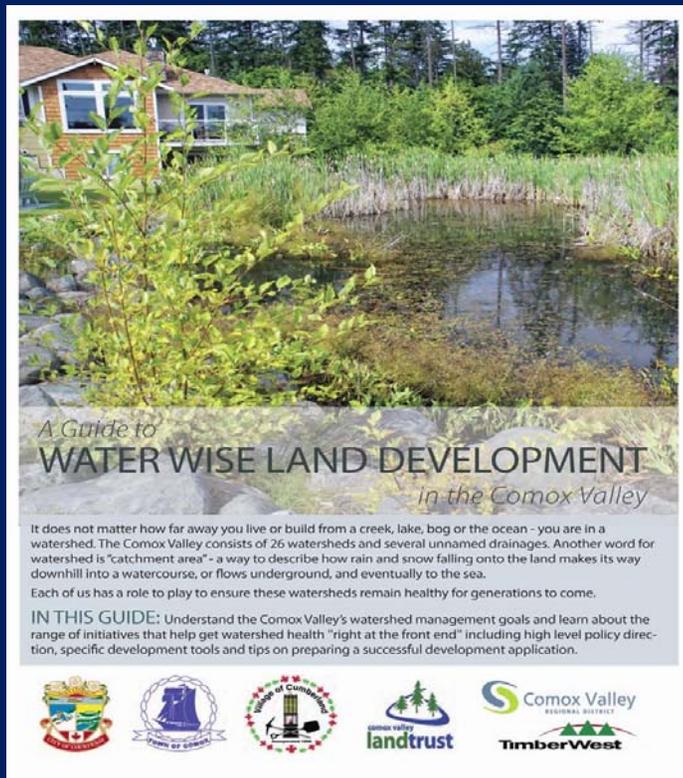
Cost to implement Rainwater Mang.	3,705.00
Cost of Storm Water DCC	<u>3,432.00</u>
Cost to “Do it Right”	\$273.00

At a net cost of \$273.00, we not only address the historic cost of improving our conveyance system, but we also retain water for periods of drought, improve fisheries habitat and reduce erosion at the point of discharge to the receiving environment.

Water Balance and Water Balance Express

- With these systems in hand, both the **engineer** and the **home owner** now have a means of exploring the use of **rainwater management**;
- Unlike its larger cousin, the Water Balance Model Express provides a simply and intuitive means for homeowners and small developers to explore the use of common rainwater management tools to protect both property and the environment from the effects of property development;
- The Express provides us a means of engaging and educating home and property owners on the ways by which we can “design with nature”.

Road Map for 'Sharing & Learning'



Context

Strategies & Tools

Interactive Segment

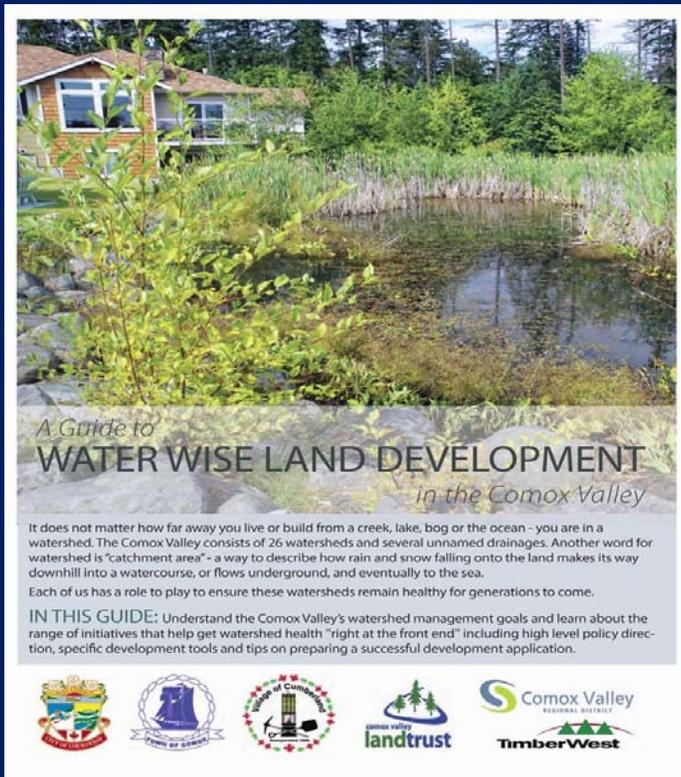
What Next

Activity

- Break out by number 1,2,3,4
- How can we best continue the conversation to share and learn about watershed health and water conservation in the CV?
(frequency, format, topics, etc.)
- 10 -15 minutes to answer
- Each group to have a scribe to jot a few ideas down.
- Then regroup to discuss results



Road Map for 'Sharing & Learning'



Context

Strategies & Tools

Interactive Segment

What Next

What Next

- Water Balance Model
Express training in 2016
- WaterWise webpage
- Water conservation
initiative – inventory and
gap analysis
- Regular opportunities to
share and learn



In Summary

WHAT: Restore and protect watershed health

WHY: Build resiliency. Adapt to wetter, warmer winters and longer, drier summers. Avoid expensive fixes. Account/value for nature's services.

HOW: Inter-departmental, inter-organizational and inter-regional collaboration

Objective: Align mandates, roles and responsibilities to protect and restore natural Water Balance in settled area

For more information visit
COMOX VALLEY WATERWISE WEBSITE

<http://cvwaterwise.squarespace.com>

(work in-progress...)

Thank – you for your time.

