Cracks in the sidewalk

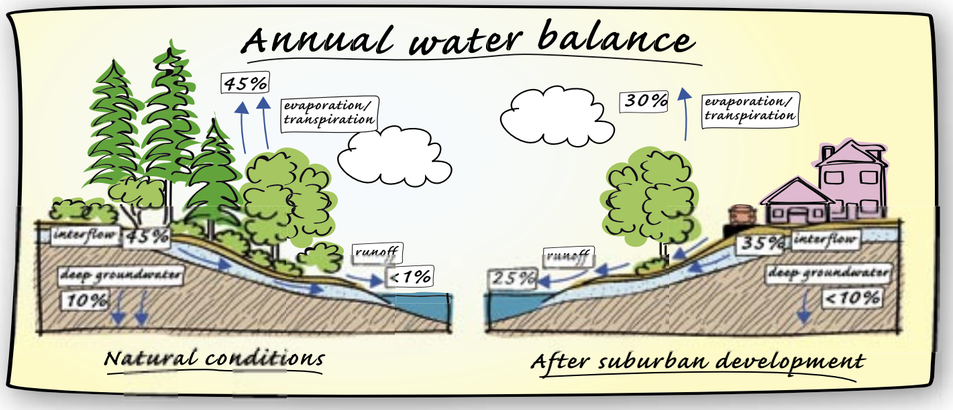
As we build communities to support our growing population, more of the natural environment is developed. Native soils and trees are removed and more hard surfaces or impervious surfaces — roads, roofs, parking lots, sidewalks and paved driveways — prevent rainwater from passing into the soil below. The increase in impervious surfaces has a larger impact on the environment than you might think.

Water on the move

In a forest, less than 1% of the rainwater flows directly overland as surface runoff and into creeks (see opposite, *Annual water balance*). As development occurs, the increase in impervious surfaces results in much higher surface runoff, with more than 25% — and in some areas as much as 75% — of the rainwater flowing overland. This surface runoff from urban areas is termed *stormwater*.

In the past, typical stormwater management involved removing stormwater as quickly as

possible, by building storm drains to rapidly collect and pipe it to the nearest waterway. Unfortunately, this has created some serious problems in our streams and creeks.



In a forested area, about 55% of the water from a typical rainstorm soaks into the ground. Some of this becomes groundwater (groundwater recharge), while some travels through the ground into streams and lakes (interflow). Another 45% of the rainwater is absorbed by plants or evaporates from the ground (evapotranspiration). In a natural forested condition, less than one per cent of the rainwater flows directly overland into the creeks (surface runoff). Development changes this water balance, so that 25% or more flows overland to the creeks. (Adapted from *Stormwater Management Planning: a Guidebook for British Columbia*.)

Results that no-one wants

Storm drains deliver rainwater to waterways, such as streams, more quickly and in greater volume than under natural conditions. Even minor rainfalls can result in higher water levels in local streams.

The combination of more impervious surfaces and the use of traditional "ditch and pipe" stormwater management has led to:

- **Flooding and erosion.** Stormwater reaches streams in a matter of minutes and hours, rather than days. Water levels rise and water flows faster, creating erosion of the stream banks and sometimes causing damage to properties downstream.
- **Water pollution.** When rain falls on roads and parking lots, it picks up pollutants such as oil and grit. Since most stormwater receives no treatment, these pollutants are carried directly into streams, and water quality declines. Impaired water quality can kill fish and other stream life.
- **Loss of groundwater recharge and interflow.** More surface runoff means that less water goes into the ground. This results in less water for people who rely on wells. It may also lead to drought conditions for trees and vegetation. Less interflow — the movement of water through the ground — means that streams and creeks receive even less water during the region's dry summer season, and may dry up.
- **Loss of aquatic habitat.** Changes in water quality and quantity can reduce the variety and abundance of plants and animals found in local streams. High water flows can wash away streamside vegetation and damage sensitive salmon spawning areas. Low summer water levels in streams reduce the amount and quality of habitat for fish and other species.

Total Impervious Area: an indicator of stream health

The total impervious area (TIA) of a watershed is the percentage of surface area that is covered with impervious surfaces. The greater the TIA, the more likely it is that the health of the stream has been impaired. Research* suggests that by the time 10% of the watershed is covered with impervious surfaces, negative impacts have already occurred to stream habitat. **A watershed with more than 30% impervious surfaces will show signs of significant damage to fish and stream habitat.**

As part of its state of environment indicator work, the Capital Regional District (CRD) has calculated the TIA for nine Greater Victoria watersheds (see map over). Two of these watersheds are below 10% TIA and three watersheds are above 30% TIA, with one of these having more than 60% TIA. Information for the remaining watersheds in the CRD is not available at this time.

*Ministry of Water, Land and Air Protection and Environment Canada, 2002. *Stormwater Management Planning: a Guidebook for British Columbia*

Be part of the solution

There are ways residential property owners can decrease the amount of stormwater runoff from local properties and increase the amount of rainwater absorbed into the ground, mimicking the natural water balance:

- **Reduce the amount of water going into your storm drain.** Water from most roofs goes down the spout and into the storm drain. This runoff could be directed into a rain barrel, for watering your lawn or garden. Or, if the permeability of the soils around your home is high, you may be able to disconnect the downspout entirely and direct the rainwater away from your home. Ask your local municipality about whether this is appropriate for your property.
- **Building a new house or development?** Call your local municipality to find out how to reduce TIA on the property, for example by creating ditches and swales, constructing narrower driveways and roads or using innovative technologies such as permeable pavement.

The CRD Stormwater, Harbours and Watersheds program works to protect watercourses, nearshore marine environments and harbours from stormwater contamination. ***Visit us at:*** http://www.crd.bc.ca/es/environmental_programs/stormwater/index.htm

This brochure was made possible through the ***Capital Regional District Roundtable on the Environment****.*

For more information on other CRD Roundtable activities, visit our website at www.crd.bc.ca/rte

WORKING TOGETHER FOR THE GEORGIA BASIN
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Stormwater as a resource

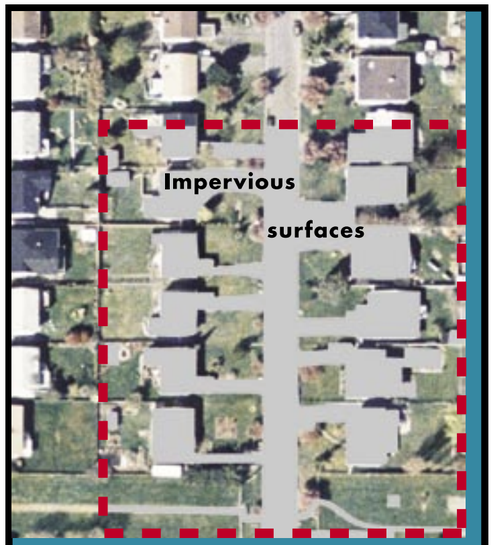
There are some excellent examples of developments around the Victoria area that are addressing the issue of TIA and using stormwater as a resource.

At the new *Vancouver Island Technology Park (VITP)* in Saanich, a BC Buildings Corporation initiative, the main parking lot is constructed of a permeable grass/gravel system. This system will not only reduce surface water runoff from the parking lot and allow groundwater recharge but staff believe the long-term maintenance of the lot will be less expensive than traditional asphalt. For more information, go to the VITP website (www.vitp.ca/facilities/green.asp) and click on Green Building and Site Design.

A new residential development, *Rogers Farm* on Christmas Hill, is another success story. The developer, *English Developments Ltd.*, worked with consultants and the District of Saanich to find an economic and ecological approach to managing storm water runoff from the subdivision. A nearby wetland, which had been used as a fill dump, was restored and expanded, with the water to support it coming from the stormwater from the new subdivision. The wetland increases the retention time of the stormwater, which helps to control flooding and erosion of the downstream creek.

Working towards solutions

Stormwater was once seen as a drainage or flood management issue. Now it is recognised for its contribution to the habitats of fish and other aquatic species, to groundwater recharge (for both stream summer flow and for potable water) and to the water supply for livestock or irrigation.



What gets through

In a typical area of single family homes, 30-50% of the landscape is made up of impervious surfaces. As a result, about 30% of rainwater becomes surface runoff. In an industrial area, as much as 70-100% of the landscape is impervious and about 75% of the rainwater becomes surface runoff.

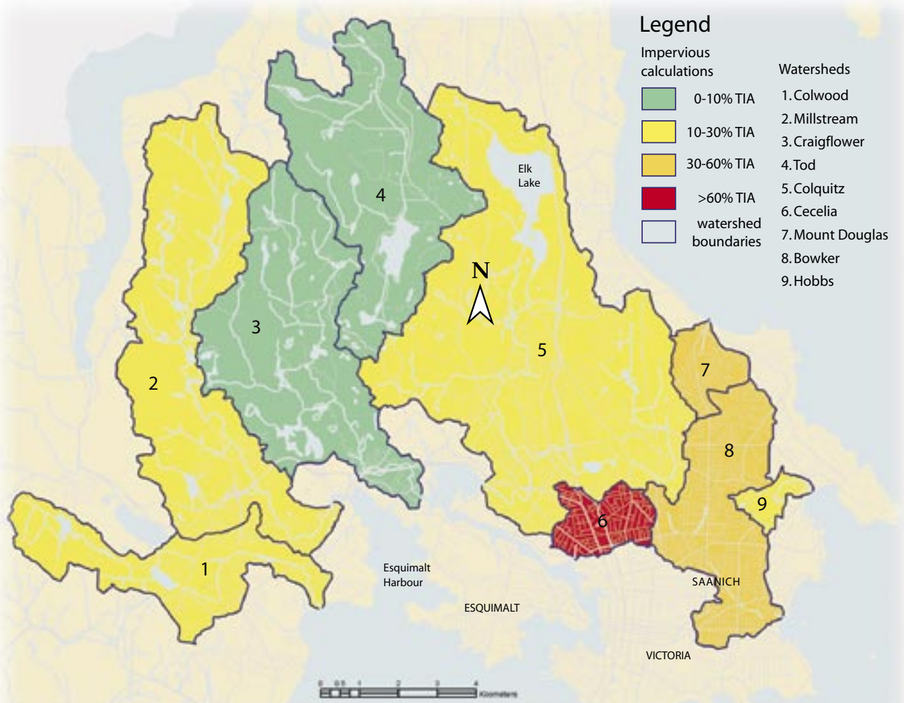
Find out more:

- Ministry of Water, Land and Air Protection and Environment Canada, 2002. *Stormwater Management Planning: a Guidebook for British Columbia.* Available at:

  wlapwww.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.pdf

- For more information, contact:

  CRD Stormwater, Harbours and Watersheds Program (250) 360-3256
  stormwater@crd.bc.ca



Total impervious area for major Greater Victoria watersheds

A "watershed" is an area of land that drains to a given point. For example, rain falling anywhere in the Colquitz Watershed will eventually end up in Portage-Gorge Waterway. Wherever you live, the water from your property (and any water-borne pollutants) will either recharge groundwater or end up in local rivers and streams and eventually the ocean (sometimes by way of storm sewers).

This map shows total impervious area (TIA) of some of the major watersheds in Greater Victoria, providing an indication of stream health. Where the TIA is below 10%, streams are usually in relatively good health. A TIA greater than 30% may result in dramatic changes to the stream, and the fish and other wildlife that it supports.

For watershed boundaries elsewhere in the Capital Region, see the CRD Harbours Atlas. www.harboursatlas.ca

CRD Stormwater, Harbours and Watersheds Program

Through the Cracks

Impervious surfaces in Greater Victoria: A state of the environment indicator for the Capital Regional District