

# Managing Water in Response to a Changing Climate in Southwest Nova Scotia: Stormwater Management

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## Stormwater Management

### What is stormwater?

Stormwater is water that originates during precipitation events and snow/ice melts. Stormwater can soak into the soil (infiltrate), be held on the surface and evaporate, or runoff and end up in nearby streams, rivers, or other water bodies (surface water).

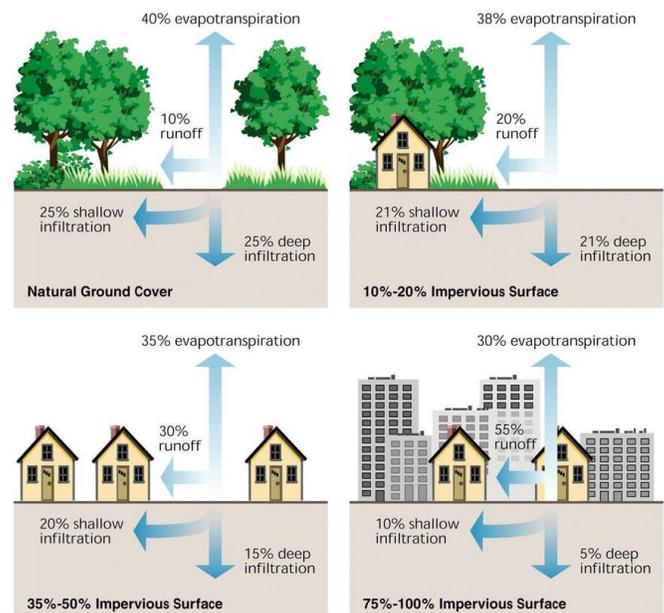
In natural landscapes such as forests, the soil absorbs much of the stormwater and plants help hold stormwater close to where it falls. In developed environments, unmanaged stormwater can create two major issues: one related to the volume and timing of runoff water (flooding), and the other related to potential contaminants that the water is carrying (water pollution).

### Stormwater impacts on water quality and quantity

In developed areas surface runoff is traditionally conveyed directly into receiving water bodies, such as rivers, lakes, streams or the ocean. Water is collected from roads, roofs and other impermeable surfaces and transported through stormwater infrastructure such as drains, pipes, culverts and other water carrying systems. The stormwater carries trash, sediment, bacteria, heavy metals and other pollutants from the landscape, degrading the quality of the receiving waters. Higher flows can also cause erosion and flooding in streams, damaging habitat, property and infrastructure.



Post rain event at stormwater demonstration site in Digby, Nova Scotia



The relationship between impervious cover and surface runoff.

## Combined sewer systems

Many of our municipal sewage systems in the Annapolis watershed use combined sewage and stormwater collection. Combined sewer systems collect sewage from houses, businesses, etc. as well as surface runoff. During high intensity precipitation or snowmelt events the amount of stormwater collected by these combined systems can exceed the capacity of the sewage treatment plant they are connected to, resulting in untreated sewage waste overflowing into receiving waters (Clean Annapolis River Project).

## Stormwater management

### Why manage stormwater?

Stormwater management reduces the negative impacts of stormwater runoff. Stormwater management aids to maintain the health of water bodies such lakes and streams; it protects aquatic species, and sustains healthy sources of water for humans through mitigating the effects of urban development. The management of stormwater will help to improve water quality, prevent flooding and erosion, and maintain the natural hydrologic cycle.

### What can you do at home?

Minor landscaping alterations can help you significantly manage stormwater on your property. By doing so, you can reduce potential flooding of your property, help minimize negative impacts on lakes, streams and other receiving waters, harvest rainwater for additional uses (watering gardens, times of drought, etc.) and help to recharge the groundwater. Listed below is a summary of Low Impact Developments and best management practices that you can consider for your home.

- **Dry detention ponds** – A dry pond is a detention basin designed to temporarily store collected stormwater runoff and release it at a controlled rate through an outlet (Ministry of the Environment, Conservation and Parks , 2012). Dry ponds are most effective for erosion and flood control.
- **Wet ponds** – A wet pond is a detention basin designed to temporarily store collected stormwater runoff and release it at a controlled rate. A wet pond is different than a dry pond in that it maintains a permanent pool of water between storm events, unlike the dry pond. Wet ponds are effective at settling contaminants between storm events, therefore producing better water quality.



A rain garden at an LID site near the hospital located in Digby, Nova Scotia



- **Constructed wetlands** – Constructed wetlands are dominated by more shallow zones, less than 0.5 m (Ministry of the Environment, Conservation and Parks , 2012). This results in more vegetation being present, therefore leaving the potential for water quality enhancement. Due to the shallow depth of the wetlands however, flood control then becomes limited.
- **French drain system/ perforated pipes** – A **French drain** is a trench that is dug below ground level, lined with geotextile fabric (preventing matter from clogging the holes in pipe), and filled with clear stone/gravel with a perforated pipe sitting in the middle of the trench. The purpose of a French drain system is to promote infiltration and redirect the water to a more suitable location (eg. catch basin). A **perforated pipe** is designed to allow water to enter or exit through small holes or slots along the pipe.
- **Depaving/ removal of impervious surfaces** – Depaving is the process of removing hard surfaces such as concrete and asphalt, and “freeing” the soil – allowing surface water the chance to infiltrate into the ground. By removing pavement and creating gardens, polluted runoff is reduced and groundwater is then recharged.
- **Cisterns and rain barrels** – Rain barrels and cisterns are rain collection systems that are hooked up to downspouts in order to capture water that drains off rooftops along with other impermeable surfaces. The harvested rainwater can be used for washing your car, flushing toilets, and watering your garden. These systems can save your money on your water bill and provide you with water in times of drought.
- **Rain gardens** - A rain garden is a planted depression or a hole that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways, parking lots, and compacted lawn areas, the opportunity to be absorbed. This reduces rain runoff by allowing stormwater to soak into the ground - as opposed to flowing into storm drains and surface waters (Clean Annapolis River Project). Native, perennial species are often planted in these gardens because they have deep root systems (promoting



An infiltration trench located in Digby, Nova Scotia



Volunteers helping with rain garden construction in Digby, Nova Scotia



infiltration), they thrive in this climate being native to the area, and require less maintenance over time.

- **Green roofs** – Green roofs are structures on rooftops that enable vegetation to grow on the upper surface. These structures help to retain and filter rain water and result in increased evapotranspiration. Green roofs also provide temperature regulation, reduce energy costs, create habitat, provide noise reduction, and increase life of roof structure (Bluenose Coastal Action Foundation, 2016).

- **Bioswales, grass swales, infiltration trenches** – *Bioswales and grass swales* are vegetated channels that direct water downhill to a destination point such as a rain garden. The stormwater is filtered along the way, through gravel and grass/soil layers, promoting infiltration. *Infiltration trenches* are excavated channels that are lined with geotextile fabric and filled with stone to promote water infiltration.

- **Water quality inlets (oil-grit separators)** – are used to trap and retain sediment and oil in detention chambers usually below the ground (ex: storm drain).

- **Tree planting** – Tree roots take up water and help to prevent flooding and erosion. Their leaf canopies act as a buffer and reduce erosion caused by falling rain. Trees capture the surface water runoff and release it back into the atmosphere through evapotranspiration – contributing the hydrologic cycle.

- **Redirecting your downspout** – Downspouts transport the water on your roof to the ground, directing it away from the foundation. To prevent flooding, it is recommended that you extend your downspout at least six feet from your foundation. You can release this water into vegetated areas on your property such as a wet pond or a rain garden, or redirect into a cistern or rain barrel to harvest the rain water at a later date.

- **Xeriscaping** – Xeriscaping is a type of landscaping method that involves selecting plants that require no/minimal supplemental water and little. Choose drought tolerant plants and they will thrive in these conditions.



Volunteer students helping with tree planting on a floodplain in Middleton, Nova Scotia



- **Soil enhancement** – soil amendments are specific organics and inorganics that can be used to improve the soils physical properties in order to increase water storage capacity and to allow plants to flourish. It is important to know what soil type you are dealing with (clay, silt, sand) in order to properly choose the appropriate amendments. Some examples of amendments are listed below:

**Organic:** compost, wood chips, manure, peat moss, etc.

**Inorganic:** gravel, lime, etc.

- **Lot grading** – Lot grading alters the slope of a property to direct water away from buildings and redirects it towards areas where water retention is preferred.
- **Permeable pavers** – permeable pavers include a range of options, such as permeable asphalt and cement, vegetated cement grids, and inter-locking paving blocks (Permeable asphalt/cement have a porous binder, where inter-locking paving blocks have built-in spacing and a cement or plastic grid with vegetation growing in a sandy soil medium between the guidelines (Bluenose Coastal Action Foundation, 2016).

For more information on ways to manage  
stormwater, contact us at:

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## Sources

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