

# Stormwater

## Fact Sheet

### Background

Precipitation is part of the hydrological cycle and is efficiently handled in nature. In urban settings, infrastructure and hard surfaces, such as buildings, sidewalks, driveways and paved roads, disrupt this process and cause an increase in runoff.



Stormwater Management Pond

### How do highways affect stormwater?

Naturally, precipitation falls from the air, and generally, evaporates, infiltrates into ground, or runs off to be collected into a water body at some point. The construction of a highway with an impervious surface (e.g. concrete, asphalt) limits infiltration of rainfall.

During summer months, pavement heated by the sun also raises water temperatures as it flows over the paved surface. Vehicles driving on the highway contribute particles of metal to the pavement surface, through normal wear and de-icing materials also leave residue on the road. Rainfall washes these particles off of the roadway.

Rainwater that flows quickly over hard surfaces instead of infiltrating directly into the ground is called stormwater runoff and it has the potential to cause flooding, which can also harm natural habitats. High volumes of runoff erodes streams, causes temperature variances and suspended pollutants that can adversely affect aquatic habitat. Decreased infiltration lowers the moisture content of surrounding soil that plants require to live.

### What can the Ministry of Transportation do?

A number of best management practices are available to deal with stormwater. The goal is to protect and maintain the natural environment, while still allowing for responsible urban development, including homes and roadways. Potential issues are identified early in the design process so that mitigation or design measures are incorporated.

Stormwater management involves an analysis that utilizes current and historical rainfall data and modelling of rainfall and storm events for the

specific location. Stormwater models are updated and will incorporate changes such as consideration of the effects of climate change. The Ministry of Transportation (MTO) uses current models and information on flood plains and watersheds and works with the Ministry of the Environment and Climate Change and local Conservation Authorities as well as the Ministry of Natural Resources and the Department of Fisheries and Oceans on stormwater management standards, treatment and aquatic habitats. MTO also works with Ontario universities on research. For each MTO project, the stormwater management plan is developed and constructed to current standards, through the Environmental Assessment process. There are opportunities throughout this process for the public to ask the project team questions and learn about stormwater management at open houses (called Public Information Centres or PIC's), through project websites and email or one on one discussions at any time during the design.

### How is highway stormwater treated?

Stormwater from highways can flow into catchbasins or ditches and be directed into stormwater management ponds or infiltration areas, prior to release into watercourses. Stormwater management usually involves a "treatment train" that utilizes lot-level conveyance and end of pipe controls. Each type works within a larger system to treat water and alleviate stormwater issues such as erosion or infiltration.

**Catchbasins:** Catchbasins on highways have an internal compartment called a sump that collects particulate matter such as sand and other materials that may be thrown from or fall off of vehicles and wash down the catch basins during a rainfall. Cleaning of these sumps with large vacuum trucks is part of MTO spring maintenance activities and is one small step in treating stormwater on highways. In key locations such as service centre truck parking, these catchbasins may also contain an oil grit separator system.

**Infiltration measures:** These measures assist infiltration (e.g. gentle slopes, infiltration trenches, and grassed swales that are engineered landscapes, which also filter contaminants).

**Wet Ponds:** These ponds provide both quality and flood control of stormwater. Grates provided at the inlet prevent any garbage or debris from entering the pond. Stormwater entering the pond flows through the sediment forebay, a shallow divided area that slows the incoming water, causing suspended particulate matter, such as sediment and particulates from vehicle wear, to be deposited here and removed by MTO maintenance contractors at a later time. The permanent pool of water allows for additional settling and separation of particulates. Other pollutants that may be present will adhere to these particulates and settle out. Wet ponds are designed to contain stormwater runoff for a minimum of 24 hours, to allow for this settling process and then release storm water at a controlled rate, so that watercourses downstream are not subject to erosion from stormwater that would otherwise flow quickly off of the hard surfaces of a highway during a storm event. Submerged plants in wet ponds also uptake dissolved nutrients and chemicals from stormwater, assisting with water quality.

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Wet ponds are sized to capture and hold stormwater according to the drainage catchment area and area of paved surface to be treated, to prevent flooding. Impervious pond liners may be considered in locations with high ground water elevations. Wet pond outlets may also be designed to cool water to benefit fish and aquatic habitats.

**Dry Ponds:** These basins store runoff temporarily to allow it to be slowly released and only provide quantity control. It reduces erosion, and provides flood control. The main basin does not maintain a permanent pool of water; hence it is “dry”.

**Constructed Wetlands:** Similar to wet ponds, but shallower water levels allow for more submerged plants to further improve water quality. However, they are not as useful for flood control because they are shallow, and they have a larger footprint.

### How are Stormwater Management Ponds maintained on MTO property?

The Ministry of Transportation has developed best management practices for operating and maintaining Stormwater Management Ponds (SWMPs), supporting the environment and ensuring public safety. Stormwater management ponds are constructed within MTO lands and are securely fenced to ensure the public's safety. Twice yearly, MTO's area maintenance contractors inspect stormwater

management ponds to ensure that they are functioning properly and report on any issues requiring repair such as erosion or required vegetation removals. In addition, any public complaints or inquiries are promptly investigated.

Stormwater management ponds may be thought of as providing mosquito habitat, but wide open areas of water, are not mosquito habitat as even the slightest breeze causes movement in the water's surface which cause immature mosquito larvae to drown.

MTO does routinely inspect each stormwater management pond for mosquitoes and follows best management practices to reducing the potential for SWMPs to provide favourable habitat for the development of mosquito larvae that transmit West Nile Virus (WNV).

In conjunction with each Health Unit, MTO samples biweekly from June to the end of September to detect the presence of larvae of mosquitoes known to carry WNV. If these larvae are found, the SWMP will be larvicided. Larviciding involves applying *bacillus thuringiensis israelensis*, or Bti, which is a naturally-occurring soil bacterium, which stops mosquito larvae from developing. Signs are placed at the stormwater management pond if treatment has occurred and the pond will be monitored closely and retreated if required. SWMPs are generally a poor breeding environment for the mosquito larvae known to carry the West Nile Virus.



Stormwater pond outlet to cool water and benefit fish and aquatic habitat.