Stormwater Management

Lake Simcoe Region Conservation Authority
Board of Directors

June 23, 2023

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Lake Simcoe Region conservation authority

Evolution of Stormwater Management

Time Frame	Objective	Practice	
Early 1980's	• Quantity (flood control)	Rapid Conveyance through storm sewer design and construction (direct discharge to receiver)	
Early 1990's	• Quantity • Quality • Erosion	Stormwater facility construction: Wet ponds, dry ponds, etc.	
Today	• Quantity • Quality • Erosion • Treatment • Fisheries protection • Stream morphology • Protection of Groundwater	Water Balance and treatment train approach using green infrastructure	

Grey

Green

Stormwater Management Today

Potential impacts are mitigated through a "treatment train" of best management practices that can include:

Lot Level Controls → **Conveyance Controls** → **End-of-Pipe Controls**

Source: ICPI

- Rooftop storage
- Cisterns
- Soakaways
- Permeable pavements
- Bioretention/Rain gardens
- Green roofs

Source: Clarifica

- Hydrodynamic separators
- Superpipes
- Swales
- Perforated pipe storm sewer systems

Source: TRCA

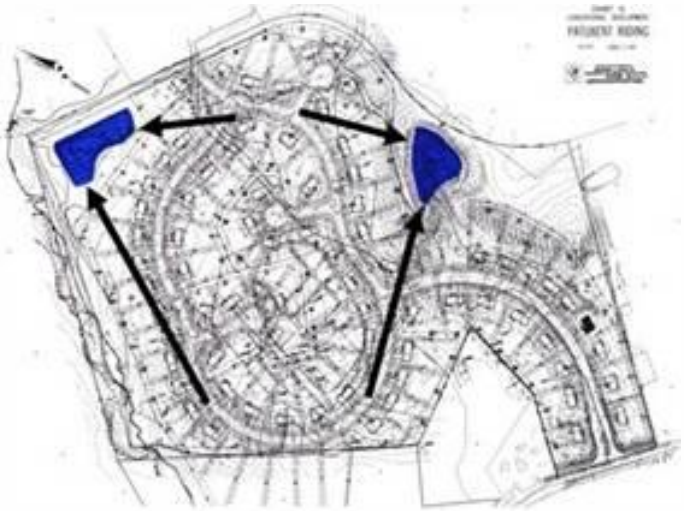
- Wet ponds
- Dry ponds
- Constructed wetlands
- Chambers/Tanks

Low Impact Development

Low Impact Development is a stormwater management approach that seeks to manage urban runoff and pollutants using distributed, small-scale controls.

The goal is to mimic a site's pre-development hydrology (response to rainfall) through:

- site designs that minimize impervious cover and preserve natural drainage features and patterns; and
- best practices that filter, harvest, evapo-transpire, detain and infiltrate stormwater as close to its source as possible.



Conventional "end-of-pipe" approach

Low Impact Development approach

Low Impact Development Practices

- Rainwater Harvesting
- Green Roofs
- Permeable Pavements
- Bioretention Swales
- Underground Infiltration Systems (soakaways, trenches, chamber systems)
- Perforated Pipe Systems

Sustainable Technologies Evaluation Program Overview

The Sustainable Technologies Evaluation Program is a multi-agency initiative developed to support broader implementation of sustainable technologies and practices within a Canadian context. www.sustainabletechnologies.ca

The water component of the Program is a conservation authority collaborative. Current partners are:

Lake Simcoe Region conservation authority

Credit Valley Conservation inspired by nature

Toronto and Region Conservation Authority

Key focus areas:

- Urban Runoff and Green Infrastructure
- Erosion and Sediment Control
- Road Salt Management
- Natural Features & Systems

Sustainable Technologies Evaluation Program Projects

Performance Evaluations:

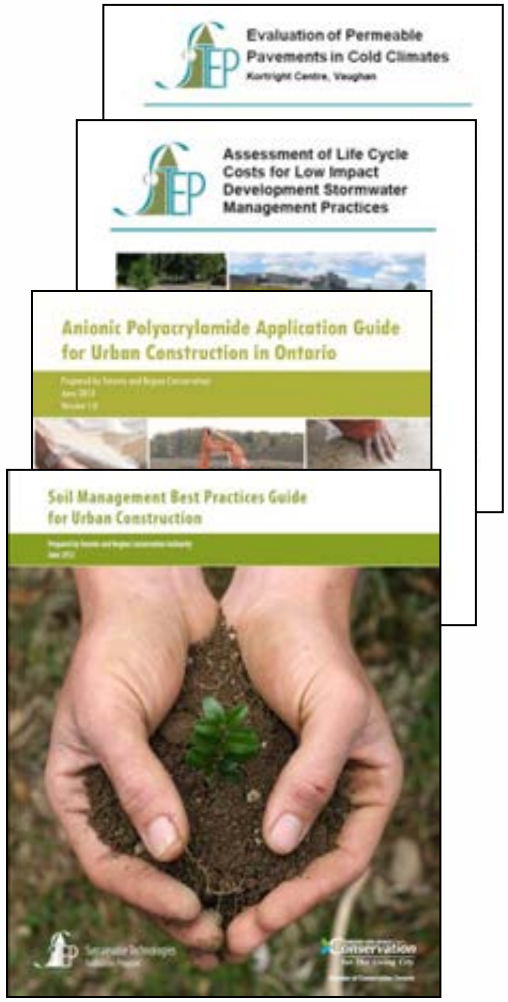
- Conventional detention facilities
- Low impact development practices e.g. permeable pavement, bio-retention swales, rainwater harvesting etc.
- Erosion and Sediment Control measures

Guideline and Tool Development:

- Low Impact Development Planning & Design, Construction Guide, Inspection & Maintenance Guide
- Low Impact Development Treatment Train Tool
- Erosion and Sediment Control Guideline

Education and Training:

- Annual Source to Stream Conference www.sourcetostream.com
- E-learning tools, webinars and workshops



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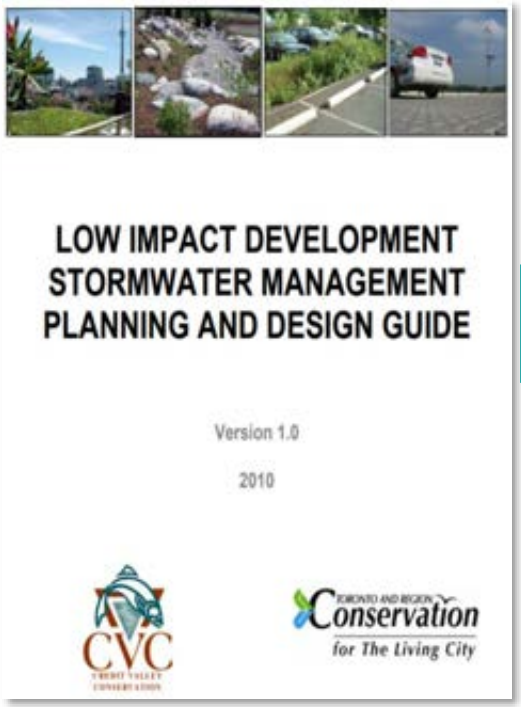
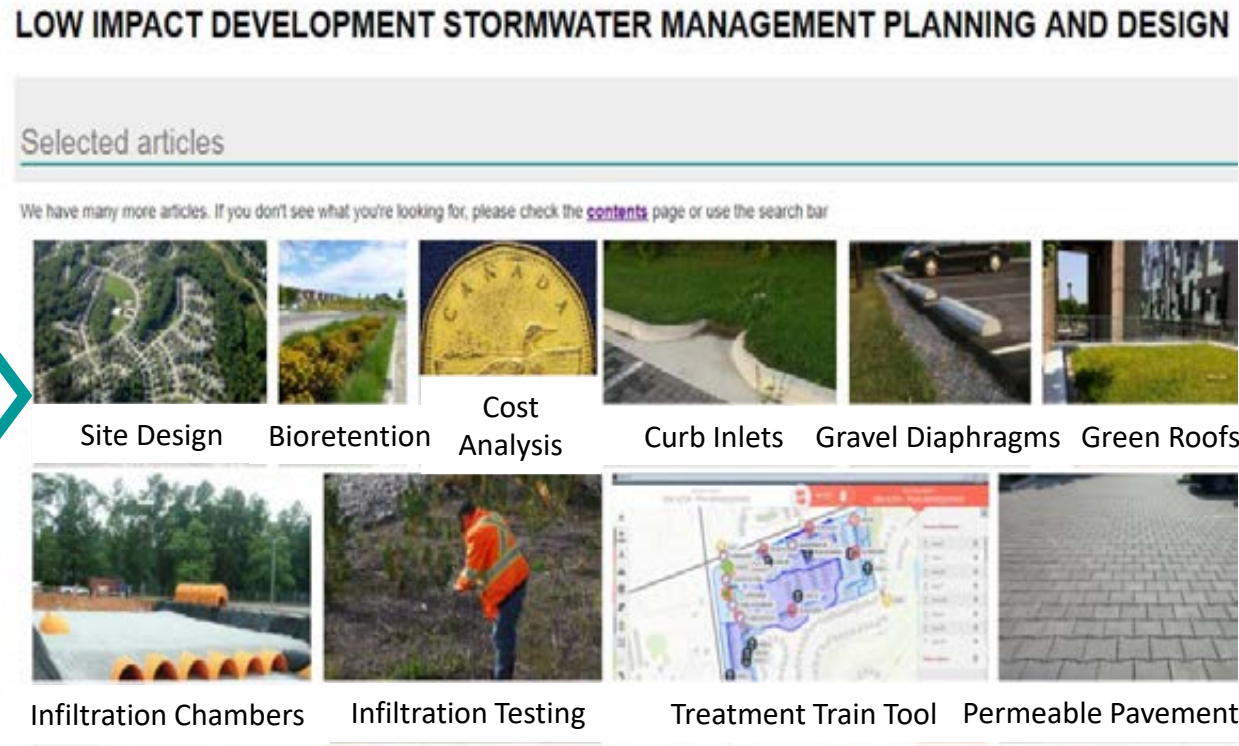




Toronto and Region Conservation Authority
Credit Valley Conservation
Lake Simcoe Region conservation authority

Lake Simcoe Region Conservation Authority's Stormwater Management Interest and Focus: Why?

- Mitigate flood risk
- Reduce phosphorus loads
- Maintain water balance
- Improve tributary health
- Adapt to climate change
- Support municipal partners

Policies, Guidelines, Legislation

- Stormwater Management Planning and Design Manual, March 2003, Ministry of the Environment
- Provincial Policy Statement (Policy 1.6.6.7)
- Lake Simcoe Protection Act & Plan, 2008/9
- Provincial Planning Statement, Draft 2023
- Conservation Authorities Act ,Ontario Regulation 179/06
- Phosphorus Offsetting Policy, May 2023
- Water Balance Recharge Offsetting Policy, May 2023
- Technical Guidelines for Stormwater Management Submissions, April 2022

Stormwater Criteria

- Stormwater Management Technical Requirements and Criteria
  - Water Quantity – Peak Flow Control
  - Water Quantity – Major Minor System Conveyance
  - Water Quantity – Volume Control
  - Water Quality – Total Suspended Solids, other Pollutants
  - Water Quality – Phosphorus
  - Natural Hazards
  - Stream Erosion
  - Erosion and Sediment Control

Offsetting Policies

- Phosphorus Offsetting Policy
- Water Balance Recharge Offsetting Policy

1. Avoid
Prevent impacts from occurring by changing project location, scope, nature of timing of activities

2. Minimize
Reduce the duration, intensity and/or extent of impacts that cannot be avoided

3. Mitigate
Rehabilitate or restore features or functions that have been exposed to impacts that could not be avoided or minimized

4. Compensate
Create or restore new habitat to compensate for loss that could not be avoided, minimized or mitigated

Water Balance Recharge and Lake Simcoe Phosphorous Offsetting Policy - Cash in Lieu Funding

- Stormwater Water Pond Retrofits
- Oil and Grit Separators
- Catch Basin Shields
- Stream Restoration Projects
- Low Impact Development
  - BioSwales
  - Rain Gardens
  - Permeable Pavers/Pavement/Concrete

Retrofitting a Stormwater Pond in Barrie- KDO3

Mitigating Flooding and Controlling Stormwater

Action on Climate Change

Improving Our Water Quality and Quantity

Reducing Phosphorus


Infiltration System
Oil & Grit Separator Units
Diversion Chamber
Diversion Berm


Questions

Stormwater Performance

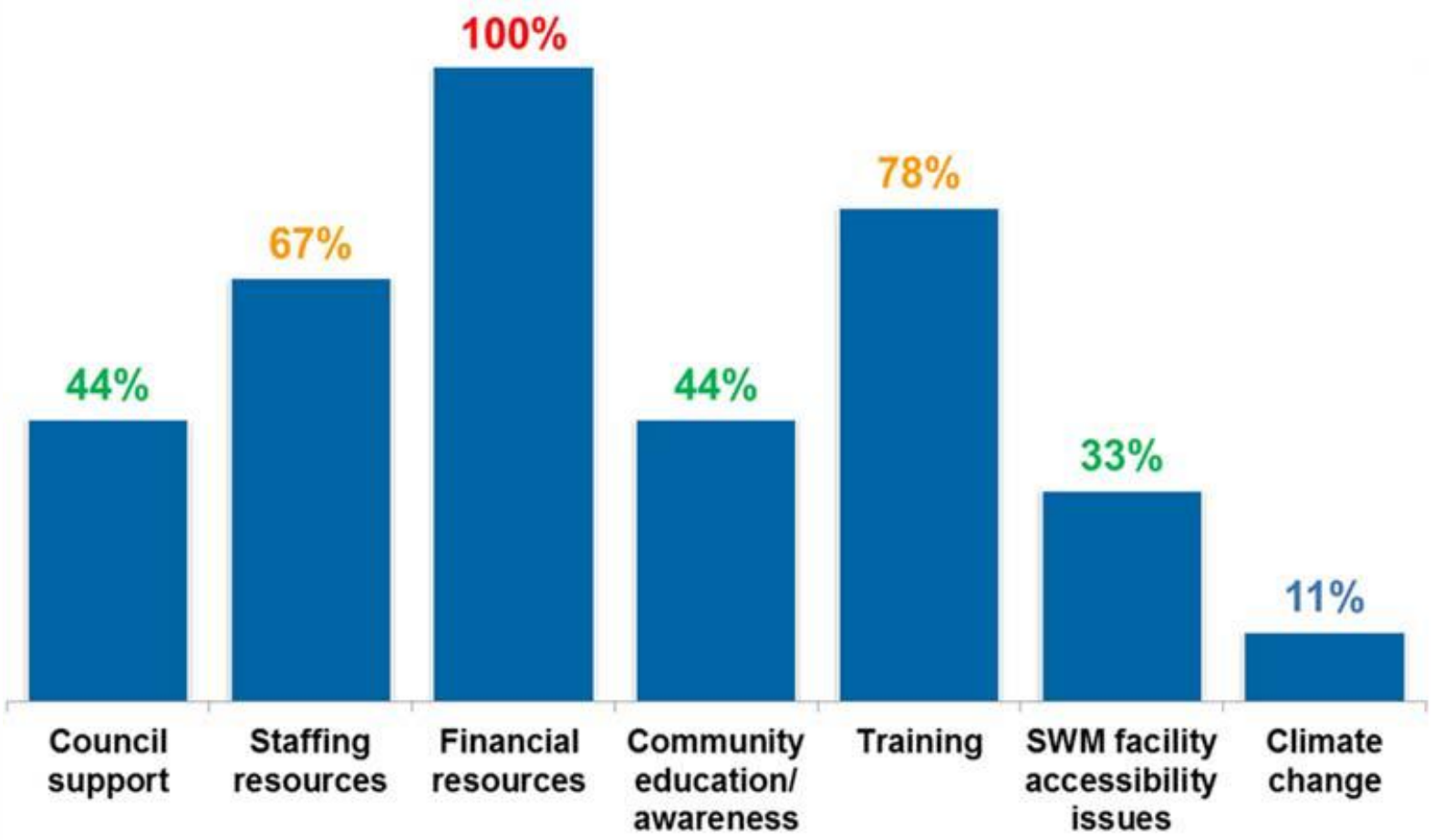
Ponds not meeting expectations

- Peak shaving (flood mitigation)
- Sediment phosphorus retention
- Sedimentation rates
- Turbidity

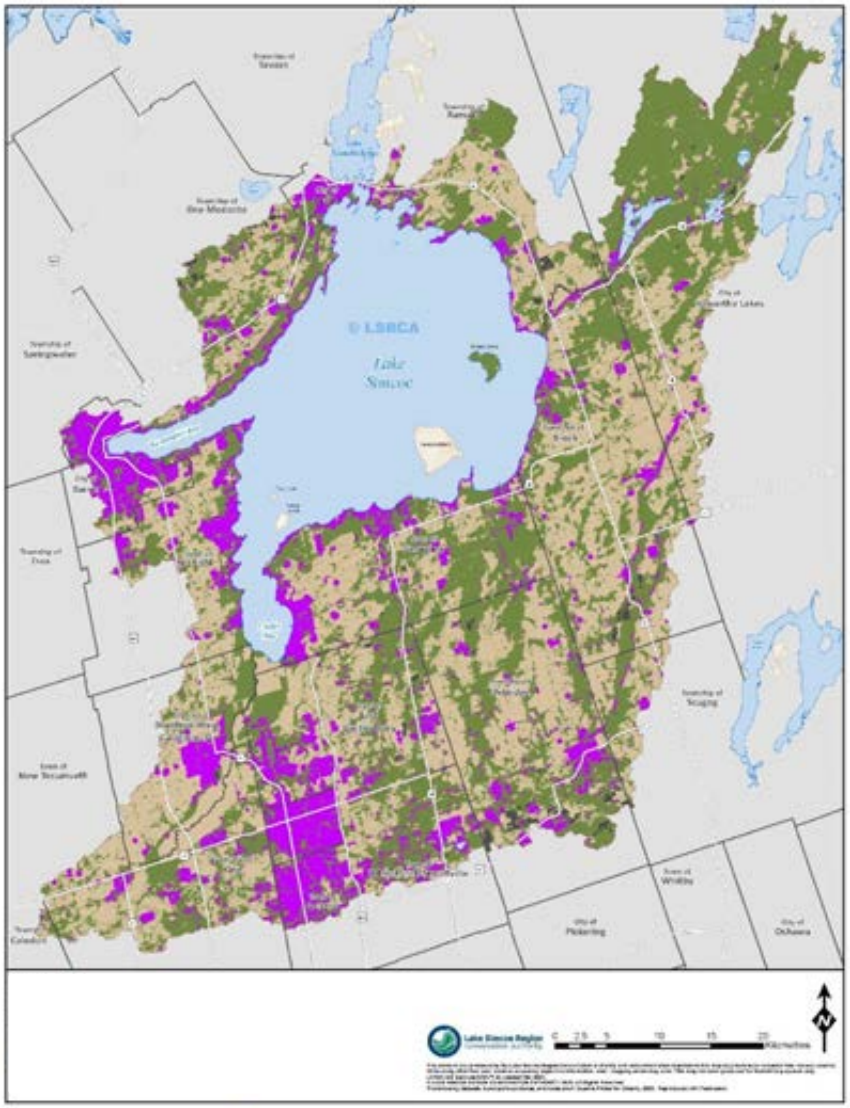
Why?

- Winter salt
- Stratification
- Limited maintenance

Municipal Interviews Confirmed Barriers to Effective Stormwater Maintenance



Stormwater Management Inventory



Ponds: 200 (2010) ➡ 500 (2022)

LIDs: 75 (2010) ➡ 195 (2022)

Legend

- Lower Tier Municipality
- Major Highway
- Waterbody

Land Cover

- Urban
- Rural
- Aggregate
- Natural Heritage

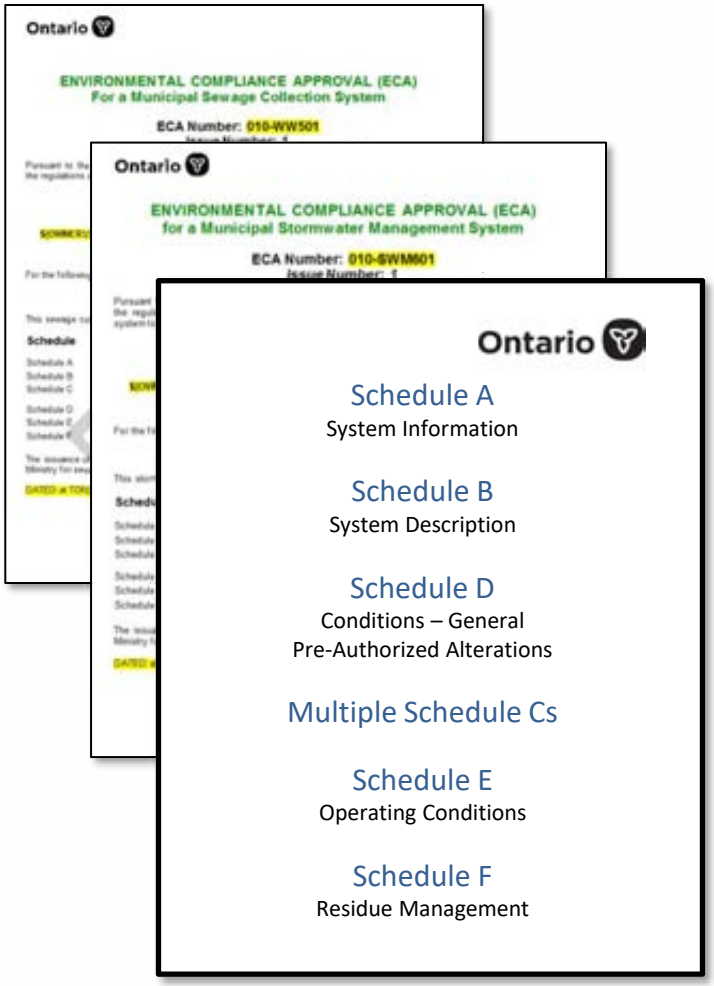
Evolving Legislative Framework:
Municipal Stormwater Inspection & Maintenance

- Ontario Ministry of the Environment, Conservation, and Parks new Ontario Regulation 208/19

  Combining individual approvals into consolidated linear infrastructure Environmental Compliance Approval for municipal stormwater management systems

- Ontario Regulation 588/17

  Municipal Asset Management requirements, including an inventory tracking program for stormwater infrastructure.



Training and Resources

- Stormwater Management Pond / Low Impact Development Inspection & Maintenance training for municipalities
- Stormwater Management Working Groups
- Database to help with asset management
- Best practice guidance documents
- Low Impact Development Treatment Train Tool

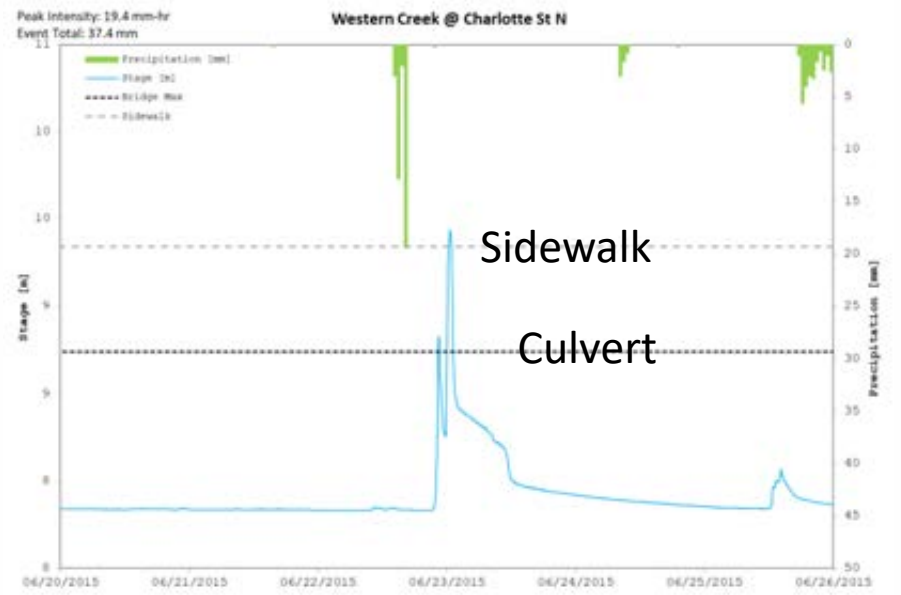
Monitoring Plan Implementation

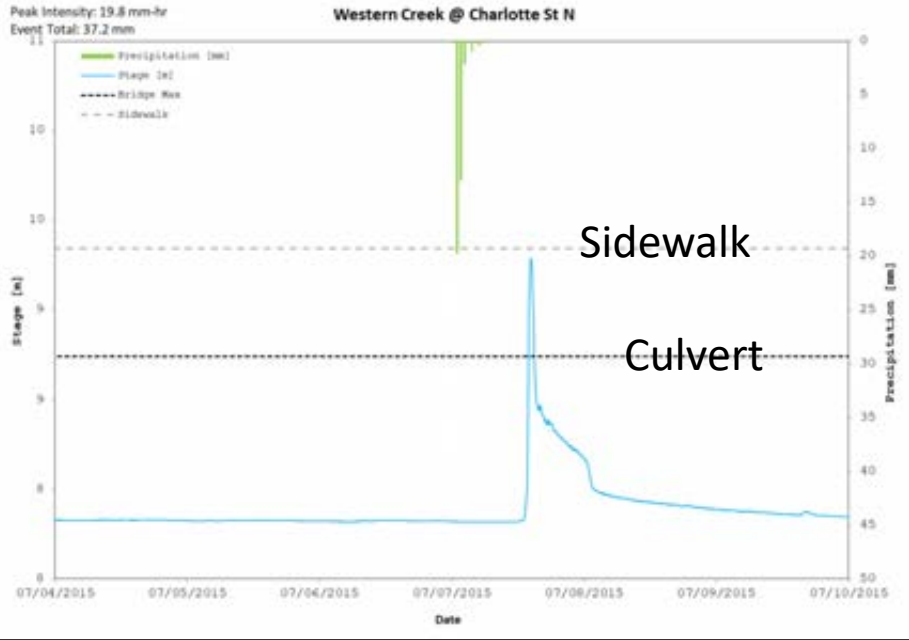
- Receiver monitoring of “Sentinel Catchments”
  - Low stream order
  - High density of stormwater infrastructure
  - Maintenance of infrastructure causes response in stream

Goals – See water course health improve over time from effective Stormwater Management, leveraging existing programs and investment

Pond Maintenance = Peak Flow Reduction

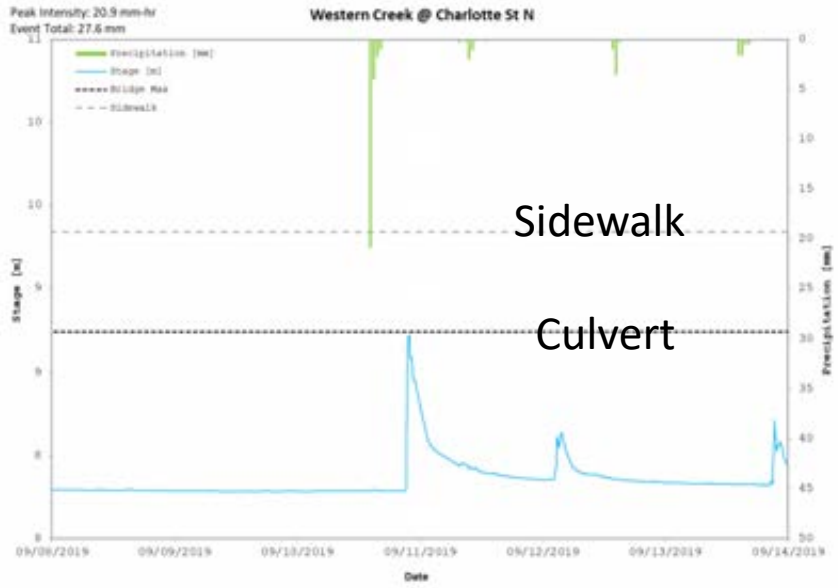
2015 – Pre-Clean Out / LID





- Upper Canada Mall pond clean out and LID projects around 2016
- Pre-clean out / LID flooding of road occurred
- Post-clean out / LID no road flooding recorded

2019 – Post-Clean Out / LID



Conservation Authority Inspection and Maintenance Services
Meeting Provincial requirements

1. Assumption clearance
2. Inventory management
3. Annual inspections
4. Sediment accumulation assessments
5. Prioritization of maintenance needs
6. Reporting
7. Operations & maintenance manual
8. Receiver Monitoring

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