

Evolution of Storm Water Management in Ontario



on



Conservation Authorities:

- manage natural resources on a watershed basis
- work with municipalities to plan and implement future growth and services

Responsibilities include:

- Flood control, forecasting, and warning
- Protecting health of rivers and lakes
- Promoting sustainable development
- Preserving and enhancing regional biodiversity







TRCA Jurisdiction

The TRCA's area of jurisdiction includes:

•3,467 sq. km: 2,506 on land and 961 water-based.

This area is comprised of nine watersheds including:

•Etobicoke Creek •Rouge River

- •Mimico Creek
- •Humber River
- •Don River
- Petticoat CreekDuffins Creek
- •Carruthers Creek

•Highland Creek

The TRCA's jurisdiction also extends into Lake Ontario to a point defined by the Territorial Divisions Act, R.S.O. 1980





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Evolution of Stormwater Management

Time Frame	Objective	Practice	Grev
Early 1980's	• Quantity (flood Control)	Rapid Conveyance through storm sewer design and construction (direct discharge to receiver)	
Early 90's	• Quantity • Quality • Erosion	SW 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	Green



WHERE WE ARE TODAY

 77% of urban areas do not have adequate stormwater controls (mostly older areas that were developed prior to the required implementation of stormwater management controls)

Over 800 SWM Ponds have been constructed

 Very few Source and Conveyance Controls (Low Impact Development)





Conventional end-of-pipe SWM strategies don't address all impacts

- Accelerated stream channel erosion
- Risk of damage to infrastructure & property
- Degraded water quality (increased temperature and pollutant loads)
- Degraded aquatic and terrestrial habitats



• Less diverse aquatic communities





Potential impacts: Risk to infrastructure



Location: Black Creek at Finch Avenue – Note Complete Failure of Embankment and Roadway



Black Creek at Finch Avenue, August 19, 2005

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- Affects water quality, aquatic habitats, infrastructure
- Streams are still responding to current levels of urban development
- Research from current watershed plans suggests current SWM approaches are not adequate







For more information...



Water Budget Discussion Paper



Toronto and Region Conservation

Gartner Lee

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Stormwater Management (SWM)

Potential impacts are mitigated through the implementation of a "treatment train" of storm water management practices consisting of:

Lot Level Controls





Low Impact Development (LID) is a stormwater management strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution.

LID comprises a set of site design strategies and distributed stormwater management practices that harvest, filter, evapotranspire, detain and infiltrate rainwater.



LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT PLANNING AND DESIGN GUIDE

Version 1.0

2010





Potential Benefits of Low Impact Development



Conventional "end-of-pipe" strategy



Low Impact Development strategy

- Mitigates impacts to hydrologic cycle
- Reduces generation of excess
 runoff volume
- Restores natural flow pathways and patterns
- Reduces temperature impacts
- Creates multi-functional landscapes



- 1. Integrating stormwater into planning
- Discussion of Municipal Planning and Environmental Planning process
- What type of studies are required and what is required for each study
- Provide examples of integrated approaches (Multi Disciplinary Approach Involving Engineers, Planners, Landscape Architects etc.)





- 2. Focus on runoff prevention
- Minimize impervious cover through narrower roadways shared driveways/parking
- Drain roofs to pervious (landscaped) areas
- Permeable pavement
- Green roofs
- Rainwater harvesting





- 3. Treat stormwater close to the source
- Decentralized stormwater management in a treatment train of small structures
- Flatten slopes, lengthen flow paths, maximize sheet flow
- Maintain natural flow paths, use open drainage
- Use LID techniques to manage frequent, low-intensity storms



Conventional "end-of-pipe" strategy





- 4. Create multifunctional landscapes
- Road right-of-ways and parkland that provide stormwater treatment, snow storage and wildlife habitat functions
- Stormwater management practices that provide filtration, peak flow control, <u>and</u> infiltration
- Reduce heat island effect
- Conserve potable water
- Enhance site aesthetics





- 5. Educate and maintain
- Teach property owners/ managers and landscapers how to monitor and maintain LID practices on private property
- Establish legal agreements to ensure long-term operation and maintenance
- Provide adequate funding and training for public works departments to monitor and maintain LID practices on public property





Low Impact Development Practices

- Non-structural practices
- Rainwater Harvesting
- Green Roof
- Downspout Disconnection
- Soakaways, Infiltration Trenchs and Chambers
- Bioretention
- Vegetated Filter Strip
- Permeable Pavement
- Enhanced Grass Swale
- Dry Swale
- Perforated Pipe Systems

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Sustainable Technologies Evaluation Program

- Multi-agency program led by TRCA
- Main program objectives:
 - Evaluate clean water and energy technologies;
 - Assess barriers to/opportunities for widespread implementation;
 - Develop knowledge transfer tools, guidelines and policy alternatives;
 - Education, advocacy, and technology transfer.
- Program web address: <u>www.sustainabletechnologies.ca</u>





• Performance Evaluations:

- Conventional detention facilities
- LID practices, such as green roofs, rainwater harvesting, bioretention, permeable pavements etc.
- Erosion and Sediment Control measures
- Best Practices Guideline and Decision Support Tool Development:
 - LID Design Guide, O&M Guide, Life Cycle Costing Tools, and Literature Reviews
 - Soil Management Best Practices Guide
 - Polymer Application Guide

Training , Professional Development:

- Annual Conference on SWM and ESC
- Training workshops on LID, ESC, and other topics
- www.thelivingcitycampus.com











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RWH Design and Sizing Tool







Key barriers to implementing LID SWM

- How to decide where risk of groundwater contamination is too high;
- 2. How best to design infiltration practices on fine textured soils;
- 3. How to provide treatment "credit" in sizing d/s end-of-pipe practices;
- 4. How to build capacity of municipalities to commission, operate and maintain SWM infrastructure;







Current Initiatives

- LID SWM Operation and Maintenance Guide;
- Technology evaluations:
 - Permeable Pavements ;
 - Residential front yard makeovers;
 - Bioretention swales;
 - Soil Management;
 - Rainwater treatment system for potable uses.













- Established in 1997 by Environment Canada
- Environment Canada
 - Responsible for the management of the national program
 - Oversees the delivery agent GLOBE Performance Solutions (GPS)
- GLOBE Performance Solutions
 - Selected as delivery agent in October 2012 via competitive process
 - Consists of a network of qualified independent performance testing and verification organizations from across Canada
 - TRCA is a member of the GPS Consortium



GLOBE Performance Solutions Consortium

- Consists of 10 organizations from across Canada with technical expertise in one of the four key environmental priority areas : water, air, energy and soil
- TRCA identified as the Stormwater and Renewable Energy testing or verification organization
- TRCA- has prepared a "Procedure for Laboratory Testing of Oil Grit Separators for Canada"



Contact Information

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