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The Next Step: Using LID to Mimic Natural Systems with Arterial Road Drainage

a presentation to TRIECA , Day 1 @ 11:30 AM

Implementing LID on a Watershed Basis and Making a Difference

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New Directions



The watershed includes all roads within a system.

Green Infrastructure

- New SWM Design Criteria project
- Pilot Projects
- Education and Training
- Permits and Approvals
- Conferences/Seminars
- National Benchmarking
- Water Resources Paper (Official Plan)



Municipal Interest : Common Issues

Stormwater is considered within **4** distinct areas of municipal interest.....



Planning and Land Development

- master environmental servicing plans
- Plans of Subdivision and Site Plans



Environmental Assessments

 stormwater drainage report provides direction in detailed design



Capital Programs

 delivery of municipal engineering projects, e.g. roads, erosion, facility design, etc.



Operations and Maintenance

- operating procedures and monitoring
- repair and replacement



"Implementing "LID "

To Make it **"Work"** we must;

- Foster the relationship between Low impact Development (LID) (and Thermal Mitigation) in municipal processes.
- Understand and Coordinate the "Permit Process"
- Understand the connection between
 - Master Planning and Design and Construction
 - EA Process and Detailed Design
- Undertake Monitoring

Peel - LID Process Report



- STEP 1. Building the Project Team
- STEP 2. Site Evaluation and Field Reconnaissance
- **STEP 3. Screening the LID options**
- **STEP 4. Preliminary Design**
- **STEP 5. Detailed Design**
- **STEP 6. Approvals**
- **STEP 7. Tender and Contract**
- STEP 8. Construction Supervision and Administration
- **STEP 9. Assumption and Verification**
- **STEP 10. Lifecycle Activities**







Hydrologic A and B Soils (high perm. soils)



Source : MOECC

Example



Hydrologic C and D Soils (low perm. soils)



Project List (Examples)

- Dixie Road Hydromedia Pilot
- Mississauga Road Project 1
- Mississauga Road Project 2
- Queen Street
- Belfountain Bridge
- Mayfield Road
- SWM Facility
 - Bovaird and Gillingham

Mississauga Road Queen Street to WIIIIams Parkway Phase 1 re-configuration of storm works on road Phase 2 centre median works, above and underground

- 2 Mississauga Road Williams Parkway to Bovaird Drive
- Belfountain Bridge

 (@ bridge and easterly)
- 4 Queen Street Chinguacousy Rd to Mississauga Rd
- 5 Britannia Road Erln Mills Pkwy to Winston Churchill Blvd.
- 5 Airport Road Phase 1 @ Brldge Phase 2 Castlemore Road to Mayfield Rd
- 7 Airport Road
 1km north of Mayfleld Road to approx.
 1km south of King Street
- B Highway 50 Castlemore Road to Mayfield Road
- 9 Mayfield Road Mississauga Rd to Chinguacousy Rd
- 10 **Mayfield Road** Winston Churchill Boulevard to Mississauga Road
- 11 Dixie Road Pilot Project Birchbank to Balmoral
- 12 SWM Pond Rehabilitations Various
- 13 Derry Road Pilot Study



Hydromedia Pilot

- Dixie Road, south of Balmoral
- 800m long x 2 m wide
 - = Total 1600 m2
- Mimics the natural hydrology of the local area
- Separated into Bays Retention

 Infiltration system
- Thermal Impact eliminated
- Final Report June 2017







Mississauga Road Project 1 and 2 LID - Goals and Objectives

- Mitigation of thermal impacts Retention and Filtration
- ✓ Overall improvements to the health of the Credit River Watershed
- Compliance with the Peel Climate Change Strategy Background Report (June 2011), specifically Section 3.4 which calls for the redesign and retrofit water collection and conveyance infrastructure and systems to reduce vulnerabilities due to climate change, as well as implement runoff reduction practices such as source and conveyance controls.
- **1. Aesthetics & Maintenance** The median landscape must meet a high aesthetic standard while requiring minimal to no long term irrigation and maintenance. Irrigation with potable region of Peel water is not an option.
- Water Conservation Uses stormwater to the greatest extent possible to sustain the vegetation in the median (i.e.. underground storage tanks with pumps or gravity fed irrigation).
- **3. Water Quality** Provide level 1 treatment or better (80% removal of TSS). Assume a water quality volume of 25 mm. Mitigate impacts to Red Side Dace including temperature mitigation.
- **4. Water Balance/Erosion** Maintain pre-development to post-development water balance to the greatest extent possible. Infiltrate or reuse a minimum of 5 mm.
- 5. Flooding Match pre-development to post-development peak flows to the greatest extent possible.

Mississauga Road Project 1 Existing Conditions: Centre Island Filter Fabric and Mulch



Mississauga Road Project 1 Existing Conditions: Existing Storm Sewer System



PLAN VIEW



PROFILE



Mississauga Road Project 1 Artists Rendition of Proposed LID



Mississauga Road Project 2





Queen Street – Infiltration





Belfountain

Construction Activities:

- Road excavation
- Removal/reconstruction of concrete headwalls (over water)
- Installation of new steel railing system in a similar heritage style to other bridges in the area
- Reinstate the road (granular fill and asphalt)
- Remove and replace the steel beam guiderail at the bridge approaches
- Slope stabilization adjacent to bridge abutments and enhancements to Jefferson Salamander habitat
- Use of Low Impact Development (LID) techniques –
- Mitigation of Thermal Impacts



Principles

- Provide underground capacity for full minor system
 - Stone trench sized with voids = volume of minor system
- Infiltrate the minor system
 - Water retained in trench until it infiltrates
 - Native soil type not a major concern
 - No outflow until a major system event or back to back minor system events
- Major System flows in chamber space
- Sediment removal made easy
 - System can be flushed
 - Catchbasin inserts e.g. CB Shields



Benefits

- Infiltrates minor system
 - no formal connection to receiving watercourse
 - ONLY ECA permit, No Permits required (CA,MNRF, etc.)
 - Thermal Mitigation achieved
 - Base flow through groundwater system to watercourse
 - Fisheries protection
 - Erosion protection is enhanced
 - No sedimentation at outfall
 - Requires less maintenance
 - Mimics the natural hydrology





Conceptual design





Conceptual design

Mayfield Road – Chamber system

STORMCHAMBER[®] WITH SEDIMENTRAP[™]





Mayfield Road – Chambers



Bovaird and Gillingham SWM Facility



Thoughts to Consider

- Good Planning = Good LID Projects
- LID promotes Thermal Mitigation
- Permits

Discharge



- LID mimics the natural area hydrology
- Operations and Maintenance
 - Operating vs Capital Expenses
 - Less effort with standard resources
- Monitoring is required to learn





Thank you !



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Low Impact Development in Action