Myth Busting Low Impact Development (LID): Lessons learned through demonstration sites can help overcome barriers to wide-scale adoption

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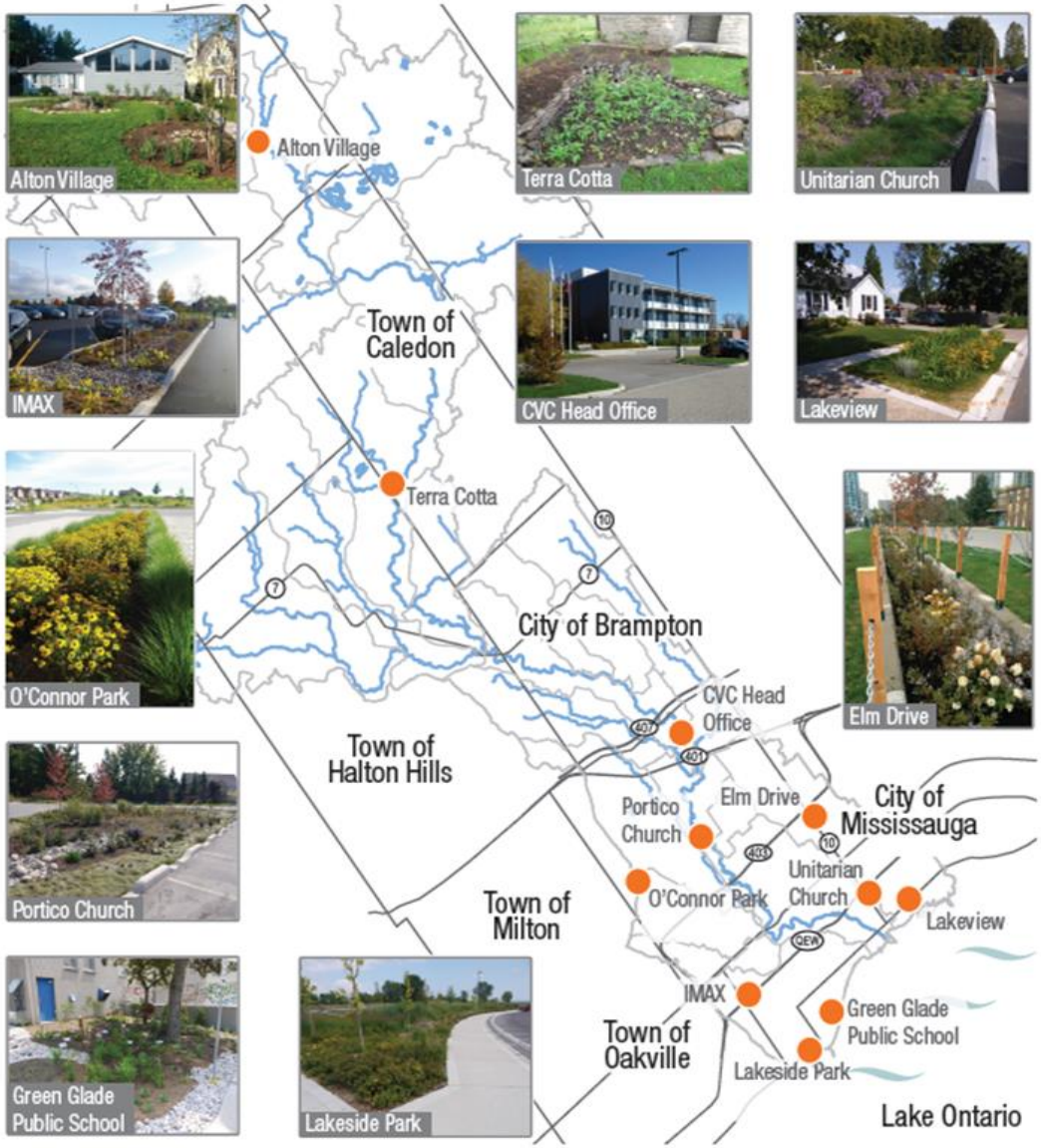
“Everything is either an opportunity to grow or an obstacle to keep you from growing. You get to choose.”
Wayne Dyer

Implementing Our Water Management Strategy

- Signing of the Watershed Charter to get political buy-in
- Developed Multi-stakeholder Committees to Identify Barriers, Gaps, Opportunities
- Engaged Leaders to learn lessons– we're not that different after all!

Monitoring to Address Barriers and Misperceptions

- 61 LID Sites
- 12 Demonstration Sites
- 19 key performance and maintenance objectives



LID Monitoring Objectives

Monitoring Objective	Demonstration Site									
	Central Parkway 	IMAX 	CVC Head Office 	Lakeview 	Elm Drive 	Mississauga Road 	Meadows in the Glen 	Wychwood 	Laurelwood	Columbia Forest
1. Evaluate how SWM ponds perform with LID upstream. Can the wet pond component be reduced or eliminated by meeting the erosion and water quality objectives with LID?							x	x	x	x
2. Assess performance of measures to determine potential rebates on development charges, credits on municipal stormwater rates and/or reductions in flood insurance premiums. (i.e. can LID reduce infrastructure demand).	x	x	x	x	x	x	x	x		
3. Evaluate whether LID SWM systems are providing flood control, erosion control, water quality, recharge, and natural heritage protection as per the design standard.	x	x	x	x	x	x	x	x	x	x
4. Evaluate and refine construction methods and practices for LID projects.	x	x	x	x	x	x	x	x		
5. Evaluate long-term maintenance needs and maintenance programs, and the impact of maintenance on performance.	x	x	x	x	x	x	x	x	x	x
6. Evaluate effectiveness of soil amendments and increased topsoil depth for water balance and long-term reliability.				x	x					
7. Assess the potential for groundwater contamination in the short and long term.		x		x	x				x	x
8. Assess the performance of LID designs in reducing pollutants that are dissolved or not associated with suspended solids (i.e. nutrients, oils/grease, and bacteria)		x		x	x		x			

PERCEPTION:
LID doesn’t work in clay soils

Performance Evaluation: Precipitation Video

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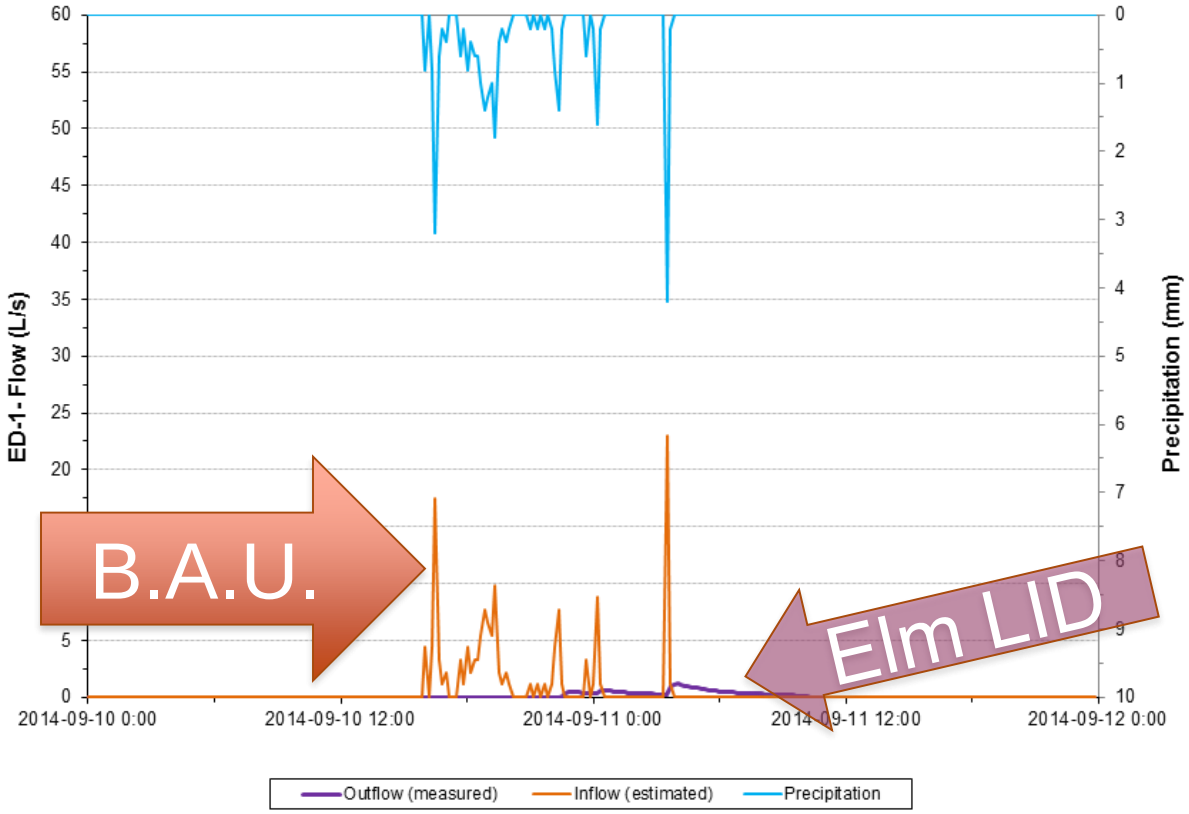
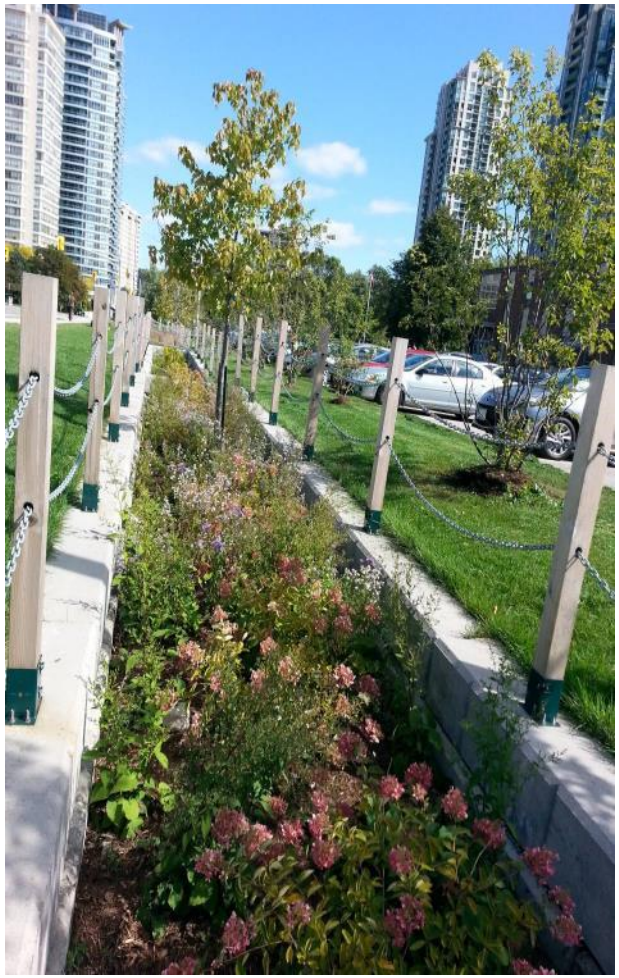
Inflow and Outflow Hydrographs





Total Rainfall = 27mm

Volume Reduction = 79%

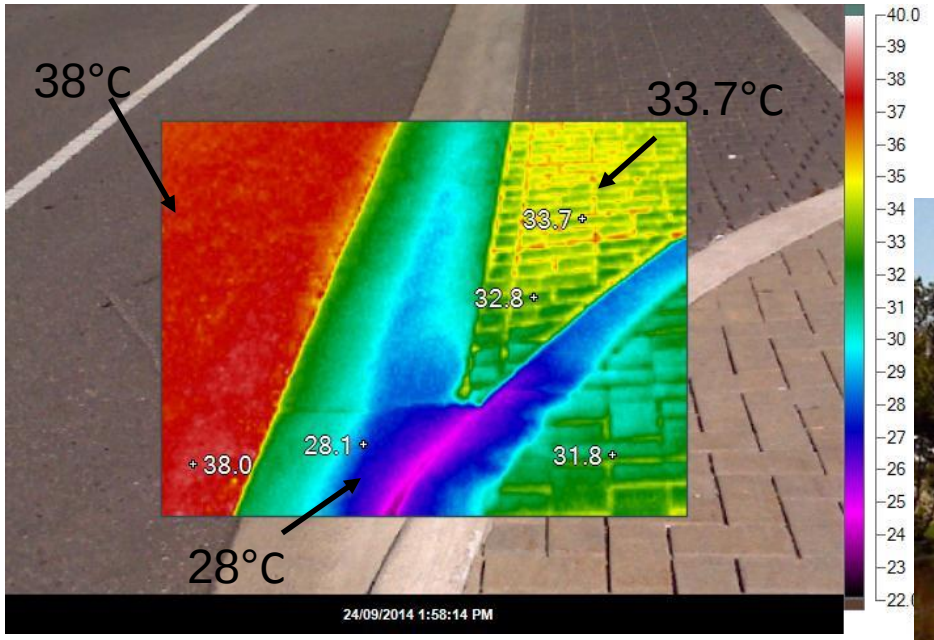
Peak Flow Reduction = 87%

Flooding, Water Quality and Erosion Performance

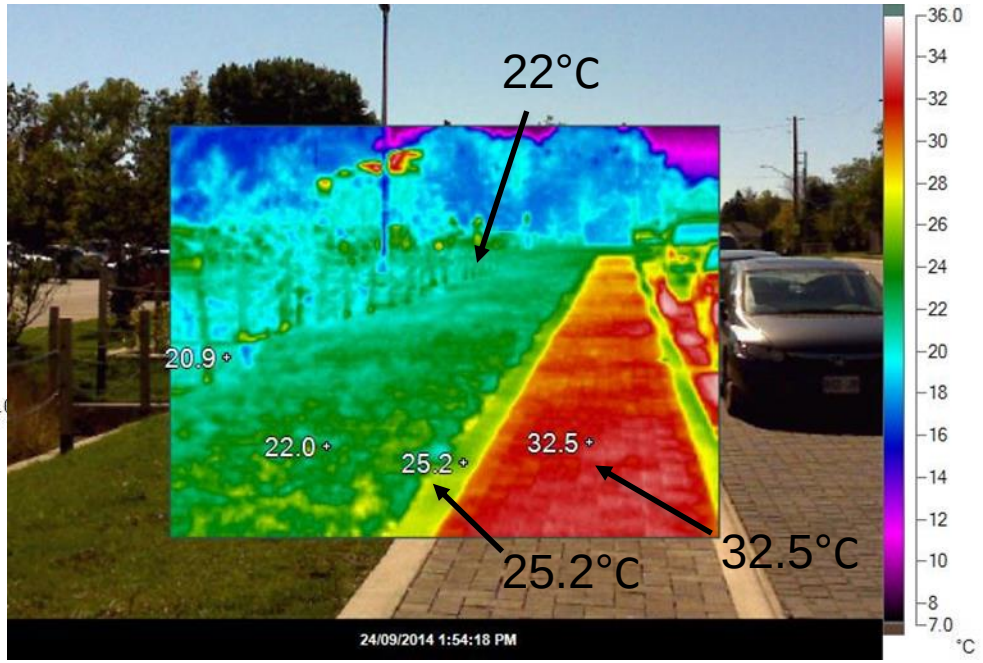
Metric	Design Criteria	Performance at Elm	Criteria Met?
Flood Control: Peak Flow Reduction (%)	2 yr event (33 mm) - 37% 5 yr event (45 mm) - 27% 100 yr event (79 mm) -13%	54-95%	
Erosion Control: Runoff Volume Reduction	2 yr event (33 mm) - 29% 5 yr event (45 mm) - 19% 100 yr event (79 mm) - 8%	40-100%	
Water Quality: TSS Removal	80%	88%	

*Based on data 2011 to 2015 (inclusive)

Surface Temperature Difference: Asphalt, Permeable payment, and Grassed area



Air Temp 26.23°C



Thermal imaging camera

PERCEPTION:
Storm water infrastructure will take away park lands and recreation

LID Options for Parks

Landscape Alternative

Permeable Pavement

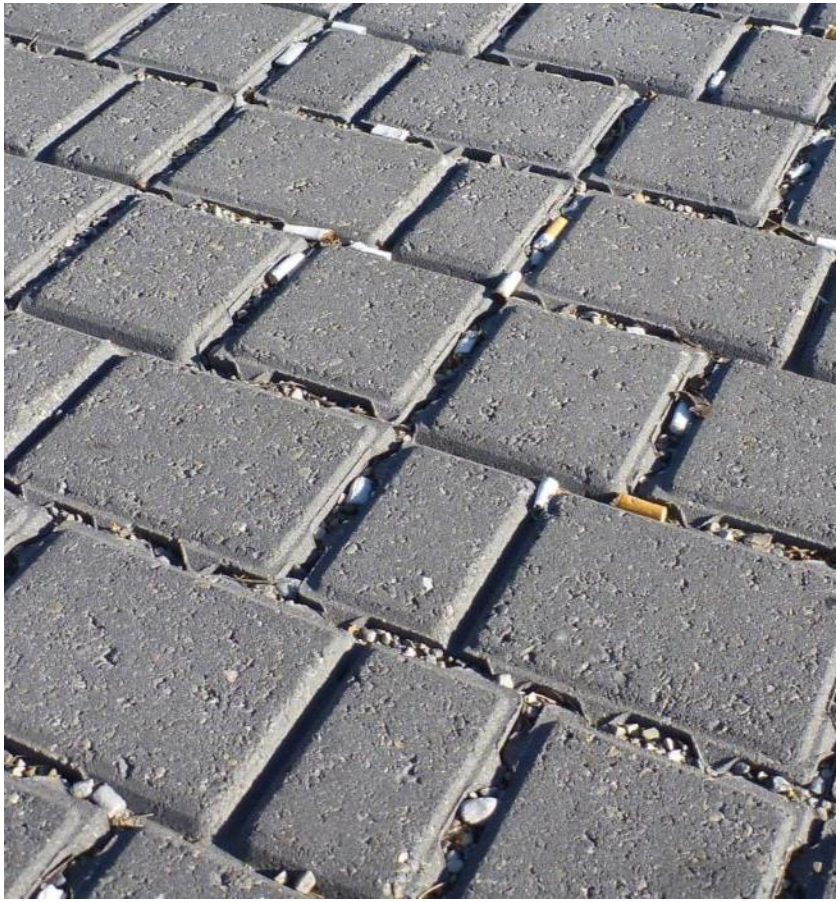
Rain Garden

Bioswales

Dry ponds and infiltration

Rainwater Harvesting

PERCEPTION:
LID costs more to maintain than ponds



Lesson Learned: Right Design for Land Use

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“No additional maintenance is required at parks with LID.”

Tad Makula and Rich Hurren, City of Mississauga

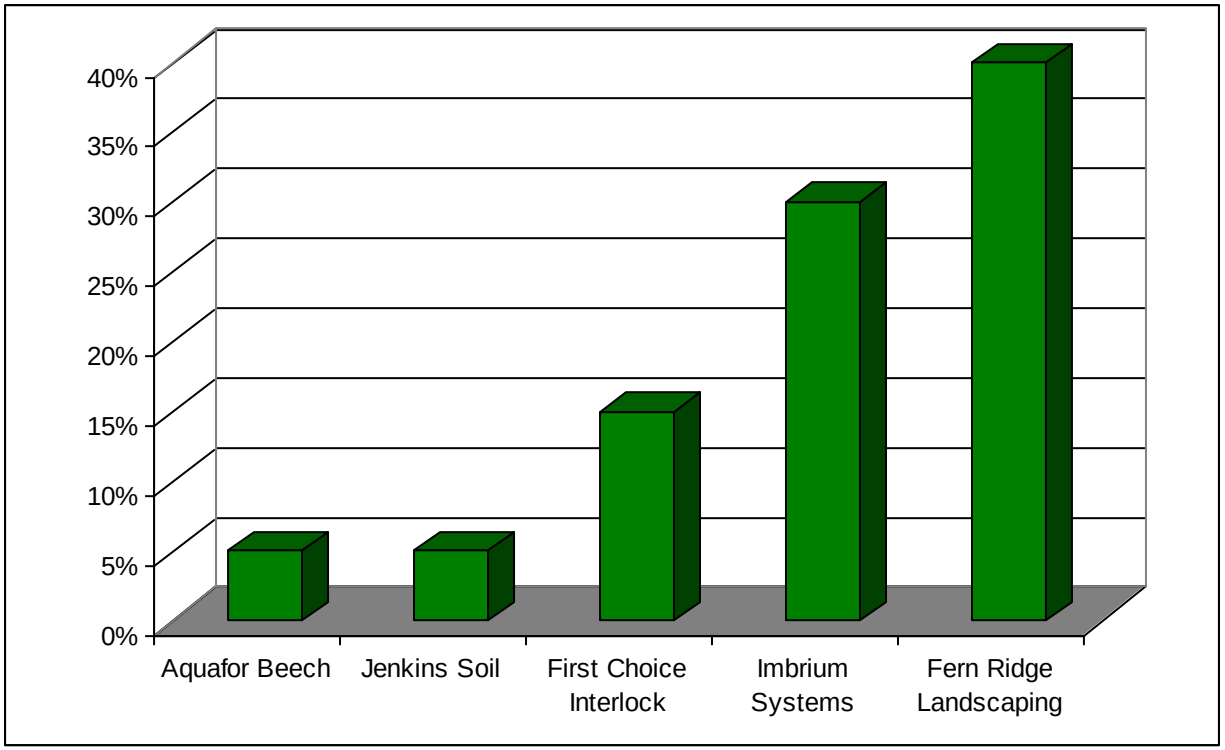
PERCEPTION:
Doing something for the environment comes at a cost

Commercial areas with green features have higher occupancy and enhanced property value

“This project will remedy a number of challenging maintenance issues and reduce our operating costs”

Nancy Cole, IMAX

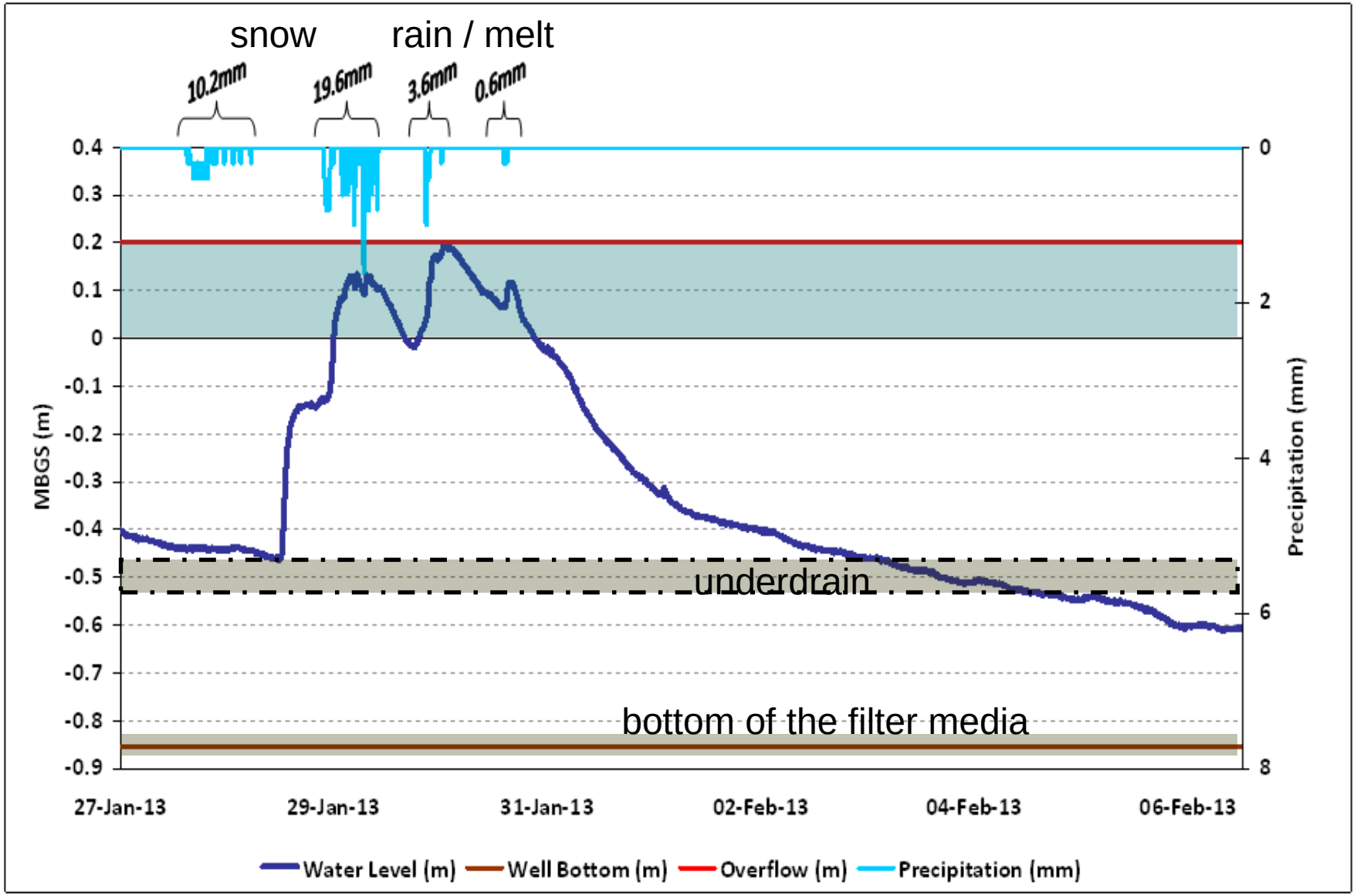
Projected growth in LID revenue



Local green business revenue is projected to grow up to 40% in the next 5 years

PERCEPTION:
LID doesn’t work in the winter

Do LID Features Work in Winter?



PERCEPTION:
We can’t reduce the size of ponds as LID doesn’t reduce volume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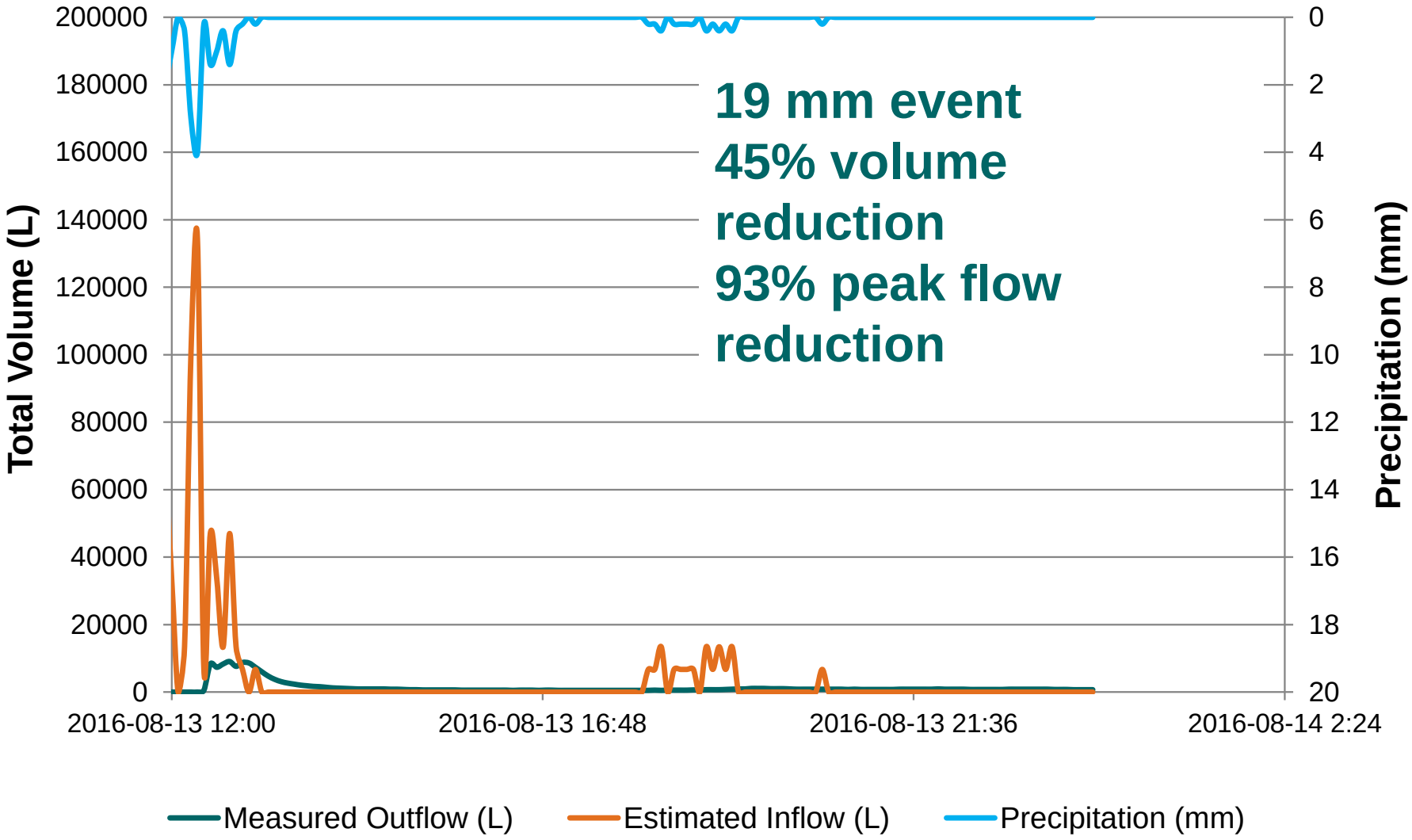
LIDs to Pond A Inlet



Stormwater Pond Performance

Lesson:
Monitoring can inform future designs and reduce risk

Lesson Learned – Importance of Grading and Inlet Design

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Proper Inlet Design

IMAX Bioswale

Wychwood Bioswale

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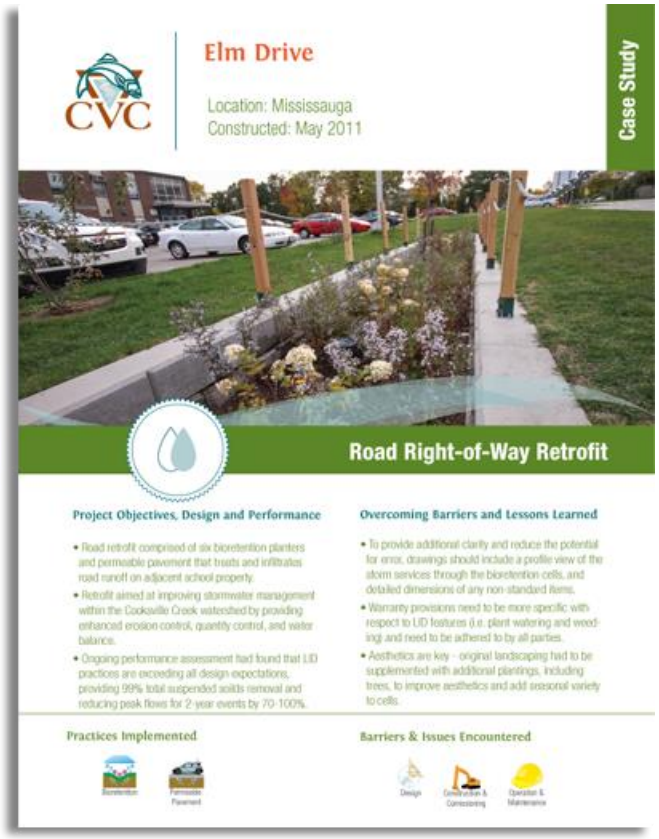
Share Lessons Learned: Case Studies



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Elm Drive

Location: Mississauga
Constructed: May 2011

Case Study

Road Right-of-Way Retrofit

Project Objectives, Design and Performance

- Road retrofit comprised of six bioretention planters and permeable pavement that treats and infiltrates road runoff on adjacent school property.
- Retrofit aimed at improving stormwater management within the Cookseville Creek watershed by providing enhanced erosion control, quantity control, and water balance.
- Ongoing performance assessment had found that LID practices are exceeding all design expectations, providing 99% total suspended soilds removal and reducing peak flows for 2-year events by 70-100%.

Overcoming Barriers and Lessons Learned

- To provide additional clarity and reduce the potential for error, drawings should include a profile view of the storm services through the bioretention cells, and detailed dimensions of any non-standard items.
- Warranty provisions need to be more specific with respect to LID features (i.e. plant watering and weeding) and need to be adhered to by all parties.
- Aesthetics are key - original landscaping had to be supplemented with additional plantings, including trees, to improve aesthetics and add seasonal variety to cells.

Practices Implemented

Barriers & Issues Encountered

CVC

Green Glade Sr. Public School
Rain Garden Retrofit

Location: Mississauga
Constructed: 2011

Case Study

Public Lands

Project Objectives, Design & Performance

- Rain garden installed to treat 320 m² drainage area comprising roof and parking lot runoff.
- Garden retrofit is dual-purpose: treats stormwater and reduces nuisance ponding in parking lot, decreasing slippery ice conditions in winter.
- Surface draw down time is well within a 24 hour period, avoiding any potential mosquito risk.
- A multi-contributor approach was used so that the school incured no direct costs for the design and construction of the rain garden.

Overcoming Barriers & Lessons Learned

- Attaining 'buy-in' from stakeholders, identifing and empower champions to facilitate communication and build consensus during all project phases were key to the success of this project.
- Bioretention media supplied did not meet specifications leading to poor drainage. Project partners worked with the soil supplier to replace media, restoring proper drainage.
- A support network has been developed to ensure that all maiteneance is being done properly.

Practices Implemented

Barriers & Issues Encountered

Summary

- More Extreme Events
- Need to add stormwater management into existing urban areas
- Public Lands are the only open spaces in existing urban areas
- LID works
- LID is Cheaper, beautiful and creates more walkable, green communities

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