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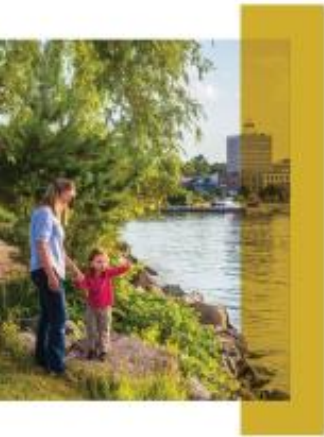


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ECONOMIC-BASED APPROACH TO STORMWATER MANAGEMENT AND GREEN INFRASTRUCTURE



Lake Simcoe Region
conservation authority



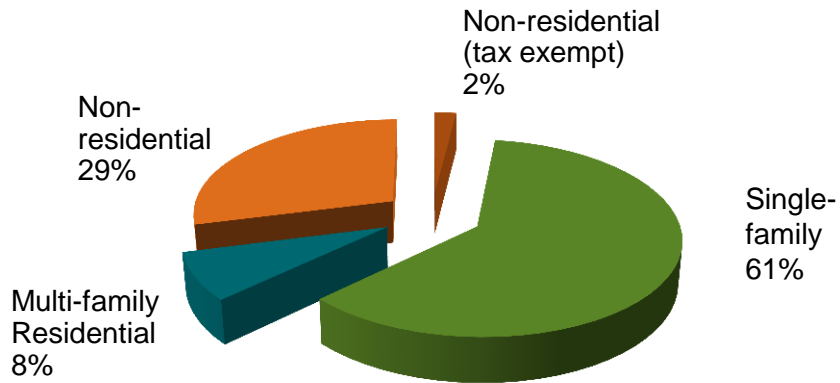
Credit Valley
Conservation



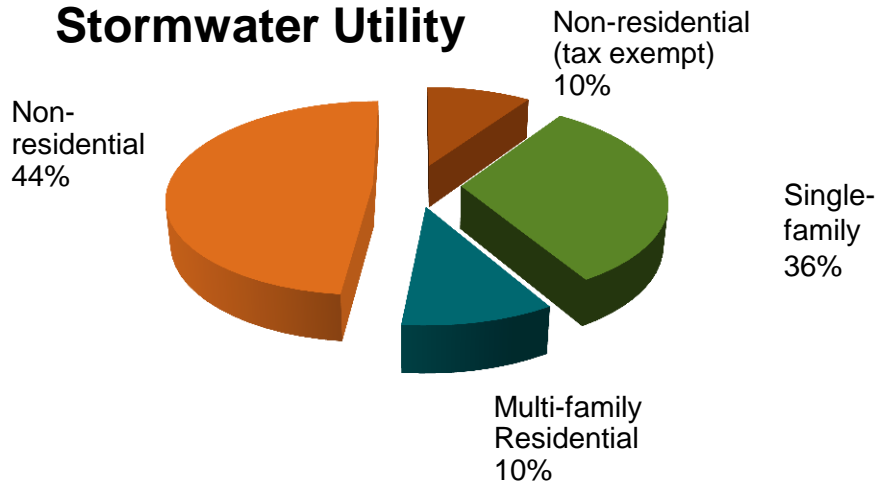
Toronto and Region
Conservation
for The Living City

The rising cost of stormwater

Property Tax Bill



Stormwater Utility

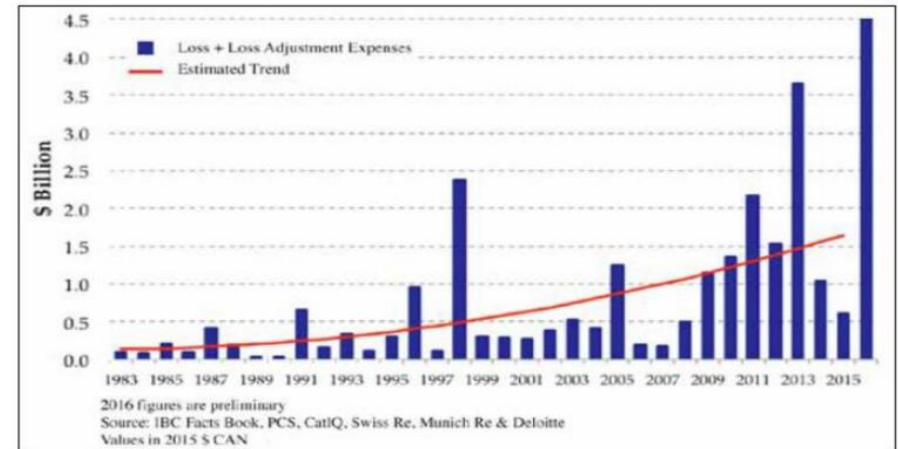


Stormwater Utility:

- Average increase of 41.5% for commercial properties
- Area of 245,945.2 m² pays \$93,952.20 annually

The rising cost of stormwater

- From 2009 to 2014 insured losses from catastrophic events were close to or above \$1 billion each year – most of this was due to water damage
- Flooding now highest cost of insurance claims
- Insurance industry changing policy and policy requirements to address risk
- Increased risk exposure concurrent with increasing severity in storm events



	Date	Location	Cost of Insurance Claims
Wint Hu A Sto C	July 2004	Peterborough	\$100 million
	August 2005	Toronto	\$500 million
	July 2009	Hamilton	\$200 million
	July 2013	Mississauga/Toronto/Brampton	\$1 billion
Heat wave			

0 50 100 150 200 250 300

Source: Cdn. Disaster Database

The proposed solution

A paradigm shift in stormwater management

We need to achieve watershed-scale, linked and integrated use of Green Infrastructure that includes public and private lands and is underpinned by sound economic principles and analysis (e.g. aggregation, economies of scale)

Some context

- \$31+ billion stormwater infrastructure deficit
- Most urban centers built prior to stormwater control
- Most land held by private property owners
- Significant limitations to amount of stormwater which can be cost effectively managed within existing urban areas exclusively on public lands



Some context

- Insufficient space and extremely high cost of land to retrofit existing urban areas with traditional stormwater ponds
- Current Best Practice = Green Infrastructure (GI) and Low Impact Development (LID)
- LID/GI aims to mimic nature by treating stormwater close to source
- Current GI and LID ad hoc and project-based
- No integration of green and grey water infrastructure



Getting answers

- Extensive research of leading jurisdictions: stormwater management, GI, LID, green building, etc.
 - municipalities (works, planning, finance, transportation, etc)
 - private residential and industrial & commercial property owners
 - insurance and financial businesses
 - conservation authorities or equivalent
- Multiple supporting market, feasibility and watershed planning studies



Constraints – Private Sector

- Stormwater fees are impacting commercial businesses
- Not implementing on-site stormwater management ROI exceeds acceptable threshold
- Incentives or credits do not tip the equation: ROI still not acceptable
- Commercial properties are qualifying for partial SW credits through existing flow controls
- Current credit & incentives as win/lose scenarios

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Mississauga to raise stormwater charges less than a year after implementation


Budget proposes raising billing rate from \$100 to \$102

Mississauga News
By [Rachael Williams](#)

In the wake of rising property taxes and massive hydro bills, Mississauga Councillor Karen Ras wants to provide residents some relief by capping the city's stormwater charge.

"At what point do we stop the bleeding a little bit for the residents who have to pay this?" Ras said during the city's second budget committee meeting on Tuesday.

Introduced at the beginning of this year, the stormwater charge, which appears on the Region of Peel water bill, ranges in price from \$50 to \$170 annually, depending on the rooftop size of a home. Revenues are placed in a dedicated fund and allocated to stormwater infrastructure maintenance and upgrades.



Stormwater Charge
Metroland file photo
Coun. Karen Ras put forward a motion to cap the city's stormwater billing rate of \$100. The motion failed during Tuesday's budget committee meeting.

stormwater charge

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Stormwater Credit Program

The Stormwater Credit Program has been designed to provide a stormwater charge reduction to multi-residential and non-residential properties whose stormwater practices or measures provide a direct benefit to the City's Stormwater Management Program.

Multi-residential and non-residential properties make up 70% of the hard surface area in the City. These sectors have the greatest opportunity for stormwater improvements and reduction. There are a number of stormwater management practices that can be implemented on multi-residential and non-residential properties as shown in the diagram below.

Stormwater Management Practices

[how the City manages stormwater](#)

Constraints – Government

- Stormwater infrastructure on public lands paid by private property owners
- Incomplete economic and optimization analyses (inc. full cost accounting)
- Capital-driven, project-based approach to water infrastructure with little integration of water systems
- GI & LID treated as add-on
- Federal and provincial funding are project based – no linkages, no integration
- After-the-fact mitigation a major driver of municipal stormwater planning



What's needed

- ROI needs to be met for private property owners to invest in LID/GI
- Must address existing development to solve most significant issues e.g. flooding
- Municipal water infrastructure planning must:
 - Be based on the principles of integrated watershed management
 - Move beyond municipal lands and borders
 - Be supported by integrated economic and optimization analyses



Economic rationale

Distributed green & grey infrastructure

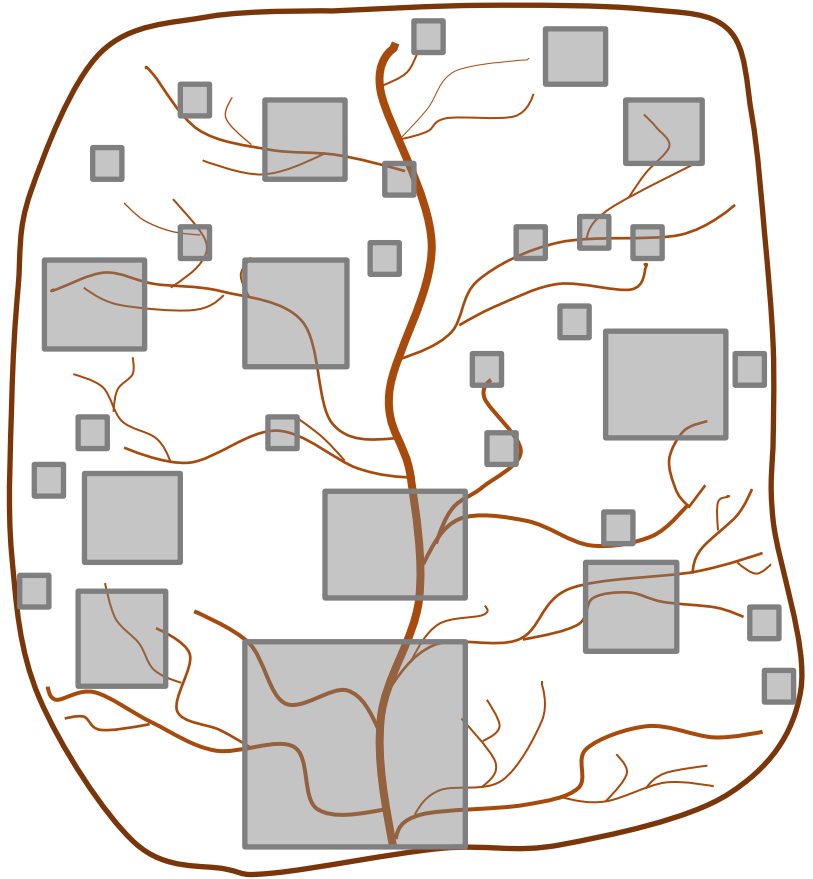
- Private land must be part of the equation
- Aggregation and integration for significant economies
- \$200,000/ha private land vs \$1 Million/ha public lands (Philadelphia)
- Saving to municipalities e.g., reduce or eliminate stormwater pond/infrastructure
- Percentage of municipal savings returned to private property owners for LID/GI
- Win-win with cost savings for land owners and municipalities
- Improved water quality, quantity & flood mitigation



Economic rationale

Equitable Responsibility

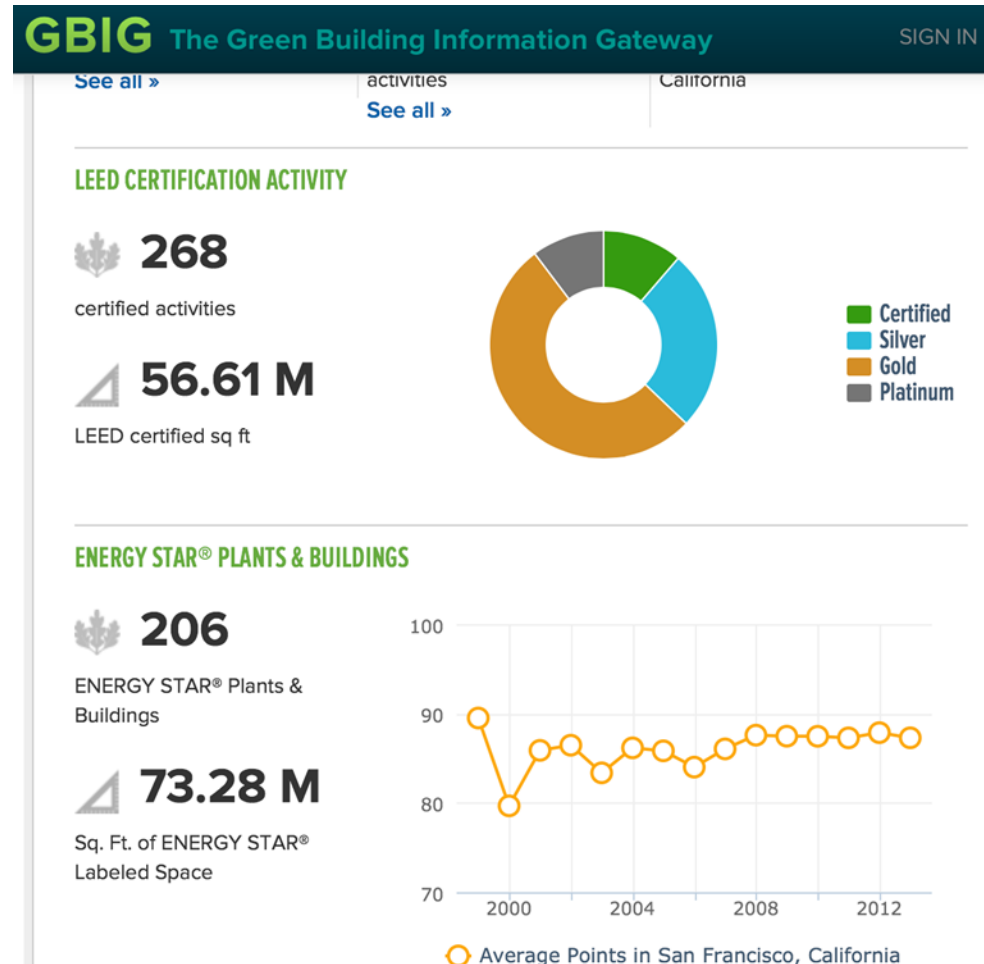
- Watershed wide economies of scale (sizing and aggregation of green and grey infrastructure)
- Cost sharing amongst municipalities
- Infrastructure (grey and green) optimization
- Water management issue targeting
- Environmental outcomes – water quality and quantity



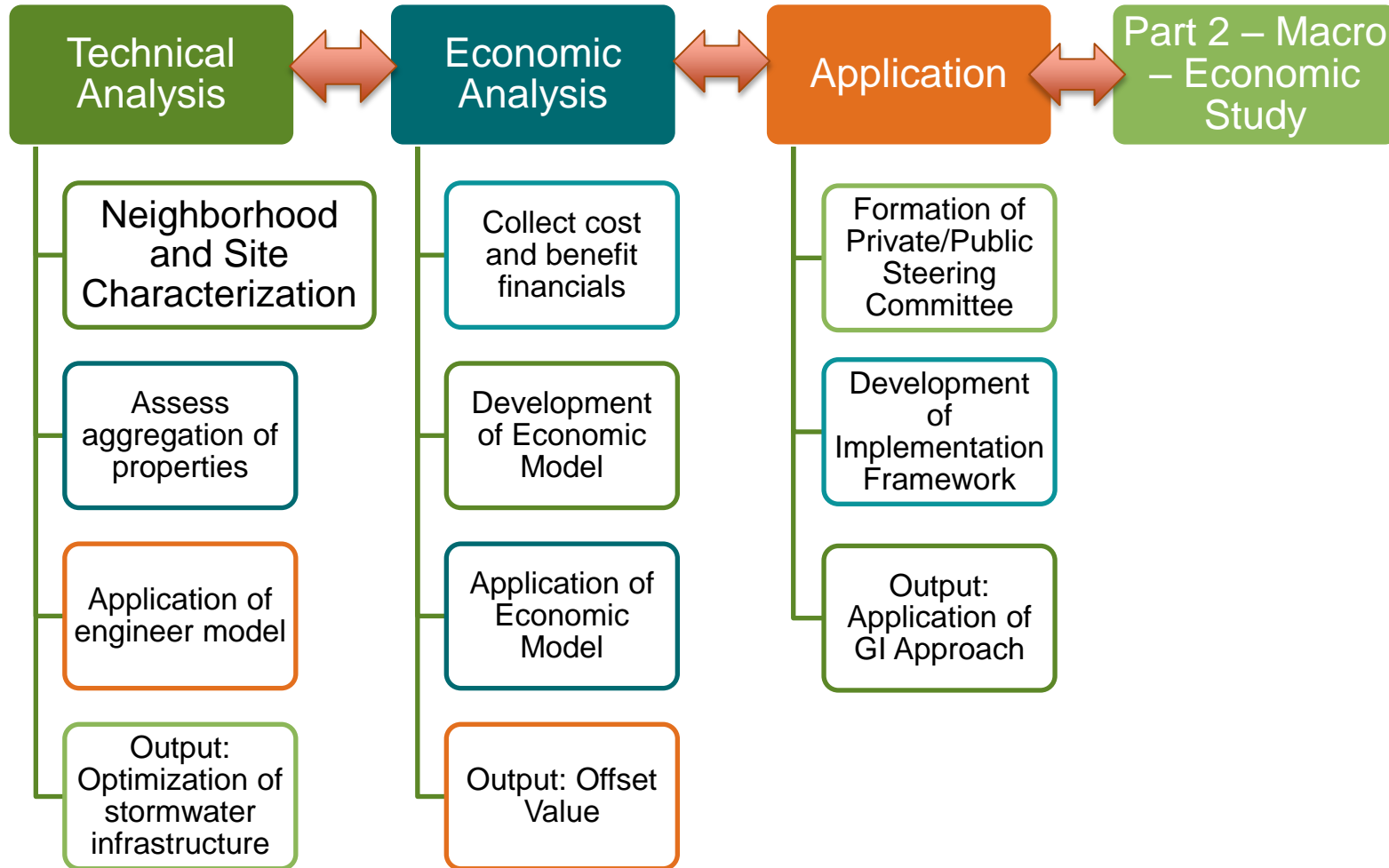
Economic rationale

In a tough economy from 2007 – 2009, buildings with green labels enjoyed:

- 2 – 6% higher rent
- 6% higher effective rent
- 11% higher sales price

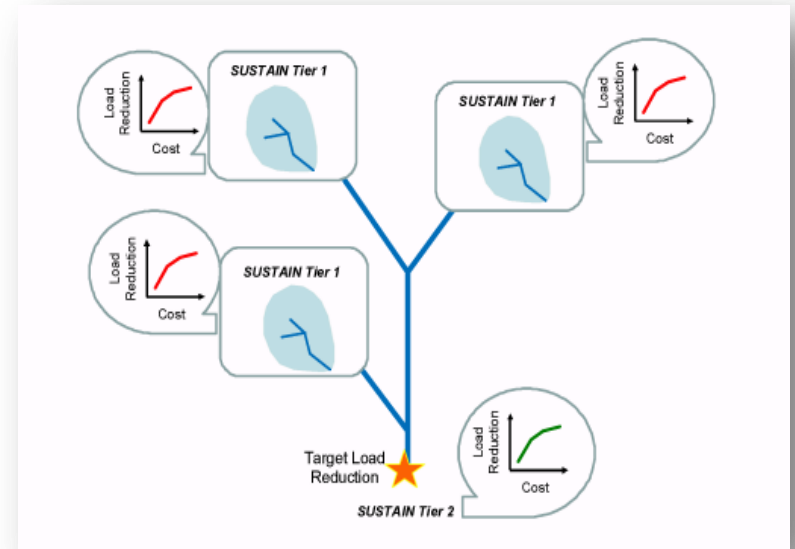


Part 1 – Micro-Economic Project



Part 2 - Macro-Economic project

- Comparative and integrated economic and performance analysis at lot, community, watershed and nested watershed levels
- Integration of GIS, watershed simulation models, process-based BMP simulation models, and cost-optimization models
- Tiered evaluation to meet specific quantity and quality requirements and multiple scenario cost-benefit analysis



Outcomes

- First ever methodology and tool to enable municipalities to complete economic and performance analysis of distributed and aggregated water systems at multiple scales
- Grey, green and integrated infrastructure analysis to determine optimized “sweet spot” providing ultimate performance at lowest cost
- Integrated Water Infrastructure Optimization tool fully open domain
- Knowledge transfer – outreach and training to municipalities, directional support from FCM, provinces, etc.

Project results implemented = a win-win due to cost savings for landowners and municipalities



Questions or Comments:

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*Together, it's our nature to conserve
and our future to shape.*
