



Current State of Stormwater Management in Ontario



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July 8th was not an Anomaly

Peterborough July 14 2004	\$100 million
Toronto Aug 19 2005	\$500 million
Hamilton July 26 2009	\$200 million
Mississauga/Toronto/Brampton	\$850 million



IPCC Report: Canada at greater risk from climate change

- More frequent hail and thunderstorms
- 4 Extreme Events in the last 10 years in GTA
- **Since 1995 a state of emergency almost every year in Ontario**



2013 RBC Canadian Water Attitudes Study

58% of Canadians feel that municipalities are upgrading systems to handle excess storm water



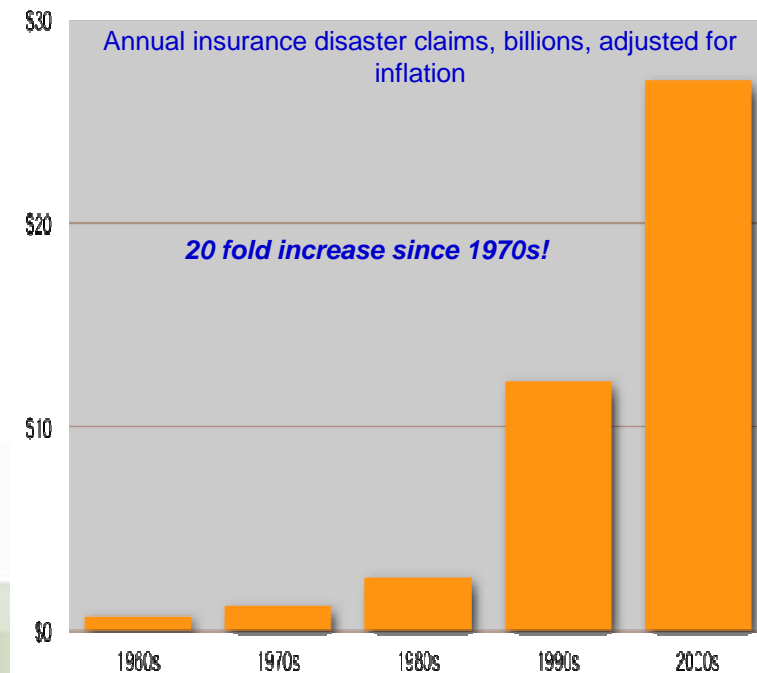
Reality

- Maintenance/repair costs for existing SW infrastructure across Ontario is estimated to be \$23 billion or 60% of the National deficit;
- 60-75% of GTA was built prior to flood control;
- National estimate to upgrade infrastructure to today's standards is estimated at 56 billion.



Risky Business

- Munich Re, Swiss Re, Lloyd's of London insurance on the same page as scientists on climate change.
- **Disasters push Intact to first underwriting loss in decade**
- **Water related insurance claims now leading property claim**
- **20 fold increase since the 1970's**



Not Just Extreme Events That Are Costly

Current Development

- 10-year event – \$47.5M*
- 100-year event – \$84M*
- 500-year event – \$109M*

New Development

- 10-year event – \$60M*
- 100-year event – \$96M*
- 500-year event – \$124M*

* Estimates for total building, content, and inventory loss (million 2010 \$)



NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY



Erosion



Nutrients / Thermal



What's at stake?

- 40% of Canada's economic activity
- Provides drinking water to 8.5 million Canadians
- \$450 M commercial and recreational fishing industry
- **Lost revenue associated with beach closures reduction & recreational fishing up to \$1.5 billion/year)**

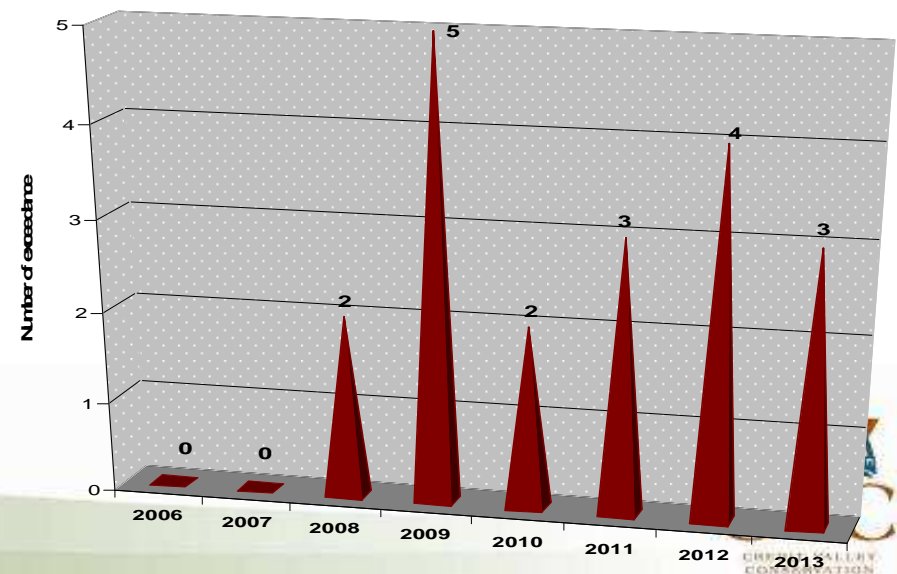


Location of the Credit River Watershed on Lake Ontario



Mississauga's Story

- 75% of Mississauga has no flood control;
- Over \$ 40 million for erosion costs for 1 creek over next 10 years!
- \$1.7 billion shortfall for SWM



Flood Risk and Vulnerability

- Urban flooding an increasing concern and liability particularly in older developed areas
- High intensity, short duration rainfall can bring more dwellings into the floodplain
- Flooding can also damage critical infrastructure, close roads and lead to habitat losses



Challenges

- Only 15% of Mississauga has water quality treatment to MOE standards
- Spills cost up to \$500,000/year
- Credit River watershed one of the largest sources of phosphorous to the Canadian side of Lake Ontario



Conclusions

- Given land constraints, Mississauga can only provide 4% additional with traditional end-of-pipe flood and water quality control. The remaining area need to look for lot level, conveyance controls (LID).



Brampton's Story

Projected growth over 200,000 in next 20 years

New development meets current MOE requirements with the use of ponds:

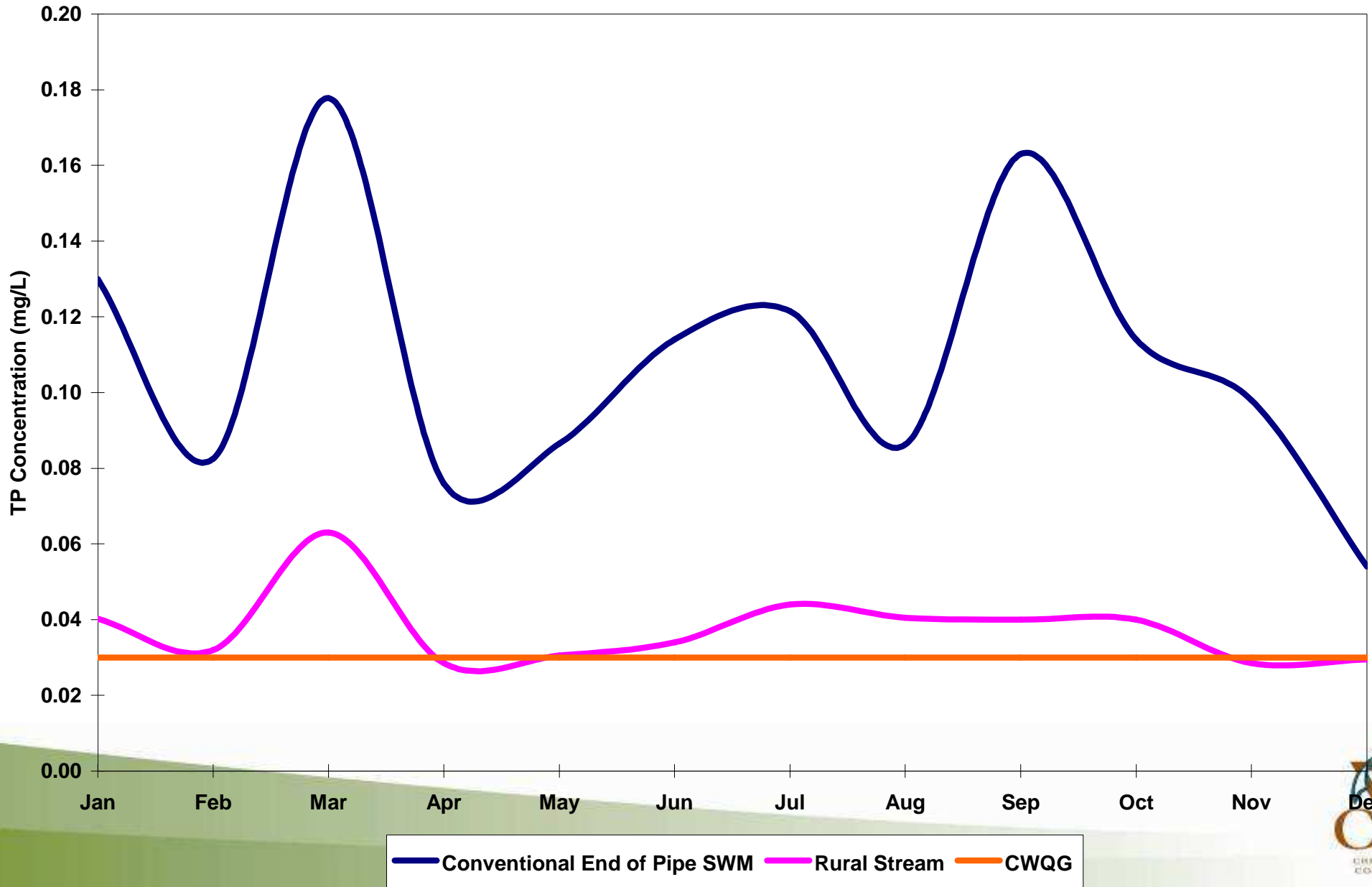
- Increasing trends in wet weather stream-flow- 3 times pre-development
- Increasing pollutant loading

Valley Lands public opening attracts crowds to Brampton



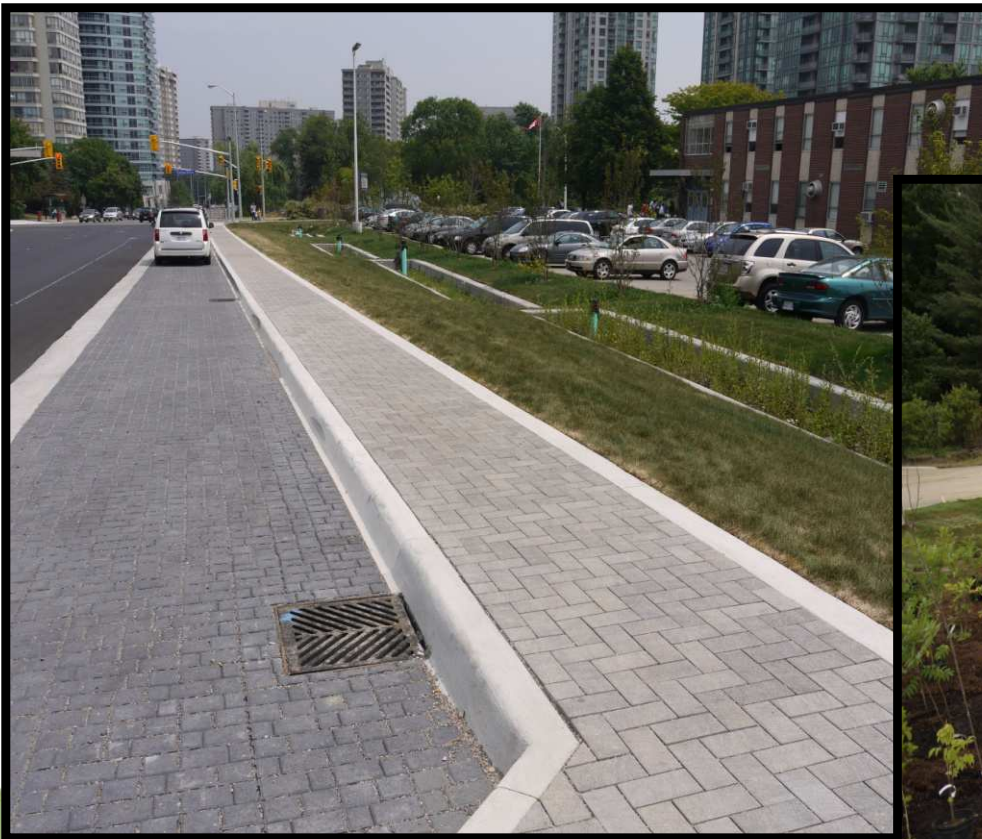
Total Phosphorus

Monthly 75th Percentile (1975-2009)



Conclusions

- Studies find LID for new and retrofit applications maintain predevelopment flows and meet PWQO.



Orangeville and Halton's Story

Despite current end-of-pipe SWM practices:

- Some tributaries showing low water levels due to to water takings and current SWM practices/urban development

**(potential impact to
wastewater
treatment plants,
restrict permits to
take water)**



Conclusions

- Studies find that LID retrofit and new development maintain baseflow to dilute WWTP discharges and reduce phosphorous.



Change Risky?

“Playing it safe is the riskiest choice we can ever make.”

Sarah Ban Breathnach

Definition of Insanity: doing the same thing over and over again and expecting different results

Albert Einstein



Integrated Stormwater Management

(called LID- or Low Impact Development)

Treat it where
it falls



Treat it
along the
path



Treat it before
it goes to
your Lake



Rainwater Harvesting



Green Roof



**Treat it
Where it**



Bioretention Planter



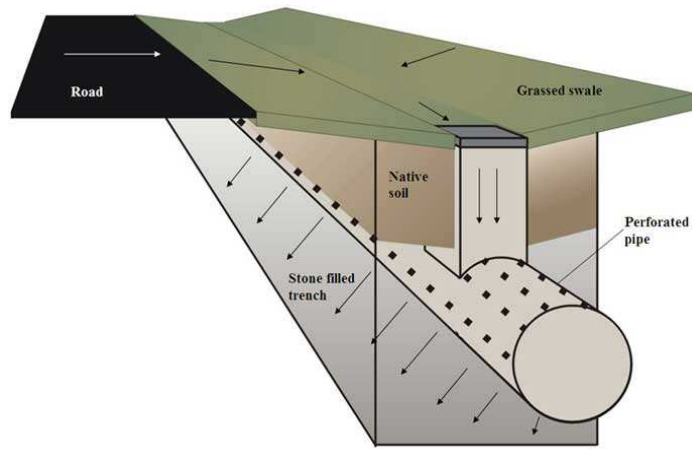
Permeable Pavement



Treat it Along the Path:



Swale



**Perforated
Pipe**



Treat it Before it goes to the Stream/Lake:



Wetpond



Wetland

Apply Low Impact Development Practices Across All Land Use Types



Industrial & Commercial Lands



Residential Lands

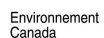


Road Right of Ways



Public Lands

Building a Stronger Tomorrow



Flooding

