Overview

STEP is a multi-agency initiative developed to support broader implementation of sustainable technologies and practices within a Canadian context.

The water component of STEP is a conservation authority collaborative. Current partners are:

Lake Simcoe Region conservation authority

Credit Valley Conservation inspired by nature

Toronto and Region Conservation Authority

Our key areas of focus are:

- Low Impact Development
- Erosion and Sediment Control
- Road Salt Management
- Natural Features Restoration

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Help Solve Ontario's Stormwater Crisis

Presented by: Kyle Vander Linden, Credit Valley Conservation

Date: May 13, 2020

The water component of STEP is a collaborative of:

Lake Simcoe Region conservation authority

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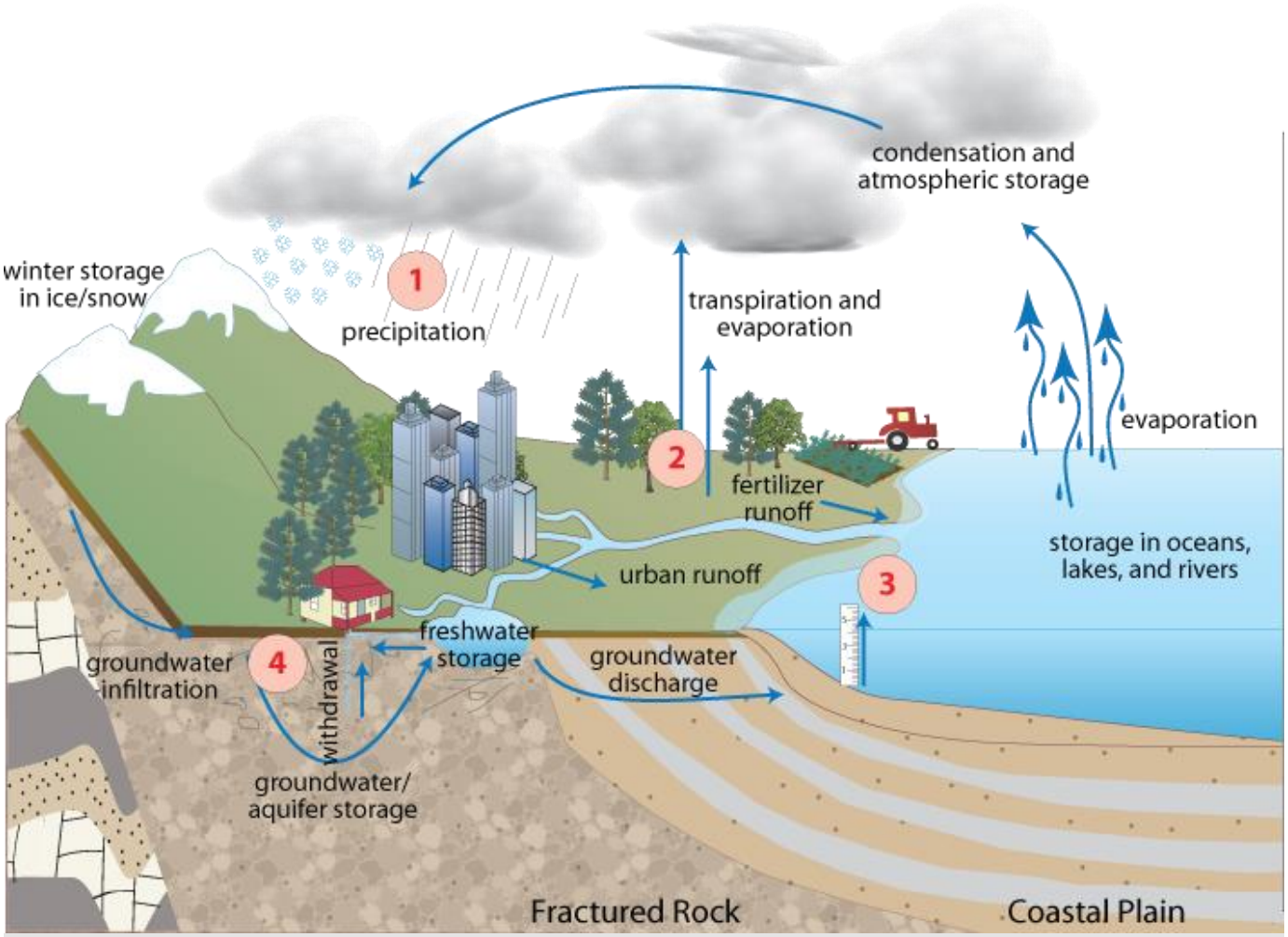
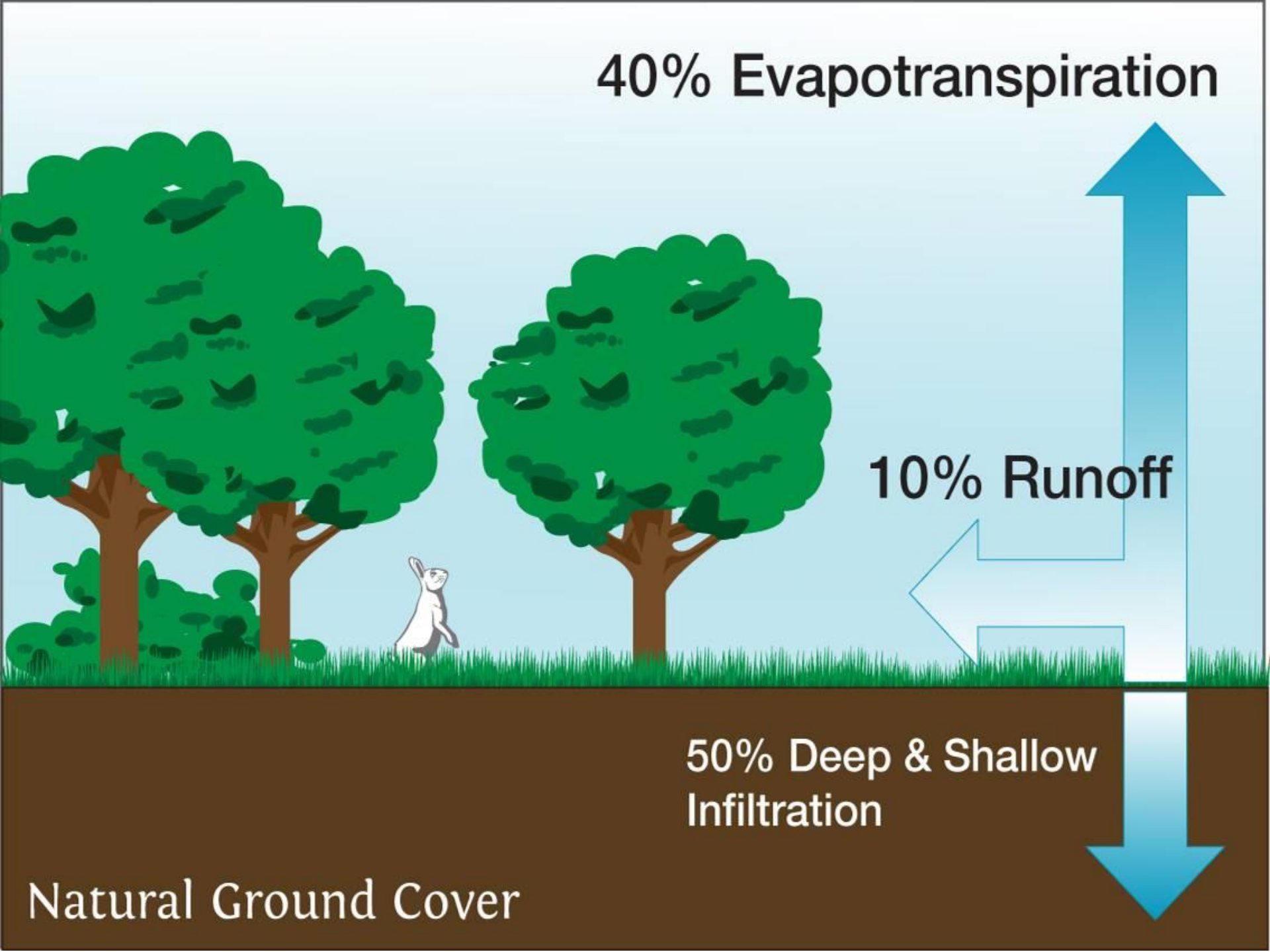
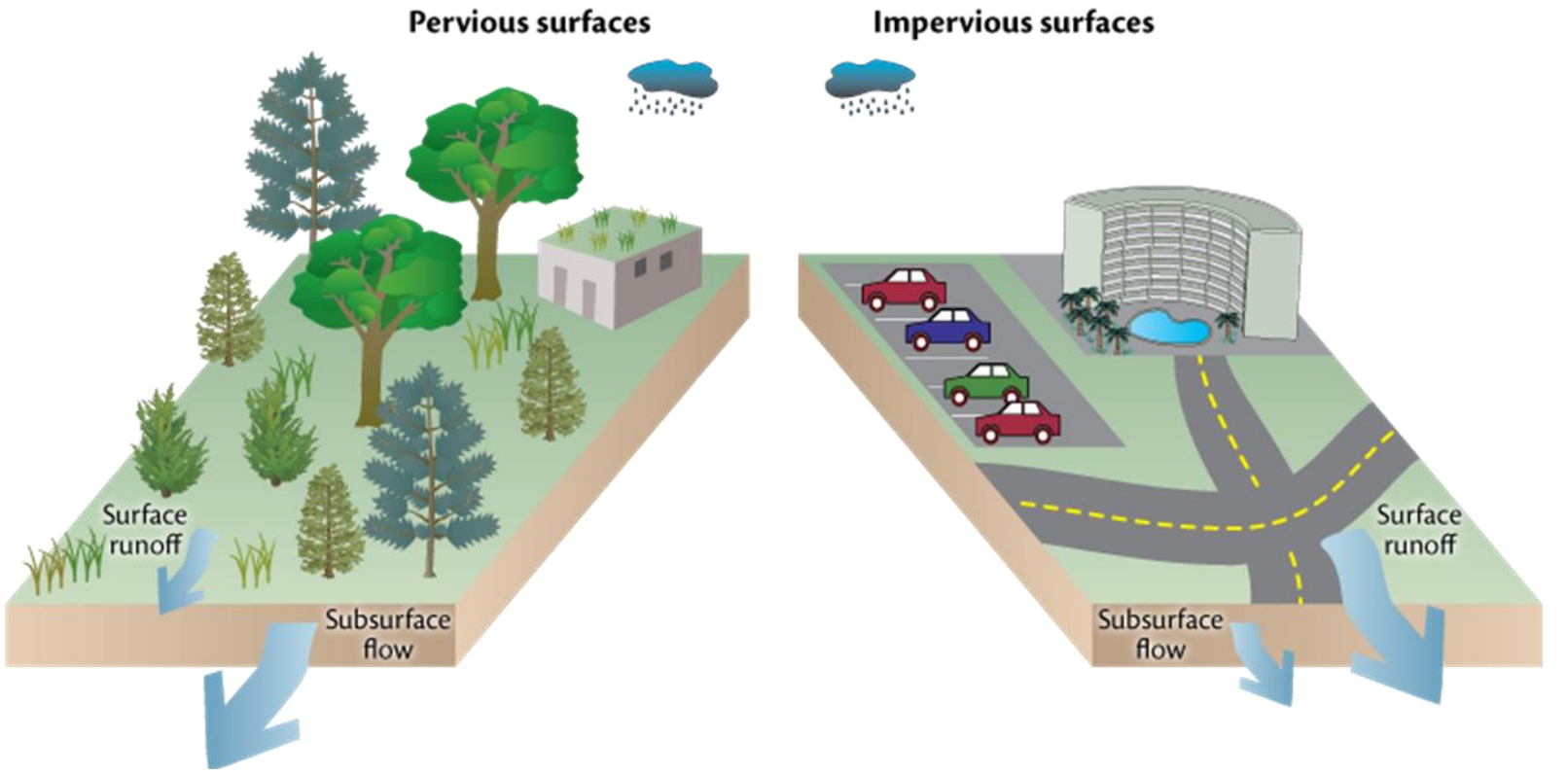
The hydrological cycle



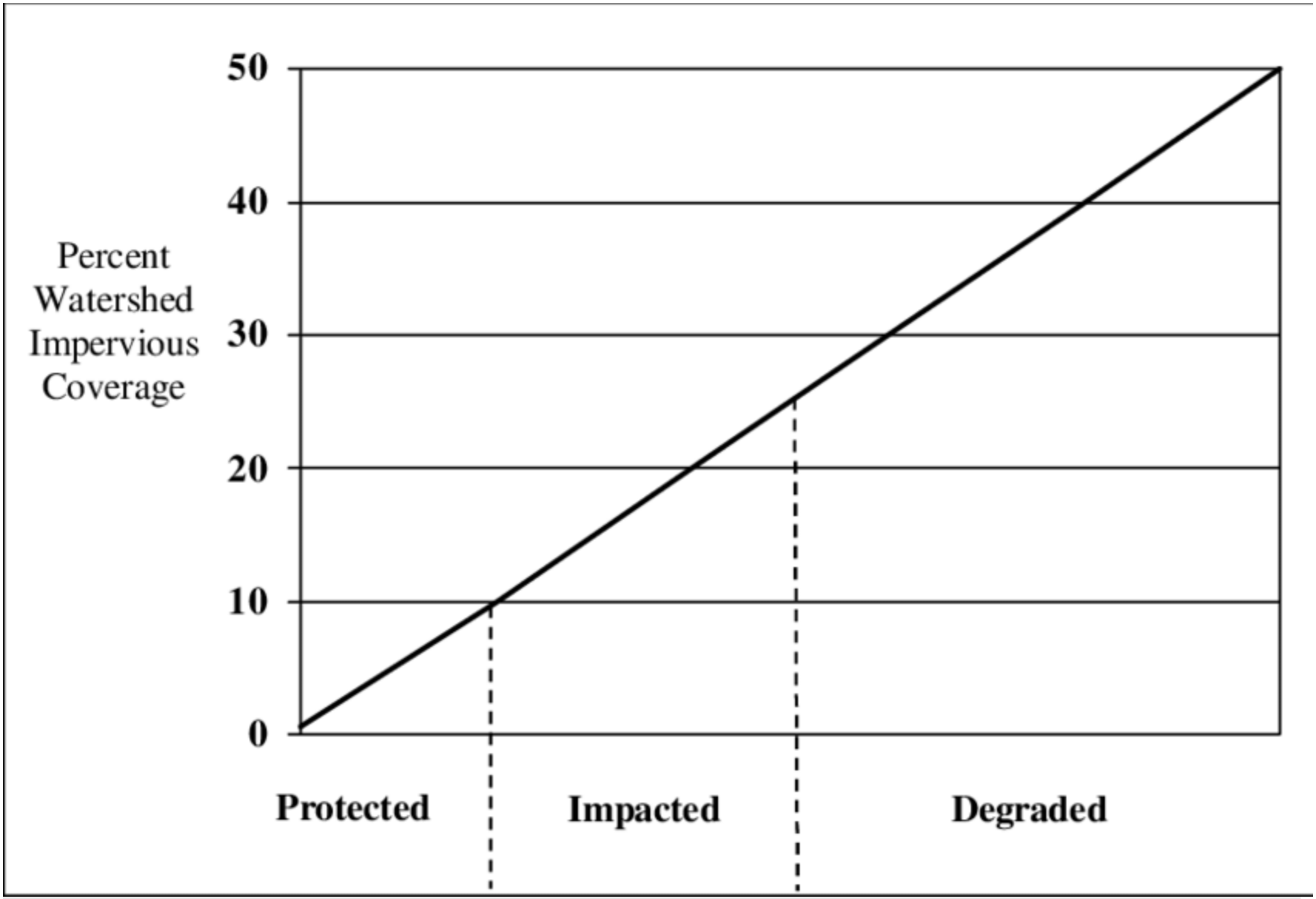
Source: Integration and Application Network (ian.umces.edu), University of Maryland center for Environmental Science


40% Evapotranspiration
10% Runoff
50% Deep & Shallow
Infiltration
Natural Ground Cover

Pervious vs. Impervious – 10 % hard surface changes hydrological function



Source: Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/)



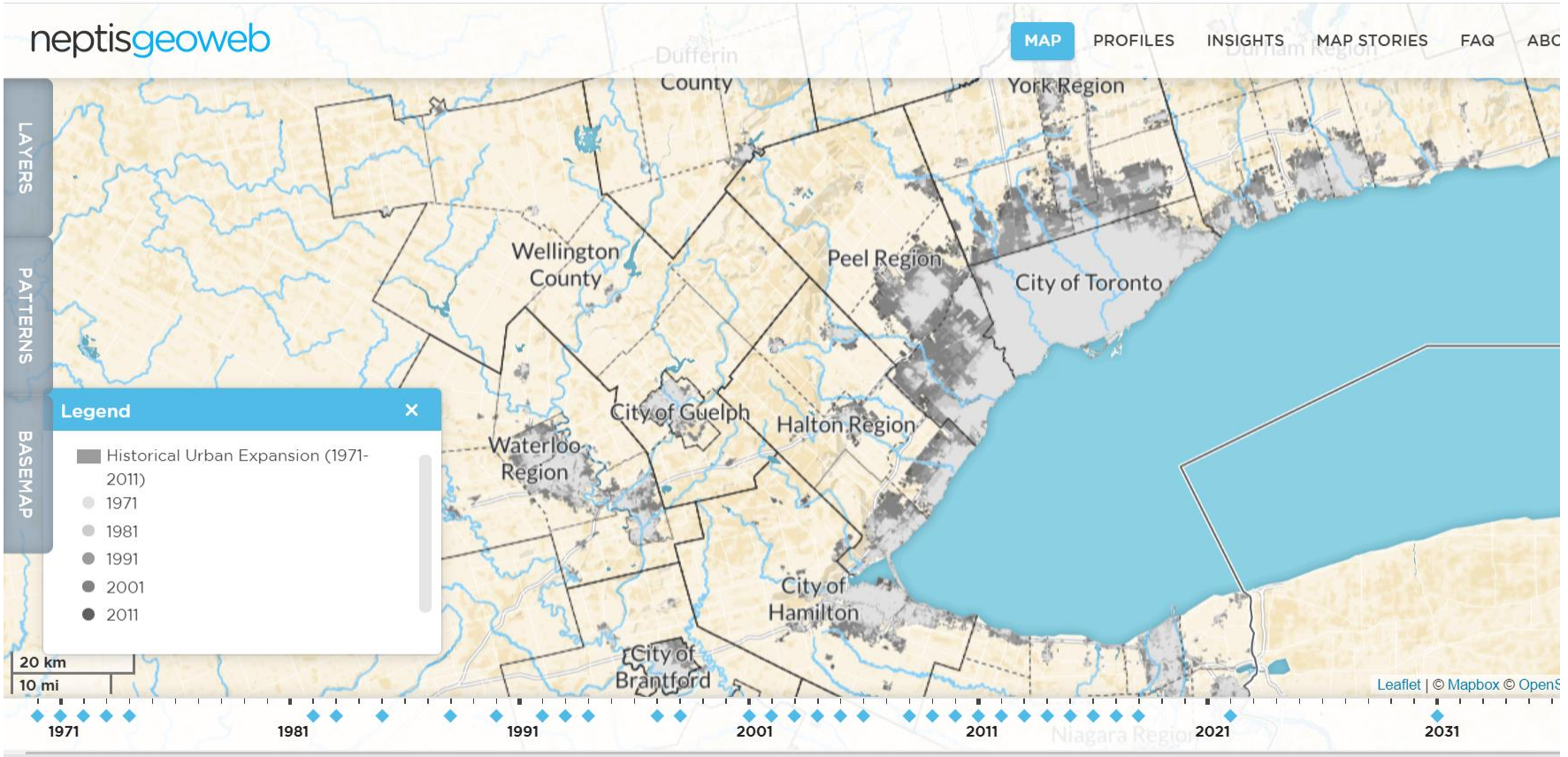
Source: Adapted from Schueller et al. 1992

Hard surface expansion

Source: www.mississauga.ca

Source: Woody Wade

Expansion of Urban Areas



Source: neptisgeoweb.org

Water needs to go some where…

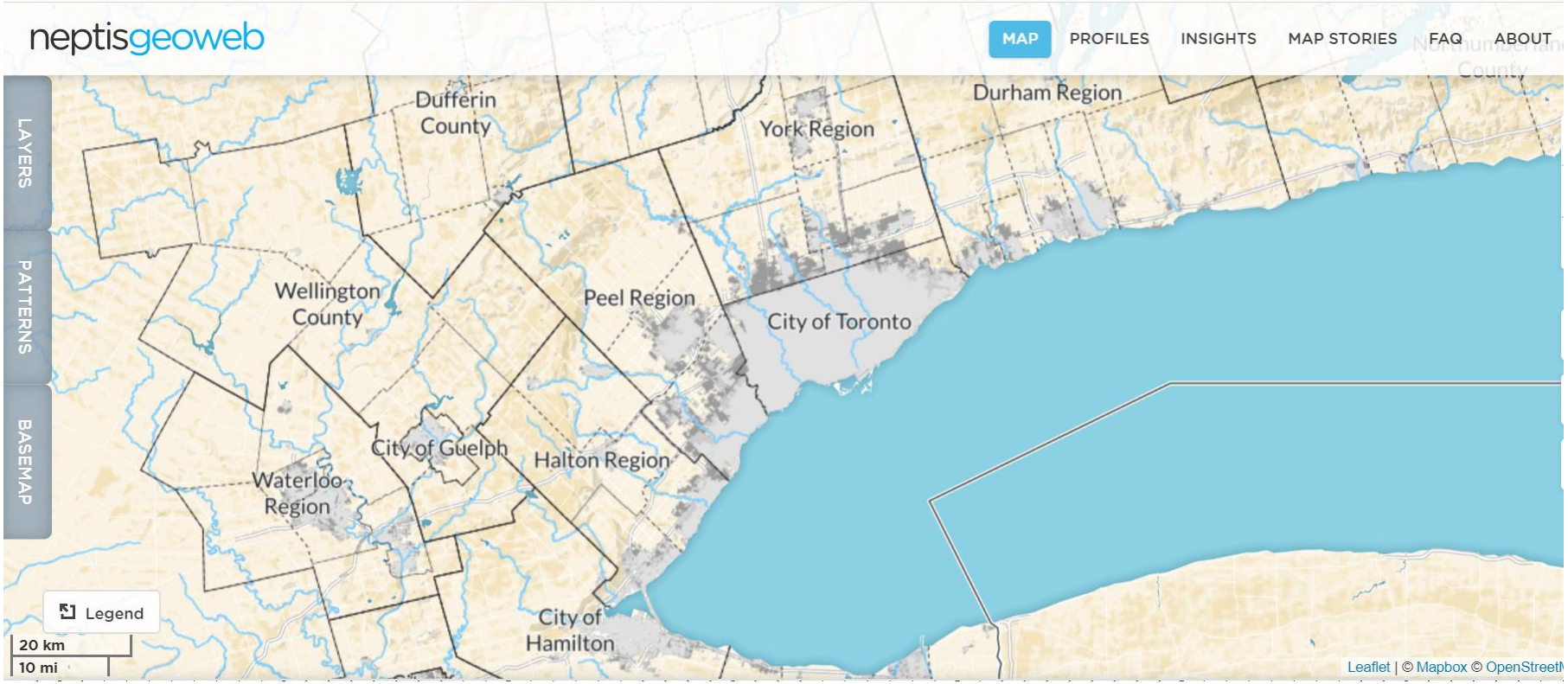
Source: Credit Valley Conservation

Typical Stormwater Management – No Treatment Accounts for 65 – 70 % of GTA

Resulting impact

Source: CTV News

Urban area without stormwater management – Development Pre-1991



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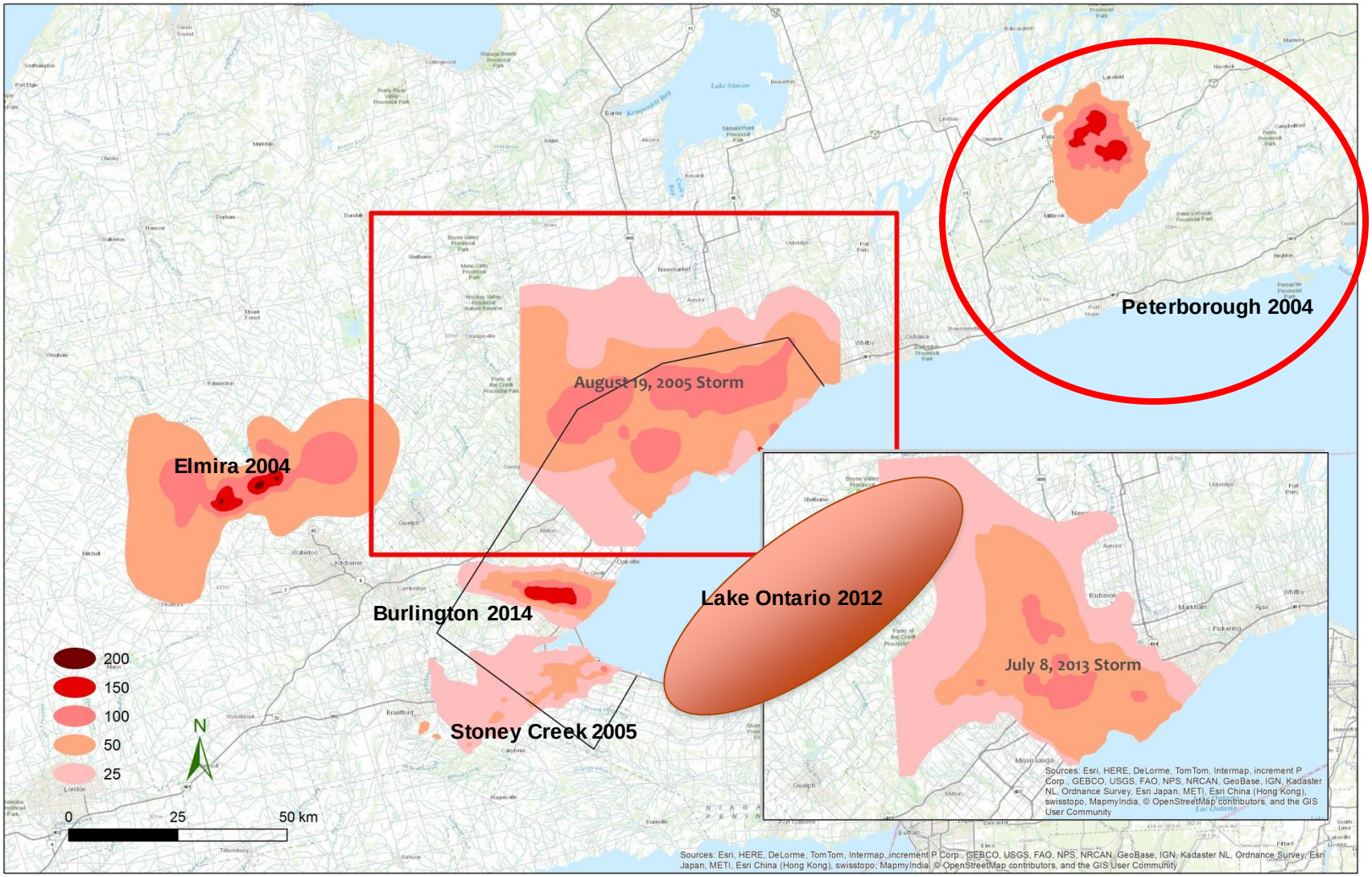
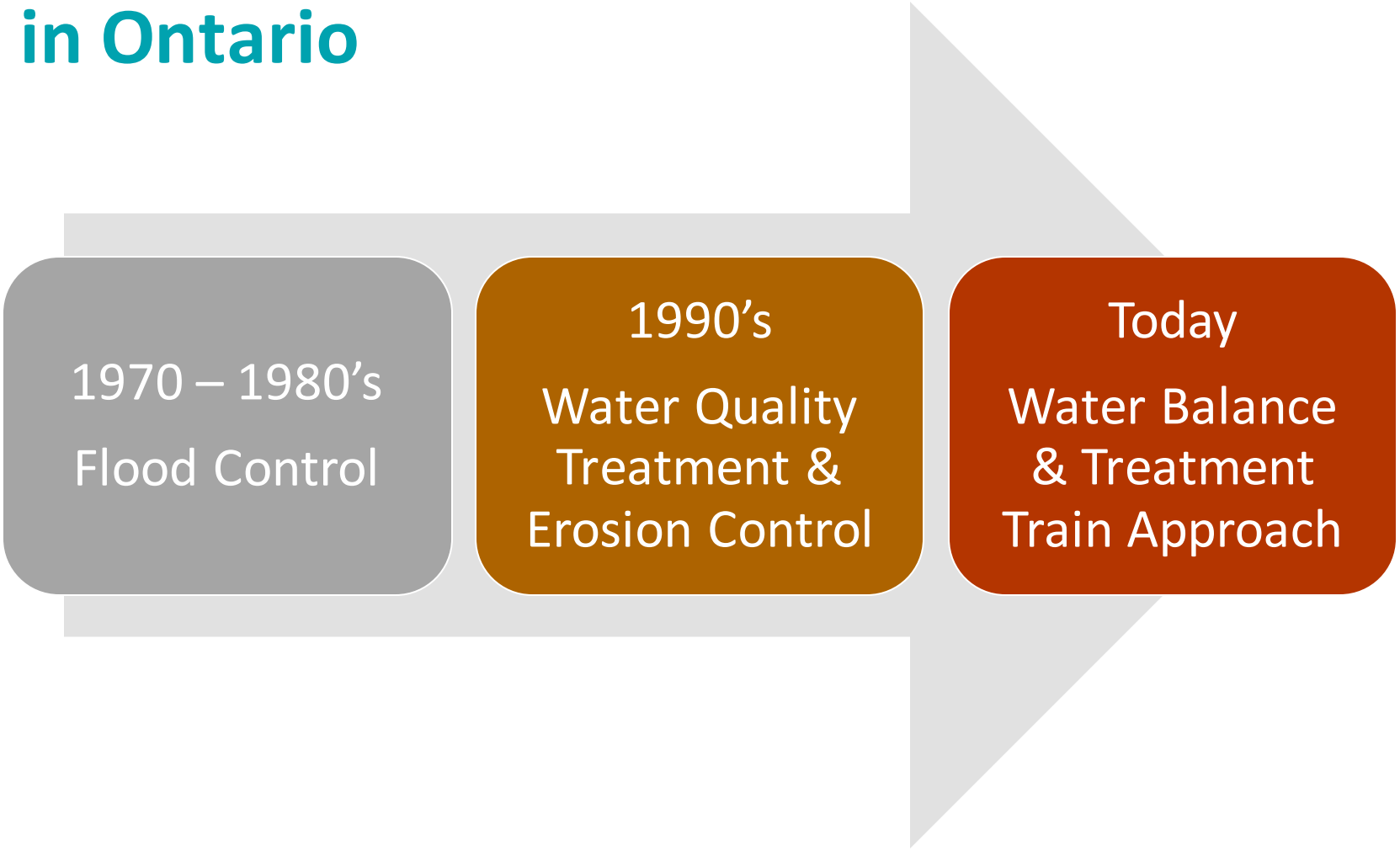
The Big Seven (14 years)



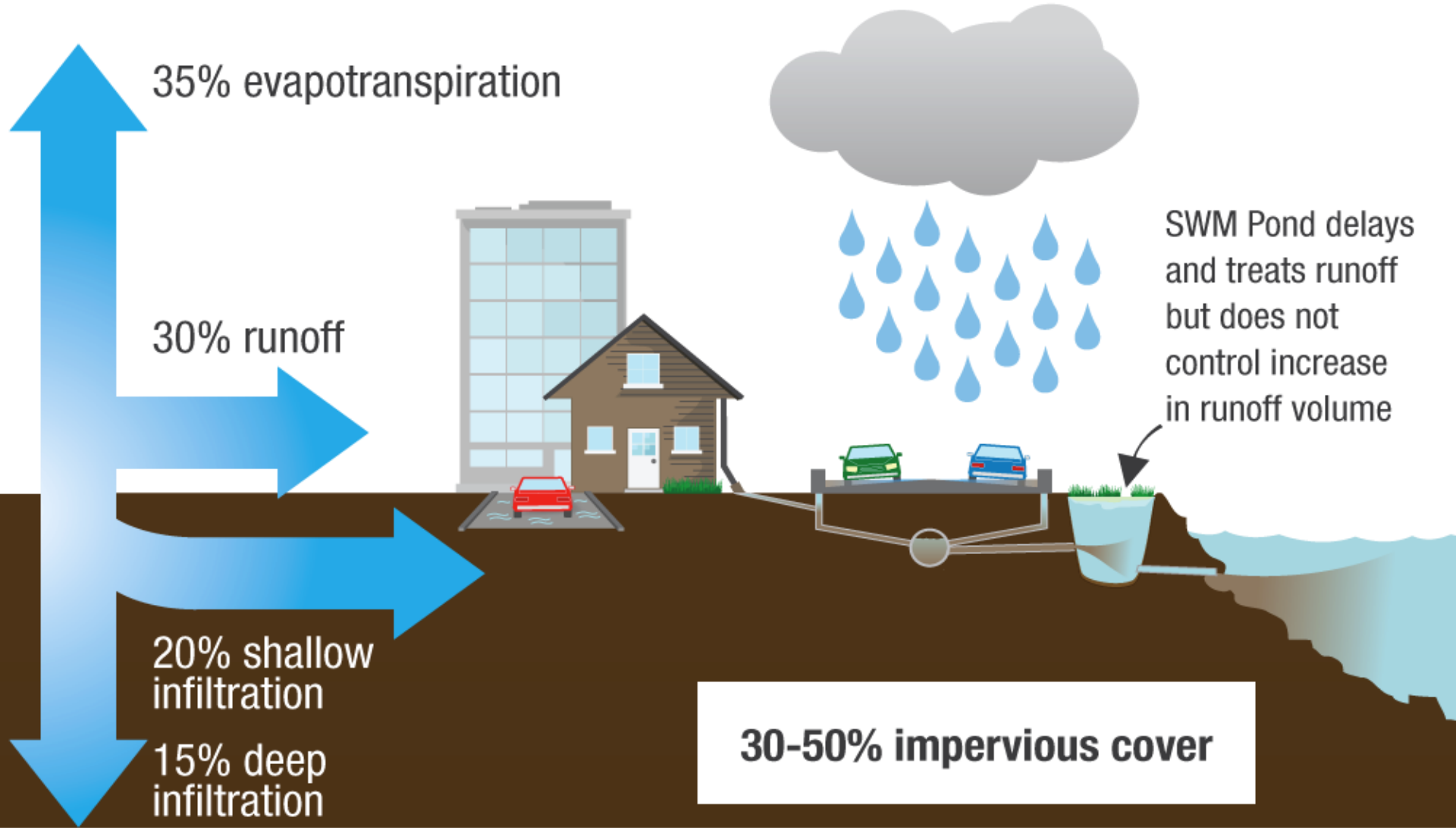
Source: www.mississauga.com/news

Evolution of Stormwater Management in Ontario



Urban Hydrology

Typical development: Stormwater management using End of Pipe SWM Pond



NO DUMPING

DRAINS TO RIVER

The Concept: Integrated Stormwater Management

Treat it where it falls

Treat it along the path

Treat it before it goes to your lake/river

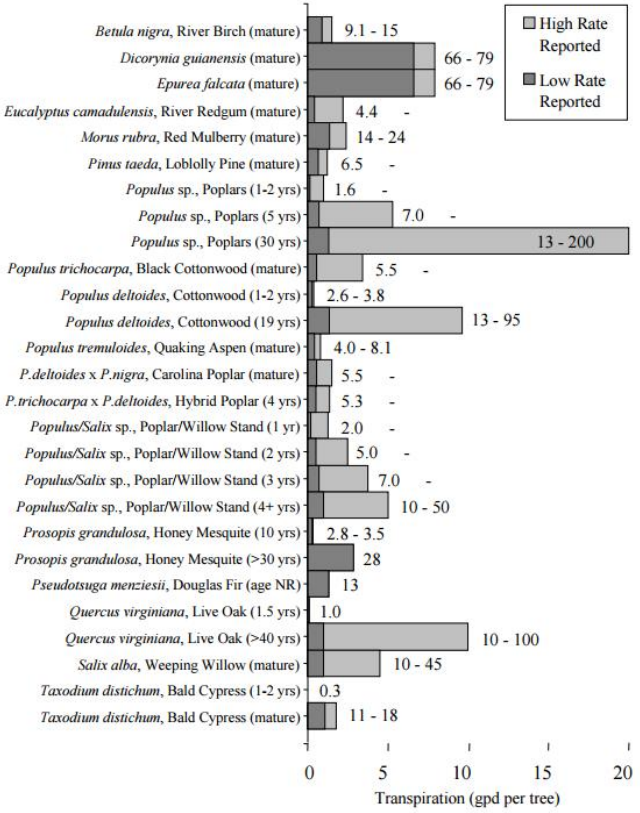
First rules of integrated water management

MINIMIZE OR REDUCE HARD SURFACE FOOT PRINT

PROTECT EXISTING GREEN SPACE / VEGETATION

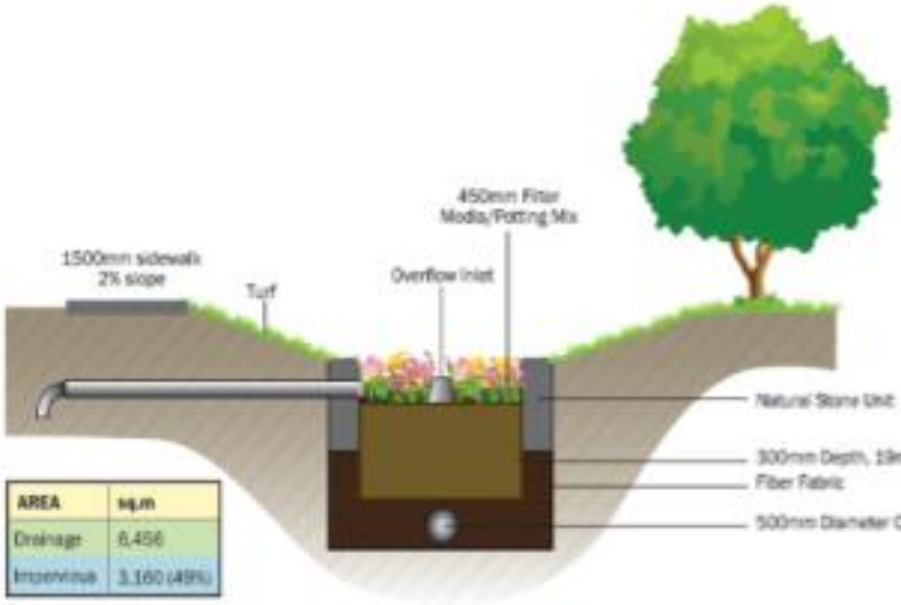
INCREASE VEGETATION PLANTINGS

Trees are effective tools in stormwater management

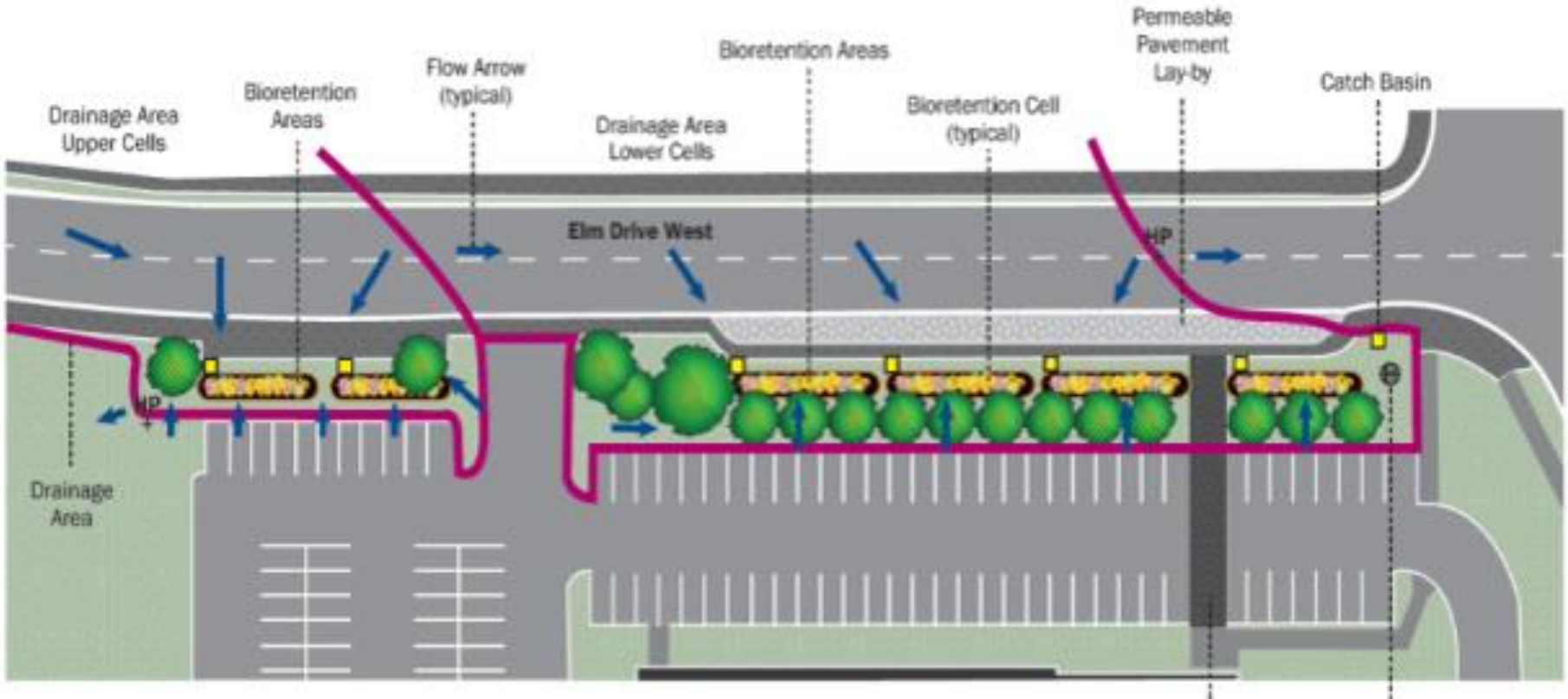


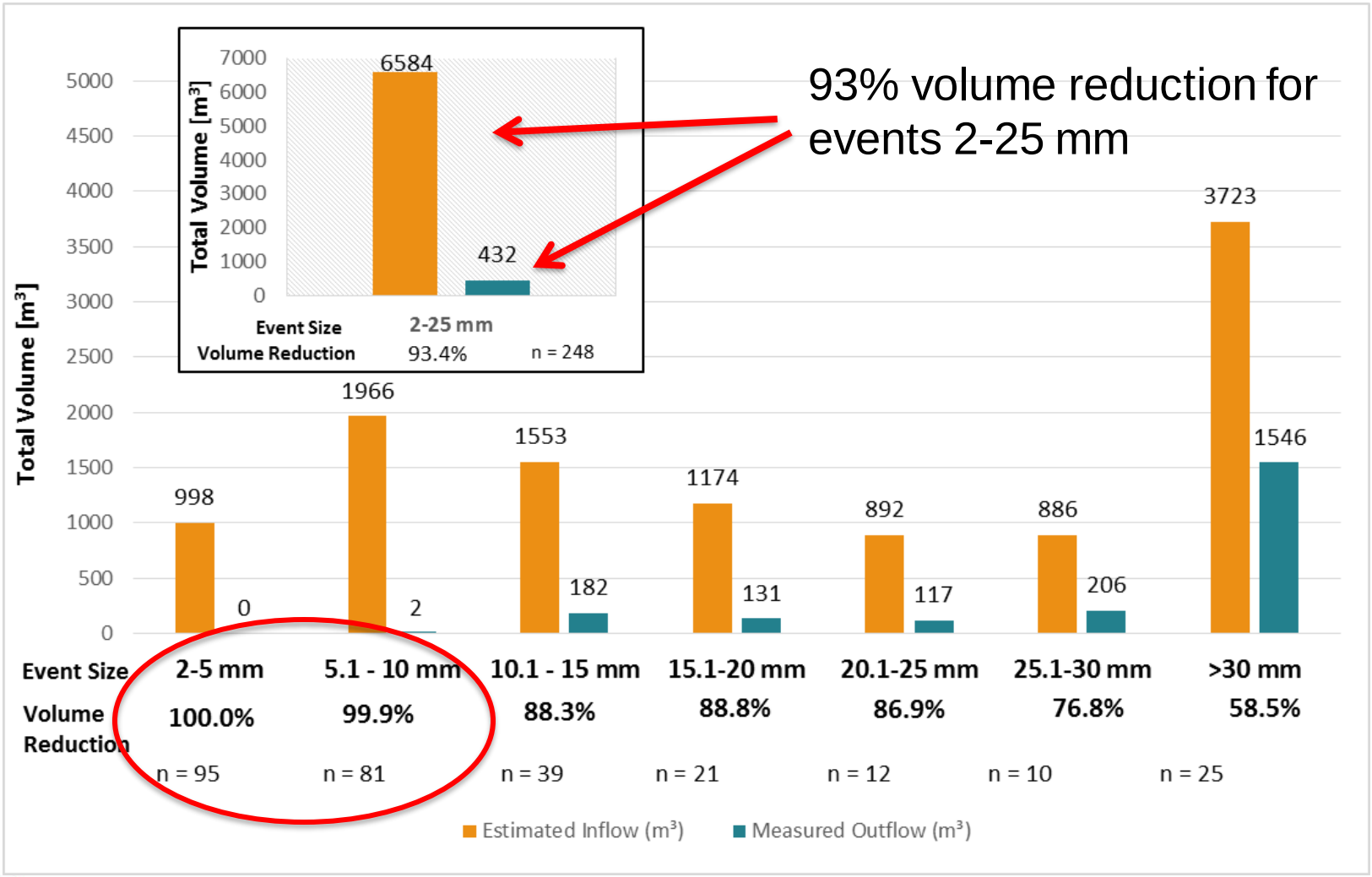
In the Ground Application of Integrated Water Management

Elm Drive LID Retrofit, Mississauga, ON;


450mm Filter Media/Potting Mix
1500mm sidewalk 2% slope
Turf
Overflow Inlet
Natural Stone Unit
300mm Depth, 19mm Clear Stone
Fiber Fabric
500mm Diameter Outlet Pipe
AREA | sq.m
Drainage | 6,456
Impervious | 3,160 (49%)


Elm Drive


Drainage Area Upper Cells
Bioretention Areas
Flow Arrow (typical)
Drainage Area Lower Cells
Bioretention Areas
Bioretention Cell (typical)
Permeable Pavement Lay-by
Catch Basin
Elm Drive West
HP
HP
Drainage Area


93% volume reduction for events 2-25 mm
Total Volume [m³]
7000
6000
5000
4000
3000
2000
1000
0
6584
432
Event Size
2-25 mm
Volume Reduction
93.4%
n = 248
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
998
0
1966
2
1553
182
1174
131
892
117
886
206
3723
1546
Event Size
2-5 mm
5.1 - 10 mm
10.1 - 15 mm
15.1-20 mm
20.1-25 mm
25.1-30 mm
>30 mm
Volume Reduction
100.0%
99.9%
88.3%
88.8%
86.9%
76.8%
58.5%
n = 95
n = 81
n = 39
n = 21
n = 12
n = 10
n = 25
Estimated Inflow (m³)
Measured Outflow (m³)

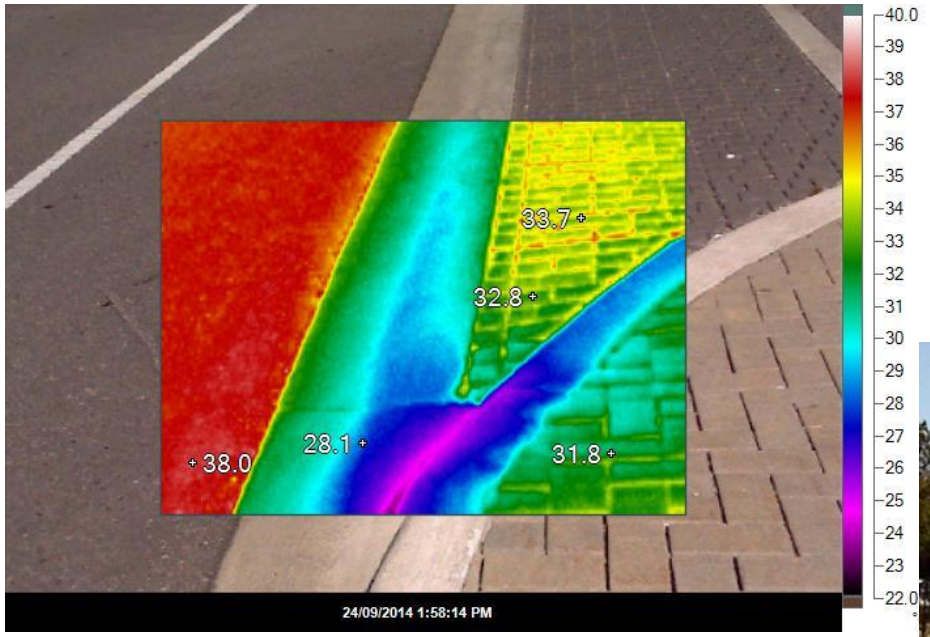
Elm Drive

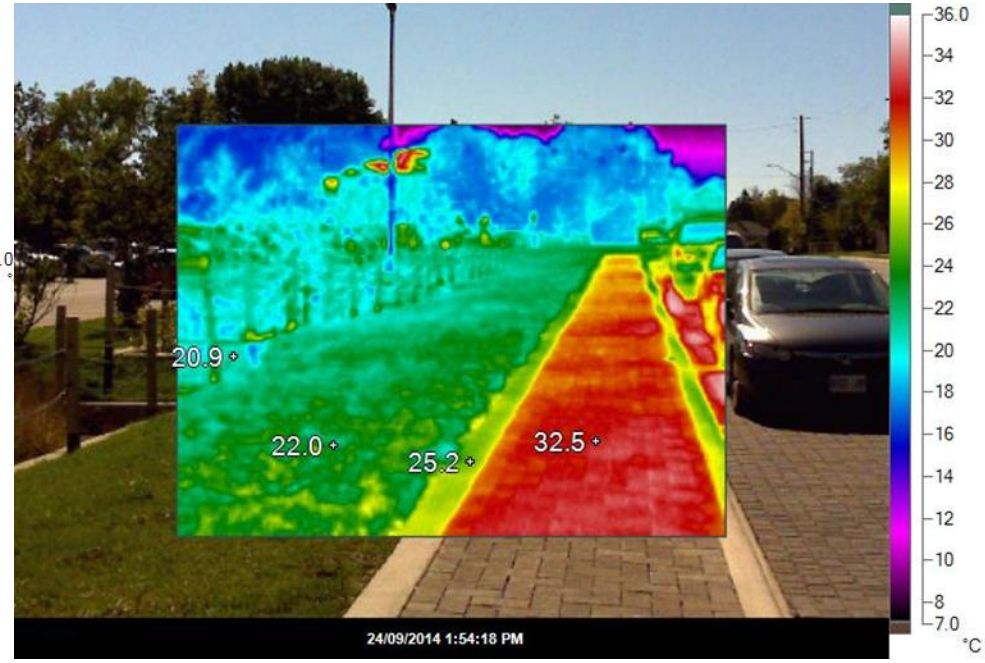
Metric	Criteria	Performance at Elm*	Criteria Met?
Peak Flow Reduction (%)	100-Year Post equal to Pre	60% Reduction	N/A
Runoff Volume Reduction	15 mm	24 mm	✓
TSS Removal (%)	80%	88%	✓
Total Phosphorous Removal (%)	50%	91%	✓
Effluent Zn Removal (%)	20 µg/L	12 µg/L	✓

Criteria/ Anticipated Performance Sources:
City of Mississauga Stormwater Credit Program (Peak and Total Volume)
MOE Stormwater Management Planning and Design Manual 2003 (TSS, TP)
LSRCA Technical Guidelines for Stormwater Management Submission (Phosphorous)
*Based on data 2011 to 2015 (inclusive)

CVC | CREDIT VALLEY CONSERVATION

Urban Heat Island





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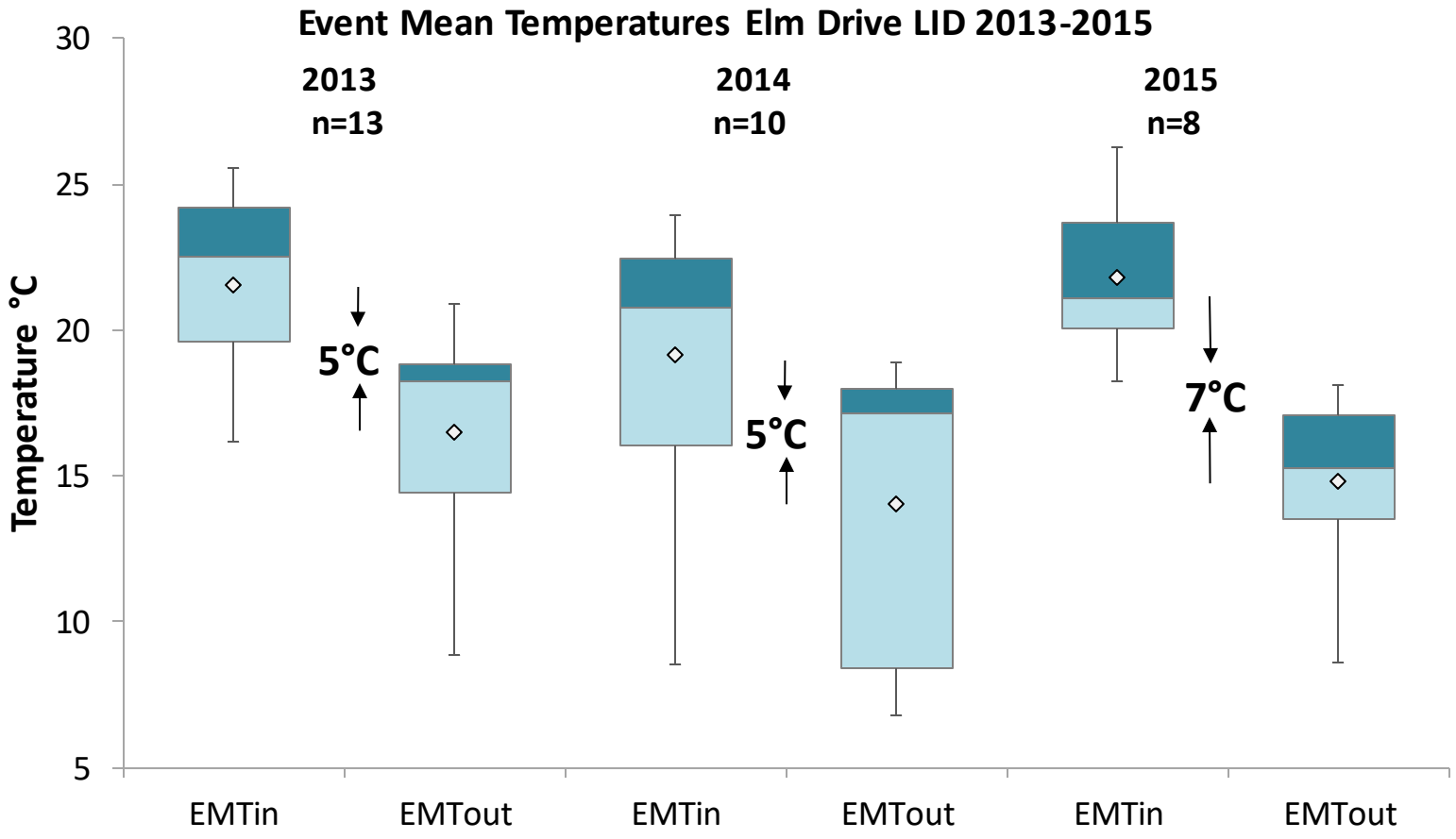
Thermal Monitoring: EMT Results



$$EMT_{in} = \frac{\sum T_{in} Q_{in} dt}{\sum Q_{in} dt} \qquad EMT_{out} = \frac{\sum T_{out} Q_{out} dt}{\sum Q_{out} dt}$$

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IMAX HEADQUARTERS PARKING LOT RETROFIT

Bioswale performance

Metric	IX-2 Bioretention to Sorbtive Vault	IX-3 Jellyfish filter to bioretention	IX-4 Bioretention control
Runoff Volume Reduction	90 %	78 %	64 %
TSS Removal	98 %	99 %	97%
TSS Concentration (mg/L)	19	8	13
Total Phosphorous Removal	90 %	65 %	57 %
Total Phosphorus Concentration (mg/L)	0.1	0.22	0.15
Dissolved Phosphorus Concentration (mg/L)	0.04	0.16	0.14

*Based on data 2014 to 2015 (inclusive)


EN GLADE PUBLIC SCHOOL LID PROJECT


PERMEABLE PAVER PARKING LOT


2014/ 7/11 10:16

fusion landscape PROFESSIONAL

Welcome to the Fusion Landscape Professional Training Seminar

Tuesday, February 11, 2020

Image courtesy of Kent Ford Design Group Inc.

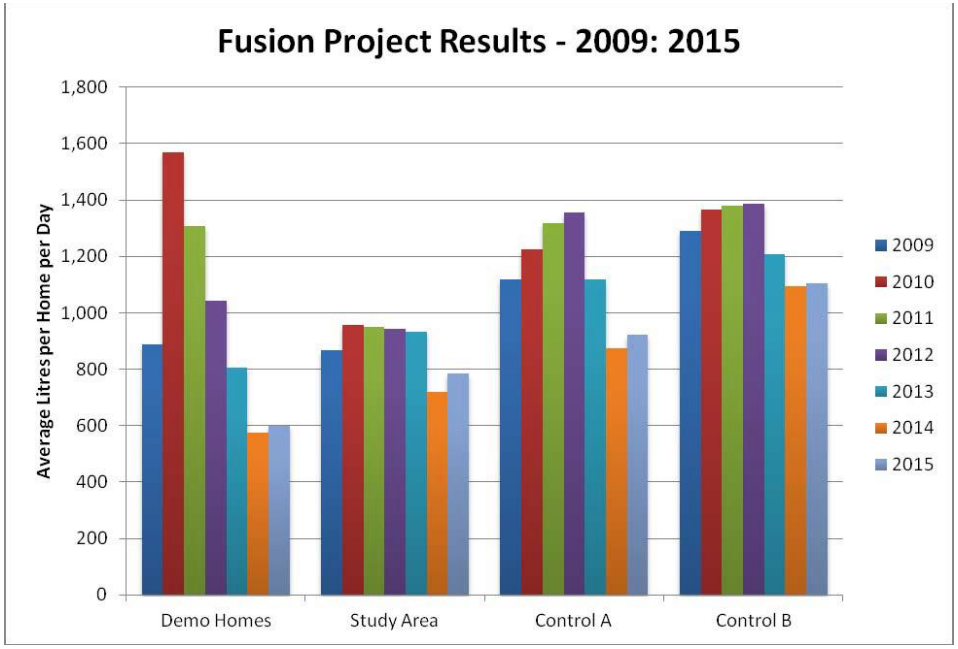
FUSION LANDSCAPE PROFESSIONAL CERTIFICATION PROGRAM

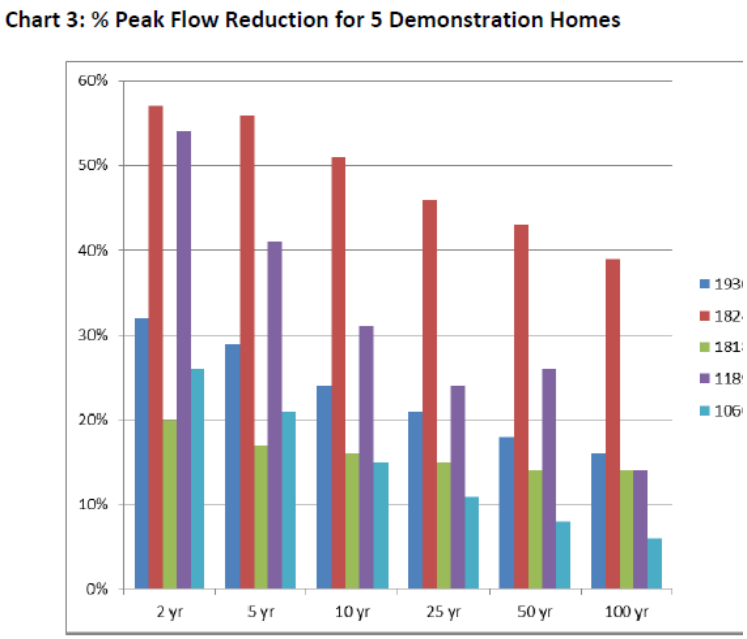
Region of Peel working with you

HORTICULTURAL TRADES ASSOCIATION landscape ontario.com Green for Life!

York Region

Fusion Landscaping Results (2009 – 2015): Reduction in Potable Water Use, Peak Flow, Sediment and Phosphorus





Home	TSS (% load reduction)	TP (% load reduction)
ve	67	67
Drive	67	67
Drive	44	44
Drive	22	22
ok Road	36	36

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Fusion Landscape Professional Program

- 2 Day Course on Fusion Landscaping
  - Design
  - Install
  - Maintenance
- Exam on training manual
- Certification process

- See: https://fusionlandscapeprofessional.ca/

Thank you

For more information:

Contact

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Email: kyle.vanderlinden@cvc.ca