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2017 MOECC Low Impact Development Stormwater Management Guidance Manual

TRIECA

March 22, 2017

Presentation Overview

1. Overview and Introduction
2. Stormwater Volume Control Requirements
3. Climate Change Process
4. Modelling Approaches

Update of Ontario's Stormwater Management Guidance

Need recognized:

- Lake Simcoe Protection Plan
- Review of stormwater management policy in light of climate change
- Low Impact Development Discussion Paper

Ontario

Update of Ontario's Stormwater Management Guidance

Ontario's Great Lakes Strategy:

Reduce stormwater and wastewater impacts on the Great Lakes.

Three specific commitments related to reducing stormwater discharge into the Great Lakes and improving stormwater quality through Low Impact Development (LID) stormwater management:

- enhance the Province's approach to stormwater approvals, with **greater emphasis on effluent quality and quantity**, in turn driving greater use of innovative source control measures; and,
- seek environmental considerations, such as use of Low Impact Development, and use of green infrastructure early in municipal planning decisions, so that stormwater is considered as **part of the project design and approvals, not after the fact**.
- engage conservation authorities, municipalities, and other stakeholders, **to develop guidance** to facilitate and remove barriers to the uptake of innovative source control measures that reduce stormwater volumes, such as green infrastructure and Low Impact Development;

1991 INTERIM STORMWATER QUALITY CONTROL GUIDELINES FOR NEW DEVELOPMENT


INTERIM STORMWATER QUALITY CONTROL GUIDELINES

FOR

NEW DEVELOPMENT

May 1991

Prepared by: Water Resources Branch
Central Region
Central Region

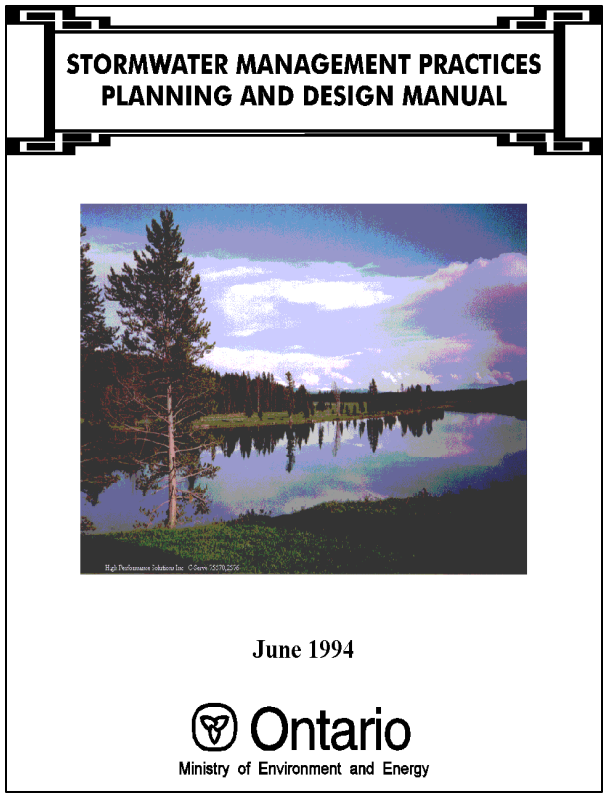
Ministry of the Environment
Ministry of the Environment
Ministry of Natural Resources

VOLUME CONTROLS

Source controls which reduce the amount of impervious area or restrict the discharge of stormwater to sewers should be used first to achieve specified volume controls. Vegetative and structural best management practices which enhance infiltration are gaining agency and public acceptance. Stormwater quality ponds should be considered as the last line of defence and applied only after all opportunities for infiltration of stormwater have been exhausted.

Ontario

1994 SWM Practices Planning and Design Manual



- 4 levels of protection
- SS reduction
- 5mm for baseflow maintenance

Ontario

2003 MOE SWM Planning & Design Manual

Objectives:

- Groundwater and baseflow characteristics are preserved;
- Water quality will be protected;
- Watercourse will not undergo undesirable and costly geomorphic change;
- There will not be any increase in flood damage potential; and ultimately,
- That an appropriate diversity of aquatic life and opportunities for human uses will be maintained.

"The recommended strategy for stormwater management is to provide an integrated **treatment train approach** to water management that is premised on providing control at the lot level and in conveyance (to the extent feasible) followed by end-of-pipe controls. This combination of controls is the only means of **meeting the multiple criteria for water balance, water quality, erosion control and water quantity**."

Ontario

INTERPRETATION BULLETIN
ONTARIO MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE
EXPECTATIONS RE: STORMWATER MANAGEMENT
February 2015

The natural hydrologic cycle should be maintained to the greatest extent possible. The ministry's existing acts, regulations, policies and guidelines emphasize the need for this approach to stormwater management.

Going forward, the Ministry expects that stormwater management plans will reflect the findings of watershed, sub-watershed, and environmental management plans, and will employ LID in order to maintain the natural hydrologic cycle to the greatest extent possible.

Too often, preservation of the natural hydrologic cycle is not sufficiently addressed in stormwater management plans submitted to the ministry for an ECA.

Low impact development stormwater management is relevant to all forms of development, including urban intensification and retrofit.

LID can be less costly than conventional stormwater management practices. A 2007 US EPA report summarizes 17 case studies of developments that include LID practices and concludes that applying LID techniques can reduce project costs and improve environmental performance (USEPA, 2007).

Ontario

Low Impact Development Stormwater Management Guidance Manual

- LID manual will complement 2003 manual
- Guidance on targets for runoff volume control
- Anticipate and mitigate potential negative effects on groundwater
- Anticipate and accommodate the effects of climate change
- Appropriate approaches and modelling tools to evaluate performance
- Will not cover detailed design, siting, or sizing of specific LID facilities

Stakeholder Review Group

Municipal Stormwater Discussion Group

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Consultation

- Jurisdictional Scan and Runoff Volume Control Targets report on EBR in near future for comment
- Draft Manual in Spring 2017 to SRG
- Manual posted to EBR for comment Summer 2017

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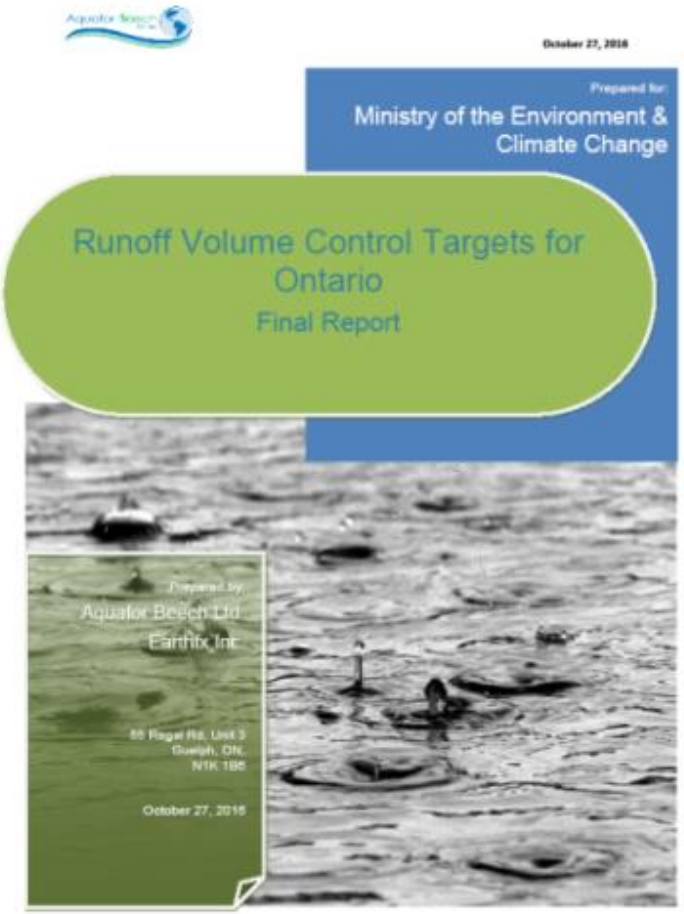
Stormwater Volume Control



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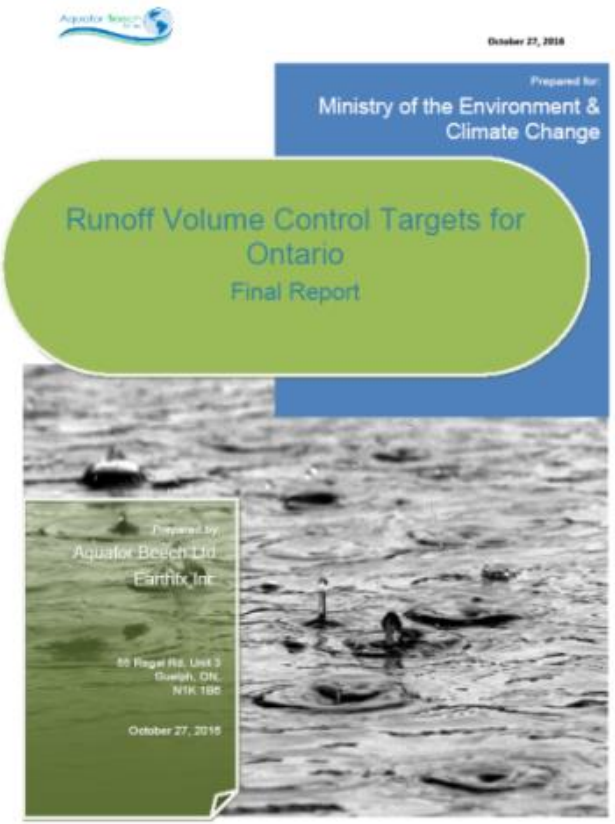
Don’t Panic! Stay Calm.



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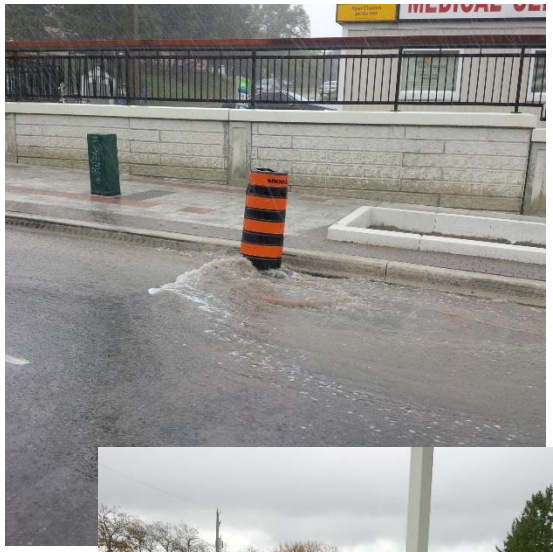
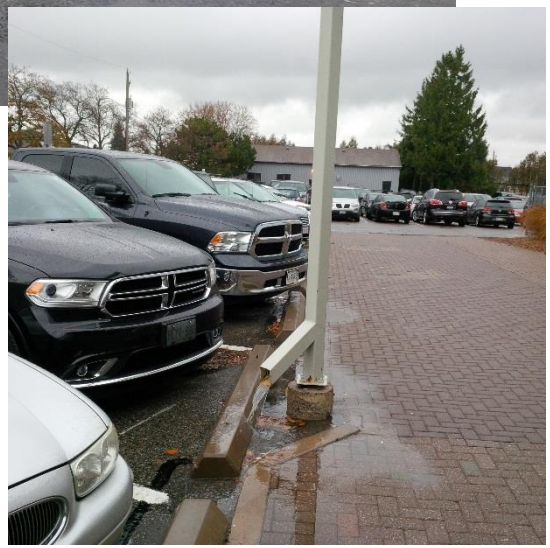
Stormwater Volume Control

Key Principles:

- Mandatory maintenance of the pre-development water balance
- Return precipitation volume to the natural hydrologic pathways of infiltration, evapotranspiration, and runoff
- Application of a consistently derived, **<u>geographically specific volume control target</u>** across the province - the 90th percentile event
- Limit total runoff volume to 10% (or less) of total rainfall volume. 90% of rainfall (RF) volume should be controlled and returned to natural pathways





Ontario

We are not alone!

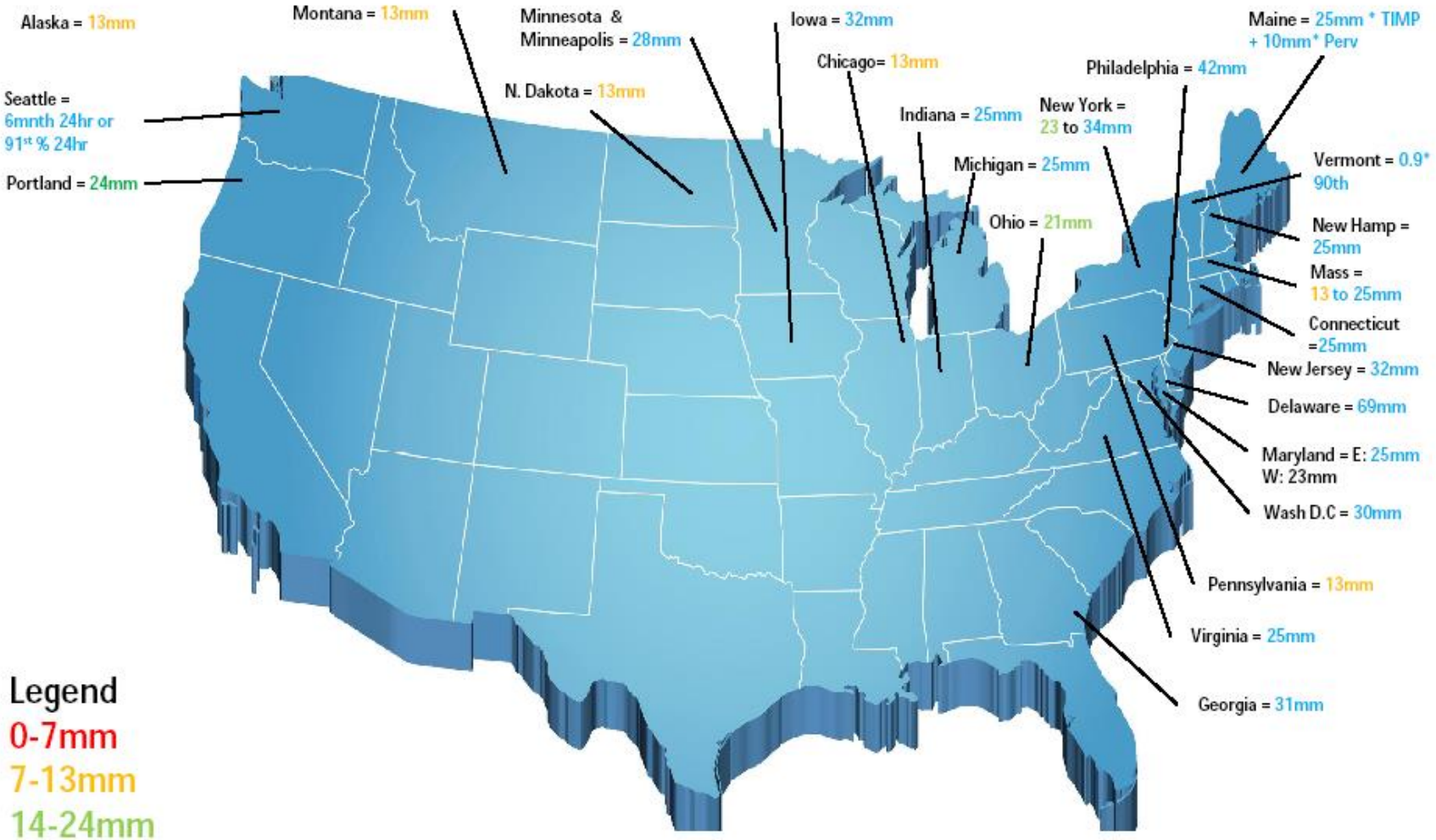


Figure 3.2 - Summary of U.S. Volume Targets

Ontario

We are not alone!....Even in Canada

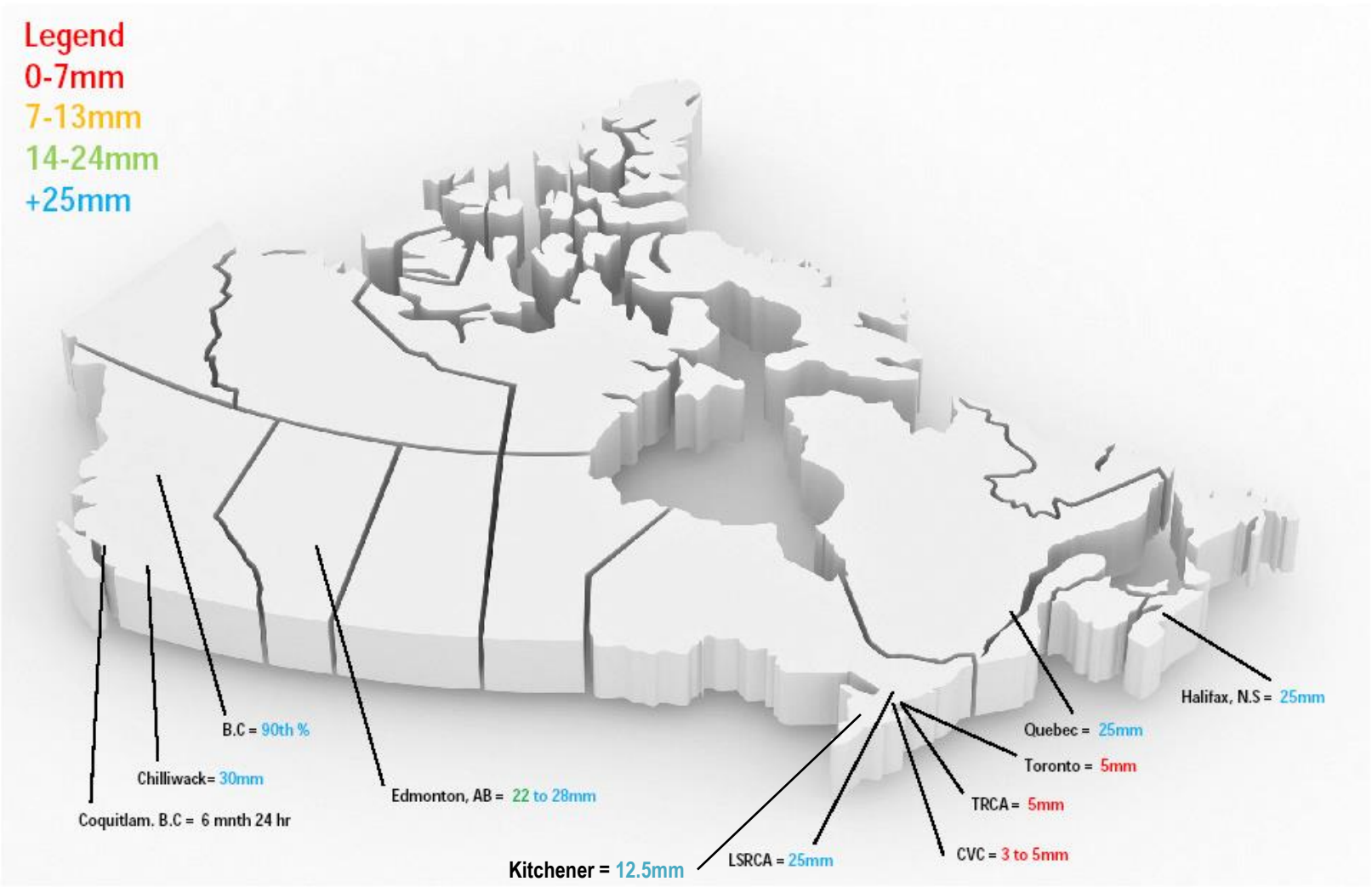


Figure 3.1 - Summary of Canadian Volume Targets

Ontario

Rainfall Analysis & RVCt

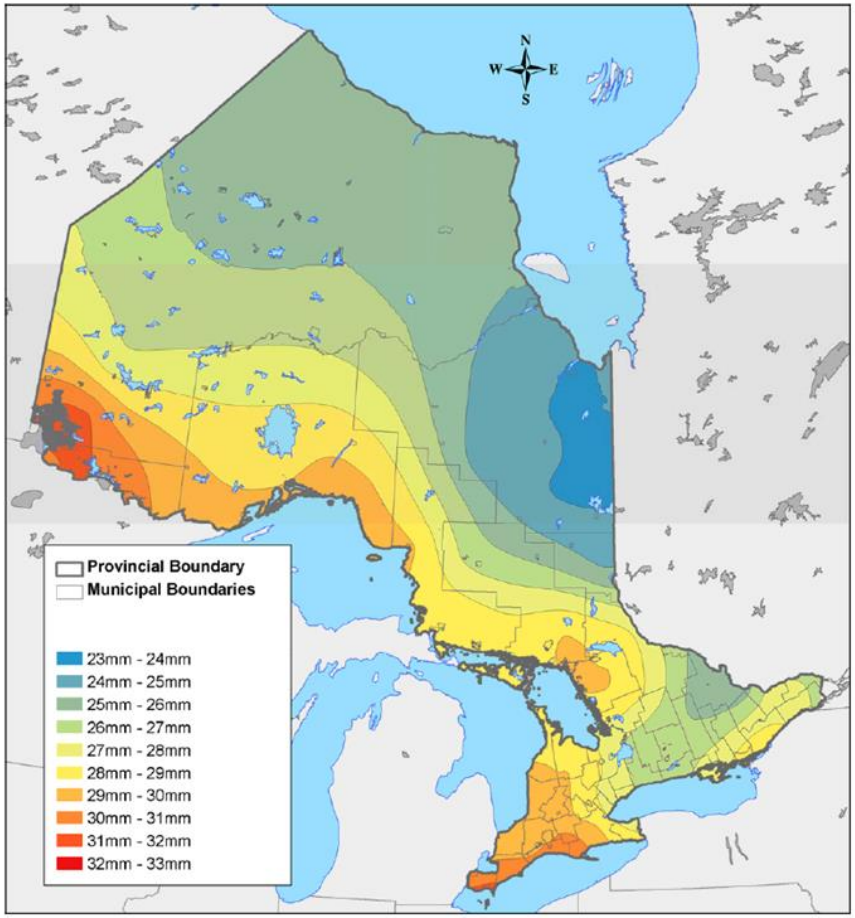
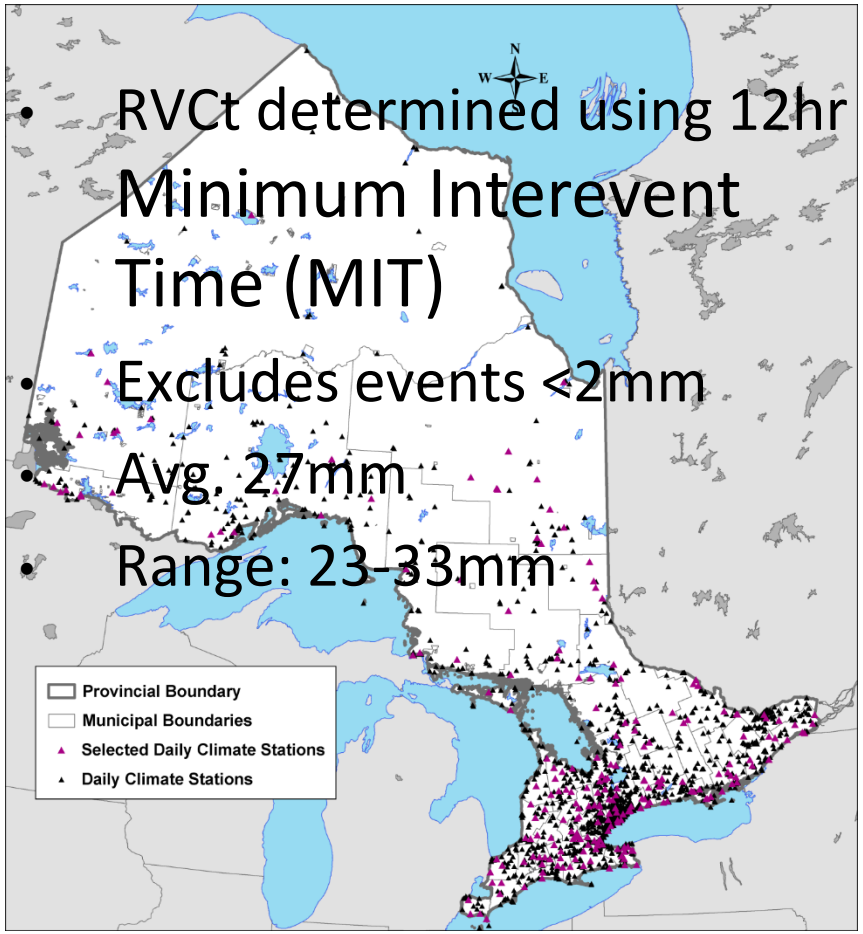


Figure 3.67 – Recommended Regional 90% Percentile Volume Targets for Ontario
(represented by the 95th percentile daily rainfall contours April - October, where daily volume exceeds 2mm).

- RVCt determined using 12hr Minimum Interevent Time (MIT)
- Excludes events <2mm
- Avg. 27mm
- Range: 23-33mm



233 climate stations selected for the daily rainfall event analysis in Ontario.

Ontario

Runoff Volume Control Target (RVCt)

- Specific volume targets for New Development; Redevelopment, Reurbanization and Intensification; Linear Development; and Stormwater Retrofits
- Road Resurfacing is exempt, but the MOECC expects “best efforts” or “maximum extent possible (MEP)”
- **It is flexible !**

  Treatment Options for Sites with Restrictions (i.e. Constraints).
- Minimum volume targets, superseded by volume targets as developed through watershed, subwatershed, master drainage plans, Environmental Impact Statement (EIS) and/or other area specific studies.
- **They can even be lower than the RVCt.**

Runoff Volume Control Target (RVCt)

- **The RVCt is not an 'infiltration target'…….**

  …..it is a 'control target'

- Key Principle: **Treatment Train** from 1991-2003 MOECC Manuals
  - Infiltration
  - Evapotranspiration
  - Re-use
  - Filtration
  - Detention
  - Mechanical Treatment (i.e. hydro-dynamic separation)

Source: Team-create.com

Ontario

Mandatory Control Hierarchy

Better Site Design (reduced land clearing, preserve natural systems etc) & **Pollution Prevention**

Approach 1 (Retention) – infiltration, evapotranspiration and or re-use. The volume does not become runoff.

Approach 2 (LID Volume Capture and Release) – utilize LID filtration. The controlled volume is filtered and released to the municipal sewer networks or surface waters at a reduced rate and volume (a portion may be infiltrated or evapotranspirated).

Approach 3 (Other Volume Detention and Release) – Other technologies which utilize filtration, hydrodynamic separation and or sedimentation (to detain and treat runoff. The controlled volume is treated and released to the municipal sewer networks or surface waters at a reduced rate.

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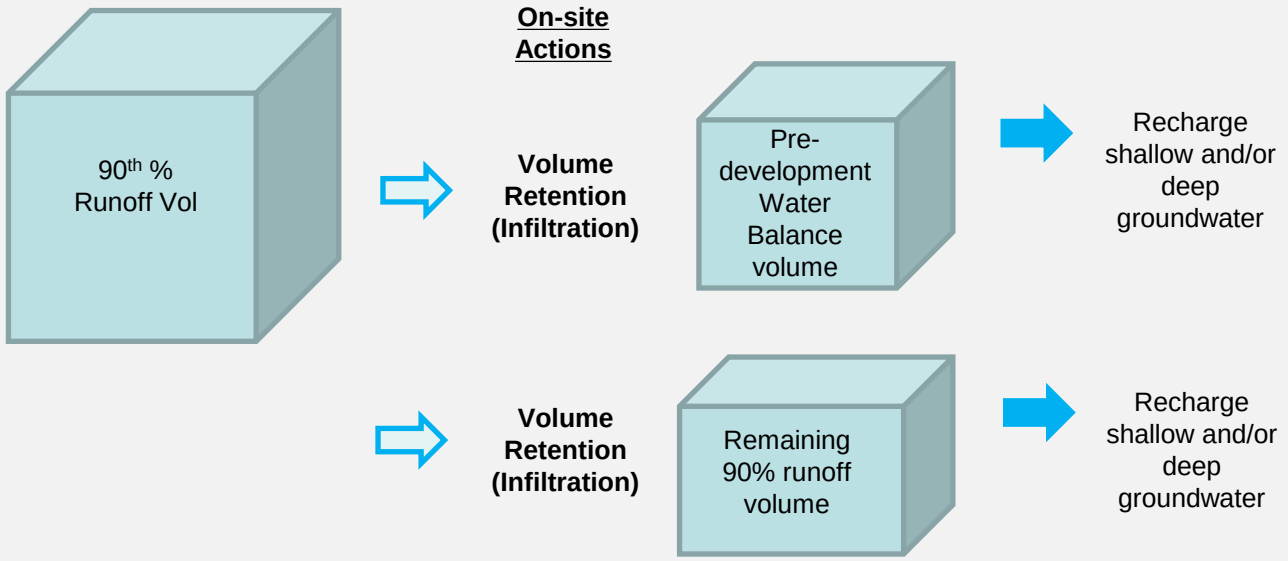
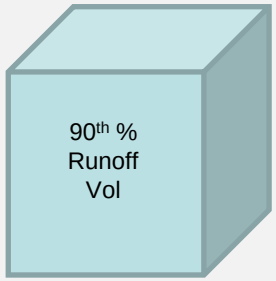
Example: Hydrologic A & B Soils (High Permeability)



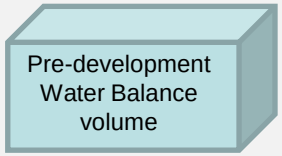
Ontario

Example: Hydrologic C & D Soils (Lower Permeability)

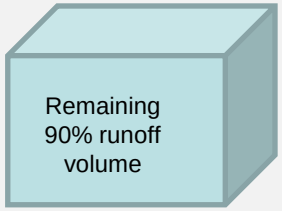


On-site Actions

Volume Retention (Infiltration)



Recharge shallow and/or deep groundwater



Partition

Priority 1

Retention
a) Infiltrate
b) Re-use
c) Evapotranspiration

a) Recharge shallow and/or deep groundwater
b) Re-use for internal or external uses
c) Return to the atmosphere

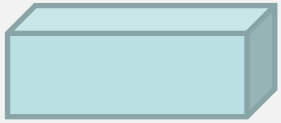
Recharge shallow and/or deep groundwater

Priority 2

LID Volume Capture & Release
d) Filtration using LIDs

d) Filter using LIDs with appropriate filter media" per the LID Stormwater Planning and Design Guide (as amended from time to time)

Release treated runoff to appropriate receiver



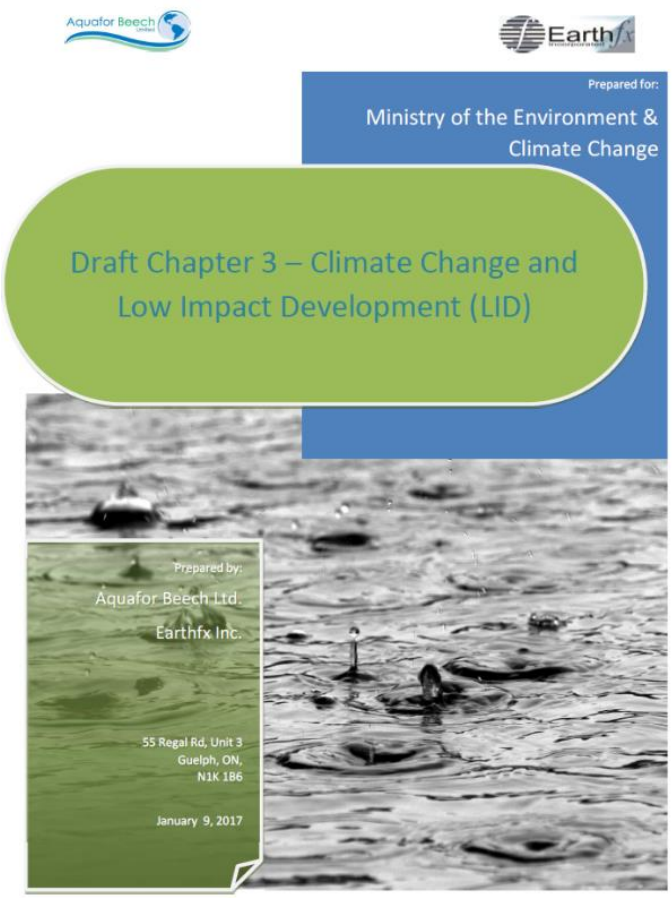
Priority 3

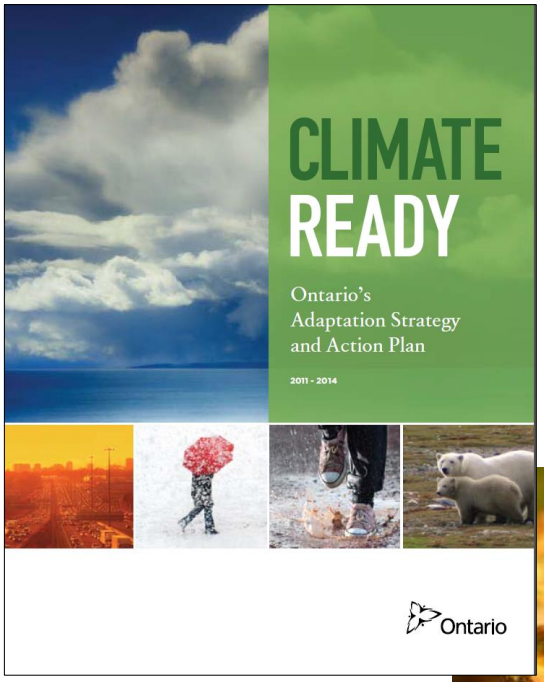
Volume Detention & Release
e) Filtration
f) Detention
g) Mechanical Treatment

e) Filter using manufactured verified product
f) Detain and treat through sedimentation (i.e. wet pond, wetland or subsurface detention systems)
g) Treat using mechanical and/or other (i.e. hydrodynamic separator)

Release treated runoff to appropriate receiver

Climate Change





Source: blogs.mcgill.ca

Source: Fau.eu

Ontario

Climate Change Fundamentals

Mitigation

- *measures or actions to avoid or reduce greenhouse gas emissions*
- *GOAL: The maximum reduction in GHG emissions*

Co-Benefit

mitigation and adaptation

LID achieves some level of both

Adaptation

- *process of adjustment in the built and natural environments in response to actual or expected climate change and its effects*
- *GOAL: greatest possible reduction in vulnerability through adaptation and climate-resilient development*

Climate Change

1) Overview of climate change

2) Observed global climate change parameters

3) Observed climate change parameters in Ontario and identifies potential impacts

4) Overview of Ontario's Adaptation Strategy and Action Plan

5) Roles and responsibilities of municipalities in climate change adaptation planning

6) Need for assessing the impacts of climate change on development planning and design at the site and municipal scale

7) Modelling approaches for assessing climate change in an urban context including models that can be adopted to assess the effects of future climate on stormwater management infrastructure

8) A 4-step climate change adaptation process and how LIDs can build climate change resiliency

9) Existing planning tools that can be used for climate change adaptation

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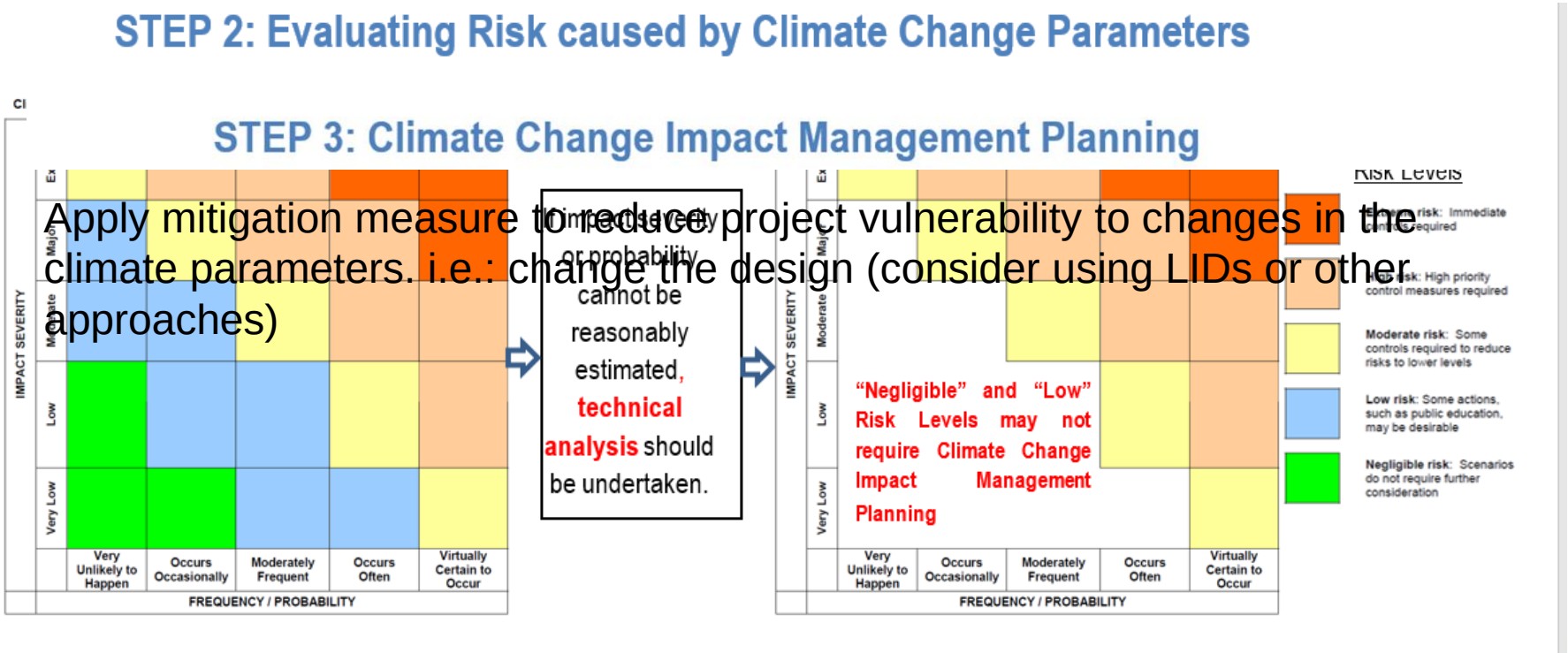
Climate Change

4 Step Process

1. Step 1 – Identify Climate Change Considerations
2. Step 2 - Evaluating Risks



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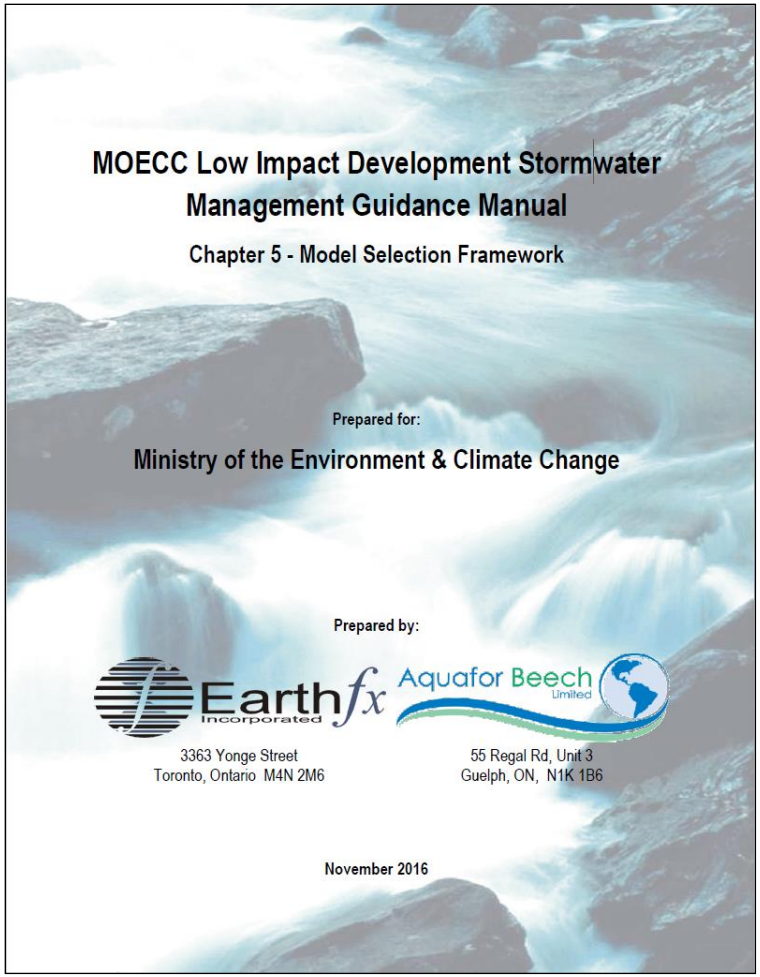
Model Selection Framework



- Guidelines should help create a *common understanding* among proponents, consultants, and regulators and ensure models are fit for purpose prior to undertaking an analysis
- Serves as a framework for the user to provide further guidance on model application
- Introduces the Low Impact Development and Urban Water Balance Modeling Tool

(TRIECA Day 2, 1:30- 2:00pm - Steve Auger)

Ontario

QUESTIONS

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