Incorporating Climate Resilience for Municipal Infrastructure into the Updates of Existing Atlantic Canada Water and Wastewater Design Guidelines

Led by: Atlantic Canada Water and Wastewater Association
Consultant: CBCL Limited
Peer Review: exp

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ACWWA Halifax 2019 Conference
October 08, 2019 | Willard D'Eon, MPH, P.Eng.

- Update the ACWWA Water Supply Guidelines and ACWWA Wastewater Guidelines

- Incorporate the design of climate resilient infrastructure

- RFP issued by ACWWA on February 06, 2019

- Awarded to CBCL March 14, 2019

Project

Natural Resources Canada (NRCan) under the:

Building
Regional
Adaptation
Capacity and
Expertise
program

BRACE

Project Funding

- 5 Year (2017-2022) $18 m program
- To increase the ability of communities, organizations… to access, use and apply knowledge and tools on climate change adaptation in their work.

- 18 programs under current funding
- 8 in Atlantic Canada

BRACE program

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Atlantic Canada funded projects:	
Government of NS	$1,000,000
Government of PEI	$1,000,000
Government of NL	$ 909,000
NB Environmental Network	$ 421,000
NB Fed. of Woodlot Owners	$ 361,000
ACWWA Guidelines Updates	$ 318,000
University de Moncton	$ 235,000
Memorial University	$ 122,000

- Internal presentations to BRACE in June 2019 on 5 projects
  - ACWWA, Memorial U , U de M, plus two from Saskatchewan
- Participant noted that we are doing “Climate Change 101” across the county
- National Conferences will be key to achieve uniformity

- Four Project Committee meetings
- Three drafts plus final Guidelines
- Four workshops (one in each AC province)
- Presentations at two national conferences
  - Adaptation Canada 2020, Vancouver, February: approved for Joint poster session with Memorial University, and Workshop
  - CWWA November 2020
- Presentation at two local conferences
- Non-technical Webinar

Project Deliverables

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- Water Supply Lead: Halifax Water (Owners):
  - Wendy Krkosek, B.A.Sc., Ph.D., P.Eng.
- Wastewater Lead: City of Charlottetown (Owners):
  - Richard MacEwen, M.Sc., FEC, P.Eng.
- Executive Director (Support):
  - Clara Shea
- Project Committee (Provincial Regulators)
  - NB: Sylvie Morton, P.Eng.
  - NL: Deneen Sprackling, P.Eng.
  - NS: John Lam, P.Eng.
  - PEI: Morley Foy, P.Eng

Project Partners: ACWWA

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- Project Manager: Willard D’Eon, MPH, P.Eng.
- Water Supply Lead: Mike Chaulk, M.Sc., P.Eng.
- Wastewater Lead: Mike Abbott, M. Eng., P.Eng.
- Climate Change Lead: Danker Kolijn, M.Sc., M.Eng, P.Eng.
- Project Coordinator: Amy Winchester, P. Eng.

Project Partners: CBCL

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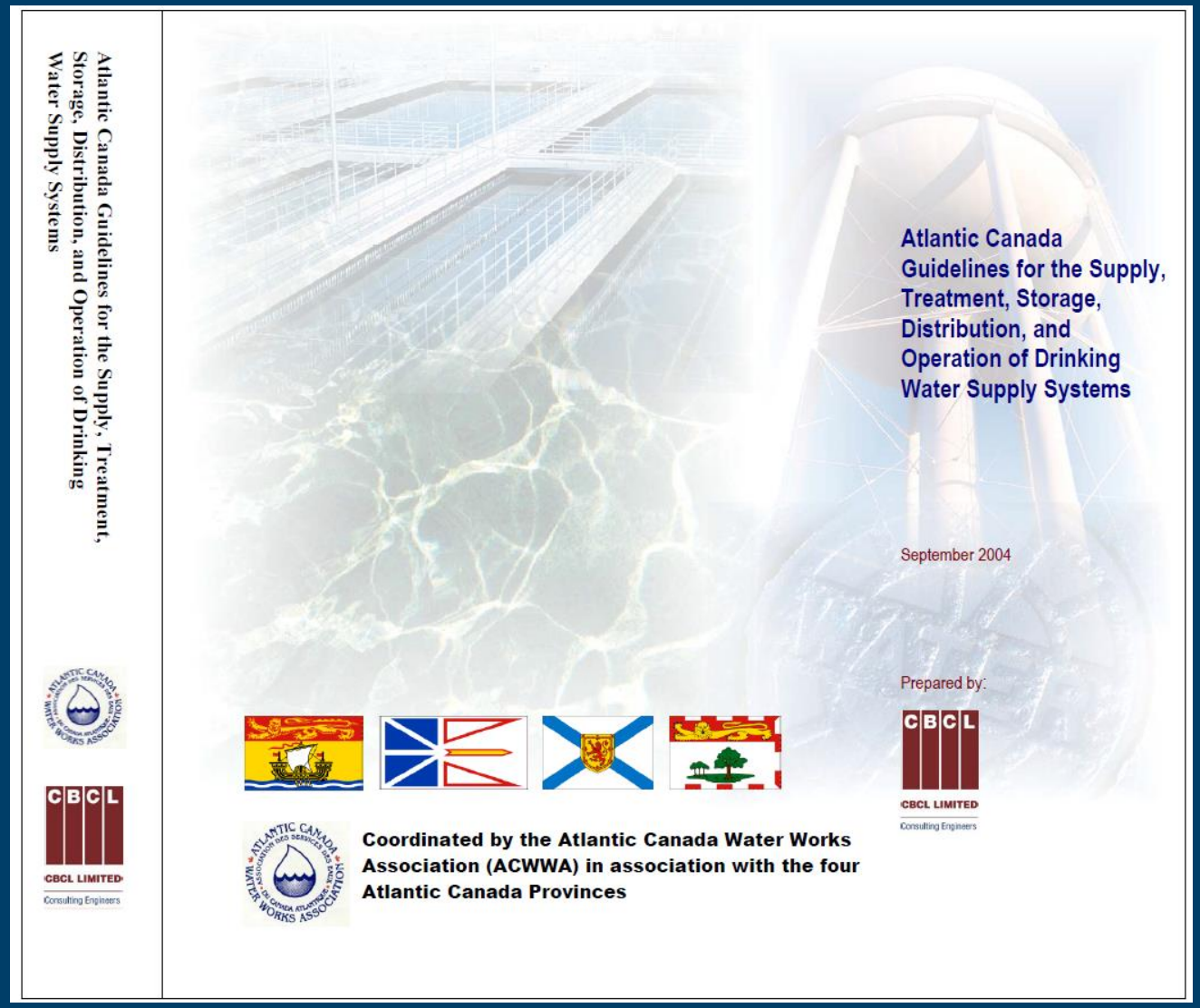
In use in all four Atlantic Canada Provinces

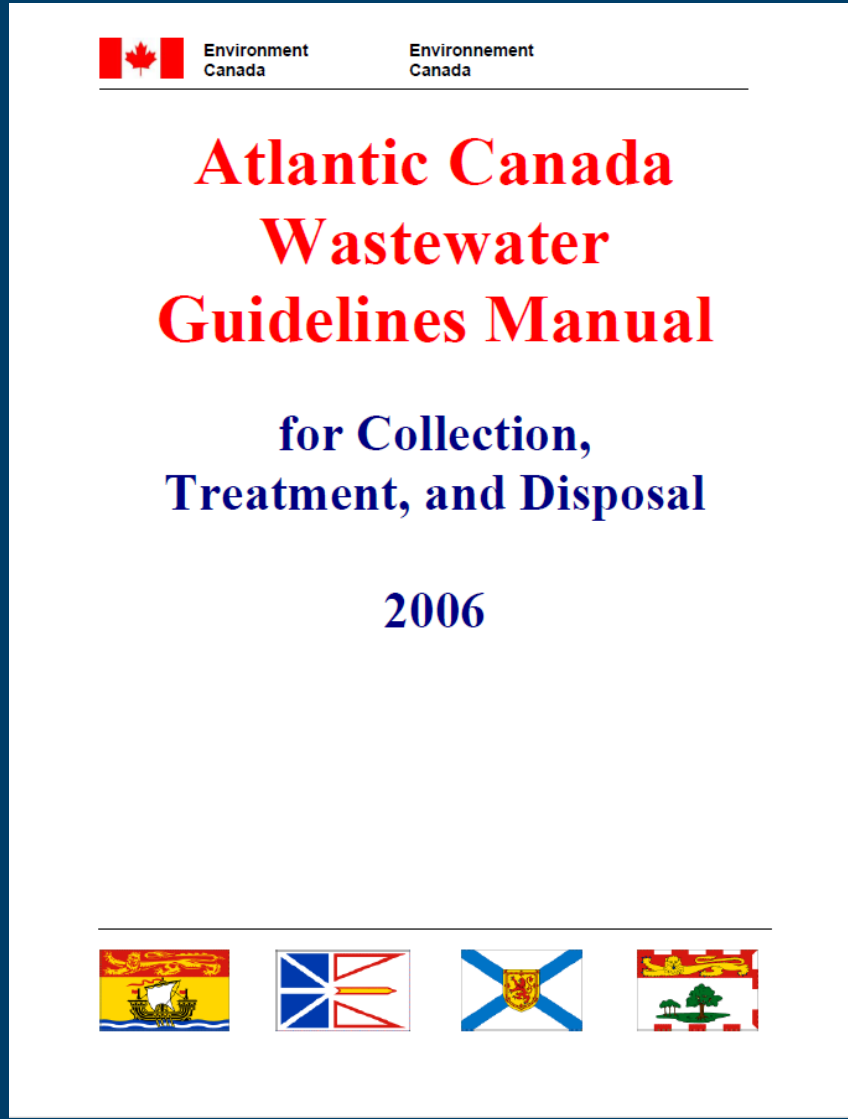
In addition:

- NS has own Treatment Standards
- NL has own Design Guidelines and Draft Treatment Standards



Water Supply Guidelines 2004

- 1991(NS document only)
- Revised 2000 (Atlantic Canada) Revised 2006
- In use in all four Atlantic Canada provinces
- In addition: NL has own Design Guidelines and Draft Treatment Standards



Wastewater Guidelines

- Technical
  - Consulting Engineers (Designers)
  - Utility/Public Works personnel (Owners)
  - Equipment and Service providers (Suppliers)

- Non-Technical
  - Municipal Administrators and Municipal Councils (Owners)

Target Audience (Stakeholders)

1. Incorporate climate resilience when investigating, designing, approving, constructing, and operating municipal water and wastewater infrastructure in Atlantic Canada.

2. Inclusion of a new chapter (or Appendix) on Climate Resilience into each of the Guidelines, and update of the existing sections to include climate resilience requirements.

3. Build climate adaptation capacity building through workshops, webinars and local and national conferences. (Key component for NRCan)

Objectives

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- Technical update of both guidelines
- update of existing sections to include climate resilient requirements.
- Jurisdictional review for relevant materials
- Reference up-to-date provincial regulatory requirements
- Reflect advancements in water and wastewater treatment process and technology.

Objective 1 – Incorporate climate resilience

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- Proposed Climate Change content in Water Supply Infrastructure (subject to Committee review)
  - Defining Climate Change
    - Adaptation and Mitigation
  - Scope of Climate Change Practice in this Guideline
  - Design Philosophy
  - Key Climate Change indices for Consideration
    - Precipitation
  - Sources of Climate Data

- **Proposed Climate Change content in Water Supply Infrastructure (subject to Committee review)**
  - **Climate Risk Assessment Framework**
  - **Key Definitions**
  - **Sample Report Outline**
  - **Resources**
  - **References**

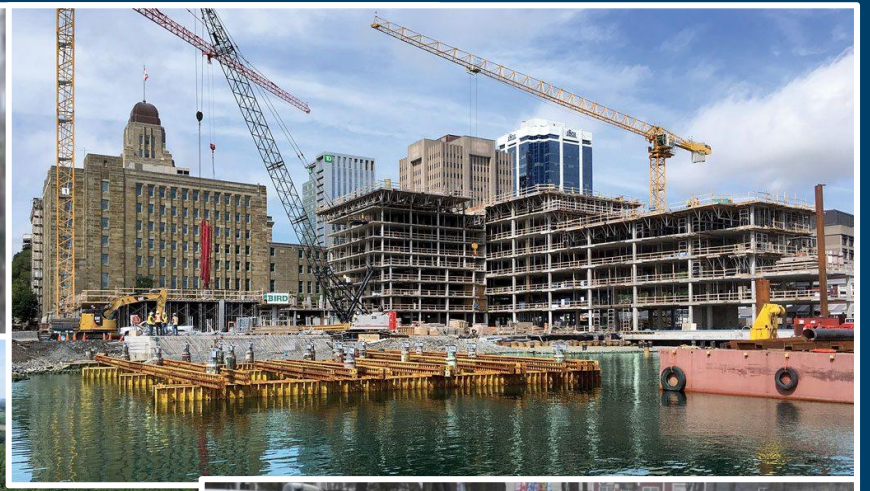
- Capacity Building is a major component of the project

- Includes conference presentations, workshops, and webinars
  - Ensure that stakeholders are aware of:
    - climate change requirements
    - Sources of data
    - Available training
      - Engineers Canada: Public Infrastructure Engineering Vulnerability Committee (PIEVC)

- **Knowledge Mobilization Plan (KMP) was established as a WEB Portal on the ACWWA website July 2019**
  - **Portal provides a platform for stakeholders to upload and download documents relevant to climate change/climate resilience and the updates of the Water and Wastewater Guidelines.**
  - ***~ 500 hits***

- Stakeholder notification followed launch of the KMP
- Sent to representative of the following organizations:
  - ACWWA
  - Maritime Provinces Water and Wastewater Association (MPWWA)
  - Consulting Engineers Associations (NL, NB, NS, PEI)
  - Atlantic Branch Equipment Suppliers (ABEA)
  - Municipal Public Works Association of NS (MPWANS)
  - CPWA Atlantic Chapter (NB, NS, PEI)
  - CPWA NL Chapter

- Total of ~ 1770 individual members (some with multiple memberships)
- Total of ~ 810 organizations (some with multiple memberships)
- Advised of the KMP
- Provided opportunity for comments:
  - on current guidelines;
  - on incorporation of climate resilience;
- Requested photos of water and wastewater infrastructure impacted by severe climate



Is there a case for climate change concerns to water and wastewater infrastructure in Atlantic Canada?

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- Yes, ACWWA believes so! And events include:
  - Winter freezing rain and severe snowstorms
    - Power outages at WTPs, WWTPs, PSs
  - Increased spring flooding
    - Submerged water and wastewater infrastructure
  - Fall Hurricanes and all seasons severe rain events
    - Power outages at WTPs, WWTPs, PSs
    - Ocean storm surges impact WWTPs

- Flooding
  - New Brunswick St. John River flooding various events (increasing)
  - 10 to 15 WWTP impacted by St. John River flooding in Spring of 2018
    - Inflow into gravity collection system manholes
  - Inflow directly into submerged PSs
  - Entire WWTPs flooded
  - Impacts on downstream WTPs?

Pumping station (not seen) and area around wastewater treatment plant submerged during Spring flooding 2014

Flooding: WWTP and PS

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Sand bag barrier built around a wastewater pumping station near river (spring flood)

Flooding: Protecting Pump Station

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Flooded wellfield raw water pump station building (spring flood)

Flooding: GW Source

Flooding: Wastewater Lagoon

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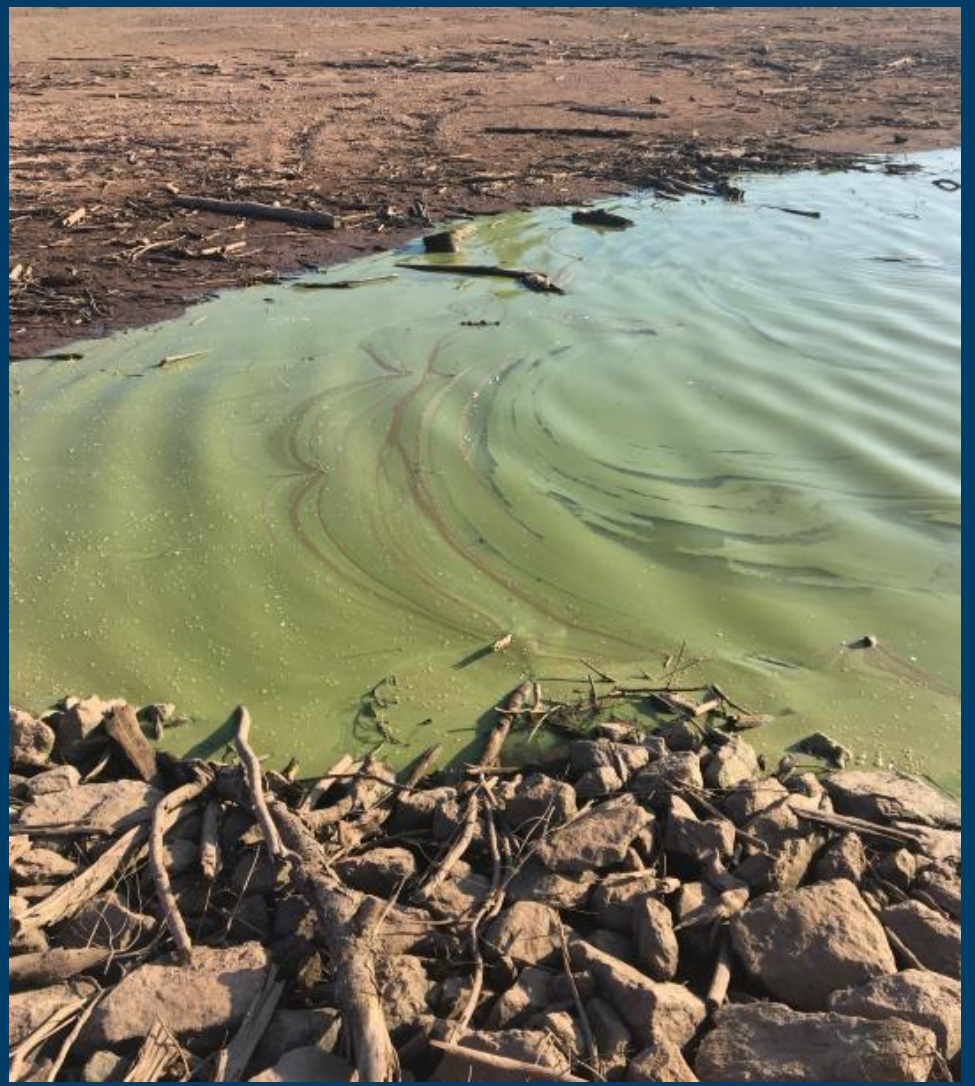
- Drought and Heat
  - Voluntary/mandatory water conservation
  - Water treatment/quality concerns
  - DFO minimum flow maintenance requirements
  - Demands for bulk municipal water and comfort stations to service residents from rural areas on individual wells
  - Odours in the wastewater collection system
  - Operational issues at WWTP
  - Potential effluent discharge issues for small WWTPs

- **Blue Green algae:**
  - **Blue green algae in St. John River kills dogs**
  - **Advisories issued for 4 weeks for Dartmouth lakes (Banook and Micmac)**
  - **Advisory issued, and soon lifted, for Bedford lake (Sandy)**
  - **Caution issued for Inverness County lake (Ainslie)**
  - **Moncton to upgrade WTP process due to algae concerns**

Low water level and algae bloom in lake reservoir (2017)



Drought and Heat: Surface Water Supply

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- September 2003, Nova Scotia and Prince Edward Island: Hurricane Juan
- February 2004, Atlantic Canada: White Juan
- September 2010 Newfoundland: Hurricane Igor
- Summer and Fall 2016 Nova Scotia: drought
- October 2016: Sydney flooding
- January 2017, New Brunswick: Ice Storm
  - Normally colder with snow

Atlantic Canada Miscellaneous Weather Events

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- 2017 New Brunswick drought
- 2016, 2018 and 2019 Dartmouth and area: Water restrictions
- February 2018: Sydney flooding (again)
- Pre-Dorian Headline
  - Link between hurricanes and sea level worrisome

Atlantic Canada Miscellaneous Weather Events

- **And then - Dorian!**
  - **30 m wave recorded offshore**
  - **Rural communities battle wastewater treatment problems**
    - **38 water and wastewater facilities were impacted by power outages**
  - **Mobile generators/pump trucks used at PSs without power**
  - **People were asked to limit water use**
  - **Lunenburg WWTP flooded with salt water, electrical equipment at risk**

- **And then - Dorian!**
  - Two Cape Breton Communities without water due to power outage
  - NS and PEI communities asked to conserve water
  - Power outages mean no water to fight fires in part of Inverness County
- **Post Dorian**
  - Inverness County: $250,000 for generators for water pumping and treatment stations

- Flooding Events
  - Submerged water sources and/or WTPs
    - Surface water and groundwater
  - Submerged wastewater collection systems
    - PS overflows
    - PS submerged
  - Submerged water distribution systems
  - Overflowing wastewater treatment plants
  - Submerged wastewater treatment plants

Overview of consequences of Severe Climate in Atlantic Canada

- Power Outages (wind, freezing rain, flooding)
  - No power at WTPs and WWTPs
  - Use of Backup generators
    - WTP
    - WWTP
    - PS
    - Residential Homes

  - Use of Emergency Stations (are water and wastewater services adequate? (Rural stations of more concern!)

Summary of consequences of Severe Climate in Atlantic Canada

- Drought and Heat
  - Voluntary or mandatory water conservation measures
  - Potential conflicts with DFO requirements?
  - Rural residents rely on nearby municipal services for bulk water
    - Stress on WTP?

July 2019 was the hottest month ever on Earth;

Previously hottest was July 2016; (local drought conditions)

Nine of the 10 hottest recorded Julys have occurred since 2005;

The last 5 Julys have ranked as the five hottest Julys on record

How hot was it?

- **We need climate resilient infrastructure!**

What do we need?

- Infrastructure that is planned, designed, built, and operated in a way that anticipates, prepares for, and adapts to, changing climate conditions.

- It can withstand, respond to, and recover rapidly, from disruptions caused by these climate conditions.

  - Source (OECD Environment Policy Paper No. 14, 2018).

Definition of Climate Resilient Infrastructure

- Project Committee Meeting # 2 tomorrow pm

- Capacity Building Workshop #1
  - tomorrow October 09 9am to 12 noon
  - Halifax C

- Discuss Climate Change and Inclusion into Guidelines
- Overview of Nova Scotia Climate Change Activities
- Discuss the Water Supply Guidelines
- Discuss the Wastewater Systems Guidelines

Thank you!