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Welcome
Toronto, ON

Climate and Asset Management Workshop Series: Ontario

Dustin Carey

February 11-12, 2020

Federation of Canadian Municipalities



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Welcome



Prairies – Saskatoon
November 26, 2019

West Coast – Vancouver
January 14 & 15, 2020

Ontario – Toronto
February 11 & 12, 2020

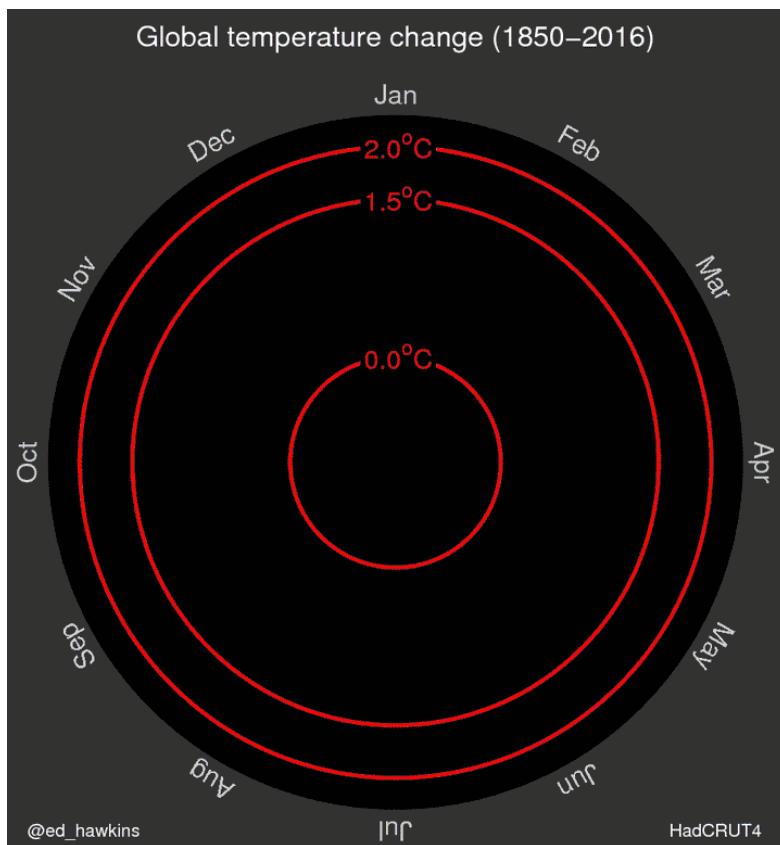
Atlantic – Moncton
March 17, 2020

Quebec – Laval
April 21 & 22, 2020



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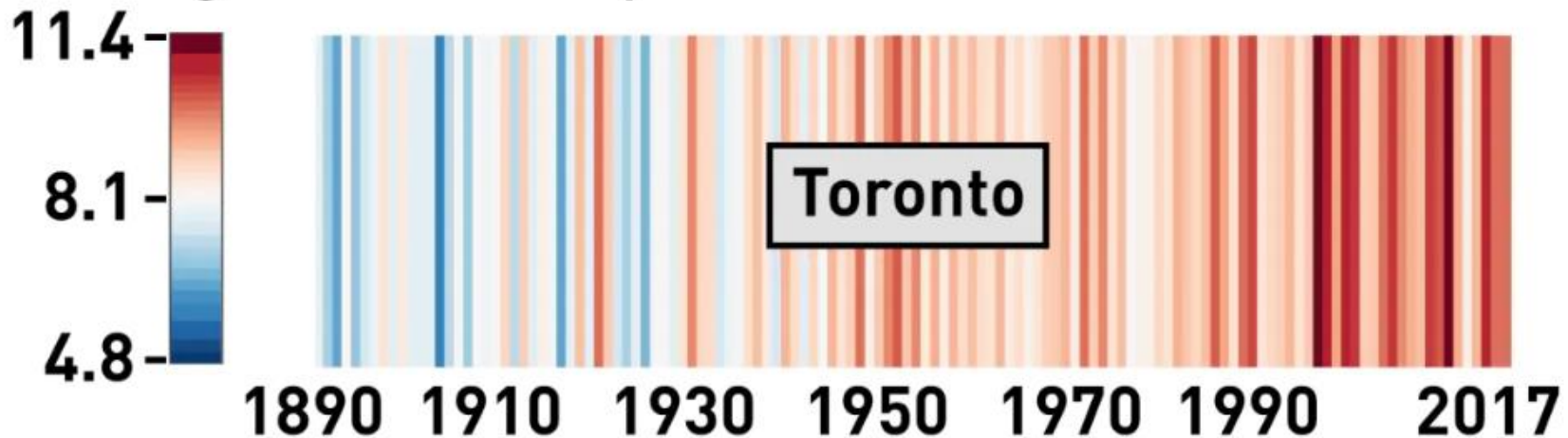
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Increased climate variability introduces significant uncertainty into both existing infrastructure preparedness and planning for future infrastructure needs

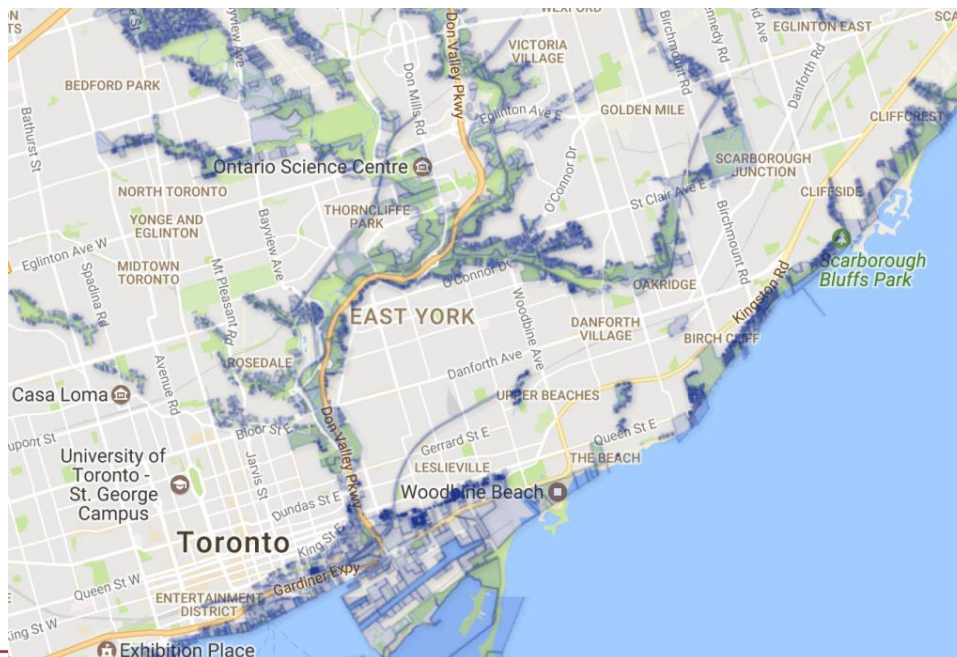


Average annual temperature °C



CBC NEWS

Source: Environment and Climate Change Canada



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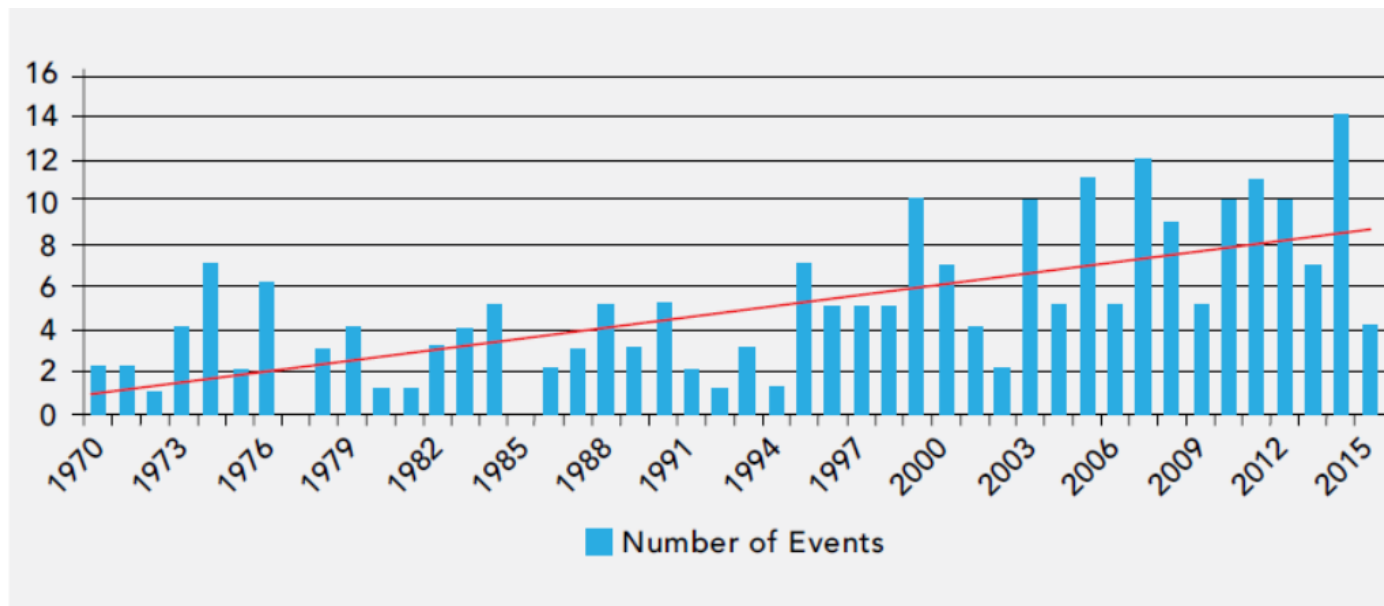
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Local Effects

- Across Canada, damage from extreme weather has cost taxpayers and insurers almost \$10 billion since 1998.
- While insurable payouts averaged \$400 million per year over the period of 1980 to 2008, for the last seven of eight years leading up to 2016, extreme insurance payouts exceeded \$1 billion in Canada.



Number of Natural Disasters in Canada Requiring Disaster Financial Assistance Arrangements for Provinces and Territories

Source: Public Safety Canada 2016-2017



World Economic Forum Global Risks Report 2020

Top 5 Global Risks in Terms of Likelihood

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1st	Infrastructure breakdown	Blow up in asset prices	Asset price collapse	Asset price collapse	Storms and cyclones	Income disparity	Income disparity	Income disparity	Interstate conflict	Involuntary migration	Extreme weather	Extreme weather	Extreme weather	Extreme weather
2nd	Chronic diseases	Middle East instability	China economic slowdown	China economic slowdown	Flooding	Fiscal imbalances	Fiscal imbalances	Extreme weather	Extreme weather	Extreme weather	Involuntary migration	Natural disasters	Climate action failure	Climate action failure
3rd	Oil price shock	Failed and failing states	Chronic diseases	Chronic disease	Corruption	Greenhouse gas emissions	Greenhouse gas emissions	Unemployment	Failure of national governance	Climate action failure	Natural disasters	Cyberattacks	Natural disasters	Natural disasters
4th	China hard landing	Oil price shock	Global governance gaps	Fiscal crises	Biodiversity loss	Cyberattacks	Water crises	Climate action failure	State collapse or crisis	Interstate conflict	Terrorist attacks	Data fraud or theft	Data fraud or theft	Biodiversity loss
5th	Blow up in asset prices	Chronic diseases	Deglobalization (emerging)	Global governance gaps	Climate change	Water crises	Population ageing	Cyberattacks	Unemployment	Natural catastrophes	Data fraud or theft	Climate action failure	Cyberattacks	Human-made environmental disasters

Top 5 Global Risks in Terms of Impact

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1st	Blow up in asset prices	Blow up in asset prices	Asset price collapse	Asset price collapse	Fiscal crises	Financial failure	Financial failure	Fiscal crises	Water crises	Climate action failure	Weapons of mass destruction	Weapons of mass destruction	Weapons of mass destruction	Climate action failure
2nd	Deglobalization	Deglobalization (developed)	Deglobalization (developed)	Deglobalization (developed)	Climate change	Water crises	Water crises	Climate action failure	Infectious diseases	Weapons of mass destruction	Extreme weather	Extreme weather	Climate action failure	Weapons of mass destruction
3rd	Interstate and civil wars	China hard landing	Oil and gas price spike	Oil price spikes	Geopolitical conflict	Food crises	Fiscal imbalances	Water crises	Weapons of mass destruction	Water crises	Water crises	Natural disasters	Extreme weather	Biodiversity loss
4th	Pandemics	Oil price shock	Chronic diseases	Chronic disease	Asset price collapse	Fiscal imbalances	Weapons of mass destruction	Unemployment	Interstate conflict	Involuntary migration	Natural disasters	Climate action failure	Water crises	Extreme weather
5th	Oil price shock	Pandemics	Fiscal crises	Fiscal crises	Energy price volatility	Energy price volatility	Climate action failure	Infrastructure breakdown	Climate action failure	Energy price shock	Climate action failure	Water crises	Natural disasters	Water crises

■ Economic
 ■ Environmental
 ■ Geopolitical
 ■ Societal
 ■ Technological

Increasing Responsibilities

Thunder Bay hit with \$300M lawsuit over flooding

CBC News | Posted: Jun 21, 2012 10:07 AM ET | Last Updated: Jun 21, 2012 2:03 PM ET

Christopher Watkins, of WATKINS LAW PROFESSIONAL CORPORATION are filing a class action lawsuit against the City of Thunder Bay for **negligence in the design and maintenance of the city storm, water and sewer systems.**

The recent heavy rains were a **predictable event** and should have been designed for and the City failed to maintain the sewage treatment plant and other storm sewer facilities which resulted in extensive damages for many city residents.

Other municipalities that have faced litigation associated with basement flooding include Port Alberni, St. John's, Kenora, Mississauga and Stratford.



PAN-CANADIAN FRAMEWORK



on Clean Growth and Climate Change

Canada's Plan to Address Climate
Change and Grow the Economy

“Canadian municipalities will also continue to be important partners in developing and implementing climate solutions locally, as well as through international collaboration with other municipalities around the world.”



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Partners for
Climate Protection

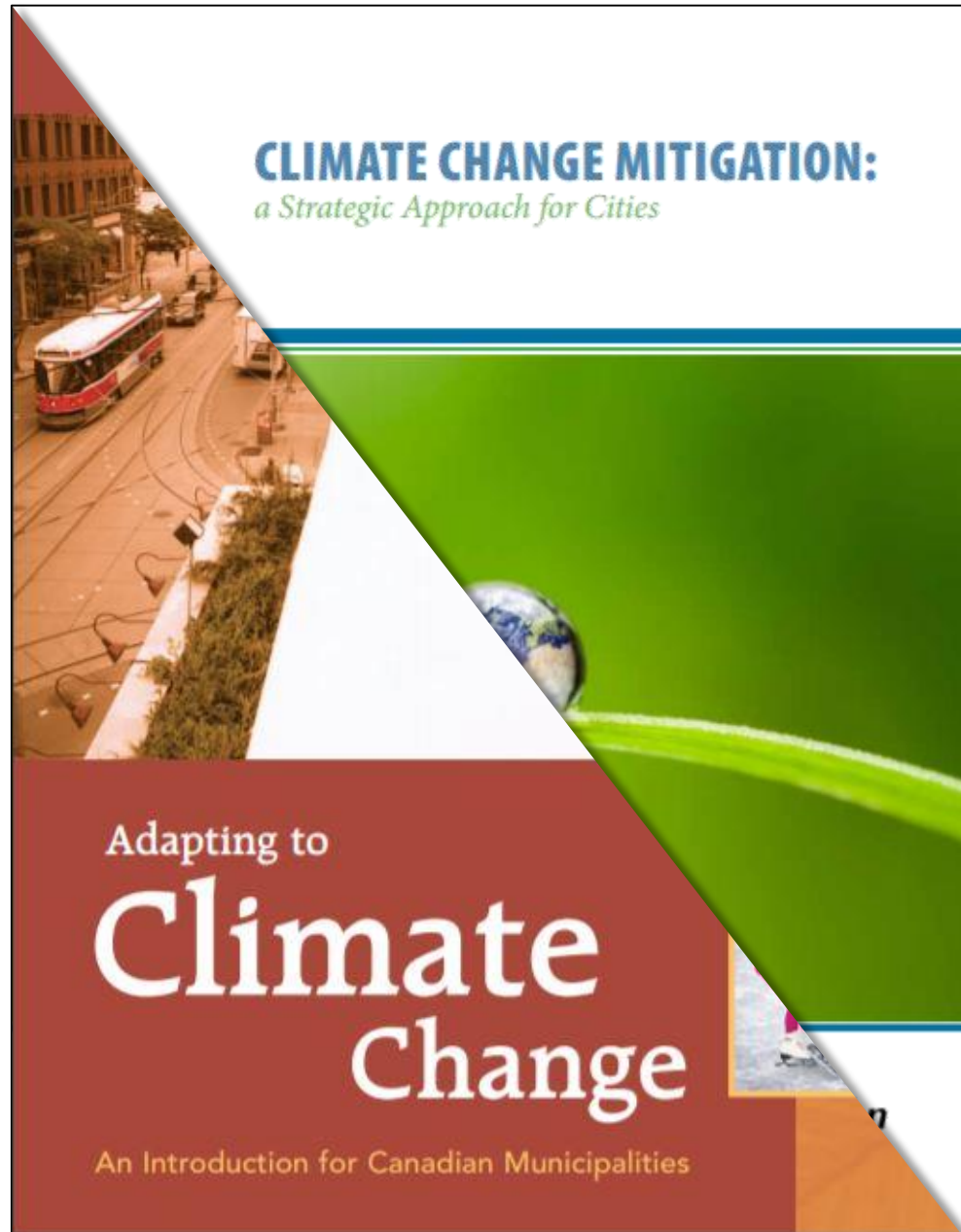
What Municipalities Can Do



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With infrastructure, you have to spend money to stand still



**NO TAX
INCREASE
BUDGET**

"In the previous 7 years (2009-2015), the annual budget was approved without a total property tax levy increase..."



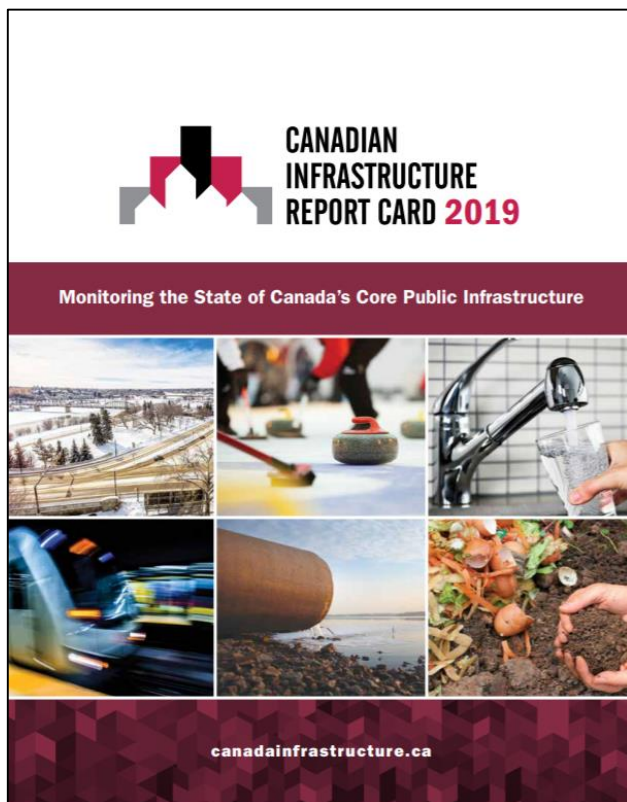
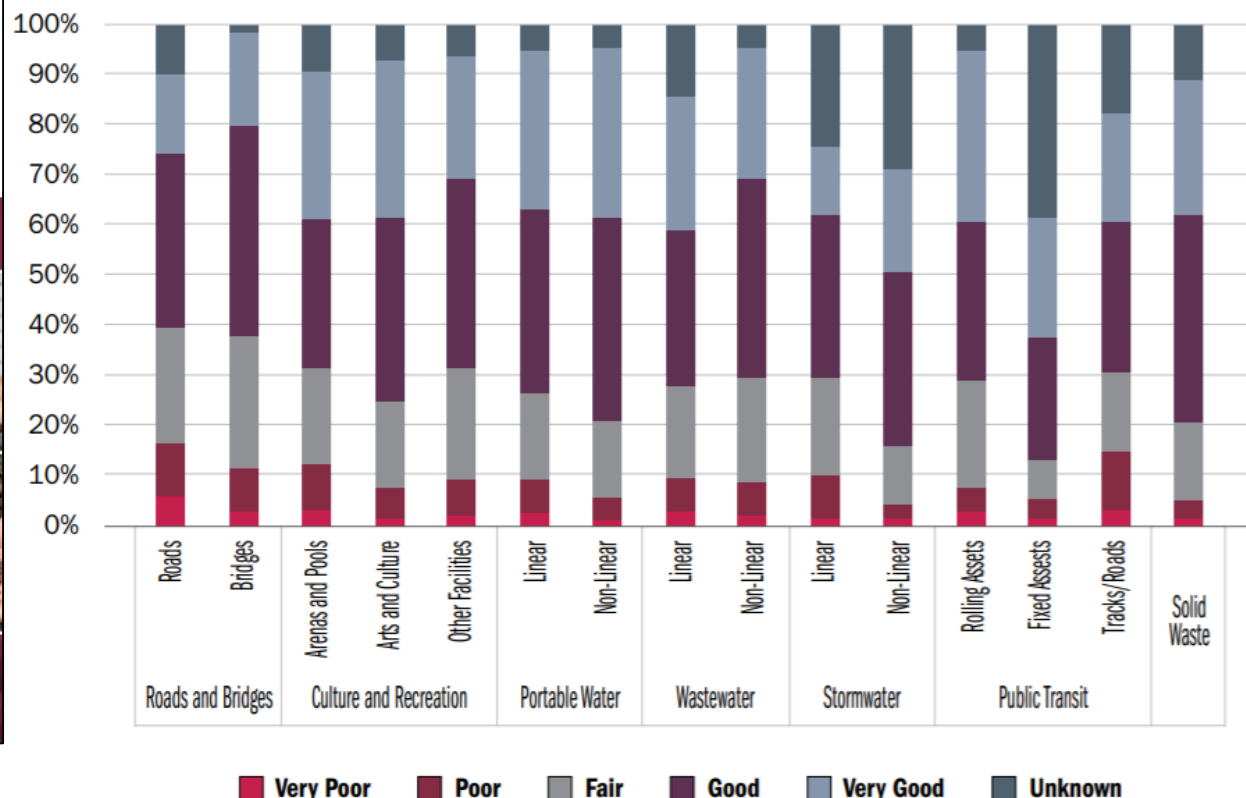


Figure 1: Core Infrastructure Asset Condition Summary



Total replacement value of infrastructure in poor or very poor condition:

\$141 billion

\$10,000 per Canadian household.



Local Government Infrastructure Systems Impacted by Climate Change

- Drainage and Flood Protection
- Wastewater
- Drinking Water
- Buildings
- Land Transportation
- Parks
- Solid Waste Management





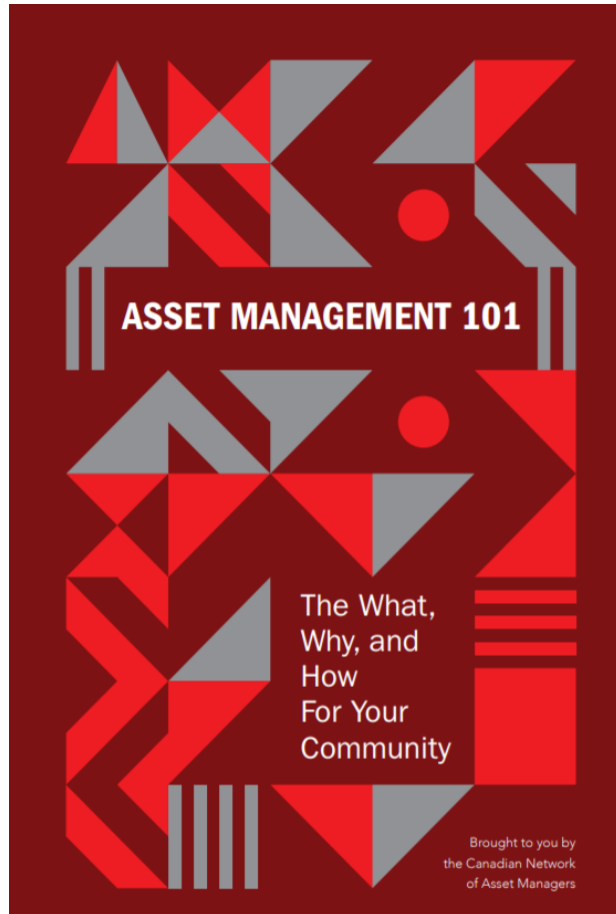
“Infrastructure must respond to, and be more resilient to climate change, but also be part of the solution”

- Catherine McKenna,
Minister of Infrastructure
and Communities

Address to FCM, November 2019







70% of large municipalities,
56% of medium-sized
municipalities and 29% of
small municipalities
reported having a formal
asset management plan in
place.



INVESTING IN CANADA'S FUTURE:

The Cost of Climate Adaptation

SEPTEMBER 2019



Climate change is increasing the frequency and severity of extreme weather events across Canada. Earlier this year, the federal government released the report *Canada's Changing Climate*. It found that the annual average temperature in Canada has increased by 1.7°C since 1948, with higher temperature increases in Canada's North, the Prairies and northern British Columbia.

While every region in Canada experiences the impacts of the warming climate differently, evidence indicates an increase in the severity of heat waves and drought, more frequent and intense rainfall events, changes in snow and ice cover, and more frequent and intense storm surges in coastal regions.

For Canada and its economy, the consequences are severe. While a number of studies have attempted to measure the cost of climate change in terms of the damage it will cause or the impact it will have on the economy, there is more to be done to estimate the cost of adapting to climate change.

IBC  BAC | FCM

Investments in adaptation and risk mitigation measures help ensure Canadian communities are resilient to threats caused by a changing climate. Research indicates that the benefits of investing in community adaptation and resilience outweigh the cost of such investments by a ratio of 6 to 1.



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Targeting the Right Intervention on the Right Asset at the Right Time

- Align adaptation responses with risk management, financial planning and emergency response
- Include capacity and vulnerability in risk assessments/capital plans in addition to age and condition
- Increase infrastructure capacity
- Increase system redundancy
- Adapt operation and maintenance practices
- Incorporate natural assets



Session Activity	Time
Light Breakfast (provided)	8:00 – 8:30
Introductions and agenda setting	8:30 – 9:00
Overview: A Guide for Integrating Climate Change into Asset Management	9:00 – 9:15
Asset Management Governance within the Context of Climate Change	9:15 – 9:45
Integrating Climate Change Considerations into the Asset Management Process	9:45 – 10:15
Networking Break (Coffee and snacks provided)	10:15 – 10:30
Accessing and using climate projections for infrastructure planning	10:30 – 12:00
Lunch (Provided)	12:00 – 1:00
Table Scenario – How would your community respond?	1:00 – 2:00
Green infrastructure and community resilience	2:00 – 2:45
Networking Break (Coffee and snacks provided)	2:45 – 3:00
Prioritizing Climate Change Risk and Tools – Hazards, Enterprise Assets and a Corporate-Wide Approach	3:00 – 3:45
Presentation on regional tools and support resources	3:45 – 4:30
Wrap Up	4:30 – 4:45
Urban Resilience Walking Tour (Sign-Up)	5:00 – 6:00



Coming
March 2020



Municipalities for **Climate Innovation** Program

Guide for Integrating Climate Change Considerations into Municipal Asset Management



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Acknowledgements

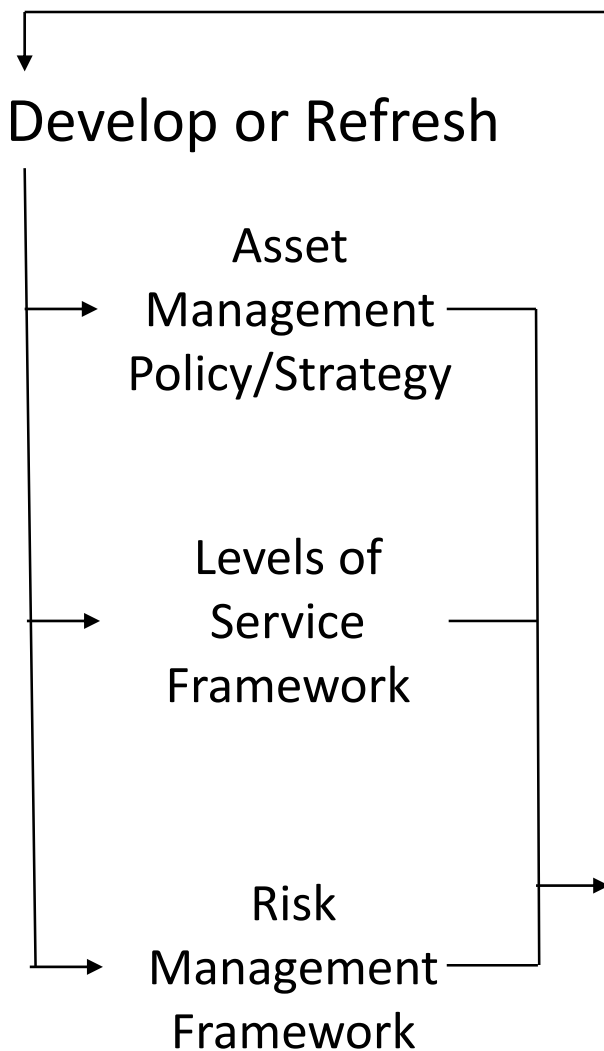
- Saint John, NB
- Fredericton, NB
- Ville de Saint-Quentin, NB
- Bromont, QC
- Halton Hills, ON
- Guelph, ON
- Kitchener, ON
- Kenora, ON
- Selkirk, MB
- Cowichan Valley Regional District, BC
- Nanaimo, BC



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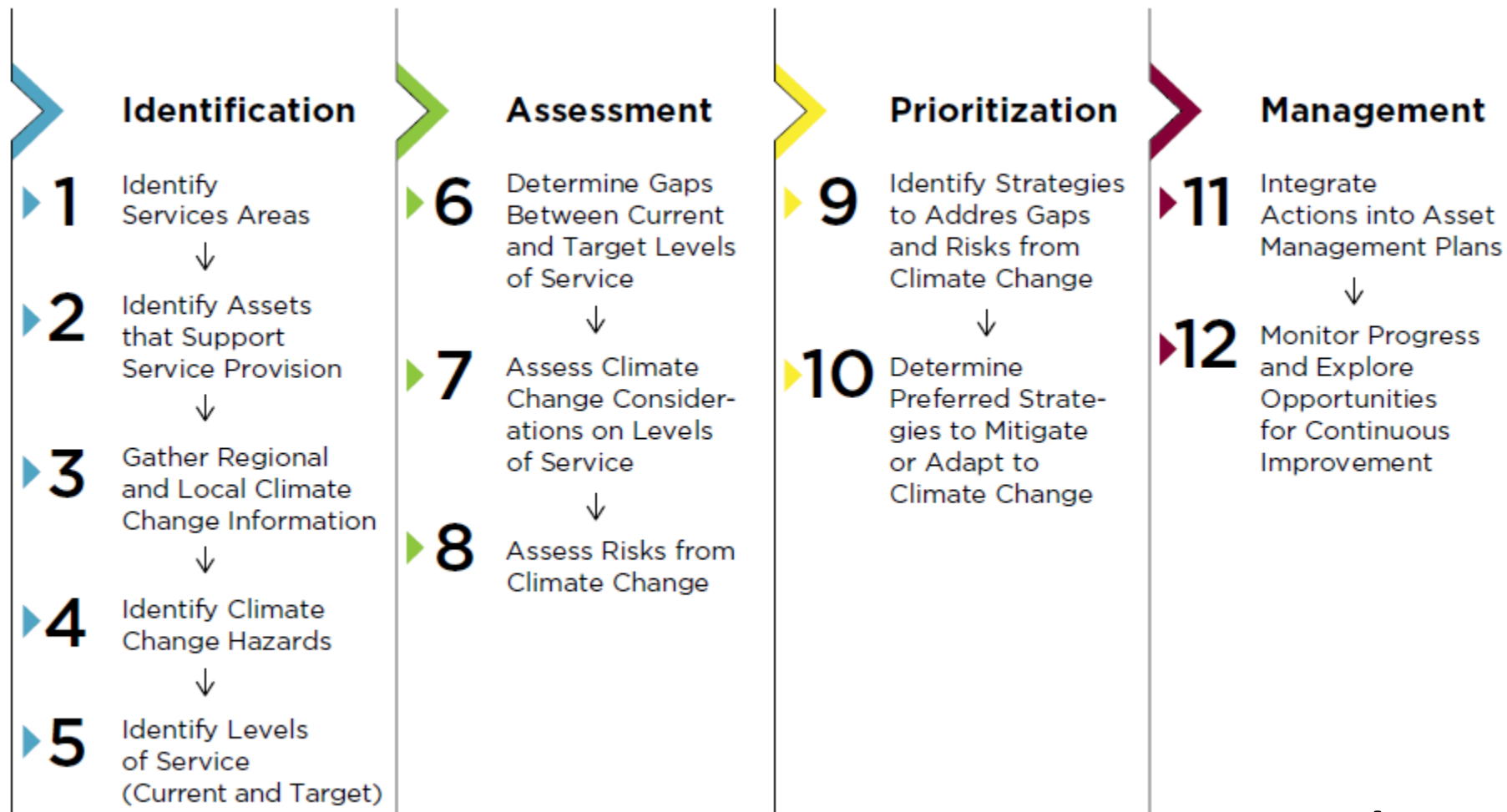
CAMN & LAMP Municipalities



Chapters

1. Enhancing Community Resilience through Service Delivery
2. Integrating Climate Change Considerations into Decision Making
3. The Framework
4. Entry Points
5. Step by Step through the Framework
6. A Call to Action





The Framework



Hazard-oriented rather than asset-oriented perspective of risk

Hazards are physical events or phenomenon that may have a negative impact, such as habitat damage, injury or loss of life, economic disruption. Climate-related hazards include:



Erosion



Landslides



Drought



Flooding



Sea Level Rise



Storm Surges



Permafrost
Degradation



Extreme
Temperatures



Wildfire



Hailstorms

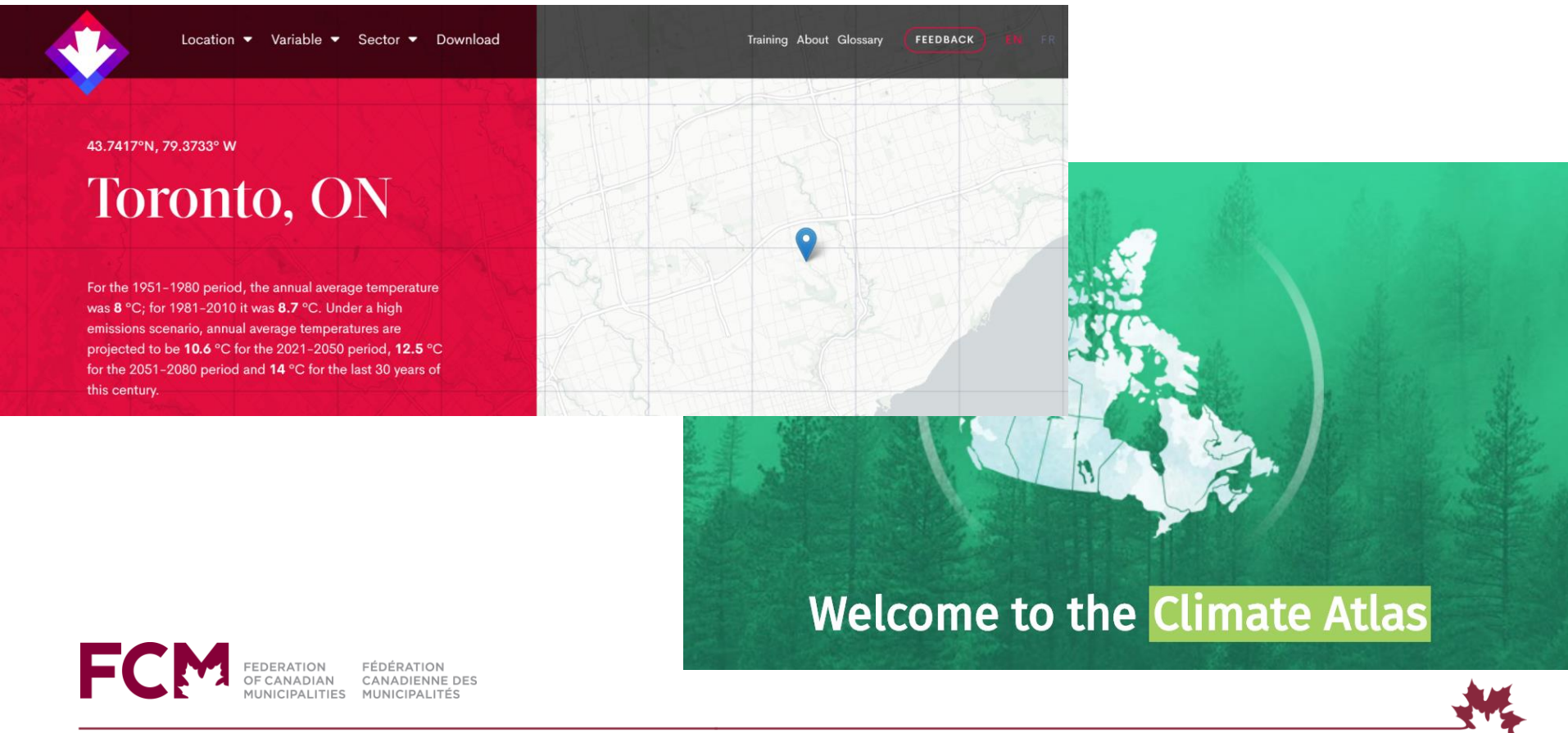


High Winds



Severe
Weather

Understanding how the climate is likely to change in your region is a key step to assessing what climate change will mean for the services you deliver



The screenshot displays the Climate Atlas web application. The top navigation bar includes a logo, dropdown menus for 'Location', 'Variable', 'Sector', and 'Download', and links for 'Training', 'About', 'Glossary', 'FEEDBACK', 'EN', and 'FR'. The main content area is split: the left side has a red background with the location 'Toronto, ON' and its coordinates '43.7417°N, 79.3733° W'. Below this, a text block provides historical and projected temperature data for the 1951-1980, 1981-2010, 2021-2050, 2051-2080, and the last 30 years of the century. The right side features a map of Toronto with a blue location pin. A large green banner at the bottom right contains the text 'Welcome to the Climate Atlas'.

43.7417°N, 79.3733° W

Toronto, ON

For the 1951–1980 period, the annual average temperature was **8 °C**; for 1981–2010 it was **8.7 °C**. Under a high emissions scenario, annual average temperatures are projected to be **10.6 °C** for the 2021–2050 period, **12.5 °C** for the 2051–2080 period and **14 °C** for the last 30 years of this century.

Welcome to the Climate Atlas



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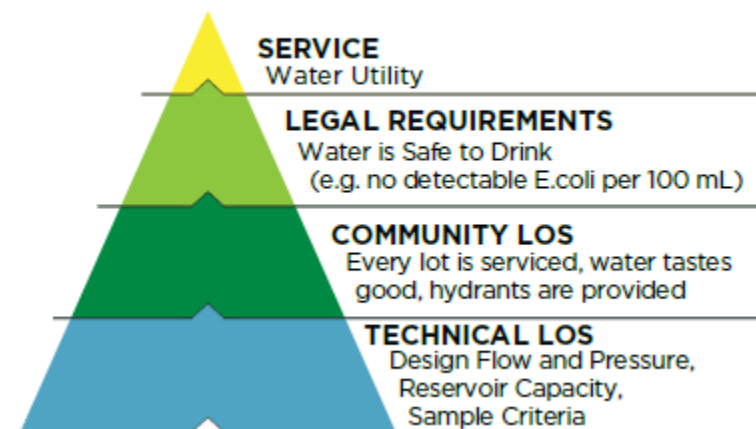
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Climate Change and Levels of Service

- Determine gaps between current and target LOS
- Use past experience and climate projections to determine where your municipality is vulnerable
- Use vulnerable services to identify assets that area likely to be affected.
- Assess implications to infrastructure, services and systems over time. Identify top vulnerabilities

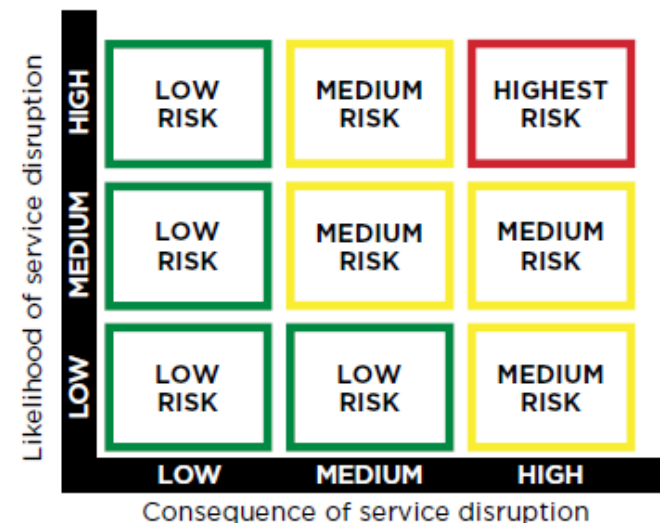
Figure 2: Levels of Service Pyramid



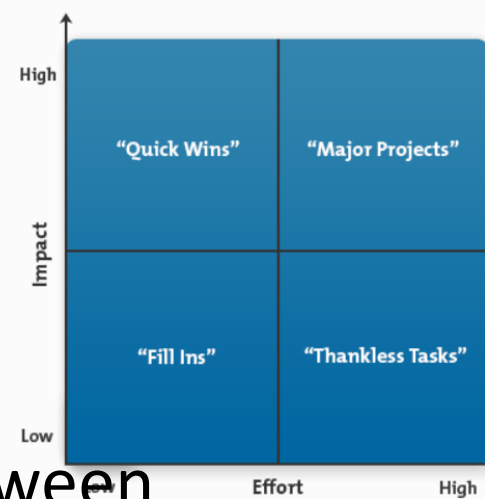
Climate Change and Risk

- For each hazard, identify consequences of climate change on your services where their delivery is interrupted temporarily or permanently.
 - Impacts on people/property. Affected services. Controls in place.
- Assess likelihood and consequences using an agreed-upon metrics.
- What risks are unacceptable?

Figure 1: Risk Matrix



Prioritization



- Identify solutions that close the gaps between current and target LOS, particularly over time, and/or reduce risks associated with climate change
 - Consider effectiveness, feasibility, equitability, flexibility
 - Financial feasibility should be assessed over full lifecycle
- Strategies should be operationalized based on what's required, when is best to implement, who is responsible, at what cost and how they should be implemented



Municipal Case Studies



Municipality in Action



The Town of Halton Hills is working to develop and implement climate change adaptation and mitigation measures relating to service levels. One area of focus is centred around sustain-

ability service levels, and in particular closing gaps by achieving GHG emissions targets for transportation systems, as well as facilities.

For example, their existing energy management program addresses energy use and carbon emissions associated with Town facilities and is being expanded to include fleet vehicles and employee commutes. They are taking action to eliminate carbon emissions associated with their operations through new net-zero construction, deep energy retrofits, green vehicle procurement, and a renewable energy supply. As part of the process, Halton Hills has hosted workshops on levels of service, held public consultation sessions on risk assessment and climate change adaptation planning, and carried out vulnerability assessment on facilities.

While the Town is identifying and closing gaps in their strategy for how to best integrate climate change considerations into a levels of service framework, challenges are being addressed along the way:

1. *Creating the awareness of "why alignment and integration is important" over and beyond the asset management planning regulatory requirements in Ontario.*
2. *Bringing all the pieces of the puzzle together to come up with a common decision-making framework;*
3. *Taking all available data and linking it to climate change and then relating this to levels of service in a structured manner.*

The Town of Halton Hills has since taken action:

1. *They have integrated Climate Change and Asset Management under one department reporting to the CAO's Office to ensure there are synergies and minimize conflicts between the two programs.*
2. *They have adopted an integrated A+M approach that will not only consider adaptation and mitigation measures to combat climate change but also integrate whole lifecycle asset management strategies and financial planning.*

Halton Hills, Ont

AN INTEGRATED A+M APPROACH



Throughout the Framework

- Questions
- Resources
- Templates

Key Components of an Action Plan

Actions	Justification	Timeline	Responsibility	Resources	Budget
What steps need to be taken? <ul style="list-style-type: none">• Consultation• Plans• Strategy implementation• Monitoring• Review	Why is this important? How does it support Council's existing policies, strategies, or Strategic Plan?	When does it need to be done by? Do we have a way to monitor progress?	Do we have goals, buy-in, and priorities? Who is responsible for implementation?	Who is a part of the project team? Do we need an expert?	Do we have a way to monitor budget? Are there pressures on the long-range capital budget?



Integrating Climate Change Considerations into Decision Making

Common Impacts of Climate Change on Local Government Infrastructure Systems

Sewer Impacts

- ☐ Exceeded capacity caused by increased inflow and infiltration (may lead to surface surcharging and basement flooding)
- ☐ Changes in the characteristics of wastewater effluent
- ☐ Flooding that affects buildings, tankage, and housed process equipment

Health/Emergency Services Impacts

- ☐ Higher demand for emergency services
- ☐ Damage or flooded emergency services structures
- ☐ Longer response times
- ☐ Reduced aide capacity

Transportation Impacts

- ☐ Road damage caused by erosion, landslides, and embankment failure
- ☐ Road damage caused by more frequent thawing/freezing of soil
- ☐ Road washout caused by overflowing culverts and storm sewers
- ☐ Causeways, bridges, and low-lying roads have a high risk of being inundated or damaged

Drainage Impacts

- ☐ System capacity exceeded more frequently
- ☐ Failure of drainage systems and dikes causing property and infrastructure damage
- ☐ Increased pumping (which increases energy costs)



Lessons Learned

1. Agree on a shared set of definitions at the start of the process, using layman's terms wherever possible;
2. Select a champion;
3. Use workshops generously for education and buy-in;
4. Ensure broad engagement with staff (operations --> senior management);
5. Collaborate across departments;
6. Good climate data is key for risk management framework analysis;
7. Consider external support where appropriate;
8. For long term success focus on a roadmap for action including a plan for rolling out year by year (and put it into the annual budget process);

....



Accompanying Resources

- Levels of Service and Risk Management Factsheets
- Plain Language Video



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Fact Sheets – Integrating Climate Change Into Municipal Processes

1. Community Planning
2. Service Delivery Planning
3. Governance and Operations

fcm.ca/climateinnovation → Climate and Asset Management



Fact Sheets – Integrating Climate Change Into Municipal Processes

Rationale and Key Questions

Municipal Case Studies

Opportunities

Key Resources and Tools



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Municipal Asset Management Program (MAMP) Top-up and Extension

Additional

\$60M

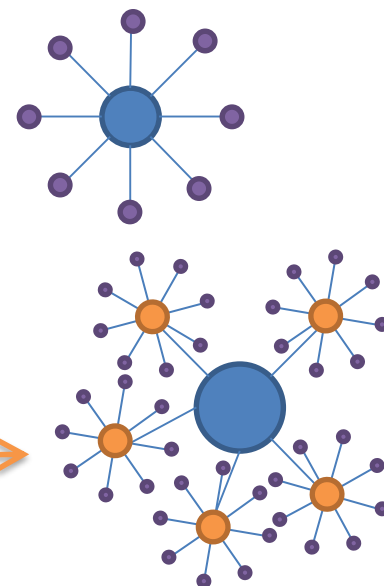
Extended to

2024

Reach

Doubled

- Continue focus on smaller municipalities
- Benefits for municipalities
 - Grants to municipalities
 - Financial support for partners to hold training events for municipalities



Thank You

Please Subscribe to FCM Connect to stay up to date on resources and events, and visit fcm.ca/climateinnovation for currently available resources

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