

A Climate Resilience Roadmap for Ontario Municipal Infrastructure and Systems



SAVANTA
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What is the Roadmap?



This Roadmap is an **approach** for municipalities to address climate risks on infrastructure and systems by building off existing best practices.

RPWCO Climate Resilience Roadmap



Why Use the RPWCO Roadmap?

- It finds municipal **efficiencies** - assessing climate risk to infrastructure at the systems level
- It helps meet **regulatory requirements** - to incorporate climate change into asset management (O.Reg. 588/17)
- It is **practical** - providing substantial guidance and activities to make meaningful progress on climate resilience
- It enables you to build a **business case** for resilient investments







AUTISTIC
CHILD
AREA

No parking signs



What Do You Get Out of the RPWCO Roadmap?

- Confirm and identify **where a municipality is at** as it relates to climate adaptation being incorporated into infrastructure processes
- Determine **current and future** infrastructure-related hazards
- Obtain **climate projections** relevant to critical infrastructure and tailor these to enable a robust risk assessment
- Prioritize “**most at-risk**” to “**least-at-risk**” climate related hazards; and
- Provide an understanding of hazards to determine appropriate **actions and/or projects**

What Does the Roadmap Not Do?



- It is not an **asset specific** assessment, nor a **municipal-wide** assessment, it is **in between**.
- It does not resolve the problem of what **Level of Service (LOS)** to **design to** - it does identify risks that can inform whether LOS should be adjusted.
- It **does not provide solutions** to address identified risks.





Scale

Two main scales of assessment are built into the Roadmap process:

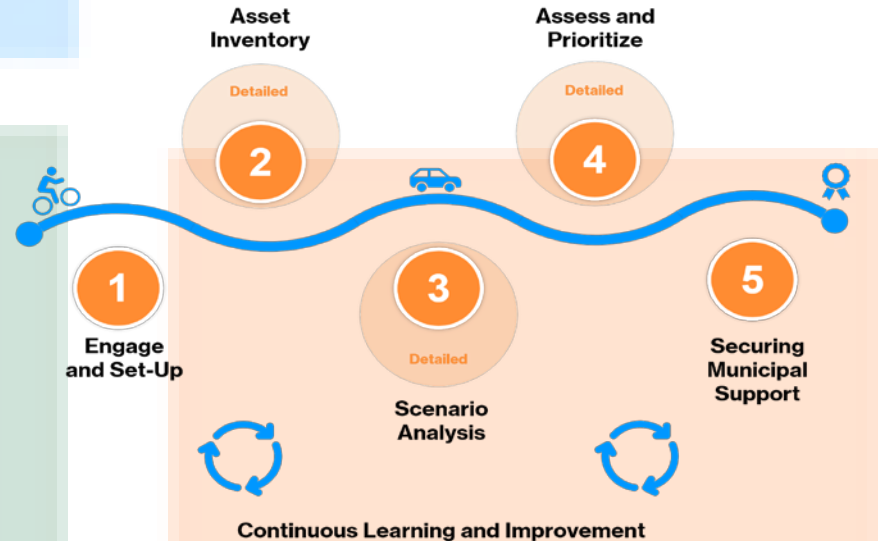
1. A **geographic area** (large or small) of interest (e.g., neighbourhood level); and
2. Across an entire **infrastructure system** (e.g., all wastewater assets).

Depth of Assessment

The **depth** of an assessment is the level of detail or rigour an analysis goes into.

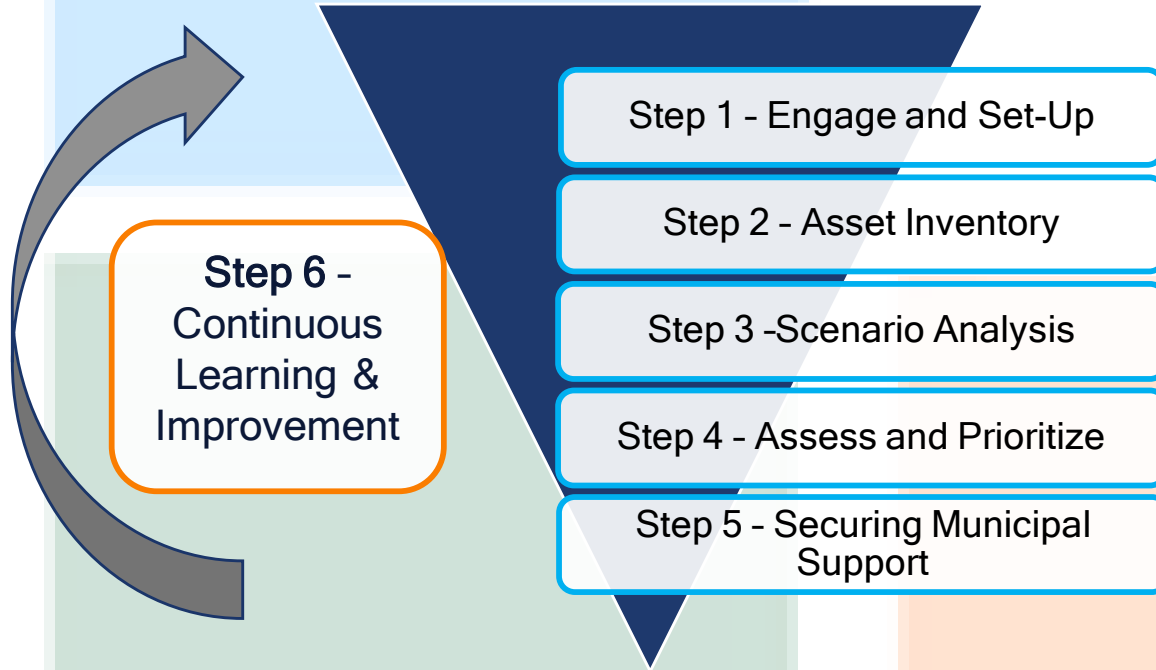
Two pathways are included in this roadmap:

1. Accelerated pathway
2. Detailed pathway (available for Steps 2, 3 & 4)



Scoping

The RPWCO Roadmap has been developed such that you start broad and narrow your scope as you progress along each step.





O.Reg.
588/17

The RPWCO Roadmap not only assists your municipality in meeting **regulatory requirements**, but it also provides an opportunity to **plan** for and **design** resilient spaces with multiple benefits.





Presented by
METRO AG - 2020/2018

SIR JOHN A. MACDONALD PARK GREEN INFRASTRUCTURE FACILITY

The informational panel contains several circular images and text blocks. The images include: a blue and white landscape, a green field, a brown field, a rocky stream bed, and a large white structure. The text blocks provide details about the facility, including its location and the types of green infrastructure it features.





Roadmap Best Practice Example

- Each step in the roadmap contains visual best practices (examples)
- A brief summary and link to further resources is provided

Measuring Progress in Urban Climate Change Adaptation

Ramboll was selected by the C40 Climate Leadership Group to develop a framework for monitoring, evaluation and reporting (MER) of adaptation actions implemented within the cities. The aim was to develop a tool to help cities “make the case” for climate change adaptation and assist/incentivize targeted adaptation initiatives for C40 and non-C40 cities. The project focused on providing a coherent, simple and applicable framework for measuring the “Actions, Outcomes, Impact” of the cities’ adaptation plans.

The MER framework developed under this project is largely synonymous to the herein proposed MEL framework, in that the MER approach is intended to ensure alignment, accountability and continuous improvement of the adaptation initiatives within cities. The specific objectives of MER include facilitating adaptation learning across cities, encouraging participation and engagement, enhancing transparency and accountability, making the case for adaptation actions and improving the decision-making process.

The project delivered a set of indicators to support the monitoring of actions, their outputs, outcomes and impacts. The published framework is [available online](#).



Roadmap Activities

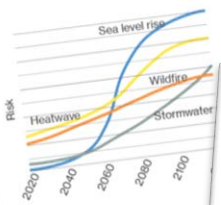
- Each step in the roadmap contains a series of activities with step-by-step instructions
- 17 activities in total

Activity #13: Prioritization of hazards

Activity At-A-Glance

- The **purpose** of this activity is to prioritize climate hazards based on estimated risk analysis outputs.
- The **outcome** of this activity can be used to target specific adaptation actions or projects (or municipal mechanisms) related to the highest priority over time. It can also be used to make the case and inspire further funding support by municipal council and senior decision makers.
- Read **pages 44-47** before completing this activity.

Part A: Based on your risk assessment(s), plot your expected risk over time for all available hazards based on the current situation, see example left.




The graph plots Risk (Y-axis) against Year (X-axis, 2020 to 2100). Five lines represent different hazards: Sea level rise (highest risk, increasing sharply), Wildfire, Stormwater, Heatwaves, and another hazard (likely Heatwaves based on the label). All hazards show an increasing trend in risk over time.

Activity #5: Municipal Asset Inventory and Scoping Risk Assessment Themes

Activity At-A-Glance

- The **purpose** of this activity is to scope and confirm relevant climate change risk assessment themes, aligned with the services your municipality provides and related to the requirements of Ontario Regulation 588/17.
- The **outcome** of this activity can be used to refine the asset(s) in scope of a risk assessment based on the available GIS information, and to inspire collaboration among infrastructure, asset management planning, and geospatial municipal staff.
- Read **pages 15-20** before completing this activity.

1. What **services** does your municipality provide to the community? Consider the following:



Create a List of Your Municipal Services (note: you may have less or more than 10):

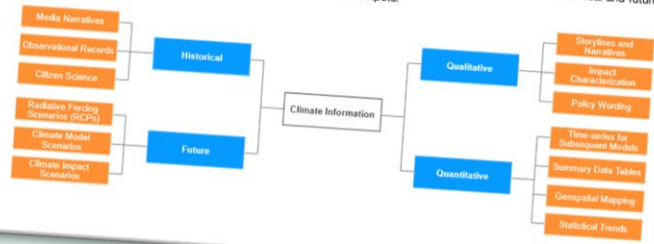
Service #1: _____

Activity #6: Climate Information Primer: The Basics and Things to Keep in Mind

Activity At-A-Glance

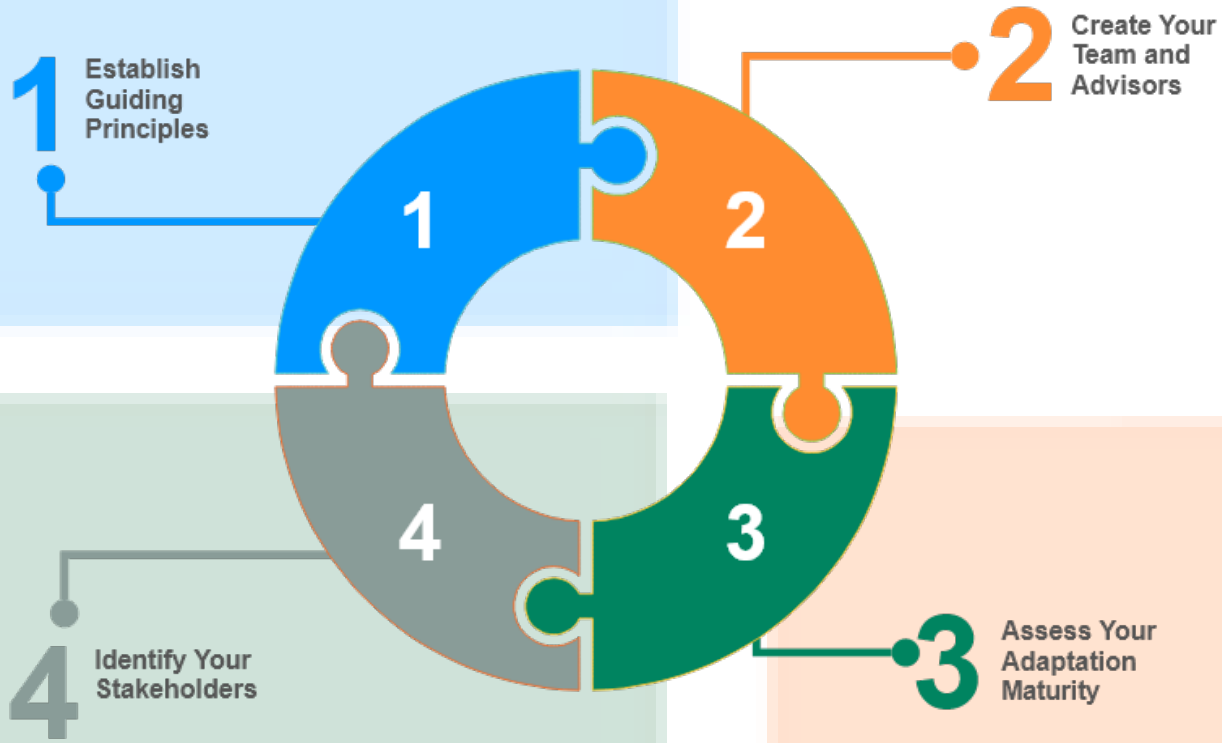
- The **purpose** of this activity is to learn more about climate modeling, projections and how they can be characterized as part of undertaking a scenario analysis. It is additional background information in support of Step 3 of the involved in obtaining, analyzing, and characterizing climate trends for use in a climate change risk assessment.
- The **outcome** of this activity can be used to increase awareness and understanding on how much effort should be
- Read **pages 23-24** before completing this activity.

Climate information can be broken down into categories. The following figures shows how it can involve historical and future information, and how it can be derived as qualitative or quantitative outputs.



```
graph LR
    CI[Climate Information] --> H[Historical]
    CI --> F[Future]
    H --- HN[Media Narratives]
    H --- OR[Observational Records]
    H --- CS[Citizen Science]
    F --- RFS[Radiative Forcing Scenarios (RFS)]
    F --- CMS[Climate Model Scenarios]
    F --- CIS[Climate Impact Scenarios]
    CI --> Q[Qualitative]
    CI --> QU[Quantitative]
    Q --- SN[Stories and Narratives]
    Q --- IC[Impact Characterization]
    Q --- PW[Policy Wording]
    QU --- TSM[Time-series for Subsequent Models]
    QU --- SDT[Summary Data Tables]
    QU --- GM[Geospatial Mapping]
    QU --- ST[Statistical Trends]
```

Roadmap Step 1: Engage and Set-Up



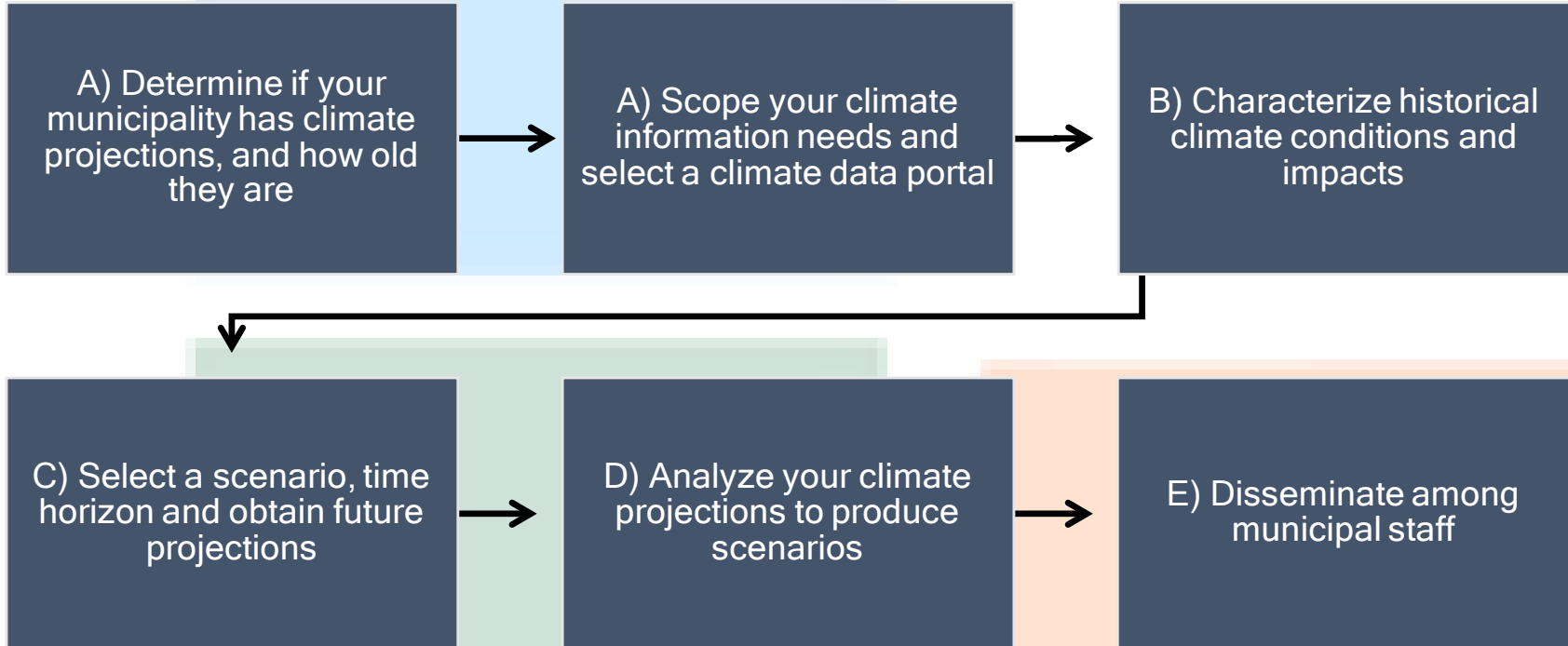


Roadmap Step 2: Municipal Asset Inventory

- A) **Document** what assets your municipality owns, manages, operators and maintains
- B) **Identify** whether your municipality has previously defined critical infrastructure
- C) **Consider** the level of spatial data already available
- A) **Confirm** all assets within scope, and whether you require a detailed pathway

Align your efforts with your municipal asset management staff. Consider [FCM resources](#) related to integrating climate change into levels of service.

Step 3: Climate Scenario Analysis



Step 4: Assess and Prioritize

A) Background research and data gathering

B) Assessment of hazard and consequences

C) Refinement and validation

D) Estimating climate risk

E) Designing a climate change adaptation strategy

IMPLEMENTATION STRATEGY



FUNDING



REDUCED RISK

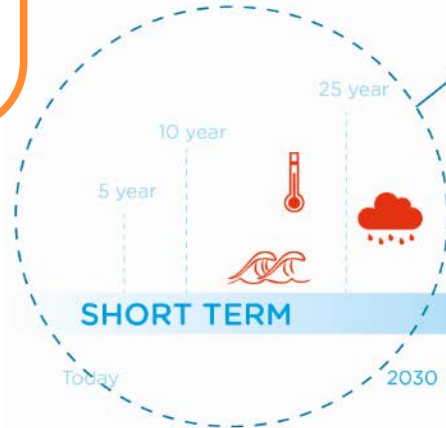


ADDED VALUE

BENEFITS

\$

COSTS



SHORT TERM



LONG TERM

Highlight the
Cost of
Inaction

Undertaking a risk assessment can be intimidating - the RPWCO Roadmap provides **clear guidelines** and **resources** to assist you along every step of the process and help scope your needs properly.



Step 5: Securing Municipal Support



A

- Identify what municipal mechanisms exist for your municipality

B

- Document historical successes

C

- Refine the mechanisms that have more leverage among senior decision makers

D

- Confirm the “targeted outputs” that assessment outputs and priorities should inform

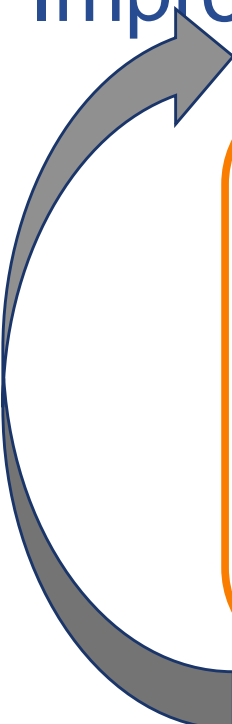
Communicating the Resilient Business Case



Good communication of assessment outcomes can help key stakeholders, council, communities, and other decision-makers understand that climate adaptation is not another cost, but an investment.

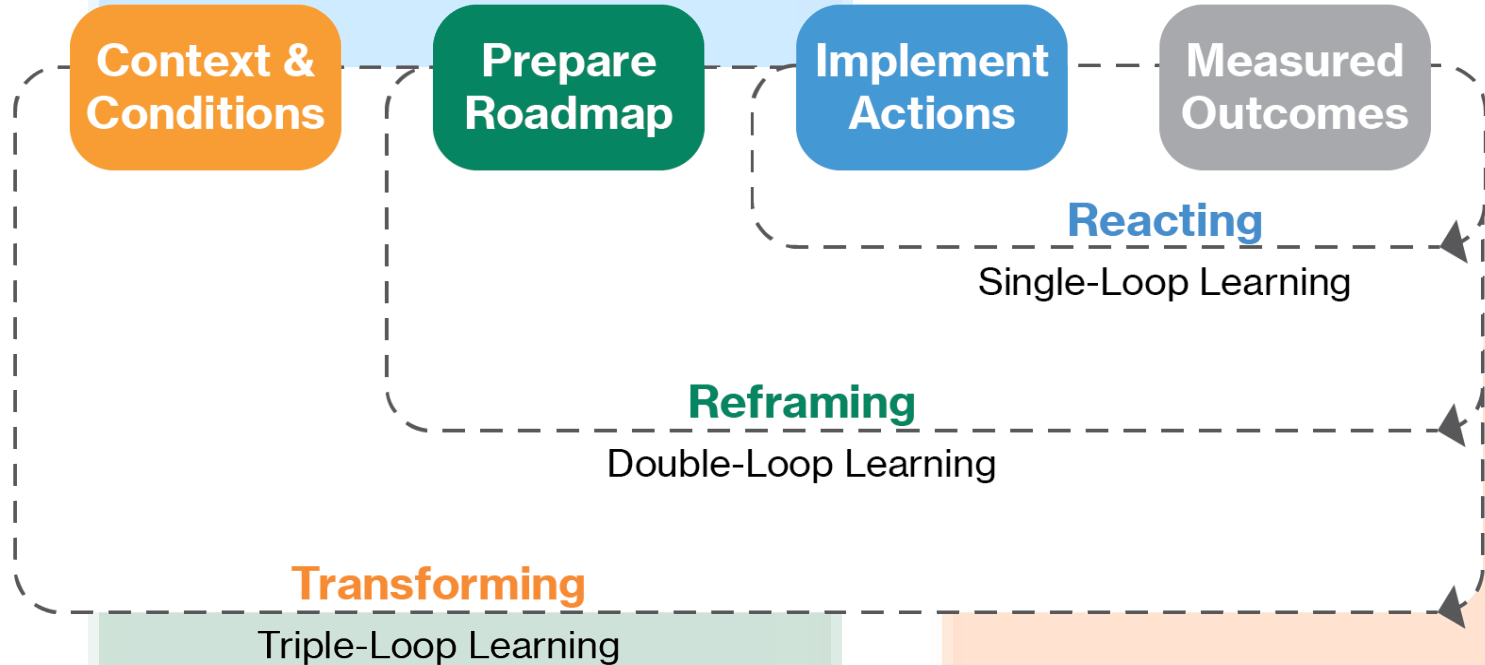


Step 6: Continuous Learning & Improvement

- 
- A. Establish a **Monitoring Evaluation and Learning** plan
 - B. Identify appropriate **Key Performance Indicators**
 - C. Implement a **triple-loop learning** approach
 - D. Publish **progress reports**



Triple Loop Learning Approach





Thank You!

 **RPWCO**
Regional Public Works
Commissioners of Ontario

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