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Integrating Climate Resilience into Existing Business Processes

March 23, 2021

The scarcest resource is not oil, metals, clean air, capital, labour, or technology. It is our willingness to listen to each other and learn from each other and to seek the truth rather than seek to be right

— Donella Meadows —

AZ QUOTES

Infrastructure Ontario's Energy Services

We work to reduce energy consumption in Ontario's government facilities, and increase the climate resilience within new and existing buildings. We collaborate with every facet of IO (transit, hospitals, general real estate and others) to ensure facilities are sustainable, efficient and comfortable for all.

Building Energy Management

- Oversee the $80M annual government real estate portfolio energy spend
- Ongoing facility energy consumption and utility cost reviews for building operational performance
- Implement programs to support and report on provincial greenhouse gas targets

Infrastructure Climate resilience

- Advise on climate resilience measures across asset and project types
- Assess climate risks to government assets and work to mitigate them
- Analyze Return on Investments (ROIs) for climate resilience measures
- Advise on future climate modeling
- Advise on flood mitigation and adaption in Ontario

Sustainability and Certification

- Advise and sign-off on building certifications like LEED, WELL, Envision, CaGBC Net-Zero, Toronto Green Standard, ISO 50001
- Author IO LEED guideline
- Track IO LEED certifications

Energy Model & Contract Advising

- Review project agreements (project specifications, energy matters schedules)
- Advise on energy modeling (and energy bid submissions) in order to maximize savings potential
- Analyze energy trends (e.g. cost/utility rate forecasts)
- Provide recommendations on building energy systems

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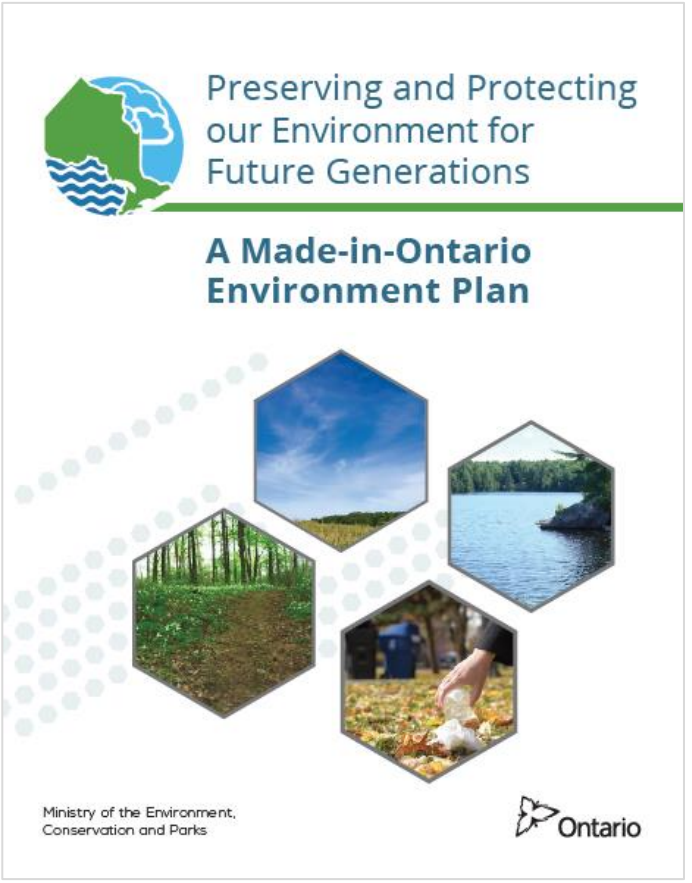
Climate Impacts on Critical Infrastructure

- Resilience actions outlined in Ontario's 2018 Environment Plan:
  - Provincial impact assessments. Identify where and how climate change is likely to impact Ontario's communities.
  - Build resilience into the province's critical infrastructure. Better technology, back-up generation, and energy storage options.
  - For vital services and infrastructure to better withstand and remain operational during extreme weather events.



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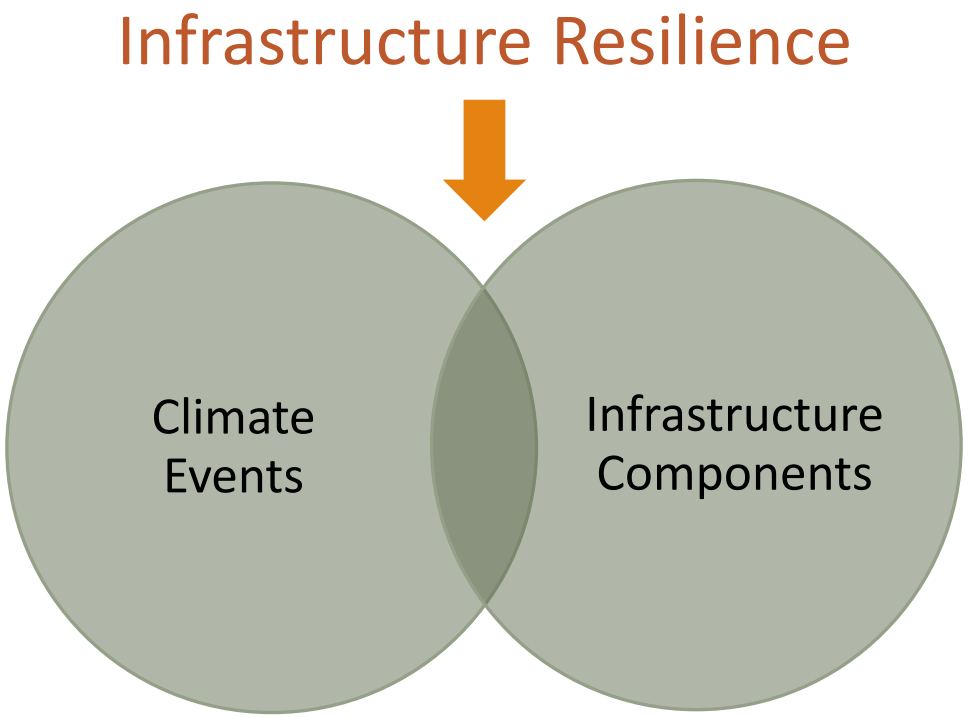
What is Infrastructure Resilience?

- INFRASTRUCTURE RESILIENCE is the capacity of an infrastructure asset to continue to function and operate under extreme conditions, such as (but not limited to) extreme temperatures, flooding, natural disasters, etc.



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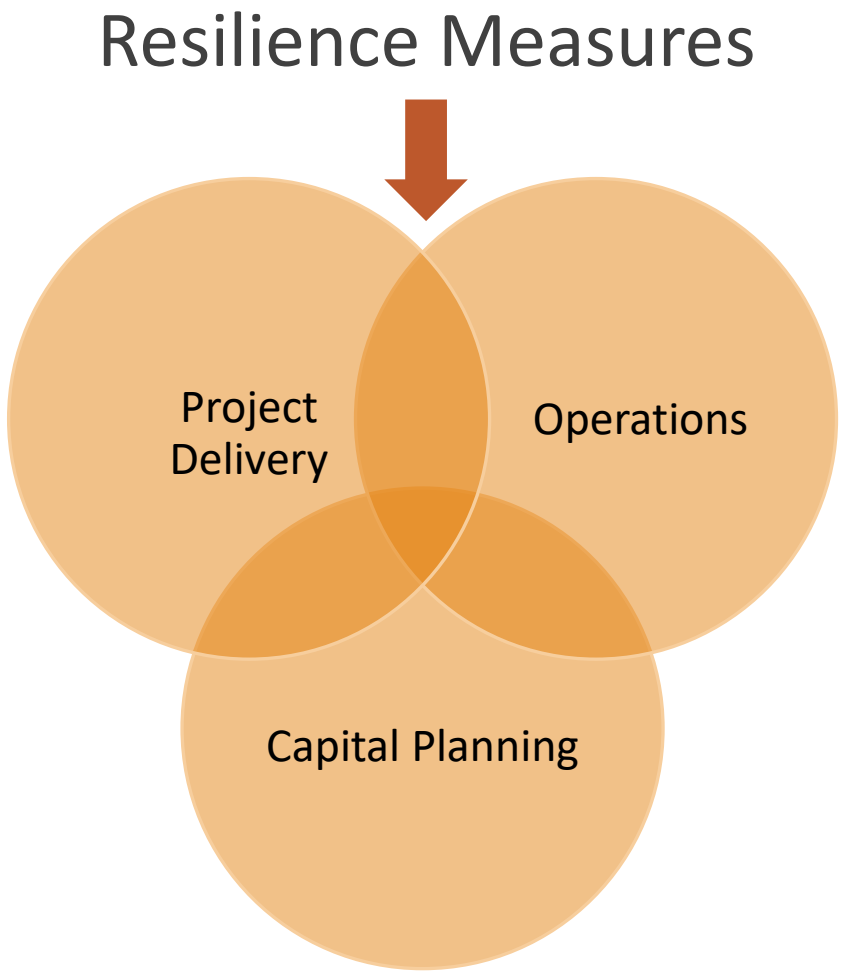
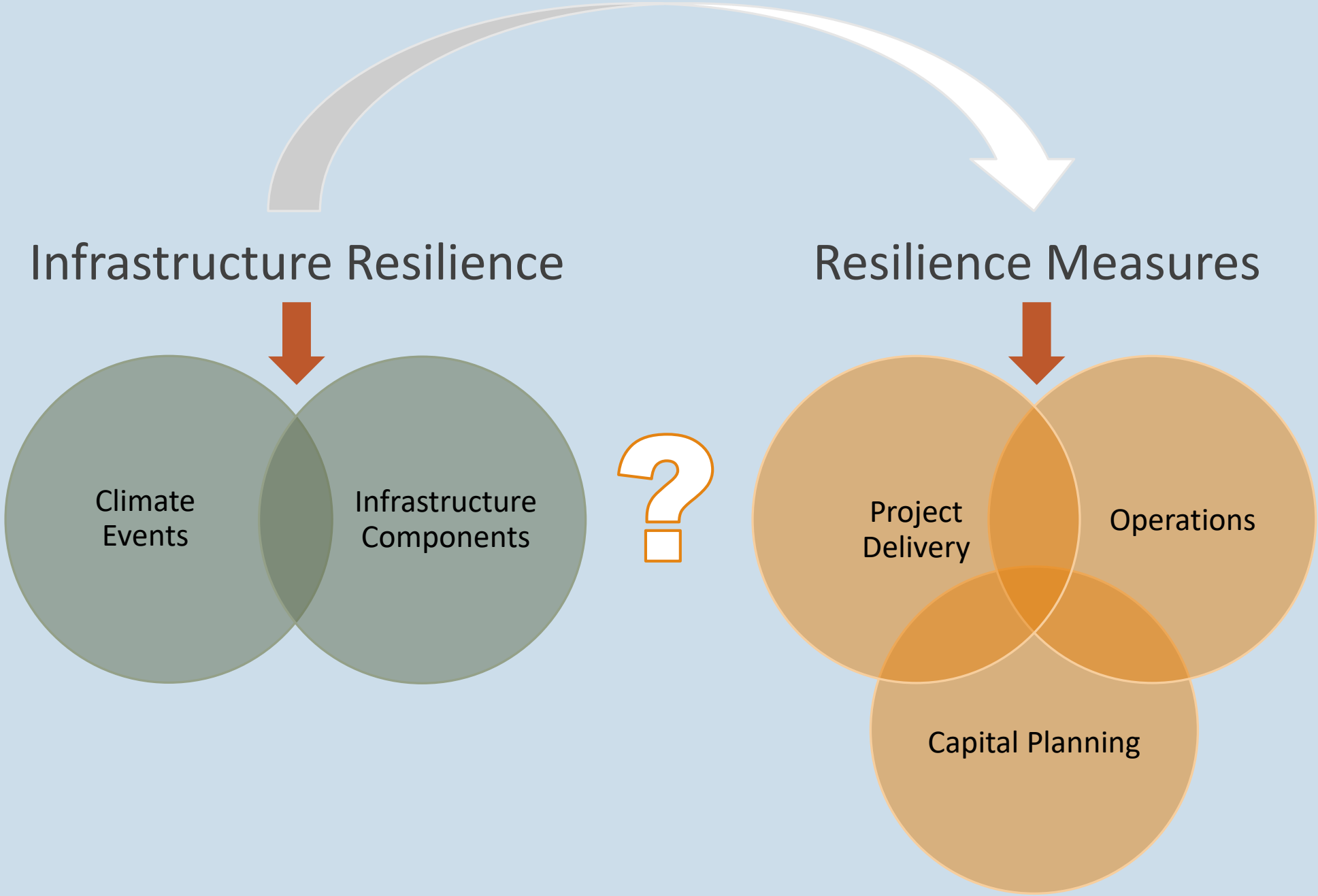
What is the Infrastructure Resilience Strategy?

A targeted set of resilience measures to be implemented within existing IO infrastructure programs

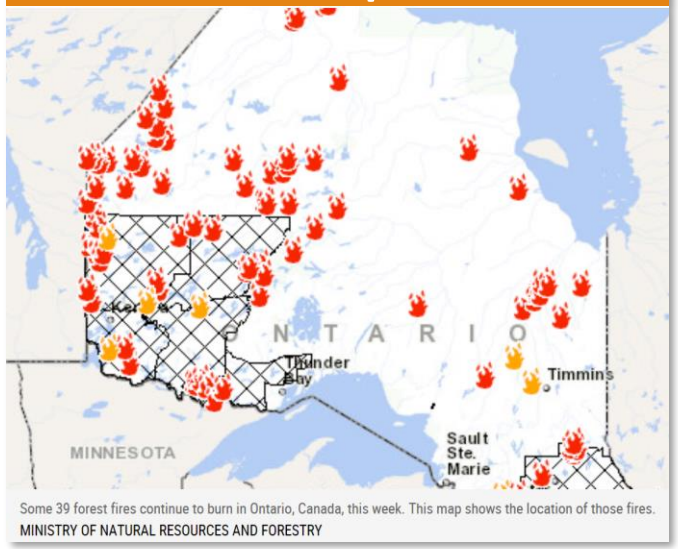
1. Climate risk assessments to inform output specifications for P3 projects
2. IO LEED Guideline to recommend to all projects uptake of credits with favourable energy and climate resilience impacts
3. Flood resilience assessment of 130 priority assets
4. Flood mitigation measures: weather warnings, resilience audits, dedicated emergency response services
5. Flood resilience checklist for base building assessments
6. Energy and resilience measures in Owner Project Requirements
7. Climate considerations for Environmental Assessments
8. Climate resilience analytics on work order and incident data
9. Foster awareness of IO's resilience program




Infrastructure Resilience
Climate Events
Infrastructure Components
?
Resilience Measures
Project Delivery
Operations
Capital Planning

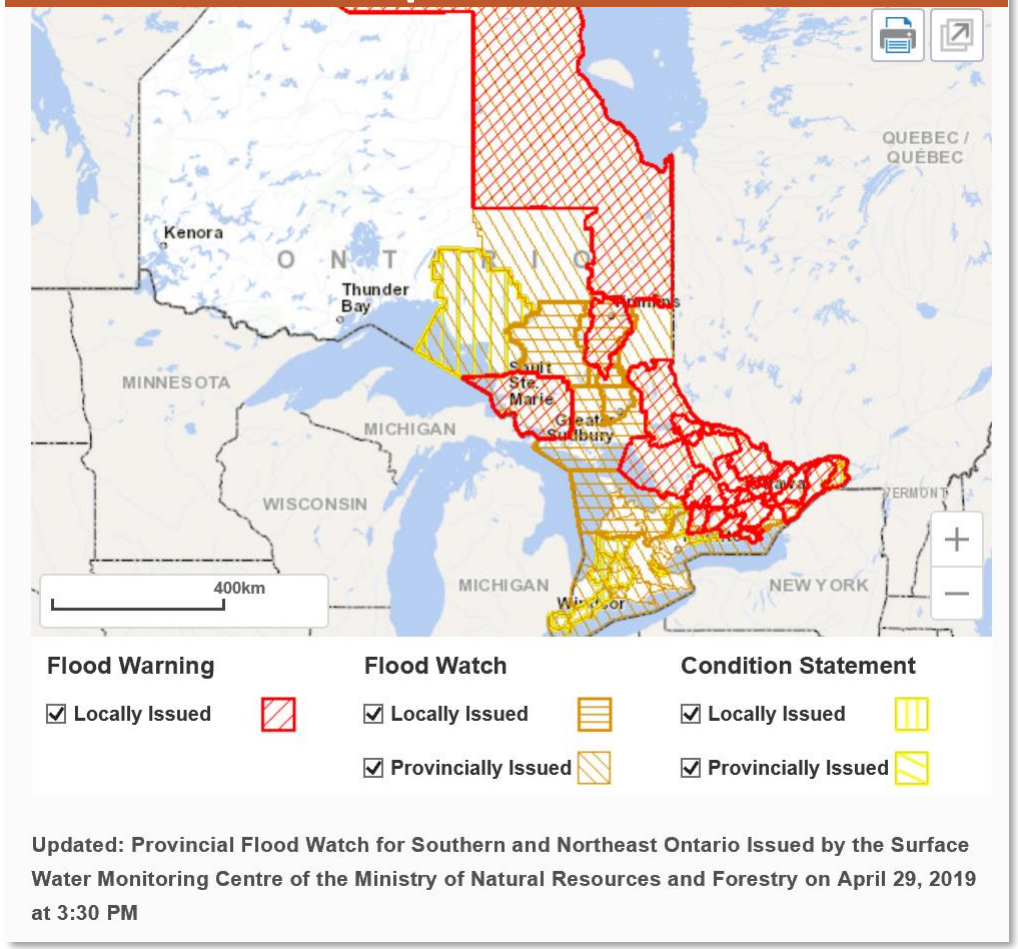
Climate Events Impacting Ontario Communities

Ontario fire map



On August 20, 2018, **39 Forest Fires** were burning across **Ontario**

Ontario flood map



By April 29, 2019 as a result of **flooding caused by heavy precipitation** and ongoing snow melt, half of Ontario was under flood advisories and 15 municipalities had declared emergencies

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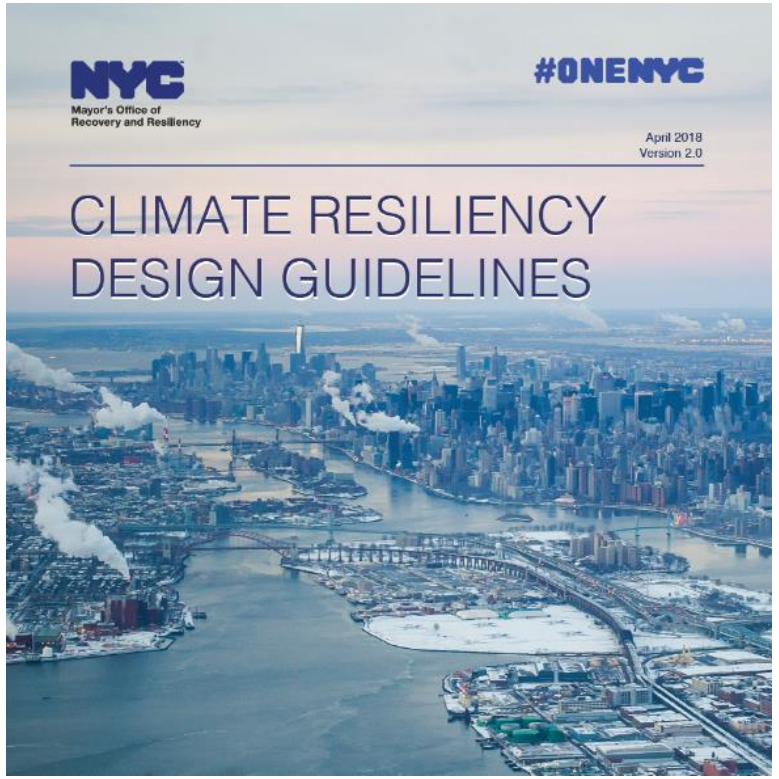
Referencing relevant guidance documents on climate change resilience

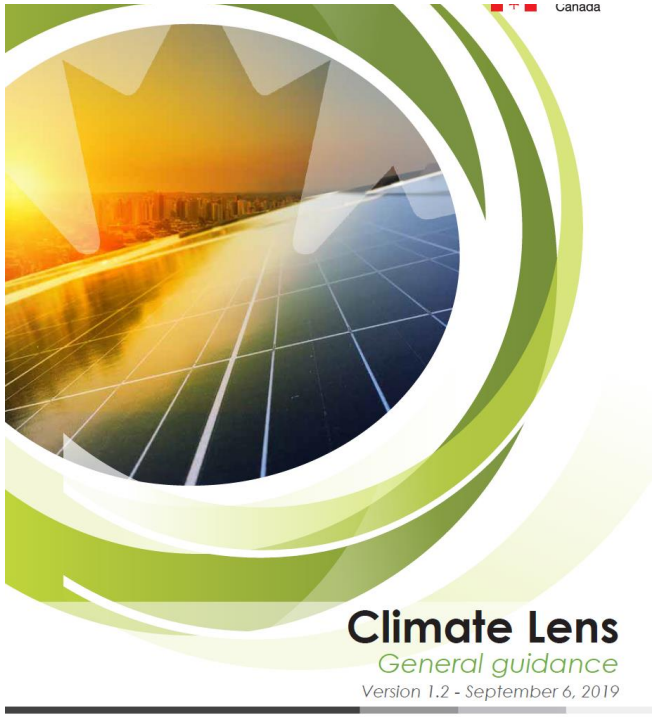


Canada - Nova Scotia Infrastructure Secretariat | Secrétariat du Programme d'Infrastructures Canada - Nouvelle Écosse

Canada | Nova Scotia / Nouvelle-Écosse

Municipal Climate Change Action Plan Guidebook

Canada-Nova Scotia Agreement on the Transfer of Federal Gas Tax Funds



Talking to People

- Ministries - regulatory requirements
- Colleagues at IO - existing process insights
- Service Providers - operational experience
- Subject Matter Experts - data driven perspectives

Portfolio-Level Flood Resilience Assessment

Flood Risk Factors

Proximity to Floodplain

Stormwater Runoff Potential

Groundwater Seepage Potential

Potential for Combined Sewers

Future Extreme Rainfall

Asset Use

Occupancy Type

Building Condition & Materials

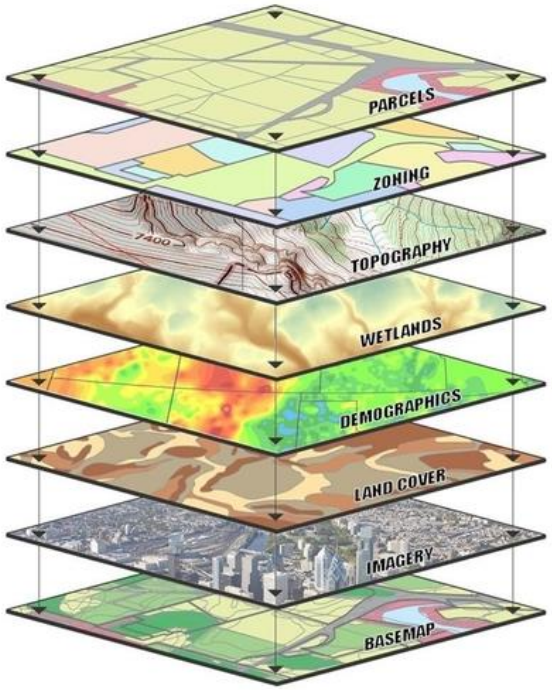
Presence of Basement

Flood-related Incidents

Backup Power Availability

Physical Flood Protection Measures

Training & Awareness



GIS DATA LAYERS

Many different types of data can be integrated into a GIS and represented as a map layer.

Examples can include: streets, parcels, zoning, flood zones, client locations, competition, shopping centers, office parks, demographics, etc.

When these layers are drawn on top of one another, undetected spatial trends and relationships often emerge. This allows us to gain insight about relevant characteristics of a location.

Hazard Map

Vulnerability Map

Capacity Map

Flood Risk Map

$$\frac{\textit{Hazard x Vulnerability}}{\textit{Adaptive Capacity}} = \textbf{Risk}$$

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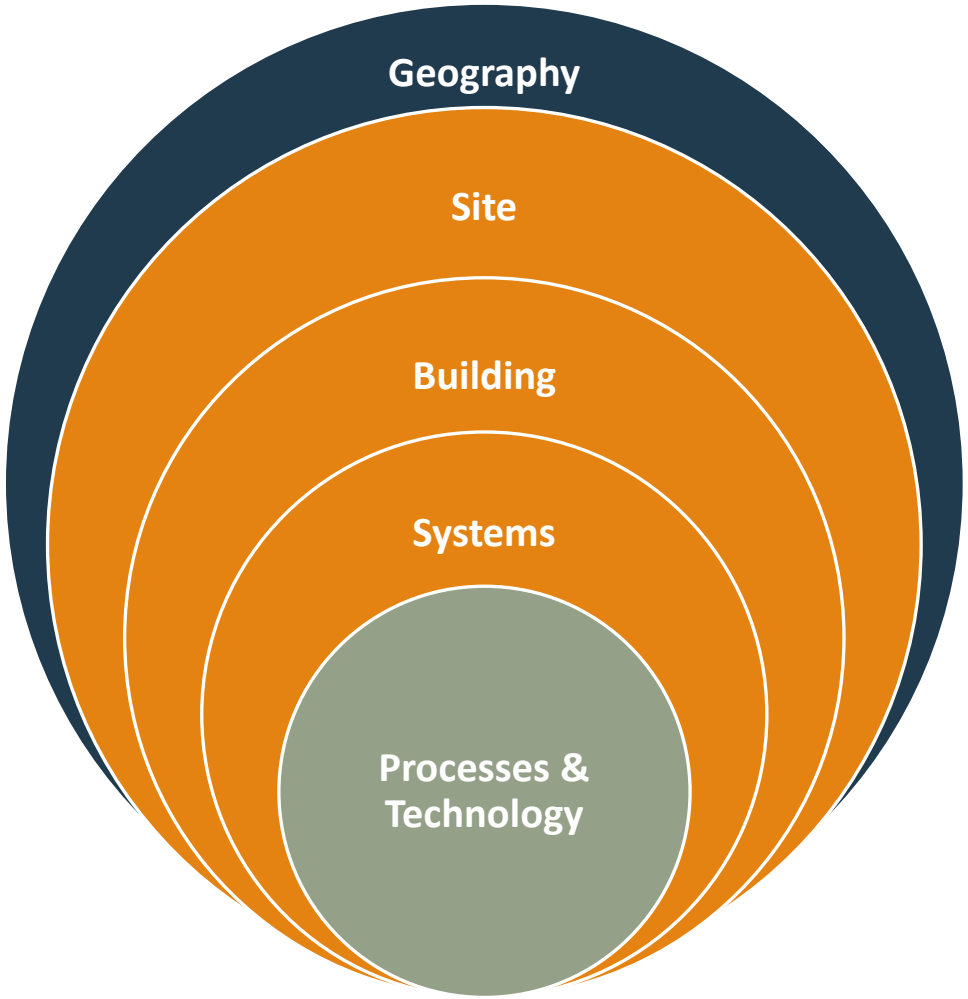
Climate Resilient Capital Planning

Flood resilience checklist integrated into existing base building assessment process

Flood Resilience Items		Asset Number:		Inspector:			
Sump Pumps		Make and Model	Power (HP/kW)	Back-up Power Source (If any)	Installation Date / Age	Serial Number	
	Sump Pump 1						
	Sump Pump 2 (If Applicable)						
	Sump Pump 3 (If Applicable)						
Back-Water Valves		Make and Model	Pipe Size (in/mm)	Body Material (ABS,PVC,...)	Installation Date / Age	Main Connection (Municipal Storm/Sewer)	
	Back-Water Valve 1						
	Back-Water Valve 2 (If Applicable)						
	Back-Water Valve 3 (If Applicable)						
Back-Up Power		Make and Model	Fuel Type	% of asset's power requirement provided	Installation Date / Age	Power and Voltage (HP/kW,V)	
	Back-up Power Source						
	Back-up Power Source 2 (If Applicable)						
Roof Drain Covers		Material	Size (in/mm)	Total Number of Covers	Installation Date / Age		
	Roof Drain Covers						

Project-Level Climate Risk Assessments



Climate risk assessments added to existing suite of due diligence services IO conducts during planning phase of project development

Hazards extreme weather events most likely to occur

Vulnerabilities infrastructure risks associated with the site, the building, building systems and program type

Adaptive Measures facility design measures and ongoing operational measures

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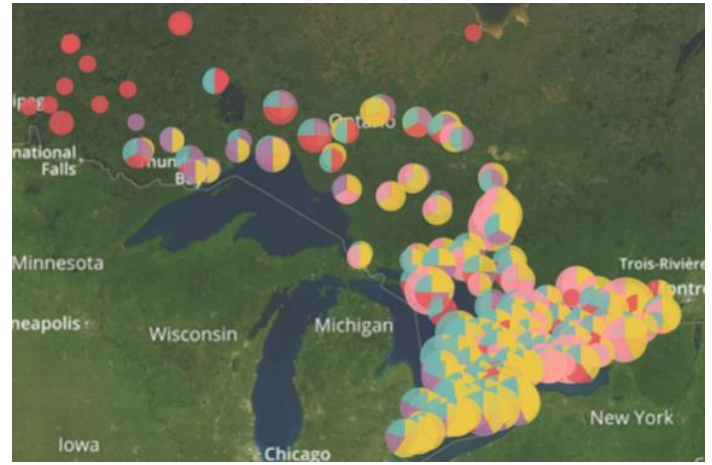
Provincial Portfolio Climate Resilience Response and Analysis

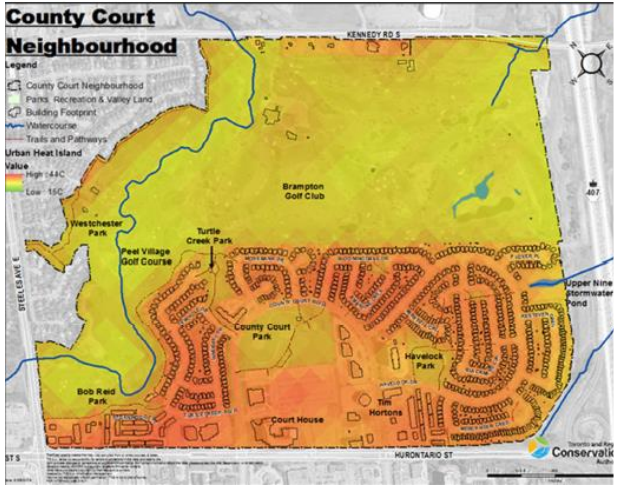
- Weather alert system to notify facility staff of imminent extreme weather events and what measures they can take to increase resilience to that event (see figures)
- Dedicated emergency response services for site assistance
- Gathering and analysing data on costs of extreme weather causing asset damages or program interruption
- Resilience audits to better understand and document root causes of climate related damages/interruptions



Collaborating on and Visioning Climate Resilience

- Gather & Analyse Data on Systems You Seek to Manage
- Take Low Cost/Low Regret Actions Towards Resilience Today
- Remove Institutional Barriers to Innovation and Adaptation
- Leverage the Knowledge and Decision-making Power of Others
- Vision the Future You Want to See

Toronto and Region Conservation Authority's Sustainable Neighbourhood Action Program: Studies and concepts completed as part of a neighbourhood-scale vulnerability assessment and adaptation plan co-created by residents, stakeholders and TRCA staff, called the *Climate Ready Count Court* project.



COUNTY COURT - SITE 5 BRAMPTON COURT HOUSE GREEN PARKING CONCEPTS - GRASS MEDIAN

Thank you!

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