TORONTO

BEYOND THE STORM: Toronto's Climate Change Adaptation Program

Its about Risk and Cost Management

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Toronto Environment Office

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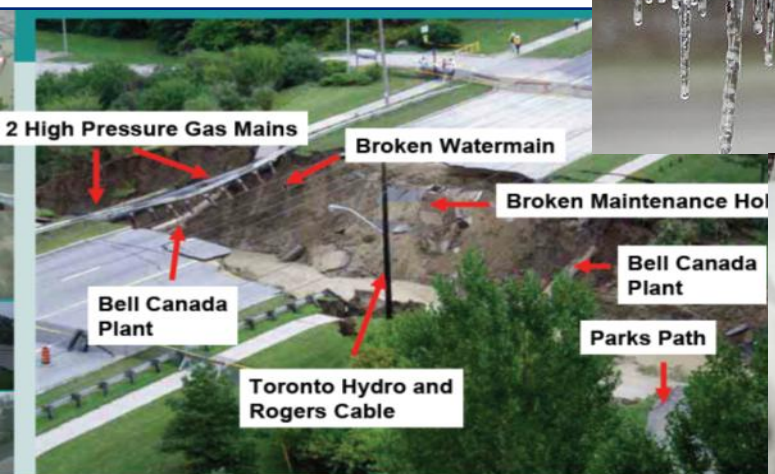
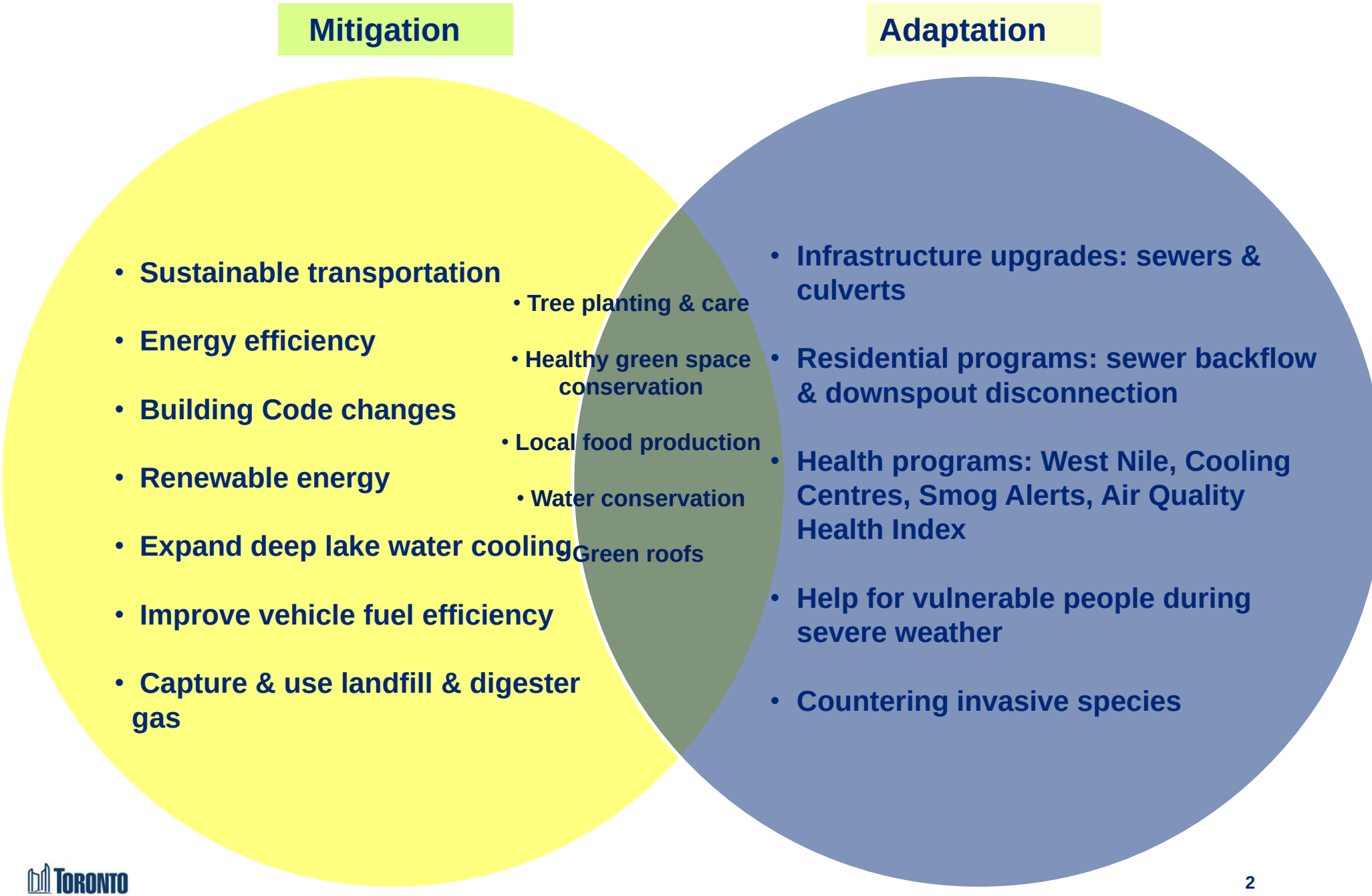


Agenda

- Mitigation & Adaptation: *Both are needed*
- Impacts of climate change on the GTA
- Examples of adaptation actions
- Drivers for Action
- GTA: Adaptation Related Groups
- CC Risk Assessment Project

Examples of Actions to combat climate change



Anticipated CC Impacts on Toronto – Infrastructure Assets

- More extreme weather events e.g.:
  - Heavy rain, flash floods, high wind, freezing rain, hail, tornadoes, etc.

- Damage to:
  - Buildings, water, sewer & transportation infrastructure
  - Electrical system, causing blackouts

Anticipated Climate Change Impacts on Toronto

- More heat waves, smog days, related illness & deaths
- Stress on electrical supply from increased use of A/C
- Declining lake levels, affecting water quality & shipping

Source on Anticipated Impacts:
Scan of Climate Change Impacts on Toronto; Clean Air Partnership, 2006

Anticipated CC Impacts on Toronto - Ecosystems

- Increased disease carried by insect vectors
- Damage to urban trees from insect pests & storms
- Increased stress & damage to vulnerable ecosystems & habitats

Local Vulnerable Population:

Heat is bothersome & lethal

"Streets to Homes" worker attending to a client

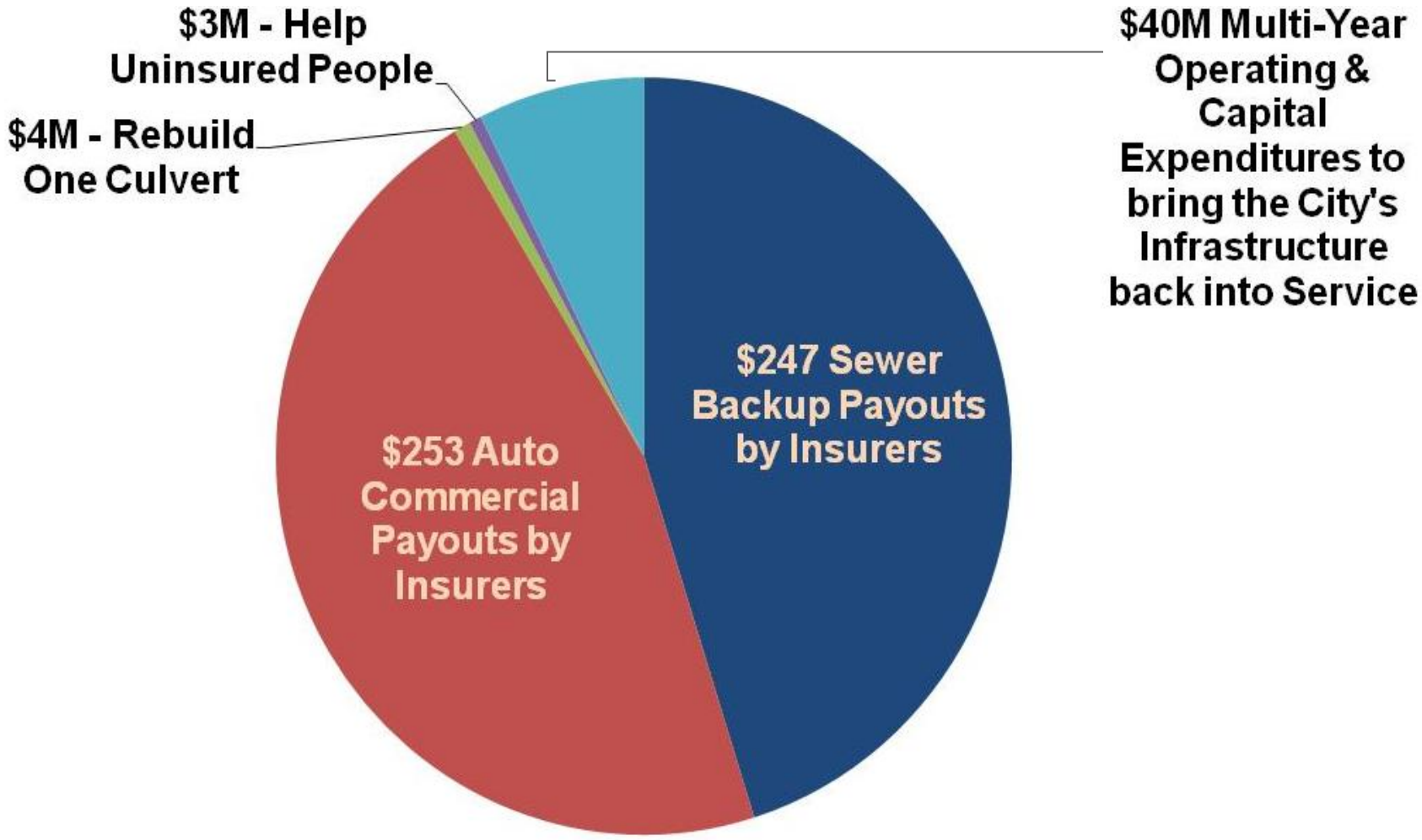
- Homeless
- Low-income people
- Housing conditions
- Limited mobility
- Lack of insurance, savings
- People in poor health
- Isolated seniors
- Infants & small children

Flooding: a growing Problem

Toronto, 2005 - $547 Million
Calgary, 2005 - $300 Million
Edmonton, 2004 - $166 Million
Peterborough, 2004 - $87.3 Million
and Hamilton …

Toronto: August 2005 Storm

Toronto has 154 large culverts



TOTAL
$547 Million

Some affected more than others…


Finch Ave in Toronto
Photos courtesy
Jane-Finch.com


Exposed utilities at Finch Ave Wash Out

New stream crossing at Finch Ave

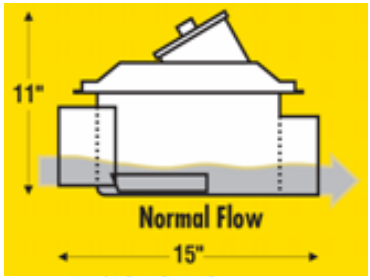
toronto: 2005 storm Impact Summary

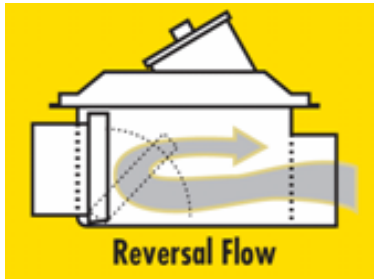
Impact Area	Impacts
Physical Structures	▪ Damage to infrastructure, homes, businesses, vehicles ▪ Loss of cultural and natural heritage features
City Operations, Business & Households	▪ Arterial road closed 14 months ▪ Businesses disrupted in flooded areas ▪ Basement contents destroyed ▪ City workers & budgets redeployed (e.g. tree disposal instead of planting & care)
Safety, Health & Security	▪ Cars caught in floods; blackouts in some neighbourhoods ▪ Mold affecting health
Financial	▪ Repair costs & overtime ▪ Loss of staff productivity ▪ Claims against the City

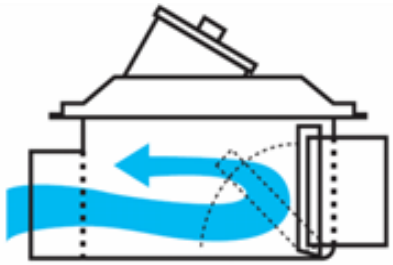
Residential Protection

Lot grading

Sewer backflow valve





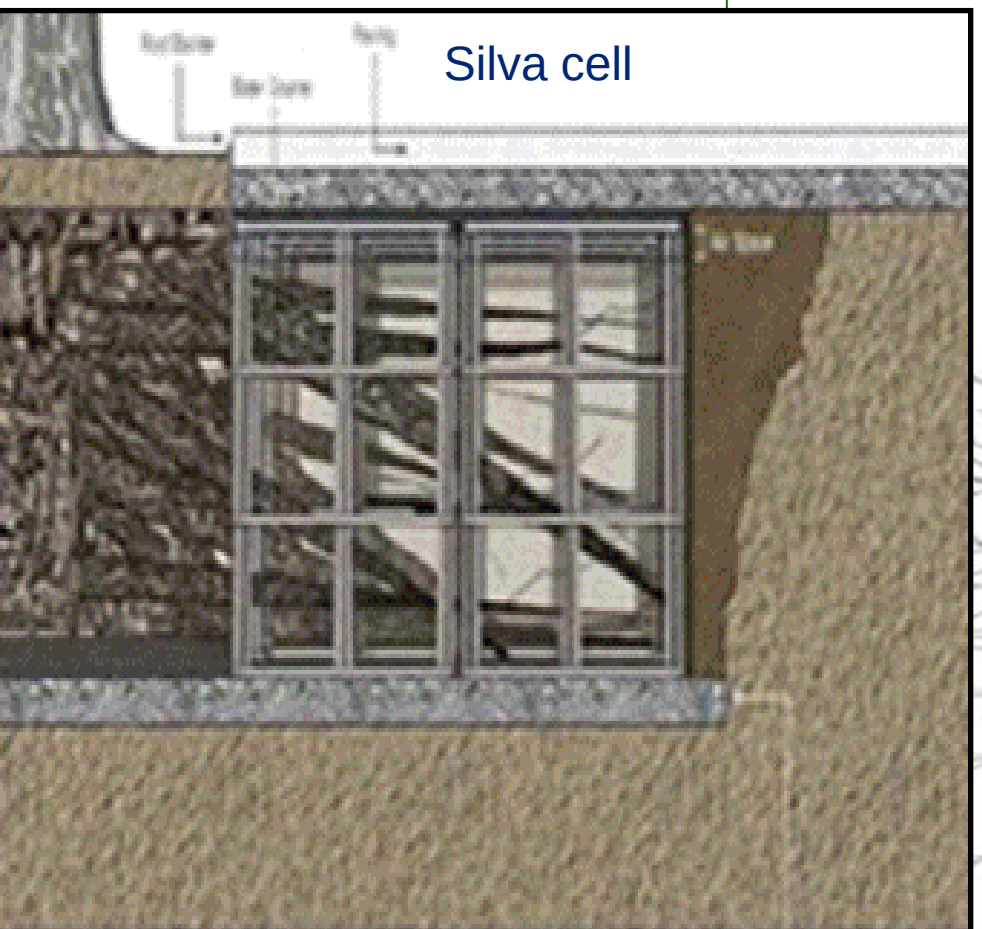


Green Roof Incentive Program

Sustainable Parking Lots

Urban Naturalization

Sustainable Sidewalks



Road Weather Info System

Sensors:

- Wind speed, gusts & direction
- Precip [yes/no]
- Temp & humidity

Cabinet contains:

- Processing unit (RPU / Data logger)
- Telecom
- Power connection
- Digital barometer - pressure

Optional sensors:

- Visibility
- Precip amount & type
- Cameras
- Traffic counters

3 In 1 Salt Truck

Flexibility to variable road & weather conditions

New Street Sweepers

Can operate dry in cold weather if there is no snow

Drivers for Action on Climate Change Risks

1. Council directive from Climate Change Adaptation Strategy (approved July 2008)
2. Safety: avoid harm to citizens & staff
3. Customer Service
4. Cost avoidance:
   a) damage from extreme weather
   b) credit & insurance risk rating of City & taxpayers
5. Personal legal liability of Staff & Council
6. Evidence of due diligence

Importance of Due Diligence and Personal Liability

Environmental due diligence:

- Employees must *"take all reasonable steps"*
- Employees must *adhere* to laws and regulations
- Employees must *anticipate* risks
- **Organization and individuals can be held liable!**

Applicable standard of care:

- Having proper management systems
- Having effective operations
- Consider leading practices:
  - City practice
  - Other cities / comparable organizations
  - Emerging technology

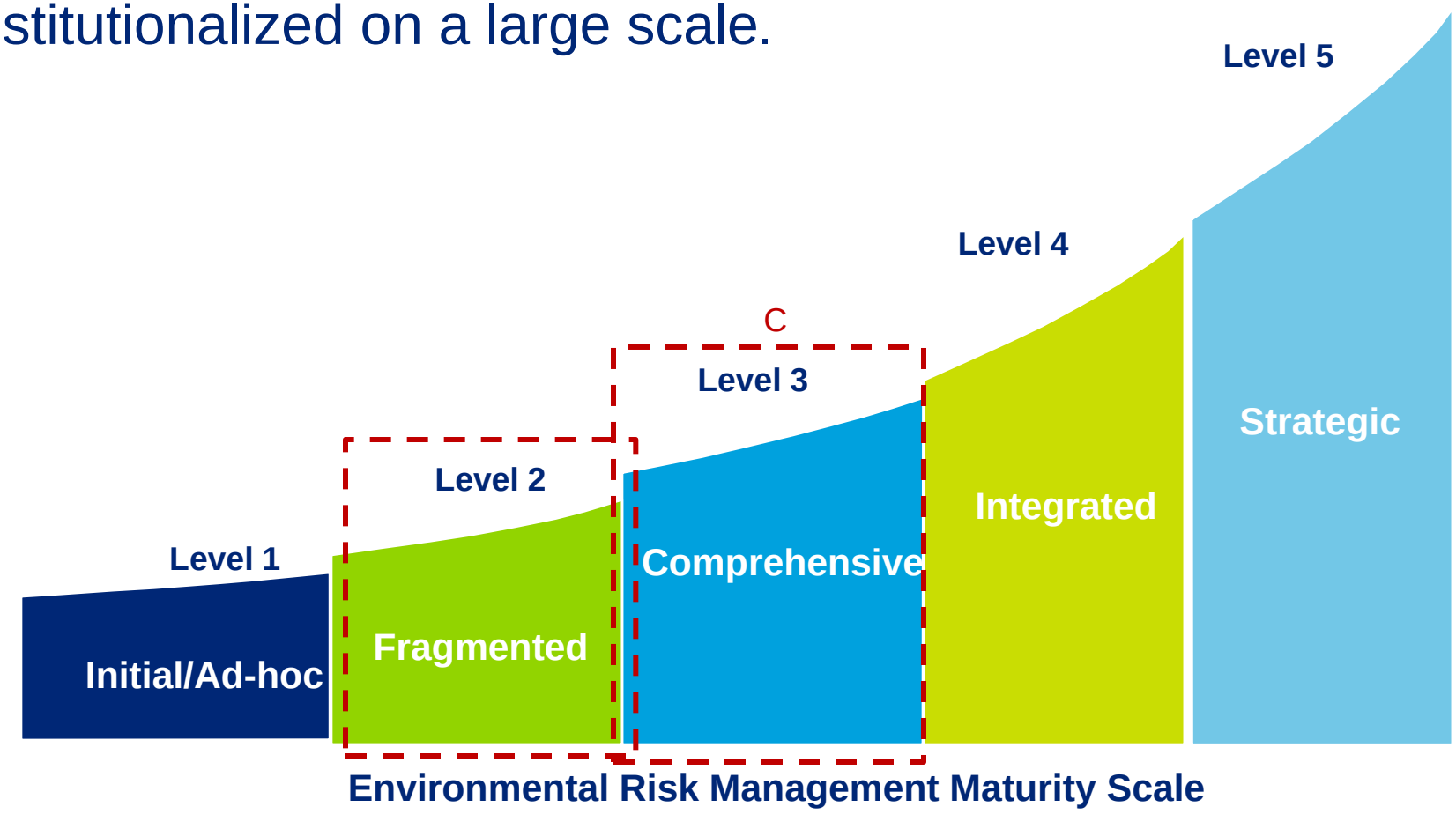
Potential consequences:

- Fines
- Incarceration
- Civil liability

Information courtesy of Graham Rempe, Environmental Lawyer, City of Toronto

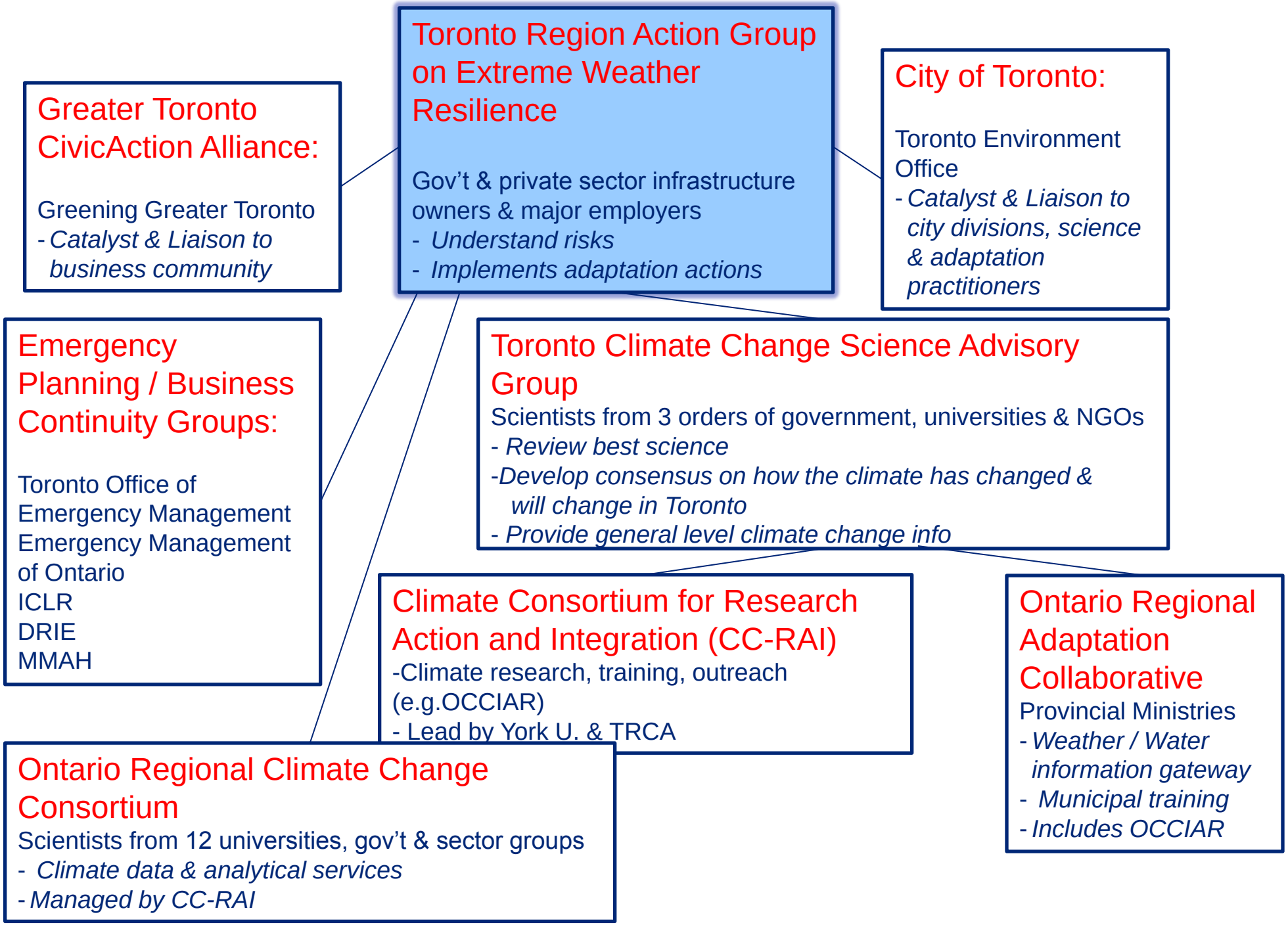
Environmental Risk Management – Current State Assessment

- Environmental risk management practices & processes are in place & formalized in some Divisions, but cannot be considered to be institutionalized on a large scale.



- A strong foundation exists in select Divisions – a good starting point for further City-wide efforts.

Figure 1: Climate Change Adaptation Groups in the Toronto Region



TORONTO: Major adaptation programs

Heat and Smog Alerts

Wet Weather Flow Master Plan (2003)

- $1 Billion investment over 25 years

Basement Flooding Program (2006)

- $833 Million investment over 10 years
  - 5 of 32 flooded areas now studied (recent cost estimate to address risk is $226 Million for the 5 areas)

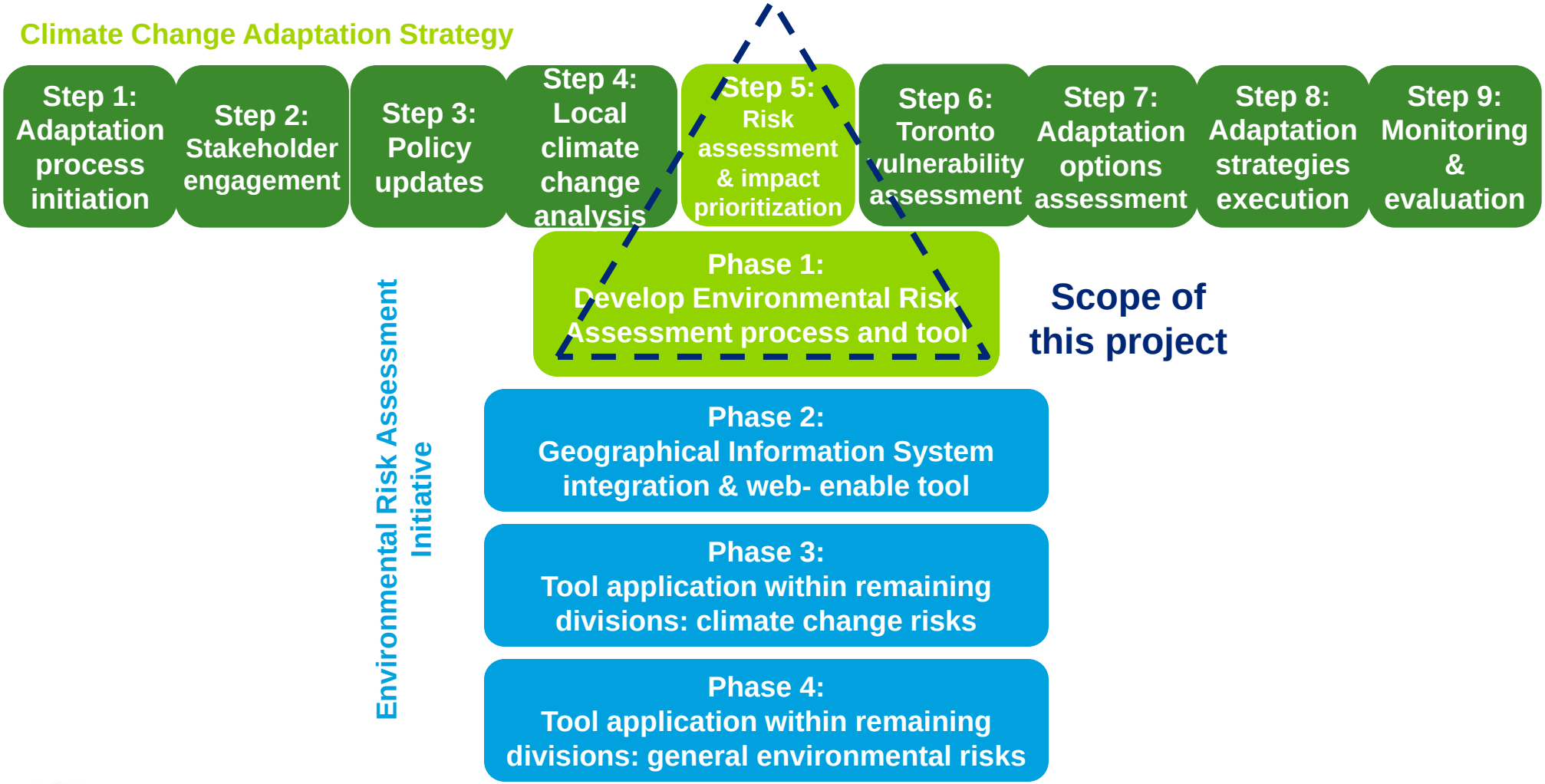
Climate Change Adaptation Strategy (2008)

- 'Ahead of the Storm': Identifies short & medium term adaptation actions
- 'Climate Drivers Study' : Improves local knowledge of future weather extremes
- Climate change risk assessment to identify & prioritize long term actions

CC Risk Assessment Project Context

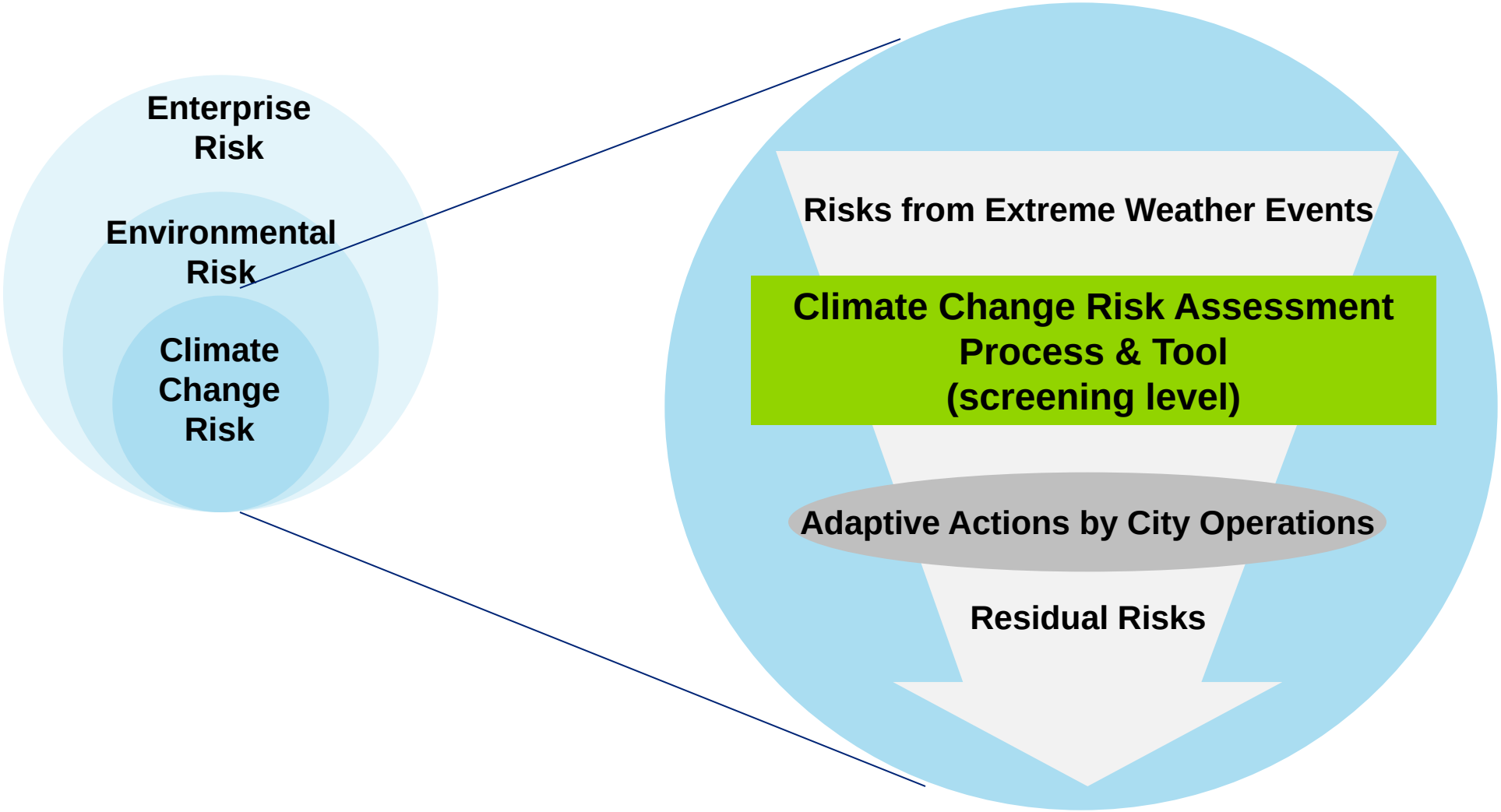
This project addresses two key mandated initiatives:

- General Environmental Risk Assessment (from Auditor General);
- Climate Change Risk Assessment (from Council).



Project Scope

Climate change risk is a subset of environmental risk



Scope of project is developing a process for screening & prioritizing all environmental risks - first application will focus on climate change risks

Environmental Risk Project Overview

Project Purpose:

- To develop organizational capacity towards a culture of env. risk management

Primary Project Activities:

- Developed a “screening-level” env. risk assessment process & tool;
- Piloted process & tool
  - Transportation Services
  - Shelter, Support & Housing Administration

Project Benefits:

1. Provide consistent means for City to identify & assess env. risks;
2. Enable City staff to prioritize risks & prepare adaptive actions; and
3. Demonstrate climate change adaptation leadership for Toronto area organizations.

Transportation Services - Level of Effort

- **95** high priority assets and services were assessed;
- Approximately **1700** risk scenarios were developed;
- For each of the time periods **2010-2020** and **2040-2050**;
- One lead risk assessor and **8 risk assessor** with high level of expertise and many years of experience were selected;
- Risk assessors were **trained** in the risk assessment process;
- 15 half day **risk assessment** sessions; and
- 3 half day **risk treatment** session were held.

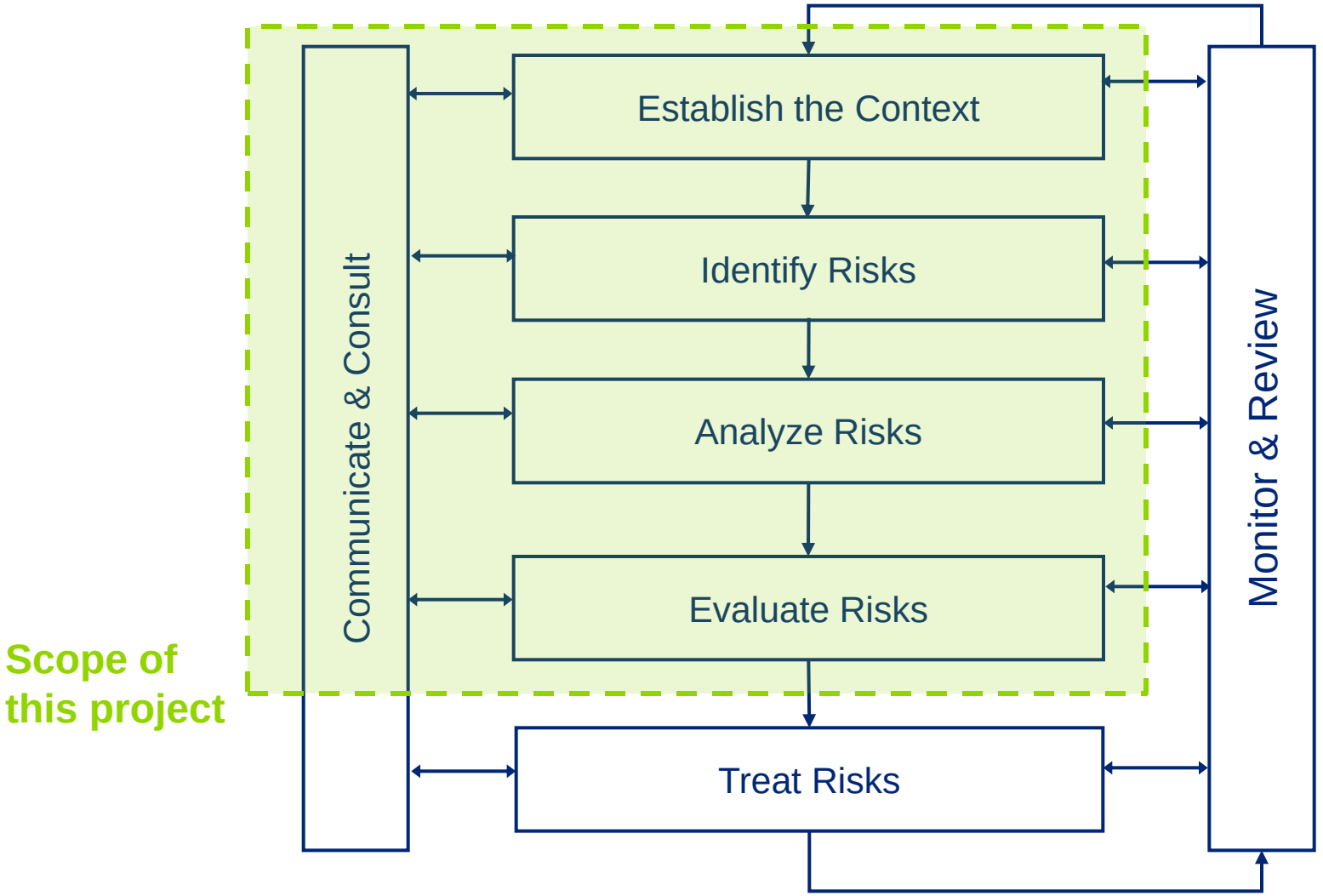
Activities Completed

Risk Sources
Extreme Freezing Rain
Extreme Rain
Extreme Heat
Freeze/Thaw Cycle
Extreme Snowfall
Extreme Cold
Extreme Wind

Transportation Services
Infrastructure Asset Management & Programming
Expressway and Structures
Urban Traffic Control Systems
Business Systems
Plant Installation and Maintenance
Road Operations

High Priority Assets and Critical Services
Roads, Bridges, Culverts – Inspection, Maintenance and Construction Traffic Controls Signals, RESCUE Operation; Traffic Control Systems; Road Operation Equipment; Staff Health and Safety; Winter Maintenance; Road Repairs; Street Sweeping Service; Inspections and Patrolling; Investigations

Risk Management Framework



Source: Australia New Zealand AS/NZS 4360

Climate Change Risk Assessment Tool:

Key Features:

- Adaptable to any kind of risk (e.g. climate, environment, health & safety)
- Large data handling capacity
- Powerful capability to analyze trends
- Ability to attach reference documents
- Captures the knowledge of experienced staff before they retire
- A good record of due diligence
- Helps management see the big picture

QUESTIONS?

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