CLIMATE CHANGE & ASSET MANAGEMENT – a work in progress

FCM Workshops
February 11 & 12, 2020
Toronto

TORONTO

OUTLINE

- Asset Management in Toronto
- Multi-sectoral climate risks & interdependencies
- Connecting Climate to Asset Management

Why is Asset Management Important?

- **Sustainable service delivery** is the goal of asset management.
- Supports **financial sustainability** and **evidence-based decision making**.
- Drives **longer term** thinking and planning
- Helps focus and **prioritize capital spending**
- No infrastructure **funding** from Province without an asset management plan.
- Complies with federal and provincial requirements

City of Toronto Infrastructure Assets

$90+ Billion

City of Toronto Strategic Priorities

Related strategies, plans and initiatives

- Biodiversity Strategy
- Circular Economy
- City Asset Management
- City Wide Real Estate Transformation
- Electric Vehicle Strategy
- Green Roof Bylaw
- Long-Term Waste Management Strategy
- Parkland Strategy
- Pollinator Protection Strategy
- Ravine Strategy
- Resilience Strategy
- Strategic Forest Management Plan
- Toronto Green Standard
- TransformTO: Climate action for a healthy, equitable, prosperous Toronto
- Wet Weather Flow Master Plan

Public Services

Priorities

Service Profile

Performance Profile

Services

Customers

Assets

Resources

Asset Profile

Infrastructures

Facilities

Vehicles

Land Parcels

Funds

Human Resources

Information/Data

Corporate Asset Management Framework

TORONTO

Asset Management – Ontario Regulation 588/17

- Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure came into effect January 2018.
- The regulation requires the following of every municipality:
  - **July 1, 2019** – Municipalities develop and adopt a Strategic Asset Management Policy.
  - **July 1, 2021** - Asset Management Plans (AMP) for "core infrastructure assets" (water, wastewater, and storm water, roads, bridges, culverts) at current levels of service.
  - **July 1, 2023** - Asset Management Plans for all assets, at current levels of service.
  - **July 1, 2024** - Asset Management Plans at proposed levels of service.

Ontario Regulation 588/17- Climate Impact

Section 3.1.5 – The municipality commitment to consider as part of its asset management planning:

i. The actions that may be required to **address vulnerabilities** that may be caused by climate change to the municipality's infrastructure assets in respect of such matters as;

- **Operations, such as increased maintenance schedules**
- **Levels of service, and,**
- **Lifecycle management**

ii. **Anticipated costs** that could arise from such vulnerabilities;

iii. **Adaptation opportunities** that may be undertaken to manage vulnerabilities

iv. **Mitigation approaches** to climate change, such as greenhouse gas emission reduction goals and targets; and

v. **Disaster planning** and contingency funding.

City's Corporate Asset Management Policy Climate Impact Provisions

- Minimize the impact of infrastructure on the environment and infrastructure should be designed to be resilient to the effects of climate change (s 6.1.10)
- Asset management planning will incorporate and align with Resilience Strategy(s 8.1.2)
- The City will consider risks, and vulnerabilities and the impact of climate change on its infrastructure assets and relevant adaptation and mitigation actions (s 8.1.6).

https://www.toronto.ca/city-government/accountability-operations-customer-service/long-term-vision-plans-and-strategies/city-asset-management/

So, What is happening Currently to consider Climate?

Environment and Energy Division
City of Toronto

Infrastructure

Basic organizational structures, social supports and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.

Social Infrastructure

1998 Ice storm local heroes from the Eastern Townships

Photo: D. MacLeod

Resilience

Capacity of individuals, communities, institutions, businesses and systems to survive and adapt no matter the chronic stress or acute shock then experience.

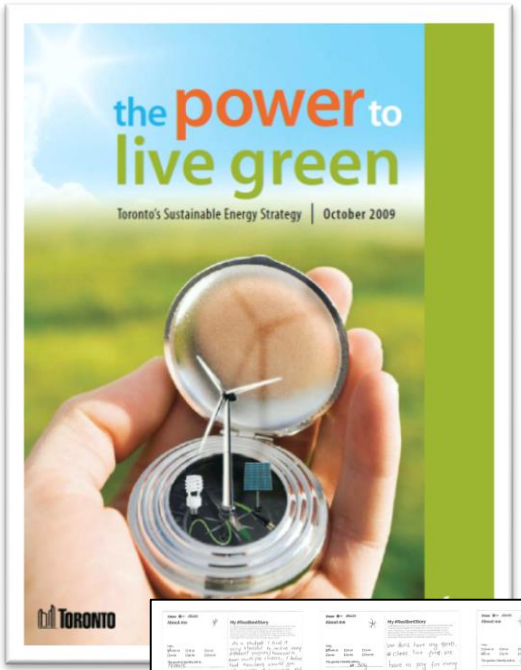
The ability to bounce back better.

History

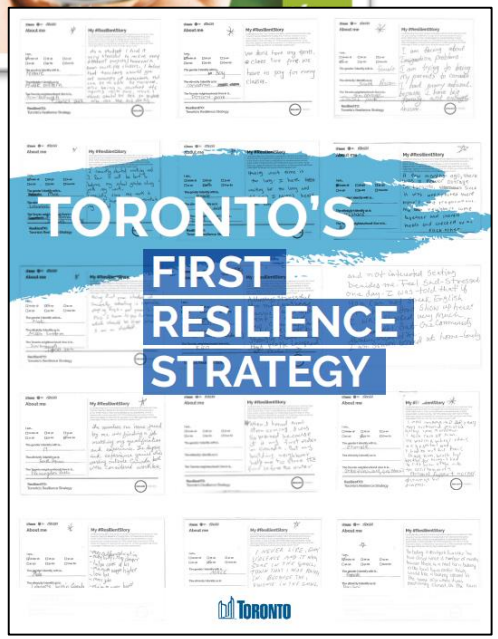
2007

2008

2009

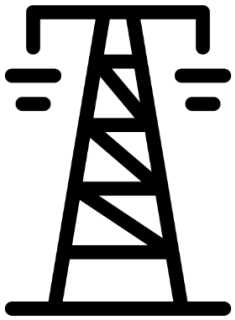


2019

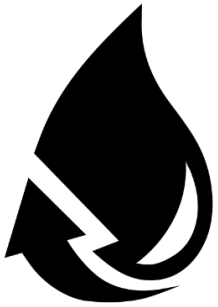


Critical Infrastructure

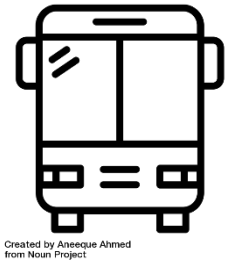
Understanding **risks** and **interdependencies**



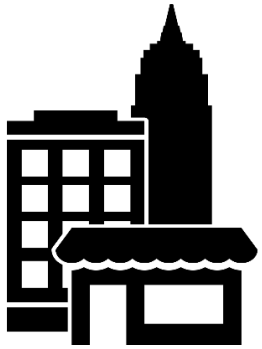
Utilities



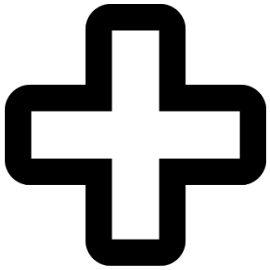
Water



Transportation



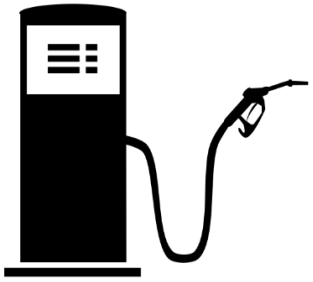
Buildings



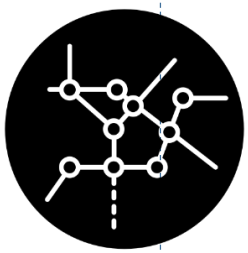
Health

Public Safety

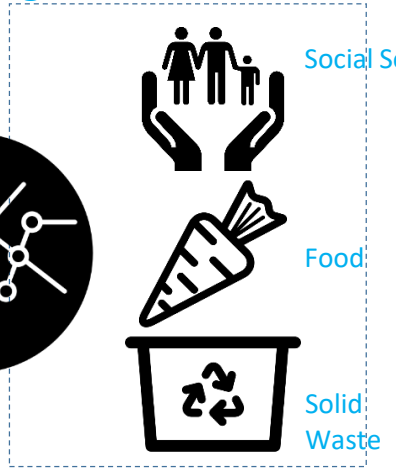
Economy/Finance/Insurance

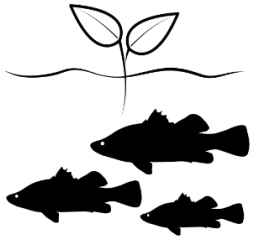


Liquid Fuels



Additional Networks

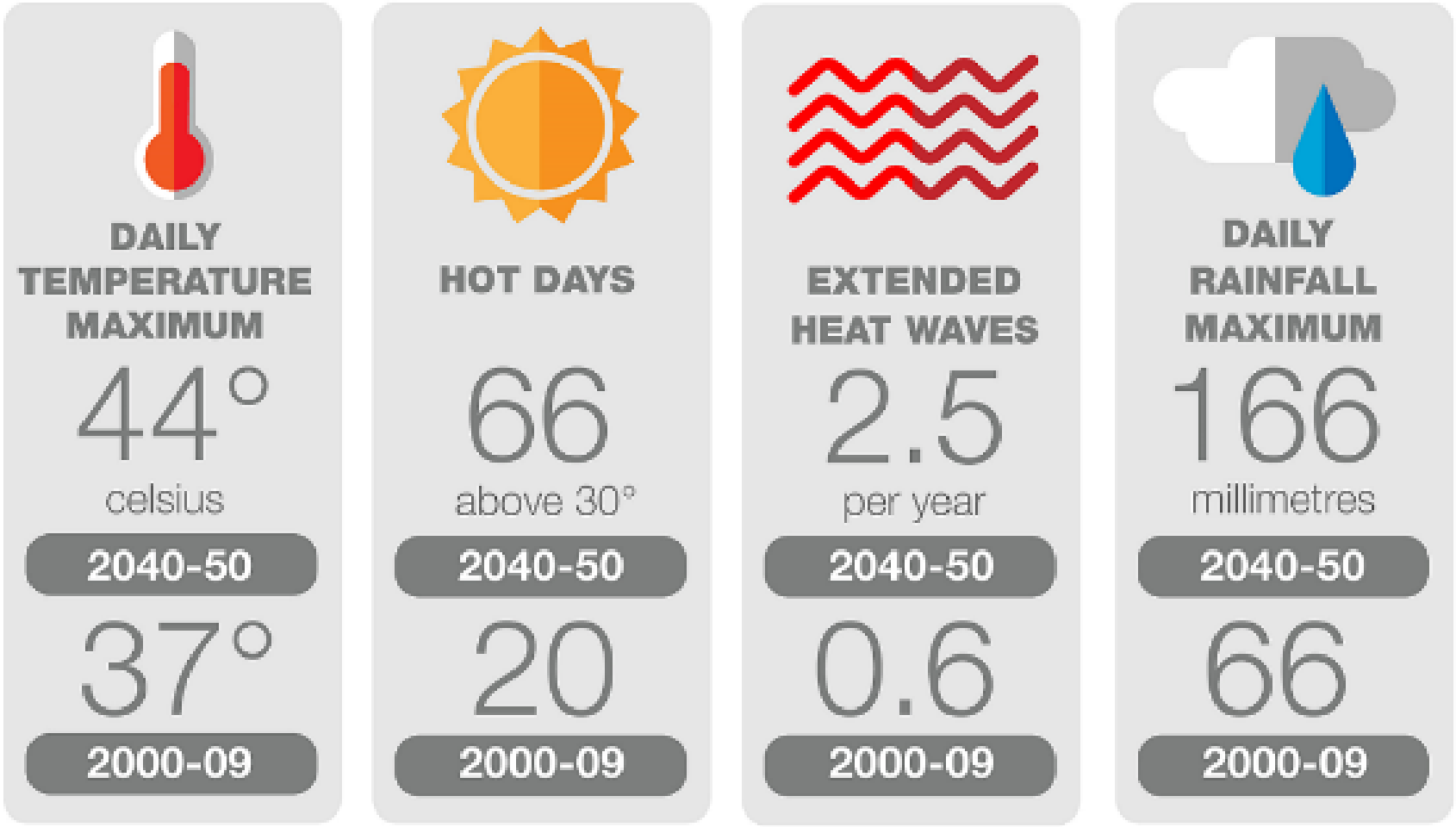




Natural Environment

Icons: The Noun Project

Toronto's **Future Weather***



Climate Drivers Study, 2011

Sample costs

Damage from Extreme Weather

Event	Total Costs
August 19, 2005, Rainstorm	$47 million
July 8, 2013, Rainstorm	$65 million
Dec 21/22, 2013, Ice Storm	$106 million
2017 High Lake Effect and 2018 Windstorm	$28 million

Planned Adaptation Costs

Project	Costs
TCHC Combined Heat and Power Generation	$63.9 million for installation in 39 towers
Basement Flooding Subsidy Program	$48.3 million by end of 2018
Basement Flooding Protection Program	$370 million spent by end of 2018 $1.7 billion in 2019-28 Capital Budget
Mandatory Downspout Disconnection	$175 million in 2019-28 Capital Budget
TTC Subway Pump Replacement Program	$108 million for 39 locations in next 10 years
Preliminary study of adaptation in City-owned buildings	$13 million for 19% of City-owned buildings

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So many hazards, so little time…

- Extreme rain
- Ice storm
- Cold snap
- Drought / wildfire
- Hail storms
- Heat waves
- Thunder storms
- Tornadoes
- Winter storms
- Geomagnetic storm

Culvert clean ups / inspections

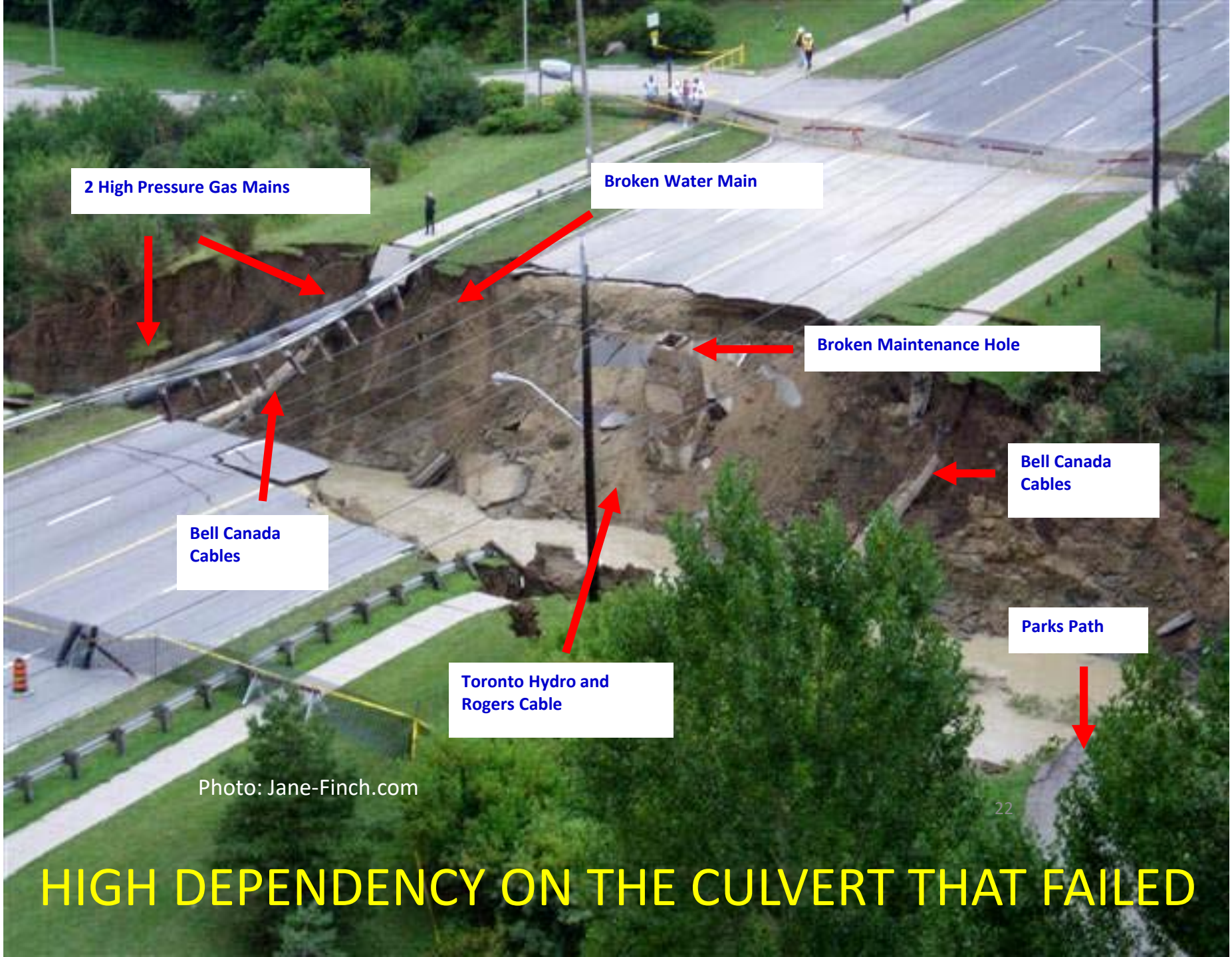


Photo: Jane-Finch.com

HIGH DEPENDENCY ON THE CULVERT THAT FAILED

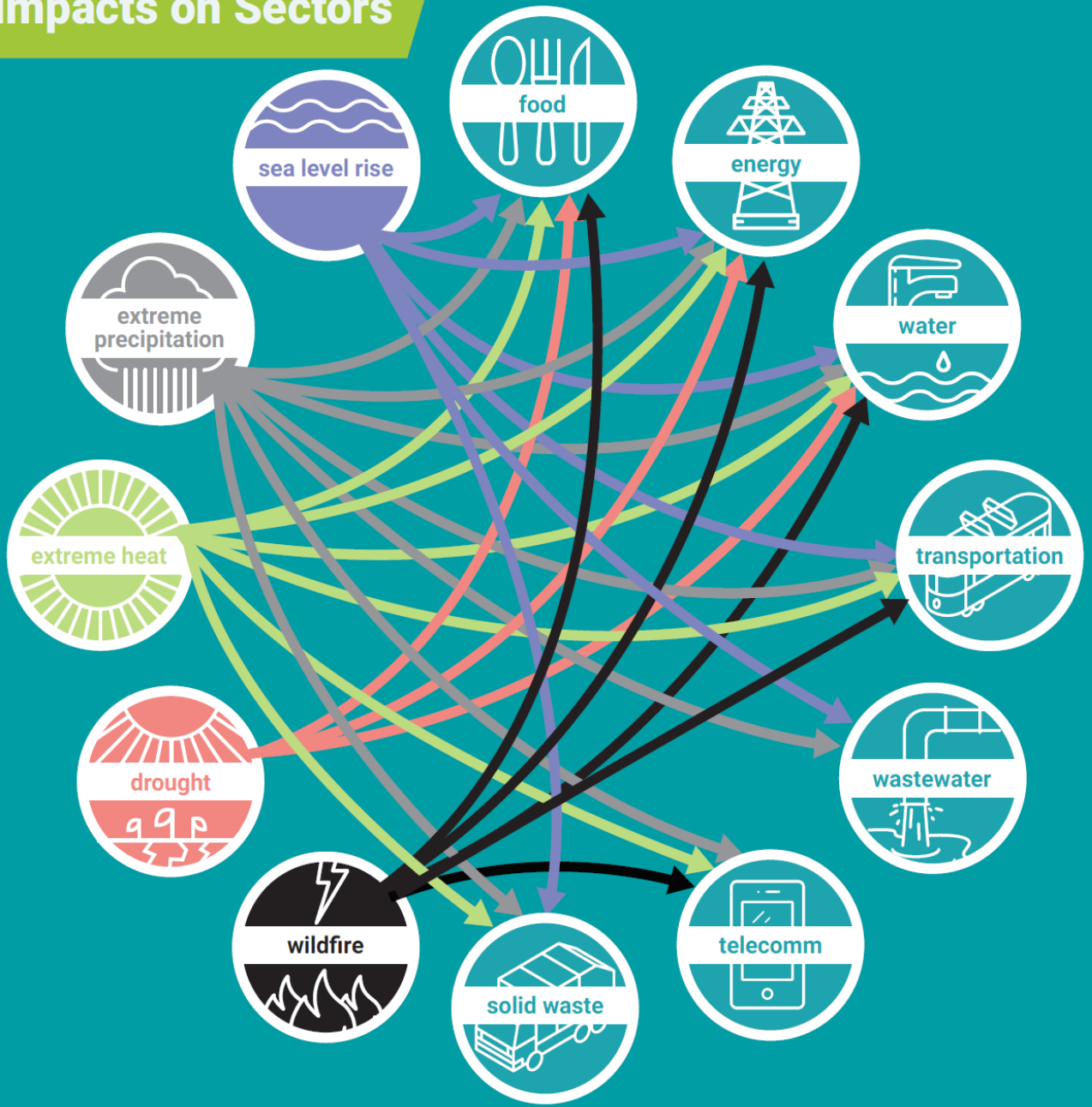
Culvert maintenance / upgrades


Electrical system strengthening


Tree trimming to reduce storm damage


Freeze/thaw damage repairs

Climate Hazard
Impacts on Sectors



Ref: C40 Infrastructure + Climate Risk Interdependencies Report (2017)

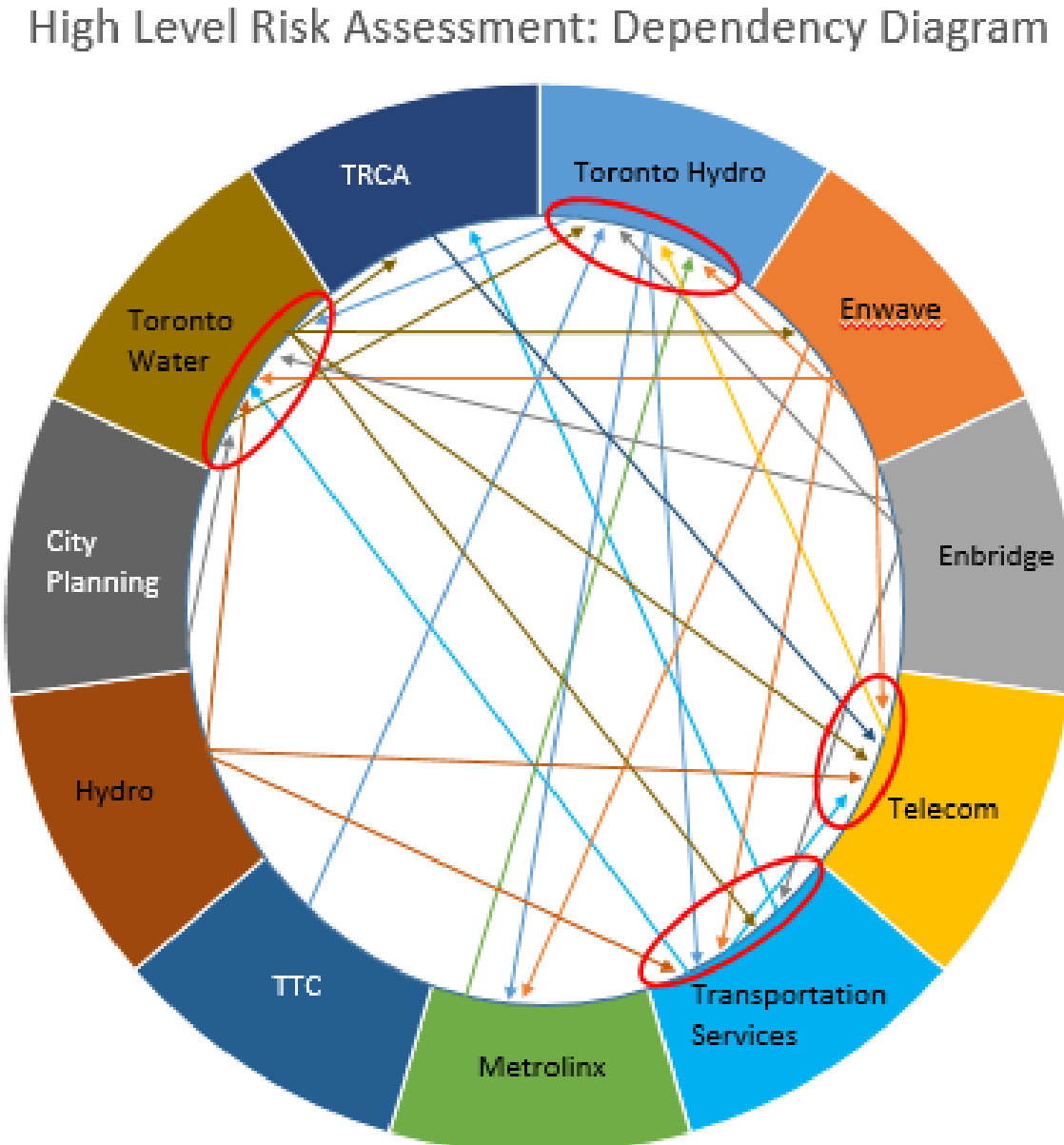
C40 CITIES
CLIMATE LEADERSHIP GROUP

High Level Risk Assessors

18 Internal & External Organizations

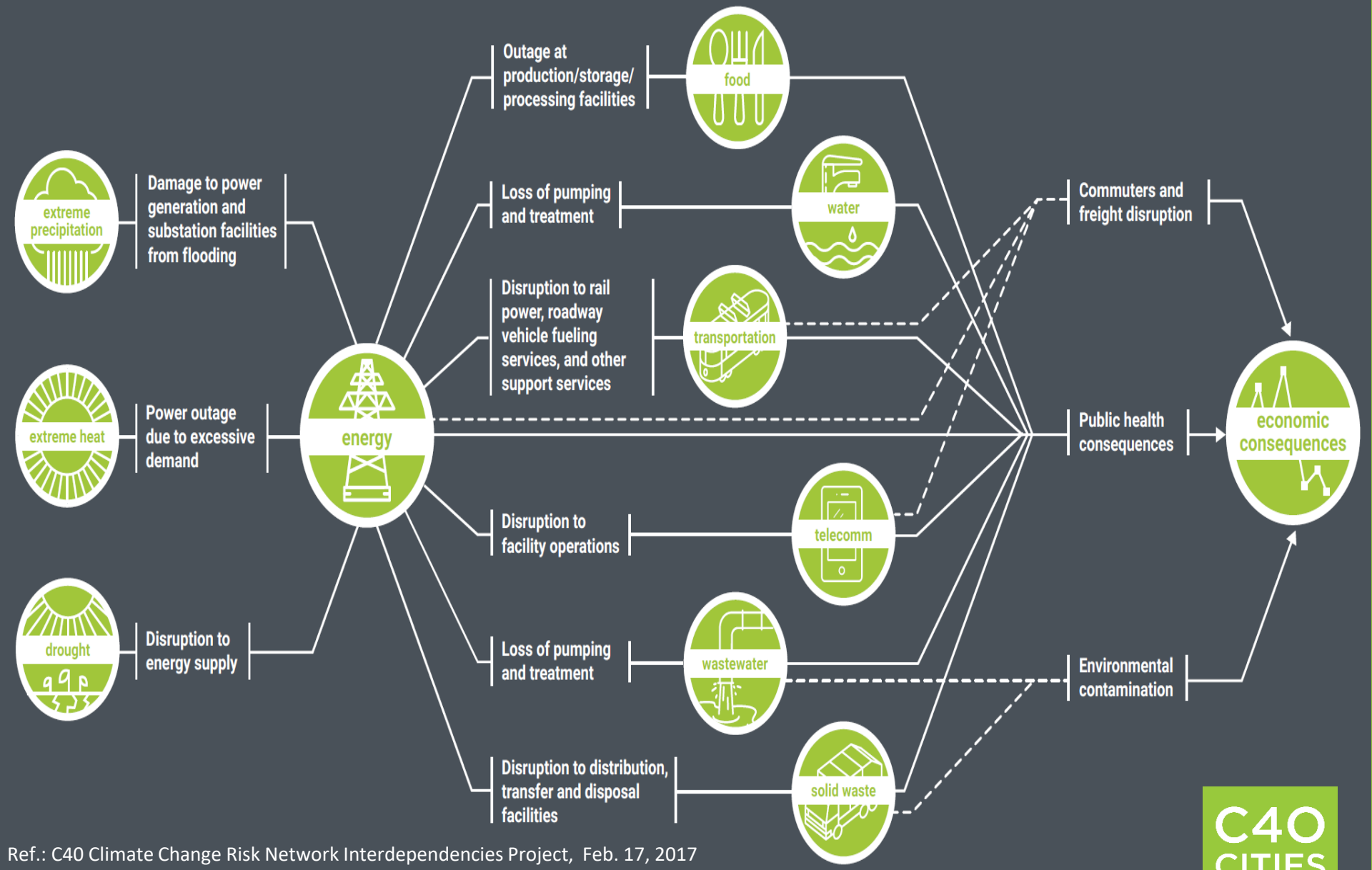
High Level Risk Assessment

Key Findings and Lessons Learned



* Graphic concept adapted with permission from MUST Urbanism (2016)

Example of a sector that impacts multiple sectors: **Energy**



Ref.: C40 Climate Change Risk Network Interdependencies Project, Feb. 17, 2017

C40 CITIES
CLIMATE LEADERSHIP GROUP

Electrical Utility Questions

- Ask your electrical utility if it is a member of the Canadian Electricity Association?
- Ask the extent to which they are following CEA guidance for climate adaptation?
- Ask if there are municipal assets of concern to their operations?
- Ask for a map of frequent outages v.s. vulnerable populations
- Ask your utility to check out PIEVC “Climate Change Engineering Vulnerability Assessment” (see www.PIEVC.ca)

Risk info may inform future rate application cases by your utility.

GREEN STREETS: Addressing Climate Change & Asset Mgmt

COUNCIL'S DIRECTIVE - 2013

> "…to develop "green infrastructure" standards for the public right-of-way for implementation in Transportation Services and Toronto Water capital projects…"

Council Direction
October 2013, (PW25.7)

BENEFITS OF GREEN STREETS

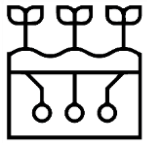
Managing stormwater runoff to enhance water quality, to reduce erosion in receiving water bodies, and to enhance resilience against extreme storms

Provide opportunities to enhance biodiversity

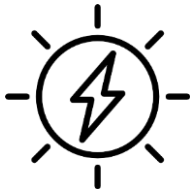
Mitigating urban heat island effect

Enhancing the extent and longevity of the urban forest

Enhancing air quality



Promoting infiltration



Conserving / generating energy

Beauty

BENEFITS OF GREEN STREETS

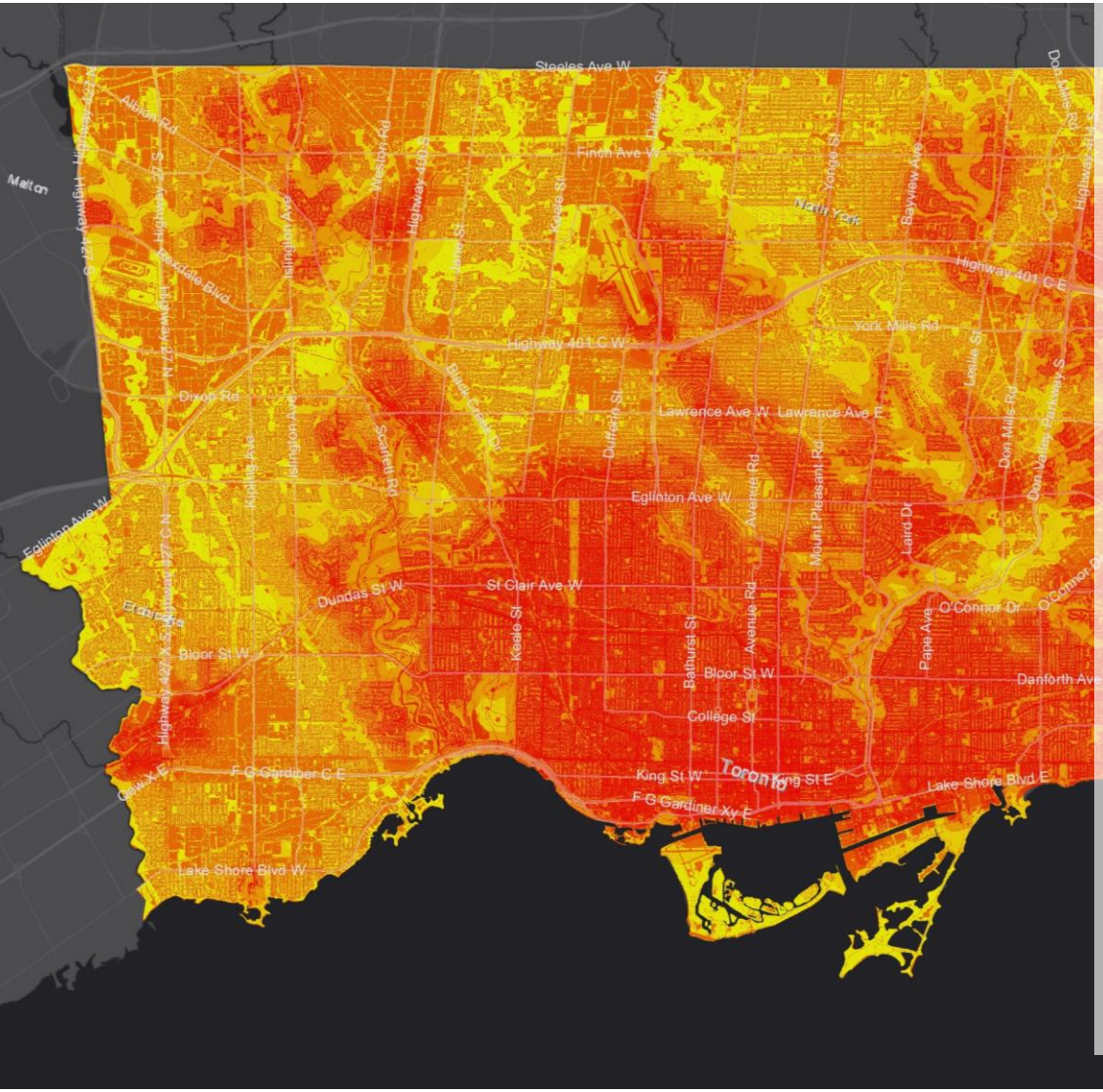
Implementation of Green Streets can achieve the goals of additional City strategies such as:

- Ravine Strategy
- TransformTO
- Biodiversity Strategy
- Pollinator Protection Strategy
- Complete Streets
- Basement Flood Reduction

Asset Management – Green Streets Project Selection Process

Through geospatial analysis of natural & man-made features within the city, the (draft) GIS Priority Maps score candidate streets through **5 main co-benefits of Green Infrastructure (GI):**

- Stormwater Management
- Air Quality
- Tree Canopy Distribution
- Social Wellness
- Urban Resilience

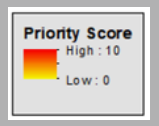


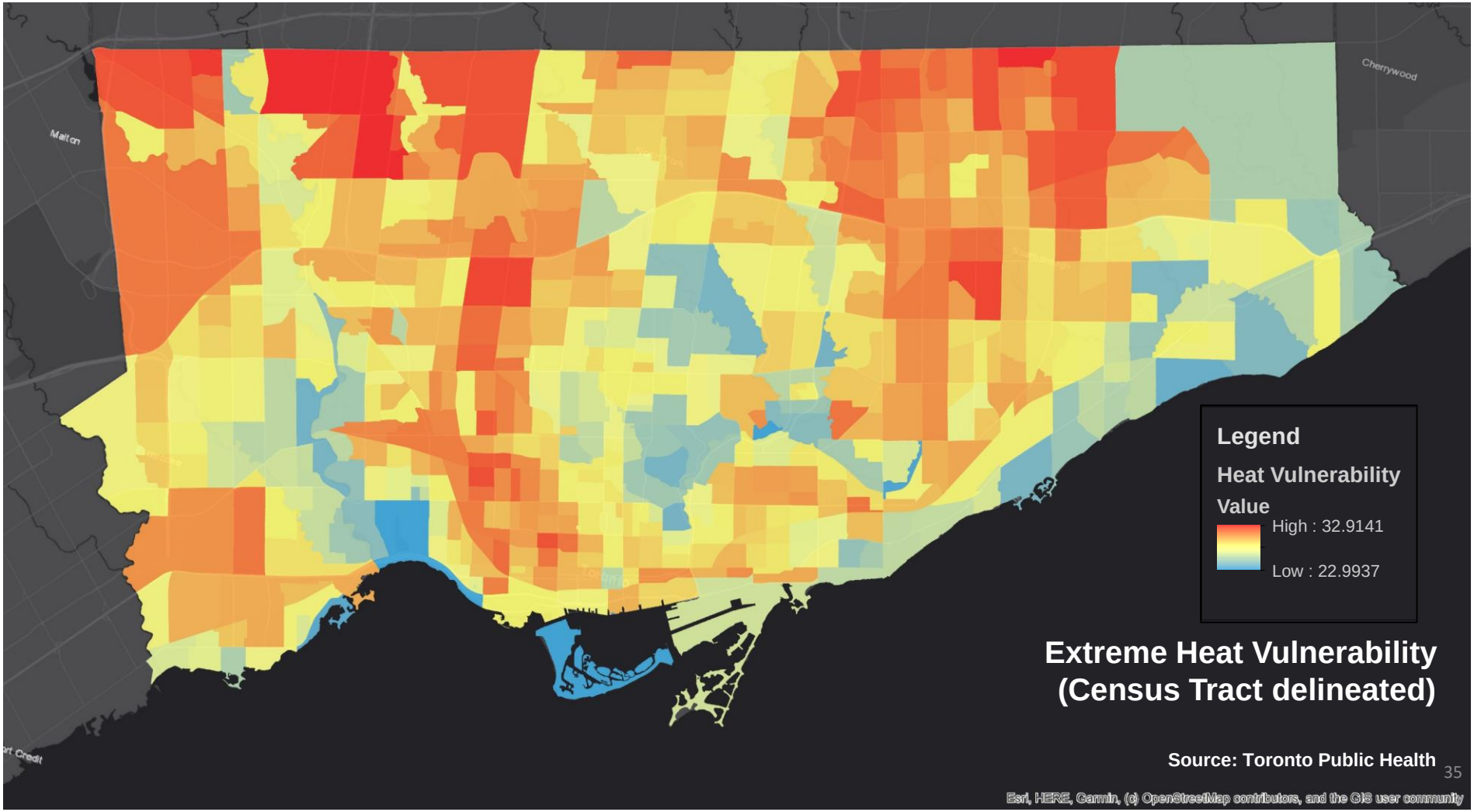
Stormwater Management Objectives:

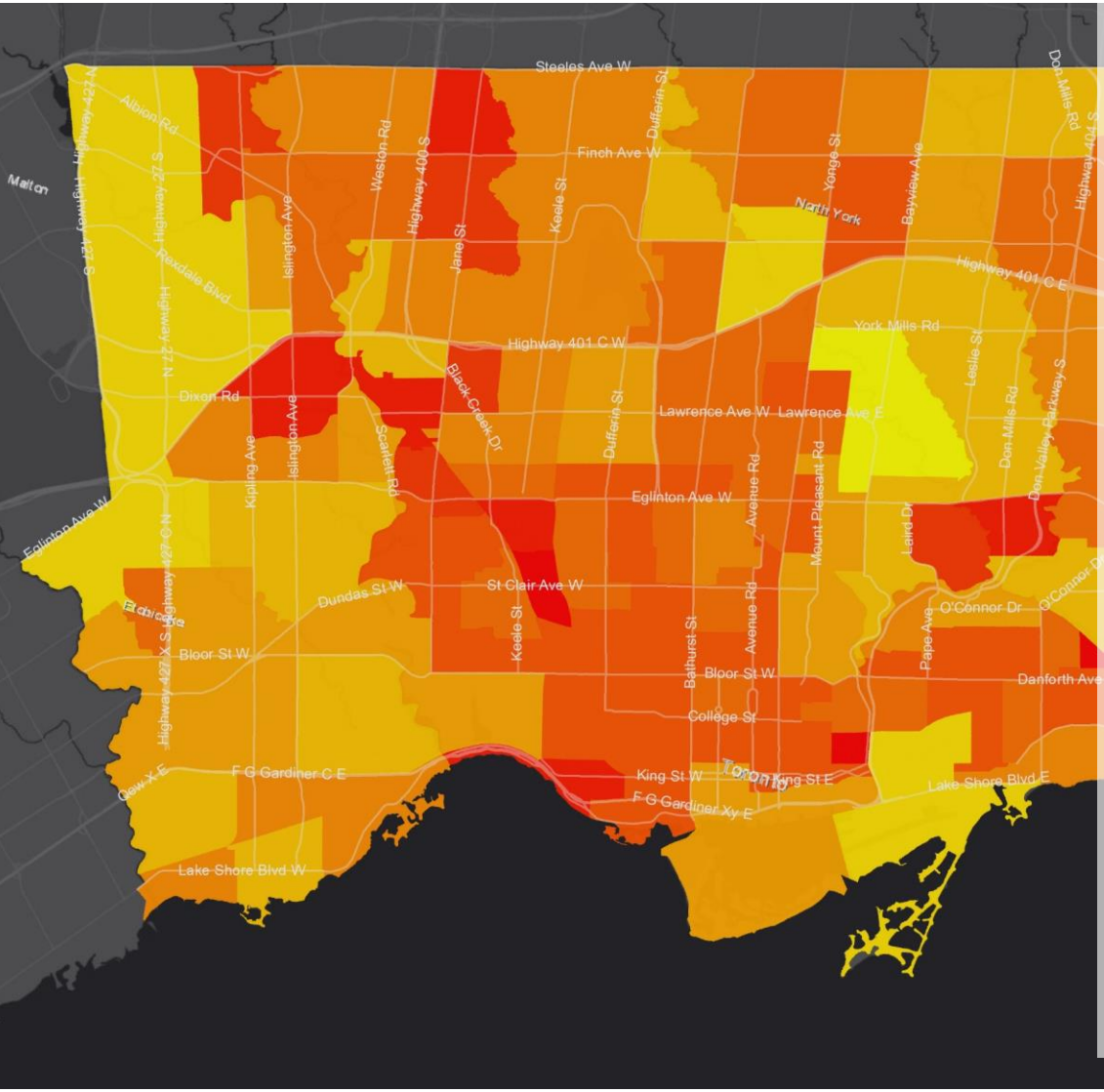
- Improve water quality by prioritizing Green Streets in areas where run-off contributes to combined sewer overflow (CSO) and storm sewers leading to environmentally significant areas
- Reduce runoff volume through increasing permeable surfaces on existing impervious areas.

Data & Source

- Toronto Sewer Lines, Toronto Water
- Environmentally Significant Area, Toronto GCCView.
- Toronto Impervious Area, Toronto Open Data




Cherrywood
Legend
Heat Vulnerability
Value
High : 32.9141
Low : 22.9937
Extreme Heat Vulnerability
(Census Tract delineated)
Source: Toronto Public Health
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

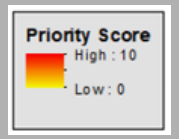


Social Wellness Objectives:

- Increase per capita accessibility to recreational green space by prioritizing neighborhoods with lower ratios of Green Area per capita
- Bring forward social benefits of GI (e.g. health, sense of community, aesthetics) to NIAs
- Maximize social value of GI by prioritizing neighborhood with high population density

Data & Source

- Green Area, Toronto GCCView.
- Neighborhood Profile, Toronto Open Data
- Neighborhood Improvement Area, Toronto Open Data



We are all in this together!

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Questions?