

Summary of the Flood Resilient Toronto Project

March 2019



This document describes Flood Resilient Toronto, an inter-divisional and inter-sectoral project led by the Resilience Office at the City of Toronto to answer the following question: How can the City and our partners better understand, and take appropriate action, to address our flood risks? It describes how the project came to be, the work that has been completed to date, and the next steps necessary to continue to address Toronto's flood risk.

Flood Resilient Toronto Working Group

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Background

Urban flooding is caused by intense and/or prolonged precipitation (also known as pluvial flooding) and consists of surface/overland flooding resulting from inadequate drainage paths ("trapped water") and sewer surcharge. Riverine flooding and floodplain mapping must be considered in assessing urban flooding due to interdependencies in the drainage network and the reliance on outfalls for discharging storm sewage/water to rivers/streams.

Urban flooding emerged as an issue through the Preliminary Resilience Assessment (PRA), completed by the City in 2017 as part of the 100 Resilient Cities Resilience Strategy development process. It was also identified through the City's High Level Risk Assessment (HRLA) process, in which numerous organizations expressed a need for 'flood or flood mapping' information.

Various organizations have deployed significant resources and expertise to understand flood risk. Significant data exist from the flood mitigation efforts of different organizations. Understanding the availability of and ability to share this data will provide valuable information to a range of stakeholders interested in better understanding the relationship between flood risk, Toronto's growth and development, key planning considerations, as well as more detailed information on vulnerabilities and risks associated with critical infrastructure.


Accordingly, the City decided to assemble a group of key internal and external stakeholders to explore urban flooding occurring in Toronto. This group came to be known as the Flood Resilient Toronto Working Group. As the project proceeded, it was decided to use the term "flooding" to include all flooding types.

Flood Resilient Toronto Working Group

The Flood Resilient Toronto Working Group was assembled to deliver the Flood Resilient Toronto project and made up of members who expressed interest in:

- a. Better understanding flood data availability and its limitations (e.g. flood limit mapping versus flood risk mapping, overland versus riverine flood information);
- b. Quantifying Toronto's urban flooding risk tolerance in the context of a changing climate;
- c. Identifying the flood information needs for critical services and infrastructure providers, recognizing flood information/data is currently needed to inform decisions; and
- d. Coordinating data sharing to inform corporate decision making for planning and development purposes.

Building on previous City and stakeholder efforts, as well as the PRA, the following key discovery question was defined: *How can the City and our partners better understand, and take appropriate action, to address our flood risks?* This key discovery question is aligned with a larger goal of ensuring Toronto's growth is climate resilient.



STORM OVER TORONTO,
PHOTO BY JAKE KNOFLOOK,
FLICKR PROFILE [HERE](#).

Purpose of the Working Group

To advance an understanding of urban flooding in the context of Toronto's broader resilience strategy.

Objectives of the Working Group

- Develop a snapshot of Toronto's approach to management of urban flooding and an understanding of current urban flooding risks;
- Identify a policy framework to ensure the City is resilient and well positioned across its divisions and agencies to manage flood risks, taking into consideration future urban flood risks resulting from a changing climate;
- Apply the policy framework to propose adaptation recommendations to improve the City's urban flooding resilience for inclusion in the City's Resilience Strategy



DAMAGE FROM AUGUST 19, 2005 STORM (PHOTO FROM JANE-FINCH.COM)

Working Group Membership

The Flood Resilient Toronto Working Group is comprised of stakeholders representing the City of Toronto, agencies and utilities, the province, academia and the private sector. The full-time members are as follows:

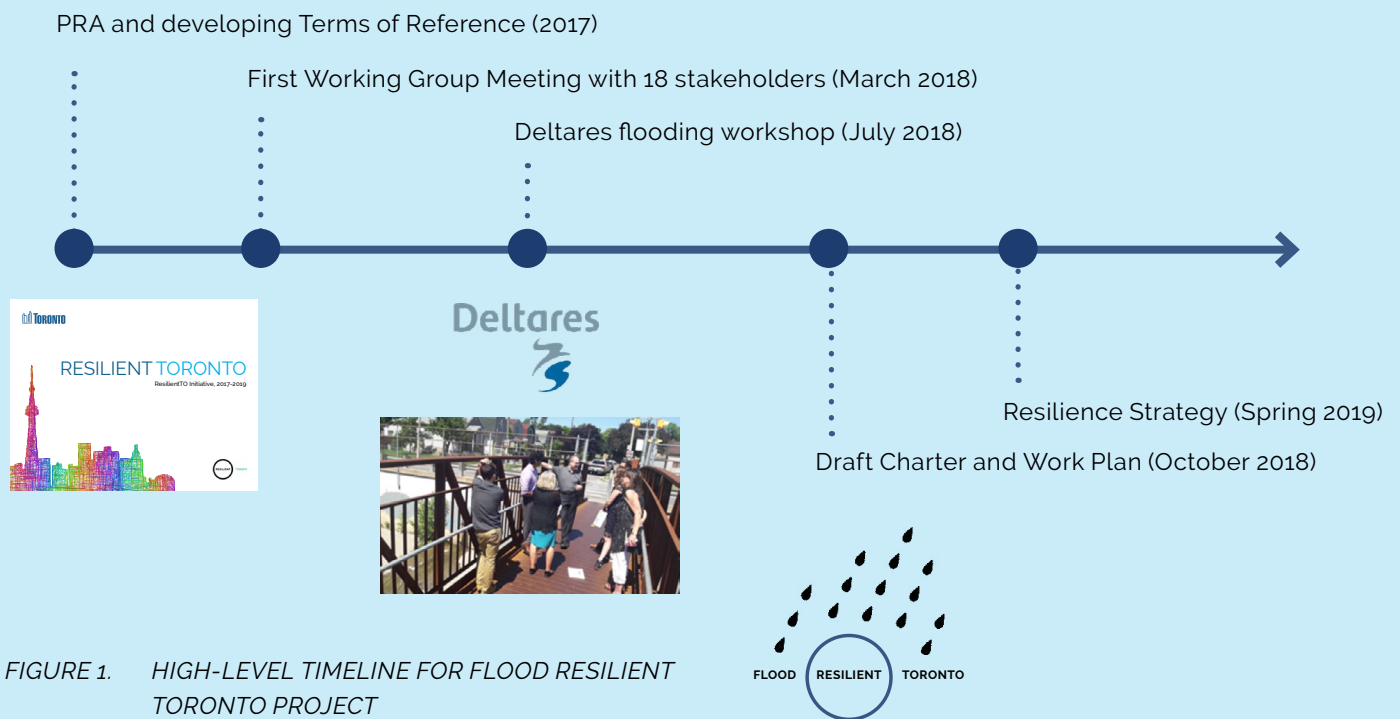
Organization	Name
Resilience Office (City of Toronto)	Elliott Cappell
Toronto Water (City of Toronto)	Kevin Tudhope David Kellershohn
Environment and Energy Division (City of Toronto)	Stewart Dutfeld
Toronto Building (City of Toronto)	Dylan Aster
City Planning (City of Toronto)	Jane Welsh
Transportation Services (City of Toronto)	Vesna Stevanovic-Briatico
Engineering & Construction Services (City of Toronto)	Hazel Breton
Facilities Management (City of Toronto)	John McCarthy
Toronto and Region Conservation Authority (TRCA)	Sameer Dhalla
Metrolinx	Quentin Chiotti
Toronto Transit Commission (TTC)	Geoff Turner
Toronto Hydro	Rob McKeown
Conservation Ontario	Jo-Anne Rzadki
Ministry of the Environment, Conservation and Parks (Province of Ontario)	John Antoszek
Intact Centre on Climate Adaptation (University of Waterloo)	Cheryl Evans
University of Toronto	Fadi Masoud
Institute for Catastrophic Loss Reduction (ICLR)	Dan Sandink

Flood Resilient Toronto Progress Update:

March 2018 to April 2019

The Working Group began meeting regularly in early 2018, meeting once per month in March, April and May 2018. The goals of these initial meetings were to understand the current state of flood mitigation effort, the availability of data and what gaps exist before identifying opportunities to improve the flood resilience of Toronto.

A high-level timeline for the Working Group, from preliminary resilience assessment (PRA) through to the Resilience Strategy is shown in Figure 1. As the Terms of Reference for the Working Group were developed, it became clear that consulting with the 100 Resilient Cities and their partners would be a tremendous asset to the process. The Resilience Office requested support from 100RC and Deltares to assist the Working Group in plotting a path forward and help in refining the flood resilient framework. The terms of reference and schedule of the Working Group's meetings were shaped to prepare for this workshop.



Scan of existing flood mitigation activities and actions

A summary of existing flood mitigation activities and actions is included in Figure 2. The list does not necessarily include all policies and actions to reduce flood risk (specifically operations) but it includes a comprehensive view of the policy landscape and successfully drove the conversation to identify gaps and challenges.

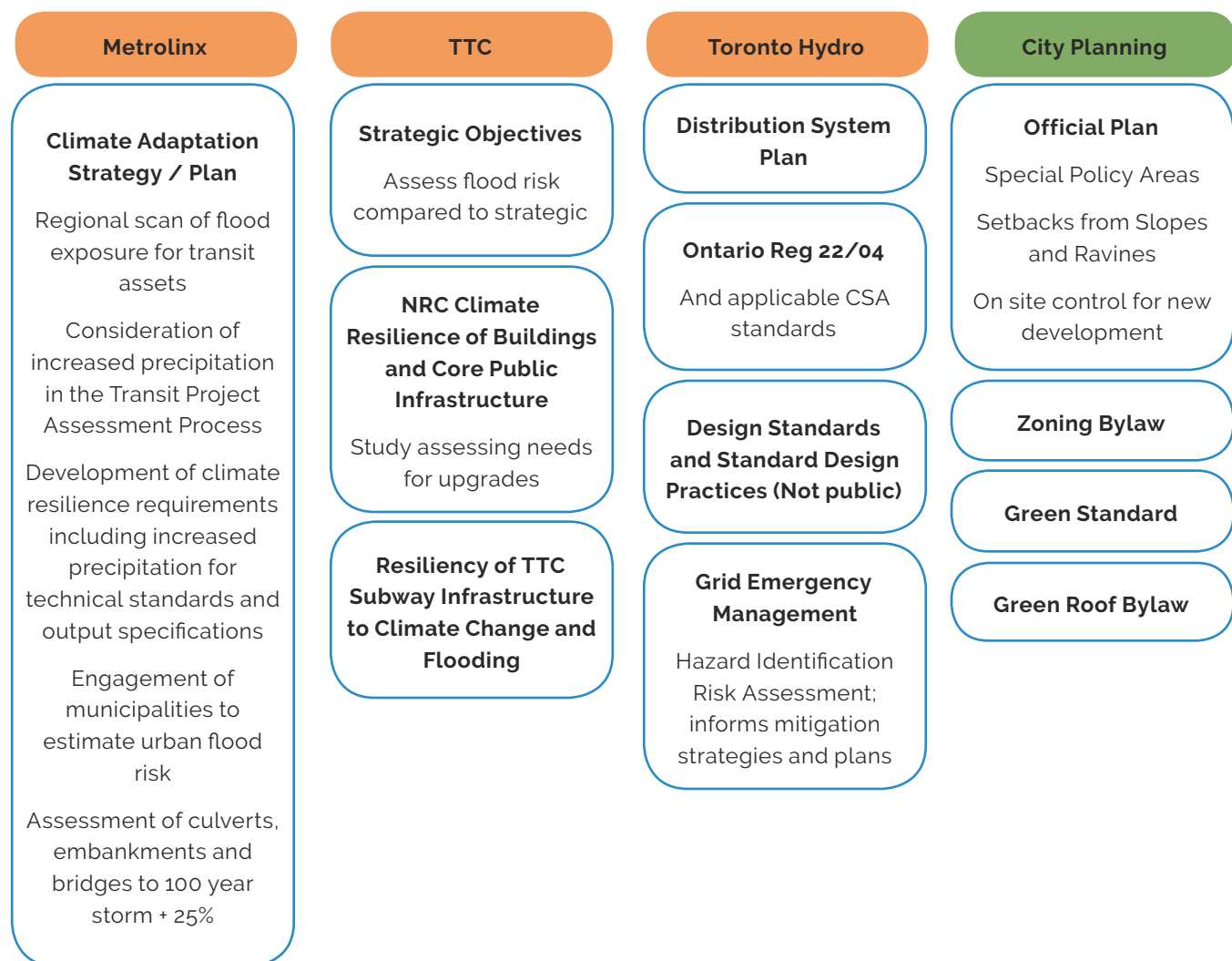
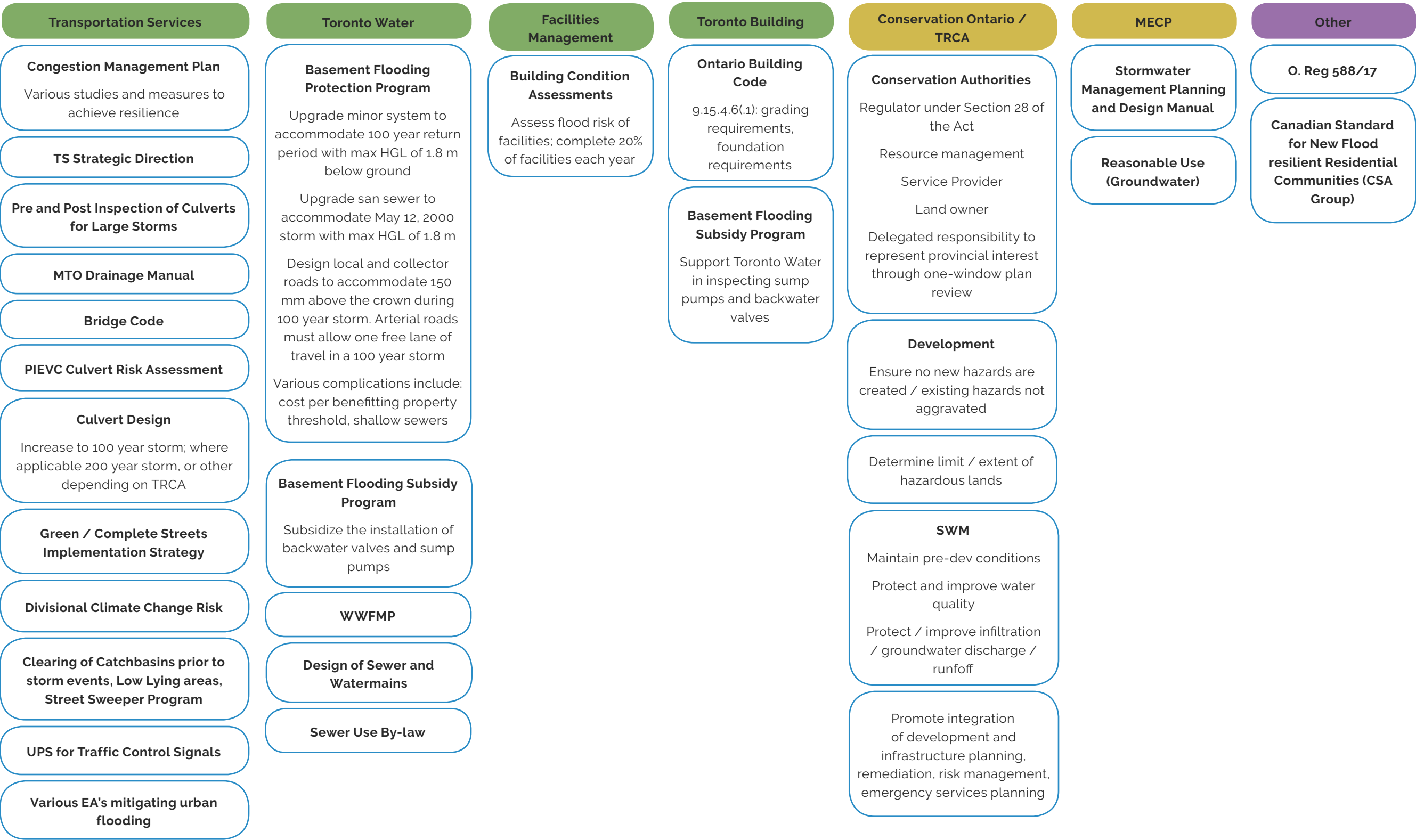


FIGURE 2. FLOOD MITIGATION POLICY AND ACTION MAP



Challenges and solutions regarding flood resilience

Following the identification of existing efforts, the Group explored prioritizing the existing challenges and proposed solutions through dialogue and exercises.

The following challenges and themes were identified (note that this list is unranked):

- Dynamic & continuously changing landscape
- Development (volume, pressure in sensitive areas)
- Modelling & Data; data – there are gaps, what does exist is specific/limited
- Interdependencies – constrained by other systems
- Flooding is just one of many priorities
- Private – Public Divide
- Willingness of households to act – with or without incentives
- Consistent design criteria
- Political will
- Funding
- Consideration of climate change is not standardized
- Need a better understanding of risk tolerance to set appropriate levels of service
- No clear mandate to address urban flooding risk – therefore no budget for flood mitigation efforts/ organizationally specific initiatives

Solutions were prioritized based on feasibility, level of complexity, speed of implementation, potential impact, and cost. The following priorities were identified by the Working Group (ranked from top to bottom):

- Collaboration – imperative to all stakeholders that we proceed collaboratively
- Improved Modelling and Risk Mapping
- Quantifying Risk & Service Standards
- Modernize Standards
- Communications and Education
- Real Time Modelling and Forecasting
- Improve Contract Requirements
- Better Building Standards
- Real Estate/Development Opportunities

Deltares workshop

Deltares, a Dutch institute with expertise in flood planning, joined the Working Group for three days in July 2018 to deliver a "Roadmap", or framework, to address flooding in Toronto. The Workshop included site visits, various working meetings, and a presentation to senior leadership.

The workshop was fruitful and resulted in the submission of a covering letter and Roadmap, attached, which identify the status of addressing flooding in Toronto and steps toward a more flood resilient city. It bears mention that the Roadmap, albeit an excellent guide, is a starting point for the Working Group as the framework and work plan continue to evolve based on the Toronto's needs, budget and schedule.

Flood Resilient Toronto Charter

A major objective of the Roadmap identified by Deltares, and aligned with the findings of the Working Group, is a Charter to provide a unified vision and set of principles for all stakeholders to work towards. The Charter represents consensus of the Working Group on prioritized best practices and actions to ensure informed decision-making in the City, with respect to flooding. The charter is scheduled to be signed by senior leadership of each organization, followed by distribution and socialization within Working Group stakeholder organizations in 2019. The Charter, along with a covering letter by the Chief Resilience Officer stressing the importance of working together to address flood risk, is attached.



DELUGE, BY CAMERON
MACMASTER

Summary of the Flood Resilient Toronto Project \

Current project status and future work plan

As outlined by the Deltares Roadmap and the priorities identified by the Flood Resilient Toronto Working Group, a large volume of work is needed to achieve Toronto's potential as a leader in flood resilience. A draft work-plan is underway and is currently a "live document" that is being updated on an ongoing basis.

Three actions related to the Flood Resilient Toronto process are proposed in the Resilience Strategy. These actions were prioritized based on the expert dialogue of the Working Group, and input from Deltares. The actions are as follows:

- i. Institutionalize an integrated, resilience approach to flooding by adopting the Flood Resilient Toronto Charter
- ii. Centralize Resources Towards a City-Wide Flooding Planning and Prioritization Tool
- iii. Review and Update Existing Flood Mitigation Programs to Account for Resilience

Subsequent to the adoption of the Resilience Strategy by City Council, the Working Group will meet to finalize the work-plan with a priority on these three actions.

Tasks associated with these three actions include:

- Following the signing and adopting of the Flood Resilient Toronto Charter in 2019, the charter needs to be distributed and socialized throughout each division. Signing and socializing the Charter is just the first step; the Resilience Office will lead the Working Group to operationalize the Charter.
- A terms of reference outlining the approach to the City-Wide Flooding Planning and Prioritization Tool has been developed in draft form for implementation subsequent to the approval of the Resilience Strategy. The terms of reference identifies the objectives of the tool and recommend a process (RFI) to refine the scope of the tool with the input of the Working Group. The application of the Tool is open-ended at this time. Different asset owners will apply it based on their needs, but the expectation is that the Working Group will provide insight into applying the tool to new policy and/or initiatives. A proposed schedule of early 2020 is targeted for commencing development of the Tool.
- The proposed review and updates to the Wet Weather Flow Master Plan, Basement Flooding Protection Program and operational frameworks will involve extensive scoping and input from multiple stakeholders. It is proposed to hold workshops, as led by Toronto Water for the Plan and Program, and as organized and led by the Resilience Secretariat and Working Group for the operational framework.

A number of additional objectives and tasks have been identified beyond the Resilience Strategy. These form an important part of the overall work-plan of the Flood Resilient Toronto Working Group and will be pursued by the group in the next two years.

- Identify recognized and agreed upon performance measures by reviewing best in practice literature (through the C40 and others). Determine performance measurement framework for application to mitigating urban flooding risk, identify a tracking and performance evaluation strategy.
- Develop a cost-benefit approach that will be applied to prioritize projects. Undertake a jurisdictional scan to inform the development of the cost-benefit approach, and collaborate with the Working Group to assign cost-benefit attributes and finalize a social cost-benefit process for decision making. Develop an associated messaging plan to communicate the evaluation and prioritization process publicly, and politically.
- The risk-based approach that will be applied to City decision making (and included in the Basement Flooding Protection Program) will be further developed, including approaches for economic loss modelling to determine return of investment, and improved understanding to set levels of service. The Flood Prioritization Tool will assist in these efforts.
- Identify knowledge gaps and required competencies to build internal capacity; develop a strategy for continuous learning and education, and continue to work with partners, university and the industry to advance best practices. Develop an external facing education strategy related to flood resilience, identifying educational material needs and distributing accordingly.
- Define key messaging and narrative to communicate flood resilience. Develop demonstration projects to increase awareness of flood resilience, and host a summit or conference in Toronto to display successes and plans for the future.
- Develop a design competition and/or recognition program to mainstream resilience and apply it to resolve challenging problems using innovative techniques.
- Through the Working Group, develop a communications/engagement plan to encourage homeowners to act to mitigate their risk of flooding. Communication materials can be created and distributed to convey this narrative, and the approach can be aligned with the public facing flood risk prioritization tool.
- Flood Resilient Toronto Working Group to work with the Resilience Office in ensuring policies and programs reflect adaptation to a changing climate.