



Dodging the ‘Perfect Storm’

Conservation Ontario’s Business Case for Strategic Reinvestment in Ontario’s Flood Management Programs, Services, and Structures

September 2013

Introduction

Flooding in Calgary, Alberta and more recently in Toronto, Ontario reminds us just how vulnerable we are when it comes to extreme weather events. The loss of life, devastation, long term social and economic disruption and the staggering cleanup costs in the aftermath of these floods clearly demonstrates how essential it is to have actionable guidelines, policies and programs in place to manage these events.



Flooding in downtown Calgary (2013).
Source: CTV News

Flooding on the Don Valley Parkway, Toronto (2013). Source: CTV News



In Ontario, flooding is the leading cause of public emergency.¹ To date, Ontario's programs to manage floods and regulate floodplains have proven extremely effective and, indeed, the Ontario government has been a leading jurisdiction in Canada for flood planning and management. While much has been accomplished, several factors, if not addressed directly and quickly, will significantly jeopardize the ability of Conservation Authorities and all levels of governments to maintain and improve on this level of management and protection.

Flood management is a shared responsibility in Ontario and Conservation Authorities are on the front lines of the Provincial Flood Forecasting and Warning program. In addition, Conservation Authorities bring added protection and benefits through watershed planning, watershed stewardship/natural heritage system management, monitoring and many other programs they deliver. Collaborating with the Conservation Authorities has enabled the Province and municipalities to use a cost effective and streamlined approach preventing upwards of \$100 million/year in flood damages.²

However, climate change, intensified development, and long term lagging investment in natural hazard structures, tools, and programs now impair Ontario's ability to maintain existing levels of flood protection and deal with emerging threats. Traditional urban development practices are compounding the damaging effects of rainfall intensity and diminishing the capacity of watersheds to slow storm runoff and ease flood flows. Investment in new risk management tools and design standards, particularly for new urban development, is required.

Tackling flood issues and increasing our long term resilience requires us to address **structural measures** such as dams, dykes, and other flood and erosion control infrastructure which *keep water away from people*, as well as, **non structural measures** such as floodplain mapping, flood forecasting and warning, regulations, natural hazard management policies and programs which *keep people away from water*.

The advantages of this approach is further leveraged with other complementary initiatives such as watershed planning, stormwater management, green infrastructure (including low impact development, wetland protection and restoration), natural heritage systems, and watershed stewardship /conservation initiatives. All of these contribute significantly to build local watershed resilience and enable Ontario communities to meet today's needs and escalating future challenges. Conservation Authorities increasingly play an important role in designing and implementing these initiatives, often in partnership with landowners, municipalities, the Province of Ontario and other agencies.

¹ Ministry of Municipal Affairs and Housing. 2007

² Conservation Ontario. 2009.

A Perfect Storm is Brewing in Ontario and Requires Strategic Investments

Aging infrastructure and under resourced flood management programs within Conservation Authorities are not keeping pace with the current and predicted escalation of extreme weather events, creating a 'perfect storm' in Ontario that will have costly and devastating results for people, businesses, and all levels of government.



Looking at the last two significant rain events in Calgary and Toronto, the Province of Alberta estimates that damage from the Calgary incident is over \$5 billion and the Insurance Bureau of Canada estimates damage in Toronto at \$850 million. The costs of these singular events are not going to be easily addressed by either residents or government – escalating multiple events could be crippling.

Strategic investments in infrastructure and flood programs are required in both the short and long term, and can build off current successful approaches thereby mitigating or reducing costly and devastating impacts in a cost effective manner. Specifically, Conservation Authorities have identified the following needs:

- **\$24.8 million (one time): Update floodplain mapping;**
- **\$50.7 million /annually: Ongoing Flood Management Operations costs including monitoring, regulation, facility operations, watershed planning and technical studies in support of emergency management, resourcing, and infrastructure asset management;**
- **\$ 27 million / annually: Existing flood and erosion control infrastructure;**
- **Access to the new northern and rural municipal infrastructure funding program in development; and**
- **Ongoing policy and program funding support for Green Infrastructure (including low impact development), stormwater management, and watershed stewardship which**

reduce runoff, improve water quality, protect water supply, and build watershed resilience.

This 2013 *Business Case for Strategic Investments in Ontario's Flood Management Program and Services* outlines how we approach flood management today in Ontario and proposes how we can address and improve all aspects of flooding in order to prevent millions of dollars in damages, potentially significant civil liability³, and loss of life.

Leveraging the expertise and assets of Conservation Authorities will enable all levels of government to be cost effective and targeted in their approach.

Flood Management Today in Ontario

Conservation Authorities and the Ministry of Natural Resource (MNR) district offices are responsible at the local level to forecast floods, issue flood warnings, operate flood control structures, and provide technical advice and support to municipal emergency responders.

Some examples of specific Conservation Authority roles and responsibilities around flood management include:

- Stream flow, rainfall and snow pack monitoring;
- Modeling and forecasting of floods, issuing flood warnings;
- Contributing to municipal emergency planning and preparedness activities;
- Providing planning support and advice to municipalities to minimize flood impacts;
- Acquiring selected flood plain lands and flood vulnerable structures;
- Informing and educating the public on flooding.

In addition, Conservation Authorities also protect important natural heritage features such as wetlands and forests which help to control flooding by storing or slowing flood waters.

Municipalities are responsible for the development of local emergency plans with respect to floods. Once notified, if necessary, municipalities deploy their local emergency plan, possibly even declaring a flood emergency.

Together with Conservation Authorities, MNR operates and maintains a Provincial Warning System to alert municipalities of potential meteorological events that could create a flood hazard. They also provide assistance to local and regional municipalities when municipal

³ Zizzo and Kocherga. 2013

resources are no longer adequate. If Provincial resources are exceeded, assistance can be provided by the Federal government.

Conservation Authorities are members of the *Provincial Flood Forecasting and Warning Committee* which also includes provincial and federal representatives. The Committee reviews operation issues and hosts an annual workshop to transfer technology, train practitioners, and create networking opportunities. The Committee developed and regularly updates the Provincial Flood Forecasting and Warning Guidelines as well as makes recommendations back to the Province.

Restricting Development in Flood Prone Areas Protects People and Prevents Costly Property and Infrastructure Damages

Conservation Authorities have delegated responsibilities to represent Provincial interests regarding natural hazards encompassed in Section 3.1 of the *Provincial Policy Statement, 2005*. This includes floodplain management, hazardous slopes, Great Lakes shorelines, and unstable soils and erosion. In accordance with the *Conservation Authorities Act (1946)*, Conservation



Source: Toronto & Region Conservation Authority

Authorities regulate development and activities in, or adjacent to river or stream valleys, Great Lakes, and large inland lakes shorelines, watercourses, hazards lands, and wetlands.

This program of planning and regulations helps to reduce potential disruption to people, and to protect the environment from flooding and erosion

The effectiveness of this approach is indisputable. More than 75 per cent of

development on urban flood plains occurred prior to implementation of land use regulations and limited encroachment has occurred since then.⁴ For example, in an effort to avoid vulnerable development in flood prone areas, 13,400 hectares (32,000 acres) of floodplain lands have been acquired in the Toronto region.⁵

⁴ A. Kumar, I. Burton, D. Etkin, 2001.

⁵ Toronto and Region Conservation Authority

In terms of structural responsibilities, Conservation Authorities operate over 900 dams, dykes, channels and erosion control structures along rivers and shorelines with a replacement value of 2.7 billion⁶.

The combination of structural and non-structural measures used by Conservation Authorities, the Ministry of Natural Resources, and municipalities represents best practice as advocated by proponents of an integrated approach to flood management. For this reason, existing programs to manage floods and regulate floodplains have been extremely effective.

Flood Messages Save Lives and Protect Property

Flood response in Ontario involves issuing warnings before a flood event is imminent, operating flood control structures, and liaising with municipal emergency management services as flooding occurs.

Notifications and flood messages are the first steps in flood response. The decision to issue warnings is based on data for stream flow, weather conditions, snow accumulation, and soil moisture conditions. There are three warning levels. A *Flood Outlook Statement* is an early notice of the potential for flooding. A *Flood Advisory* warns municipalities that flooding is possible within specific flood prone areas. A *Flood Warning* is issued where flooding is imminent or already occurring in specific watercourses or municipalities.

Once a Flood Warning is issued and flooding is occurring the Authority establishes a Flood Watch Center and staff begin the task of working with the emergency responders to provide constant updates on weather and flood conditions. Flood management personnel also closely monitor the operation of flood control structures to minimize the impact of flooding to the local communities. The Flood Watch Center is maintained until the flooding has subsided and is no longer deemed a threat.



NORMAL:
Conditions are within NORMAL limits. No flooding is expected.

WATER SAFETY STATEMENT:
High flows, unsafe banks, melting ice or other factors could be dangerous. Flooding is not expected

FLOOD OUTLOOK STATEMENT:
Early notice of the potential for flooding based on weather forecasts calling for heavy rain, snow melt, high wind or other conditions that could lead to high runoff, cause ice jams, lakeshore flooding or erosion.

FLOOD ADVISORY:
Flooding is possible in specific watercourses or municipalities. Municipalities, emergency services and individual landowners in flood-prone areas should prepare.

FLOOD WARNING:
Flooding is imminent or already occurring in specific watercourses or municipalities. Municipalities and individuals should take action to deal with flood conditions. This may include road closures and evacuations.

⁶ Conservation Ontario. 2009.

The Need for Hazard and Emergency Management

There is increasing evidence that the frequency and severity of floods have changed and are getting worse. The Ontario government's *Climate Ready: Adaptation Strategy and Action Plan 2011 - 2014* identified changing weather patterns that include:

- More extreme precipitation events (rainfall and snow),
- Year round flood season, and
- Increased storm runoff from more intense and frequent rainfall.

In its 2012 report, *Telling the Weather Story*, the Insurance Bureau of Canada (IBC) states that "Future trends in the frequency and severity of extreme weather will have a significant impact on the ability of individuals, governments and insurance companies to prepare for future catastrophic events".⁷

As part of their hazard management programs, Conservation Authorities in Ontario monitor and report on the intensity of storm events that are characterized by the frequency in which they return, measured in years. For example, a 100 year storm is expected on average to occur no more than once every hundred years. What they are actually finding is that large storm events are occurring far more frequently than the 100 year return period.

For example, the community of Peterborough had two storm events within a two year period (2002 and 2004) which either met or exceeded the current 100 year return period.



Figure 2: July 2004 Peterborough Flood (Source: City of Peterborough)

⁷ Institute for Catastrophic Loss Reduction and the Insurance Bureau of Canada, 2012

And most recently the City of Toronto also experienced significant flood events exceeding the 100 year return period within an eight year period (2005 and 2013). These observations along with a five to tenfold increase in the number of flooding advisories and warnings issued by Conservation Authorities in the last five year period provide the evidence that the risk of flooding has increased.

What this shows us is that the risk of events is being underestimated. Updated methods are needed to assess both the current risk and the potential increased risk in the future under climate change.

Preventative Actions Avoid the Higher Costs of Doing Nothing



Figure 3: Raymore Drive and the Humber River during Hurricane Hazel. (Source: Toronto & Region Conservation)

Ontario's Conservation Authorities learned two simple but important lessons from the devastating 1954 Hurricane Hazel flood that helped shape our flood management programs today: we need to warn people of impending floods to safeguard lives, and we need to avoid building in floodplains in the first place.

Traditionally, engineered solutions or structures such as dams, dykes, and diversions have been used to control flooding in existing developed areas and while necessary to protect residents and mitigate flood damages, they are expensive to construct, have perpetual long term maintenance costs and have the potential to fail resulting in catastrophic loss.

Preventing flooding rather than responding to flooding is more cost effective and significantly diminishes the impact of flood events by safeguarding our communities and keeping people out of harm's way⁸. While there is no way to estimate the numbers of lives saved, in 2009 Conservation Ontario estimated that the flood management programs delivered by Conservation Authorities prevent well over \$100 million in annual flood damages.⁹

⁸ Environment Canada <http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=0365F5C2-1>

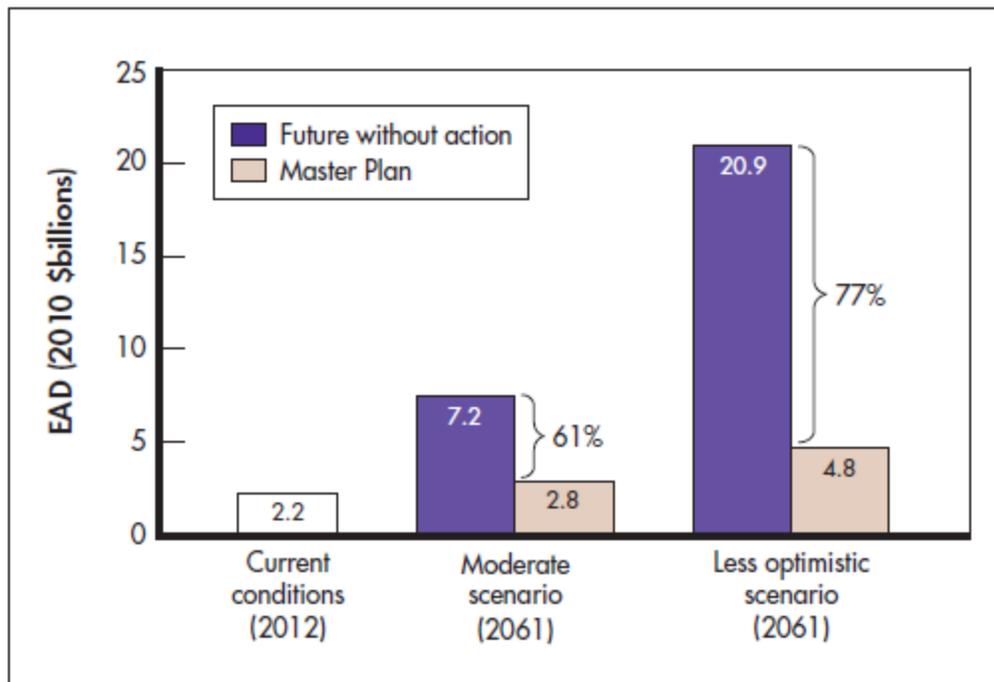
⁹ *Protecting People and Property: A Business Case for Investing In Flood Prevention and Control* (2009) Conservation Ontario

U.S. State of Louisiana Provides Relevant Example

A recently released study by a U.S. non-profit, RAND Corporation, estimates that it will cost \$50 billion over 50 years to protect Louisiana from the next large storm and rising sea levels. It is estimated that doing nothing will cost between \$7 billion and \$21 billion *per year* five decades from now.¹⁰

RAND Corporation developed a Master Plan that looked at the cost of different risk reduction strategies and restoration projects as well as the cost of doing nothing. The Planning Tool was used to identify a final alternative that struck an acceptable balance of investments across different types of projects, coastal regions, near-term and long-term risk reduction and land-building benefits, and projected future ecosystem services. Flood-damage results show that storm-surge flood damage represents a major threat to coastal Louisiana and that, if no action is taken, this damage can be expected to grow significantly in the future. Louisiana chose an option that relied on preventative measures.

How the Chosen Master Plan Affects Coast-Wide Flood Risk



¹⁰ Groves, David G., Jordan R. Fischbach, Debra Knopman, Christopher Sharon, David R. Johnson, David S. Ortiz, Benjamin P. Bryant, Matthew Hoover and Jordan Ostwald. 2013

Ontario Flood Management Programs Rely On Integrated Approach to Reduce Risk to Flooding

Early flood management programs have evolved over the last decade into a more comprehensive program based on the following five pillars: prevention, mitigation, preparedness, response, and recovery. Within each of these, activities include:

- Planning and regulation
- Flood control structures, flood proofing and flood forecasting & warning systems
- Flood contingency planning, training, public education
- Monitoring and flood messaging, and
- Recovery programs which assess overall damage and conduct post event audits

These activities represent the Conservation Authority model to address flood prevention now and into the future. Referred to as the **five pillars of Emergency Planning and Management** it is an integrated approach which creates internal efficiencies, cost savings and is extremely defensible based on new science and technology.

PILLARS OF EMERGENCY PLANNING				
PREVENTION Prevent effects of floods	MITIGATION Reduce flooding	PREPAREDNESS Develop capacity to respond	RESPONSE Take action during a flood	RECOVERY Deal with flood aftermath
EMERGENCY MANGEMENT ACTIVITY				
Planning and regulation to minimize vulnerabilities (e.g. regulate floodplain land use, education)	Evaluate risks and implement mitigation programs (e.g. flood control structures, flood proofing, flood forecasting & warning systems)	Develop plans for emergency preparedness (e.g. flood contingency planning, partner training, public education)	Implement emergency measures (e.g. monitor storms and stream flows, issue flood warnings)	Help administer relief / recovery programs (e.g. assess overall damage, post audit of flood response)

Not all Conservation Authorities have the ability to deliver this model approach due to a lack of local resources and/or capacity. Conservation Authorities vary in size across Ontario and are supported by budgets that rely heavily on critical municipal levies drawn from the local tax base which range regionally¹¹.

¹¹ Conservation Ontario. 2012

Solutions to Improving Flood Management Programs in Ontario

a) Invest in Updating Floodplain Mapping and Modeling (\$24.8 million – one time)

The foundation of any flood prevention program is floodplain mapping along with the supporting hydrologic and hydraulic modeling used to derive flood flows and delineate flood prone areas. The accuracy of this mapping and modeling is paramount not only because it delineates the flood regulated areas but also because it is utilized for identifying flood mitigation measures, control options, developing effective emergency preparedness plans and emergency response systems.

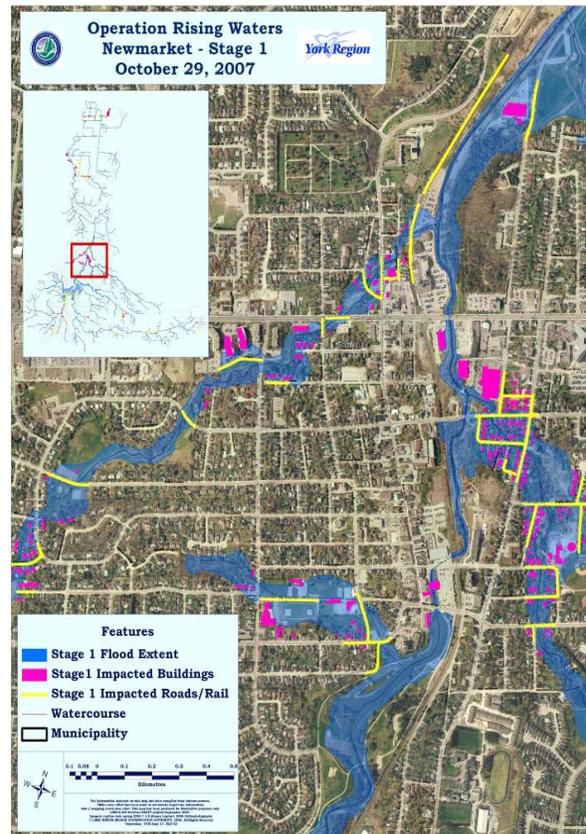
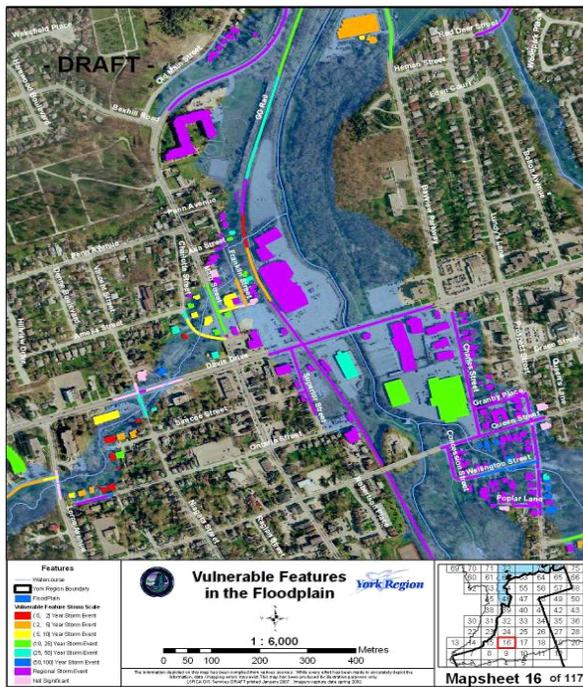


There is a significant added value in integrating the process to derive floodplain mapping into a more holistic emergency management systems approach. The ability to predict when, where and how flooding will impact a community is invaluable in emergency response, helping to save lives and prevent flood damage.

The creation of accurate digital floodplain maps can be used to create inundation maps, depicting how buildings, roads and utilities would be impacted by different flood conditions. This information has been used to develop alternative flood evacuation routes, target flood reduction efforts to minimize disruption and, where possible, relocate utilities out of the flood prone areas. The tool significantly improves flood management response and its effectiveness has been proven in emergency preparedness exercises with municipal partners.

Much of the floodplain mapping used today is, on average, more than 22 years old¹² and in hard copy format.

¹² Conservation Ontario. 2009



Advancements in technology have now reduced the cost to update floodplain mapping. Once floodplain mapping is updated to a digital format, it is easier and more cost effective to maintain going forward. This removes a major barrier to implementing modern emergency and risk management products and tools.

It is essential that the necessary financial resources be allocated to update mapping to a digital standard compatible with current analytical techniques for flood forecasting. Those Conservation Authorities which have been able to produce new mapping have done so with municipal support but many municipalities simply do not have the resources necessary to undertake the work. A cost shared approach is recommended whereby all levels of government would contribute to the task of updating the mapping and creation of an emergency management response system.

The cost to update the current Conservation Authorities floodplain mapping to a standard suitable for effective emergency management and planning is estimated at \$24 million.¹³

¹³ M. Walters and C. Wilkinson, Conservation Ontario 2013.

2) Increase Investments in Flood Management Operations (\$50.7 million / annually)

The Ontario government has traditionally provided funding to Conservation Authorities for operational components of hazard and flood management activities including, in part, the operation of flood and erosion control structures, flood forecasting and warning, the preparation of watershed and technical studies and input into official plans.

Over the years, this funding has significantly declined. A recent analysis indicates that the current funding level provided by the Ministry of Natural Resources of \$7.4 million/year is far short of the total required (*eligible*) expenditures which are \$50.7 million¹⁴, resulting in a significant annual shortfall.

3) Increase Investments to Maintain Flood and Erosion Control Infrastructure and Enable Conservation Authorities to Address New Infrastructure Needs (\$27 million / annually)

Flood relief and control involves building and managing structures to reduce the impact of flooding within communities that were developed within a floodplain prior to the regulations. Not maintaining these flood control structures can directly threaten the safety of people and property in the communities they were designed to protect.

Conservation Authorities' flood management structures have an estimated replacement value of \$2.7 billion. Up until 2012 and 2013, the Ontario government and municipalities have been contributing \$10 million dollars annually to provide ongoing maintenance, repair, and replacement. This represents about 0.4 percent of the total replacement cost of these assets¹⁵. It has been suggested that a target of one percent is more realistic is for the maintenance, repair and replacement of these assets. At one percent the annual budget requirement is \$27 million.

Conservation Authorities recommend additional, multi-year funding to address this need. As well, enabling Conservation Authorities to be eligible for additional funding under the Northern and Rural Municipal Infrastructure program currently in development would provide another funding option for critical flood relief infrastructure. The Conservation Authorities face serious funding challenges to maintain dams and other water and erosion control infrastructure on behalf of the smaller rural and northern municipalities.

¹⁴ This figure (\$50.7 million) is taken from Conservation Ontario's 2009 Flood Business Case

¹⁵ For a two year period (2012-2013 and 2013-2014), the MNR reduced the provincial share of the Water and Erosion Control Infrastructure (WECI) program to \$2.5 million as part of required cost cutting efforts by all provincial ministries.

4) Continue to Invest in Green Infrastructure, Stormwater Management and Watershed Stewardship Activities that Help to Prevent Flooding

Layered on top of the Emergency Planning and Management programs, there are other activities that also contribute significantly to mitigating or reducing the impacts of flood events while at the same time building local watershed resiliency. These include initiatives such as stormwater management, green infrastructure (including LID, wetland protection and restoration), natural heritage systems, and watershed stewardship/conservation best management practices. These are often funded and implemented across various levels of government and are frequently implemented in local partnerships including Conservation Authorities, landowners, all levels of government, or other agencies or corporations.



These activities have multiple benefits and, in addition to assisting with flood prevention, also contribute to meeting other provincial objectives around climate change adaptation, protecting the Great Lakes and biodiversity. A number of current Ontario policies and programs recognize the benefits of these activities and support including:

- *Water Opportunities Act (2010)* – designed to foster stormwater technologies, services and practices in public and private sectors
- Showcasing Water Innovation (2010 – 2014) - \$17 million grant program to support Ontario's *Water Opportunities Act*
- *Climate Ready: Ontario's Adaptation Strategy and Action Plan* – identifies a need for increased resilience of municipal stormwater systems in light of climate change induced alterations to rainfall intensities and storm patterns
- Places to Grow plan for Ontario's Greater Golden Horseshoe region – municipalities are encouraged to implement and support innovative stormwater management actions as part of redevelopment and intensification
- *Lake Simcoe Protection Plan*

- Ontario's Great Lakes Strategy and Canada – Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem; Great Lakes Water Quality Agreement
- Provincial Policy Statement (2012 – Five Year Review)¹⁶

Conservation Authority Activities Currently Supported by Provincial and Federal Governments That Help to Prevent Floods

Ontario Ministry of Environment	<ul style="list-style-type: none"> • Green Infrastructure / Low Impact Development / Stormwater Management • Ontario Drinking Water Stewardship Program • Great Lakes
Ontario Ministry of Natural Resources	<ul style="list-style-type: none"> • Natural Hazards Management • Great Lakes • Water and Erosion Control Infrastructure (WECI)
Ontario Ministry of Public Infrastructure	<ul style="list-style-type: none"> • Water and Erosion Control Infrastructure (WECI)
Ontario Ministry of Municipal Affairs and Housing	<ul style="list-style-type: none"> • Disaster Relief Fund
Ministry of Community Safety & Correctional Services	<ul style="list-style-type: none"> • Emergency Management Ontario • National Disaster Mitigation Strategy
Ontario Ministry of Agriculture & Rural Affairs	<ul style="list-style-type: none"> • Agricultural Best Management Practices and effectiveness, monitoring and modeling
Environment Canada	<ul style="list-style-type: none"> • Great Lakes Sustainability Fund

¹⁶ *Low Impact Development Discussion Paper (2012), ICF Marbek*

Specific Examples of Activities with Multiple Benefits Including Flood Management

Showcasing Water Innovation – Working with the Ministry of the Environment, seven Conservation Authorities deliver innovative stormwater management programs that control both water quality and quantity. Water quantity control not only reduces peak flows but also runoff volumes that can significantly reduce flooding in urban and rural areas.

Ausable Bayfield Conservation Authority has initiated an innovative new water-quality project that will improve knowledge of how agricultural and rural drainage function in a rural landscape. The groundbreaking new model will provide more detailed and precise information on how to manage any stormwater impact during springtime and heavy rainfall events. This increased understanding will guide new stewardship projects designed to effectively reduce and manage run-off.

Credit Valley Conservation Authority is involved in the construction and monitoring of Low Impact Development (LID) projects designed to reduce runoff at the site. By infiltrating the water at the source, urban runoff is reduced, as is the threat of flooding. Monitoring of the sites is being conducted to demonstrate the effectiveness of the LID measures to control water quantity and improve water quality.

Ganaraska Region Conservation Authority Use and evaluate new and more efficient technologies to measure and analyze information for predicting and assessing flooding and erosion in urban and rural areas. The new technologies will provide high-quality topographic data to support sustainable water-management practices.

Kawartha Lakes Conservation Authority is demonstrating the use of floating wetland technology that improves stormwater effluent and water quality in the Kawartha Lakes. The project takes research at the Centre for Alternative Wastewater Treatment to the next level by applying it in community settings.

Lake Simcoe Region Conservation Authority is comparing the efficiency and efficacy of innovative technology approaches for managing stormwater to decrease the level of phosphorus in Lake Simcoe. Three existing stormwater management facilities in three separate communities in the Lake Simcoe watershed will be retrofitted and upgraded with technologies that have not yet been tested or proven.

Toronto Region Conservation Authority is demonstrating leading-edge stormwater, rainwater-harvesting and water-conserving technologies and practices. Effectiveness monitoring and evaluations, both technical and financial, will be completed for each demonstration project. These results will provide the critical information needed to

promote the green infrastructure transformation within the building industry, municipalities and the general public.

Upper Thames River Conservation Authority is researching, analyzing, modeling and acquiring data related to water quality and flooding issues from climate change in the Thames River watershed. The project includes redesigning and testing rural best management practices to reduce nutrient discharges into the Thames River.

Summary

Addressing escalating damage costs and personal losses as a result of more frequent and stronger flood events should be a serious priority for all levels of government and it should be tackled through ongoing and additional support for both structural and non structural flood measures. All levels of government and the Conservation Authorities share potentially increasing levels of liability associated with flood events. And although we have enjoyed relative success to date, we have reached a point where we need to immediately address gaps in floodplain management programs, flood operations and aging infrastructure.

It should not be forgotten that flooding also presents a significant threat to water quality and resilient ecosystems across Ontario's watersheds, creating the need for increased and ongoing restoration and remediation. Supporting green infrastructure and watershed stewardship on the ground in collaborations with private and public sectors will help us to keep water on the landscape, reducing the costly impacts of damaging and contaminated runoff.

Acting on behalf of the Province and other levels of government, Conservation Authorities are the front line agencies in flood management. Maintaining a consistent level of protection requires investment. **Conservation Authorities need to be adequately funded, staffed and provided with the tools to meet their responsibilities.** This can be achieved through individual Conservation Authority investments and/or collaborative efforts among Conservation Authorities. A reinvestment of resources is required from all levels of government and possibly even private partners to sustain past accomplishments and respond to emerging threats.

Climate change and rapid urbanization will continue to challenge us in the future.

Doing nothing to address the development of this 'perfect storm' will be a very expensive option if not today, then not too far from today.

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