

---

**For Information**

---

**REPORT TITLE:**     **State of Stormwater Management in Peel Region**

**FROM:**             Gary Kent, CPA, CGA, ICD.D, Chief Financial Officer and Commissioner  
of Corporate Services

---

**OBJECTIVE**

To provide an overview of how the Region of Peel and other jurisdictions are addressing climate change as it relates to stormwater management ponds and low impact development.

**REPORT HIGHLIGHTS**

- Regional Council has requested staff to report back on climate change best practices as they relate to the stormwater management ponds and low impact development (Resolution 2019-971).
  - The recent United Nation’s Intergovernmental Panel on Climate Change 6<sup>th</sup> Working Group Report has reiterated, with greater certainty, that climate change is happening and is happening faster than previously understood.
  - Insurance Bureau of Canada acknowledges that flooding is the most widespread and costly natural disaster across Canada and is causing economic losses, mental/psycho-social stress, and in some cases, fatalities.
  - There is general consistency in how the Region of Peel, Area Municipalities and Conservation Authorities are managing stormwater.
  - The Region of Peel, Area Municipalities, and Conservation Authorities have stormwater mechanisms that are considered best practices, though there are still best practices outside of Peel that can be looked to and implemented.
- 

**DISCUSSION**

**1. Background**

The United Nation’s Intergovernmental Panel on Climate Change (IPPC) recently released its Working Group Report, which presented the updated science to inform the upcoming 6<sup>th</sup> Assessment Report (2022 release date). The IPCC report has reiterated, with greater certainty, that climate change is happening and is happening faster than previously understood. Municipalities, like the Region of Peel, will continue to be exposed to rising temperatures and increasing frequency and severity of extreme weather (ex. flooding).

The Insurance Bureau of Canada recently acknowledged that these weather events pose a serious risk to cities across Canada. As stated above, these events are growing in frequency and intensity, causing an impact in terms of insurance claims, economic losses mental/psycho-social stress, and in some cases, fatalities. Although each municipality faces a unique combination of climate change related challenges, flooding has become the most widespread

## **State of Stormwater Management in Peel Region**

and costly natural disaster across Canada (IBC 2019). The Region of Peel and area municipalities are not immune to flood risk amplified by climate change; and pursuing stormwater management best practices is an important way to address peak-flow, conveyance, water retention, erosion, and water quality concerns associated with intense storms and localized flooding.

Increased flooding and other climate change risks threaten the resiliency of critical infrastructure (CI) that the Region and area municipalities are increasingly dependent on including, information and telecommunications, energy, transportation, banking and finance, and emergency services. A localized flood could result in the disruption of service or failure of CI causing a cascading disruption or failures in interdependent infrastructure, resulting in significant impacts within a community.

In addition to exacerbating flooding, climate change is altering rainfall patterns, which may increase erosion of stream and riverbanks. Additionally, rising temperatures can worsen water quality in ponds, streams and lakes, and impact the ecosystems they support.

Large scale, rapid action is needed now to reduce greenhouse gas emissions, and at the same time, investment is needed by municipalities to adapt and be prepared for the unavoidable and worsening climate impacts.

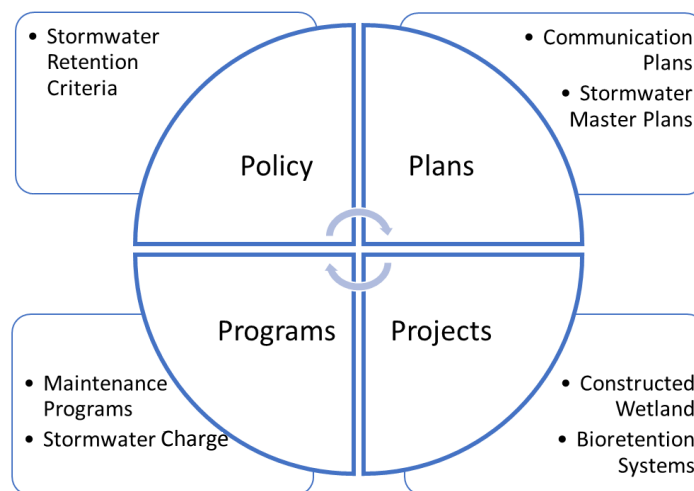
Regional Council has recognized the important connection between climate change and stormwater management as a mechanism to help reduce the impact of more frequent and severe storms that can lead to localized flooding and water quality concerns. This report is in response to Council's request for more information on how other jurisdictions are addressing climate change as it relates to stormwater management ponds and low impact development (LID) (Resolution 2019-971). The report will also provide a description of the stormwater management approaches currently in-place at the Region of Peel, Area Municipalities and Conservation Authorities and how climate change is being considered.

### **Mechanisms for Stormwater Management**

Municipalities recognize the threat of climate change to their communities as an amplifier of extreme storms and localized flooding. The Region of Peel, Area Municipalities, and Conservation Authorities are among those proactively responding to this threat; both leading and learning. The Area Municipalities are responsible for the majority of stormwater management infrastructure in Peel, though the Region of Peel and Conservation Authority stormwater management infrastructure provide important functions. Effective stormwater management is delivered through four main mechanisms: (1) Policy; (2) Plans; (3) Programs; and (4) Projects, all having various management activities (Figure 1). These mechanisms and activities are used in the next section to review, with a climate change lens, the current state of stormwater management in Peel and other jurisdictions.

## State of Stormwater Management in Peel Region

Figure 1: Mechanisms and Activities for Municipal Stormwater Management:



## 2. Findings

### a) Stormwater Management in Peel

In response to Council's enquiry, staff responsible for stormwater management within the member organizations of the Peel Climate Change Partnership (Region of Peel, City of Brampton, City of Mississauga, Town of Caledon, Credit Valley Conservation, Toronto Region Conservation Authority) were surveyed on the status of activities related to stormwater management and climate change. Respondents were asked to include examples of stormwater management best practice internal and external to Peel Region. These results were used to identify common stormwater management approaches and inform future opportunities to improve.

The following are key findings from the survey (additional details can be found in Appendix I: Stormwater Management Survey Results):

- City of Brampton, City of Mississauga, Credit Valley Conservation, and Toronto Region Conservation Authority have stormwater management communication plans emphasizing outreach to external audiences.
- City of Brampton and City of Mississauga have a stormwater charge that funds stormwater management initiatives.
- Stormwater management pond maintenance programs have been established in all Peel municipalities.
- The Region of Peel's Stormwater Master Plan has accounted for climate change, remaining Stormwater Master Plans are being updated to account for climate change.
- The Conservation Authorities are assisting all Peel municipalities with the development of LID maintenance programs.

### b) Stormwater Management Best Practices

As the climate continues to change and extreme weather increases in severity and frequency, municipal and conservation authority stormwater management professionals continue to assess, enhance and adapt the practices. Information sharing is occurring

## State of Stormwater Management in Peel Region

between the Region of Peel, Area Municipalities and Conservation Authorities and with jurisdictions outside of Peel.

The Region of Peel, Area Municipalities, and Conservation Authorities have stormwater mechanisms that are considered best practice, though there are some best practices outside of Peel that can be looked to and implemented. The following are a sample of stormwater management best practices inside and outside Peel.

### i) Policy, Plans and Programs - Inside Peel

- **Stormwater Design Criteria (Region of Peel)**

The Region has pro-actively adopted the stormwater management criteria proposed in the anticipated Ontario Ministry of the Environment, Conservation and Parks' *Low Impact Development Stormwater Management Guidance Manual*. The Region of Peel updated Stormwater Design Criteria will be applied to the Region's stormwater infrastructure. The Region has also updated its rainfall intensity-duration-frequency curves to better account for changing precipitation patterns with climate change.

- **Green Development Standard Stormwater Management Scan (Credit Valley Conservation)**

Credit Valley Conservation saw the need for more holistic green development standards and completed a *Green Development Standard Stormwater Management Scan*. The Scan assessed how others are incorporating stormwater resilience into green development standards. This work can inform the green development standards being developed within area municipalities.

### ii) Policy, Plans and Programs - Outside Peel

- **Comprehensive Stormwater Program (City of Kitchener)**

The City of Kitchener's proactive holistic approach to stormwater management allows them to be less reactive following a stormwater event. The program includes the following (1) comprehensive maintenance through routine and lifecycle practices; (2) retrofitting older urban areas that lack stormwater management; (3) comprehensive treatment train approach to stormwater management in new development; and (4) communication plan that includes grading the City's performance in meeting their goals.

- **GreenForce TO (City of Toronto)**

The City of Toronto is employing social-innovation to build a new, green workforce through its GreenForceTO program. The focus of this program is to fill capacity gaps by training local individuals, who are facing barriers to employment within the community. This training includes building the skills to maintain various sustainability initiatives, like municipal LID infrastructure.

### iii) Projects - Inside Peel

- **Bioretention Retrofit Projects (City of Brampton & City of Mississauga)**

The City of Brampton and City of Mississauga are diversifying their approach to stormwater management to include mechanisms like bioretention. Portions

## State of Stormwater Management in Peel Region

of stormwater runoff from Haggert Avenue (Brampton) and Elm Drive (Mississauga) are now being managed through bioretention practices retrofitted within the right-of-way. These practices use trees and other vegetation to help capture pollutants like sediment from the runoff, reduce the quantity of runoff through infiltration and plant uptake, and slow remaining runoff before it filters or overflows into the storm sewer. These bioretention solutions help make the cities' respective storm sewer systems more resilient to climate change impacts, while also increasing the urban tree canopy and shade for cyclists. These projects demonstrate how stormwater management can be retrofitted into existing systems and road networks.

- **Constructed Wetland (Caledon) (In Progress)**  
The Town of Caledon is exploring ways that stormwater mechanisms can mimic the appearance and function of a natural wetland. Two stormwater management facilities constructed in the 1990s for the purpose of flood control are being upgraded to modern facilities called a 'constructed wetland.' The constructed wetland will provide an improved level of service for the community by delivering the fuller suite of stormwater management services of water quality, quantity, and erosion control.

### iv) Projects - Outside Peel

- **Toronto Stormwater Tree Trenches (City of Toronto)**  
The City of Toronto has been a strong advocate for the onsite management of stormwater. This is exemplified through the newly reconstructed Six Point Interchange in Toronto includes the planting of 300 trees in specialized 'soil cells,' as part of a LID practice often referred to as Stormwater Tree Trenches. These stormwater tree trenches enhance urban tree health and canopy by providing additional soil volume and protection of tree roots from compaction by hard surfaces like sidewalks and roadways, while helping manage the majority of the stormwater quantity and quality in the catchment area. Similar work has been completed along a portion of The Queensway in Etobicoke and is achieving similar beneficial outcomes.
- **Meadows in the Glen Low-Impact Development Subdivision (Halton Hills)**  
The Town of Halton Hills recognized that future greenfield development will need to include LID features in a comprehensive stormwater management system. The Meadows in the Glen Subdivision located in the Hamlet of Glen Williams in the Town of Halton Hills is a greenfield LID subdivision. The site includes a number of LID measures including narrower road widths, porous pavement, street swales, bioretention, soakaway pits, preservation of forests, and water and energy conservation measures. These practices help improve the subdivision's climate change resiliency and reduce the environmental impact of its residents.

## 3. Next Steps and Future Opportunities

The Region of Peel is committed to the delivery and continuous improvement of stormwater management services for its residents and businesses while protecting and enhancing the

## **State of Stormwater Management in Peel Region**

environment, including responding to a changing climate. The following are some of the next steps Regional staff are taking:

- Inventory Green Infrastructure assets (i.e., permeable pavement, green roofs, natural assets, etc.) and establish associated Levels of Service, risk management and lifecycle asset management to enable more informed strategic planning and decision making, and compliance with Ontario Regulation 588/17.
- Develop a Climate Change Risk Assessment Tool that will be used to analyze risks to the Region's infrastructure from climate change, identify climate change adaptation strategies and quantify the investment needed to protect the Region's portfolio of assets worth over \$30 billion.
- Implement a Green Infrastructure pilot that will showcase a suite of best-in-class approaches to managing stormwater and adapting the Region's properties to climate change.
- Develop Standard Operating Procedures to effectively inspect and maintain Regional stormwater assets; this will include a 2022 budget request.
- Through new and existing partnership continue working with Peel Area Municipalities and Conservation Authorities to further improve stormwater management while accounting for climate change.

## **FINANCIAL IMPLICATIONS**

Cost of implementing adaptation measures, like stormwater management and LID, at the needed scale, have incremental capital and operational budget implications. Municipal climate change action plans contain direction to implement best in practice stormwater management and LID measures. Funding or financing these plans remain an ongoing pressure and opportunity for joint-funding applications or collective advocacy to upper levels of government.

## **CONCLUSION**

By learning from one another, and employing consistent messaging for collective action or advocacy, municipalities can make much needed progress on climate adaptation. An important start is with the implementation of sound stormwater management that accounts for and compliments the suite of practices available to a municipality. Peel Region, Area Municipalities and Conservation Authorities have begun to take the steps necessary to meet this need, but much more is required and with the impacts of climate change growing stronger, this work cannot be undervalued.

## **APPENDICES**

Appendix I - Stormwater Management Survey Results

Appendix II – Glossary

---

*Authored By: Jeremy Schembri, Manager, Office of Climate Change and Energy Management*