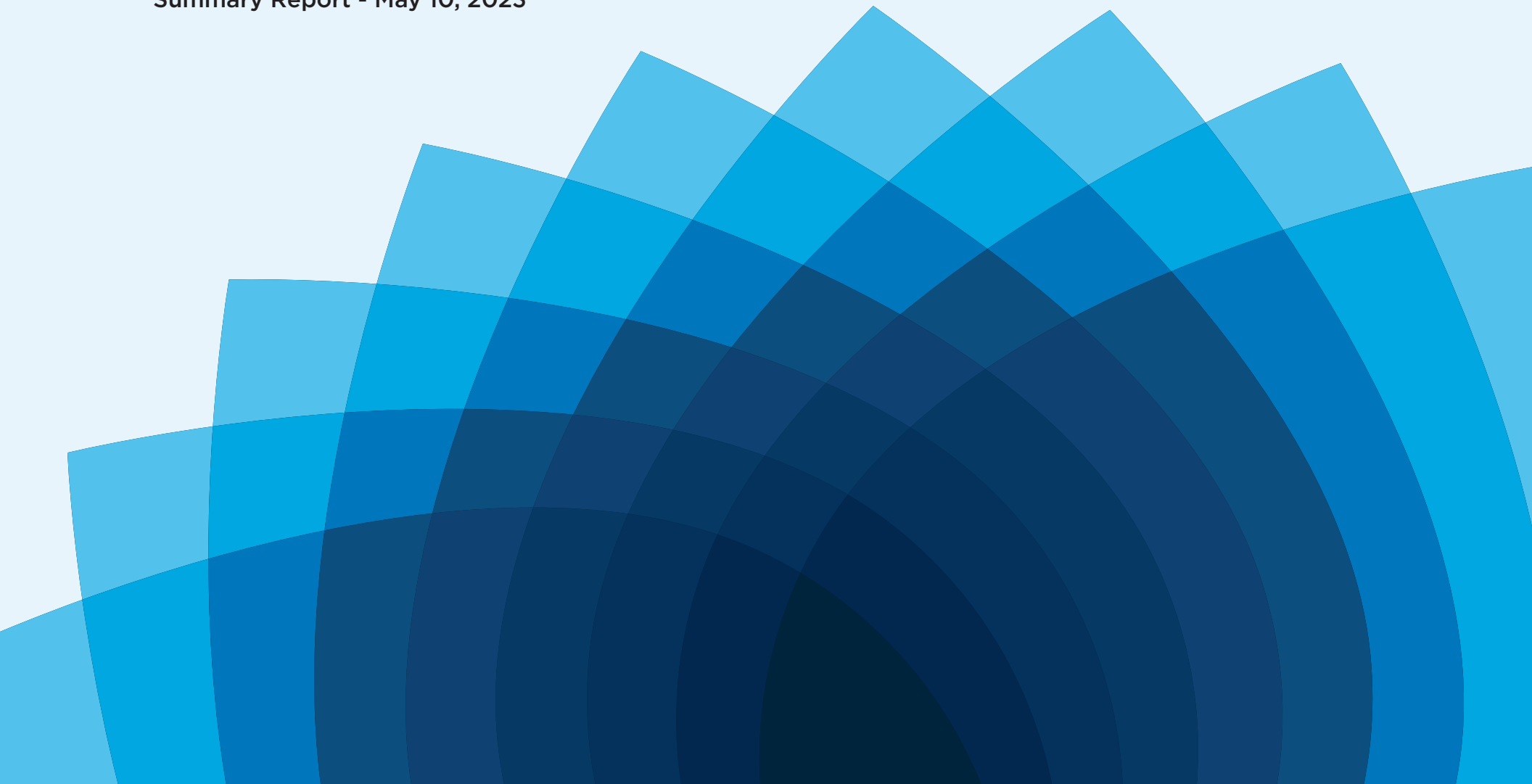
# buildbeautiful

## Stormwater Master Plan

MISSISSAUGA

Summary Report - May 10, 2023



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# Executive Summary

The City of Mississauga is located on the shore of Lake Ontario, part of the largest system of freshwater lakes in the world. Managing the City's stormwater is fundamentally important, as all of the City's rainwater and snowmelt ends up in Lake Ontario, which is the source of the City's drinking water.

***Vision Statement for the Stormwater Master Plan***

***Build value in water resources through collaboration, to protect and enhance the quality of our built and natural environment. Build Beautiful to connect to nature and our communities.***

The City of Mississauga is committed to protecting the quality and integrity of water through each stage of its cycle (i.e., stormwater, drinking water, and wastewater), to provide clean and safe drinking water for current and future generations, to protect the local and global environment, and to mitigate and adapt to a changing climate. Stormwater management is crucial in achieving these goals in order to protect public safety and health, and work to reduce flood risks, control erosion and maintain water quality in local natural waterways.

Build Beautiful, the Stormwater Master Plan, provides a framework of actions to collectively address issues associated with stormwater and guide stormwater management in the City for the immediate and long-term future. The approach is premised on accounting for growth, climate change, and the maintenance of the City's built and natural resources.

In preparing Build Beautiful, the City consulted with stakeholders, community partners and residents to develop a Stormwater Master Plan that reflects the ideas and values of the diverse communities within Mississauga.

To inform the Stormwater Master Plan, the City conducted a review of Mississauga's existing conditions (e.g., creeks, waterways, natural systems, etc.), prepared a checklist of relevant legislation affecting stormwater and environmental management, and undertook a study of best practices being applied in other cities. This research resulted in the identification of recommendations for the City's Stormwater Program and stormwater services, which were categorized into four themes premised on guidance from the public:

- Understand its Nature (Studies)
- Create Solutions (Design & Implementation)
- Protect Quality (Monitoring & Maintenance)
- Celebrate its Value (Engagement & Partnerships)

These four themes form the basis of the framework of actions for the Stormwater Master Plan, which is based on the Adaptive Management Cycle and Asset Management Cycle.

To elaborate, the themes include improving the City's understanding of its systems by studying them, developing solutions to address the study findings, monitoring and maintaining the solutions, and then beginning the cycle once again by completing a study at such a time when updated information is required. Throughout this process, continuous engagement takes place with City partners and the public to communicate updates, receive feedback and celebrate the projects and initiatives within the City.

The Stormwater Master Plan framework is comprised of activities or actions which fall into one of the four theme areas, and includes the following types of activities:

- Plans
- Programs
- Policies
- Partnerships
- Projects

The organizational structure of the Stormwater Master Plan groups the activities into **Existing and Future Actions** and **Core Service Line Enhancements** as follows:

- **Actions** are predominantly standalone stormwater management activities and are comprised of several components that represent the multiple steps required to meet a long-term objective. Actions will be implemented through programs by those departments which focus on stormwater management services.
- **Core Service Lines Enhancements** include activities which are implemented through existing core functions through which the City delivers its services to meet its mandate, and can include a range of departments.

Enhancements related to the delivery of stormwater services were identified for four of the City's Core Service Lines:

- Policies, Guidelines, Regulations
- Development Review
- Capital Program
- City Operating Procedures

The following activity implementation considerations were identified for all **Existing and Future Actions** and **Core Service Line Enhancements**:

- Activity Type
- Timeline
- Priority
- Cost
- Status
- Leading Group
- Supporting Group
- Partnerships

The implementation of the Stormwater Master Plan will include partnerships across internal City Divisions and Departments, as well as with External Stakeholders.

| External Agency Partnerships | Internal City Department / Division Partnerships | |
|---|---|---|
| • Federal<br>• Provincial<br>• Regional<br>• Conservation Authorities<br>• Other (e.g., Universities) | • Forestry<br>• Parks<br>• Works, Operations, and Maintenance<br>• Capital Works | • Facilities and Property Management<br>• Climate Change Team<br>• Planning and Building |

The following table identifies the Existing and Future Actions that form the Stormwater Master Plan.

| Theme | Associated Action |
|---|---|
| **Theme A: Understand Its Nature (Studies)** | A.1 Prepare Dual Drainage Models in Older Neighbourhoods – Existing Action<br>A.2 Map Groundwater (City-wide) – Future Action<br>A.3 Economic Considerations for Environmental Decision-Making Process – Future Action<br>A.4 Pursue System-wide Environmental Compliance Approval – Future Action |
| **Theme B: Create Solutions (Design & Implementation)** | B.1 Strategic Land Acquisition of Flood Vulnerable Lands – Future Action<br>B.2 Low Impact Development Practices for Roads Program – Existing Action<br>B.3 City-Wide Flood Control Retrofit Project – Future Action<br>B.4 Groundwater Management – Existing Action<br>B.5 Cooling Best Management Practices – Future Action |
| **Theme C: Celebrate Its Value (Engagement & Partnerships)** | C.1 Artist in Residence Program – Future Action<br>C.2 Stormwater Outreach – Existing Action<br>C.3 Enhance Stormwater Charge Credit Program – Existing Action |
| **Theme D: Protect Quality (Monitoring & Maintenance)** | D.1 Outfall Monitoring – Existing Action<br>D.2 Pollution Prevention Plans – Existing Action<br>D.3 Asset Management: Watercourses – Existing Action<br>D.4 Asset Management: Storm Sewers– Existing Action<br>D.5 Asset Management: Stormwater Management Facilities – Existing Action<br>D.6 Culvert and Bridge Assessments – Future Action<br>D.7 Integrated Rainfall Monitoring Program – Existing Action<br>D.8 Shoreline Management – Future Action<br>D.9 City-Wide Water Quality Retrofit Program – Existing Action<br>D.10 Open Ditch Management Strategy – Future Action |

# 1.0 Introduction

The City of Mississauga is located on the shore of Lake Ontario, part of the largest system of freshwater lakes in the world. Managing the City's stormwater is fundamentally important, as all of the City's rainwater and snowmelt ends up in Lake Ontario, which is the source of the City's drinking water.

In recent history, drinking water has been seen as a highly valuable resource while wastewater and stormwater have often been considered as waste products to be managed and disposed. The term "One Water" emphasizes that water comes from one source, and that all water (i.e., drinking water, wastewater and stormwater) is a resource to be valued. The City of Mississauga is committed to protecting the quality and integrity of water through each stage of its cycle, to provide clean and safe drinking water for current and future generations, to protect the local and global environment, and to mitigate and adapt to a changing climate.

Stormwater management is crucial in protecting public safety and health, reducing flood risks, controlling erosion, and maintaining water quality in local natural waterways. The City manages stormwater by planning, designing, constructing, operating, and maintaining stormwater assets within municipal roadways, public easements and other City lands.

Some of the current and emerging issues related to stormwater management that have led the City to prepare this Stormwater Master Plan include:

- Climate change is affecting the intensity and frequency of storm events.
- Urban growth and development alter the amount of runoff and pollution.
- Infrastructure such as pipes, culverts, and outfalls have limited life expectancy.
- Stormwater infrastructure must be actively maintained throughout their expected life, including watercourses, storm sewers, catch basins, stormwater ponds, pump stations, culverts, and outfalls.
- Appropriate projects must be proactively planned to address environmental needs and related problems.
- Design standards have changed, and designs of stormwater infrastructure developed under older standards may be inadequate to meet current regulatory requirements.


The Stormwater Master Plan aspires to build on the City's existing stormwater management program of actions based on municipal priorities, current and emerging legislative requirements, and recommend improvements to existing actions and/or additional "new" actions to effectively manage stormwater in Mississauga.

## What is Stormwater?

Stormwater, or rainwater, is the rain and melted snow that flows from properties and drains along streets, ditches, storm drains, and watercourses into Lake Ontario. When rainwater hits the ground or when snow melts, it generates stormwater runoff.

Hard surfaces such as asphalt and concrete generate more stormwater runoff than soft surfaces such as grass. This is because soft surfaces can soak up stormwater whereas hard surfaces cause the water to pool or flow off land more rapidly, increasing the potential to cause flooding and erosion, and increasing water pollution from contaminants.

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# Stormwater Master Plan

## 1.1 Vision

The Vision for the Stormwater Master Plan is based on the One Water principle, which is that all of the City's water comes from one source. Rainwater becomes stormwater, and ends up in Lake Ontario to eventually become drinking water. The One Water principle recognizes the cycle of rainwater, and values it through every stage in its process.

The origin of "Build Beautiful" for the name of the Stormwater Master Plan is based on the concept of 'Build' which signifies a proactive, rather than reactive approach and 'Beautiful' which aspires for the form and function of the projects the City will deliver, and how communities can connect to nature.

The Stormwater Master Plan established Actions and Core Service Lines Enhancements which, in combination, will protect its quality, give it place, celebrate its value and understand its nature.

It strives to improve community resilience, accounting for potentially new community priorities and considerations, some of which are a result of COVID-19. The Vision was also created to acknowledge the influence of core stormwater elements including green infrastructure, climate change, sustainability, and attractive built form, to achieve the goals of Build Beautiful.

***Vision Statement for the Stormwater Master Plan***

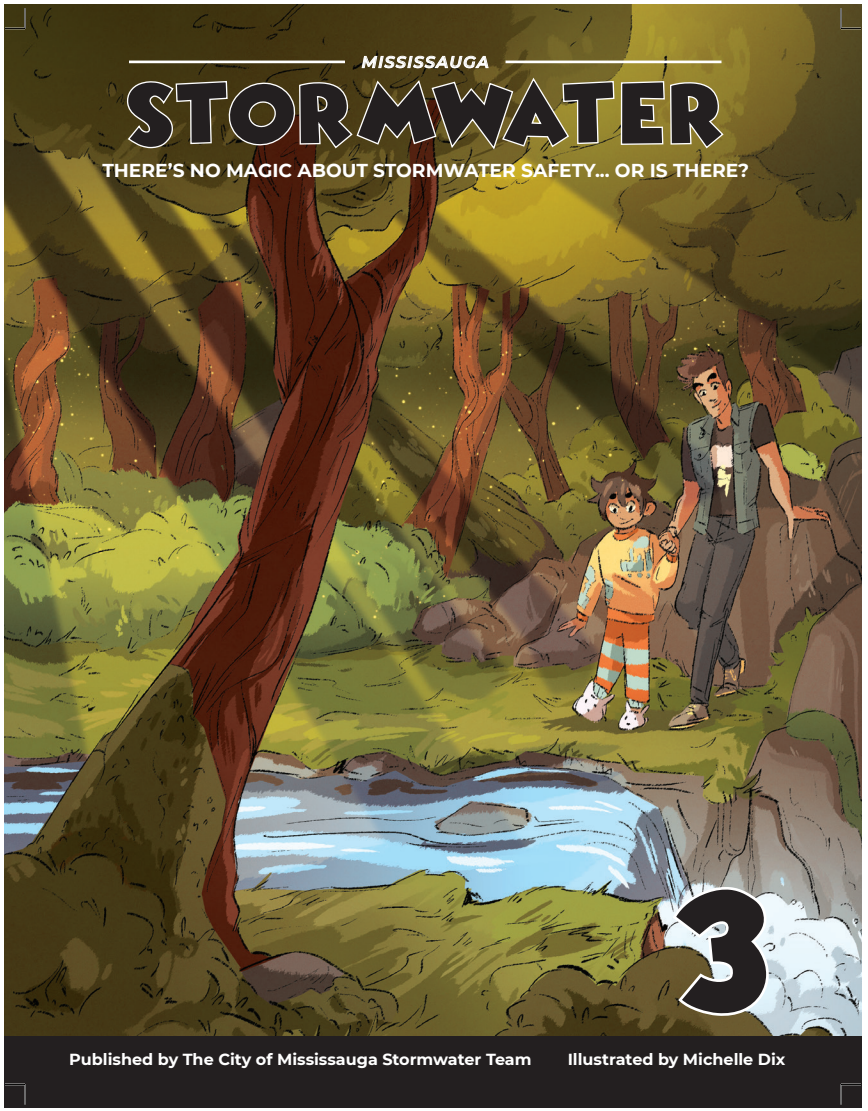
***"Build value in water resources through collaboration, to protect and enhance the quality of our built and natural environment. Build Beautiful to connect to nature and our communities."***

## 1.2 Engagement

The City worked closely with stakeholders, community partners, and residents to develop a Stormwater Master Plan that reflects the ideas and values of the diverse communities within Mississauga.

Consultation occurred through four primary forums:

- Stakeholder Advisory Group, comprised of Region of Peel and Conservation Authority staff, which met at each key milestone of the project to provide strategic direction, consult on existing initiatives, share data, and collaborate on future programs and activities.
- Municipal Staff Technical Consultation with a range of City and Regional departments to develop a clear understanding of existing programs, implementation challenges, and potential future directions for the Stormwater Master Plan.
- Public Consultation throughout the duration of the project, completed virtually as a result of the Covid-19 pandemic, which included:
  - Virtual Open Houses
  - Two Online Surveys
  - Social Media Engagement on Twitter, Facebook and Instagram
  - Project Website and Online Materials
- Environmental Action Committee presentations for feedback from select members of City Council and environmental organizations.
- Indigenous Peoples and Nations engagement.




Stormwater Comic Book Series Published by the City to spread stormwater awareness to the youth of Mississauga.

# 2.0 Mississauga Today

As Mississauga continues to grow and evolve, the City's stormwater system faces more pressure to accommodate increased population and additional stormwater runoff from both greenfield and intensified development, as well as challenges associated with aging infrastructure.

In order to better plan and mitigate these pressures, a complete and current knowledge of the City of Mississauga's existing and future conditions, including built and natural infrastructure is required. This understanding of Mississauga Today provides perspective on the City's population, growth forecast, land use, and climate trends, which were used to influence the development of stormwater action/program priorities, detailed in Section 5.

## 2.2 Existing Conditions

### Land Use

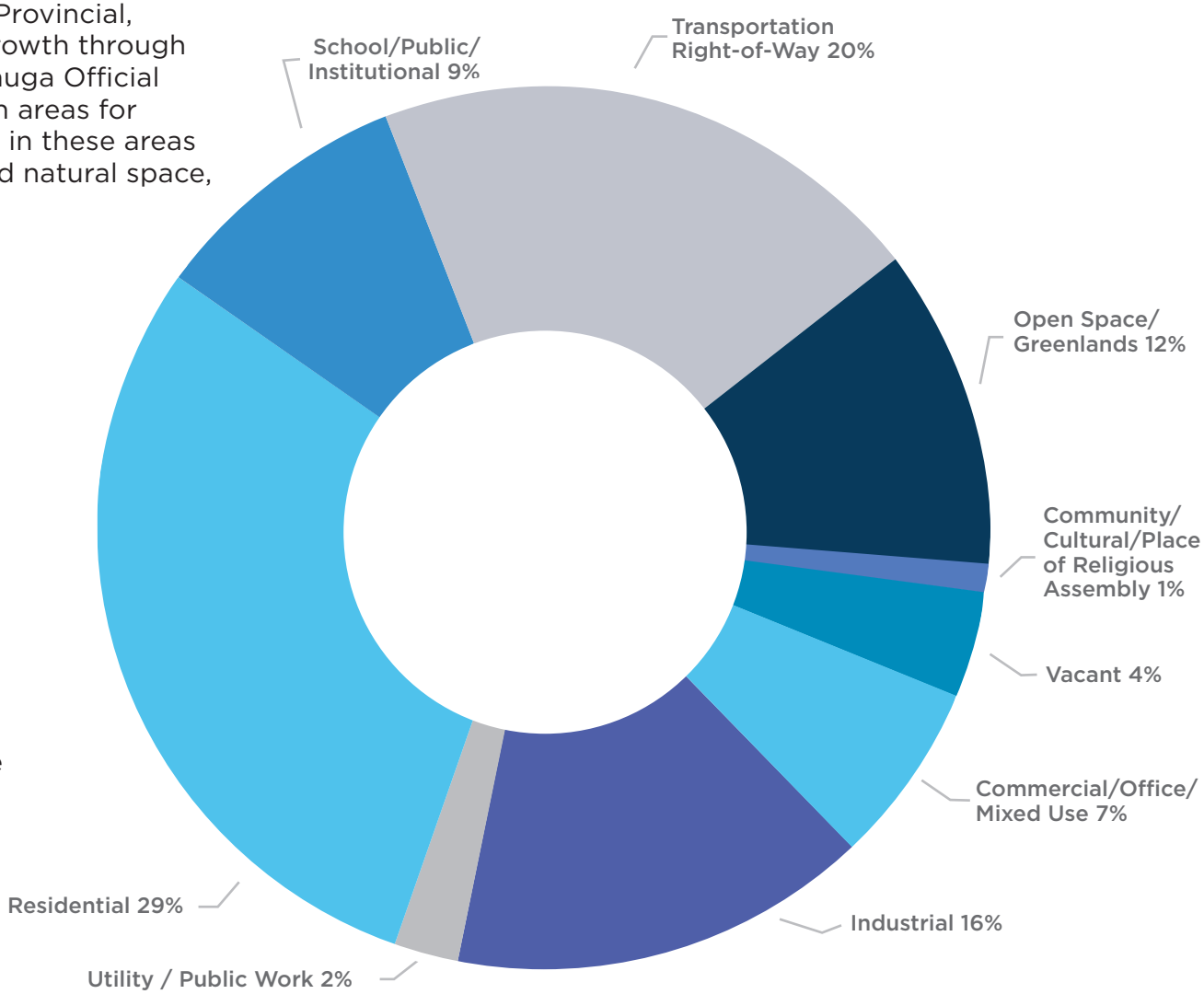
Land use planning is undertaken at the Provincial, Regional and Municipal level to guide growth through urban development. The City of Mississauga Official Plan (2023), identifies key intensification areas for future growth, and designates land uses in these areas as residential, commercial, industrial, and natural space, among others.

### How Does Land Use Influence Stormwater?

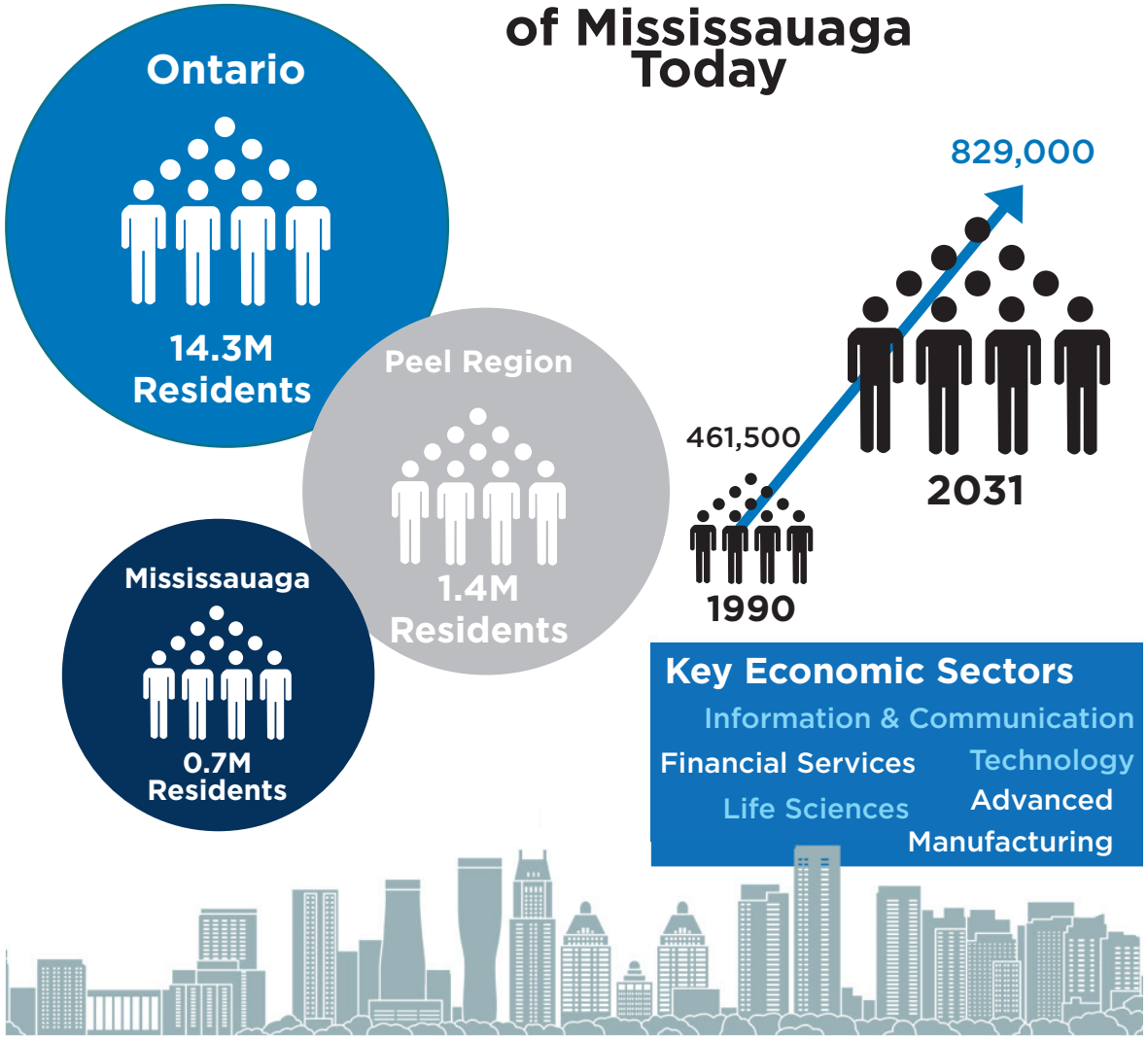
Urban areas, and areas with more hard surfaces such as buildings and pavement, generate more stormwater runoff, as stormwater cannot soak into the natural ground. Stormwater runoff also flows off land more rapidly, increasing the potential to cause flooding and erosion.

Private development and public entities need to systematically plan stormwater management infrastructure based on existing and future land uses and their impervious areas to adequately manage flows, mitigate flood risks and prevent erosion.

**Land Use in Mississauga**



# Snapshot of Mississauaga Today




## Population

The City of Mississauga is Canada's 6th largest city and has a population of 717,961 as identified in the 2021 Census. The City's population was projected to grow to 829,000 by 2031 based on the 2013 Mississauga Council endorsed forecast. In 2022, this projection increased to 852,100 based on growth forecasts approved by Regional Council in 2022.

*Population growth is accompanied by more homes and built infrastructure, which means more hard surfaces and typically an increase in stormwater runoff.*

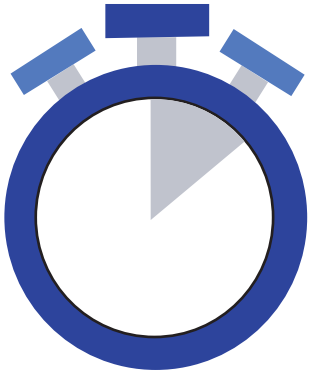
## Climate

The "Climate Trends and Future Projections in the Region of Peel Report" (2016) identified that precipitation will significantly change in the short, medium, and long term in regards to total precipitation, extreme rain events, and consecutive rain events. Extreme rain events are to become more frequent and severe and total precipitation is expected to increase in winter and spring seasons, while summer and fall remain steady or decrease.

### What Does it Mean for Stormwater?

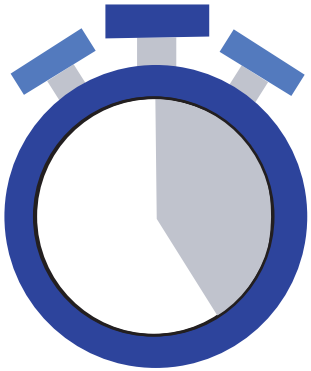
An increase in the amount and number of severe precipitation events means that stormwater systems will require increased capacity to reduce the potential for flooding and erosion in streams.

### Short Term: 2020's



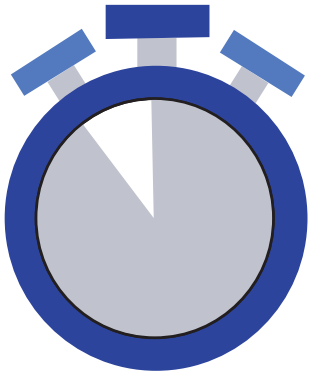
- 1-day and 5-day maximum precipitation amounts expected to increase by 5%.
- Worst 1% of extreme precipitation events are on track to increase by 20%.

### Medium Term: 2050's



- On an annual basis, precipitation is expected to increase by 74 mm.
- 1-day and 5-day maximum precipitation amounts are expected to increase by 8% and 10%.
- Worst 1% and 5% of extreme precipitation events are on track to increase by 51% and 28%.

### Long Term: 2080's



- Annual precipitation is expected to increase by 99 mm.
- 1-day and 5-day maximum precipitation amounts are expected to increase by 22% and 17%,
- The worst 1% and 5% of extreme precipitation events are on track to increase by 90% and 46%.

## 2.2 Watersheds and Storm Drainage Systems

Watersheds, subwatersheds and municipal storm drainage systems are all part of the City's natural and built stormwater system. It is important to understand how each of these systems function, in order to provide tailored management recommendations. Each system is unique and has different considerations for groundwater quality, surface water quality, natural conditions, and land cover, and also faces different challenges related to flooding, erosion, pollution, and degree of urbanization.

The Region of Peel, the City of Mississauga, and the Conservation Authorities with jurisdiction within Mississauga (Credit Valley Conservation, Conservation Halton and Toronto Region Conservation Authority) work together to develop a current and accurate understanding of the City's water resource system though the preparation of Watershed Report Cards, Watershed Plans, Subwatershed Studies, and environmental and water-based studies.

Five major watersheds exist within Mississauga, including the Credit River, Humber River, Etobicoke Creek, Mimico Creek, and Sixteen Mile Creek.

## 2.3 Watersheds and Storm Drainage Systems

The City and its stakeholders undertake a range of projects and programs, and establish partnerships within Mississauga to protect, restore, and maintain the City's natural and built infrastructure systems.

Examples of these projects and programs include:

- Watercourse Assessment & Prioritization Program (City)
- Flood Protection and Remedial Capital Works Program (Toronto and Region Conservation Authority)
- Artist in Residence Program (City)
- Fusion Landscaping (Region of Peel)
- Your Green Yard (Credit Valley Conservation)

### Natural Infrastructure

Natural infrastructure refers to intact or restored systems that deliver infrastructure outcomes and co-benefits for the environment and community, such as watercourses, wetlands, vegetative areas, ponds, shorelines, and lakes.

### Built Infrastructure

Built Infrastructure in the context of stormwater management and flood prevention refers to human-made elements, engineered and constructed measures and systems, such as pipes (sewers), pumping stations, catch basins, culverts, ditches, and detention ponds.

## 2.4 Guiding Stormwater Documents

### Asset Management Plan

The 2021 Asset Management Plan identifies the City's stormwater infrastructure, quantifies its stormwater assets (such as how many kilometres of storm sewers there are in the City), provides an overall condition assessment of stormwater assets, and identifies a replacement value. The City's stormwater infrastructure was valued at $5.3 Billion in 2021.

### Stormwater Financing Study

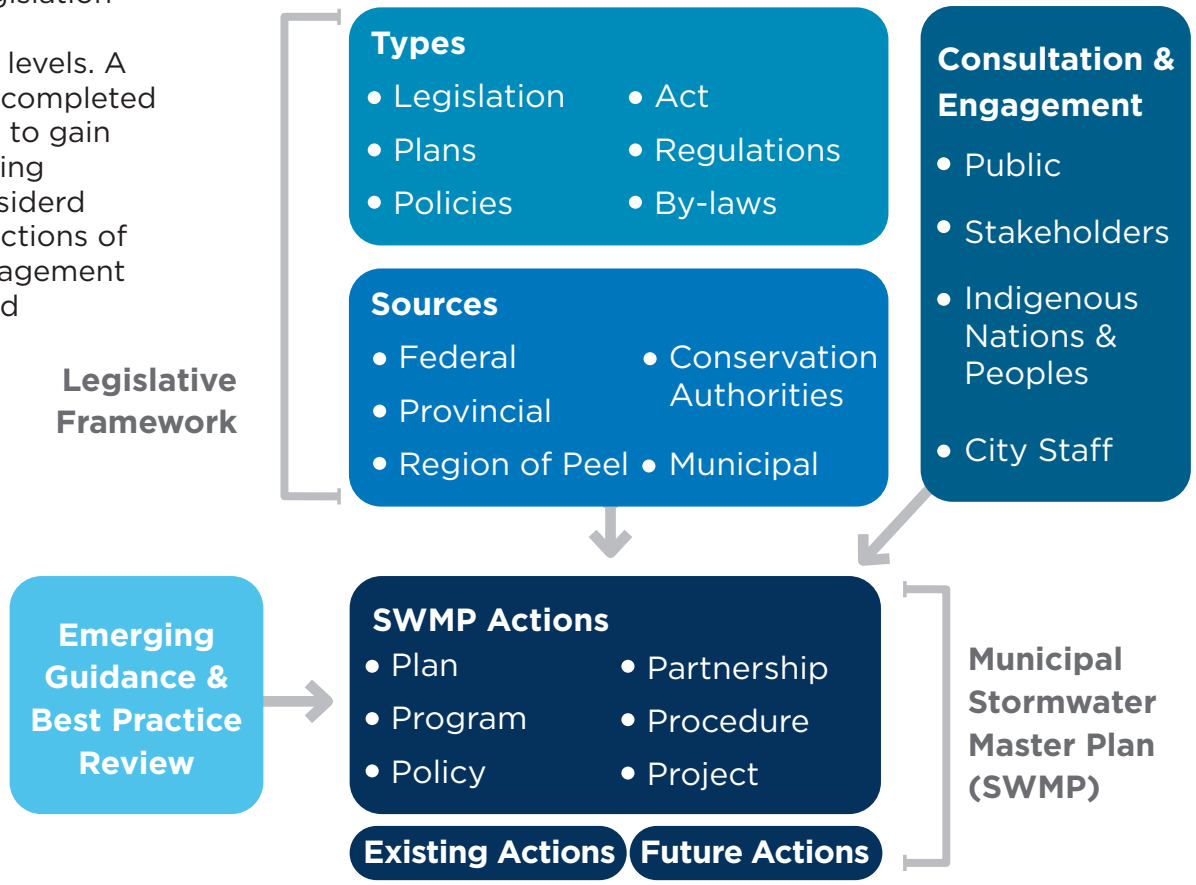
The 2013 Stormwater Financing Study assessed the City's current stormwater program and assets, as well as funding requirements to meet the City's desired levels of service. This study resulted in the establishment of the Stormwater Fees, Charges and Credit program, which provides the City with a direct and equitable funding source to plan, design, construct, operate and maintain, monitor, inspect, renew, and rehabilitate stormwater infrastructure. The City's stormwater operating budget for 2022 is $44.6 Million, increasing to $47.3 Million by 2025.

# 3.0 Legislative Framework

Stormwater management and natural systems protection are guided by extensive legislation and policies at the Federal, Provincial, Municipal and Conservation Authority levels. A comprehensive legislative review was completed as part of the Stormwater Master Plan to gain an understanding of the relevant existing and emerging legislation which is considerd fundamental to guide and direct the actions of the City in delivering stormwater management services and protecting the natural and water-based environment.

A legislative checklist was prepared through this review to:

- Ensure that Mississauga's legislative requirements are being addressed through City actions,
- No gaps exist, and
- Stakeholder needs are being met.



## 3.1 Federal and Provincial Guidance

The process of preparing the legislative checklist included:

- A review of applicable legislation to identify municipal requirements related to stormwater, as the City has legal requirements to meet upper tier guidance.
- A gap analysis of where requirements were not being met, to support actions to address any gaps.
- A review of whether an existing action partially met the requirement, leading to a recommendation to modify the existing action or recommend a new action to fully address the gap.

This resulted in a total of 37 gaps being identified, and accordingly 37 new recommendations.

The following tables provide a list of the legislative, guidance and policy-oriented documents which were reviewed to inform the Stormwater Master Plan.

| Federal Guidance |
|---|
| Achieving a Sustainable Future – A Federal Sustainable Development Strategy (FSDS) for Canada 2019 to 2022 (2019) |
| Canadian Environmental Protection Act (1999) |
| Canadian Fisheries Act (1985) |
| Canadian Environmental Assessment Act (2012) |
| Species at Risk Act (2002) |
| Canadian Navigable Waters Act (1985) |

| Provincial Policy |
|---|
| Provincial Policy Statement (2020) |
| A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019) |
| A Made-in-Ontario Environment Plan (2018) |
| Ontario Building Code (1992) |

| Provincial Legislation | |
|---|---|
| Ontario Water Resources Act (1990) | Municipal Act (2001) |
| Provincial Water Quality Objectives (1994) | Ontario Drainage Act (1990) |
| Ontario Clean Water Act (2006) | Endangered Species Act (2007) |
| Ontario Brownfields Act (2004) | Lakes and Rivers Improvement Act (2019) |
| Ontario Emergency Management Act (2002) | O. Reg. 406/19 On-Site and Excess Soil Management (2019) |
| Ontario Water Opportunities Act (2010) | |

## 3.2 Provincial and Conservation Guidance

The following tables provide a list of additional Provincial guidance and Conservation Authoirty guidance and policy-oriented documents which were reviewed.

| Provincial Agency Guidelines and Requirements |
|---|
| MOE Stormwater Management Planning and Design Manual (2003) |
| Low Impact Development Stormwater Management Guidance Manual (Draft) (2022) |
| MNRF Natural Channel Systems: Adaptive Management of Stream Corridors in Ontario (2001) |
| MNRF Natural Hazards: Technical Guides for Rivers and Stream Systems (2002) |
| Watershed Planning in Ontario (Draft) (2022) |
| MTO Drainage Management Manual (2022) |
| MTO Highway Drainage Standards (2008) |
| MTO Stormwater Management Requirements for Land Development Proposals (2016) |

| Conservation Authority Guidance |
|---|
| Credit Valley Conservation Living by the Lake Action Plan (2018) |
| Credit Valley Conservation Watershed Planning & Regulation Policies (2010) |
| Credit Valley Conservation Stormwater Management Criteria (2012) |
| Credit Valley Conservation Risk and Return on Investment Tool (2019) |
| Toronto and Region Conservation Authority Living City Policies (2014) |
| Toronto and Region Conservation Authority Stormwater Management Criteria (2012) |
| Conservation Halton Land Use Planning Policy (2006) |
| Technical Guidelines for Flood Hazard Mapping (2017) |
| Low Impact Development Stormwater Management Planning and Design Guide (2010) |
| Toronto and Region Conservation Authority Approaches to Manage Regulatory Event Flow Increases Resulting from Urban Development (2016) |

## 3.3 Regional and Municipal Guidance

The following tables provide a list of the Regional and Municipal guidance and policy-oriented documents which were reviewed.

| Regional Guidance |
|---|
| Region of Peel Official Plan (2018) |
| Region of Peel Climate Change Master Plan (2019) |
| Stormwater Servicing Master Plan for Regional Road Infrastructure (2022) |

| Municipal Policies, Plans, and Strategies | |
|---|---|
| Strategic Plan (2009) | Parks and Forestry Master Plan (2019) |
| Action Plan (2009) | Waterfront Parks Strategy (2019) |
| Official Plan (2019) | Natural Heritage and Urban Forestry Strategy (2014) |
| Local Area Plans (2015-2019) | Salt Management Plan (2004) |
| Climate Change Action Plan (2019) | Spills Response Plan (2017) |
| Living Green Master Plan (2012) | Stormwater Quality Control Strategy Update (2012) |

| Municipal Stormwater Guidelines, Regulations and By-laws |
|---|
| Stormwater Fees, Charges and Credit Program (2013) |
| City of Mississauga Development Requirements (2016) |
| Erosion & Sediment Control Guidelines (2019) |
| Green Development Standards (2012) |
| Sewer Use By-Law (2022) |
| Development Charges By-Law (2019) |

# 4.0 Cities & Stormwater

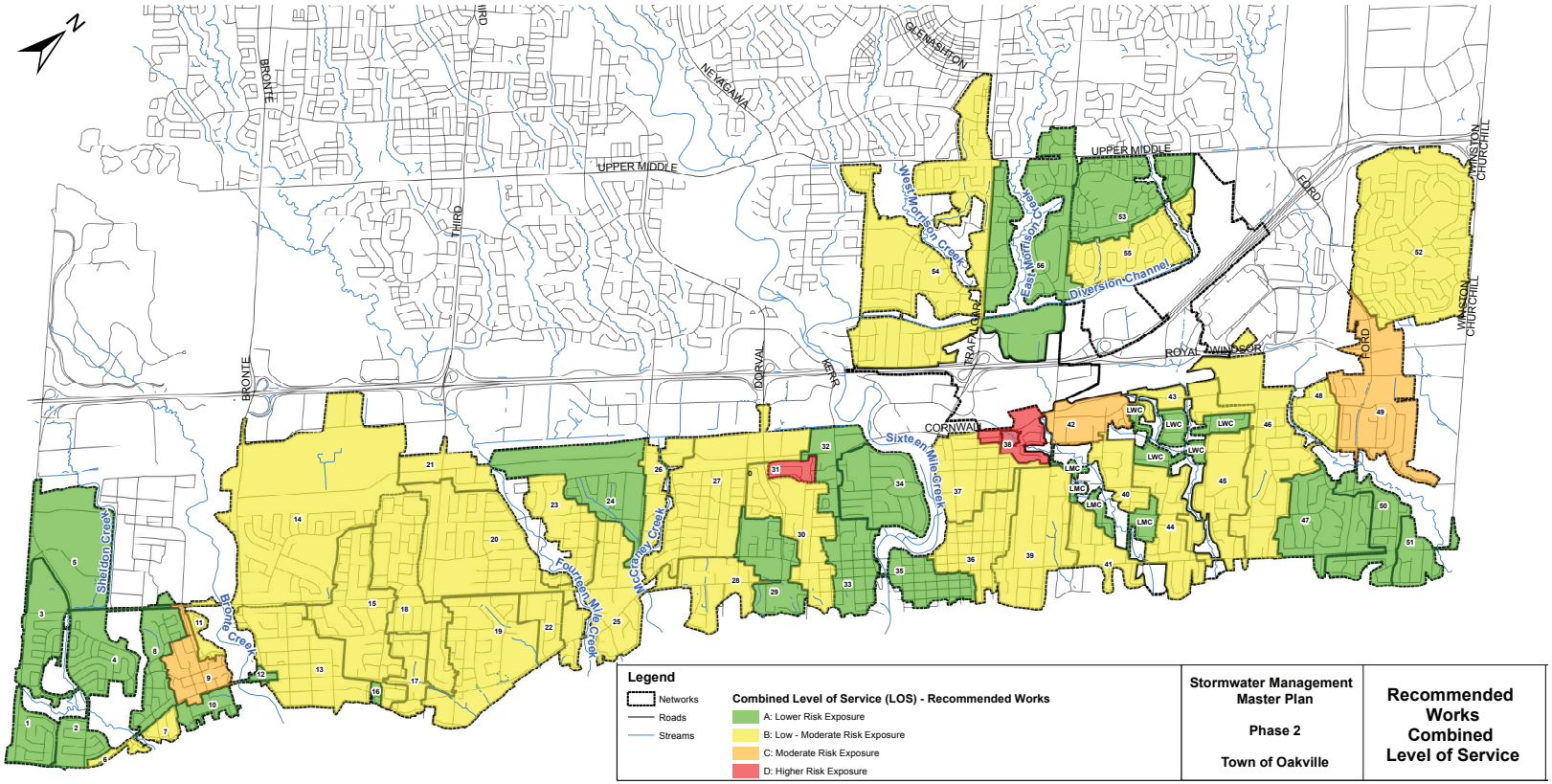
The City completed a review of stormwater management best practices being applied in local, national, and international communities to identify potential new strategies that may be suitable for application in Mississauga. This section lists the various communities from which this industry scan reviewed policies, programs and activities.

## 4.1 Local

### Town of Oakville – Stormwater Management Master Plan (2020)

The Town of Oakville, as part of its Stormwater Management Master Plan, modelled and analyzed its existing urban drainage systems to determine the current Level of Service. Recommendations were then provided to address flooding in each network to enhance the Level of Service, such as through storm sewer upgrades and roadway re-profiling.

| Best Practice Documents Reviewed |
|---|
| **Local** |
| Town of Oakville – Stormwater Master Plan (2020) |
| **National** |
| City of Vancouver – City-wide Rainwater Management Plan (2019) |
| **International** |
| New York City Environmental Protection - Innovative & Integrated Stormwater Management (2017) |



| Best Practice Documents Reviewed |
|---|
| **Local** |
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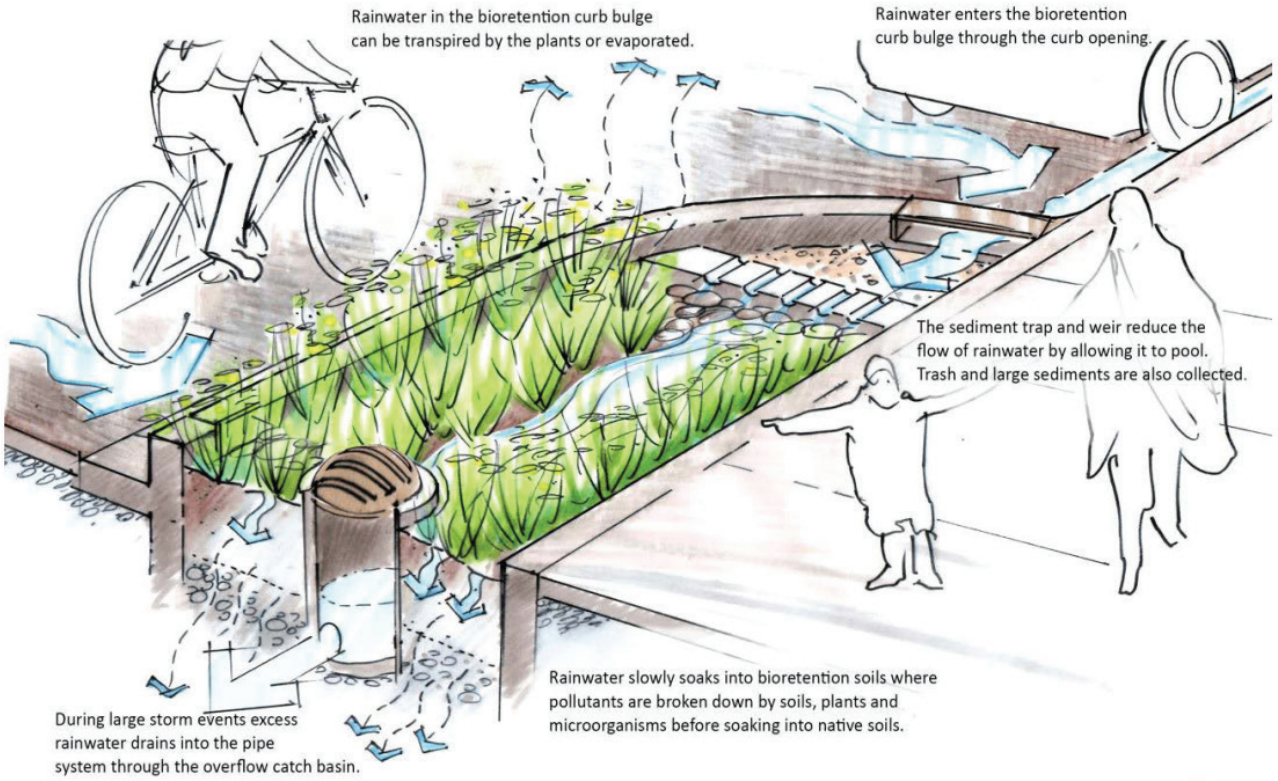
| **National** |
| City of Vancouver – City-wide Rainwater Management Plan (2019) |
| **International** |
| New York City Environmental Protection - Innovative & Integrated Stormwater Management (2017) |

## 4.2 National

### City of Vancouver – City-wide Rainwater Management Plan (2019)

As part of the Rain City Strategy (2019), the City of Vancouver established a new performance target to manage 90% of average annual rainfall, and a new design standard to capture the first 48 mm of rainfall in 40% of Vancouver's impervious areas by 2050. The aspirational target is to manage 100% of Vancouver's impervious surfaces citywide using Green Rainwater Infrastructure (GRI).



| Best Practice Documents Reviewed |
| --- |
| **Local** |
| Town of Oakville – Stormwater Master Plan (2020) |
| **National** |
| City of Vancouver – City-wide Rainwater Management Plan (2019) |
| **International** |
| New York City Environmental Protection - Innovative & Integrated Stormwater Management (2017) |

## 4.3 International

### New York City Environmental Protection – Innovative & Integrated Stormwater Management (2017)

New York City, Department of Environmental Protection, interviewed 34 communities across North America and abroad regarding initiatives, programs, regulations, and future plans that go into an integrated stormwater program. The report identified innovative approaches being applied by Communities, such as the following examples:

Right-of-way rain garden in New York City, NY

Post-construction bioretention implemented on private property in the Northeast Ohio Regional Sewer District, OH

The Inner Harbor Water Wheel in Baltimore Harbor (Trash Collecting Wheel)

# 5.0 Planning & Implementation

Through the documentation of existing conditions in Mississauga, preparation of the Legislative Checklist, and study of best practices for Cities and Stormwater, a range of activities and recommendations for the City's Stormwater Program and complementary services was established, supported by extensive consultation.

These activities are categorized into the four themes discussed earlier:

- Understand its Nature (Studies)
- Create Solutions (Design & Implementation)
- Protect Quality (Monitoring & Maintenance)
- Celebrate its Value (Engagement & Partnerships)

These four themes form the basis of the framework of actions for the Stormwater Master Plan, which is based on the Adaptive Management Cycle and Asset Management Cycle.

To elaborate, the themes include improving the City's understanding of a system by studying it, developing solutions to address the study findings, monitoring and maintaining the solutions, and then beginning the cycle once again by completing a study at such a time when updated information is required.


Throughout this process, continuous engagement takes place with City partners and the public to communicate updates, receive feedback, and celebrate the projects and initiatives within the City. Some illustrative examples include:

- Study a drainage system to identify areas at risk of flooding.
- Create solutions by designing and constructing pipe upgrades based on the study recommendations.
- Monitor and maintain pipe upgrades so that they operate correctly and last their full design life.
- Reassess the drainage area in 15 years following new development in the area.
- Throughout this process, partner with the Region of Peel, Conservation Authorities and local residents to communicate and implement these solutions.

The Stormwater Master Plan Framework is comprised of activities which fall into one of the four themes, and includes the following types of activities:

- Plans
- Programs
- Policies
- Partnership
- Project

Activity implementation considerations are defined in the table below, which will support the City and its partners with the implementation of Existing and Future Actions, as well as Core Service Line Enhancements.

The organizational structure of the Stormwater Master Plan groups the activities into **Existing and Future Actions** and **Core Service Line Enhancements**:

- **Actions** are predominantly standalone stormwater management activities and are comprised of several activities that represent the multiple steps required to meet a long-term objective. Actions will be implemented through programs by those departments which focus on stormwater management services.

- **Core Service Line Enhancements** include activities which are implemented through existing core functions by which the City delivers its services to meet its mandate, and can include a range of departments.

A qualitative means of prioritizing the various activities was established through the Stormwater Master Plan in order for the City to consider those activities of highest importance based on a set of criteria which include: risk to public, risk to the environment, community benefit and legislative requirements.

| **Prioritization Criteria** | |
|---|---|
| Risk to Public | Inaction may result in the continued or increased risk to the public, such as risks to safety associated with infrastructure disrepair and risks to property associated with flooding. |
| Risk to Environment | Inaction may result in continued or increased risk to the environment, such as risks to watercourses due to erosion, or risks to wildlife due to pollution. |
| Community Benefit | Action will result in community benefits, such as beautification efforts associated with infrastructure upgrades and additional park space. |
| Legislative Requirement | Action is a requirement of Higher Order Policy or Guidance, and inaction would result in non-compliance. |

| **Supporting Actions** | | **Action Type** | | **Timeline** | **Priority** | **Cost** | **Status** | **Lead** | **Support** | **Partnerships** |
|---|---|---|---|---|---|---|---|---|---|---|
| # | X | Plan<br>Program<br>Policy | Partnership<br>Procedure<br>Project | Short (1-3 yrs)<br>Medium (3-10 yrs)<br>Long (10-25 yrs)<br>Ongoing | Low<br>Medium<br>High | N/A<br>$ (0 - $100,000)<br>$$ ($100,000 - $500,000)<br>$$$ (>$500,000) | Not Initiated<br>Planned<br>Underway<br>Completed | Env. Services | Varies | Varies |

## 5.1 Action Implementation

### A. Understand Its Nature (Studies)

A clear and current understanding of the environment or systems within the City is the first step to providing meaningful recommendations. This includes natural systems such as watersheds and local ecosystems, as well as built infrastructure systems such as the sewer system or transportation network. The City improves its understanding of these systems by undertaking studies and assessments which can be completed at a range of scales, from a neighbourhood drainage assessment to mapping the groundwater table City-wide.

This is the first step in understanding a problem in order to provide a tailored solution.


**Theme A: Understand Its Nature (Studies)** is comprised of the following Actions:

- **A.1** Prepare Dual Drainage Models in Older Neighbourhoods - Existing Action
- **A.2** Map Groundwater (City-wide) - Future Action
- **A.3** Economic Consideration for Environmental Decision Making Process - Future Action
- **A.4** Pursue System-wide Environmental Compliance Approval - Future Action

## Action A.1: Prepare Dual Drainage Models in Older Neighbourhoods

Integrated mapping of sanitary and storm sewer flood risks for older residential neighbourhoods (i.e., Pre-1970s) through the preparation of dual drainage models. These models analyze the capacity of the minor system (water flowing in sewers) and the major system (surface water that flows overland).

**Action Type**

| Existing | Future |
|---|---|
| ● | |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| A1.-1 | Prioritize study areas and determine desired frequency of study to establish a schedule for neighbourhood assessments.<br>• Focus on older neighbourhoods.<br>• Coordinate with the Region of Peel on sanitary flooding assessments. | Plan | Short | Medium | $ | Underway | Environmental Services | N/A | Region of Peel, Conservation Authorities |
| A.1-2 | Complete dual drainage modelling studies and identify recommendations and future study requirements. | Project | Ongoing | Medium | $$ | Underway | Environmental Services | N/A | N/A |
| A.1-3 | Based on outcomes of the studies, implement the recommendations for capital improvements and develop Flood Management Plans where required. | Program | Ongoing | Medium | $$$ | Underway | Capital Works | Environmental Services | N/A |
| A.1-4 | Acquire modelling software to use for future studies. | Program | Short | Low | $ | Planned | Environmental Services | N/A | N/A |
| A.1-5 | Training for City staff on modelling software, which can additionally be used for further investigations and infrastructure planning. | Program | Medium | Low | $ | Not Initiated | Environmental Services | N/A | N/A |

## Action A.2: Map Groundwater (City-wide)

Improve the data for groundwater levels across the City by developing a mapping database of areas in the City which have higher groundwater levels therefore are at higher risk of being impacted by development. This mapping database will inform decision-making on land development, management practices and infrastructure renewal.

**Action Type**

| Existing | Future |
|---|---|
| | ● |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| A.2-1 | Engage with the Oak Ridges Moraine Groundwater Program (ORMGP), Credit Valley – Toronto and Region – Central Lake Ontario Source Protection Committee (CTC SPC) and Partners (Region of Peel, Conservation Authorities) to evaluate the current level of data collection and existing mapping across the City and establish the need for future monitoring. | Partnership | Short | Low | N/A | Not Initiated | Environmental Services | N/A | ORMGP, CTC SPC, Region of Peel, Conservation Authorities |
| A.2-2 | Collect, review and categorize available data within the City to establish a City database which can be used to generate water table mapping and can be updated with future data. | Project | Long | Low | $$ | Not Initiated | Environmental Services | Works Operations and Maintenance, Geospatial Solutions, Development Engineering (Transportation and Works), Development & Design (Planning and Building) | ORMGP, CTC SPC, Region of Peel, Conservation Authorities |
| A.2-3 | Complete a review of By-laws and permitting processes to explore opportunities to strengthen codes and permits to reduce the risk of basement flooding due to groundwater. | Policy | Long | Low | $ | Not Initiated | Environmental Services | Development & Design (Planning and Building), Building Division | Region of Peel, Conservation Authorities |

## Action A.2: Map Groundwater (City-wide) (Continued)

**Action Type**

| Existing | Future |
|---|---|
| | ● |

Improve the data for groundwater levels across the City by developing a mapping database of areas in the City which have higher groundwater levels therefore are at higher risk of being impacted by development. This mapping database will inform decision-making on land development, management practices and infrastructure renewal.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| A.2-4 | Integrate groundwater level mapping as part of stormwater management planning. This includes the location and design of Low Impact Development measures across the City. | Program | Long | Low | N/A | Not Initiated | Environmental Services | Transportation Asset Management. | Conservation Authorities |

## Action A.3: Economic Considerations for Environmental Decision-Making Process

**Action Type**

| Existing | Future |
|---|---|
| | ● |

The use of economic tools to evaluate flood and environmental risk mitigation options based on cost-benefits to support environmental assessments and infrastructure feasibility studies (e.g., the Risk and Return on Investment Tool developed by Credit Valley Conservation).

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| A.3-1 | Engage with Credit Valley Conservation & Sustainable Technologies Evolution Program to explore the use of the Risk and Return on Investment Tool to identify opportunities for use specific to the City's actions. Explore the National Research Council Canada's Flood Control Cost Benefit Guideline for direction. | Partnership | Short | Medium | N/A | Ongoing | Environmental Services | N/A | Conservation Authorities & Sustainable Technologies Evolution Program |
| A.3-2 | Training for City staff for the use of the Risk and Return on Investment Tool (or other similar software) to investigate the economic benefits and opportunities for application on City initiatives. | Program | Short | Low | N/A | Not Initiated | Environmental Services | Corporate Finance, City Planning Strategies | Conservation Authorities & Sustainable Technologies Evolution Program |
| A.3-3 | Initiate a case study to test the financial modelling and assessment tools for stormwater management planning within the City. Advance recommendations and establish standards/guidelines for evaluating economic benefits. | Project | Medium | Medium | $ | Not Initiated | Environmental Services | Corporate Finance | Conservation Authorities & Sustainable Technologies Evolution Program |

## Action A.4: Pursue System-wide Environmental Compliance Approval

**Action Type**

| Existing | Future |
|---|---|
| | ● |

In 2020, the Ministry of the Environment, Conservation and Parks proposed to implement a Consolidated Linear Infrastructure Permissions Approach which would adopt system-wide Environmental Compliance Approvals for low-risk municipal sewage works, modelled after the existing permitting framework for municipal drinking water systems.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| A.4-1 | Continue to develop a detailed City-wide database and mapping of natural and built infrastructure systems in support of the ongoing City-wide asset management strategy. | Project | Ongoing | High | $ | Underway | Environmental Services | Geospatial Solutions | N/A |
| A.4-2 | Establish advanced operations, maintenance and monitoring plans for all City owned stormwater management infrastructure to support and ensure compliance with the future Consolidated Linear Infrastructure Environmental Compliance Approval application for the City. | Plan | Short | High | N/A | Underway | Environmental Services | N/A | Ministry of the Environment, Conservation and Parks |
| A.4-3 | Engage with the Region of Peel, City of Brampton and Town of Caledon regarding program requirements to share lessons learned and foster a collaborative approach to infrastructure management within the City. | Partnership | Ongoing | Low | N/A | Underway | Environmental Services | N/A | Region of Peel, City of Brampton, Town of Caledon |

## 5.1 Action Implementation

### B. Create Solutions (Design & Implementation)

The next step in the adaptive management cycle is to create solutions that address a specific problem, implement study recommendations, or improve stormwater management within the City.

Solutions can range from developing new policies, designing and constructing infrastructure projects, and administering programs.


**Theme B: Create Solutions (Design & Implementation)** is comprised of the following Actions:

- **B.1** Strategic Land Acquisition of Flood Vulnerable Lands - Future Action
- **B.2** Low Impact Development Practices for Roads Program - Existing Action
- **B.3** City-Wide Flood Control Retrofit Project - Future Action
- **B.4** Groundwater Management - Existing Action
- **B.5** Cooling Best Management Practices - Future Action

## Action B.1: Strategic Land Acquisition of Flood Vulnerable Lands

Program to acquire land in flood vulnerable areas, including easement acquisition through development and/or for capital project delivery.

**Action Type**

| Existing | Future |
|---|---|
| | ● |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| B.1-1 | Initiate studies to establish flood risk areas across the City, based on both fluvial and pluvial systems. | Project | Short | High | $$ | Not Initiated | Environmental Services | N/A | Conservation Authorities |
| B.1-2 | Establish flood risk land acquisition priorities using a systematic approach including cost-benefit analyses. Engage with the internal Parks department to continue building upon the parkland acquisition initiative to evaluate additional opportunities for stormwater benefit. | Program | Medium | Medium | N/A | Underway | Environmental Services | Park Planning | Conservation Authorities |
| B.1-3 | Based on the flood risk study outcomes, coordinate property appraisals in key areas and initiate neighbourhood-based consultation with the public and stakeholders to outline and discuss opportunities. | Plan | Long | Low | $ | Not Initiated | Environmental Services | Park Planning, Legal, Realty | Public, Stakeholders, Neighbourhood Associations, Conservation Authorities |
| B.1-4 | Develop funding for multi-year acquisition program for flood risk mitigation. | Plan | Long | Low | $$$ | Not Initiated | Environmental Services | Park Planning, Legal, Realty | Provincial & Federal Government |

## Action B.2: Low Impact Development Practices for Roads Program

**Action Type**

| Existing | Future |
|---|---|
| ● | |

Roadway Stormwater Retrofit program with source controls, coordinated with road rehabilitation program to identify opportunities to implement Low Impact Development Best Management Practices throughout the City within Road Right-of-Ways.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| B.2-1 | Develop a system (e.g., software tool) to support the selection and decision framework for applicable Low Impact Development Best Management Practice sites. This will include building a database, City policy review, interactive data mapping, and City staff training to use the tool. | Project | Medium | Medium | $ | Not Initiated | Environmental Services | Transportation Asset Management. | City of Toronto, Sustainable Technologies Evolution Program, Conservation Authorities |
| B.2-2 | Develop formalized documentation for the program including Standard Operating Procedure for the program (i.e., site selection criteria), Low Impact Development Best Management Practice options based upon site, construction procedures, and monitoring requirements. | Program | Short | Medium | $ | Not Initiated | Environmental Services | Transportation Asset Management, Forestry. Park Planning & Parks Development (for areas of park frontage), Urban Design (Planning and Building) | Credit Valley Conservation, Region of Peel |
| B.2-3 | Continue program applying decision framework and selection tool to formalize the process and proactively assess feasible locations requiring additional quality control improvements. | Program | Ongoing | High | $ | Underway | Environmental Services | Transportation Asset Management, Capital Works | Conservation Authorities |
| B.2-4 | Evaluate the opportunity for including Low Impact Development Best Management Practices as part of standard requirements for future road right-of-way cross-sections in conjunction with the City's 'Changing Lanes' project. | Policy | Short | Medium | $ | Underway | Environmental Services | Transportation Asset Management, Development Engineering, Works Operations and Maintenance, Forestry | Region of Peel, Sustainable Technologies Evolution Program |

## Action B.3: Flood Control Retrofit Projects (City-wide)

Project to determine the location and feasibility for flood control retrofits in largely uncontrolled watersheds (e.g., Cooksville Creek).

**Action Type**

| Existing | Future |
|---|---|
| | ● |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| B.3-1 | Conduct a City-wide Flood Risk Assessment & Ranking Study to identify the most flood-vulnerable areas within the City and evaluate which areas may benefit the most from retroactive stormwater management and offer multi-functional benefits for spaces dedicated to flood control. Demonstrate the benefits under both historical and future climate conditions. | Project | Medium | High | $$ | Not Initiated | Environmental Services | N/A | Conservation Authorities, Sustainable Technologies Evolution Program |
| B.3-2 | Based on the outcomes of the City-wide study, coordinate with internal City stakeholders to determine potential alignment of City initiatives to maximize benefit. Develop a prioritization for Capital Works and retrofits and the need for additional local study. | Plan | Medium | Medium | $ | Not Initiated | Environmental Services | Park Planning, Facilities & Property Management, Capital Works | Conservation Authorities, Sustainable Technologies Evolution Program |
| B.3-3 | Establish a long-term funding, scheduling and implementation program to support the stormwater management retrofit recommendations specific to quantity control improvements. | Program | Long | Medium | $$$ | Underway | Environmental Services | Capital Works, Corporate Finance | Conservation Authorities, Sustainable Technologies Evolution Program |

## Action B.4: Groundwater Management

Protect water resources by managing the quantity and quality of groundwater that enters the City's storm sewer system.

**Action Type**

| Existing | Future |
|---|---|
| ● | |

| | Supporting Activities | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| B.4-1 | Engage with Credit Valley Conservation and Toronto and Region Conservation Authority to streamline the hydrogeologic aspects of the land development review process in order to eliminate duplication of effort, and consistency amongst approvals. | Policy | Short | Medium | N/A | Ongoing | Environmental Services | Development & Design (Planning and Building) | Conservation Authorities |
| B.4-2 | Update the Storm Sewer Use By-Law to increase concentration limits for naturally occurring metals and minerals in groundwater discharge. | Policy | Short | High | N/A | Ongoing | Environmental Services | N/A | N/A |
| B.4-3 | Update the Development Manual to include quantity limits and criteria for groundwater discharge to the storm sewer system. Include reference to Storm Sewer Use By-Law for discharge quality requirements. | Policy | Short | Medium | N/A | Planned | Environmental Services | N/A | N/A |
| B.4-4 | Update the application requirements for Temporary and Permanent Discharge Permits and Agreements, that will also include specific monitoring and compliance reporting requirements.<br>• Develop City Standard Operating Procedures, goals and objectives to managing groundwater.<br>• Implement charge for Permits. | Policy | Medium | High | $ | Underway | Environmental Services | N/A | N/A |
| B.4-5 | Assess drainage systems in areas of proposed concentrated high-rise development (e.g., Downtown) in terms of available capacity for residual groundwater contributions. | Project | Medium | Medium | $$ | Planned | Environmental Services | N/A | N/A |

## Action B.5: Cooling Best Management Practices

Through temperature mitigation research and/or pilot projects, establish clear guidance and process regarding the planning, design, implementation and monitoring of cooling Best Management Practices which can be provided to proponents and City departments in locations where it is most important to protect and enhance the thermal regime for natural systems.

**Action Type**

| Existing | Future |
|---|---|
| | ● |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| B.5-1 | Review and establish the temperature sensitive watershed systems within the City to identify highest at-risk areas for prioritization. | Plan | Medium | Medium | $ | Not Initiated | Environmental Services | N/A | Conservation Authorities, Sustainable Technologies Evolution Program |
| B.5-2 | Initiate pilot projects in prioritized watersheds for cooling Best Management Practice design and implementation. Opportunity for collaboration with Conservation Authorities, the Sustainable Technologies Evolution Program) and/or Colleges and Universities for design, construction, monitoring and public awareness.<br>• Collaborate on City initiatives (i.e., Community Centre / City owned Properties).<br>• Prioritize opportunities in waterfront parks. | Project | Medium | Low | $ | Not Initiated | Environmental Services | Capital Works, Parks, Forestry & Environment Division, Facilities & Property Management | Conservation Authorities, Sustainable Technologies Evolution Program, Colleges & Universities |
| B.5-3 | Develop a thermal monitoring program as part of existing stormwater management facility and watercourse monitoring. | Program | Long | Low | $ | Not Initiated | Environmental Services | N/A | Conservation Authorities, Sustainable Technologies Evolution Program |

## 5.1 Action Implementation

### C. Celebrate Its Value (Engagement & Partnerships)

Engaging with the public, stakeholders, and municipal partners is fundamental to the success of the Stormwater Master Plan. Public and stakeholder engagement can include workshops, open houses, administrative programs, and communications such as social media releases and outdoor signage.

The City partners with the Region of Peel and Conservation Authorities on a variety of initiatives, such as the joint administration of programs for homeowner landscaping, children's activities, and resident artists.


**Theme C: Celebrate Its Value (Engagement & Partnerships)** is comprised of the following Actions:

- **C.1** Artist in Residence Program - Future Action
- **C.2** Stormwater Outreach (Contemporary/Effective/ Innovative) - Existing Action
- **C.3** Enhance Stormwater Charge Credit Program - Existing Action

## Action C.1: Artist in Residence Program

Artist in Residence programs increase artworks of many forms in communities, improving the public realm by building beautiful spaces, and providing opportunities for artworks which can raise public awareness to important issues in Mississauga. Notably in relation to stormwater, an Artist in Residence program provides the opportunity to raise awareness of stormwater management projects and processes, which are often "out of sight, out of mind".

**Action Type**

| Existing | Future |
|---|---|
| | ● |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| C.1-1 | Establish a collaboration between the Environmental Services and Culture Division to determine the preferred option for program structure and future roll-out.<br>• Options include project based/ funding initiated, update to the City's Art Master Plan, student engagement (post-secondary recruitment), public competition, etc.<br>• Explore opportunity to collaborate with the Region of Peel and the local Conservation Authorities for shared initiatives and public awareness. | Plan | Short | High | $$ | Planned | Environmental Services | Culture Division | Colleges & Universities, Region of Peel, Conservation Authorities |
| C.1-2 | Establish the program details and engage with external stakeholders to initiate program roll-out. | Program | Long | Low | $ | Not Initiated | Environmental Services | Culture Division | Colleges & Universities, Region of Peel, Conservation Authorities |

## Action C.2: Stormwater Outreach

Stormwater outreach includes two-way communication, providing an avenue for the public to receive information and provide feedback and improve the stormwater program and outreach initiatives in a contemporary, effective, and innovative way.

**Action Type**

| Existing | Future |
|---|---|
| ● | |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| C.2-1 | Establish a Public Awareness Campaign of catch-basin branding and design.<br>• Engage with the public and youth groups.<br>• Opportunity to partner with Toronto and Region Conservation Authority's Rainfall to Runoff Program. | Program | Ongoing | Low | $ | Not Initiated | Environmental Services | Culture Division, Works Operations and Maintenance | Toronto and Region Conservation Authority |
| C.2-2 | Hold workshops that highlight the benefits to City residents and businesses through attractive landscapes, water efficient landscapes, improved water quality, and financial support (e.g., grants, free compost, plant giveaways).<br>• Opportunity to partner with various on-going community engagement initiatives including Toronto and Region Conservation Authority's Sustainable Neighbourhood Action Program, the Sustainable Technologies Evolution Program, Region of Peel's Rain Garden program, Credit Valley Conservation's Your Green Yard, etc. | Program | Ongoing | Medium | $ | Not Initiated | Environmental Services | Parks & Forestry Division, Corporate Communications, Climate Team | Conservation Authorities, Sustainable Technologies Evolution Program, Region of Peel |

## Action C.2: Stormwater Outreach (Continued)

Stormwater outreach includes two-way communication, providing an avenue for the public to receive information and provide feedback and improve the stormwater program and outreach initiatives in a contemporary, effective, and innovatice way.

**Action Type**

| Existing | Future |
|---|---|
| ● | |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| C.2-3 | Create digital engagement resources to educate the public on the effective and sustainable management of stormwater, including promoting One Water principles.<br>• Resources may include updated Stormwater Program visual identifier, updated City web pages, program and Corporate channels social media outreach, virtual presentations, in-person talks, community events, in-person information booth, Stormwater e-newsletters and partnerships with City Councillors, print materials, outdoor signs, Curbex mobile signs, social ads, advertorials, development of a regional online portal for stormwater information and animated whiteboard video. | Program | Ongoing | High | $ | Underway | Environmental Services | Corporate Communications, Creative Services, Climate Team, Emergency Management | Conservation Authorities, Sustainable Technologies Evolution Program, Region of Peel, City of Brampton, Town of Caledon |

## Action C.3: Enhance Stormwater Charge Credit Program

**Action Type**

| Existing | Future |
|---|---|
| ● | |

The Stormwater Charge provides a direct and reliable funding source for the City's Stormwater Program, allowing for proactive planning of projects and programs. The Stormwater Charge further represents an equitable funding source, as it is based on the amount of impervious area, property size and type. The Stormwater Charge Credit Program provides an incentive to non-residential and multi-residential property owners to implement stormwater management practices and measures which support the objectives of the Stormwater Master Plan.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| C.3-1 | Formalize process for communal facilities to share credits. | Program | Short | Medium | N/A | Planned | Environmental Services | N/A | Conservation Authorities |
| C.3-2 | Define variable credit criteria by geography (i.e., watershed or sub-watershed level), based on City development requirements and existing characterization of the stormwater system. | Program | Short | Medium | $ | Planned | Environmental Services | N/A | N/A |
| C.3-3 | Explore options for sliding scale criteria for site retrofits to allow partial credits for site retrofit developments, should existing site constraints limit the opportunities for Best Management Practices. | Program | Short | Medium | $ | Planned | Environmental Services | N/A | N/A |
| C.3-4 | Review and refine the maximum credit in any category to reflect and support the ongoing needs of the City. | Program | Short | Medium | $ | Planned | Environmental Services | N/A | N/A |
| C.3-5 | Review and add new stormwater management practices or measures to be eligible for credits. | Program | Short | Medium | $ | Planned | Environmental Services | N/A | Conservation Authorities, Sustainable Technologies Evolution Program |

## Action C.3: Enhance Stormwater Charge Credit Program (Continued)

**Action Type**

| Existing | Future |
|---|---|
| ● | |

The Stormwater Charge provides a direct and reliable funding source for the City's Stormwater Program, allowing for proactive planning of projects and programs. The Stormwater Charge further represents an equitable funding source, as it is based on the amount of impervious area, property size and type. The Stormwater Charge Credit Program provides an incentive to non-residential and multi-residential property owners to implement stormwater management practices and measures which support the objectives of the Stormwater Master Plan.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| C.3-6 | Establish a Business Outreach and Education program to support the uptake of the Enhanced Stormwater Charge Credit Program. Partnerships could leverage efforts from Credit Valley Conservation's Greening Corporate Grounds program or Toronto and Region Conservation Authority's Partners in Project Green. | Program | Short | Medium | $ | Not Initiated | Environmental Services | N/A | Conservation Authorities, Sustainable Technologies Evolution Program |

## 5.1 Action Implementation

### D. Protect Quality (Monitoring & Maintenance)

The final step of the Stormwater Management Framework is to monitor and maintain the City's assets and stormwater solutions to protect their quality. Monitoring informs the City that the project or system is functioning as planned, or identifies that maintenance is required, which can avoid impacts such as adverse flooding, erosion or pollution. Regular maintenance extends the life expectancy of stormwater assets which results in a higher return on investment.

**Theme D: Protect Quality (Monitoring & Maintenance)** is comprised of the following Actions:

- **D.1** Outfall Monitoring - Existing Action
- **D.2** Pollution Prevention Plans - Existing Action
- **D.3** Asset Management: Watercourses - Existing Action
- **D.4** Asset Management: Storm Sewers - Existing Action
- **D.5** Asset Management: Stormwater Management Facilities - Existing Action
- **D.6** Culvert and Bridge Assessments - Future Action
- **D.7** Integrated Rainfall Monitoring Program - Existing Action
- **D.8** Shoreline Management - Future Action
- **D.9** City-Wide Water Quality Retrofit Program - Existing Action
- **D.10** Open Ditch Management Strategy- Future Action


## Action D.1: Outfall Monitoring

Outfall monitoring throughout the City aims to protect the quality of runoff to the City's natural systems. This is done through the identification, investigation, and remediation of issues to ensure compliance with the City's Sewer Use By-Law and protection of natural features.

**Action Type**

| Existing | Future |
|---|---|
| ● | |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.1-1 | Establish a mapping platform for outfall asset management, data collection and monitoring summary to improve the program performance City-wide. | Program | Short | High | N/A | Underway | Environmental Services | Geospatial Solutions | N/A |
| D.1-2 | Maintain the existing reactionary program and investigate possible partnership with the Region of Peel to develop an on-call City position for spills and quality issues. | Program | Ongoing | Medium | $ | Underway | Environmental Services | Works Operations and Maintenance | Region of Peel, Ministry of the Environment, Conservation and Parks |
| D.1-3 | Evaluate the outcomes and findings of the 2021 proactive program to identify lessons learned and formulate a standard operating procedure for monitoring across the City. | Program | Short | High | $ | Underway | Environmental Services | N/A | N/A |
| D.1-4 | Complete a review of the City infrastructure mapping database to develop an inventory of outfalls to be monitored proactively on a subwatershed basis, including a targeted priority sequence. | Plan | Medium | Medium | $$ | Not Initiated | Environmental Services | Geospatial Solutions | N/A |
| D.1-5 | Based upon the findings from the review of the proactive and reactive programs, establish Capital Works improvements and long-term / continuous monitoring sites to ensure compliance and remediation of issues. | Program | Long | High | $$ | Underway | Environmental Services | Capital Works, Works Operations and Maintenance | Region of Peel, Ministry of the Environment, Conservation and Parks |

## Action D.2: Pollution Prevention Plans

Pollution Prevention Plans are an important pollution planning measure to avoid and/or minimize the overall risk to the environment and/or human health through preventative measures.

**Action Type**

Existing ● Future

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.2-1 | Establish the need for additional staff which can help support existing staff for review of Pollution Prevent Plan submissions and compliance. | Program | Medium | Low | N/A | Not Initiated | Environmental Services | N/A | N/A |
| D.2-2 | Utilize local case studies to develop Mississauga-based business fact sheets for Pollution Prevention planning, to explore the economics and cost-saving benefits. | Plan | Short | Low | N/A | Not Initiated | Environmental Services | N/A | Conservation Authorities, Sustainable Technologies Evolution Program, Sustainable Neighbourhood Action Program, Region of Peel |
| D.2-3 | Develop a Pollution Prevention Plan checklist for low-cost options based upon specified business type (low-risk and/or non-compliant industries).<br>• Opportunity to partner with Conservation Authorities to incorporate green landscaping as part of checklist initiatives.<br>• Roll-out can be combined with Stormwater Outreach for public education and support for the business community.<br>• Consider specific requirements for properties nearby and/or directly contributing to watercourses and the lake. | Policy | Medium | Medium | $ | Not Initiated | Environmental Services | Compliance & Licensing (Transportation and Works) | Conservation Authorities, Region of Peel |

## Action D.3: Asset Management: Watercourses

Asset management of watercourses includes both monitoring and capital improvements which are both important for the management and protection of the City's engineered and natural open water features, and the public and private lands in the surrounding areas.

**Action Type**

| Existing | Future |
|---|---|
| ● | |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.3-1 | Develop map-based watercourse asset inventory as part of a City-wide asset management initiative. Integrate ongoing and historical monitoring findings into the map database for improved data tracking.<br>• This will allow the City to develop more reliable replacement values, condition records, risk scores and track operations, and capital spending of individual asset. | Program | Medium | High | $$ | Underway | Environmental Services | Geospatial Solutions, Works Operations and Maintenance, Capital Works, Parks & Forestry | N/A |
| D.3-2 | Upgrade field equipment for georeferenced photography and field notes for enhanced integration into existing and future map-based inventory and improved accuracy and categorization of assets. | Program | Medium | High | $ | Not Initiated | Environmental Services | Geospatial Solutions | N/A |

## Action D.3: Asset Management: Watercourses (Continued)

Asset management of watercourses includes both monitoring and capital improvements which are both important for the management and protection of the City's engineered and natural open water features, and the public and private lands in the surrounding areas.

**Action Type**

| Existing | Future |
|---|---|
| ● | |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.3-3 | Strengthen partnership with Conservation Authorities and Region of Peel for identification of issues, restoration solutions and data management of post-inspections.<br>• Investigate use of the Risk and Return on Investment Tool through partnership with Credit Valley Conservation for watercourse erosion modelling City-wide. Field data can be shared with Credit Valley Conservation to strengthen the model results, and to identify high priority areas for City monitoring.<br>• Investigate the applicability of Toronto and Region Conservation Authority's Stream, Erosion and Infrastructure Database within the City. | Partnership | Medium | Medium | N/A | Not Initiated | Environmental Services | N/A | Conservation Authorities, Region of Peel |
| D.3-4 | Continue updating the asset database to identify key priorities for monitoring frequency and establish planning for capital improvements and watercourse asset management. | Program | Ongoing | High | $$ | Underway | Environmental Services | Works Operations and Maintenance, Capital Works, Parks & Forestry Division | Region of Peel |

## Action D.4: Asset Management: Storm Sewers

**Action Type**

| Existing | Future |
|---|---|
| ● | |

The stormwater drainage system is one of the largest asset classes owned and operated by the City. The storm sewer system represents the majority of this value, and requires regular inspection and investigation in order to identify and prioritize needs for maintenance, restoration and/or replacement to maintain its function and performance across the City.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.4-1 | Continue to expand and refine map data and develop digital database developed as part of the City's Asset Management Plan. | Program | Ongoing | High | N/A | Underway | Environmental Services | Geospatial Solutions, Transportation Asset Management., Community Services, Miway, Rapid Transit | N/A |
| D.4-2 | Conduct preventative analysis of the City's storm sewer systems to establish areas at-risk to urban flooding during extreme events. This may include:<br>• City-wide modelling analysis of sewersheds.<br>• Mapping of low-lying areas / large drainage area to inlet ratio which can be indicative of infrastructure prone to debris and blockages.<br>• Evaluating risk of infrastructure failure to include variety of factors, including environmental and economic implications. | Program | Medium | Medium | $$ | Not Initiated | Environmental Services | Geospatial Solutions, Works Operations and Maintenance, Transportation Asset Management. | Region of Peel, Ministry of Transportation |

## Action D.4: Asset Management: Storm Sewers (Continued)

**Action Type**

| Existing | Future |
|---|---|
| ● | |

The stormwater drainage system is one of the largest asset classes owned and operated by the City. The storm sewer system represents the majority of this value, and requires regular inspection and investigation in order to identify and prioritize needs for maintenance, restoration and/or replacement to maintain its function and performance across the City.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.4-3 | Through initiatives such as the integrated rainfall monitoring program, a municipal warning system could be developed and/or allow for the City to evaluate the storm sewer network under extreme storm events to establish at-risk areas. This modelling could be compared with resident calls and complaints to prioritize issues for mitigation. | Project | Short | Low | $ | Not Initiated | Environmental Services | Works Operations and Maintenance | N/A |
| D.4-4 | Establish an Emergency Response Program to improve the City's ability to react quickly to identified issues, such as infrastructure failure sites, emergency spills and flooding issues. | Program | Medium | Medium | $$ | Not Initiated | Environmental Services | Risk Management, Emergency Management, Works Operations and Maintenance | Region of Peel, Ministry of the Environment, Conservation and Parks |
| D.4-5 | Implement infrastructure improvement projects to maintain existing infrastructure in a state of good repair and/or to applicable levels of service and improve the major / minor system flow capacity and reduce flood risk. | Program | Ongoing | High | $$$ | Underway | Environmental Services, Capital Works | N/A | Region of Peel |

## Action D.5: Asset Management: Stormwater Management Facilities

**Action Type**

| Existing | Future |
|---|---|
| ● | |

Stormwater Management Facilities offer a variety of benefits including improved water quality, erosion control and flood control benefits, as well as socio-economic value within the watershed. These facilities include stormwater ponds (end-of-pipe) as well as on-site controls such as Low Impact Development Best Management Practices, both of which represent a significant component of the storm drainage system value, owned and operated by the City.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.5-1 | Continue to refine centralized mapping database by georeferenced photographs and field notes to continuously update database with inspections and logs connected to City asset management system. This will support the planning and procedures for City-wide monitoring. | Program | Short | High | $ | Underway | Environmental Services | Works Operations and Maintenance, Geospatial Solutions | N/A |
| D.5-2 | Provide training to City staff regarding Low Impact Development Best Management Practice inspection and maintenance protocols for existing and future practices, maintenance guidelines and documents. | Program | Short | Medium | $ | Planned | Environmental Services | Works Operations and Maintenance, Forestry | Conservation Authorities, Sustainable Technologies Evolution Program |
| D.5-3 | Establish a Low Impact Development Best Management Practice maintenance program based upon current asset inventory and guidelines currently in development. Low Impact Development Best Management Practices require unique maintenance practices, therefore guidelines and a formalized program would improve efficiency and stormwater management asset management. | Program | Ongoing | Medium | $ | Underway | Environmental Services | Works Operations and Maintenance, Forestry | Conservation Authorities, Sustainable Technologies Evolution Program |

## Action D.5: Asset Management: Stormwater Management Facilities (Continued)

**Action Type**

| Existing | Future |
|---|---|
| ● | |

Stormwater Management Facilities offer a variety of benefits including improved water quality, erosion control and flood control benefits, as well as socio-economic value within the watershed. These facilities include stormwater ponds (end-of-pipe) as well as on-site controls such as Low Impact Development Best Management Practices, both of which represent a significant component of the storm drainage system value, owned and operated by the City.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.5-4 | Review inventory of stormwater management facilities and establish/ execute a prioritized monitoring program based upon key criteria (i.e., outlet, watershed, design criteria, age of infrastructure, etc.) to achieve the following program elements:<br>• Increase frequency of wet pond bathymetric survey to a 5-year cycle.<br>• Develop stormwater management facility monitoring requirements for all existing facilities, and translate into requirements for future facilities.<br>• Ensure consistency with Consolidated Linear Infrastructure Environmental Compliance Approval submission requirements, developing storm sewer and stormwater management inventory, monitoring and reporting to support future applications. | Program | Ongoing | High | $$ | Underway | Environmental Services | Works Operations and Maintenance | Ministry of the Environment, Conservation and Parks |

## Action D.5: Asset Management: Stormwater Management Facilities (Continued)

**Action Type**

| Existing | Future |
|---|---|
| ● | |

Stormwater Management Facilities offer a variety of benefits including improved water quality, erosion control and flood control benefits, as well as socio-economic value within the watershed. These facilities include stormwater ponds (end-of-pipe) as well as on-site controls such as Low Impact Development Best Management Practices, both of which represent a significant component of the storm drainage system value, owned and operated by the City.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.5-5 | Based upon outcomes of the stormwater management facility monitoring program, identify retrofit opportunities, implement capital improvements and rehabilitation requirements to maintain design function and/or improve facility operation to current design standards. | Program | Ongoing | Medium | $$$ | Underway | Environmental Services | Capital Works | Ministry of the Environment, Conservation and Parks, Conservation Authorities |
| D.5-6 | Pursue collaboration opportunities through inter-departmental Service Level Agreements to support stormwater assets managed by other internal stakeholders (e.g., Parks). This would facilitate internal cost transfer to provide technical expertise to other groups as the Stormwater Asset Management Program is focused on Transportation & Works owned and managed assets. | Partnership | Medium | Low | N/A | Underway | Environmental Services | Parks Operations, Facilities & Property Management, Transitway | N/A |

## Action D.6: Culvert and Bridge Assessments

**Action Type**

| Existing | Future |
|---|---|
| | ● |

Culverts and Bridges on City road crossings of regulated watercourses have a direct impact on regulated upstream flood plains and at-risk areas. By better understanding those that cause the greatest "bottleneck" to capacity, the City can coordinate and optimize its efforts to reduce existing flood risks and build in resiliency to future changes due to climate change and land use change.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.6-1 | Complete a Bridges and Culverts Hydraulic Capacity Assessment Master Plan study to identify high risk bridges and culverts based on insufficient hydraulic capacity and flood vulnerable municipal roadways based on both existing and future climate change conditions. | Project | Short | Medium | $ | Not Initiated | Environmental Services | Transportation Asset Management | Conservation Authorities, Railway Groups |
| D.6-2 | Opportunity to incorporate findings from the watercourse monitoring program and partnership with the Conservation Authorities to utilize the Risk and Return on Investment Tool's erosion module which identifies potential erosion-based damage to bridges and culverts. | Partnership | Medium | Low | N/A | Underway | Environmental Services | N/A | Conservation Authorities |
| D.6-3 | Establish a priority list and program for capital improvements and/ or additional study in order to continue reducing flood risk. Align proposed works with other ongoing City initiatives (e.g., road renewal, infrastructure in Parks). | Program | Long | Medium | $$$ | Not Initiated | Environmental Services | Transportation Asset Management., Parks & Forestry Division, Capital Works | Conservation Authorities |

## Action D.7: Integrated Rainfall Monitoring Program

**Action Type**

| Existing | Future |
|---|---|
| ● | |

Integrating the current rainfall monitoring program with the Conservation Authorities and Region of Peel can allow for strengthened data accuracy, and adoption of shared data and tools to improve the City's data uses for infrastructure investigation and major storm prediction and warning to maximize flood control capacities.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.7-1 | Acquire upgraded rainfall gauge equipment in order to utilize an integrated database and strengthen existing network. | Program | Short | High | $ | Underway | Environmental Services | N/A | N/A |
| D.7-2 | Engage partnership with Region of Peel and Conservation Authorities to add City gauges into Gauge Adjusted Radar Rainfall network. Establish access and refine data uses for City staff and related City initiatives. | Partnership | Medium | Medium | $ | Planned | Environmental Services | N/A | Region of Peel, Conservation Authorities |
| D.7-3 | Incorporate an enhanced level of Quality Assurance / Quality Control and summary reporting for City gauge data as part of requirements for new external monitoring contracts. | Program | Short | High | N/A | Planned | Environmental Services | N/A | N/A |
| D.7-4 | Explore utilization of rainfall data across all municipal departments. This may include:<br>• Application of models to conduct forensic and preventative analysis for storm sewer and stormwater management systems.<br>• Operational uses in urban flood management (warning system application).<br>• Road Weather Information Systems.<br>Based upon the planned uses, target certain data requirements (e.g., locations, data type, frequency, seasonal vs continuous) to support ongoing and planned City initiatives. | Plan | Long | Medium | $ | Not Initiated | Environmental Services | Works Operations and Maintenance, Emergency Management, Transportation Asset Management. | Region of Peel, Conservation Authorities |

## Action D.8: Shoreline Management Partnership Strategy

**Action Type**

| Existing | Future |
|---|---|
| | ● |

The Credit Valley Conservation has outlined an Action Plan to restore the Mississauga shoreline, focusing on five restoration priorities. The recommendations have identified actions for which the City of Mississauga can provide support, several of which are supported by the various City actions outlined in Build Beautiful. The Credit Valley Conservation recommendations pertaining specifically to shorelines which have identified the City to support have been summarized below.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.8-1 | Manage Stormwater Quality & Quantity by:<br>• Incorporating provisions for shoreline structure life cycle management, maintenance and emergency repairs in leases and land management agreements.<br>• Continuing shoreline erosion monitoring program on public lands. | Policy | Ongoing | Medium | N/A | Underway | Credit Valley Conservation | Parks Operations, Environmental Services | Region of Peel, Provincial Government, Federal Government |
| D.8-2 | Improve Habitat Quality by:<br>• Creating site-level restoration plans and/or sustainable neighbourhood action plans and evaluate the feasibility and type of enhancement that should be directed at each location.<br>• Developing detailed nearshore aquatic habitat restoration plans to establish targets, prioritize efforts and create concept plans.<br>• Creating fish habitat along existing shoreline treatment structures. | Project | Medium | Medium | N/A | Planned | Credit Valley Conservation | Environmental Services | Provincial Government, Federal Government |

## Action D.8: Shoreline Management Partnership Strategy (Continued)

**Action Type**

| Existing | Future |
|---|---|
| | ● |

The Credit Valley Conservation has outlined an Action Plan to restore the Mississauga shoreline, focusing on five restoration priorities. The recommendations have identified actions for which the City of Mississauga can provide support, several of which are supported by the various City actions outlined in Build Beautiful. The Credit Valley Conservation recommendations pertaining specifically to shorelines which have identified the City to support have been summarized below.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.8-3 | Manage Existing Habitat by:<br>• Developing Official Plan policies and/or by-laws to achieve conservation actions and incorporate recommended conservation actions, where appropriate, through review of land use change proposals.<br>• Updating ecological land classification data across the Mississauga shoreline and include areas not yet surveyed, to better inform decision-making and track changes over time.<br>• Completing an assessment of Significant Wildlife Habitat along the Mississauga shoreline. | Project | Medium | Medium | N/A | Planned | Credit Valley Conservation | City Planning Strategies Environmental Services | Region of Peel |
| D.8-4 | Connect Habitat by:<br>• Where feasible, connecting aquatic habitats, including fish access from Lake Ontario, by removing engineered channels on public lands through public works projects coupled with naturalization and infrastructure redevelopment.<br>• Where feasible, promoting planting of native tree, shrub and herbaceous vegetation along the shoreline to (re)connect and enhance north-south and east-west habitat corridors. | Project | Long | Low | $$$ | Planned | Credit Valley Conservation | Environmental Services, Capital Works, Forestry | Region of Peel |

## Action D.8: Shoreline Management Partnership Strategy (Continued)

**Action Type**

| Existing | Future |
|---|---|
| | ● |

The Credit Valley Conservation has outlined an Action Plan to restore the Mississauga shoreline, focusing on five restoration priorities. The recommendations have identified actions for which the City of Mississauga can provide support, several of which are supported by the various City actions outlined in Build Beautiful. The Credit Valley Conservation recommendations pertaining specifically to shorelines which have identified the City to support have been summarized below.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.8-5 | Outreach, Education & Communications by:<br>• Enhancing educational opportunities about the history and natural heritage of the shoreline for people accessing public spaces along the Credit Valley Trail and the Waterfront Trail, including interpretive signage where strategic and appropriate.<br>• Enhancing multi-cultural and new Canadian access to the shoreline through experiential education services and partnering with Newcomer Centres.<br>• Promoting public access and stewardship of the shoreline and lake, emphasizing the linkage between nearshore habitat health and human health.<br>• Undertaking targeted outreach to priority homes along the shoreline for onsite conservation actions through the Naturescaping program. | Program | Long | Low | N/A | Planned | Credit Valley Conservation | Division, Parks Development | Non-Governmental Organizations, Community Associations, Private Landowners, Newcomers Centres |

## Action D.9: City-Wide Water Quality Retrofit Program

**Action Type**

| Existing | Future |
|---|---|
| ● | |

The City's first over-arching review of stormwater quality retrofit opportunities was completed in 1995. For many years, the principles within that document guided the retrofit program including identifying the 25% upper limit of total drainage area on an area-basis subject to water quality control. The update of Mississauga's Stormwater Quality Control Strategy in 2017 provided additional recommendations for opportunities to increasingly explore and carry out opportunities for water quality improvements to go beyond the 25% upper limit.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.9-1 | Utilizing the mapping database for the management of stormwater assets that is currently under development, complete a review of the watershed systems within the City to identify the level of quantity control achieved through existing stormwater management measures. | Program | Short | High | N/A | Not Initiated | Environmental Services | Geospatial Solutions | N/A |
| D.9-2 | Identify a priority list of watershed systems for water quality retrofits, based on a variety of factors (i.e., level of existing control, watershed sensitivity, number of sewershed outlets, identified issues, contributing land uses, cost-benefit for retrofit stormwater management etc.) and establish a schedule to complete detailed review of targeted areas. | Plan | Medium | High | N/A | Not Initiated | Environmental Services | Geospatial Solutions | Conservation Authorities |

## Action D.9: City-Wide Water Quality Retrofit Program (Continued)

**Action Type**

| Existing | Future |
|---|---|
| ● | |

The City's first over-arching review of stormwater quality retrofit opportunities was completed in 1995. For many years, the principles within that document guided the retrofit program including identifying the 25% upper limit of total drainage area on an area-basis subject to water quality control. The update of Mississauga's Stormwater Quality Control Strategy in 2017 provided additional recommendations for opportunities to increasingly explore and carry out opportunities for water quality improvements to go beyond the 25% upper limit.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.9-3 | Based on the identification and prioritization of target areas for water quality retrofits, integrate the findings with the other ongoing/planned City initiatives with internal stakeholders, including Stormwater Master Plan Actions such as:<br>• Outfall Monitoring (ref. Action D.1) – the identification of in-field water quality issues through monitoring can support the prioritization of retrofit opportunities.<br>• Incorporate retrofit prioritization as part of the Low Impact Development for Roads (Action B.2) selection tool and/or pilot study areas for Cooling Best Management Practices (Action B.5) in areas in need of improved water quality control.<br>• Identify existing stormwater management facilities (Action D.5) which may benefit from retrofit design, including both water quality and water quantity improvements (ref. Action B.3). | Program | Ongoing | Medium | $$ | Underway | Environmental Services | Transportation Asset Management., Capital Works, Climate Team | Conservation Authorities, Region of Peel, Sustainable Technologies Evolution Program, Sustainable Neighbourhood Action Program |

## Action D.9: City-Wide Water Quality Retrofit Program (Continued)

**Action Type**

| Existing | Future |
|---|---|
| ● | |

The City's first over-arching review of stormwater quality retrofit opportunities was completed in 1995. For many years, the principles within that document guided the retrofit program including identifying the 25% upper limit of total drainage area on an area-basis subject to water quality control. The update of Mississauga's Stormwater Quality Control Strategy in 2017 provided additional recommendations for opportunities to increasingly explore and carry out opportunities for water quality improvements to go beyond the 25% upper limit.

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.9-4 | Implement post-construction monitoring of new Low Impact Development Best Management Practices and stormwater management facility retrofits to assess performance of designs. Continue to update and refine the City's stormwater management asset management system and the level of water quality control across the City to monitor program progress. | Program | Long | Medium | $ | Ongoing | Environmental Services | Works Operations and Maintenance, Forestry, Facilities & Property Management, Transitway | Conservation Authorities |

## Action D.10: Open Ditch Management Strategy

Develop program(s) to prioritize and maintain urban areas of the City with a rural servicing standard (i.e. roadside ditches) and culvert assets.

**Action Type**

| Existing | Future |
|---|---|
| | ● |

| Supporting Activities | | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|---|
| D.10-1 | Initiate a project focusing on data collection and development of a digital inventory of City-wide ditch and culvert network to establish asset identification and support asset management program. | Project | Short | Medium | $$ | Not Initiated | Environmental Services | Geospatial Solutions; Transportation Asset Management., Works Operations and Maintenance | N/A |
| D.10-2 | Develop formal inspection and condition assessment program. Establish schedule, time requirements, and prioritization for inspections and condition assessment. | Plan | Short | Medium | $ | Not Initiated | Environmental Services | Transportation Asset Management., Works Operations and Maintenance | N/A |
| D.10-3 | Initiate program through continuous condition assessment (i.e., visual only), supplemented by engineering inspection (i.e., survey) to establish Capital Works requirements (i.e., survey, ditch grading, headwall, and culvert repair/replacement). | Program | Medium | Medium | $$ | Not Initiated | Environmental Services | Transportation Asset Management., Works Operations and Maintenance, Capital Works | N/A |

## 5.2 Core Service Line Enhancements

The development of the Stormwater Master Plan while largely focused on direct actions (existing or future) associated with the adaptive management cycle of infrastructure renewal, also considered the day-to-day workings of the City's stormwater group, and other municipal departments.

Given the overlap in services between departments, one group is often reliant on another in the fulsome service delivery to the public. The Stormwater Master Plan Team hence considered these services under a "Core Service Line" delivery model including four (4) categories:

- Policies, Guidelines, Regulations
- Development Review
- Capital Program
- City Operating Procedures

While none of the individual services would be considered an action or activity unto itself, various operational enhancements or needs became apparent over the course of the Stormwater Master Plan development based upon either feedback from staff and stakeholders, best practices review or legislative needs and these have been documented to improve overall service delivery under the foregoing core service lines.

Core Service Lines represent those functions conducted by a City as part of the current mandate whereby it delivers its services to the public. Some of the activities identified in the following tables are underway and others will be initiated to enhance the City's Core Service Lines as they relate to stormwater management.

## Capital Planning & Delivery Program for Storm Infrastructure

The Capital Planning & Delivery Program for Storm Infrastructure is a City-wide program that identifies strategic priorities for capital improvement projects and consists of the planning, design and construction of major and minor infrastructure projects. This stormwater aspect of the program is led by the City's Infrastructure Planning & Engineering Division, with support from a range of City divisions.

| Core Service Line Enhancements | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|
| **Create Solutions** | | | | | | | | |
| Design City owned facilities to meet interim and ultimate development conditions to ensure water quality, water quantity and erosion objectives are met under both conditions. | Program | Medium | Low | $ | Underway | Environmental Services, Capital Works, Facilities and Property Management, Parks Development | N/A | N/A |
| Assess which ditches warrant repair and/or upgrades to perforated and non-perforated pipe systems as part of the Capital Works projects. | Program | Long | Low | $$ | Not Initiated | Environmental Services | Capital Works, Works Operations and Maintenance | N/A |
| Assess potential for removing engineered channels as part of the Capital Works projects. | Program | Long | Low | $$$ | Not Initiated | Environmental Services | Capital Works | Conservation Authorities |
| **Celebrate Its Value** | | | | | | | | |
| Seek opportunities to acquire and enhance land along the waterfront for recreational and ecological value. | Program | Long | Low | $$$ | Not Initiated | Park Planning | Realty | Conservation Authorities |
| **Protect Its Quality** | | | | | | | | |
| Incorporate climate change resiliency and decision-making into infrastructure planning, including applying future rainfall scenarios. | Program | Ongoing | High | N/A | Planned | Environmental Services | Climate Team | Region of Peel |
| Formalize intake and hand-off process of new stormwater capital assets added to master inventory. | Program | Ongoing | High | $ | Not Initiated | Environmental Services | Capital Works, Geospatial Solutions | Transportation Asset Management |

## Development Review

The City partners with the Region of Peel and the Conservation Authorities on the review of development applications to ensure the respective municipal and other organizational policies are being met. Development Review is completed by Planners, Engineers and other Specialists, as appropriate. The Development Review Core Service Line is led by the City's Planning & Building Department, with support from various City departments, including Transportation and Works.

| Core Service Line Enhancements | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|
| **Understand Its Nature** | | | | | | | | |
| Undertake study to determine appropriate By-law regarding maximum impervious lot coverage. | Policy | Medium | Medium | $ | Not Initiated | Environmental Services | Development & Design (Planning and Building) | N/A |
| Develop mapping to identify where deeper basements may intercept the groundwater table, and develop subsequent policy to regulate development. | Project | Medium | Low | $$ | Not Initiated | Environmental Services | Development & Design (Planning and Building), Building Division | Conservation Authorities |
| **Create Solutions** | | | | | | | | |
| Revise review process to involve Stormwater Development Review team to review Industrial/ Commercial/Institutional properties rather than all properties which do not require Site Plan Control. | Plan | Short | Medium | $ | Not Initiated | Environmental Services | Development & Design (Planning and Building), Development Engineering (Transportation and Works) | N/A |

## Policies & Guidelines

The City's Policies & Guidelines provide direction on how to manage stormwater as related to land use change. Stormwater guidance ranges from recommended best practices to mandatory compliance requirements and notably reflects the requirements of upper tier regulators. The City partners with the Region of Peel and the Conservation Authorities to manage stormwater in Mississauga.

| Core Service Line Enhancements | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|
| **Understand Its Nature** | | | | | | | | |
| Incorporate Region of Peel Official Plan policy based on Peel Watershed Plans Synthesis Report into City Official Plan policies and operating procedures. | Policy | Short | High | N/A | Underway | City Planning Strategies | Environmental Services | Region of Peel |
| Undertake study to provide building guidance for high-risk intensification areas (particularly basement apartments) to reduce flooding. | Project | Short | High | $$ | Not Initiated | Environmental Services | Development & Design (Planning and Building) | Conservation Authorities, Region of Peel |
| Undertake studies to further the understanding of existing environmental conditions, with a focus on terrestrial and aquatic environments and partnership opportunities. | Plans | Long | Low | $$ | Underway | Environmental Services | Forestry | Conservation Authorities, Region of Peel |
| **Create Solutions** | | | | | | | | |
| Update Zoning By-law to provide land coverage guidance and set maximum impermeable surface areas. | Policy | Medium | Low | $ or N/A | Not Initiated | City Planning Strategies | Environmental Services | N/A |
| Enhance Green Development Standards to Green Development By-law, which requires rather than encourages application. | Policy | Short | Medium | $ or N/A | Not Initiated | City Planning Strategies | Environmental Services | N/A |
| Enhance Green Development Standards (or By-law) to include groundwater protection considerations and Low Impact Development Best Management Practices. | Policy | Short | Medium | $ or N/A | Not Initiated | City Planning Strategies | Environmental Services | N/A |

## Policies & Guidelines (Continued)

The City's Policies & Guidelines provide direction on how to manage stormwater as related to land use change. Stormwater guidance ranges from recommended best practices to mandatory compliance requirements and notably reflects the requirements of upper tier regulators. The City partners with the Region of Peel and the Conservation Authorities to manage stormwater in Mississauga.

| Core Service Line Enhancements | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|
| Include policy in the Official Plan which encourages lot-level stormwater controls in areas adjacent to key hydrologic features and key natural heritage features. | Policy | Short | High | N/A | Underway | City Planning Strategies | Environmental Services | Region of Peel |
| **Protect Its Quality** | | | | | | | | |
| Develop park standards that include measures to address resiliency to climate change influences in parks. | Policy | Medium | Medium | $ | Underway | Park Planning | Environmental Services, Climate Team | N/A |
| Complete a climate vulnerability assessment of all existing municipal stormwater assets. | Project | Medium | Medium | $$$ | Underway | Env Section | Environmental Services, Corporate Finance | N/A |
| Include policy in the City Official Plan which encourages lot-level stormwater controls in areas adjacent to key hydrologic features and key natural heritage features. | Policy | Short | High | N/A | Underway | City Planning Strategies | Environmental Services | Region of Peel |
| Coordinate with Municipalities to implement Great Lakes Strategy objectives and Source Water Protection Plan recommendations. | Program | Long | Medium | $$ | Not Initiated | Environmental Services | Environmental Services | Neighbours Municipalities, Region of Peel, Conservation Authorities |

## City Operating Procedures

Operating Procedures exist for each City Department and Division, and these provide direction to program objectives, asset maintenance frequencies, project priorities and management approaches. The Operating Procedures of the Works Operations & Maintenance and Infrastructure Planning & Engineering Divisions are particularly important to the management of the City's stormwater infrastructure.

| Core Service Line Enhancements | Activity Type | Timeline | Priority | Cost | Status | Lead | Support | Partnerships |
|---|---|---|---|---|---|---|---|---|
| **Create Solutions** | | | | | | | | |
| Conduct audit of municipal water provision services. | Project | Medium | Low | $ | Not Initiated | Environmental Services | Facilities & Property Management | Region of Peel |
| Increase water conservation practices for parking lot designs (e.g., permeable pavers to increase water infiltration). | Policy | Medium | Low | $ | Underway | Environmental Services, | Facilities & Property Management | Conservation Authorities |
| Coordinate cross departmental efforts to balance priorities like stormwater management, flood control and creating new active park space. | Plan | Medium | Medium | $ | Underway | Environmental Services | Park Planning | - |
| Increase projects which include naturalization of portions of lands now owned by the City or Conservation Authorities. Naturalization of park spaces needs will consider the balance of open space for passive and active recreational use. | Program | Long | Medium | $$ | Underway | Environmental Services | Park Planning, Forestry | Conservation Authorities |
| **Protect Its Quality** | | | | | | | | |
| Review existing watering programs based on changing climate conditions and consider alternative sources of water. | Program | Medium | Low | $ | Underway | Environmental Services | Forestry, Parks Operations, Facilities & Property Management | - |

## 5.3 Partnerships

As part of the investigative and consultation process for the Stormwater Master Plan, various Partnership opportunities were identified. This process involved consultation with City partners through the Stormwater Advisory Group, technical interviews with the City's Environmental Services Department to establish a clear understanding of Existing Actions, and "Roadshow" sessions held with several City departments that will be involved with the implementation of activities identified in the Stormwater Master Plan.

The External Partnerships Table summarizes the partnership opportunities identified with external stakeholders for all activities recommended in the Stormwater Master Plan. The Internal City Department/Division Partership Table summarizes the partnerships opportunities with City departments and divisions.

The significant number and range of partnership opportunities illustrates that active participation is required to achieve the goals identified within the City's Stormwater Master Plan. It is anticipated that through the implementation phase, these partnerships may grow and evolve to continue to support the goals of the Stormwater Master Plan, as well as additional City, stakeholder, and public initiatives and objectives.

### External Partnership Summary

| Agency Partnerships | Number of Opportunities |
|---|---|
| Federal | 2 |
| Provincial | 10 |
| Regional | 9 |
| Conservation Authorities | 13 |
| Other (e.g., Universities) | 7 |
| Total | 61 |

### Internal City Department / Division Partnership Opportunities Summary

| City Department / Division | Existing Actions | Future Actions | Core Service Lines |
|---|---|---|---|
| Forestry | 4 | 2 | 3 |
| Parks | 3 | 4 | 7 |
| Works Operations and Maintenance | 6 | 2 | 4 |
| Facilities and Property Management | 3 | 2 | 7 |
| Climate Change Team | 3 | 0 | 3 |
| Capital Works | 7 | 6 | 10 |
| Planning and Building | 3 | 4 | 12 |
| Total | 29 | 20 | 46 |

# 6.0 Conclusion

The City of Mississauga "Build Beautiful" Stormwater Master Plan is an aspirational plan intended to guide the City's stormwater management activities across a broad spectrum of infrastructure and environmental interests. Numerous stakeholders have been consulted as part of its development and the input received has been central to the formation and ultimate success of the plan. Some of the important highlights and components of the plan have included:

- Development of a Vision to guide plan development and frame the Stormwater Master Plan recommendations for the public and other stakeholders.
- Best Practices review of cities across Ontario, Canada and North America.
- Audit of "Mississauga Today" to capture a current understanding of the City's built and natural infrastructure.
- Establishment of the Adaptive Management process for Infrastructure renewal with four themes including Study, Design & Implement, Monitor & Maintain and Consult & Engage.
- Legislative Review of existing and proposed/ emerging legislation to ensure that the City is meeting its legal obligations related to stormwater management.
- Develop details associated with enhancements to Existing Actions and formulation of Future Actions to address the City's current and emerging responsibilities.
- Outline enhancements to existing Core Service Lines for delivery of stormwater management services.
- Establish implementation plan for recommended Actions and Core Service Line enhancements.

The City of Mississauga is currently meeting the majority of its obligations at the Federal and Provincial level with some notable emerging requirements resulting in additional stormwater actions and services.

The Stormwater Master Plan has identified and framed Future Actions and Core Service Line Enhancements to address these legislative gaps. The Stormwater Master Plan will be reviewed on a regular basis to confirm the progress of these initiatives, and identify any new or emerging requirements as they may arise, to ensure the City remains at the foreground of compliance across the Federal, Provincial and Municipal sectors.

# Glossary

### Asset

An item, thing, or entity that has potential or actual value to the City, including but not limited to tangible assets, natural assets, heritage or culturally significant assets and information assets.

### Asset Management

Asset Management is the coordinated activities of an organization to realize optimal value from its assets. It involves balancing costs, opportunities and risks against the desired performance of assets to achieve the City's objectives

### Built Infrastructure

In the context of stormwater management and flood prevention, built infrastructure refers to human-made elements, engineered and constructed measures and systems, such as pipes (sewers), pumping stations, catch basins, culverts, ditches, and detention ponds.

### Climate Change

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. Climate change is any systematic change in the long-term statistics of climate elements (such as temperature, sea level, precipitation, humidity, or winds) sustained over several decades or longer.

### SPC

Credit Valley - Toronto and Region - Central Lake Ontario Source Protection Committee.

### Floodline

A line as determined in accordance with criteria specified by the Provincial Government.

### Green Infrastructure

An infrastructure asset consisting of natural or human-made elements that provide ecological and hydrological functions and processes and includes natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces and green roofs.

### Levels of Service

Defined measure(s) for a particular activity or service. Levels of service will be either technical or community in nature.

### Low Impact Development

A stormwater management strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible. Low Impact Development comprises a set of site design strategies that minimize runoff and distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater. These practices can effectively remove nutrients, pathogens and metals from runoff, and they reduce the volume and intensity of stormwater flows. It has the same meaning as green infrastructure for stormwater management when it is a human-made (engineered) green infrastructure.

### ORMGP

Oak Ridges Moraine Groundwater Program.

### Natural Infrastructure

Intact or restored systems that deliver infrastructure outcomes and co-benefits for the environment and community, such as watercourses, wetlands, vegetative areas, ponds, shorelines and lakes.

### Natural Hazard Lands

Property or lands that could be unsafe for development due to naturally occurring processes. Along the shoreline of Lake Ontario, this means the land between a defined offshore distance or depth and the furthest landward limit of the flooding hazard, erosion hazard or dynamic beach hazard limits. Along river and stream systems, this means the land, including that covered by water, to the furthest landward limit of the flooding hazard or erosion hazard limits

### Runoff Control

The regulation of the rate of flow of surface runoff.

### ROW (Right-of-way)

Linear piece of land set aside for transportation purposes. Typically extends beyond the paved roadway.

### Stormwater

Rainwater and melted snow that flows over roads, parking lots, lawn and other sites in rural and urban areas.

### Stormwater Management Best Management Practices

A set of practices which includes techniques, measures, structural and non-structural controls that are used to manage the volume, discharge rate and quality of stormwater runoff, promote groundwater infiltration and reduce the release of pollutants into waterbodies and in-stream erosion.

Stormwater best management practices may include Low Impact Development techniques to replicate the natural hydrologic cycle through infiltration, evapotranspiration, reuse and storage such as innovative site design and landscaping to minimize imperviousness, permeable paving, greenroofs, rainwater harvesting and bioretention. Stormwater best management practices may also include roadway bioretention and stormwater management ponds.

### Subwatershed

The watershed of a tributary stream, sub-unit of a major watershed.

### Watercourse

An identifiable depression in the ground in which water flows regularly or continuously.

# Appendix A - Consultation Summary

Engagement was an integral part of developing the Stormwater Master Plan. The City worked closely with stakeholders, community partners and residents to develop a Plan that reflects the ideas and values of the diverse communities within Mississauga. This was done through:

- A Stakeholder Advisory Group
- Municipal Technical Consultation
- Public consultation including a Virtual Open House, two Online surveys and additional Online materials (e.g., project website, project information)
- Engagement with Indigenous Nations & Peoples
- Consultation with the City's Environmental Action Committee

The engagement process was designed to:

- Generate feedback on the plan, actions items, and themes
- Raise awareness about the importance of stormwater
- Establish partnerships and facilitate data sharing, lessons learned and program support

## Stakeholder Advisory Group

The Stakeholder Advisory Group included participants from the Region of Peel and local Conservation Authorities including Credit Valley Conservation, Conservation Halton and Toronto and Region Conservation Authority. The Stakeholder Advisory Group met at key milestones of the project to provide strategic direction, consult on existing initiatives, share data and collaborate on future programs and activities.

## Municipal Technical Consultation

Extensive consultation with staff from the City of Mississauga and the Region of Peel was conducted in order to receive feedback from all municipal staff that will be involved in the implementation of the Actions and Cores Service Line Enhancements. This included the establishment of a Core Project Team, Environmental Service Interviews, and a 'Roadshow'.

A Core Project Team was created to provide strategic direction throughout the Project, review study materials and discuss key City policies and initiatives.

Environmental Service Interviews were undertaken to establish an understanding of the existing stormwater actions being completed by the City. Interviews were conducted with ten City staff within Environmental Services, the primary division responsible for stormwater management. Discussions included staffing, budgeting, partnerships, emerging changes, and best practices that could be implemented.

A Roadshow was conducted with several departments across the City that were identified as having a lead or supporting role in the implementation of the Stormwater Master Plan activities. These departments included:

- Building
- Facilities & Property Management
- City Planning Strategies
- Capital Works within the Transportation & Works Department
- Environmental Services
- Parks, Forestry & Environment
- Works, Operations & Maintenance

The Roadshows provided the opportunity to discuss key activities forming Existing and Future Actions as well as Core Service Line Enhancements, to develop an implementation plan for each activity, including which department should lead or support the activity, timeline, and budget considerations.

## Public Consultation

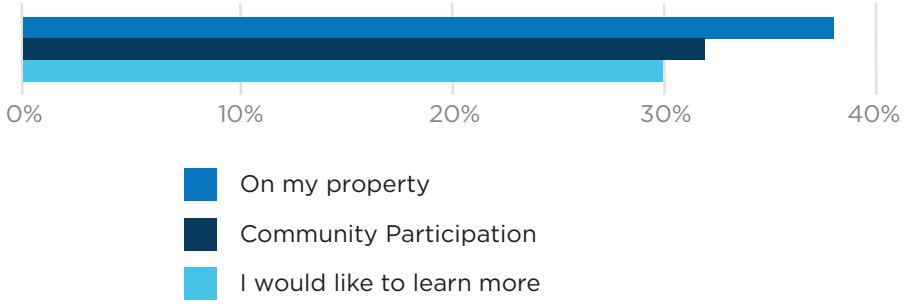
Public consultation was a central component to the engagement process. Various methods of engagement were employed to facilitate public engagement for residents, businesses, and stakeholders. This included a Social Flare, two Online Surveys, an Online Public Information Centre and online project materials.

The Social Flare included an online campaign for residents to submit stories and photographs of what they discovered as beautiful during the COVID-19 Pandemic Lockdown. The goal of the Social Flare was to identify a new context for community contribution to the Stormwater Master Plan.

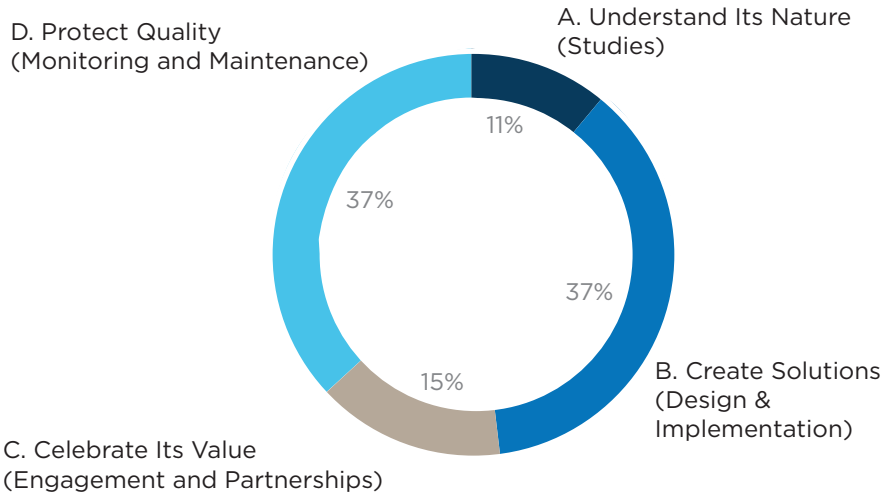
Two Online Surveys were conducted to receive feedback on Stormwater Master Plan actions and priorities. The first survey received 111 responses, while the second survey received 41 responses. The surveys provided valuable insight into public priorities regarding stormwater management practices in the City and informed the direction of the Stormwater Master Plan.

## What We Heard

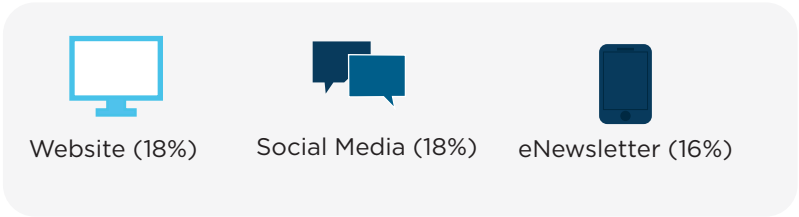
**How people think they can best support stormwater management in the City:**




**Theme areas that are of greatest importance:**



**How people would like to keep informed:**




**The importance of stormwater:**

89% think stormwater is either extremely or very important for the City to manage

90% are concerned about the environmental quality of the streams and rivers located within the City

An Online Public Information Centre was held on April 13th 2021, and provided background on stormwater and the City's existing stormwater program. Two sessions were held throughout the day and 41 participants attended.

These sessions included a presentation of the Stormwater Master Plan activities, online survey questions integrated throughout the presentation to receive feedback, and an open Question and Answer period. Topics included the role of legislation, the Stormwater Master Plan Framework and Actions, Core Service Line Enhancements and partnership opportunities.

## Public Consultation

Consultation in the form of written and verbal communication was conducted with the following Indigenous Peoples and Nations:

- Haudenosaunee Confederacy Chiefs Council (HCCC) represented by Haudenosaunee Development Institute (HDI)
- Six Nations of the Grand River (SNGR)
- Mississauga's of the New Credit First Nation (MNCFN)
- Huron-Wendat First Nation (HWN)

## Environmental Action Committee

The City's Environmental Action Committee is comprised of citizen and agency liaison members, individuals from local businesses, and City Councillors. This committee works to address local environmental issues and provides direction on a range of City initiatives.

Three presentations were provided to the Environmental Action Committee to receive direction at key milestones. These milestones include project initiation, early project development and the work plan, and the Stormwater Master Plan Framework and consultation summary.

# Appendix B - Legislative Requirements

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| Federal | Achieving a Sustainable Future – A Federal Sustainable Development Strategy for Canada 2019 to 2022 (2019) | 3 | 1 | - | 2 | 0 | N/A | 100% |
| | Canadian Environmental Protection Act (1999) | 2 | 1 | - | 1 | 0 | N/A | 100% |
| | Canadian Fisheries Act | 5 | 4 | 1 | | 0 | N/A | 100% |
| | Canadian Environmental Assessment Act | 1 | ? | - | 1 | 0 | N/A | 100% |
| | Species at Risk Act | 1 | - | - | 1 | 0 | N/A | 100% |
| | Navigable Waters Act | 2 | 1 | - | 1 | 0 | N/A | 100% |
| Provincial | Provincial Policy Statement | 36 | 21 | 9 | 4 | 0 | N/A | 100% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| Provincial | A Place to Grow: Growth Plan for the Greater Golden Horseshoe | 12 | 4 | - | 8 | 3 | 1. Implement legislative recommendation to include policy in the Official Plan which encourages lot-level stormwater controls in areas adjacent to key hydrologic features and key natural heritage features.<br>2. Coordinate with Municipalities to implement Great Lakes Strategy objectives and Source Water Protection Plan recommendations.<br>3. Undertake studies to further the understanding of existing environmental conditions. | 75% |
| | A Made-in-Ontario Environment Plan (2018) | 5 | 1 | - | 4 | 0 | N/A | 100% |
| | Building Code | 2 | | - | 2 | 0 | N/A | 100% |
| | Ontario Water Resources Act | 6 | 5 | 1 | - | 0 | N/A | 100% |
| | Provincial Water Quality Objectives | 3 | 2 | 1 | - | 0 | N/A | 100% |
| | Ontario Clean Water Act | 4 | 2 | 2 | - | 0 | N/A | 100% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| Provincial | Ontario Brownfields Act | 1 | 1 | - | - | 0 | N/A | 100% |
| | Ontario Emergency Management Act | 2 | 2 | - | - | 0 | N/A | 100% |
| | Ontario Water Opportunities Act | 5 | 3 | 1 | 1 | 2 | 1. Seek opportunities to partner with Region and Conservation Authorities to drive action in the field of One Water.<br>2. Conduct audit of municipal water provision services. | 60% |
| | Municipal Act | 6 | 4 | 1 | 1 | 0 | N/A | 100% |
| | Ontario Drainage Act | 2 | 1 | - | 1 | 0 | N/A | 100% |
| | Endangered Species Act | 1 | | - | 1 | 0 | N/A | 100% |
| | Lakes and Rivers Improvement Act | 1 | 1 | - | - | 0 | N/A | 100% |
| | O. Reg. 406/19 On-Site and Excess Soil Management | 1 | 1 | - | | 0 | N/A | 100% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| Provincial | Ontario Environmental Assessment Act | 4 | 3 | - | 1 | 0 | N/A | 100% |
| | MOE Stormwater Management Planning and Design Manual | 10 | 5 | 5 | - | 0 | N/A | 100% |
| | Low Impact Development Stormwater Management Guidance Manual (Draft) | 5 | 1 | 1 | 2 | 1 | 1. Expand on Green Development Standards to include Groundwater protection considerations. | 80% |
| | MNRF Natural Channel Systems: Adaptive Management of Stream Corridors in Ontario | 1 | 1 | - | - | 0 | N/A | 100% |
| | MNRF Natural Hazards: Technical Guides for Rivers and Stream Systems | 7 | 2 | 3 | 2 | 0 | N/A | 100% |
| | Watershed Planning in Ontario (Draft) | 3 | 1 | 1 | 1 | 0 | N/A | 100% |
| | MTO Drainage Management Manual | 3 | - | 2 | 1 | 0 | N/A | 100% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| Provincial | MTO Highway Drainage Standards | 2 | - | 1 | 1 | 0 | N/A | 100% |
| | MTO Stormwater Management Requirements for Land Development Proposals | 1 | - | - | 1 | 0 | N/A | 100% |
| Region of Peel | Region of Peel Official Plan | 14 | 2 | 4 | 4 | 0 | N/A | 100% |
| | Region of Peel Climate Change Master Plan (2019) | 13 | 7 | 5 | 1 | 0 | N/A | 100% |
| | Stormwater Servicing Master Plan for Regional Road Infrastructure | 3 | 1 | 1 | 1 | 0 | N/A | 100% |
| Conservation Authority | CVC Living by the Lake Action Plan | 24 | 15 | 3 | 6 | 2 | 1. Develop Shoreline Management Program.<br>2. Discuss whether parking lot design guidelines should be incorporated into City guidance documents with City partners (community centre recreation group, property development group). | 92% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| Conservation Authority | CVC Watershed Planning & Regulation Policies | 10 | 1` | 2 | 7 | 0 | N/A | 100% |
| | CVC Stormwater Management Criteria | 3 | - | - | 3 | 0 | N/A | 100% |
| | CVC Risk and Return on Investment Tool | 1 | - | 1 | | 0 | N/A | 100% |
| | TRCA Living City Policies | 10 | 1 | 2 | 7 | 0 | N/A | 100% |
| | TRCA Stormwater Management Criteria | 10 | 6 | 2 | 2 | 0 | N/A | 100% |
| | TRCA Approaches to Manage Regulatory Event Flow Increases Resulting from Urban Development | 2 | - | 2 | - | 0 | N/A | 100% |
| | Conservation Halton Land Use Planning Policy | 8 | - | 2 | 6 | 1 | 1. Develop Shoreline Management Program. | 88% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| **Conservation Authority** | Technical Guidelines for Flood Hazard Mapping | 3 | 1 | | 2 | 0 | N/A | 100% |
| | Low Impact Development Stormwater Management Planning and Design Guide | 4 | 1 | 2 | 1 | 0 | N/A | 100% |
| **Municipal Policies, Plans, and Strategies** | Strategic Plan | 5 | 3 | 1 | 1 | 0 | N/A | 100% |
| | Action Plan | 13 | 4 | 4 | 4 | 2 | 1. Develop water conservation program.<br>2. Seek opportunities to acquire and enhance land along the waterfront for recreational and ecological value. | 85% |
| | Official Plan | 35 | 10 | 5 | 15 | 3 | 1. Design facilities to meet interim and ultimate. development conditions<br>2. Determine suitability of stormwater ponds in parklands. | 80% |
| | Local Area Plans | 1 | - | - | 1 | 0 | N/A | 100% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| **Municipal Policies, Plans, and Strategies** | Climate Change Action Plan | 10 | 1 | 2 | 5 | 2 | 1. Create a Municipal Green Infrastructure Management Program.<br>2. Conduct a climate vulnerability assessment of all existing municipal assets. | 80% |
| | Living Green Master Plan | 15 | 7 | 2 | 6 | 2 | 1. Continue implementing Stormwater Quality Control Strategy.<br>2. Complete climate vulnerability assessment of all existing municipal assets, which is underway. | 87% |
| | 2019 Parks and Forestry Master Plan | 5 | - | - | 5 | 3 | 1. Implement policy recommendation to develop park standards that include measures to address resiliency in parks.<br>2. Incorporate Peel Watershed Plans Synthesis Report guidance into Official Plan policies and City operating procedures.<br>3. Develop a Watershed Plan or Watershed Plan Equivalency Document for the watersheds within the City, through coordination with the Conservation Authorities and partner municipalities. | 40% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| **Municipal Policies, Plans, and Strategies** | Waterfront Parks Strategy 2019 | 7 | 4 | 3 | - | 4 | 1. Implement new action, prioritizing opportunities in waterfront parks.<br>2. Develop Shoreline Management Program.<br>3. Continue existing action, consider more stringent requirements for businesses by lake/watercourses.<br>4. Implement new action, prioritizing opportunities in waterfront parks. | 43% |
| | Natural Heritage and Urban Forestry Strategy | 5 | 1 | - | 4 | 3 | 1. Consider legislation/ zoning which provides land coverage guidance and sets maximum impermeable surface areas.<br>2. Identify partnership opportunities and stewardship initiatives.<br>3. Increase naturalization efforts, support City Forestry Department. | 40% |
| | Salt Management Plan | 1 | - | - | 1 | 0 | N/A | 100% |
| | Spills Response Plan | 4 | 3 | - | 1 | 0 | N/A | 100% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| **Municipal Policies, Plans, and Strategies** | Stormwater Quality Control Strategy | 20 | 14 | 3 | 6 | 7 | 1. Upgrade ditches across City.<br>2. Develop ditch management strategy.<br>3. Incorporate retrofit recommendations into Asset Management strategy for Stormwater Management Facilities.<br>4. Incorporate new facility recommendations into capital works program.<br>5. Identify open ponds in downtown opportunities.<br>6. Incorporate stream restoration measures into Asset Management strategy for watercourses.<br>7. Incorporate stream restoration recommendations into capital works program. | 65% |
| | Stormwater Fees, Charges and Credit Program | 3 | 3 | - | - | 1 | 1. Explore alternative means of increasing credit program uptake (e.g., checklists). | 67% |
| | Stormwater Guidelines | 9 | 1 | 1 | 2 | 0 | N/A | 100% |
| | Erosion & Sediment Control Guidelines | 2 | - | - | 1 | 0 | N/A | 100% |

| Document Tier | Document | # Of Requirements | # Of Existing Actions | # Of Future Actions | # Of Core Service Line Enhancements | Legislative Gaps | Recommendations | Rate of Compliance |
|---|---|---|---|---|---|---|---|---|
| **Municipal Policies, Plans, and Strategies** | Green Development Standards | 2 | - | 2 | - | 1 | 1. Seek opportunities to implement new action, consider updating Green Development Standards to include cooling Best Management Practices. | 50% |
| | Sewer Use By-Law | 11 | 3 | 2 | 4 | 0 | N/A | 100% |
| | Development Charges By-Law | 1 | - | - | 1 | 0 | N/A | 100% |