CITY OF BARRIE

IMPLEMENTATION PLAN

CLIMATE CHANGE ADAPTATION STRATEGY

2018

ACKNOWLEDGEMENTS

The City of Barrie would like to thank everyone who generously shared their knowledge and time in developing the Implementation Plan for Barrie's Climate Change Adaptation Strategy. Climate change affects the entire municipality and will continue to affect it over the long-term. Adaptation planning is not the responsibility of any sole department or agency but requires considerable cooperation. Similarly, the implementation of adaptation actions requires the input and participation of various groups both within the City of Barrie and within the community. The development of the Implementation Plan was a collective effort including numerous City staff from a wide variety of departments, as well as various community organizations and stakeholders. Their insights, guidance and expertise helped to develop an Implementation Plan that is tailored to the City of Barrie's current conditions and future challenges.

Once again, thank you to all contributors for helping the City continue its efforts to build a stronger, more resilient community.

IMPLEMENTATION PLAN

CITY OF BARRIE CLIMATE CHANGE ADAPTATION STRATEGY

EXECUTIVE SUMMARY

Our climate is changing. According to the Intergovernmental Panel on Climate Change (IPCC), the leading international scientific community on climate change science, the warming of the climate system is now unequivocal. This is being experienced as increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea levels. For Canadians, this trend in warming will result in temperature changes on both a seasonal and daily basis. Furthermore, Canadians can expect to experience changes in precipitation patterns, greater climate variability, and an increase in the frequency and intensity of extreme rain events. While some changes may occur at a global scale, many impacts are felt at the local level. Anticipating the effects of climate change and taking actions before major impacts occur is an effective strategy to manage climate risk and reduce a community's overall vulnerability.

The City of Barrie recognizes the threat that climate change poses, both to its internal operations and the community. While the City has already undertaken numerous efforts to reduce its greenhouse gas emissions, including the development of its Active Transportation Plan and Energy Management Plan, the City also recognizes the need to adapt to the inevitable impacts of climate change. In 2016, the City hired ICLEI Canada and Lura consulting to develop a Climate Change Adaptation Strategy. Guided by ICLEI Canada's Building Adaptive and Resilient Communities Framework, the Adaptation Strategy consists of 59 actions and seven overarching goals that the City of Barrie will strive towards to increase its resilience. Included in the Strategy was a commitment from the City to develop an Implementation Plan, which details how the City is going to achieve the high-level actions outlined in the Strategy.

In 2017, the City of Barrie continued their work with ICLEI Canada and Lura Consulting to develop an Implementation Plan to complement the Adaptation Strategy. The intent of the Plan is to take the City from the planning stages of adaptation to on-the-ground implementation of priority actions. The process involved extensive engagement with City departments to identify important implementation considerations for each action, including responsible departments, budgets, timelines, supporting tasks, and measurements of success. All of this work culminated in the creation of Action-Specific Action Plans (ASAPs), which provide detailed implementation guidance for each of the priority actions from the Strategy.

The ASAPs are categorized under the seven goals from the Adaptation Strategy. For each ASAP, priority ratings, quick wins, mitigation co-benefits, and "people's choice" public priorities were identified. These considerations lend guidance to the timing of implementation for each ASAP, as well as the possible co-benefits and public support behind various actions. To ensure that progress on implementation is measured, a reporting template and framework was created. This reporting template will be used by every responsible department to report on the progress of implementation for the priority actions.

The Implementation Plan will serve as a means of guiding ownership, communication, and progress on Barrie's adaptation actions. The Plan ensures that each responsible department is doing what is necessary to fulfill the goals and intentions of the Adaptation Strategy, and also that adaptation actions are embedded into day-to-day City operations. Because of the multi-disciplinary nature of adaptation and the uncertainty around climate change planning, an intentionally flexible Implementation Plan is required to ensure that changes to available data, policies, funding and staff resources are accommodated.

THE PLANNING TEAM

The development of the Implementation Plan was successful due to the contributions of numerous individuals both within the City of Barrie and the community.

PROJECT TEAM

The Project Team consisted of members from the City of Barrie, ICLEI Canada, and Lura Consulting. The Project Team led the development of the Implementation Plan by facilitating workshops, conducting interviews with departmental staff, and conducting research into existing and best practices on adaptation.

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Hana Lapp, Adaptation and Resilience Planner, ICLEI Canada

Susan Hall, Vice President, Lura Consulting

Jeff Garkowski, Senior Planner & Project Manager, Lura Consulting

CONTRIBUTING CITY STAFF

Numerous City of Barrie staff from a variety of different departments contributed to the development of the Implementation Plan. Some of these individuals participated as part of the Adaptation Team, which was the core group involved in the development of the Climate Change Adaptation Strategy, and provided consultation on the Action-Specific Actions Plans (ASAPs) as well as the Daft Implementation Plan. Other City Staff participated in interviews and meetings with the Planning Team to provide department-specific expertise, context and ideas for the development of the ASAPs.

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Stephanie Zoschke, Senior Environmental Officer; Environmental Services

STAKEHOLDER ADVISORY GROUP

The Stakeholder Advisory Group (SAG) consisted of community stakeholders with interests and expertise in the areas of climate change and adaptation. Most of the members were also involved in the development of the Climate Change Adaptation Strategy. The SAG provided input in the development and review of the Implementation Plan and were able to highlight potential partnerships and community perspectives vital to the success of the Plan.

Peter Bursztyn, Environmental Advisory Committee

Mike Fox, Transition Barrie/Living Green

Morgan Levison, Simcoe Muskoka District Health Unit

Aileen MacMillan, Tourism Barrie/Explore Lake Simcoe Sustainable Tourism

Mike McCann, Ward 10 Councillor

Alan McNair, Brereton Field Naturalists

Geri Poisson, Environmental Advisory Committee

Clinton Reynolds, Environmental Advisory Committee

Craig Stevens, Downtown Barrie BIA

Sean Stewart, Canadian Red Cross Simcoe Muskoka Branch

Glenn Switzer, Nottawasaga Valley Conservation Authority

Bill Thompson, Lake Simcoe Region Conservation Authority

Kathleen Trainor, Tourism Barrie/Explore Lake Simcoe Sustainable Tourism

Marina Whelan, Simcoe Muskoka District Health Unit

Jenna Zardo, Barrie Urban Pantry Project/Fruit Share Barrie

Naomi Wachowiak, Simcoe Muskoka District Health Unit

INTRODUCTION

2017 CLIMATE CHANGE ADAPTATION STRATEGY

At the local scale, climate change impacts the physical, natural, economic, and social systems across a community. The City of Barrie recognizes this and has already experienced the impacts of climate change first-hand on several of its municipal operations. In response, the City of Barrie released its first ever Climate Change Adaptation Strategy in early 2017.

Development of the Adaptation Strategy began in 2016, guided by the cross-departmental Adaptation Team, which was the core group contributing to the adaptation planning effort. Plan development was also guided by the Stakeholder Advisory Group, which consisted of community partners and experts in the areas of climate change, adaptation, health, and the environment.

The Strategy is built on a unified vision:

"Barrie will adapt to changing climate conditions and embrace new opportunities to remain a vibrant, healthy, and sustainable waterfront community."

To actualize this vision, seven different goals, and one cross-cutting action section, were developed to frame the actions contained in the Strategy:

Cross-Cutting Actions

Goal 1: Maintain Public Health and Safety

Goal 2: Minimize Risks to Buildings and Properties

Goal 3: Strengthen Infrastructure Resilience

Goal 4: Help Local Businesses and the Tourism Industry Adapt to Changing Conditions

Goal 5: Protect Biodiversity and Enhance Ecosystem Functions

Goal 6: Minimize Disruption to Community Services

Goal 7: Build Community Resilience

Each goal encompasses a list of priority adaptation actions that will improve the City's preparedness, response, and overall resilience to localized climate change impacts. The Adaptation Strategy is intended to help coordinate decision-making and planning efforts, in hopes of reducing known vulnerabilities to climate change, while building resilience across City operations.

Barrie's Climate Change Adaptation Strategy is available for viewing on the City of Barrie website.

PURPOSE OF THE IMPLEMENTATION PLAN

The current reality is that many municipalities fail to implement their planned initiatives due to lack of resources and support at the implementation stage.

Having a detailed Implementation Plan and access to a wide range of implementation approaches is essential to achieving an action. Planning for implementation improves the likelihood of effective adaptation, provides new opportunities for outreach and engagement, and fosters long-term sustainability of the action by integrating multiple streams of support.

Shortly after the creation of the Adaptation Strategy, the City of Barrie began developing an Implementation Plan to ensure priority actions are implemented across departments. The Implementation Plan describes how the City will achieve the actions outlined in the Strategy, identifies community partners, and establishes a framework for reporting on implementation progress. Action Specific Action Plans tailor each adaptation action to it's responsible or supporting departments and groups within the City. The plan includes step-by-step processes for staff to take ownership of and implement actions as part of their roles at the City.

The Implementation Plan also identifies opportunities to integrate actions into current municipal operations, streamlining processes and taking advantage of existing resources.

The Plan employs an integrated implementation approach, meaning that a variety of different implementation tools will be used to achieve adaptation actions. Examples of these tools include communications/marketing initiatives, municipal policy tools, and education/training programs. Using an Integrated Approach helps to maximize the reach and impact of each action and encourages buy-in or compliance from both internal and external stakeholders.

OUR APPROACH

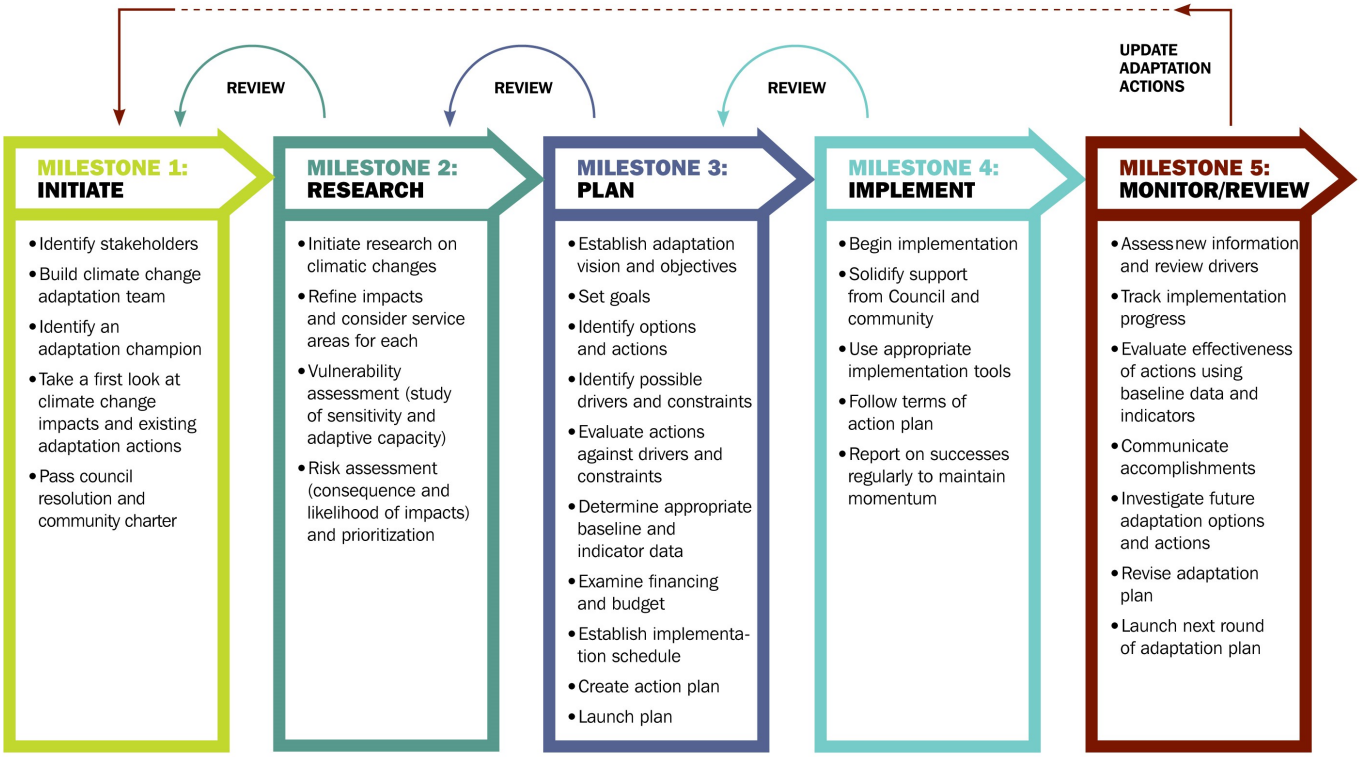
BARC PROCESS

The Building Adaptive and Resilient Communities (BARC) Program was developed by ICLEI Canada following the release of Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation in 2010. The BARC Program provides a framework and protocol guiding municipalities through a comprehensive planning methodology that includes research and climate impact assessment methods, plan development, action-setting processes, implementation planning, and monitoring and review strategies (see Exhibit 1).

Guided by Milestones 1-3 of the BARC methodology, Barrie's Adaptation Strategy was developed through extensive collaboration with City departments and community stakeholders. Following research on local climate projections, over 60 climate change impacts were initially identified for the City of Barrie. Risk and vulnerability assessments were then conducted to prioritize climate change impacts, resulting in 28 impacts being brought forward into the planning stage. From there, the City developed actions it could take in order to adapt. Following analysis by the Project Team, a total of 59 actions were selected as priority 'Must Do' adaptation actions.

The Implementation Plan is based on Milestone Four and Five of the BARC program. In the fourth milestone, Implement, municipalities work to ensure that they have the appropriate implementation tools as well as the necessary support and engagement to enact the Climate Change Strategy. To obtain the Milestone, municipalities establish the details necessary to ensure effective implementation of each action outlined in the Strategy.

Exhibit 1: BARC Milestone Framework



Though the City of Barrie has made strides towards becoming more adaptive, it is through the implementation phase and beginning to put the Strategy into action that it will improve its adaptive capacity.

The fifth and final Milestone, Monitor and Review, serves to assess whether the goals previously set by the City have been achieved and to identify any problems that have been encountered with an aim of developing solutions. In order to measure success, the Implementation Plan includes both process and outcome-based indicators, to measure the status and outcomes of each action over time. Fundamentally, tracking the community's progress is meant to gauge the implementation status of each adaptation action, and to identify whether these actions are helping to improve adaptive capacity and achieve the climate adaptation vision established in the Strategy during Milestone Three.

PRIORITIZATION AND QUICK-WINS

One of the first steps in creating the Implementation Plan was establishing which actions were a priority to both the City and Community, and which actions could serve as "quick-wins".

Workshops were held with both the Adaptation Team and the Stakeholder Advisory Group to review the actions, select priorities, identify quick wins, and begin to identify implementation considerations.

Priority Actions: Actions were assigned a priority of either one, two or three. While all of the actions in the Implementation Plan will be implemented, not all of them can be implemented at the same time. The prioritization is intended to be a reference for the City to use when prioritizing implementation and will be a factor among other considerations such as available budgets and resources.

Quick-Win Actions: Quick wins are actions that require limited resources and time to implement. Quick wins tended to include actions that were already planned for, or that were slight modifications of current practices.

The Implementation Plan recognizes existing actions that are either already planned or currently underway, and which address priority impacts. While these actions may exist in other existing plans and policies, they were included in the original Climate Change Adaptation Strategy as means to recognize the efforts the City is already undertaking to increase its adaptive capacity

ACTION-SPECIFIC ACTION PLANS (ASAPS)

Central to the development of the Implementation Plan was the creation of Action-Specific Action Plans or ASAPs for each of the priority actions. The ASAPs are intended to show the key implementation information for each action in an easy to use format. They outline responsibilities, current practices, supporting tasks, timelines, financials, and indicators for each action, and will act as key guidance documents for the implementation process.

Each department responsible for implementation was consulted in the development of their assigned actions. Conference calls and in person meetings were held to discuss how the action and supporting tasks could be implemented at the departmental-level, and how it could fit within current contexts. It was important for the City to ensure that the ASAPs both fulfilled the commitments made in the Climate Change Adaptation Strategy, while also ensuring they could be implemented by City staff under current conditions or with additional identified resources.

It is important to note that while the Implementation Plan builds off the preliminary implementation schedule established in the City of Barrie's Climate Change Strategy, changes have been made. In some cases, actions were re-worded or edited to provide clarity to departments or align with an existing practice or opportunity. In all cases, the intention of the action remains the same, but supporting tasks and additional considerations may be included in the Implementation Plan that were not originally considered in the Adaptation Strategy. Furthermore, lead and supporting departments were sometimes changed once the clarity and scope of actions were further defined.

The ASAPs are intended to be living documents, which will allow the City to accommodate unexpected challenges, or capitalize on new opportunities.

READING THE ASAPS

Each of the ASAPs have been divided into seven sections. These sections include:

1. Background Information - This section provides context concerning the purpose and scope of the action, as well as some information taken from the original implementation schedule in the Adaptation Strategy. This section includes:

a. **Objectives** – Outlines what the action is trying to achieve.

b. **Action Description** – Provides detail on the scope and intention of the action.

c. **Action Rationale** – Describes why it is important to implement the action.

d. **Supporting Actions from Adaptation Strategy** - In certain cases, actions have been grouped together in the same ASAP if they exist under the same Goals and strive towards similar outcomes.

e. **Potential Partnerships or External Resources**– These include possible external partnerships that the City could pursue to implement the action, or organizations that could provide information or other resources to aid implementation

f. **Associated Plans and Strategies** – This section lays out any applicable or relevant plans and policies already in place in the City that could support or address the action.

2. Municipal Leads - This section outlines which department will be responsible for leading the implementation of the action. In some cases, supporting departments have also been identified if implementation requires contributions from multiple departments.

3. Timeline – An overall timeline for the implementation of the action is identified here. It provides an estimate start date, the duration of implementation (i.e. the length of a project), and the number of times the action is implemented in a period of time. In many cases, the action is a continuous activity as opposed to a one-off, in which cases it is identified as “ongoing”.

4. Current Status/Practice – Departments identified any existing or current practice in relation to the action. In certain cases, the action is building on or improving current practices, while other times there is no current practice in place.

5. Action Plan Tasks – This section is where the majority of the guidance for implementing the action is included. It outlines specific, detailed steps that departments will need to take in order to implement the overarching action. Alongside the identified tasks, estimated start dates, initial costs, and ongoing costs, as well as the responsible department have been outlined. While each ASAP already has a lead department identified, there are certain action plan tasks that require action from other departments.

6. Measuring Success - Indicators have been developed for each action, where feasible. Effort was taken to identify indicators that already exist or that are already being tracked by the City. In cases where indicators exist, departments identified where the information can be found. A department was also assigned for tracking progress for each indicator. For some actions, indicators will be identified as implementation progresses.

7. Additional Notes/Comments – Additional information that is important or relevant for the action but was not captured in any of the other categories was listed here. Examples include known or existing funding opportunities, external technology or resource needs, and possible constraints to implementation.

GOALS AND ACTIONS

The ASAPs for each priority action have been divided out under the seven Goals from the Climate Change Adaptation Strategy (including the Cross Cutting Actions). In most cases, the Action ID assigned to each ASAP aligns with the Action ID from the 2017 Adaptation Strategy. Any changes to Action IDs from the Adaptation Strategy to the Implementation Plan are outlined in Appendix B.

CROSS CUTTING ACTIONS

GOAL 1: MAINTAIN PUBLIC HEALTH AND SAFETY

GOAL 2: MINIMIZE RISKS TO BUILDINGS AND PROPERTIES

GOAL 3: STRENGTHEN INFRASTRUCTURE RESILIENCE

GOAL 4: HELP LOCAL BUSINESSES AND THE TOURISM INDUSTRY ADAPT TO CHANGING CONDITIONS

GOAL 5: PROTECT BIODIVERSITY AND ENHANCE ECOSYSTEM FUNCTIONS

GOAL 6: MINIMIZE DISRUPTION TO COMMUNITY SERVICES

GOAL 7: BUILD COMMUNITY RESILIENCE

GOAL ICON LEGEND

Each introductory page outlines the purpose of the Goal and the actions included. For each ASAP, prioritizations, quick wins, mitigation co-benefits, and "people's choice" considerations have been identified.

Icon	Name	Description
	Prioritization	The Adaptation Team and Stakeholder Advisory Group assigned a priority level to each action. The prioritization is intended to be a reference for the City to use when selecting which actions to implement first. 1 indicates a high priority, while 3 indicates a low priority.
	Quick Win	"Quick wins" are actions that require limited resources and time to implement. Quick wins tended to include actions that were already planned for, or that were slight modifications of current practices.
	Mitigation Co-benefit	"Mitigation co-benefits" identifies any adaptation actions that may also serve to reduce greenhouse gas emissions. These actions may include increasing tree planting or natural areas, as these actions provide carbon sequestration.
	People's Choice	"People's Choice" identifies actions that were selected as top priority to the community. Actions were voted on by members of the community during a 'Climate and Environment Fair', as well as through an online survey. Actions that received less than five votes have a single person icon, those that received between 5 and 10 votes received a three-person icon, and those that received more than 10 votes were given a crowd icon.

Exhibit 2: Goal Icon Legend


CITY OF BARRIE

CROSS CUTTING ACTIONS

Cross-cutting actions are actions that are applicable across a range of Goals. For this Strategy, these actions primarily refer to integrating climate change considerations into existing plans, policies, and frameworks. Factoring climate change into Barrie's programs, plans, and policies is one of the most important ways the City can contribute to adaptation while simultaneously supporting planning and decision-making processes. Integrating climate change considerations across the corporation provides a more effective, efficient, and sustainable use of resources. Rather than designing and managing climate policies separately, incorporating these policies into ongoing activities allows for a holistic approach to adaptation.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
CC.2 & CC.1	Integrate climate change considerations into Barrie's existing plans and policies (e.g. Multi-Modal Transportation Master Plan, Emergency Management Plan, etc.) Incorporate climate change into the Official Plan	1			
CC.3	Develop education initiatives to lead and encourage awareness of the City's efforts towards adapting to climate change for Barrie residents and businesses. When possible, integrate these initiatives into existing programs and communications.	1			

ACTION CC.2

Integrate climate change considerations into Barrie's existing plans and policies (e.g. Multi-Modal Transportation Plan, Transportation Master Plan, Emergency Management Plan, etc.)

1. Background Information	
Objectives	• Mainstreaming climate change considerations
Action Description	As municipal plans and policies are updated on a regular basis, the City of Barrie will work to integrate climate change considerations into existing plans and policies during review.
Action Rationale	Incorporating climate change into existing plans and policies helps to mainstream these considerations into municipal day-to-day activities. It will help towards ensuring community resilience in the face of climate change impacts.
Supporting Actions from Adaptation Strategy	CC.1 - Incorporate climate change into the Official Plan
Potential Partnerships or External Resources	Active Transportation Working Group, Emergency Management Working Group
Associated Plans and Strategies	As identified

2. Municipal Leads	
Lead Department	Engineering—Source Water Protection
Supporting Department(s)	Planning & Building Services—Planning Services; Others as identified

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Dependant on review schedules
Frequency of Implementation	Dependant on number of policies and plans that need to have climate change implemented

4. Current Status/Practice
The Climate Change Adaptation Strategy was completed and endorsed by Council in 2017.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Begin Official Plan review and have climate change incorporated (to incorporate in other plans and policies).	2019	N/A	N/A	Engineering – Source Water Protection & Planning & Building Services – Planning Services
Liaise with all City departments to develop inventory of all plans and policies that may need to have climate change considerations included.	2018	Staff time	N/A	Engineering – Source Water Protection
Work with responsible departments to incorporate climate change considerations as appropriate within their respective plans and/or policies during the next update.	Dependant on department review period	Staff time	N/A	Engineering – Source Water Protection

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
CC.2.1	% of identified plans and policies with climate change considerations included	No	Engineering—Source Water Protection

7. Additional Notes/Comments

Possible Plans/Policies that could include climate change considerations:

- Economic Development Strategy
- Parks Master Plan
- Comprehensive Stormwater Management Master Plan
- Drainage Master Plan
- Multi-Model Active Transportation Plan

ACTION CC.3

Develop education initiatives to lead and encourage awareness of the City's efforts towards adapting to climate change for Barrie residents and businesses. When possible, integrate these initiatives into existing programs and communications.

1. Background Information	
Objectives	• Improve awareness among residents and businesses of the City's climate change adaptation efforts • Mainstream climate change into existing communications and programs
Action Description	The City will continue to develop climate change-related communications and programming for the Barrie community. Efforts will be focused on highlighting existing climate change adaptation measures taken by the City and future projects that may come as a result of the Climate Change Adaptation Strategy.
Action Rationale	Improving citizen and staff awareness of climate change will work to embed climate change resilience and preparedness into day-to-day activities. It will help towards ensuring community resilience in the face of climate change impacts.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Simcoe Muskoka District Health Unit; Media; Community Organizations; Active Transportation Working Group
Associated Plans and Strategies	Climate Change Adaptation Plan

2. Municipal Leads	
Lead Department	Engineering—Source Water Protection
Supporting	Access Barrie; Others as identified

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

The City currently hosts a climate change webpage, and has lead a public open house, as well as several pop-up engagement events as part of the development of the 2016 Climate Change Adaptation Strategy.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Plan overall climate change communications and education program including all other Climate Change Adaptation actions that involve public communication plans.	2018	N/A	N/A	Engineering – Source Water Protection
Identify existing City communication programs that could also support climate change messaging.	2018	Staff time	N/A	Engineering – Source Water Protection
Develop key messages that target these programs and that highlight climate change co-benefits.	2018	Staff time	N/A	Engineering – Source Water Protection & Access Barrie
Add key messaging where these programs are currently advertised (e.g. website) and integrate with other environmental communications and education programming (e.g. waste diversion, water conservation, anti-idling, energy saving, active transportation, etc.).	2018	Staff time	Staff time	Engineering – Source Water Protection & Access Barrie
Develop communications plan.	2018	Staff time	Staff time	Engineering – Source Water Protection & Access Barrie
Collaborate with departments who may have information to guide development of communications plan.	2018	Staff time	N/A	Engineering – Source Water Protection
Implement communications plan.	2018	Staff time	Staff time	Engineering – Source Water Protection & Access Barrie

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
CC.3.1	Number of programs that have highlighted climate change co-benefits	No	Source Water Protection

7. Additional Notes/Comments

Additional indicators will be determined as implementation progresses.

GOAL 1: MAINTAIN PUBLIC HEALTH AND SAFETY

Climate change comes with great public health and safety concerns. Over the coming decades, Barrie will experience more severe and potentially threatening weather and climate phenomena such as extreme heat, extreme cold, and freezing rain events. Additionally, impacts due to vector-borne diseases (e.g. West Nile and Lyme disease) are expected to increase in the future and have direct implications for the health and safety of residents. Everyone will be affected by climate change, but vulnerable communities in Barrie including children, the elderly, the homeless, and those with existing health conditions may be particularly affected. In the face of a changing climate, the City of Barrie is committed to maintaining the health, safety, and wellness of the entire community.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
1.1	Improve communications to the public regarding road conditions and municipal facility closures during extreme weather events.	2	✓		✓
1.2	Continue to work towards blue flag certifications for all of Barrie's beaches.	3	✓	✓	✓
1.3	Continue to communicate beach closures and swimming advisories to the public.	3	✓		✓
1.4	Support the continued implementation of Barrie's Geese Management Program.	3	✓		✓
1.5	Require adherence to the Threshold Limit Values (TLVs) for excessive weather events recommended by the Ministry of Labour (via work procedures, education and training of staff) to reduce heat or cold stress and maintain productivity.	2	✓		✓
1.6	Partner with Simcoe Muskoka District Health Unit to address climate change considerations in food-security communications and programming.	2		✓	✓
1.7	Consider impacts and risks of increased disease vectors in design and operation of storm water infrastructure (e.g. avoiding ponding/ standing water).	2	✓		✓

ACTION 1.1

Improve communications to the public regarding road conditions and municipal facility closures during extreme weather events.

1. Background Information	
Objectives	• Improved driver awareness and preparedness • Increased resident awareness of municipal facility closures
Action Description	The City of Barrie is already experiencing increased freezing rain, thunderstorms, and snow storms. The City of Barrie will continue to explore new ways to improve communication to the public on road conditions and municipal facility closures during extreme weather events.
Action Rationale	Improved communications on road conditions and municipal facility closures may help to reduce vehicle accidents and improve public health and safety.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Media
Associated Plans and Strategies	Emergency Management Plan

2. Municipal Leads	
Lead Department	Access Barrie
Supporting Department(s)	Roads, Parks and Fleet, Barrie Fire and Emergency Service, Corporate Facilities, Recreation Services.

3. Timeline	
Estimate Start Date	Ongoing - Winter 2016
Estimated Duration	Ongoing
Frequency of Implementation	As required

4. Current Status/Practice
Road conditions and municipal facility closures are currently communicated to the public through various media, including social media, the City of Barrie website, media advisories, e-mails, voicemails to staff, and special e-news bulletins.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing/ Operating Cost	Responsible Department
Refine organizational charts and establish SOPs so that Access Barrie has up-to-date contact information for the relevant staff members who are responsible for assets.	Summer 2018	N/A	N/A	Roads, Parks & Fleet; Corporate Facilities
Install cameras at major hubs of the City to provide real-time images to aid in the response after an extreme weather event.	Summer 2018	Varies	Varies	Roads, Parks & Fleet
Continue regular media updates regarding snowfall and road conditions (this information is repurposed via our various communications outlets and shared with Service Barrie).	Winter 2016/2017	N/A	N/A	Access Barrie
Review process/chain of information/information flow with Roads, Parks & Fleet during extreme weather.	Summer 2018	N/A	N/A	Access Barrie

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
1.1.1	Reduction in calls to Service Barrie concerning winter control issues.	Yes, Service Barrie	Service Barrie
1.1.2	Reduction in calls to Service Barrie with complaints regarding municipal facility closures.	Yes, Service Barrie	Service Barrie

7. Additional Notes/Comments

N/A

ACTION 1.2

Continue to work towards blue flag certifications for all of Barrie's beaches.

1. Background Information	
Objectives	• Increased public awareness • Healthier beaches • Tourism benefits (specifically sustainable tourism)
Action Description	Blue Flag is a world-renowned eco-certification for beaches and marinas. The City of Barrie will continue to work towards Blue Flag certifications for public beaches, including Centennial Beach, Johnson's Beach, Minet's Point Beach, Tyndale Beach, and Wilkins Beach.
Action Rationale	Climate change is expected to increase the incidence of diseases contracted by swimmers. Recreational waters located in areas where climate change causes increased precipitation and runoff are more likely to become contaminated with pathogens. Blue Flag certification ensures that a beach is clean, accessible, has superior water quality, has a healthy ecosystem, and meets high safety standards, thereby reducing the impacts of climate change.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Private marinas, Businesses (i.e. boat and other watercraft rental businesses), Tourism Barrie, Simcoe Muskoka District Health Unit
Associated Plans and Strategies	Waterfront and Marina Strategic Plan

2. Municipal Leads	
Lead Department	Corporate Facilities
Supporting Department(s)	Environmental Services—Environmental Operations Branch

3. Timeline	
Estimate Start Date	Ongoing - Began in 2015
Estimated Duration	Ongoing
Frequency of Implementation	Annually

4. Current Status/Practice

The City of Barrie Marina received a Blue Flag certification in 2015. The City will continue to pursue certification for other beaches in the area where feasible.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Continue to renew Blue Flag membership for City of Barrie Marina.	Ongoing/ Seasonally	$600	$600	Corporate Facilities
Work with the Barrie Marina staff on lessons learned related to their experience with the Blue Flag certification process.	Summer 2018	N/A	N/A	Corporate Facilities
Identify the highest priority beach(es) at which to pursue Blue Flag certification first .	Summer 2018	N/A	N/A	Corporate Facilities
Incorporate Blue Flag certification for new beaches in Waterfront and Marina Strategic Plan.	During Plan Update	N/A	N/A	Corporate Facilities

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
1.2.1	Percentage of Barrie's recreational beaches with Blue Flag certification	Yes, Corporate Facilities	Corporate Facilities

7. Additional Notes/Comments

N/A

ACTION 1.3

Continue to communicate beach closures and swimming advisories to the public.

1. Background Information	
Objectives	• Improved public safety • Greater awareness of closures and advisories
Action Description	A swim advisory is a warning to swimmers, but it is not a beach closure. During a swim advisory, a beach is posted with warning signs when the water contains levels of bacteria that indicate there may be an increased risk of developing minor skin, eye, ear, nose and throat infections and stomach disorders. A beach closure is issued when a catastrophic event occurs or an immediate risk to health is present. The City of Barrie will continue to work with the Simcoe Muskoka District Health Unit to communicate these closures and advisories to the public.
Action Rationale	Climate change is expected to increase the incidence of diseases contracted by swimmers. Recreational waters located in areas where climate change causes increased precipitation and runoff are more likely to become contaminated with pathogens. Ensuring the effective communication of beach closures and swimming advisories will help reduce the health and safety risks to swimmers.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Simcoe Muskoka District Health Unit
Associated Plans and Strategies	Waterfront and Marina Strategic Plan

2. Municipal Leads	
Lead Department	Environmental Services – Environmental Operations Branch
Supporting Department(s)	Roads, Parks & Fleet - Traffic & Parking Services; Access Barrie; Corporate Facilities; Recreation Services

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Annually—Spring and Summer

4. Current Status/Practice

The Simcoe Muskoka District Health Unit is the regulatory body that oversees the Beach Program. Barrie beaches involved in the Beach Program are Centennial Beach, Johnson's Beach, Minet's Point Beach, Tyndale Park, and Wilkin's Beach. Samples are taken on a weekly basis by the City's Environmental Compliance team and these samples are delivered to the Provincial Lab in Orillia. The advisory/closure is based on sampling that was representative of beach water quality sampled over 24 hours the previous day. Results cannot be provided real time. The Health Unit analyzes the samples and determines if a beach Advisory or Closure is required. The Health Unit communicates the requirement for the City to post signs at the beaches to the Environmental Operations Branch. The Environmental Operations Branch communicates the advisory/closure by email to key City staff according to an existing procedure. Environmental Operations posts the applicable signs at the impacted beaches and Traffic & Parking Services posts signs at nearby parking lots at the pay machines. Access Barrie will post advisories and closures through the City's Twitter account. All questions regarding the program are directed to the Health Unit. During the sampling season, swim advisories and closures are posted on the Health Unit's website.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Continue to post beach closures and advisories signs and notify key staff.	Ongoing	N/A	Staff time	Environmental Services – Environmental Operations Branch; Roads, Parks & Fleet - Traffic Services
Continue to post closures and advisories on Twitter.	Ongoing	Staff time	Staff time	Access Barrie

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
1.3.1	Annual number of beach closures vs. Annual number of beach closures communicated	Yes, SMDHU	Environmental Services – Environmental Operations Branch & Access Barrie
1.3.2	Annual number of swimming advisories vs. Annual number of beach advisories communicated	Yes, SMDHU	Environmental Services – Environmental Operations Branch & Access Barrie

7. Additional Notes/Comments

N/A

ACTION 1.4

Support the continued implementation of Barrie's Geese Management Program.

1. Background Information	
Objectives	• More usability of waterfront parkland • Improved beach area water quality • Improved community health and safety
Action Description	The Geese management program helps control the population of geese using the park areas on Barrie's waterfront.
Action Rationale	Reducing the number of geese on City waterfronts will improve beach water quality and the health of waterfront parks.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Blue Flag Beach Program, Lake Simcoe Region Conservation Authority (LSRCA), Ministry of Natural Resources and Forestry (MNRF), Ministry of Environment and Climate Change (MOECC), Simcoe Muskoka District Health Unit
Associated Plans and Strategies	Geese Management Program

2. Municipal Leads	
Lead Department	Roads, Parks & Fleet – Parks & Forestry
Supporting Department(s)	Access Barrie; Environmental Services – Environmental Operations Branch

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice
The City currently undertakes a number of federally-approved geese prevention methods, including dog patrols, avian dissuader laser light, avian distress call, marine and shoreline control, pyro technics, and egg oiling.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Continue City funding of project.	Ongoing	N/A	$50,000 (plus 70 hours annually of staff time)	Roads, Parks & Fleet – Park Operations
Monitor success of various strategies.	Annually	N/A	20 hours of staff time	Roads, Parks & Fleet – Park Operations
Explore opportunities to improve the “Don’t Feed the Wildlife” campaign.	06/2018	TBD	TBD	Roads, Parks & Fleet – Park Operations

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
1.4.1	Average number of geese along Waterfront April-November	Yes, Geese Management Program	Park Operations

7. Additional Notes/Comments

N/A

ACTION 1.5

Require adherence to the Threshold Limit Values (TLVs) for excessive weather events recommended by the Ministry of Labour (via work procedures, education and training of staff) to reduce heat or cold stress and maintain productivity.

1. Background Information	
Objectives	• Improved worker health • Decreased injury and sick time • Improved productivity • Lower WSIB costs
Action Description	The Threshold Limit Values (TLVs) for Heat Stress Exposure is a guideline intended to help employers, workers and other workplace parties understand heat stress, and develop and implement workplace policies to prevent heat-stress-related illness. A related document issued by the Government of Saskatchewan is used to set a guideline for working in extreme cold weather events. The City of Barrie will ensure that all municipal departments adhere to these guidelines.
Action Rationale	Adhering to TLVs for extreme weather exposure will ensure that all municipal outdoor workers are protected from heat or cold-related illnesses during periods of extreme temperatures.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Ministry of Labour; Workplace Safety Associations
Associated Plans and Strategies	Health and Safety Policies

2. Municipal Leads	
Lead Department	Human Resources
Supporting Department(s)	Roads, Parks & Fleet; Environmental Services; Legislative & Court Services, Creative Economy, Corporate Facilities, Recreation, Planning and Building Services, and Access Barrie

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

Current practices include implementing safety talks, monitoring daily temperatures for potential days requiring TLV implementation, training of staff and supervisors for awareness and implementation, posting of information and bulletins during high heat/extreme cold months. Charts and tables with humidex and related rest times are provided to supervisors of outside staff when required. Outdoor workers are provided with water and given time to rest and cool off/warm up during high heat/extreme cold days. Where practical, work hours for outdoor workers are shifted to cooler hours of the day during high heat events.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Investigate current corporate policies and practices	Ongoing	Staff time	N/A	Human Resources
Encourage appropriate work attire (e.g. breathable clothing)	Ongoing	N/A – in budget	N/A – in budget	Each Department
Develop and deliver training sessions	Ongoing	N/A – complete	Staff time	Human Resources
Set uniforms, equipment, and vehicle standards (e.g. mandatory A/C, etc.)	Ongoing—phase-in at replacement	N/A – in budget	N/A – in budget	Human Resources

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
1.5.1	Lost time injuries	Yes—HR	Human Resources
1.5.2	Number of extreme heat day events	No	Human Resources
1.5.3	Number of extreme heat day events	No	Human Resources

7. Additional Notes/Comments

N/A

ACTION 1.6

Partner with Simcoe Muskoka District Health Unit to address climate change considerations in food-security communications and programming.

1. Background Information	
Objectives	• Improved community food security • Better health outcomes • Improved local food system resilience
Action Description	Climate change represents an important health concern as it relates to food system impacts and food insecurity. The City of Barrie will partner with Simcoe Muskoka District Health Unit to support their food security programming and enhance City-lead initiatives as well.
Action Rationale	Improving education, allowing citizens to grow their own food, and working to address vulnerable and low-income populations will all serve to improve food security throughout the Barrie community. Food systems are susceptible to climate change impacts not only on production, but also on processing facilities, distribution networks, marketing venues, consumption sites like homes and restaurants, and on effective waste and organics collection. A climate resilient food system is one with support for a variety of innovative, economically viable and environmentally sensitive activities in all of these broad categories.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Simcoe Muskoka District Health Unit, the urban pantry (Barrie Fruit Share, Good Food Box, Cultivating Culture), school boards, Georgian College, Living Green Barrie, Simcoe County Federation of Agriculture
Associated Plans and Strategies	Parks and Recreation Master Plan, Official Plan, Urban Forest Management plan, Zoning bylaws

2. Municipal Leads	
Lead Department	Engineering—Parks Planning
Supporting Department(s)	Roads, Parks and Fleet – Parks and Forestry; Planning & Building Services- Planning Services; Business Development

3. Timeline	
Estimate Start Date	Ongoing—— implementation began in 2009
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

The city does not have a comprehensive strategy and/or policy framework to guide direction on this work. Two community gardens exist in the City. Recent initiatives with the Health Unit are targeting an Urban Agricultural strategy and Food Strategy for the City which could increase the use and distribution of community gardens.

The City and the Health Unit participate in semi-annual liaison meetings and other working groups and project specific meetings as required. Food security programming and partnerships is included in these discussions.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Explore sponsorship and funding opportunities with private businesses, grants, service clubs, etc.	2018	Staff time	N/A	Engineering – Parks Planning
Identify new community garden location opportunities.	2018	Staff time	N/A	Engineering – Parks Planning
Consider incentives to encourage the formation of grower co-ops, incubator kitchens and/or other economic development initiatives related to local food (e.g. SPROUT).	2019	Staff time	TBD	Business Development
Work with key stakeholders to start a community working group to identify and develop opportunities for community agriculture activities.	2019	Staff time	Staff time	Engineering – Parks Planning
Where possible, support community food production/urban agriculture, health food environment initiatives and food skills education opportunities.	2020	TBD	TBD	Engineering – Parks Planning
Protect agricultural land for local food production by embedding food access and food system policy statements into land use planning documents.	2020	Staff time	Staff time	Engineering – Parks Planning, Planning & Building Services
Engage the community workgroup in developing an education and outreach program. The program should highlight the importance of urban agriculture and how it can be integrated into public and private spaces; provide education on community gardens, urban agriculture, how to grow food, and where to purchase local foods; and support local culinary tourism.	2020	TBD	TBD	Engineering – Parks Planning

Encourage community access to food skills education, community kitchen programs, small scale food processing, and food distribution through recreational courses.	2020	TBD	TBD	Recreation Services

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
1.6.1	Garden plots rented to full capacity	Yes	Parks Planning
1.6.2	Waiting list for plot availability	Yes	Parks Planning
1.6.3	Number of City-involved promotional events for local food	Yes	Access Barrie

7. Additional Notes/Comments

Additional indicators will be determined as implementation progresses

ACTION 1.7

Consider impacts and risks of increased disease vectors in design and operation of storm water infrastructure (e.g. avoiding ponding/standing water).

1. Background Information	
Objectives	• Disease Prevention
Action Description	The City of Barrie will consider and implement various control strategies for managing the risk of vector-borne diseases in stormwater management design and operation.
Action Rationale	Stormwater infrastructure (e.g. retention ponds) can contribute to mosquito and tick production, which can increase the risk of vector-borne diseases.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Simcoe Muskoka District Health Unit
Associated Plans and Strategies	Comprehensive Stormwater Management Master Plan, Stormwater Design Guideline

2. Municipal Leads	
Lead Department	Engineering—Policy and Standards, Roads, Parks, and Fleet – Roads, Stormwater & Rail Operations
Supporting Department(s)	Environmental Services – Environmental Operations Branch

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

Public notifications are sent out annually advising residents to reduce or eliminate ponding water on their properties.

The City's Environmental Operations Branch oversees mandatory larvaciding programs under the authority of the Local Medical Officer of Health to prevent mosquitos from developing into vectors of West Nile Virus. Larvacides are applied to municipally owned catch basins throughout the City.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Update Stormwater Design Guideline with design consideration statement for limiting vector born disease elements.	06/2018	Staff time	N/A	Engineering —Policy & Standards

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses.	-	-

7. Additional Notes/Comments

- Standing water is inevitable with certain stormwater infrastructure (e.g. stormwater ponds and catch basins).
- Implementation of Low Impact Development techniques that promote infiltration of storm-water may offer co-benefits to mosquito control by reducing standing water.

GOAL 2: MINIMIZE RISKS TO BUILDINGS AND PROPERTIES

In recent years, the City of Barrie has experienced increased incidences of basement flooding, cracked building foundations, and damaged landscapes. The impacts have come as a result of changing climate conditions, which have manifested as more frequent extreme weather events, overland flooding, and changes to freeze-thaw cycles. These changing conditions will affect the ways in which buildings and landscapes are designed, constructed, managed, and maintained. The City of Barrie is dedicated to minimizing risks from climate change to buildings and properties to ensure public health and safety and reduce costs incurred by property owners.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
2.4	Promote higher building standards which reflect climate projections by updating by -laws, development guidelines, and zoning regulations.	2			
2.2, 2.5, & 2.8	Develop an education and incentive program to promote lot level storm water controls (e.g. rain barrels, rain gardens, downspout disconnections, etc.).	2			
	Develop communications campaign with messaging to residents on lot-level resiliency actions (e.g. green roofs, shade structures, rain gardens, etc.).				
	Develop outreach program to teach residents what they can do to reduce snowmelt flooding on their property (e.g. removing snow from around their foundations, clearing debris from catch basins, etc.).				
2.1 & 2.6	Enhance Barrie's Disconnect to Protect rebate program to reduce inflow and infiltration to City sewers from private property.	2			
	Update the City's Sanitary Inflow and Infiltration Reduction Program.				
2.3 & 2.7	Evaluate and recommend opportunities for increased storm water management during park redevelopment and in new parks to reduce flood risk.	1			
	Explore possibilities of implementing stormwater management facilities within existing developed watersheds to reduce flooding where needed.				

ACTION 2.4

Promote higher building standards which reflect climate projections by updating by-laws, development guidelines, and zoning regulations.

1. Background Information	
Objectives	• Ensuring higher standards to prepare for worst-case scenarios • Prevention of infrastructure damage
Action Description	The City of Barrie will consider climate change in new infrastructure, including retrofits and upgrades. This practice will be enforced through climate-resilient standards and bylaws.
Action Rationale	Incorporating climate change considerations in building standards, such as Barrie's zoning bylaw and building bylaw, will ensure that new infrastructure and planning projects are resilient in the face of future climate conditions.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Ministry of Municipal Affairs and Housing, Infrastructure Planning, Developers
Associated Plans and Strategies	Zoning By-law, Building By-law

2. Municipal Leads	
Lead Department	Planning & Building Services
Supporting Department(s)	Engineering –Source Water Protection; Engineering – Development Services

3. Timeline	
Estimate Start Date	2019
Estimated Duration	1 Year
Frequency of Implementation	Once

4. Current Status/Practice
N/A

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Research what other municipalities have done regarding higher building standards (e.g. sanitary backflow prevention) that can help to increase resilience to climate change impacts.	2019	Staff time	N/A	Planning & Building Services, Engineering– Infrastructure Planning
Review Zoning By-Law and Building By-law and identify changes or additions that can be made in support of this action.	2020	Staff time	N/A	Planning & Building Services
Review applicable development guidelines and identify changes or additions that can be made in support of this action.	2020	Staff time	N/A	Planning & Building Services, Engineering— Development Services

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses.	-	-

7. Additional Notes/Comments

N/A

ACTION 2.5

Develop communications campaign with messaging to residents on lot-level resiliency actions (e.g. green roofs, shade structures, rain gardens, etc.).

1. Background Information	
Objectives	• Reduced flooding events on private properties • Reduced property damage and insurance claims • Residents educated and informed that they have a role in protecting their own property
Action Description	As the climate continues to change, it will be important for homeowners to be better informed and better prepared. The City of Barrie will develop a communication campaign that raises awareness to residents on how they can adapt their homes and lifestyles to prepare for the impacts of climate change, including better lot level stormwater controls.
Action Rationale	By educating homeowners on practical measures they can take to adapt to the impacts of climate change, the City will build a better, more resilient community.
Supporting Actions from Adaptation Strategy	2.2 – Develop an education and incentive program to promote lot level storm water controls (e.g. rain barrels, rain gardens, downspout disconnections, etc.). 2.8 - Develop outreach program to teach residents what they can do to reduce snowmelt flooding on their property (e.g. removing snow from around their foundations, clearing debris from catch basins, etc.).
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority, Ministry of Environment and Climate Change
Associated Plans and Strategies	Comprehensive Stormwater Management Master Plan

2. Municipal Leads	
Lead Department	Engineering – Source Water Protection
Supporting Department(s)	Access Barrie, Facilities—Energy Management

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Annual

4. Current Status/Practice

Rain Barrels: The City has an annual rain barrel sale that offers rain barrels to City of Barrie residents at discounted prices.

Downspout disconnection: The Disconnect to Protect program provides rebates to qualifying Barrie residents for disconnecting illegal downspout and sump pump/foundation drain connections to the sanitary sewer system. The City is currently working on improving the communications plan related to the program which has not seen uptake from residents.

Rain gardens: Some information exists on the City of Barrie's website on the Water Conservation page. No City incentives currently exist for rain gardens.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Continue the promotion and marketing of existing programs (e.g. Disconnect to Protect).	Ongoing	Staff time	TBD	Access Barrie
Research similar programs implemented by other municipalities.	2019	Staff time	N/A	Engineering – Source Water Protection
Identify funding opportunities and available resources.	2019	Staff time	N/A	Engineering – Source Water Protection
Work with Access Barrie to develop and implement a communication plan to increase public awareness.	2019	Staff time	N/A	Engineering – Source Water Protection & Access Barrie
Host public workshops (partner with LSRCA), etc.	Dependant on funding	Dependant on funding	Dependant on funding	Engineering – Source Water Protection
Explore opportunities to implement demonstration sites.	Dependant on funding or partnership opportunities	Dependant on funding or partnership opportunities	Dependant on funding or partnership opportunities	Engineering – Source Water Protection
Explore feasibility of developing incentives for LID (i.e. rain gardens) on private lands or advertising existing incentive opportunities.	2020	Staff time	Dependant on funding opportunities	Engineering – Source Water Protection, Infrastructure Planning

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
2.5.1	# rain barrels sold/year (in City sale)	Facilities—Energy Management	Facilities – Energy Management
2.5.2	# of uptakes to Disconnect to Protect program	No	Engineering – Infrastructure Planning
2.5.3	Survey of homes experiencing flooding Barrie annually during rain or snowmelt events.	No	Engineering – Source Water Protection

7. Additional Notes/Comments

Additional indicators will be determined as implementation progresses.

ACTION 2.6

Update the City's Sanitary Inflow and Infiltration Reduction Program.

1. Background Information	
Objectives	• Reduce the unnecessary treatment of clean water at the wastewater treatment plant by reducing sanitary sewer inflow and infiltration • Reduce the risk of sewage by-passes at the wastewater treatment plant during large precipitation events • Reduce the risk of basement flooding due to sewer backups
Action Description	The City is updating the Wastewater Collection Master Plan to assess options to address inflow and infiltration (I&I) both on public and private side of the sanitary collection system. It will provide recommendations for the next phase in I&I reduction that can be brought before Council for endorsement.
Action Rationale	Continual monitoring of flow rates at the Waste Water Treatment Facility indicate that inflow and infiltration (I&I) is occurring when compared to production and distribution volumes and shows distinct increases during extreme precipitation events. I&I contributes to the unnecessary treatment of clean water at the wastewater treatment plant, increases the risk of sewage by-passes and the potential risk of basement flooding due to sewer backups. The Wastewater Collection Master Plan update will provide recommendations for the next phase in I&I reduction, including on private and public property, that can be brought before Council for endorsement.
Supporting Actions from Adaptation Strategy	Action 2.1 Enhance Barrie's Disconnect to Protect rebate program to reduce inflow and infiltration to City sewers from private property
Potential Partnerships or External Resources	Landlords (multi-residential), Barrie Municipal Non-Profit Housing Corporation, Simcoe City Housing Authority, Access Barrie, Barrie & District Association of Realtors (BDAR).
Associated Plans and Strategies	Sewer use by-law 2012-172, Sanitary Sewage Collection System Policies and Design Guidelines, Wastewater Treatment Master Plan, Storm Drainage & Stormwater Management Policies & Design Guidelines, Inflow Reduction Rebate (SSIRR) program.

2. Municipal Leads	
Lead Department	Engineering – Infrastructure Planning
Supporting Department(s)	Environmental Services – Wastewater Operations Branch; Engineering – Design & Construction; Access Barrie; Engineering – Corporate Asset Management

3. Timeline

Estimate Start Date	Update Wastewater Collection Master Plan: 2018 Enhance I&I program: ongoing Disconnect to Protect program: ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

An I&I study and major rehabilitation program was conducted between 2007-2010; $350,000 in sanitary sewer rehabilitation works resulted in a significant I&I reduction (approximately 2 ML/D).

In an effort to decrease I&I on private property, a voluntary rebate program called Disconnect to Protect was created. The program offers grants to cover a portion of the cost associated with disconnecting downspouts and foundation drains that are illegally connected to the sanitary collection system. The program has had limited uptake. This is likely because disconnecting is not perceived as being worth the effort. The program offers a maximum rebate of 50% of the total cost of disconnecting. For the resident, the status quo is seemingly convenient and there is no penalty for non-compliance.

The LSRCA conducted outreach efforts with door-to-door visits in the Kidd's Creek area, which involved talking to homeowners about disconnecting downspouts from the sanitary system. In 2017, the communication plan for the rebate program was reviewed and updated. The updated communication plan included a website update, new pamphlets, radio advertisements, and social media messaging. Finally, a workshop was held with local real estate agents, home inspectors and plumbers in November 2017 to gather ideas on how to improve the program.

The Wastewater Collection Master Plan update will provide recommendations for the next phase of the I&I reduction program that can be brought before Council for endorsement. These recommendations are expected in 2018.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Complete Wastewater Collection Master Plan.	2018	$480,000	N/A	Engineering—Infrastructure Planning
Continue the development of groundwater databases to identify areas with a high potential for infiltration.	2018	N/A	N/A	Engineering Infrastructure Planning—Source Water Protection

Pending Master Plan recommendations; seek Council endorsement to undertake a new phase of the Infiltration Reduction Program focused on sanitary collection system rehabilitation.	2019	TBD	TBD	Engineering – Infrastructure Planning/ Environmental Services
Improve oversight on linear construction projects to ensure sewer systems are tight and resist the infiltration of groundwater.	2019	TBD	TBD	Engineering— Design and Construction & Development Services
Review criteria for inclusion of sanitary sewers in the Sewer Rehabilitation Program to prioritize areas with high infiltration.	2019	N/A	N/A	Engineering – Corporate Asset Management
Update the "Disconnect to Protect" program to address I&I from private property.	2019	N/A	N/A	Engineering— Infrastructure Planning
Review City led construction dewatering activity practices to identify opportunities for increased diversion from sanitary sewer system.	2020	Staff time	TBD	Engineering— Design & Construction

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
2.6.1	Reduction in the peaking factor at the Wastewater Treatment Facility	Yes, Infrastructure Planning	Engineering – Infrastructure Planning
2.6.2	Number of Disconnect to Protect rebate inquiries	No	Engineering – Infrastructure Planning
2.6.3	Number of download hits from the City of Barrie's Inflow & Infiltration webpage	No	Engineering – Infrastructure Planning; Information Technology

7. Additional Notes/Comments

N/A

ACTION 2.7

Explore possibilities of implementing stormwater management facilities within existing developed watersheds to reduce flooding where needed.

1. Background Information	
Objectives	• Prevention of infrastructure damage • Reduction in surcharge and overflow • Reduce peak flows within watersheds and drainage areas
Action Description	Detention facilities are constructed to reduce peak flows temporarily and then slowly drain when the peak period has passed. The City of Barrie will explore the possibility of implementing detention facilities within watersheds and drainage areas to reduce flood risk.
Action Rationale	Detention facilities can be an effective engineering solution for flood prevention in urban areas. By implementing detention facilities, the City may be able to reduce the frequency and severity of flooding to buildings and residents downstream.
Supporting Actions from Adaptation Strategy	2.3 – Evaluate and recommend opportunities for increased storm water management during park redevelopment and in new parks to reduce flood risk.
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Ministry of Environment and Climate Change
Associated Plans and Strategies	Comprehensive Stormwater Management Master Plan; Storm Drainage & Stormwater Management Policies & Design Guidelines; Parks and Recreation Strategic Master Plan; Parks standards; Subwatershed Impact Studies; Drainage MP

2. Municipal Leads	
Lead Department	Engineering – Infrastructure Planning; Engineering—Parks Planning
Supporting Department(s)	Roads, Parks & Fleet – Parks & Forestry; Roads, Parks & Fleet – Stormwater, Road & Rail Operations; Legal Services; Environmental Services – Environmental Operations Branch

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	10+ years
Frequency of Implementation	Ongoing

4. Current Status/Practice

Storm water management facility retrofits and new facilities have been identified in the Drainage Master Plans since 2000. To date one new facility has been constructed and four have been retrofitted/reconstructed. Three more retrofits are currently being designed.

Storm water management, grading and naturalization opportunities are reviewed and assessed during the development or redevelopment of every park within the City of Barrie. Currently, Heritage Park is undergoing a review for improved storm water management and drainage system solutions (with possible LID techniques).

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated On-going Cost	Responsible Department
Conduct detailed localized climate projections and modelling (MDP model).	2018	$50,000	N/A	Engineering—Infrastructure Planning
Identify areas of high priority (MDP) & implement.	2019	$1,000,000 (MDP) Implementation costs TBD	N/A	Engineering—Infrastructure Planning
Develop long range (25 year) plan and explore ways to obtain committed and reliable funding to implement the plan.	2020	$300,000	$2-3 million/year	Engineering—Infrastructure Planning
Assess parks in high priority areas and identify opportunities to integrate stormwater management improvements.	2020	TBD	N/A	Engineering—Infrastructure Planning

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
2.7.1	Percentage watershed area treated for peak control	Yes, IT	Engineering – Infrastructure Planning; Information Technology
2.7.2	Percentage watershed area treated for quality control	Yes, IT	Engineering – Infrastructure Planning; Information Technology
2.7.3	Percentage watershed area treated for volume control	Yes, IT	Engineering – Infrastructure Planning; Information Technology

7. Additional Notes/Comments

N/A

GOAL 3: STRENGTHEN INFRASTRUCTURE RESILIENCE

Recent climate events have offered insight into what continued changes might mean for Barrie's infrastructure: increased intensity of rainfall, runoff, and erosion leading to wash-outs on roads, shoulders, and bridges; more frequent freeze-thaw cycles, soil instability, and ground movement causing damage to roads, sidewalks, and underground infrastructure; and more extreme weather events resulting in direct physical damage to infrastructure. Recognizing that climate change will strain Barrie's critical green and grey infrastructure, the City is committed to strengthening the resilience of its infrastructure systems to climate change and other non-climatic factors (e.g. land-use changes, population growth, aging infrastructure) to prevent disruptions of essential services and ensure the safety of the community.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
3.1	Increase staff and/or resources to maintain and preserve road surfaces.	2			
3.2	Increase natural/forested areas within sub watersheds with high surcharge and flooding.	1			
3.4 & 3.6	Manage a comprehensive operations, maintenance, and inspection program for stormwater infrastructure. Conduct stormwater drainage area inspections to identify areas of potential risk for debris blockage and dams.	2			
3.5	Improve sediment and erosion control from construction activities through improved inspections, reporting, and operational controls.	1			
3.7	Develop an inspection policy for high risk infrastructure to identify any damage from major storm and extreme weather events.	2			
3.8	Investigate and apply methods of incorporating climate change considerations into infrastructure (grey, green, and urban forests) asset management.	1			

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
3.3, 3.9, & 3.11	Develop and implement a plan to regularly update the design Intensity-Duration-Frequency (IDF) curve to reflect the geographic areas of the municipality and changing climate parameters.	1			
	Develop engineering policy for regularly updating design standards to reflect new climate change projections.				
	Update Engineering policy and standards to encourage design that includes consideration of the potential impacts of climate change.				
3.10	Investigate and explore opportunities to promote the collection and recycling of greywater and stormwater on private property and City facilities.	2			
3.12	Explore the possibility of implementing a stormwater utility/ rebate in Barrie to manage and operate stormwater infrastructure.	2			
3.13	Improve storm water infrastructure capacity as part of renewal projects.	2			

ACTION 3.1

Increase staff and/or resources to maintain and preserve road surfaces.

1. Background Information	
Objectives	• Improved road safety • Improved traffic flow • Reduced emissions • Cost savings related to insurance claims
Action Description	A combination of more frequent violent storms and intense rainfall caused by climate change, and increased and unusual freeze-thaw cycles have a harsh impact on road infrastructure. As the climate continues to change, it will be important for the City of Barrie to be prepared with funding and staff to maintain road surfaces.
Action Rationale	Allocating more staff time and resources to maintain road surfaces will ensure that the City's road infrastructure network is in good condition, and safe for motorists and pedestrians. It will also ensure that the City will continue to meet the Ontario Minimum Maintenance Standards in the face of increasing impacts related to climate change.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Universities, Consulting firms
Associated Plans and Strategies	Asset Management Plans, Operations and Maintenance Plans

2. Municipal Leads	
Lead Department	Roads, Parks, and Fleet – Road, Stormwater & Rail Operations
Supporting Department(s)	Engineering – Corporate Asset Management; Engineering – Design & Construction

3. Timeline	
Estimate Start Date	Annual Sidewalk Inspection Program – Ongoing annual program; Pothole Tracking and Repair Program – Ongoing continuous program; Annual Pothole Reports for Top 10 Worst Road Sections – Ongoing, reported in January every year;

	Asphalt, Curbs and Sidewalk Maintenance Program – Ongoing annual program; Road Resurfacing Program – Ongoing annual program; End of Life Pavement Replacement Program – 2018, pending Council approval
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

A network-wide pavement condition assessment is completed every four years. This results in data that can be used to assess the overall condition of the road network and assign a condition rating, from Very Poor to Very Good, to each road segment. Road surfaces are also inspected and maintained through the annual sidewalk inspection program, pothole tracking and repair program, the asphalt, curbs and sidewalk maintenance program, and the reporting mechanism for the worst road segments for potholes.

Road pavement preservation is undertaken through the annual Road Resurfacing Program in order to keep roads in good condition at the lowest overall lifecycle cost. Reactive repairs are also made on an ongoing basis to individual road defects and problem areas.

The proposed End of Life Pavement Replacement Program is considered to be a different approach to apply repair/replacement activities to fast deteriorating roads and the most problematic road segments identified from the pothole tracking report.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Conduct research on Reclaimed Asphalt Pavement recycling and reuse for flexible pavement patching and/or rehab.	Summer 2018	Varies	Varies	Roads, Parks, and Fleet
Establish the End of Life Pavement Replacement (annual) Program to repair and replace the fast detreating and worst road segments identified from the pothole report.	Summer 2018	$220,000 (2018 budget)	Increase to $500,000/year based on identified needs	Roads, Parks, and Fleet
Continue to increase investment in pavement preservation through the annual Road Resurfacing Program.	Ongoing	$3,150,000 (2018 budget)	Increasing gradually from $3,150,000/year to $8,400,000/ year	Corporate Asset Management

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.1.1	Annual number of Insurance claims against the City related to potholes	Yes, Insurance Bank Examiner	Legal Services
3.1.2	Number of resident reported potholes	Yes, Pingstreet & Pothole App	Roads, Stormwater & Rail Operations
3.1.3	% of roads meeting Provincial Minimum Maintenance Standards for Municipal Highways	Yes, Road Patrol Data	Roads, Stormwater & Rail Operations
3.1.4	Road network condition metrics (Pavement Condition Index [PCI])	Yes, pavement conditional assessment is conducted every 4 years	Corporate Asset Management

7. Additional Notes/Comments

N/A

ACTION 3.2

Increase natural/forested areas within sub-watersheds with high surcharge and flooding.

1. Background Information	
Objectives	• Increased resilience of forest ecosystem • Increased business and tourism benefits • Natural stormwater management • Improved air quality • Reduction in Urban Heat Island effect • Improved food security
Action Description	The City of Barrie will investigate and implement opportunities to increase natural areas and forest in sub-watersheds, as well as strengthen the protection of watercourse corridors.
Action Rationale	Natural and forested areas have various hydrological benefits including attenuating stormwater flows. This is one way to make improvements within sub-watersheds that experience flooding.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; local businesses; neighbourhood associations; FruitShare Barrie; local nurseries and growers; business owners (e.g. golf courses); Trees Canada
Associated Plans and Strategies	City of Barrie Built Boundary Community Improvement Plan and other improvement plans; Intensification Area Urban Design Guidelines; Parks and Recreation Strategic Master Plan; Comprehensive Stormwater Management Master Plan; Urban Forestry Strategy

2. Municipal Leads	
Lead Department	Engineering –Parks Planning; Roads, Parks & Fleet – Parks & Forestry
Supporting Department(s)	Planning & Building Services – Planning Services; Engineering – Infrastructure Planning

3. Timeline	
Estimate Start Date	2019
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

N/A

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Explore incentives for the development community to encourage more green space.	2019	Staff time	N/A	Planning & Building Services
Explore opportunities for boulevard trees and increased naturalization in public areas.	2019	TBD	TBD	Engineering – Parks Planning/ Road, Parks & Fleet – Parks & Forestry
When securing land due to critical drainage concerns, consider developing naturalized spaces in high priority areas.	2020	N/A	TBD	Engineering – Infrastructure Planning; Parks Planning
Seek strategic land donations.	2020	Staff time	Staff time	Engineering— Parks Planning/ Legal Services

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.2.1	Inventory of current natural areas and forest cover	Yes, GIS data based on air photos	GIS

7. Additional Notes/Comments

N/A

ACTION 3.4

Implement a comprehensive operations, maintenance and inspection program for stormwater infrastructure.

1. Background Information	
Objectives	• Compliance with Environmental Compliance Approval (system-wide) • Improved flood management
Action Description	The City of Barrie will continue to ensure the proper operations and maintenance of stormwater infrastructure, especially after extreme weather events.
Action Rationale	Annual inspections of stormwater infrastructure, proper operational and maintenance activities will ensure that the system is functioning properly.
Supporting Actions from Adaptation Strategy	3.6 - Conduct stormwater drainage area inspections to identify areas of potential risk for debris blockage and dams.
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Ministry of Environment and Climate Change; Third party contractors
Associated Plans and Strategies	Comprehensive Stormwater Management Master Plan; Storm Drainage & Stormwater Management Policies & Design Guidelines; System-Wide Environmental Compliance Approval including the City's Operations and Maintenance Manual for Stormwater Infrastructure

2. Municipal Leads	
Lead Department	Roads, Parks and Fleet - Roads, Stormwater and Rail Operations
Supporting Department(s)	Information Technology- GIS Branch, Engineering- Development Services, Design and Construction, Infrastructure Planning Branches

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

Operations and Maintenance Manual for Stormwater Works was developed based on the requirements of the system-wide stormwater ECA and implemented in October 2016 to address monitoring, reporting, operations, and maintenance activities for annual SWM pond inspection and cleaning, watercourse inspections, ditch inspection and repair, OGS inspection and cleaning, and limited operational flexibility within the ECA.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Conduct inspections to identify and prioritize repair and maintenance needs.	Summer 2018	$20,000	$20,000	Roads, Parks, and Fleet - Roads, Stormwater and Rail Operations
Securing funding as required for repair and maintenance programs.	TBD based on inspection results	TBD based on inspection results	TBD based on inspection results	Roads, Parks, and Fleet - Roads, Stormwater and Rail Operations
Update City practices and procedures to better address the monitoring, reporting, operations and maintenance activities for the above mentioned programs.	ASAP	N/A	N/A	Roads, Parks, and Fleet - Roads, Stormwater and Rail Operations

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.4.1	City Works related Service Requests and completed Work Orders	Yes, CMMS Co-ordinator	Roads, Parks & Fleet
3.4.2	Percent of samples that confirm that TSS removal requirements are met	Yes, Roads, Parks & Fleet	Roads, Parks & Fleet

7. Additional Notes/Comments

N/A

ACTION 3.5

Improve sediment and erosion control from construction activities through improved inspections, reporting, and operational controls.

1. Background Information	
Objectives	• Reduction in siltation • Improved water quality • Improved resident safety
Action Description	The City of Barrie will work to prevent erosion during the construction process, through stringent inspections, monitoring, maintenance, and reporting protocols, as well as improved operational controls where feasible.
Action Rationale	Erosion of exposed soils can cause local air quality problems, degradation of aquatic habitats, and damage to downstream recreational areas and infrastructure. With the expected increase in high intensity storm events associated with climate change, improved sediment and erosion control will be vital to minimize these potential impacts.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Home builders and developers; Ministry of Environment and Climate Change; Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority
Associated Plans and Strategies	Comprehensive Stormwater Management Master Plan; Site Alteration By-Law; Sewer-Use By-Law

2. Municipal Leads	
Lead Department	Engineering – Design and Construction; Engineering – Development Services
Supporting Department(s)	Environmental Services – Environmental Operations Branch, IT; Centre for Continuous Improvement

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Depending on project volume

4. Current Status/Practice

Public Property: The Design & Construction group is responsible for municipal infrastructure construction projects on public property. The group currently has 7 inspectors (5 for capital and operating projects, and 2 in the right of way activity group). These inspectors monitor construction-related sediment and erosion control issues according to contract specifications and city standards. All linear capital projects and tenders have sediment and erosion control plan requirements that must be submitted and approved prior to commencement of work. Inspectors ensure that sediment and erosion measures are implemented in accordance with approved plans. The Ministry of Environment and Climate Change or Barrie Environmental Operations Branch deals with non-compliance issues.

Private Property: The Development Services branch is responsible for site plan applications on private property and subdivision development. The group issues site alteration permits for developments greater than 0.5 hectares in size. Development Services has two field coordinators that will visit sites with permits to ensure that sediment and erosion control measures are installed in accordance with approved plans. The developer's Consultant Engineer will submit reports in regard to the sediment and erosion control measures to Development Services. The Ministry of Environment and Climate Change, or Barrie Environmental Operations Branch deals with non-compliance issues.

Enforcement: Enforcement of sediment and erosion issues within the City is the responsibility of the Environmental Operations Branch. This mainly occurs through inspection and on a reactive basis when a spill to the storm system has occurred or when a complaint has been received. The offender can be issued infractions under the Site Alteration By-law.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Improve Design and Construction field inspection record keeping, including developing inspection and mitigation protocols in relation to sediment and erosion control.	2018	TBD	TBD	Design and Construction & Environmental Operations Branch
Require all Design and Construction inspectors to have Certified Inspector of Sediment and Erosion Control (CISEC) Training and certification.	2018	$500 for CISEC course/ $250 exam fee	$90 certification renewal fee/ $180 CISEC Membership Renewal	Design and Construction
Require external consultants and/or contractors responsible for the ongoing site control measure monitoring and maintenance to have Certified Inspector of Sediment and Erosion Control (CISEC) Training and certification.	2018	Staff time	N/A	Design and Construction & Development Services

Research and evaluate tools for tracking spills and non-compliance issues (i.e. work order management).	2019	Staff time	TBD	Environmental Operations Branch & I.T.; Centre for Continuing Improvement
Evaluate feasibility and benefit of increasing erosion and sediment control requirements for City projects.	2019	Staff time	TBD	Design and Construction
Review and evaluate potential for increased inspection, reporting and operational requirements within the City's Site Alteration By-law.	2020	Staff time	TBD	Development Services

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.5.1	Number of spills that have occurred per year	Yes, Environmental Operations database	Environmental Operations Branch
3.5.2	Number of proactive inspections conducted by Environmental Operations Branch	Yes, Environmental Operations database	Environmental Operations Branch
3.5.3	Number of sediment and erosion control deficiencies corrected	No	Design and Construction & Development Services

7. Additional Notes/Comments

N/A

ACTION 3.7

Develop an inspection policy for high risk infrastructure to identify any damage from major storm and extreme weather events.

1. Background Information	
Objectives	• Proactively address risks associated with major storm and extreme weather events • Reduce maintenance costs • Extend lifespan of infrastructure
Action Description	The City will develop a policy to inspect high risk infrastructure after major storm and extreme weather events in order to plan for maintenance requirements immediately and in the future required as a result of the event. This policy may be an extension of the existing proactive inspection programs.
Action Rationale	As extreme weather events become more frequent and intense, infrastructure damage will also increase. Inspection policies are effective in identifying existing and potential maintenance related issues for high risk infrastructure.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Federation of Canadian Municipalities (LAMP program)
Associated Plans and Strategies	Asset Management Plans, Operations and Maintenance Plans, Standard Operating Procedures

2. Municipal Leads	
Lead Department	Engineering – Corporate Asset Management, Engineering – Infrastructure Planning; Environmental Services – Wastewater Operations; Environmental Services – Water Operations; Roads Parks,
Supporting Department(s)	N/A

3. Timeline	
Estimate Start Date	2018
Estimated Duration	2020
Frequency of Implementation	Consider policy review and update to align with Asset Management Plan update, or alternate frequency aligned with operating process reviews

4. Current Status/Practice

The City currently has a policy for the condition assessment of storm and sanitary sewers and follows legislated requirements to inspect large diameter culverts and bridges. The City also has an established risk matrix for all City-owned infrastructure, based on four failure modes (physical mortality, capacity, financial efficiency, and level of service). Neither of these explicitly consider or are designed to address increased risks to infrastructure posed by extreme weather events. Operations staff conduct patrols and inspection of known risk areas pre and post weather events, however the policy isn't formally documented.

Staff from the Water Operations and Wastewater Operations Branches identify and prioritize repairs to impacted infrastructure using information/data collected during the course of regularly scheduled inspections, through the completion of preventative maintenance activities and by monitoring SCADA systems used within the various processes undertaken by each Branch. In the event that SCADA systems are disrupted as a result of an extreme weather event, coordinating repairs and responses during or following this event could be more difficult.

The Province recently passed Ontario Regulation 588/17 "Asset Management Planning for Municipal Infrastructure" which requires municipalities to consider climate change as part of asset management planning. Specifically related to this action plan, consideration must be given to "the actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets", adaptation opportunities that may be taken to manage the vulnerabilities and disaster planning. To date, there has been minimal consideration of climate change in asset management planning, however moving forward Barrie will need to ensure compliance with the regulation.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Engage with other municipalities to identify what others are doing to deal with high risk infrastructure.	2018	Staff time	N/A	Engineering – Corporate Asset Management or Engineering – Infrastructure Planning
Review City's risk matrix each AMP update cycle.	Dependant on AMP review cycle	Staff time	N/A	Engineering – Corporate Asset Management
Identify and define which types of climate change related weather events are most likely to impact infrastructure.	2019	Staff time	N/A	Engineering – Corporate Asset Management; Environmental Services – Wastewater Operations & Water Operations; Roads Parks, Fleet – Road, Stormwater and Rail Operations

Identify and prioritize high risk infrastructure based on specific weather events and impacts.	2019	Staff time	N/A	Engineering – Corporate Asset Management; Environmental Services – Wastewater Operations & Water Operations; Roads Parks, Fleet – Road, Stormwater and Rail Operations
Identify current practice for each infrastructure type and conduct gap analysis.	2019	Staff time	N/A	Environmental Services – Wastewater Operations & Water Operations; Roads Parks, Fleet – Road, Stormwater and Rail Operations
Develop and implement inspection protocol.	2020	Staff time	N/A	Environmental Services – Wastewater Operations & Water Operations; Roads Parks, Fleet – Road, Stormwater and Rail Operations
Review inspection protocol and assess opportunities for monitoring.	2021	Staff time	Staff time	Environmental Services – Wastewater Operations & Water Operations; Roads Parks, Fleet – Road, Stormwater and Rail Operations

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses	-	-

7. Additional Notes/Comments

The City's stormwater inspection policy currently requires annual pond inspections, annual ditch inspections, and annual oil grit separator inspections. This information may be used for baseline data later on as indicators are selected to measure progress.

ACTION 3.8

Investigate and apply methods of incorporating climate change considerations into infrastructure (grey, green, and urban forests) asset management.

1. Background Information	
Objectives	• More resilient natural ecosystems • Reduced maintenance costs • Extended lifespan of infrastructure • Catalogue of assets
Action Description	The City will work to incorporate climate change impacts and vulnerabilities into asset management planning to address climate change and make informed infrastructure investment decisions.
Action Rationale	The City of Barrie is already engaging in asset management planning in order to be more strategic about how the City manages its assets and spending. Incorporating climate change considerations into asset management is an innovative approach to manage physical and natural assets in a way that is socially, environmentally, and economically sustainable for the long term.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Federation of Canadian Municipalities (LAMP, MAMP), Municipal Natural Assets Initiative (MNAI) through Union of BC Municipalities (UBCM), Green Infrastructure Ontario
Associated Plans and Strategies	Asset Management Plans; Urban Forest Management Plan

2. Municipal Leads	
Lead Department	Engineering – Corporate Asset Management
Supporting Department(s)	Roads, Parks & Fleet – Parks & Forestry

3. Timeline	
Estimate Start Date	2018
Estimated Duration	1-4 years
Frequency of Implementation	5 years—to align with AMP or AM policy updates

4. Current Status/Practice

The Province recently passed Ontario Regulation 588/17 “Asset Management Planning for Municipal Infrastructure” which requires municipalities to consider climate change as part of asset management planning. Specifically related to this action plan, consideration must be given to “the actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality’s infrastructure assets”, adaptation opportunities that may be taken to manage the vulnerabilities and disaster planning. To date, there has been minimal consideration of climate change in asset management planning, however moving forward Barrie will need to ensure compliance with the regulation.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Investigate current best practices in Asset Management regarding climate change and green infrastructure during AM policy development and with AMP update cycle and implement as appropriate.	2018	Staff time/ part of larger consultation assignment	N/A	Engineering – Corporate Asset Management
Explore, evaluate, and report on options related to integration of natural assets into asset management planning.	2019 pending resource availability	Staff time and training	N/A	Engineering – Corporate Asset Management
Leverage available Asset Management grants, such as FCM’s Municipal Asset Management Program.	2019 pending resource availability	Staff time – Grant allows 11 months to complete project	N/A	Engineering – Corporate Asset Management

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.8.1	AM Policy/Strategy explicitly includes climate change considerations	Yes, Asset Management Strategy and Plans	Engineering – Corporate Asset Management
3.8.2	Percentage of AMPs that explicitly include climate change considerations	No	Engineering – Corporate Asset Management

7. Additional Notes/Comments

N/A

ACTION 3.9

Develop an engineering policy to update design standards to reflect new climate change projections.

1. Background Information	
Objectives	• Prevention of infrastructure damage • Higher standards to prepare for worst-case scenarios • Reduced insurance and reconstruction costs
Action Description	The City of Barrie will develop a policy to identify and recommend measures to address the vulnerabilities and risks from climate change in the design and installation of municipal infrastructure, as well as development applications.
Action Rationale	Increases in the frequency and intensity of storms and extreme temperatures will have impacts on infrastructure repair and recovery costs, as well as extended disruptions of infrastructure services. By incorporating climate change projections into engineering standards and development applications, the City of Barrie will ensure the resilience and longevity of City infrastructure.
Supporting Actions from Adaptation Strategy	3.3 – Develop and implement a plan to regularly update the design Intensity-Duration-Frequency (IDF) curve to reflect the geographic areas of the municipality and changing climate parameters. 3.11 – Update Engineering policy and standards to encourage design that includes consideration of the potential impacts of climate change.
Potential Partnerships or External Resources	Ministry of Environment and Climate Change; Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; LSRCA, National Utilities Contractors Association, Insurance Bureau of Canada
Associated Plans and Strategies	Engineering Design Guidelines (e.g. storm/sanitary, etc.)

2. Municipal Leads	
Lead Department	Engineering –Policy and Standards
Supporting Department(s)	Engineering – Corporate Asset Management; Engineering – Infrastructure Planning

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	As each standard is updated

4. Current Status/Practice

N/A

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Incorporate consideration of climate projections into review and update processes for Engineering Design Standards.	2018	N/A	N/A	Engineering – Policy & Standards
Investigate the most appropriate design IDF curve to reflect changing climate parameters and implement during update to applicable guidelines and standards.	2019	$50,000	N/A	Engineering – Policy & Standards

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.9.1	Framework built and in use to ensure consistent application of process	No	Engineering – Policy and Standards

7. Additional Notes/Comments

N/A

ACTION 3.10

Investigate and explore opportunities to promote the collection and recycling of greywater and stormwater on private property and City facilities.

1. Background Information	
Objectives	• Water conservation • Stormwater flow reduction • Reduced sanitary sewer flows and treatment costs
Action Description	The City of Barrie will investigate and promote new opportunities, technologies, and practices for managing and recycling greywater and stormwater on private property and City facilities.
Action Rationale	The recycling and reuse of stormwater not only creates a dependable, locally-controlled water supply, it also provides environmental benefits. Greywater recycling can help reduce water and wastewater treatment costs.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Association of Municipalities of Ontario (AMO); Developers
Associated Plans and Strategies	N/A

2. Municipal Leads	
Lead Department	Engineering –Source Water Protection
Supporting Department(s)	Corporate Facilities, Planning Services, Engineering – Policy & Standards

3. Timeline	
Estimate Start Date	2020
Estimated Duration	2 years
Frequency of Implementation	Once

4. Current Status/Practice
In 2006 the Canadian Standards Association released a standard for greywater systems. Currently in Ontario if a greywater system is installed in compliance with Class 2 sewage systems of the Ontario Building Code and complies with CSA B128-2006 standard and relevant local pluming codes then it would be a legal system.

Most available greywater systems promote storing water from showers or bathtubs in a cistern and pumping it to the toilets at a low pressure. The greywater is given primary treatment through filtration and is then disinfected with chlorine. The systems default to the municipal water supply in the event of inadequate greywater supply or overflow to the wastewater system in the event of surplus greywater.

Currently, the City does not operate any public greywater systems, however some private systems have been implemented in the community at the household and small business level.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Research similar programs and projects that have been implemented.	2020	Staff Time	N/A	Engineering – Source Water Protection; Policy & Standards
Develop or amend guidelines, educational materials, etc. to promote best practices for implementation.	2020	Staff Time	N/A	Engineering; Planning & Building
Provide guidance to Corporate Facilities department to encourage implementation in new or existing City facilities where practical.	2021	Staff Time	N/A	Engineering; Corporate Facilities

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.10.1	Stormwater or greywater recycling/reuse implemented at City facilities	Yes (this has not been done before)	Corporate Facilities

7. Additional Notes/Comments

This action would need to be endorsed by Council if the City is going to support these systems as this could result in significant changes to current practices.

ACTION 3.12

Explore the possibility of implementing a stormwater utility/ rebate in Barrie to manage and operate stormwater infrastructure.

1. Background Information	
Objectives	• Develop a dedicated funding source for stormwater management infrastructure • Fund stormwater management operations and maintenance in step with increased regulatory requirements (MOECC/LSRCA) • Improve stormwater management infrastructure to current standards to further improve public safety and protect private/public infrastructure • Improve stormwater management infrastructure resiliency as part of the City's climate change adaptation policy • Reduce the City's environmental impact through stormwater infrastructure improvements
Action Description	The City of Barrie will investigate implementation of a stormwater utility as well as the benefits and challenges.
Action Rationale	A dedicated funding source will facilitate ongoing capital improvements, operation and maintenance needs, allow for predictable long-range capital planning and keep pace with increased regulatory requirements.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	N/A
Associated Plans and Strategies	Stormwater Master Plan

2. Municipal Leads	
Lead Department	Engineering – Infrastructure Planning & Finance
Supporting Department(s)	Roads, Parks & Fleet – Roads, Stormwater & Rail Operations

3. Timeline	
Estimate Start Date	2018
Estimated Duration	2-3 years
Frequency of Implementation	Once

4. Current Status/Practice

There is currently no utility for stormwater. A budget request has been submitted to explore the possibility.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Complete Stormwater Master Plan	Ongoing	N/A	N/A	Engineering – Infrastructure Planning
Stormwater Infrastructure Finance Study	2018	$75,000	N/A	Engineering – Infrastructure Planning
	2019	$225,000	N/A	Finance

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses.	-	-

7. Additional Notes/Comments

N/A

ACTION 3.13

Improve storm water infrastructure capacity as part of renewal projects.

1. Background Information	
Objectives	• Increased capacity to manage peak flows • Improved water quality • Reduced erosion
Action Description	The City of Barrie will systematically improve stormwater infrastructure where required. The City will also consider alternative stormwater management strategies.
Action Rationale	Improving the capacity of storm water infrastructure, where needed, will reduce the impacts of storm water runoff, resulting in improved water quality and reduced risk of flooding. Stormwater infrastructure capacity improvements require reliable and accurate data on capacity needs in order to make appropriate recommendations when renewal-driven capital projects are planned.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	N/A
Associated Plans and Strategies	Comprehensive Stormwater Management Master Plan; Storm Drainage & Stormwater Management Policies & Design Guidelines; City Wide Drainage Master Plan

2. Municipal Leads	
Lead Department	Engineering – Infrastructure Planning and Corporate Asset Management
Supporting Department(s)	Information Technology – GIS; Roads, Parks & Fleet – Parks & Forestry

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

Capacity deficiencies are addressed during renewal projects where appropriate, but the required data to identify capacity needs for local infrastructure has not been available in the past. The required data will be developed as a part of the Master Drainage Plan update. Additionally, the process to identify and incorporate capacity needs into renewal projects in not formalized.

Discussions are already occurring, and are ongoing, between Corporate Asset Management and Infrastructure Planning to understand capacity needs and make recommendations for improvements to storm infrastructure when renewal-driven capital projects are brought forward. Corporate Asset Management has provided input on timing of renewal needs to Infrastructure Planning to assist in realistic scenario planning related to the Master Drainage Plan development for the Sophia Creek Watershed, and is compiling similar information for the City's remaining watersheds as part of phases 1 and 2 of the City Wide Drainage Master Plan review process currently underway.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Complete the review and update of the Drainage Master Plan including incorporating renewal needs in the consideration of alternatives.	Underway	Part of existing project	N/A	Engineering - Infrastructure Planning
Ensure appropriate databases and maintenance processes are in place to support stormwater capacity modelling needs.	2018	Staff Time	Staff Time	Engineering - Infrastructure Planning; Engineering - Corporate Asset Management; Information Technology - GIS
Formalize the collaboration structure to plan capital projects incorporating renewal and capacity needs. Consider regular meetings to support this process.	2018	Staff Time	Staff Time	Engineering - Corporate Asset Management; Engineering - Infrastructure Planning; Roads, Parks & Fleet – Parks & Forestry

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
3.13.1	Percentage watershed area treated for peak control	Yes	Engineering – Infrastructure Planning; Information Technology
3.13.2	Percentage watershed area treated for quality control	Yes	Engineering – Infrastructure Planning; Information Technology
3.13.3	Percentage watershed area treated for volume control	Yes	Engineering – Infrastructure Planning; Information Technology

7. Additional Notes/Comments

N/A

GOAL 4: HELP LOCAL BUSINESSES AND THE TOURISM INDUSTRY ADAPT TO CHANGING CONDITIONS

Climate change can pose significant risks to businesses, not only for their operations, but also to their suppliers, employees, customers, and people living in the areas in which they operate. The City of Barrie will help local businesses and the tourism industry in adapting to climate change impacts in order to ensure the continuity of their operations, improve their ability to reduce and manage risk, and build and maintain a positive and proactive reputation within the community.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
4.1	Improve communications to local businesses on their role in the maintenance of sidewalks, appropriate salt application rates, and best management practices during freezing rain or snow events.	3			
4.2	Assess new opportunities for different forms of tourism as a result of changing climate conditions.	3			
4.4 & 4.3	Establish a local best practice network (e.g. business continuity, green business practices, adaptation measures, etc.) and provide guidance for businesses. Provide guidance to local business on how to maintain business continuity (e.g. supply chain) during extreme weather events.	2			

ACTION 4.1

Improve communications to local businesses on their role in the maintenance of sidewalks, appropriate salt application rates, and best management practices during freezing rain or snow events.

1. Background Information	
Objectives	• Increased awareness of impacts of salt; • Increased awareness and availability of salt alternatives; • Increased awareness of appropriate salt application rates based on winter conditions; and • Increased awareness of best practices to minimize liability risk
Action Description	Winter seasons are often challenging for property owners in terms of property safety. Slippery conditions on walkways and paved areas can cause health and safety issues. The City of Barrie will communicate with local businesses on winter control best practices, including reducing salt use while maintaining safe conditions and how to reduce liability risk.
Action Rationale	Improving communications with businesses concerning salt management and winter control measures will protect the safety of employees and the public while reducing the impacts of sodium and chloride to local watercourses and drinking water sources. With the expected increase in freezing rain events related to climate change, it is important for local businesses to be aware of winter control best management practices in order to maintain community safety while preventing the unnecessary release of sodium and chloride into the environment.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Business Improvement Area (BIA), Chamber of Commerce, Tourism Barrie
Associated Plans and Strategies	Winter Operations Plan; Winter Control Program; Salt Optimization Strategy; Salt Management Plan

2. Municipal Leads	
Lead Department	Engineering – Source Water Protection
Supporting Department(s)	Business Development; Roads, Parks, and Fleet—Road, Stormwater & Rail Operations

3. Timeline

Estimate Start Date	2019
Estimated Duration	4 months
Frequency of Implementation	Annual

4. Current Status/Practice

N/A

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Host a Smart About Salt workshop and training session for business owners and/or contractors.	2019	$15,000	N/A	Source Water Protection
Engage with the Barrie Chamber of Commerce about adding salt-reduction considerations into their Environmental Practices Award.	2019	Staff time	Staff time	Business Development
Include salt-reduction best practices and information into existing communications (e.g. BIA & Chamber of Commerce newsletters) where feasible.	2019	$1,000	$1,000 annually	Source Water Protection & Access Barrie & Business Development
Engage with Barrie Chamber of Commerce and BIA to assess opportunities for workshops or presentations at existing meeting or events regarding winter maintenance best practices.	2019	N/A	N/A	Source Water Protection & Business Development

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
4.1.1	Number of attendees at Smart About Salt workshop/training sessions	No	Source Water Protection

4.1.2	Number of communications to businesses that include salt management practices	No	Business Development
4.1.3	Number of businesses awarded recognition for salt reduction efforts	No	Source Water Protection

7. Additional Notes/Comments

The Business Development Department can support the distribution of information/ communication to their businesses, and through their partner organizations such as the Chamber of Commerce and Tourism Barrie. Subject matter expertise on salt reduction strategies and best practices will be provided by the Source Water Protection group.

ACTION 4.2

Assess new opportunities for different forms of tourism as a result of changing climate conditions.

1. Background Information	
Objectives	• Increased tourism • Increased community use of tourism attractions
Action Description	Climate is an essential resource for tourism, and especially for beaches, natural areas, and winter sports. The City of Barrie will continue to support new tourism opportunities in the face of changing conditions.
Action Rationale	Assessing new opportunities for tourism will help the City prepare for changing demand patterns and tourist flows.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Tourism Barrie, County of Simcoe Tourism
Associated Plans and Strategies	N/A

2. Municipal Leads	
Lead Department	Business Development
Supporting Department(s)	Creative Economy

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice
N/A

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Conduct an assessment of current internal Festival and Events to identify opportunities for adaptive actions.	2018	Staff time	N/A	Creative Economy – Department of Culture
Work with Tourism Barrie to apply for tourism grants/funding to enhance events based on identified opportunities.	2019	Staff time	Staff time	Creative Economy – Department of Culture
Encourage Tourism Barrie to perform an assessment of current tourism opportunities and highlight gaps to build in redundancy in the local tourism industry.	2019	Staff time	N/A	Business Development
Encourage Tourism Barrie to reach out to specific businesses affected by climate change to identify opportunities for adaptation.	2019	Staff time	N/A	Business Development
Encourage Tourism Barrie to assist businesses in the tourism industry to work towards Sustainable Tourism accreditation through the Tourism Industry Association of Ontario greening program.	2020	Staff time	N/A	Business Development

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses	-	-

7. Additional Notes/Comments

N/A

ACTION 4.4

Establish a local best practice network (e.g. business continuity, green business practices, adaptation measures, etc.) and provide guidance for businesses.

1. Background Information	
Objectives	• Increased economic productivity • Increased awareness of climate change impacts among businesses
Action Description	Climate change is having, and will continue to have, a large impact on many businesses. The City of Barrie will work to establish a best practise network of local business to share best practices for adapting to climate change and ensuring business continuity.
Action Rationale	By considering climate change in business continuity management, businesses can identify and mitigate risks and minimize disruption to standard business operations.
Supporting Actions from Adaptation Strategy	4.3 - Provide guidance to local business on how to maintain business continuity (e.g. supply chain) during extreme weather events.
Potential Partnerships or External Resources	Georgian College, ventureLAB, Small Business Centre of Barrie - Simcoe County and Orillia Tourism Barrie (Explore Lake Simcoe Project), Chamber of Commerce
Associated Plans and Strategies	N/A

2. Municipal Leads	
Lead Department	Business Development
Supporting Department(s)	Emergency Management Services; Engineering—Source Water Protection.

3. Timeline	
Estimate Start Date	2019
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice
N/A

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Explore possibility of climate change and business as theme for Mayor's Breakfast.	2019	Staff time	N/A	Business Development
Host a public open house/ event night for local businesses to learn about climate change as it relates to their day-to-day operations (e.g. green business practices, adaptation measures, etc.).	2019	TBD	N/A	Business Development and Source Water Protection
Partner with the Barrie Chamber of Commerce to incorporate climate change resiliency and business continuity topics into events.	2019	Staff time	N/A	Business Development
Gauge local businesses' interest in establishing/participating in a local best practice network that meets annually to discuss adaptation measures in business operations.	2019	Staff time	TBD	Business Development
Explore availability of City resources to support a local best practice network (i.e. meeting space, administration, subject matter expertise, etc.).	2019	Staff time	N/A	Business Development

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
4.4.1	Number of businesses that attend public open house/ community event	No	Business Development
4.4.2	Number of businesses interested in local best practice network	No	Business Development
4.4.3	Number of businesses that establish a business continuity plan, recovery plan or engage in resiliency planning	No	Business Development

7. Additional Notes/Comments

N/A

GOAL 5: PROTECT BIODIVERSITY AND ENHANCE ECOSYSTEM FUNCTIONS

Climate change affects ecosystems directly by creating favorable climatic conditions for the spread of invasive species and, causing environmental damage due to extreme weather events, while simultaneously interacting with other human stressors. The increase in rainfall intensity leading to overburdened stormwater ponds, or the increased frequency of winter events that require the use of de-icing substances are a few of the many examples where stress will have cascading effects on water quality and ecosystem functions. Acknowledging the intrinsic value of ecosystems and their contributions to the quality of life in Barrie, the City will take steps to further protect and enhance ecosystems' functions and services.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
5.2	Develop incentives, standards, and permitting processes to enhance green space, green roofs, and tree canopy on private and public properties.	3	✓	✓	✓
5.3 & 5.1	Collect data on the urban canopy to develop baseline information and direction for a future Urban Forest Management Plan.	3		✓	✓
	Develop an Urban Forest Management Plan with specific greening strategies for areas of the City where tree canopy/greenspace is low.				
5.5, 5.4 & 5.6	Develop partnerships and funding strategies to control invasive species.	2		✓	✓
	Support the identification and mapping of invasive species as part of the Urban Forest Strategy.				
	Increase education and communication to public about invasive species (e.g. dog strangling vine, garlic mustard, round goby, zebra mussels, and quagga mussels).				
5.7	Explore the possibility of implementing a Natural Areas and Trails Master Plan that includes initiatives to reduce erosion risk, improve creek and ravine health, and promote native vegetation and biodiversity.	2	✓	✓	✓
5.8	Support the implementation of road salt handling, storage, and application best management practices to optimize salt used by the City, businesses, and residents.	2	✓		✓
5.9	Increase Low Impact Development (LID) technologies throughout the City and update engineering policy and standards accordingly.	1		✓	✓

ACTION 5.2

Develop incentives, standards, and permitting processes to enhance green space, green roofs, and tree canopy on private and public properties.

1. Background Information	
Objectives	• Improved green spaces • More attractive neighbourhoods • Reduction in Urban Heat Island (UHI) • Improved stormwater management • Improved happiness and mental health
Action Description	The City of Barrie will use incentives and other tools as appropriate to promote and increase the amount of green space and natural areas throughout the City.
Action Rationale	Green space provides a number of benefits to the environment by filtering pollutants and dust from the air, providing shade and lowering temperatures in urban areas, reducing erosion of soil into our waterways, and attenuating peak flows during storms. It also provides social and economic benefits, including increased property value, aesthetics/attractiveness of an area, and mental health benefits.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Association of Municipalities of Ontario (AMO); Developers; Canada Green Building Council, School Boards; Simcoe Muskoka District Health Unit; Neighbourhood Associations; Trees Canada; Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority
Associated Plans and Strategies	Draft Sustainable Development Strategy, Official Plan, Urban Design Manual, Urban Forest Strategy

2. Municipal Leads	
Lead Department	Planning & Building Services – Planning Services
Supporting Department(s)	Engineering –Policy and Standards; Engineering– Parks Planning

3. Timeline	
Estimate Start Date	2018
Estimated Duration	1 year to conduct research, develop policy and implementation tools; ongoing implementation
Frequency of Implementation	One-time to develop policy and implementation tools; ongoing implementation

4. Current Status/Practice

The City of Barrie is committed to expanding natural areas by increasing the urban tree canopy, planting gardens along municipal boulevards, increasing parkland space, and implementing of the City's Urban Forest Strategy. Currently, the Official Plan has some limited text included regarding the Urban Heat Island effect, urban forestry, and green roofs.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Research other municipalities or case examples of this practice to gauge success.	2019	Staff Time	N/A	Planning & Building – Planning Services
Review current standards that promote greater green space and natural areas.	2019	Staff time	N/A	Engineering – Policy and Standards
Develop policies and/or guidance to promote green space.	2019	Staff Time	N/A	Planning & Building – Planning Services
Include language concerning green roofs in Urban Design Manual update.	Ongoing	Staff time	N/A	Planning & Building – Planning Services
Research possible incentives for developers to include more green space in new developments.	2019	Staff time	N/A	Planning & Building – Planning Services
Develop implementation tools based on best practices.	2020	Staff Time	N/A	Planning & Building – Planning & Building
Implement tools and policy and provide appropriate education.	2020	N/A	$10,000/year	Planning & Building – Planning & Building; Roads, Parks & Fleet – Parks & Forestry

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
5.2.1	Number of green roofs in the municipality	No	Roads, Parks and Fleet—Parks & Forestry
5.2.2	Number of trees planted by the municipality per year	Yes, City Works database	Roads, Parks and Fleet—Parks & Forestry

7. Additional Notes/Comments

Additional indicators will be identified as implementation progresses

ACTION 5.3

Develop an Urban Forest Management Plan with specific greening strategies for areas of the City where tree canopy/ greenspace is low.

1. Background Information	
Objectives	• Increase tree canopy cover in the City • Improved management of urban forests
Action Description	The City of Barrie's current Urban Forest Strategy directs the creation of an Urban Forest Management Plan for the City of Barrie. The Plan will: • Provide direction on all aspects of the urban forest program; • Set goals and objectives for the long-term sustainability of the urban forest; • Set measurable targets for success; and • Project short and long-term resource requirements to meet goals.
Action Rationale	The Urban Forest provides a variety of social, environmental and economic benefits to the citizens of Barrie, including natural stormwater management, increased shade areas, carbon sequestration, improved livable spaces, etc.
Supporting Actions from Adaptation Strategy	5.1 - Collect data on the urban canopy to develop baseline information and direction for a future Urban Forest Management Plan.
Potential Partnerships or External Resources	School boards, Bereton Field Naturalists, Living Green, Public (Community Gardens), Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Georgian College, Simcoe Muskoka District Health Unit, Lakehead University
Associated Plans and Strategies	Urban Forest Strategy

2. Municipal Leads	
Lead Department	Roads Parks and Fleet – Parks & Forestry
Supporting Department(s)	Information Technology—GIS

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Create Plan: 2 years
Frequency of Implementation	Plan review and update every 5 years

4. Current Status/Practice

The Urban Forest Management Plan is in the pre-planning process. IT-GIS is currently assessing methods of repeatable urban canopy capture and mapping for target setting within the Urban Forest Management Plan.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Collect data on urban tree canopy.	2018	$15,000 (direct) + 120 hours staff time	$10,000 every 5 years	Roads Parks and Fleet – Parks & Forestry & Innovate Barrie – Information Technology/GIS
Identify areas of low canopy cover and problematic areas.	2018	$5,000 (plus 40 hours of staff time)	$5,000/year	Roads Parks and Fleet – Parks & Forestry
Develop Citizen Science program to help measure and monitor urban forestry.	2019	$5,000 (plus 120 hours staff time)	$5,000/year (plus 80 hours annual staff time)	Roads Parks and Fleet – Parks & Forestry
Use public education and citizen science to help in identifying strategies for the Management Plan.	2019	$25,000 (plus 160 hours staff time)	$10,000/ year (plus 40 hours annual staff time)	Roads Parks and Fleet – Parks & Forestry
Increase tree planting within low canopy areas.	Ongoing	$25,000 (plus 60 hours staff time)	$25,000/year (plus 60 hours staff time)	Roads Parks and Fleet – Parks & Forestry

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
5.3.1	Number of citizen volunteer tree health inspectors	No	Roads, Parks and Fleet—Parks & Forestry
5.3.2	Percentage of public health trees in good or excellent health	Yes, for public trees only.	Roads, Parks and Fleet—Parks & Forestry

7. Additional Notes/Comments

N/A

ACTION 5.5

Develop partnerships and funding strategies to control invasive species.

1. Background Information	
Objectives	• Healthy forest canopy • Control of invasive species
Action Description	Invasive species are becoming more common in natural areas within the City and surrounding County. As part of the Urban Forestry Strategy the City of Barrie will implement efforts to control invasive species, including researching possible funding strategies for managing invasive species, mapping and identification of invasive species, and continued public education.
Action Rationale	Non-native species such as dog-strangling vine, garlic mustard, etc. are serious problems that will impact long term sustainability of forested lands.
Supporting Actions from Adaptation Strategy	• 5.4 - Support the identification and mapping of invasive species as part of the Urban Forest Strategy. • 5.6 - Increase education and communication to public about invasive species (e.g. dog strangling vine, garlic mustard, round goby, zebra mussels, and quagga mussels).
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Georgian College; MNRF; LEAF; Bradford Greenhouse; Ontario Invasive Plant Council; Local interest groups.
Associated Plans and Strategies	Urban Forest Strategy

2. Municipal Leads	
Lead Department	Roads Parks and Fleet – Parks & Forestry (coordination); Roads, Parks and Fleet—Roads
Supporting Department(s)	Access Barrie

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

Invasive species crosses multiple departments. There is currently no lead department that is fully responsible for invasive species. The Urban Forestry Strategy states that the City of Barrie will:

- "Continue to investigate partnerships and provincial and federal funding opportunities to identify, map and address the problem caused by non-native invasive species".
- "Increase the opportunities for public education and outreach through community partners, volunteer planting events, and involvement in environmental community events and committees."
- "Educate 15 community partners (e.g. garden stores) on the value of native species and the dangers of invasive species could result in less long-term impact on natural areas"

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Evaluate financial and human resource requirements for implementation and develop a work plan	2018	Staff time	N/A	Roads, Parks and Fleet – Parks & Forestry; Roads, Stormwater and Rail Operations; IT - GIS
Research possible funding opportunities/grants for research, mapping, and development of invasive species policy	2018	Staff time	N/A	Roads, Parks and Fleet – Parks & Forestry; Roads, Stormwater and Rail Operations; IT - GIS
Define roles and responsibilities for different departments for addressing invasive species	2020	Staff time - est. 100 hours combined	TBD through framework	Roads, Parks and Fleet – Parks & Forestry; Roads, Stormwater and Rail Operations
Develop a framework for the identification and mapping of invasive species	2020	Staff time	TBD	Roads, Parks and Fleet – Parks & Forestry; Roads, Stormwater and Rail Operations; IT - GIS
Coordinate public outreach concerning invasive species, including possible partnerships opportunities (e.g. citizen-science programs)	Summer 2021	Staff time - est. 60 hours combined	$10,000/year	Roads, Parks and Fleet – Parks & Forestry; Roads, Stormwater and Rail Operations; Access Barrie
Education and outreach to internal departments concerning invasive species	2021	Staff time - est. 400 hours combined	Staff time	Roads, Parks and Fleet – Parks & Forestry; Roads, Stormwater and Rail Operations

Create policy framework for invasive species, either in-house or through third-party consultant (depending on resources).	2021	Staff time - hours TBD	TBD	Roads, Parks and Fleet – Parks & Forestry; Roads, Stormwater and Rail Operations

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
5.5.1	Number of new invasive species identified/year	No	Roads, Parks and Fleet—Parks & Forestry

7. Additional Notes/Comments

Additional indicators will be identified as implementation progresses.

ACTION 5.7

Explore the possibility of implementing a Natural Areas and Trails Master Plan that includes initiatives to reduce erosion risk, improve creek and ravine health, and promote native vegetation and biodiversity.

1. Background Information	
Objectives	• Improved biodiversity • Reduce erosion risk • Improved water quality
Action Description	A Natural Areas and Trails Master Plan is a high-level planning document that is intended to support future trail and natural areas management initiatives. The City of Barrie will explore the possibility of developing a Natural Areas and Trails Master Plan to include considerations for ravine management and health, as well as the protection, restoration and enhancement of natural areas.
Action Rationale	Protecting and enhancing natural areas and trail networks will protect natural assets, improve community recreation opportunities, and increase local biodiversity.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority
Associated Plans and Strategies	Comprehensive Stormwater Management Master Plan; Urban Forestry Strategy; Waterfront & Marina Strategic Plan; Parks and Recreation Strategic Master Plans

2. Municipal Leads	
Lead Department	Roads Parks and Fleet – Parks & Forestry
Supporting Department(s)	Engineering—Parks Planning

3. Timeline	
Estimate Start Date	2019
Estimated Duration	1 year to develop plan
Frequency of Implementation	One-off to develop plan with ongoing implementation

4. Current Status/Practice

Barrie's Parks and Recreation Master Plan (PRMP) mentions that trails master planning can improve trail provision and connectivity. Several other recommendations from the PRMP mention the protection and expansion of trails, including:

- 6.27 - Strive to enhance connectivity within the trails system, as well as designing appropriate trails for multiple uses throughout all seasons.
- 6.29 - Undertake a Trails / Active Transportation Master Plan to provide comprehensive insight into how best to enhance and manage the City's trails system, as well as land acquisitions needed to complete trail networks

The PRMP also commits to "maintain and enhance the natural river valleys, vistas and other aesthetic qualities of the environment" and, "identify and protect locally significant heritage resources".

The Parks and Forestry department currently performs naturalization projects along creeks and ravines within the City of Barrie, including planting ground covers, shrubs, and/or trees.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Conduct background review of other regional/municipal natural environment trail and natural areas initiatives, existing legislative policies and contexts, biophysical opportunities/constraints, etc.	2018	Approx. 40 hours Staff time	N/A	Roads Parks and Fleet – Parks & Forestry
Submit budget request to Council.	2018	Approx. 60 hours staff time	N/A	Roads Parks and Fleet – Parks & Forestry
If approved, begin development of Natural Areas and Trails Master Plan.	2019	$100-150K – plus est. 400 hours combined staff time	TBD through cost estimates of implementation in MP.	Roads Parks and Fleet – Parks & Forestry

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
5.7.1	Length of maintained trails (metres)	Yes, IT—GIS	Roads, Parks and Fleet—Parks & Forestry
5.7.2	Length of new constructed trails/year (metres)	Yes, IT—GIS	Roads, Parks and Fleet—Parks & Forestry

7. Additional Notes/Comments

N/A

ACTION 5.8

Support the implementation of road salt handling, storage, and application best management practices to optimize salt used by the City, businesses, and residents.

1. Background Information	
Objectives	• Reduction of sodium and chloride concentration within water systems • Increased awareness of impacts of salt on the environment • Increased awareness and availability of salt alternatives
Action Description	The City will use public education, training opportunities, and changes to operational practices to support the implementation of road salt handling, storage, and application best management practices to optimize salt used by the City, businesses, and residents.
Action Rationale	Previous studies have found that road salt contaminates both groundwater and surface water and washes into creeks, rivers, lakes, and ultimately into drinking water. With an increase in winter conditions requiring the use of de-icers (increase in number of freezing rain events), the proper management of salt handling, storage and application of road salt is important as to not continue the increasing trends of sodium and chloride in City wells, creeks, and lakes.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Downtown Barrie Business Association; Tourism Barrie (Explore Lake Simcoe Project); Lake Simcoe Region Conservation Authority; Nottawasaga Valley Conservation Authority
Associated Plans and Strategies	Winter Operations Plan; Salt Optimization Strategy; Salt Management Plan; Source Water Protection Plan

2. Municipal Leads	
Lead Department	Engineering - Source Water Protection
Supporting Department(s)	Roads, Parks & Fleet – Road, Stormwater and Rail Operations

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

Commencing in the 2018/2019 Winter Control Season, the City of Barrie will be requiring Winter Maintenance Contractors to be Smart About Salt ™ Certified. The City held the Smart About Salt course for City employees and contractors free of charge on September 27th, 2017 to support the change to winter contracts

The Source Protection Plan requires Risk Management Plans for winter salt application, salt storage, and snow storage within 100m of a municipal supply well. Seven Risk Management Plans have been signed which incorporate salt handling, storage, and application best practices.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Revise "Do Small Things" communication campaign to assess opportunity for increased road salt handling, storage and application best management practices communications.	2018	Staff time	Staff time	Engineering—Source Water Protection
Work with Source Protection Region to expand area for Risk Management Plan requirement for winter salt application.	2018	Staff time	Staff time	Engineering—Source Water Protection

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
5.8.1	Number of local registered Smart About Salt certified contractors	Yes, Smart About Salt Council website	Engineering—Source Water Protection
5.8.2	# Risk Management Plans including winter maintenance measures	Yes, Source Water Protection	Engineering—Source Water Protection

7. Additional Notes/Comments

N/A

ACTION 5.9

Increase Low Impact Development (LID) technologies throughout the City and update engineering policy and standards accordingly.

1. Background Information	
Objectives	• Reduce runoff • Increased natural stormwater management
Action Description	Low impact development (LID) refers to land developments or retrofits that aim to manage stormwater runoff by mimicking natural processes and treating it as close to the source as possible. The City of Barrie will utilize policy approaches to encourage the use of LID technologies in stormwater management projects throughout the City.
Action Rationale	LID emphasizes conservation and use of on-site natural features to protect water quality. By implementing LID technologies, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Community organizations; Association of Municipalities of Ontario (AMO); Developers
Associated Plans and Strategies	City of Barrie Built Boundary Community Improvement Plan & other improvement plans; Intensification Area Urban Design Guidelines; Parks and Recreation Strategic Master Plan; Comprehensive Stormwater Management Master Plan; Urban Forestry Strategy, Stormwater Guideline and LID Guideline; Drainage Master Plan

2. Municipal Leads	
Lead Department	Engineering –Policy and Standards
Supporting Department(s)	Engineering – Infrastructure Planning, Engineering – Development Services; Road, Parks and Fleet - Road, Stormwater & Rail Operations, Engineering – Design & Construction

3. Timeline	
Estimate Start Date	2018
Estimated Duration	12 months
Frequency of Implementation	One time with 5-year review cycle

4. Current Status/Practice

Interim guidance documents have been published. Low Impact Development Design Guideline is being incorporated into the 2018 workplan.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Collect feedback from municipal departments and development community on draft LID Design Guidelines.	Ongoing	N/A	N/A	Engineering - Policy & Standards
Publish LID Design Guidelines document.	2018	Staff time	N/A	Engineering - Policy & Standards
Communicate LID Guidelines to Land Owners Group and Developers.	2018	Staff time	N/A	Engineering - Policy & Standards; Development Services
Incorporate LID analysis and recommendations into next Drainage Master Plan update (2023).	Ongoing	Staff time	N/A	Engineering - Infrastructure Planning

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses	-	-

7. Additional Notes/Comments

N/A

GOAL 6: MINIMIZE DISRUPTION TO COMMUNITY SERVICES

The more frequent occurrence of extreme weather has the potential to hinder people's routines and day-to-day activities, while posing safety-related risks to those driving or using outdoor recreational spaces such as waterfront and community park pathways. Recognizing that the ability of the City to efficiently deliver services to residents will be under pressure due to changing climatic conditions, the City of Barrie will take measures to ensure that the needs of the community are met, and any disruption to core services are minimized.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
6.1	Develop a communication tool (e.g. an app) which tells residents the plowing/ sanding/salting status of roads in order to better plan routes for driving in hazardous conditions.	2			
6.2	Mandate the use of snow tires on all City vehicles during winter months.	3			
6.3 & 6.4	Continue to treat roads using anti-icing/ de-icing liquids where practical to reduce sodium chloride usage and engage in continuous research on best practices for winter control. Continue to implement winter control measures (snow removal and de-icing) on waterfront park and community park pathways and parking lots.	1			
6.5	Enhance communication plans between departments (e.g. Environmental Operations, Roads, Parks, and Fleet, Emergency Management, etc.) to ensure efficient response and clean-up during extreme weather events.	1			
6.7 & 6.6	Increase preventative maintenance and inspection of trees on public property (e.g. tree pruning, removal of diseased/ hazardous trees, proactive planting in strategic areas) in order to reduce damage to the urban forest caused by extreme weather events. Plant trees in strategic areas to reduce wind pressure and serve as windbreaks where feasible.	2			

6.8	Expand Barrie's Road Weather Information System (RWIS) network and take the advantage of new and advanced road conditions sensing technology to enhance winter maintenance actions.				
6.9	Operationalize teleworking and other alternative work arrangements (e.g. Stay-at-home days/shifted/flex) that eliminate commuting during extreme weather events and hazardous road conditions.				

ACTION 6.1

Develop a communication tool (e.g. an app) which tells residents the plowing/sanding/salting status of roads in order to better plan routes for driving in hazardous conditions.

1. Background Information	
Objectives	• Improved citizen awareness • Decrease calls to Service Barrie
Action Description	The City of Barrie will investigate the possibility of developing a communication tool or app to communicate road conditions to residents. The intent of the app would be for motorists to get up to the minute information on road conditions, when snowplows have already cleared roads and when they are expected to be in the area.
Action Rationale	A tool to communicate road plowing and salting status could improve road safety and reduce the number of calls to Service Barrie. It will also help internal staff and residents make informed decisions on their daily commute within the City, especially during extreme winter events.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Association of Road Supervisors (AORS); Ministry of Transportation Ontario; Ontario Good Roads Association; Georgian College; City's current AVL provider
Associated Plans and Strategies	Winter Operations Plan; Salt Management Plan; Salt Optimization Strategy

2. Municipal Leads	
Lead Department	Access Barrie
Supporting Department(s)	Service Barrie; Information Technology; Roads, Parks, Fleet – Roads, Stormwater & Rail Operations, Traffic and Parking Services

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Annually

4. Current Status/Practice

The Ontario Ministry of Transportation (MTO) has launched the Track My Plow online service that allows the public to track snowplows on provincial highways in the Owen Sound and Simcoe County areas. However, this app does not cover streets within the City of Barrie. A version that covers the City of Barrie called “Plow Tracker” has been developed and released in late December 2017. The app will be piloted and monitored internally for the 2017/2018 winter maintenance season to address any issues that arise.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Launch the Web Portal for public use.	2018/2019 Winter Season	Staff time	TBD	Access Barrie
Promote the “Plow Tracker” Web Portal through existing communication networks.	2018/2019 Winter Season	TBD	TBD	Access Barrie

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
6.1.1	Total number of collisions during winter seasons	Yes, Traffic and Parking Services	Traffic and Parking Services
6.1.2	Total Service Request calls received during winter season	Yes, Service Barrie	Service Barrie
6.1.3	Total number of visits to web tool	Yes, IT	IT

7. Additional Notes/Comments

N/A

ACTION 6.2

Mandate the use of snow tires on all City vehicles during winter months.

1. Background Information	
Objectives	• Service consistency in extreme weather • Improved road safety
Action Description	Winter tires have tread designs dedicated to improving traction on snow and ice. The City of Barrie will explore the possibility and benefits of installing snow tires on City vehicles (e.g. department vehicles).
Action Rationale	Mandating the use of winter tires on City vehicles during the winter months could improve road safety and reduce possible accidents.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Ontario Good Roads Association
Associated Plans and Strategies	Winter Operations Plan; Winter Control Program; Salt Optimization Strategy; Salt Management Plan; Source Protection Plan

2. Municipal Leads	
Lead Department	Roads Parks and Fleet—Fleet Services
Supporting	N/A

3. Timeline	
Estimate Start Date	2019
Estimated Duration	6 months
Frequency of Implementation	Once. If tires are purchased, there will be a one-time initial purchase as well as periodic replacements.

4. Current Status/Practice
Barrie's Transit fleet uses all weather tires, which are rated for snow. Other fleet vehicles use mud and snow tires, all season tires, and snow tires, depending on the vehicle. Pickup trucks are equipped with snow tires based on the operator's need and application.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Review data on winter accidents involving fleet vehicles that are not equipped with winter tires.	2019	Staff time	N/A	Roads, Parks and Fleet
Conduct cost-benefit analyses on using snow tires on specific fleets/department vehicles.	2019	Staff time	N/A	Roads, Parks and Fleet

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
6.2.1	Winter accidents involving vehicles that are not equipped with winter tires.	Yes, Fleet Services accident files	Fleet Services

7. Additional Notes/Comments

- Fleet does not have a tire machine or tire technician, so rims would need to be purchased along with tires.
- Outfitting all light and medium duty vehicles with tires and rims would cost $130,000 above the 2018 repair budget.
- Onsite storage sheds would need to be purchased or rented. Cost would be approximately $120.00 per month to rent or $10,000 to purchase.
- Replacement cost would average $3500-$5500 annually

ACTION 6.3

Continue to treat roads using anti-icing/de-icing liquids where practical to reduce sodium chloride usage and engage in continuous research on best practices for winter control.

1. Background Information	
Objectives	• Continued good performance of the City's roads program • Safer roads • Healthier environment
Action Description	As part of the Winter Control program, the City of Barrie currently implements snow removal and de-icing activities to a variety of community pathways, sidewalks, parking lots and waterfront properties. These treatments include anti-icing, which is the application of a chemical solution (salt brine) to the pavement before a storm or the formation of frost to prevent the bonding of ice or snow to the road surface. The City of Barrie will continue to pre-treat roads in advance of storms where practical and engage in research on effective materials and techniques that provide optimal performance and value.
Action Rationale	Continuing to implement Winter Control measures will ensure that public areas are safe and accessible to the public. Pre-treating roads with brine or other alternatives, reduces the overall application of salt, which reduces the impact to plants, animals, birds, fish, lake and stream ecosystems, and groundwater.
Supporting Actions from Adaptation Strategy	Action 6.4 - Continue to implement winter control measures (snow removal and de-icing) on waterfront park and community park pathways and parking lots
Potential Partnerships or External Resources	Source Protection Authorities; Ontario Good Roads Association; Downtown BIA
Associated Plans and Strategies	Winter Operations Plan; Salt Optimization Strategy; Salt Management Plan

2. Municipal Leads	
Lead Department	Roads, Parks & Fleet – Roads, Stormwater & Rail Operations
Supporting Department(s)	Legal Services, Engineering –Source Water Protection; Roads Parks and Fleet – Parks & Forestry, Traffic & Parking Services, Corporate Facilities

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	November to April annually
Frequency of Implementation	Ongoing

4. Current Status/Practice

The City currently implements winter control measures on 1370 km of road, 570 km of sidewalks, 25 parking lots, 72 crosswalks, 113 bus shelters, 708 bus stops, and downtown sidewalk intersections:

- Parks staff maintain the waterfront trail (one main walking trail) from Heritage Park to Minets Point Rd, and the bike path from Kempenfelt Drive to Hurst Drive. Parking lots around the waterfront are maintained so that residents can drive to and enjoy a winter walk on the waterfront.
- Sidewalks in the Central Business District (Dunlop, Collier, Mulcaster, High, & intervening streets) are cleared by the adjoining property owners as required by by-law. The remaining sidewalks are cleared by City crews. The City anticipates all sidewalks will be plowed at least once within 24 hours in accordance with minimum maintenance standards.
- Traffic Services maintains City-owned parking zones and lots, and crosswalks, as well as snow removal for all bus shelters and transit stops.

Anti-icing (brine) is applied based on its optimum effective temperature and road conditions. Roads Operations also actively engages in research on new anti-icing products and establishes pilot programs to test those products.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Continue to implement winter control measures in public recreation areas, trails, pathways, and parking lots.	Ongoing	N/A	Varies (included in existing services levels for RPF)	Roads, Parks and Fleet
Conduct research in high price to performance ratio winter materials. Develop and implement pilot programs for the winter materials.	Ongoing	Staff time	Staff time	Roads, Parks and Fleet
Continue to produce monthly salt usage report for Roads Operations.	Ongoing	N/A	Staff time	Roads, Parks and Fleet
Continue to host snow school for winter equipment operators for winter operations best practices.	Ongoing	Varies	Staff time	Roads, Parks and Fleet
Investigate opportunities for salt reductions in current practices and winter control routes.	Ongoing	Staff time	N/A	Roads, Parks and Fleet

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
6.3.1	Total number of winter incident claims	Yes, Insurance Examiner	Roads, Parks, and Fleet
6.3.2	Sodium and chloride concentrations in City wells	Yes, Risk Management Official	Source Water Protection
6.3.3	Average salt use per winter storm (kg/km/event)	Yes, City Works database	Roads, Parks, and Fleet
6.3.4	Kilometres of maintained pathways	Yes, GIS	IT—GIS

7. Additional Notes/Comments

N/A

ACTION 6.5

Enhance communication plans between departments (e.g. Environmental Operations, Roads, Parks, and Fleet, Emergency Management, Emergency Services, etc.) to ensure efficient response and clean-up during extreme weather events.

1. Background Information	
Objectives	• Improved coordination and responses • Improved recovery time • Safer community
Action Description	Strong collaboration is required between departments to respond effectively and ensure service continuity during extreme weather. The City of Barrie will ensure that communication strategies are in place between departments and that frontline crews are effectively trained to manage extreme weather events.
Action Rationale	Robust and well executed communications between key departments will improve the City of Barrie's capacity to respond to the increase in extreme weather that is predicted due to climate change.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	SMDHU - Emergency Management Coordinator, Emergency Services, Ministry of Environment and Climate Change
Associated Plans and Strategies	Emergency Management Plan

2. Municipal Leads	
Lead Department	Emergency Management
Supporting Department(s)	All

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

The City has an Emergency Plan that includes communication protocols during an emergency, but this is only applicable when an emergency has been declared. Further, there is currently no platform for overall situational awareness among the City's various departments.

There is currently no platform for overall situational awareness among City departments and Emergency Services.

For day-to-day operations, staff in the City's operational groups actively communicate with each other to share information and inform each other about potential problems, but there is no formal communication plan to help coordinate responses during extreme weather events.

The City's primary communication network operates over VOIP. Network disruptions can therefore impact communications capabilities for some staff. Many key and front-line staff have mobile phones which will still work if the City's network is down. Some operational staff have access to radios for communication, however there are some issues with the radios that need to be addressed.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Establish annual meeting between key stakeholders, to identify issues and opportunities for improvement	2018	Varies	Varies	Environmental Services; Roads, Parks & Fleet; Emergency Management; Emergency Services; IT
Review the City's backup communication capabilities and identify gaps.	2018	Staff time	TBD depending on whether technology improvements are identified as a need	Environmental Services; Roads, Parks & Fleet; Emergency Management; Emergency Services; IT
Ensure key staff are trained on use of backup communication systems.	2018	Staff time	Staff time	Environmental Services; Roads, Parks & Fleet; Emergency Management; IT
Draft SOPs based on type of extreme weather events and type of cleanup activities to establish ownership and assign the task to key stakeholders.	2019	Staff time	Staff time	All

Implement a communications platform in which a common situational awareness can be established and maintained at all times.	2020	Investigate and implement	Maintenance and Support Staff to maintain information	All

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses.	-	-

7. Additional Notes/Comments

In addition to the Corporate Emergency Response Plan(s), as part of their Drinking Water Quality Management System the Water Operations Branch has established their own Emergency Response Plan(s) utilizing the Incident Management System (IMS) model that details emergency response protocols, personnel, communications plans (internal and external), SOPs and resources available for use in the event of an emergency. These documents may be a useful starting point as the development of Draft SOPs is undertaken at Corporate level.

ACTION 6.7

Increase preventative maintenance and inspection of trees on public property (e.g. tree pruning, removal of diseased/ hazardous trees, proactive planting in strategic areas) in order to reduce damage to the urban forest caused by extreme weather events.

1. Background Information	
Objectives	• Improved tree canopy health • Reduction in infrastructure damage • Reduction in power outages
Action Description	The City is responsible for the maintenance of trees that are located on the City-owned road right-of-way (between curb and private property line). As part of Barrie's Street Tree Pruning Program, the City will look for ways to improve its proactive pruning/ maintenance efforts to reduce damage to both trees and surrounding infrastructure from extreme weather events.
Action Rationale	It is important to actively prune street and park trees in order to address safety concerns, ensure tree health & vitality, and promote disease control.
Supporting Actions from Adaptation Strategy	Action 6.6 - Plant trees in strategic areas to reduce wind pressure and serve as windbreaks where feasible.
Potential Partnerships or External Resources	N/A
Associated Plans and Strategies	Urban Forest Strategy; Tree Protection Policy

2. Municipal Leads	
Lead Department	Roads Parks and Fleet—Parks and Forestry
Supporting Department(s)	N/A

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Annual tree pruning program for city trees (streets, parks and edges of city owned natural areas)

4. Current Status/Practice

There are currently 35,000 street trees and 15,000 open space park trees as well as 145 km of city owned forest edges adjacent to private property (mainly residential properties).

Each year the City's Forestry Section undertakes a contracted Street Tree Pruning Program, pruning approximately 3500 street trees as part of maintenance requirements for clearance from streets, lights, signs, sidewalks, lawns, as well as to remove crowded branches, structurally weak branches, dead branches, etc. The primary purpose of the program is tree health and public safety. This represents a 10 year cycle of standard pruning, at an annual cost of $100,000.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Prioritize areas of high risk through current tree inspection program.	Summer 2018	$140K (3,500 hours first year to inspect or contract)	$28K/year (700 staff hours)	Roads, Parks & Fleet - Parks and Forestry
Increase number of trees planted annually in low-risk areas.	Summer 2018	$25,000 (plus 60 hours staff time)	$25,000/year (plus 60 hours staff time)	Roads, Parks & Fleet - Parks and Forestry
Develop Citizen Science program for residents to know how to identify and report trees/limbs of concern (e.g. dead trees, branches hanging over roads, etc.).	2019	In-house: $5,000 (plus 120 hours staff time); External Consultant: $25,000	$5,000/year (plus 80 hours annual staff time)	Roads, Parks & Fleet - Parks and Forestry
Increase proactive pruning.	2019	N/A	$200K/year (plus 350 hours annual staff time)	Roads, Parks & Fleet - Parks and Forestry

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
6.7.1	Number of trees pruned per year	Yes, GIS	Roads, Parks, and Fleet - Parks and Forestry
6.7.2	Number of trees inspected per year	Yes, GIS	Roads, Parks, and Fleet - Parks and Forestry
6.7.3	Number of trees planted per year	Yes, GIS	Roads, Parks, and Fleet - Parks and Forestry

7. Additional Notes/Comments

To increase the current 10-year pruning cycle to once every 5 years, plus include the open space park trees, we would need to prune 10,000 trees each year at an estimated cost of $285,000 (not including staff salary time to administer, inspect and manage the program, approx. $14,000 staff time).
Based on ISA best management practices for inspections of street and park trees, staff would need to inspect a minimum of 15,000 trees per year, the approximate equivalent of 80 days of annual inspections (approximately $28,000 in staff time at arborist rates).

In addition, more regular inspections of all city trees would include the 145km of forest edges plus trees along waterways. Based on travel time, access and areas it would take two staff the majority of the summer to complete one inspection of all these areas (standard operating procedure that staff work in pairs in more remote areas / rough terrain in case of emergencies). Because these would be lower risk trees, arborist apprentices could complete these at an annual cost (2 summer student positions) of $30,000.

Increased development tree removal permit fees (i.e. $/hectare for development related tree removals) is one possible way to support additional funding for tree maintenance.

Details about the 2016 ice storm impacts on trees, specific to Parks and Forestry (only), are shown below:

Total public trees impacted by Ice storm > 1850 on streets, approximately 500 in parks and natural areas.

- Approx. 400 Trees destroyed (and completely removed)
- 1,950 trees with significant branches broken/damaged by ice

Direct costs were as follows, not including equipment rates for city equipment:
$300,500 in contracted services costs (cleanup, removals and replanting)
$107,000 in staff hours and overtime expenses
$437,500 in direct expenses related to ice storm.

ACTION 6.8

Expand Barrie's Road Weather Information System (RWIS) network and take the advantage of new and advanced road conditions sensing technology to enhance winter maintenance actions.

1. Background Information	
Objectives	• Continue to meet and exceed LOS required by Council for Winter Operations • Enhance weather monitoring/forecast capabilities and increase effectiveness and efficiency for winter operations
Action Description	A road weather information system (RWIS) collects winter weather and road condition information. Sensors measure pavement temperature, wind speed and direction. The City of Barrie will expand its RWIS system to improve pavement condition data resulting in more efficient and improved winter maintenance actions.
Action Rationale	RWIS data is used by the City of Barrie to support winter maintenance activities making roads safer for motorists. An increase in the number of RWIS stations will allow for the City to respond to an increased variability in winter events throughout the City.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Third party contractors
Associated Plans and Strategies	Winter Operations Plan; Salt Optimization Strategy; Salt Management Plan

2. Municipal Leads	
Lead Department	Roads, Parks, & Fleet—Road, Stormwater & Rail Operations
Supporting Department(s)	Purchasing

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Ongoing

4. Current Status/Practice

The City of Barrie currently has two RWIS stations located at Livingston/Bayfield and Yonge/ Ashford. A new station has been installed in Fall 2017. A replacement of RWIS station is being proposed and waiting for the 2018 Council budget approval.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Inspection and repair of current RWIS stations.	Ongoing	$1,000	$5,000	Road, Parks, & Fleet - Road, Stormwater & Rail Operations
Replacement of aged RWIS station.	2018	$100,000	$10,000	Road, Parks, & Fleet - Road, Stormwater & Rail Operations
Research in new technology.	Ongoing	N/A	N/A	Road, Parks, & Fleet - Road, Stormwater & Rail Operations

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
6.8.1	Installation of new RWIS station complete	No	Roads, Parks, & Fleet - Road, Stormwater & Rail Operations
6.8.2	Total number of collisions during winter season	Yes, Traffic Services	Roads, Parks, & Fleet - Road, Stormwater & Rail Operations

7. Additional Notes/Comments

N/A

ACTION 6.9

Operationalize teleworking and other alternative work arrangements (e.g. Stay-at-home days/shifted/flex) that eliminate commuting during extreme weather events and hazardous road conditions.

1. Background Information	
Objectives	• Reduced employee absenteeism and improved productivity during extreme weather and hazardous conditions • Continuity of services • Less traffic and improved road safety during extreme weather and hazardous conditions
Action Description	The City of Barrie will operationalize options for telecommuting, flexible work days, and stay-at-home days for City staff, especially during periods of inclement weather. The City will also encourage these options for organizations within the City of Barrie where possible. Efforts will be taken to eliminate barriers and strengthen the culture to support alternative work arrangements during extreme weather and hazardous conditions.
Action Rationale	Telecommuting and flexible work arrangements can help to reduce energy use, reduce strain on transportation and road systems, and increase public safety during inclement weather. It also allows employees that may not otherwise be able to get to work, to continue working remotely. This improves productivity and ensures continuity of City services and other work efforts.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Union Partners
Associated Plans and Strategies	Inclement Weather Policy; Declaring Inclement Weather Procedure; Flexible Working Hours Procedure; Reduced Work Week Procedure; Work From Home Procedure.

2. Municipal Leads	
Lead Department	Human Resources
Supporting Department(s)	All (management staff)

3. Timeline	
Estimate Start Date	2018
Estimated Duration	3 months—review and research 6 months—communicating training

Frequency of Implementation	Ongoing implementation and monitoring

4. Current Status/Practice

These protocols are already in place allowing for certain positions to engage in flexible working arrangements and telecommuting. Although options are available, some departments may not fully support the approval of such arrangements. Policies and procedures are due for a review pending HR Director direction.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Research and review of policies and procedures • Identification of core staff essential to running the City • Consultation with departments	2018	Staff time	N/A	Human Resources
Update policies and procedures	2018	Staff time	N/A	Human Resources
Ensure employees have technology (e.g. laptops, etc.) to work from home	Ongoing	TBD	N/A	Innovate Barrie
Communicate and deliver training on new policies and procedures (strengthen culture)	2018/2019	Staff time	Staff time	Human Resources

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
6.9.1	Level of support for telecommuting and flexible working arrangements throughout the Corporation	New survey required on management support for these arrangements	Human Resources
6.9.2	Employees feel supported with their requests for flexible working arrangements/ telecommuting	New survey on what employees would like to see	Human Resources
6.9.3	Number of weather events and impacts to services	No	Human Resources

7. Additional Notes/Comments

N/A

GOAL 7: BUILD COMMUNITY RESILIENCE

Climate change poses a variety of risks to the community, ranging from flooding, to extreme heat and cold, to habitat loss, and property damage. To ensure that the City of Barrie is able to withstand and recover from the impacts of climate change it is important to build and maintain the community's resilience. Building community resilience, in the context of this Strategy refers to actions that can be taken by the City to support residents and citizens in order to improve local adaptive capacity and reduce risks.

	ACTION NAME	PRIORITY	QUICK WIN	MITIGATION CO-BENEFIT	PEOPLE'S CHOICE
7.2	Conduct education and outreach to developers to encourage the use of Low Impact Development (LID) technologies.	2			
7.3	Increase education to residents on planting urban gardens with native species that provide habitat and enhance local biodiversity.	2			
7.4	Encourage natural and constructed shade, cooling structures and spaces (e.g. recreational/sprinkler community water parks) on public and private property.	2			
7.5	Support ongoing community initiatives that address extreme heat and cold.	2			
7.6 & 7.1	Create naturalized and edible landscapes on City land using existing resources. Continue with active tree planting, community partnerships, and naturalization programs as outlined in the Urban Forest Strategy.	1			

ACTION 7.2

Conduct education and outreach to developers to encourage the use of Low Impact Development (LID) technologies.

1. Background Information	
Objectives	• Increased use of Low Impact Development • Improved stormwater management • Increased awareness among developers
Action Description	Low impact development (LID) refers to land developments or retrofits that aim to manage stormwater runoff by mimicking natural processes and treating it as close to the source as possible. The City of Barrie will support education to developers on how they can incorporate LID technology into new residential and industrial developments.
Action Rationale	LID emphasizes conservation and use of on-site natural features to protect and enhance water quality. By implementing LID technologies, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Association of Municipalities of Ontario (AMO); Developers
Associated Plans and Strategies	City of Barrie Built Boundary Community Improvement Plan & other improvement plans; Intensification Area Urban Design Guidelines; Comprehensive Stormwater Management Master Plan, Hewitt and Salem SIS for Annex Lands, Stormwater Management Guidelines

2. Municipal Leads	
Lead Department	Engineering – Development Services
Supporting Department(s)	Planning and Building Services – Planning Services; Engineering – Policy & Standards

3. Timeline	
Estimate Start Date	Ongoing - Developers are encouraged to use LID where conditions permit. Part of SWM Guidelines, Lake Simcoe Protection Plan, etc.
Estimated Duration	Ongoing
Frequency of Implementation	Every Site Plan and Subdivision application

4. Current Status/Practice

Developers are encouraged to incorporate LID in their designs where conditions permit. Cannot be used in certain areas or conditions (e.g. well head protection areas, high water table), or with certain land uses (e.g. industrial).

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Create education and outreach opportunities for developers at existing meetings or events (i.e. Annexed Lands meetings)	2018	Staff time	Staff time	Engineering—Development Services
Develop a Low Impact Development Manual	2018	Staff time	N/A	Engineering—Policy & Standards

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
7.2.1	Number of Site Plans and Subdivisions that incorporate LID in their design	No	Engineering - Development Services
7.2.2	Phosphorous levels in watercourses	Yes, Lake Simcoe Region Conservation Authority	Environmental Operations Branch

7. Additional Notes/Comments

N/A

ACTION 7.3

Increase education to residents on planting urban gardens with native species that provide habitat and enhance local biodiversity.

1. Background Information	
Objectives	• Increased biodiversity • Improved public health
Action Description	The City of Barrie will continue to encourage residents to plant gardens using native species in order to enhance local biodiversity. Native plants are preferable for urban gardens as they are tolerant to the local climate, and are more resistant to disease and thus require less fertilizer and pesticides.
Action Rationale	Planting urban gardens can make a major difference in promoting local biodiversity, such as providing habitat for pollinating insects, birds, butterflies, and other animals. Urban gardens also have the added bonus of naturally controlling stormwater during rain events.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Barrie Garden Club; Cultivating Culture; Communities in Bloom
Associated Plans and Strategies	Naturalization Policy, Parks & Recreation Strategic Master Plan, Community Garden Policy, Comprehensive Stormwater Management Master Plan, Commemorative Program, Parks Planning Recreation Guide

2. Municipal Leads	
Lead Department	Engineering – Parks Planning
Supporting Department(s)	Access Barrie; Roads, Parks & Fleet—Parks & Forestry

3. Timeline	
Estimate Start Date	2018
Estimated Duration	Ongoing
Frequency of Implementation	Spring and fall

4. Current Status/Practice

Several recommendations in the Parks & Recreation Strategic Master Plan speak to urban gardening and increasing local biodiversity, including:

- 6.46 - Integration of horticultural displays and arts and cultural elements into the design of public spaces is encouraged at key destinations through improved aesthetics and creation of comfortable places, as a means to encourage for both passive and active recreational activity.
- 7.1 - Develop a Greening Strategy that is aligned with community priorities and speaks to the departmental mandates and efforts to protect and preserve clean air, land and water and encompasses parks naturalization, beautification, urban forestry targets, reduction of waste in facilities and parks, education and awareness through the facilities, programs and services, reduction of greenhouse gas emissions through the use of trails for active transportation and the engagement of children and youth in protecting and enhancing the environment.

A Naturalization Policy in also in place for city lands.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Provide more information on urban gardens on City's Beautification website page.	2018	Staff time	Staff time	Engineering – Parks Planning
Provide education and outreach opportunities at Communities in Bloom events.	2018	Staff time – est. 16 hours additional to CIB prep.	Staff time – est. 16 hours additional to CIB prep.	Road, Parks & Fleet – Parks and Forestry
Publications in local newspapers. This week in Barrie, and Recreation Program.	2018	$2,000	$2,000	Access Barrie
Have demonstration plots/ gardens on public property with educational signage.	2019	$1,500/plot	$2,000/plot	Road, Parks & Fleet – Parks and Forestry
Offer mentoring at existing Community events (e.g. Celebrate Barrie, Public Works Week, etc.) for residents on what to plant/how to maintain urban gardens.	2019	$1,000 per event in staff time	$1,000 per event in staff time (est. 25 hours)	Parks Planning & Parks and Forestry
Engaging development and building community to have demonstration plots on private property (e.g. demonstration garden in showcase homes for new developments).	2020	TBD	TBD	Engineering – Parks Planning

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
7.3.1	Number of demonstration sites on public property	No	Roads, Parks & Fleet—Parks and Forestry
7.3.2	Number of demonstration sites on private property	No	Engineering—Parks Planning

7. Additional Notes/Comments

N/A

ACTION 7.4

Encourage natural and constructed shade, cooling structures and spaces (e.g. recreational/sprinkler community water parks) on public and private property.

1. Background Information	
Objectives	• Increased shaded areas • Reduction in Urban Heat Island effect
Action Description	Barrie is already dealing with the impacts of extreme heat and extended heat waves. To address increasing temperature, the City of Barrie will encourage strategies such as planting trees for increased shade cover, constructing new or extending hours of existing community water parks, increasing access to drinking water, and other cooling options.
Action Rationale	Extreme heat can pose a health risks to residents in the City of Barrie, especially vulnerable populations. Pursuing various cooling strategies within the city will help to reduce the risk of heat-related illness given the expected increase in the number of hot days.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority; Downtown Barrie Business Association; Tourism Barrie; Simcoe Muskoka District Health Unit; School Boards
Associated Plans and Strategies	City of Barrie Built Boundary Community Improvement Plan & other improvement plans; Intensification Area Urban Design Guidelines; Parks and Recreation Strategic Master Plan; Parks standards

2. Municipal Leads	
Lead Department	Engineering – Parks Planning
Supporting Department(s)	N/A

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing
Frequency of Implementation	Annual

4. Current Status/Practice

Consideration is given to natural and constructed shade with the development or redevelopment of parks.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Evaluate tree densities in Annexed lands and prioritize areas of planting.	Ongoing	TBD	TBD	Engineering – Parks Planning
Incorporate shade trees and shade structures into development of new parkland and/or existing parkland.	Ongoing	TBD	TBD	Engineering – Parks Planning
Encourage partnerships with Clubs and Agencies.	Ongoing	N/A	N/A	Engineering – Parks Planning
Incorporate larger shade trees into provisional costs for new parkland.	2019	$750/tree	Varies	Engineering – Parks Planning

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
7.4.1	Percentage of urban tree canopy.	Yes, Urban Forest Strategy	Engineering—Parks Planning

7. Additional Notes/Comments

Shade Structures – range from $25,000 - $125,000 + depending on design and location. Drinking fountains est. $7,500 each plus infrastructure; large shade trees – average $750 each.

ACTION 7.5

Support ongoing community initiatives that address extreme heat and cold.

1. Background Information	
Objectives	• Improved public health and safety
Action Description	Extreme heat and cold pose a major health and safety risk to vulnerable populations within the City of Barrie. The City will investigate opportunities to support community initiatives that address these issues.
Action Rationale	Supporting community organizations and initiatives that address extreme heat/cold will help to protect those most vulnerable in the City of Barrie.
Supporting Actions from Adaptation Strategy	N/A
Potential Partnerships or External Resources	Community organizations (e.g. local churches); Simcoe Muskoka District Health Unit; Barrie Fire and Emergency Services; Simcoe County; Barrie Police Services; Canadian mental Health Association; Royal Victoria Regional Health Centre
Associated Plans and Strategies	Emergency Management Plan

2. Municipal Leads	
Lead Department	Engineering – Source Water Protection
Supporting Department(s)	Access Barrie; Corporate Facilities

3. Timeline	
Estimate Start Date	2019
Estimated Duration	Ongoing
Frequency of Implementation	Annually—Winter Season

4. Current Status/Practice

N/A

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Continue to make City Facilities available as warming/cooling centres during extreme heat and cold days.	Ongoing	N/A	N/A	Corporate Facilities
Investigate corporate policies related to promotion of charitable organizations and community partner initiatives (e.g. SMDHU and extreme heat programming)	2019	Staff time	Staff time	Engineering —Source Water Protection

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
-	To be determined as implementation progresses.	-	-

7. Additional Notes/Comments

N/A

ACTION 7.6

Create naturalized and edible landscapes on City land using existing resources.

1. Background Information	
Objectives	• Improve local food security • Increased environmental awareness • Provide teaching opportunities for children and adults
Action Description	Edible landscapes can be used as sustainable food production models and contribute to local biodiversity and ecological integrity. As such, the City of Barrie will continue its partnership with Fruitshare Barrie to create edible landscapes on City-owned property.
Action Rationale	Creating edible landscapes can improve food security, biodiversity, and sustainability in Barrie's urban areas.
Supporting Actions from Adaptation Strategy	7.1 - Continue with active tree planting, community partnerships, and naturalization programs as outlined in the Urban Forest Strategy.
Potential Partnerships or External Resources	Nottawasaga Valley Conservation Authority; Lake Simcoe Region Conservation Authority, Barrie Garden Club, FruitShare Barrie; Brereton Field Naturalists; Cultivating Culture
Associated Plans and Strategies	Naturalization Policy, Urban Forest Strategy, Official Plan

2. Municipal Leads	
Lead Department	Roads, Parks, and Fleet - Parks and Forestry
Supporting Department(s)	Engineering – Parks Planning, Creative Economy

3. Timeline	
Estimate Start Date	Ongoing
Estimated Duration	Ongoing, 10+ years
Frequency of Implementation	Ongoing

4. Current Status/Practice
Forestry staff partner with Fruitshare Barrie on an annual planting project mainly funded through fruit tree planting grants obtained by Fruitshare Barrie. Staff time to determine a planting location as well as the associated planting support expenses and materials are donated by the

City. Fruitshare Barrie obtains funding to purchase fruit trees which are planted during a community event. Three locations have been planted to date through this process, and other sites have been selected for future funding.

5. Action Plan Tasks

Tasks	Suggested Start Date	Estimated Initial Cost	Estimated Ongoing Cost	Responsible Department
Research other urban agriculture policies for best practices.	2018	Staff time (est. 40 hrs)	N/A	Roads, Parks, and Fleet—Parks and Forestry & Engineering – Parks Planning
Support funding applications through local partnerships (FruitShare Barrie).	2018	Staff time (est. 20 hrs)	Staff time (est. 20 hrs)	Roads, Parks, and Fleet - Parks and Forestry
Increase the number and area of volunteer community garden plots on City parkland.	2018	TBD based on level of increase	TBD based on level of increase	Engineering—Parks Planning & Development
Assess feasibility of increasing edible plants within City of Barrie gardens.	2019	TBD based on level of increase	TBD based on level of increase	Roads, Parks, and Fleet - Parks and Forestry
Coordinate with food markets for harvesting opportunities pending edible plants are planted.	2020	Volunteer / community group time	Volunteer / community group time	Engineering - Parks Planning & Development

6. Measuring Success

ID	Indicator	Does Baseline Data Exist? If yes, where?	Department responsible for measuring progress
7.6.1	Number of fruit trees planted per year	Yes, Forestry records	Roads, Parks, and Fleet - Parks and Forestry
7.6.2	Area of fruit orchards created	No	Roads, Parks, and Fleet - Parks and Forestry
7.6.3	Number of volunteer garden plots	Yes, Parks Planning & Development	Roads, Parks, and Fleet - Parks and Forestry

7. Additional Notes/Comments

Forestry does not support the planting of fruit trees on streets (boulevards) or adjacent to high use public areas (e.g. playgrounds) for the following reasons:

- Fruit trees require more regular maintenance than standard street trees
- Fruit droppings on public boulevards create hazards for users (trip and slip, fruit on roadways) and generate significant complaints from residents. Many municipalities have stopped all planting of crab apple varieties on boulevards as a result.
- Boulevard soils are not generally of quality to produce healthy fruit trees.
- Boulevards trees are prone to salt damage, most fruit trees are salt sensitive.
- Fruit trees do not provide the same climate change mitigation values as large canopy native tree species.

Great areas for fruit orchards and plantings include underutilized portions of parks and naturalized areas that are in proximity to low income areas and close to public transit. Staff in consultation with Fruitshare Barrie have selected several prime candidates and there are more alternatives within existing parkland where we plan to continue these types of plantings.

This program is supported by external funding (Fruitshare Barrie fundraising and grant applications through Tree Canada: Edible Trees, ISA Ontario, Natural Resources Canada, & business partners)

ANNUAL REPORTING

Each lead department will be responsible for reporting on the progress of implementation for their assigned Action-Specific Action Plans. In order to do so, the City has developed an ASAP reporting template for departments to fill out annually.

The reporting template is a guide as to how each lead department will report on the implementation of the actions. It tracks information relating to progress and adjustments to sub tasks from the Implementation Plan (including budgets, timelines, etc.), as well as progress and measurement on indicators identified or new indicators. There is also an opportunity for departments to list new tasks or initiatives that have been undertaken that support the implementation of the ASAPs.

The reporting template will help the City to measure progress over time, and provide a platform to share outcomes from the Strategy on an annual basis.

REVIEW OF IMPLEMENTATION PLAN AND ADATATION STRATEGY

A formal review of the Climate Change Adaptation Strategy is planned to occur every five years. An update to council on the progress of the Implementation Plan will occur on an annual basis using the feedback from the ASAP Reporting.

Fundamentally, the 5-year review is intended to gauge the implementation status of priority actions and identify whether these actions are helping to improve the adaptive capacity of the City of Barrie. The progress on implementation will be greatly informed by the ASAP reporting, which will allow the City to determine the status of priority actions. However, it will also help the City to consider such questions as:

- How many actions have been undertaken by various departments?
- How many departments/staff have been involved in implementing the Adaptation Strategy?
- How has the community been involved in the implementation of the Adaptation Strategy?
- How has the City increased the general and technical capacity of both the corporation and community to adapt to climate change impacts?
- How is climate change information being considered in decision-making processes within the City and community?
- How effective have the actions been in achieving the Adaptation Strategy's goals and vision?
- How has awareness regarding climate change and adaptation increased in both the corporation and community?

This information will subsequently facilitate an update to the Adaptation Strategy. Actions fully completed or integrated into current operations will be retired, while existing actions that have not been implemented for various reasons can be edited or revised to overcome existing barriers. New actions for the Strategy may be developed in several ways. As natural, economic, social, and political conditions change, the City will review its research and assessments conducted in Milestone Two. This will involve a review of local climate projections, current impacts to the City, and the risk and vulnerability assessment results. From there, the Adaptation Team and Stakeholder Advisory Group can develop new actions or solutions to address relevant impacts. The City will also capitalize on the 'Monitor' and 'Investigate Further' actions previously identified in Appendix F of the 2017 Adaptation Strategy. These existing actions may be brought forward in the Strategy update or be edited to reflect changing conditions.

REPORTING TEMPLATE

Barrie	City of Barrie Climate Change Adaptation Strategy	Reporting Year: YYYY
	Annual ASAP Reporting Template	Date Completed: yyyy-mm-dd

OVERVIEW

Action Name: Name as written in Implementation Plan	Associated Goal: What goal does this action fall under?
Lead Department: As indicated in implementation plan	Lead Department Key Contact: Name
Supporting Department: As indicated in implementation plan	Status: Completed, Ongoing, Pending, Not Started
Action Summary: Provide a short summary on work to date, issues, or changes to the action overall.	

ACTION PLAN TASKS (FROM IMPLEMENTATION PLAN)

List the supporting actions identified in the implementation plan, and report on their current status.

Task Description	Status	Start Date	Completion Date	Forecasted Cost	Actual Cost To-Date	Details/Comments
	Completed, Ongoing, Pending, Not Started, Omitted	MM/YYYY (forecasted or actual)	MM/YYYY (forecasted or actual)	$0.00	$0.00/ TBD	Provide additional details regarding the status of this supporting action. If not being implemented, provide rationale.
	Completed, Ongoing, Pending, Not Started, Omitted	MM/YYYY (forecasted or actual)	MM/YYYY (forecasted or actual)	$0.00	$0.00/ TBD	Provide additional details regarding the status of this supporting action. If not being implemented, provide rationale.
	Completed, Ongoing, Pending, Not Started, Omitted	MM/YYYY (forecasted or actual)	MM/YYYY (forecasted or actual)	$0.00	$0.00/ TBD	Provide additional details regarding the status of this supporting action. If not being implemented, provide rationale.

ADDITIONAL TASKS

List any additional tasks completed or planned for to date that are not captured in the Action Plan Tasks from the Implementation Plan above.

Task Description	Status	Start Date	Completion Date	Forecasted Cost	Actual Cost To-date	Details/Comments
	Completed, Ongoing, Pending, Not Started	MM/YYYY (forecasted or actual)	MM/YYYY (forecasted or actual)	$0.00	$0.00/TBD	Provide additional details regarding the status of this supporting action.

MEASURING PROGRESS

Report on any new measurements for the identified indicators from the Implementation Plan. Include any new indicators that were used/ identified.

ID #	Indicator	Baseline Data (if applicable)	Data from previous year	Data from current year	If needed, describe what has changed in the last year.

ADDITIONAL NOTES/COMMENTS

Provide any additional notes/comments that are relevant to the implementation of this action.

GLOSSARY

Adaptation: Includes any initiatives or actions in response to actual or projected climate change impacts and which reduce the effects of climate change on built, natural and social systems.

Adaptive Capacity: The ability of built, natural and social systems to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Biodiversity: Biological diversity refers to the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes a diversity within species, between species, and of ecosystems.

Climate: The weather of a place averaged over a period of time, often 30 years. Climate information includes the statistical weather information that tells us about the normal weather, as well as the range of weather extremes for a location.

Climate Change: Climate change refers to changes in long-term weather patterns caused by natural phenomena and human activities that alter the chemical composition of the atmosphere through the build-up of greenhouse gases which trap heat and reflect it back to the earth's surface.

E. coli: *E. coli* is a type of bacteria. There are many subtypes of this bacterial species that cause a wide variety of diseases in humans. The bacteria can be transmitted person-to-person and by contaminated food and water.

Extreme Weather Event: A meteorological event that is rare at a place and time of year, such as an intense storm, tornado, hail storm, flood or heat wave, and is beyond the normal range of activity. An extreme weather event would normally occur very rarely or fall into the tenth percentile of probability.

Greenhouse Gas Emissions: Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation, emitted by the Earth's surface, the atmosphere itself, and by clouds. Water vapour (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), ozone (O3), and chlorofluorocarbons (CFCs) are the six primary greenhouse gases in the Earth's atmosphere in order of abundance.

Greywater: Greywater is defined as any domestic wastewater produced, excluding sewage. The main difference between greywater and sewage (or blackwater) is the organic loading. Sewage has a much larger organic loading compared to greywater.

Heatwave: Environment Canada issues heatwave warnings for central and southern Ontario when two consecutive days of daytime maximum temperatures are expected to reach 31ºC or when two consecutive days of humidex values reach 40ºC or more.

Impact: The effects of existing or forecast changes in climate on built, natural, and human systems. One can distinguish between potential impacts (impacts that may occur given a projected change in climate, without considering adaptation) and residual impacts (impacts of climate change that would occur after adaptation).

Intensity Duration Frequency (IDF) Curve: Intensity Duration Frequency (IDF) curves describe the relationship between rainfall intensity, rainfall duration, and return period (or its inverse, probability of exceedance). They are commonly used in the design of hydrologic, hydraulic, and water resource systems. IDF curves are obtained through frequency analysis of rainfall observations.

Invasive Species: An invasive species is a species that is established outside of its natural past or present distribution, whose introduction and/or spread threaten biological diversity.

Low Impact Development (LID): Low Impact Development (LID) refers to systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater in order to protect water quality and associated aquatic habitat.

Maladaptation: Maladaptation is a process that results in increased vulnerability to climate variability and change, directly or indirectly, and/or significantly undermines capacities or opportunities for present and future adaptation. One characteristic of maladaptation is any adaptation action that increases greenhouse gas emissions, as it would increase the likelihood that further adaptation to climate change will be required in the future.

Mitigation: The promotion of policy, regulatory and project-based measures that contribute to the stabilization or reduction of greenhouse gas concentrations in the atmosphere. Renewable energy programs, energy efficiency frameworks and substitution of fossil fuels are examples of climate change mitigation measures.

Native Species: A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy using its natural dispersal systems.

Pathogen: An agent causing disease or illness to its host, such as an organism or infectious particle capable of producing a disease in another organism. Pathogens are mostly microscopic (e.g. bacteria, viruses, etc.) and thrive in various places such as air, dust, surfaces, soil, etc.

Resilience: The capacity of a system, community or society exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.

Urban Heat Island: A metropolitan area which is significantly warmer than its surroundings. The temperature difference is usually larger at night than during the day and larger in winter than in summer. The main causes are changes in the land surface by urban development along with waste heat generated by energy use. As population centers grow, they tend to change greater areas of land which then undergo a corresponding increase in average temperature.

Vector: In the biological context, a vector is a carrier (i.e. an invertebrate animal) that can transmit an infective agent from one host to another. For example, species of mosquito carry the malaria parasite, *Plasmodium*, between humans.

Weather: The day-to-day state of the atmosphere, and its short-term variation in minutes to weeks.

ACRONYMS

AMO: Association of Municipalities of Ontario

ASAP: Action-Specific Action Plan

AR: Assessment Report

BARC: Building Adaptive and Resilient Communities

BIA: Business Improvement Area

CMMS: Computerized Maintenance Management Systems

ECA: Environmental Compliance Approval

GIS: Geographic Information Software

LSRCA: Lake Simcoe Region Conservation Authority

MNAI: Municipal Natural Assets Initiative

MOECC: Ministry of Environment and Climate and Change

PIEVC: Public Infrastructure Engineering Vulnerability Committee

SAG: Stakeholder Advisory Group

SMDHU: Simcoe Muskoka District Health Unit

SOP: Standard Operating Procedure

TLV: Threshold Limit Value

UBCM: Union of British Columbia Municipalities

WSIB: Workplace Safety and Insurance Board

APPENDIX A: STAKEHOLDER ENGAGEMENT REPORT

INTRODUCTION AND BACKGROUND

Following adoption of the Climate Change Adaptation Strategy in 2017, the City of Barrie is pursuing the development of an Implementation Plan to further the vision of adapting to changing climate conditions and embracing new opportunities to remain a vibrant, healthy and sustainable waterfront community. The purpose of the Climate Change Adaptation Strategy (CCAS) is to mainstream adaptation actions into City operations and to reduce the risk climate change poses to Barrie's physical, economic, social and ecological systems. The Implementation Plan will outline the details of how the City will achieve the actions outlined in the CCAS, identify community partners, and determine how monitoring and reviewing the implementation of the Adaptation Plan will occur.

The City will continue to follow ICLEI Canada's Building Adaptive and Resilient Communities (BARC) five-milestone framework, which provides a structured approach to adaptation planning. The CCAS included the completion of Milestones One, Two and Three and the Implementation Plan will meet the requirements of the final stages, Milestones Four and Five.

The City of Barrie has retained ICLEI Canada in collaboration with Lura Consulting to develop the Implementation Plan for the CCAS.

Engaging the Barrie community is an important part of developing the Implementation Plan for the City of Barrie's CCAS. This Community Engagement Summary Report outlines the various activities and tools that were used to support the development of the CCAS Implementation Plan and summarizes the input received.

COMMUNITY ENGAGEMENT

Three main audiences were engaged during the planning process: City of Barrie staff (Adaptation Team), key stakeholder organizations (Stakeholder Advisory Group), and the general public (local community members, residents, and businesses). A description of the activities used to engage these audiences is provided below.

Climate Adaptation Team

The Climate Adaptation Team, which had assisted with the development of the CCAS, was reconvened to provide strategic direction and technical support to the development of the Implementation Plan. The Adaptation Team was composed of cross-departmental staff members from the City of Barrie with a diversity of expertise and experience with the management of infrastructure, planning, public communications, natural resources, economic development, parks and community recreation, tourism, and emergency services.

Two workshops were held over the course of the Implementation Plan's drafting process. These meetings were designed to capture valuable input to guide the Action-Specific Action Plans (ASAPs) as well as the Draft Implementation Plan. The process involved extensive engagement with City departments to identify important implementation considerations for each action, including responsible departments, budgets, timelines, supporting tasks, and measurements of success.

The objectives of the first Adaptation Team meeting on September 26, 2017 were to: welcome and reintroduce the team to Phase 2 of the project; provide an overview of the Phase 2 process and receive feedback on what is needed to make it a success; review CCAS actions and initiate discussion on ASAPs; present and discuss SAG action and implementation priorities and explore implementation tools for each action.

The objectives of the first Adaptation Team meeting on March 5, 2018 were to: reintroduce the Project Team and the Adaptation Team; provide a recap of the Implementation Plan and the work to date;

discuss Climate and Environment Fair outputs; review final ASAPs and discuss how they align with current initiatives; discuss the role of the Adaptation Team moving forward; and discuss project next steps.

Stakeholder Advisory Group

A Stakeholder Advisory Group (SAG) was formed to provide an ongoing forum for advice, feedback, and guidance to the City of Barrie at key points during the Implementation Plan drafting process. Many members of the SAG were also involved in the development of the CCAS.

The role of the SAG was to provide sector-specific knowledge and input, while acting as champions for the project. The SAG consisted of representatives from:

- Barrie Urban Pantry Project
- Brereton Field Naturalists
- Canadian Red Cross Simcoe Muskoka Branch
- City Council
- Barrie Environmental Advisory Committee
- Downtown Barrie BIA
- Explore Lake Simcoe Sustainable Tourism
- FruitShare Barrie
- Lake Simcoe Region Conservation Authority
- Living Green
- Nottawasaga Valley Conservation Authority
- Simcoe Muskoka District Health Unit
- Tourism Barrie
- Transition Barrie

The SAG met twice over the course of the project. SAG members were also encouraged to provide feedback on the Draft Implementation Plan through email.

The objectives of the first SAG meeting on September 26, 2017 were to: introduce the Project Team and SAG members; provide a recap of the Climate Change Adaptation Strategy (CCAS); introduce the purpose of the second phase of the project; provide a recap and update on the role of the SAG and involvement in the project; review the CCAS actions and identify priorities for implementation; explore implementation tools for each action and identify potential partners; and discuss the potential Climate and Environment Fair.

The objectives of the second SAG meeting on March 5, 2018 were to: re-introduce the Project Team and the Stakeholder Advisory Group; provide a recap of the Implementation Plan and work to date; discuss the Climate and Environment Fair outputs; review the ASAPs and discuss how they align with the current initiatives; discuss how members of the SAG can help facilitate the plan; and discuss project next steps.

PUBLIC ENGAGEMENT

Climate and Environment Fair

On Saturday, February 3, 2018, the City of Barrie, The Project Team, and SAG affiliated organizations hosted a Climate and Environment Fair from 11:00am – 3:00pm in the Barrie Public Library as part of Barrie Winterfest 2018. The purpose of the fair was to:

- Introduce Barrie residents to Barrie's Climate Change Adaptation Plan;
- Gather feedback on project priorities through ranking exercises;
- Receive comments on proposed climate change strategies;
- Provide project partners with the opportunity to share climate change initiatives with the public.

A series of display boards were presented which featured components of the seven goals of the Climate Change Adaptation Strategy with a list of the actions associated with each goal. The boards also demonstrated how the actions were prioritized, which actions were noted as quick wins, and which would have mitigation co-benefits. Each display board also provided a brief informational blurb demonstrating the

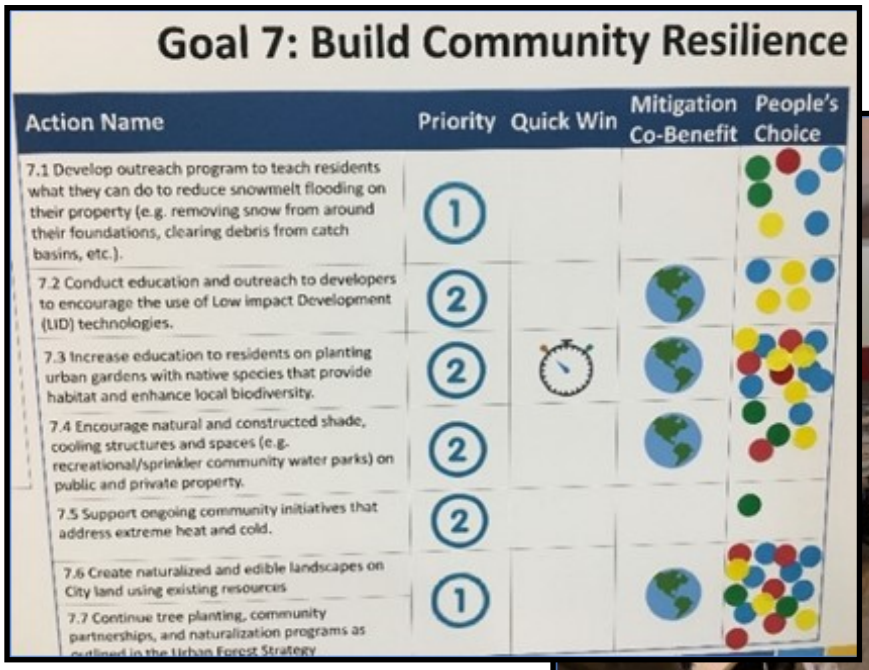
need for action. Project team members were available to speak informally with attendees and answer questions. Stations were also organized by project partners to provide the public with information regarding what City departments and supportive organizations are doing in the community related to climate change. The additional information stations included the following:

- FruitShare, Barrie Urban Pantry, Cultivating Culture
- Red Cross
- Simcoe County School Board
- City of Barrie Energy Management
- City of Barrie's Active Transportation Working Group
- Simcoe Muskoka District Health Unit

Participants were encouraged to provide their input on the Implementation Plan through the review of the adaptation actions. Upon review of the actions, participants were given sticker dots to vote on the ones they thought were most important. For those who couldn't attend the fair, a survey mirroring the interactive display boards was available online until February 18, 2018. Approximately 140 people attended the Climate and Environment Fair and 5 community members completed the online survey.

During the fair, participants tended to engage with several information stations and took the time to review multiple Goals and their actions. Many participants voted for the actions they thought were most important. Genuine interest in learning about climate change adaptation was expressed.

The outcome of the dot voting exercise was integrated into the draft Implementation Plan with a "people's choice" indicator assigned to each ASAP. A key outcome from the dot voting exercise revealed that the most popular ASAPs were the actions that participants could take action on themselves. The top vote-getting ASAPs are displayed in Exhibit 3.



ASAP Number	Action	Vote Tally
Goal 5: Protect Biodiversity and Enhance Ecosystem Functions		
5.2	Develop incentives, standards, and permitting processes to enhance green space, green roofs, and tree canopy on private and public properties.	13
Goal 6: Minimize Disruptions to Corporate Services		
6.7	Increase preventative maintenance and inspection of trees on public property (e.g. tree pruning, removal of diseased/hazardous trees, proactive planting in strategic areas) in order to reduce damage to the urban forest caused by extreme weather events.	10
6.6	Plant trees in strategic areas to reduce wind pressure and serve as windbreaks where feasible	
Goal 7: Building Community Resilience		
7.3	Increase education to residents on planting urban gardens with native species that provide habitat and enhance local biodiversity.	12
7.6	Create naturalized and edible landscapes on City land using existing resources.	16
7.7	Continue with active tree planting, community partnerships, and naturalization programs as outlined in the Urban Forest Strategy.	

Exhibit 3: Top Vote-Getting ASAPs from Climate & Environment Fair

COMMUNICATION AND OUTREACH TOOLS

Various tools and communication channels were used to reach a broad audience of Barrie community members and encourage their participation in the development of the Implementation Plan to support the CCAS.

Project Webpage

A dedicated webpage on the City of Barrie's website (www.Barrie.ca/ClimateChange) was used to share information about the development of the Implementation Plan, the Climate and Environment Fair, opportunities to provide feedback, staff contact information, and project documents.

Social Media Promotion

The City's established Twitter (@cityofbarrie) and Facebook accounts were used to promote the project and encourage participation. The Climate and Environment Fair was advertised through these channels and included a link to the online survey.

Online Survey

An online survey was developed to complement the dot voting exercise at the Climate and Environment Fair. The purpose of the survey was to give members of the public, who were unable to attend the Fair, the opportunity to vote on the ASAPs they felt were most important. The survey was designed to mirror the display panels provided at the Fair. 5 survey responses were received from community members.

NEXT STEPS

The Project Team worked with City staff to integrate the feedback that was received through the engagement activities. The ASAPs were refined through prioritization, the development of potential implementation tools, and the identification of potential partnerships with external organizations. Additionally, consultation with the public helped to identify which ASAPs are a priority to the Barrie community.

The collaborative planning approach used to develop the Implementation Plan will help to ensure that Barrie's commitments are reflective of the needs and priorities of the community as we move towards a new climate reality.

The City of Barrie recognizes that the successful implementation of the Climate Change Adaptation Strategy will depend on the collective efforts of City staff, residents, businesses, and partner organizations throughout Barrie.

APPENDIX B: ACTION IDS

Each of the 59 priority actions from the 2017 Adaptation Strategy were assigned an ID number, allocated by goal, to identify and track the action throughout the Strategy. During the development of the Implementation Plan and the Action-Specific Action Plans, some actions were combined with other actions, and moved under different Goals. As such, their Action ID changed from those given in the Adaptation Strategy. Below is a list of priority actions whose Action ID changed from the Adaptation Strategy to the Implementation Plan.

Action Name	Action ID in Implementation Plan	Action ID from Adaptation Strategy
Update the City's Sanitary Inflow and Infiltration Reduction Program	2.6	3.1
Explore possibilities of implementing stormwater management facilities within existing developed watersheds to reduce flooding where needed.	2.7	3.4
Implement a comprehensive operations, maintenance and inspection program for stormwater infrastructure.	3.4	3.7
Conduct stormwater drainage area inspections to identify areas of potential risk for debris blockage and dams.	3.6	3.9
Improve sediment and erosion control from construction activities through improved inspections, reporting, and operational controls.	3.5	3.8
Develop an inspection policy for high risk infrastructure to identify any damage from major storm and extreme weather events.	3.7	3.11
Develop an engineering policy to update design standards to reflect new climate change projections.	3.9	3.12
Develop and implement a plan to regularly update the design Intensity-Duration-Frequency (IDF) curve to reflect the geographic areas of the municipality and changing climate parameters	3.3	3.5
Update Engineering policy and standards to encourage design that includes consideration of the potential impacts of climate change.	3.11	3.14
Investigate and explore opportunities to promote the collection and recycling of greywater and stormwater on private property and City facilities.	3.10	3.13
Explore possibility of stormwater utility/rebate in Barrie to manage and operate stormwater infrastructure.	3.12	3.15
Improve storm water infrastructure capacity as part of renewal projects.	3.13	3.16
Increase Low Impact Development (LID) technologies throughout the City and update engineering policy and standards accordingly.	5.9	3.9
Develop outreach program to teach residents what they can do to reduce snowmelt flooding on their property (e.g. removing snow from around their foundations, clearing debris from catch basins, etc.).	2.8	7.1
Continue with active tree planting, community partnerships, and naturalization programs as outlined in the Urban Forest Strategy.	7.1	7.7

Barrie