



SUBJECT: Climate Adaptation Plan

TO: Environment, Infrastructure & Community Services Cttee.

FROM: Environment, Infrastructure and Community Services

Report Number: EICS-03-21

Wards Affected: All

File Numbers: 210-09

Date to Committee: March 4, 2021

Date to Council: March 23, 2021

Recommendation:

Receive and file environment, infrastructure and community services report EICS-03-21 regarding Burlington's upcoming Climate Adaptation Plan.

PURPOSE:

Vision to Focus Alignment:

- Support sustainable infrastructure and a resilient environment

Background and Discussion:

On April 23, 2019, Burlington City Council declared a [climate emergency](#) “for the purposes of deepening our commitment to protecting our economy, environment and community from climate change” and “that Council and staff immediately increase the priority of the fight against climate change and apply a climate lens to the plans and actions of the City of Burlington including the Council strategic workplan and future budgets.”

The City has shown leadership with respect to plans to reduce greenhouse gas emissions – also known as climate mitigation. A net carbon neutral goal by 2040 for corporate emissions was first approved in [Burlington's Strategic Plan 2015-2040](#) and confirmed again in July 2019 with the approval of the [Corporate Energy and Emissions Plan: 2019-2024](#). In April 2020, Council approved a net carbon neutral goal by 2050 for

community emissions in Burlington's [Climate Action Plan](#). While work is underway to reduce the greenhouse gas emissions which contribute to climate change, we must also recognize that our climate is changing.

In 2018, the Intergovernmental Panel on Climate Change (an international body responsible for assessing the science related to climate change) reported that the [world](#) has already warmed by 1°C above preindustrial levels (1850-1900) due to human activities and is projected to reach 1.5°C by 2030-2052 at the current rate of warming. [Canada](#) is warming at a faster rate with overland temperatures increasing an average of 1.7°C between 1948 and 2016 and about 2.3°C for northern Canada with the majority of the warming due to human activities. Annual [precipitation](#) rates have also increased with extreme events becoming more frequent and intense.

Climate Projections for Burlington

The first step to developing a climate adaptation plan for Burlington is to identify local climate projections based on climate science. The Climate Projections Report for Burlington Region (Appendix 1) presents how Burlington's climate has and is projected to change from the recent past (1976-2005) to the immediate future (2021-2050) and near future (2051-2080) for two emission scenarios¹ (low and high). For consistency, the timeframes, emission scenarios, geographical area, and most of the climate categories and climate variables used in the report are based on the [Climate Atlas of Canada](#)'s terminology when available. Additional data was gathered from scientific articles which might use different time frames or emission scenarios but are clearly acknowledged as such in the report.

The "Burlington Region" grid used in the Climate Atlas was identified by the Government of Canada's National Topographic System where grids are typically named after cities, towns or landmarks within the area. Since the area included all of Burlington and most of Oakville and in the spirit of cross jurisdictional collaboration, the City of Burlington's sustainability project coordinator worked with the Town of Oakville's environmental coordinator to develop a joint Climate Projections report primarily done

¹ Emission scenarios, also known as representative concentration pathways (RCPs) are based on the Intergovernmental Panel on Climate Change's Fifth Assessment Report (IPCC AR5) adopted in 2014. RCPs simulate how climate might change in response to different activities. Further details are provided in the Climate Projections Report for Burlington Region where RCP4.5 represents a low carbon scenario and RCP8.5 represents a high carbon scenario.

in-house with a few hours of in-kind support from ICLEI - Local Governments for Sustainability Canada staff.

The Climate Projections report presents over 40 climate variables under seven categories – temperature, hot weather, cold weather, precipitation, agriculture, extreme weather and Lake Ontario.

Under a high emissions scenario, Burlington's annual mean temperature is projected to increase by 4.2°C from 8.6 to 12.8°C by 2051-2080. However, the warming is not the same across all seasons with winter mean and winter minimum temperatures expected to increase by 4.7 and 5.2°C respectively. An additional six weeks of temperatures over 30°C are anticipated with about three of those weeks at over 34°C. There will be more heat waves, each lasting longer, and many more 'tropical' nights when the temperature does not drop below 20°C. Conversely, the number of cold days will decrease with the average coldest temperature increasing by 7.8°C from -20.8 to -13°C.

Annual precipitation is expected to increase by 10% on average with winter and spring precipitation increasing a greater amount and summer precipitation staying about the same. There will be more heavy precipitation days (10 mm or 20 mm days) and an increase in maximum 1-day and 5-day precipitation.

It is anticipated that there will be a longer frost-free season with the date of the last spring frost coming earlier and the date of the first fall frost coming later. Growing degree days which are used to assess the growth and development of different crops as well as insects and pests are projected to increase.

Extreme events are projected to become more frequent and intense with more precipitation falling in a shorter time frame. Wind gusts and freezing rain events (in December, January and February) are expected to increase.

The projected increase in annual temperatures, precipitation and extreme weather events will continue to impact the Great Lakes. Annual mean surface air and water temperature has increased over Lake Ontario and ice coverage and thickness has and will continue to decrease.

Three words which best summarize the Climate Projections report are "warmer," "wetter" and "wilder."

Infographics

The Climate Projections report is a 68-page document cover to cover. To make the content more relatable for Burlington residents, sustainability staff worked with creative services staff to develop a series of infographics to provide some key highlights under the themes of warmer, wetter and wilder. An image to represent the overall project was also created. In addition, icons were developed to represent various weather events

such as extreme heat, high wind, ice storm, extreme rain and flooding, etc. The images are illustrated in Appendix 2.

Climate Impacts in Burlington

The City of Burlington is not immune to the impacts of climate change and has already experienced events projected to become more common. Examples include major events such as the ice storm in Dec. 2013 when the City opened three warming stations to serve households experiencing extended power outages and a flood in Aug. 2014 where 3,000 homes reported flooding and two evacuation centres were opened to serve residents. Other events such as extreme heat and cold, high wind, vector borne diseases and high lake levels have also had impacts in Burlington.

These events incur economic impacts (costs to repair or rebuild infrastructure, transportation impacts such as road closures and accidents, disruption to electrical systems), social impacts (mental health impacts of flooding, heat stress from extreme heat, slips and falls from freezing rain events, illness due to West Nile Virus and Lyme disease), and impacts to the natural environment (degradation of ecosystems, shifts in animal and plant species) to name a few.

Story Map

To help illustrate these events and associated impacts, sustainability staff worked with Geographic Information System (GIS) staff to develop a story map using a combination of text and multi-media content. Sustainability staff first created a story by researching and identifying some events that have taken place in Burlington under the categories of extreme heat, high winds, rainfall, high Lake Ontario levels, freezing rain, extreme cold and vector-borne diseases as examples of what could become more common in the future. Based on this data, GIS staff created maps to help highlight some of the stories and produced the [story map](#).

Climate Adaptation in Burlington

Although the City of Burlington does not have a formal climate adaptation plan, staff do have direction from [Burlington's Strategic Plan 2015-2040](#) and also from the [2018-2022 Burlington's Plan: From Vision to Focus](#) to develop and implement a plan.

In addition, there are many programs or initiatives that are already in place or being developed to help us to adapt to a changing climate including:

- [Climate Emergency](#) declaration - requires applying a climate lens to City plans and actions including the Council strategic workplan and future budgets - Apr. 2019
- Flooding

- [Stormwater Management Design Guidelines](#) - updated and approved June 2020
- [Urban-Area Flood Vulnerability, Prioritization and Mitigation Study update](#) – July 2015 where an additional \$20.4 million was approved in the 2016 Capital Budget and 2017-2025 Capital Forecast and [final report](#) – July 2017
- (Halton) Enhanced Basement Flooding Prevention Subsidy Program [report](#) and [webpage](#) where subsidies were increased up to 100% coverage for some actions – July 2016
- (Halton) Region Wide Basement Flooding Mitigation Study: [Final Report and Recommendations](#) – to develop and implement a program to reduce potential of future basement flooding - July 2015
- Extreme Heat
 - (Halton) heat warnings [webpage](#) and [video](#) about heat illness and how to take precautions and prevent health issues in extreme heat
 - Extended outdoor pool hours and opening of cooling centres during heat waves
 - Working in Hot Weather, a corporate health and safety standard – Feb. 2017
- Policy
 - [Chapter 4 \(Environment and Sustainability\)](#) of the new Official Plan – section 4.1 addresses climate change – April 2018
 - [Sustainable Building and Development Guidelines](#) within the new Official Plan – April 2018. These are currently under review providing an opportunity to strengthen climate adaptation measures
- Assets
 - [Asset Management and Financial Strategy](#), opportunity to integrate climate adaptation into the upcoming update as mandated by Ontario Regulation 588/17 – by July 21, 2021 for core municipal assets and July 21, 2023 for all other municipal infrastructure assets
- Natural Assets
 - [Cootes to Escarpment EcoPark System Lower Grindstone Heritage Lands Management Plan](#) – [approved](#) Jan 2021
 - [Municipal Natural Assets Initiative](#) - Grindstone Creek Project with Burlington, Hamilton, Conservation Halton and Royal Botanical Gardens - launched Dec 2019

- [Urban Forest Master Plan](#) – update to launch in 2021
- [Parks, Recreation and Cultural Assets Master Plan](#) – currently under review
- Emergency Services
 - [Burlington Emergency Management Program](#)
 - Hazard Identification and Risk Assessment
 - Burlington Ready Program Community Advisory Group - to be reconvened in 2021

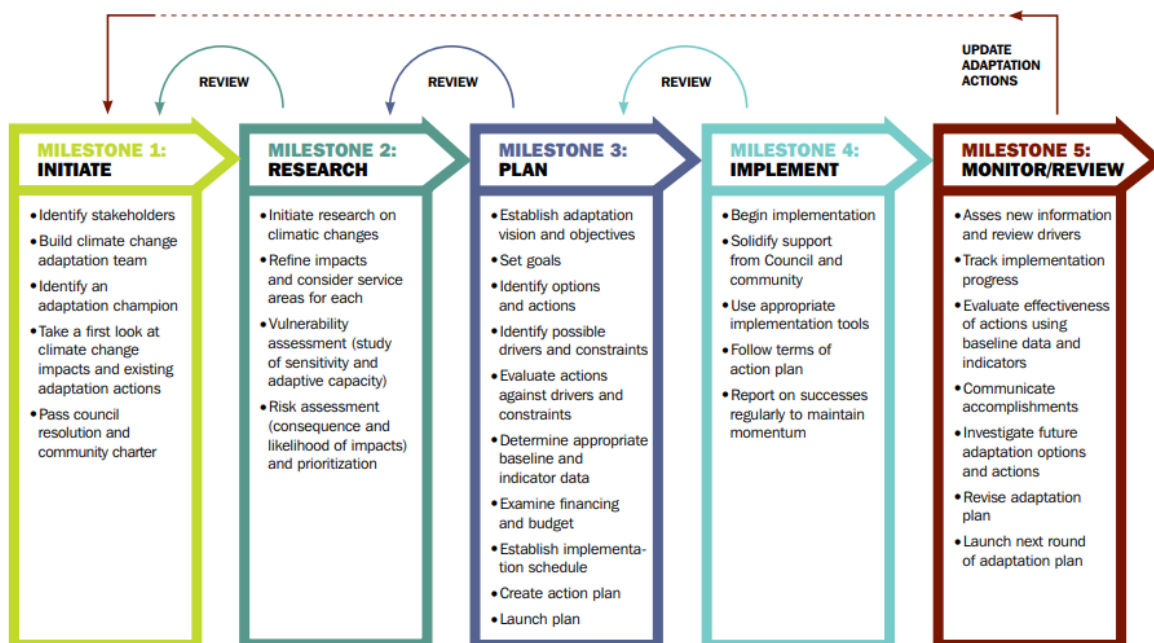
In 2016/17, the City participated in the [Train-the-Trainer Initiative of the Great Lakes Climate Change Adaptation Project](#) along with 15 other local and regional governments. This training will be beneficial as we go through the process of developing a formal climate adaptation plan.

In Dec. 2019, the City (Report [CW-20-19](#)) joined Global Covenant of Mayors for Climate and Energy ([GCoM](#)). This coalition of city leaders around the world are tackling climate change by pledging to cut greenhouse gas emissions (mitigation) and preparing for the future impacts of climate change (adaptation). The City of Burlington was one of 25 Canadian municipalities selected to participate in a [one-year pilot program](#) under GCoM Canada which offered technical support, training, networking opportunities and access to tools and resources. There are reporting requirements through this process including badges for commitment, assessment, goal and plan.

Strategy/process

As a member of GCoM, following specific reporting frameworks is required. Canada has well established reporting frameworks for both climate mitigation (FCM's Partners for Climate Protection (PCP) Program) and adaptation (ICLEI Local Governments for Sustainability's Building Adaptive and Resilience Communities (BARC) program) and municipalities are permitted to use these existing programs to meet GCoM's requirements.

BARC has a five-milestone process: initiate, research, plan, implement, and monitor/review as illustrated below. In ordinary circumstances, it takes municipalities about two years to move from the project launch date to producing a plan.



Milestone 1: Initiate (We are here).

- Direction to complete and implement an adaptation plan is outlined in [Burlington’s Strategic Plan 2015-2040](#) and the [2018-2022 Burlington’s Plan: From Vision to Focus](#) documents approved by City Council.
- The project is under the direction of the Executive Director of Environment, Infrastructure and Community Services.
- Two working teams have been identified – a staff team and a community stakeholder team. Additional stakeholders and the broader community will also have opportunities to be engaged using Get Involved Burlington, special online events, etc.
- Information on climate impacts will be shared with the teams for review and further development.

Milestone 2: Research

- The project manager co-developed the Climate Projections report in partnership with the Town of Oakville and ICLEI – Local Governments for Sustainability Canada.
- It is anticipated that it will take the rest of the year to complete milestone two (developing climate impact statements and carrying out vulnerability and risk assessments). A request for proposals (RFP) will be issued to hire a consultant to coordinate and facilitate the online workshops and produce a summary document.

Milestone 3: Plan

Based on the results of the work carried out in milestone 2, it is anticipated that the plan will be developed in 2022.

Vision to Focus

[2018-2022 Burlington's Plan: From Vision to Focus](#), which was approved by City Council in July 2019, identified that this project be completed by March 2021. After consulting with staff from other municipalities and representatives from ICLEI Canada, staff realized that more time and resources are required to complete the plan and meet the reporting requirements for GCoM. The global pandemic also caused additional delays. However, staff have (i) researched and compiled the Climate Projections report in partnership with staff from the Town of Oakville with initial support from ICLEI Canada, (ii) developed a story map to highlight local climate impacts, and (iii) created some infographics.

Financial Matters:

Total Financial Impact

The 2020 budget approved \$60,000 one-time funding for this project. However, based on the review of the process to meet the GCoM requirements to complete and report on the Climate Adaptation Plan, staff are suggesting an additional budget of \$60,000 for a total of \$120,000 to complete this project.

Source of Funding

The source of funding of \$60,000 approved in the 2020 operating budget was from the Tax Rate Stabilization Reserve Fund. Some of this funding will be used to retain a consultant to carry out Milestone 2 of the BARC process identified on page 7 including the engagement process, the vulnerability and risk assessment workshops for staff and the community, and a follow-up report on this part of the process.

Additional funding is required to complete the adaptation plan (Milestone 3 of the process) including assessing the information and data gathered during the risk and vulnerability phase, reviewing current initiatives and identifying gaps in measures and programs to improve community resiliency, setting goals, etc. Staff are estimating up to \$60,000 is required to complete this phase of the plan.

Staff are recommending that the additional funding required be diverted from previously approved funds to support the home energy retrofit project pending a successful FCM application. Staff expect a response from FCM on Burlington's application for the home

energy retrofit project in the next two to four months. If the FCM application is denied, staff will report back to City Council for additional funding to complete Milestone 3 of the climate adaptation plan including a funding source. It should be noted that FCM does not currently have a funding stream to support developing climate adaptation plans.

Other Resource Impacts

As noted above, to mainstream climate adaptation, staff representing functional areas from across the corporation will need to dedicate their time to developing the plan. Staff time will also be required to engage community stakeholders to provide a broader lens to this important work.

Cost and benefits of investing in climate change adaptation

In Feb. 2020, the Insurance Bureau of Canada and the Federation of Canadian Municipalities released a [report](#) titled Investing in Canada's Future: The Cost of Climate Adaptation at the Local Level. This report highlighted that the benefits of investing in climate change adaptation and resilience outweigh the costs of investment by 6:1. It further stated that an annual investment of \$5.3 billion (0.26% of Gross Domestic Product (GDP)) in municipal infrastructure and local adaptation actions is needed to adapt to climate change. International studies have shown an average of 0.60 to 1.25% of GDP is needed to minimize the worst impacts of climate change across sectors of the economy.

On Dec. 11, 2020, Canada released [A Healthy Environment and a Healthy Economy](#), a \$15 billion plan containing "64 strengthened and new federal policies, programs and investments to cut pollution and build a stronger, cleaner, more resilient and inclusive economy." One of the five pillars "embracing the power of nature to support healthier families and more resilient communities" includes investments such as:

- Up to \$3.16 billion over 10 years to plant two billion trees across Canada.
- Up to \$631 million over 10 years to restore and enhance wetlands, peatlands, grassland and agricultural lands. It was noted that natural wetlands have been shown to reduce climate related flooding costs by as much as 38%.
- Provide \$98.4 million over 10 years to establish a new Natural Climate Solutions for Agriculture Fund.

The federal government is also planning to develop Canada's first-ever National Adaptation Strategy which will help inform where best to target policy programs and future investments.

Cost of climate change

Our weather is becoming warmer, wetter and wilder and Burlington is not immune to the impacts of a changing climate. A few examples are listed below:

- Dec. 2013 ice storm assistance program claim in Burlington was over \$2 million
- Aug. 4, 2014 flood resulted in over 3,000 homes being flooded with \$90 million in claims and \$20.4 million was added to capital budget for stormwater management updates
- Apr. 4, 2018 wind storm – \$82,000 in initial forestry related clean-up costs for the roads, parks and forestry (RPF) department; 8.5% of Burlington Hydro customers lost power
- Apr. 15, 2018 ice storm - \$25,000 in initial forestry clean-up costs for RPF; 9% of Burlington Hydro customers lost power
- May 4, 2018 wind storm – RPF initial clean-up costs were \$234,000; 43% of Burlington Hydro customers lost power

The 2011 [Paying the Price: the Economic Impacts of Climate Change for Canada](#) report by the National Roundtable on the Environment and Economy found that the economic impact of climate change on Canada could reach \$5 billion per year in 2020 and between \$21 and \$43 billion per year in 2050. Considering this report only looked at a few factors under the categories of people (air quality impacts from higher temperatures leading to more hospital visits in Toronto, Montreal, Vancouver and Calgary), places (flooding damages to coastal dwellings due to sea level rise and increased storms) and prosperity (timber supply impacts from changes in pests, fires, and forest growth), the costs are likely higher.

[Weather related insurance claims](#) in Canada averaged \$400 million between 1983 and 2008 and \$1.8 billion between 2009 and 2017. The Insurance Bureau of Canada's ([IBC](#)) top 10 highest payout years on record include every year since 2016. In 2020, the [IBC](#) reported that severe weather caused \$2.4 billion in insured damage while global losses from natural disasters hit \$270 billion.

In addition to insured losses, there are also uninsured losses incurred by government, businesses and individuals. It has been reported that for every \$1 of insured losses, there are [\\$3 to \\$4 of uninsured losses](#).

Climate Implications

While Burlington is one of many local governments planning actions to mitigate greenhouse gas emissions to avoid the worst impacts of climate change, we must also do what we can to adapt to our changing climate which is predicted to be warmer, wetter and wilder. Actions related to climate adaptation are already being carried out. By going through the process to develop a plan, any potential gaps or areas needing further attention will be recognized and incorporated into the plan.

Engagement Matters:

Two working teams – staff and the community - will be struck to develop the plan. The project manager will also work with the engagement and volunteer manager to engage additional community stakeholders through the Get Involved Burlington platform. A community engagement plan will be developed to engage staff and the broader community throughout this project.

Conclusion:

While work is underway to reduce the greenhouse gas emissions which contribute to climate change, we must also plan for our warmer, wetter and wilder weather and adapt to climate change.

Rather than wait for a weather disaster to strike and then respond, a better plan is to reduce the risk before it happens. The benefits of investing in community adaptation and resilience outweigh the costs by a ratio of [6 to 1](#).

Respectfully submitted,

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Appendices:

- A. EICS-03-21 Climate Projections for Burlington Region
- B. EICS-03-21 Infographics for Burlington Region

Report Approval:

All reports are reviewed and/or approved by Department Director, the Chief Financial Officer and the Executive Director of Legal Services & Corporation Counsel.