



Hamilton

CITY OF HAMILTON

CLIMATE CHANGE IMPACT ADAPTATION PLAN

An aerial photograph of the City of Hamilton, showing a mix of residential and commercial buildings, green spaces, and a large body of water in the background under a blue sky with scattered clouds. The year '2022' is overlaid in large white text at the bottom right.

2022

Table of Contents

1. Land Acknowledgement	3
2. Executive Summary	4
3. Acknowledgements	7
4. Message from the Mayor	9
5. Glossary	10
Acronyms	13
6. Introduction	14
Adaptation vs. Mitigation	14
International Policy Direction on Climate Adaptation	14
Federal Policy Direction on Climate Adaptation	15
Provincial Policy Direction on Climate Adaptation	16
7. Climate Change and Hamilton	17
City of Hamilton’s Commitment to Climate Change	17
Intention of the Plan and Community Scope	19
8. Vision Statement	20
9. Climate Science, Local Impacts and Risks	21
ICLEI Canada’s Building Adaptive and Resilient Communities (BARC) Framework	21
Engagement and Outreach Approach	22
Climate Science and Projections	24
Impact Identification	24
Vulnerability Assessment	25
Risk Assessment	25
Priority Climate Change Impacts	26
Action Development and Prioritization	28
10. The Path to a Climate Resilient Hamilton: Themes, Objectives, and Actions	30
Enabling Actions	30
RESILIENT THEME #1: BUILT ENVIRONMENT	31
RESILIENT THEME #2: PEOPLE AND HEALTH	36

RESILIENT THEME #3: NATURAL ENVIRONMENT, AGRICULTURAL AND WATER	47
RESILIENT THEME #4: ENERGY AND ECONOMY	54
11. Implementation	57
Monitoring and Review	58
Indicators.....	58
Central Climate Change Office and Plan Review.....	58
Advancing Adaptation Project	60
12. Conclusion	61
13. Appendices	63
Appendix A: Implementation Schedule.....	63
Appendix B: Climate Science Infographic	82
14. References	85

List of Figures and Tables

Figure 1: Overlap and Differences Between Adaptation and Mitigation (Source: ICLEI Canada, 2019).....	14
Figure 2: City of Hamilton's Climate Change Work (1994 - present).....	19
Figure 3: BARC 5-Milestone Framework.....	21
Figure 4: Summary of CCIAP Engagement.....	24
Figure 5: Priority Climate Change Impacts for the City of Hamilton	28
Figure 6: Action Prioritization Criteria	29

1. Land Acknowledgement

The City of Hamilton is situated upon the traditional territories of the Erie, Neutral, Huron-Wendat, Haudenosaunee, and Mississaugas. This land is covered by the Dish With One Spoon Wampum Belt Covenant, which was an agreement between the Haudenosaunee and Anishinaabek to share and care for the resources around the Great Lakes. We further acknowledge that this land is covered by the Between the Lakes Purchase, 1792, between the Crown and the Mississaugas of the Credit First Nation.

Today, the City of Hamilton is home to many Indigenous people from across Turtle Island (North America) and we recognize that we must do more to learn about the rich history of this land so that we can better understand our roles as residents, neighbours, partners, and caretakers.



2. Executive Summary

Hamilton's Declaration of Climate Emergency in 2019 was a public recognition of a longstanding fact: the impacts of climate change are here in Hamilton and will increase over the 21st century. Hamilton is not alone in this; the impacts of climate change are becoming more apparent globally every year, with annual average temperature records toppling regularly and hurricanes that exceed in wind speed of our existing meteorological frameworks.

We've seen a world-record-breaking heat dome in British Columbia and catastrophic floods, prairie droughts that affect food availability and pricing for the whole country, far northern communities with their territory eroding into the ocean, dry-day flooding events in coastal communities on both coasts, and historic wildfires that burn entire communities to the ground. Here at home, we've seen extreme heat events, waterfront flooding, escarpment erosion, increases in vector-borne diseases, extended power outages, air quality impacts from wildfires thousands of kilometres away, and flooding.

Hamilton's commitment to climate action predates this Adaptation Plan. Staff have been developing and delivering programs such as expanded stormwater capacity, sewer separation, extreme temperature response programs, infrastructure improvements, and programs to assist homeowners in recovering from basement floods. But this Adaptation Plan represents the City's first effort in pulling together these existing efforts and extending them in new ways to address a carefully considered list of priority climate impacts through a comprehensive program, based on internal and external stakeholder consultation.

This Plan, created with ICLEI Canada through their Building Adaptive and Resilient Communities (BARC) framework, is based on up-to-date projections for Hamilton's climate throughout this century, relying on global and national climate models reflecting a range of GHG emissions scenarios. These projections were then used to create over 70 climate impact statements, reflecting all of the ways that climate change may affect City operations and the community at large.

Through the Vulnerability and Risk Assessment (VRA) process, staff consulted with every City Department and dozens of community organizations, including businesses, industry, environmental organizations, social service organizations, and institutions such as Hamilton Health Sciences, and our school boards and post-secondary academic institutions. These conversations developed a full picture of how these climate impacts will affect all of Hamilton's communities, and determined a list of thirteen high-priority climate impacts reflecting the most significant concerns of the City and the community,

which this Adaptation Plan will work to mitigate. This process is described in detail in the Vulnerability and Risk Assessment Report.

ICLEI then completed a best-practices review of Adaptation Plans from across the country to assemble a list of known adaptive actions already used to address these impacts; using contributions from staff and the community, this list of preliminary adaptive and supporting actions totaled over 130. Duplicated actions were removed, overlapping actions were combined, and actions already underway with dedicated budgets and staff time were removed. These existing actions are of course important and form a part of the City's Adaptation response, and new actions will reflect and add to them, but given that they are already demonstrated City priorities, it was considered a duplicated effort to include them in the Action Prioritization Exercise. We ended up with a list of 27 new adaptive actions that would protect the City and community from projected climate impacts.

These actions were then ranked in a Prioritization exercise by internal and external stakeholders, into three categories: urgent (under 2 years), high priority (3-5 years), and medium priority (5-10 years). This process is described in Action Development and Prioritization beginning on p. 28.

Staff then used these prioritized adaptive actions, sorted into four themes and eleven objectives, to undertake Implementation Planning focusing on scope, supporting actions, participants and leaders, resourcing gaps, next steps and monitoring metrics. An Implementation Schedule table summarizing these completed worksheets is included in Appendix A, and constitutes the scaffolding of the Adaptation Plan.

The four Resilient Themes of the Adaptation Plan are:

1. Built Environment
2. People and Health
3. Natural Environment, Water and Agriculture
4. Energy and Economy

The objectives relating to each of them and their related adaptive actions are shown starting on p. 31.

Staff and ICLEI realized the importance of two enabling actions (not related to a particular theme or objective, but underlying the success of the whole Plan) through Implementation Planning discussions internally and externally: the creation of a centralized Climate Change Office, and the development of a City-wide program to track

key climate impact metrics. The centralized Climate Change Office would have dedicated staff and resources to coordinate and carry out adaptation and mitigation projects and programs and take the lead on most of the actions in this Plan. As well, while information for key climate metrics often exists, it is not being collected or stored in a way that makes for easy sharing or use. Creating a process to address this would support the success of the entire program.

While the completion of this Plan is a substantial milestone for the City and staff, the hard work of implementation and monitoring is about to begin. The Implementation Schedules in Appendix A will guide and structure that work, in some cases for decades to come, and show a path to decreasing inequality, protecting residents and businesses from climate impacts, and improving quality of life for all in a sustained and coordinated effort across the City and community.



3. Acknowledgements

The Climate Change Impact Adaptation Plan forms a key part of the City of Hamilton's Climate Action Strategy, and its development was guided by a core team of internal and ICLEI Canada staff. Many thanks for your time and contributions.

Andrea McDowell (Project Manager, Air Quality and Climate Change, Healthy and Safe Communities)

Trevor Imhoff (Senior Project Manager, Air Quality and Climate Change, Healthy and Safe Communities)

Ewa Jackson (Managing Director, ICLEI Canada)

Hiba Kariem (Climate Change Project Coordinator, ICLEI Canada)

Adam Watson (Project Manager, Healthy and Safe Communities)

Connie Verhaeghe (Senior Emergency Management Coordinator, Healthy and Safe Communities)

Kirsten Marples (Emergency Management Coordinator, Healthy and Safe Communities)

Gavin Chamberlain (Risk Analyst, Corporate Services)

Christine Newbold (Manager Sustainable Communities, Planning and Economic Development)

Robert Lalli (Director Strategic Initiatives, Planning and Economic Development)

Andrea Vargas (Manager, Strategy and Continuous Improvement, Public Works)

We are very grateful for the extensive and generous contributions of time, insight and experience by the many community stakeholders who participated in this project. This Plan has benefited greatly from your input and we hope those benefits will be felt by the entire City for many years to come.

- Hamilton Regional Friendship Centre
- Green Venture
- Royal Botanical Gardens
- Union Gas
- Hamilton Industrial Environmental Association (HIEA)
- Sustainability Leadership
- McMaster University
- YWCA
- Hamilton Conservation Authority
- Environment Hamilton
- HCE Energy Inc
- Bay Area Climate Change Council (BACCC)
- West End Homebuilders Association
- Alectra
- Mohawk College
- Hamilton Chamber of Commerce
- Committee for Persons with Disabilities
- Faith and the Common Good
- Social Planning and Research Council of Hamilton
- Hamilton Halton Home Construction Association
- Wesley Urban Ministries
- CF Lime Ridge Mall
- Hamilton Health Sciences
- Hamilton Utilities Corporation
- Hamilton Airport
- ACORN Hamilton
- Welcome Inn
- Immigrant Working Centre
- Senior Advisory Council
- Hamilton-Oshawa Port Authority
- Hamilton Roundtable for Poverty Reduction
- United Way Halton and Hamilton
- EcoWHAM
- Community Response to Extreme Weather (CREW)



4. Message from the Mayor

5. 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 damage, to take advantage of opportunities, or to cope with the consequences.

Baseline: A climatological baseline is a reference period, typically three decades (or 30 years), that is used to compare fluctuations of climate between one period and another. Baselines can also be called references or reference periods.

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.

Climate Atlas of Canada: The Climate Atlas of Canada is an interactive tool that combines climate science, mapping, and storytelling to depict expected climatic changes across Canada to the end of the century. The 250-layer map is based on data from 12 global climate models. Users are shown a baseline period of warming trends by region that spans from 1950 to 2005 and can toggle between two future projection periods, 2021 to 2050 and 2051 to 2080.

Climate Data Canada: Offers local climate data and advanced customization options to allow for a better understanding of changes likely to be experienced by Canadian communities. Climate Data Canada is a collaboration between Environment and Climate Change Canada, the Computer Research Institute of Montréal, Ouranos, the Pacific Climate Impacts Consortium, the Prairie Climate Centre, and HabitatSeven.

Climate Projections: Climate projections are a projection of the response of the climate system to emissions or concentration scenarios of greenhouse gases and aerosols. These projections depend upon the climate change (or emission) scenario used, which are based on assumptions concerning future socioeconomic and

technological developments that may or may not be realized and are therefore subject to uncertainty.

Climate Change Scenario: A climate change scenario is the difference between a future climate scenario and the current climate. It is a simplified representation of future climate based on comprehensive scientific analyses of the potential consequences of anthropogenic climate change. It is meant to be a plausible representation of the future emission amounts based on a coherent and consistent set of assumptions about driving forces (such as demographic and socioeconomic development, technological change) and their key relationships.

Ensemble Approach: An ensemble approach uses the average of all global climate models (GCMs) for temperature and precipitation. Research has shown that running many models provides the most realistic projection of annual and seasonal temperature and precipitation than using a single model.

Extreme Weather Event: A meteorological event that is rare at a place and time of year, such as an intense storm, tornado, hailstorm, 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 (GHG) 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 vapor (H₂O), carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO₂), ozone (O₃), and chlorofluorocarbons (CFCs) are the six primary greenhouse gases in the Earth's atmosphere in order of abundance.

Climate 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).

Impacts of a changing climate: means the present and future consequences from changes in weather patterns at local and regional levels including extreme weather events and increased climate variability.¹

Impact Statement: Climate-related impact statements are concise statements that outline locally-relevant projected threats and how those changes are expected to affect the built, natural, social, and economic systems of the municipality.

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.

Representative Concentration Pathways: Representative Concentration Pathways (RCPs) are four greenhouse gas concentration (not emissions) trajectories adopted by the IPCC for its fifth Assessment Report (AR5) in 2014. It supersedes the Special Report on Emissions Scenarios (SRES) projections published in 2000.

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.

Risk: The combination of the likelihood of an event occurring and its negative consequences. Risk can be expressed as a function where $Risk = likelihood \times consequence$. In this case, *likelihood* refers to the probability of a projected impact occurring, and *consequence* refers to the known or estimated outcomes of a particular climate change impact.

Sensitivity: Measures the degree to which the community will be affected when exposed to a climate-related impact. Sensitivity reflects the ability of the community to function (functionality) as normal when an impact occurs.

Vulnerability: Vulnerability refers to the susceptibility of the community to harm arising from climate change impacts. It is a function of a community's sensitivity to climate change and its capacity to adapt to climate change impacts.

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

Acronyms

AR6 – Sixth Assessment Report

BARC – Building Adaptive and Resilient Communities

CDP – Carbon Disclosure Project

GcoM – Global Covenant of Mayors

GHG – Greenhouse Gas

ICLEI – International Council for Local Environmental Initiatives

IPCC – Intergovernmental Panel on Climate Change

RCP – Representative Concentration Pathways



6. Introduction

Adaptation vs. Mitigation

Climate change is defined as any change in global or regional climate patterns. While the Earth's climate has naturally fluctuated for millions of years, changes in climate from the mid-to-late 20th century onwards are largely attributed to increased levels of atmospheric carbon dioxide produced by burning fossil fuels. Climate change must be addressed in two ways. One set of strategies minimizes future changes to the climate; the other helps us prepare for the inevitable changes that are to come.

Climate change mitigation refers to the implementation of policy, regulatory, and project-based measures that stabilize and/or reduce greenhouse gas concentrations in the atmosphere, including transitioning to low-carbon emission sources, reducing consumption of goods, building retrofits to conserve energy, anti-idling by-laws, and increasing active transportation options.

Climate change adaptation, on the other hand, refers to measures that help us adjust to the impacts of a changing climate on our social, economic, built, and natural systems. This can include enhancing the capacity of our built environment (e.g. upgrades to infrastructure), educating the public about preparedness against climate change hazards and emergencies, protecting and enhancing our natural environment and ecological services, and business continuity planning.

As the effects of climate change are wide-ranging, a diverse set of responses is required. Adaptation is not meant to replace or undermine mitigation efforts, rather adaptation complements local government efforts to protect and improve long-term sustainability. Implementing both climate change mitigation and adaptation measures is important to respond to both the causes and effects of climate change.

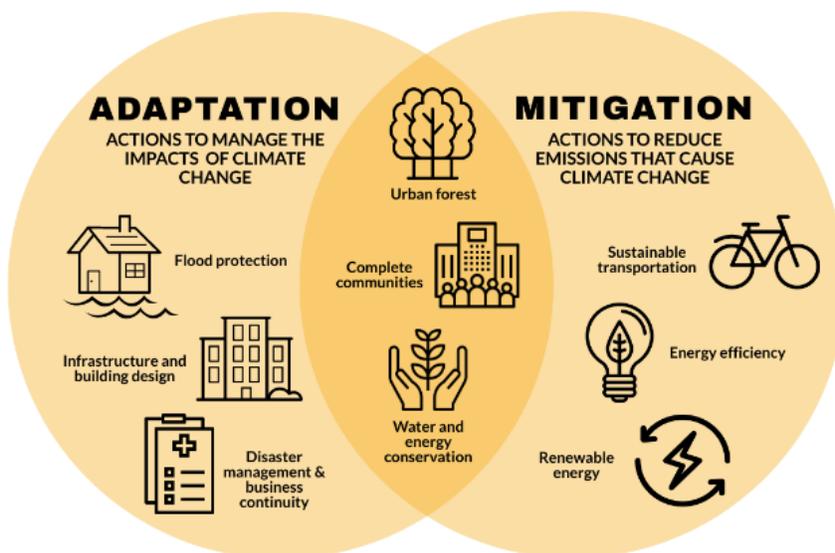


Figure 1: Differences and Overlap Between Climate Adaptation and Mitigation

International Policy Direction on Climate Adaptation

The United Nations (UN) Intergovernmental Panel on Climate Change (IPCC) is the UN institution tasked with assessing the scientific basis of climate change, its impacts and potential future risks, and potential response options. In its Sixth Assessment Report (AR6), released in 2022, the IPCC declared with certainty the widespread impact of human-caused climatic changes. The report stated:

“Human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability. The rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt”.ⁱⁱ

The most urgent report to date, the AR6 Report states that even with major reductions of GHG emissions in the short-term (RCP2.5 scenario) there is greater than a 50% likelihood that global warming will reach or exceed 1.5°C in the near term. According to the report, “Global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans. The level of risk will depend on concurrent near-term trends in vulnerability, exposure, level of socioeconomic development, and adaptation.”ⁱⁱⁱ Now more than ever, it is crucial that cities implement comprehensive, effective, and innovative responses between adaptation and mitigation efforts to advance sustainable development and to capitalize on the co-benefits these strategies can provide.^{iv}

Federal Policy Direction on Climate Adaptation

Canada was one of 195 countries to sign the Paris Agreement in December 2015. The Agreement aims to keep the global temperature to well below two degrees Celsius and to drive efforts to limit the temperature increase even further to 1.5 degrees Celsius above pre-industrial levels. In terms of adaptation, the Agreement’s goals include enhancing adaptive capacity, strengthening resilience and reducing vulnerability to global climate change.

In addition to signing the Paris Climate Agreement, the Government of Canada produced several policy documents that inform and guide decision-makers on climate change adaptation. In 2016, the Government of Canada released its Pan Canadian Framework on Clean Growth and Climate Change, which includes adaptation considerations and actions to improve climate resiliency. Updated in 2020, the Government of Canada committed to developing Canada’s first National Adaptation Strategy with provincial, territorial, and municipal governments, Indigenous Peoples, and other key partners. A major focus has been put on the development of Expert Advisory Tables to focus on:

- Health and Wellbeing;

- Resilient Natural and Built Infrastructure;
- Thriving Natural Environment;
- Strong and Resilient Economy;
- Disaster Resilience and Security.

The framework recognizes the important role that municipalities will play in implementing climate solutions locally. The strategy is set to be completed in the summer of 2022. While federal and provincial governments provide strategic focus, standards, and potential funding streams for adaptation, it will be up to local governments to tailor climate change adaptation strategies to their local circumstances and the unique set of climate change impacts they are already experiencing or expect to face.

Other resources developed by the Government of Canada include the National Issues Report *Health of Canadians in a Changing Climate* to provide a national perspective on how climate is impacting Canadian communities, the environment, and its economies. The *Map of Adaptation Actions* is a repository of case studies from across Canada that explores how communities and sectors are adapting to a changing climate.

Provincial Policy Direction on Climate Adaptation

The Government of Ontario's 'A Made-in-Ontario Environment Plan' addresses climate change through both mitigation and adaptation strategies. These strategies include emissions performance standards and regulations to reduce emissions from the transportation sector, programs to enhance and expand public transit networks, funding for extreme-weather resistant infrastructure, a province-wide multi-sector provincial climate change impact assessment, and the *Protecting People and Property: Ontario's Flooding Strategy* to reduce flood risk. Additionally, the Provincial Policy Statement has been updated to include direction for planning authorities to prepare for the impacts of a changing climate, including climate change decision-making in land-use and development policy, and enhanced stormwater management policies to enhance climate resilience.

7. Climate Change and Hamilton

After the 2015 Paris Accord, in which national governments agreed to keep warming under 2°C and preferably under 1.5°C, the IPCC undertook an analysis of how and whether the global economy could decarbonize to support that goal. In 2018, the IPCC published this analysis as the Special Report: Global Warming of 1.5°C. This report made headlines internationally with its finding that, if the world did not reduce carbon emissions by at least 45% by 2030 and eliminate emissions entirely by 2050, it would not be possible to keep warming below 1.5°C (and even then, would very likely require carbon removal and sequestration technologies).

The IPCC's most recent report on impacts, vulnerabilities and adaptation was published in February 2022, specifically looking at what a 1.5°C temperature rise would mean. They found that:

“Global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans (very high confidence). The level of risk will depend on concurrent near-term trends in vulnerability, exposure, level of socioeconomic development and adaptation (high confidence). Near-term actions that limit global warming to close to 1.5°C would substantially reduce projected losses and damages related to climate change in human systems and ecosystems, compared to higher warming levels, but cannot eliminate them all (very high confidence).” (Summary for Policy Makers)

The City of Hamilton is not immune to the impacts of climate change, and indeed we have seen them increasing in recent years: ice storms, power outages, recent waterfront flooding and the accompanying costly infrastructure repairs, increasing escarpment erosion and damage to escarpment access roads, basement flooding, increasing extreme heat events, wind storms, and vector-borne diseases such as Lyme. Businesses, livelihoods and education have been disrupted; people have been injured, made ill, and sometimes died. As the 2022 IPCC report makes clear, while it is imperative for every economy to decarbonize over the coming decades, it is equally imperative to adapt to and prepare for those climate impacts we can no longer avoid.

City of Hamilton's Commitment to Climate Change

Although climate change is a global issue, impacts are felt at a local level. While climate change efforts are necessary across all levels of government, local governments are especially well-positioned to take action. Municipal decision-makers have a unique opportunity to begin preparing for a changing climate as they will be on the front lines of responding to its impacts.^v Being responsible for key service areas that will be affected

by climate change: infrastructure, health, water, parks and recreation, and transportation – they have a responsibility to respond by utilizing the many planning and policy tools and mechanisms available to them.

Hamilton's work on climate change goes back to joining the FCM's Partner's for Climate Protection (PCP) program in 1994. In the years since this commitment has deepened becoming an extensive Climate Action Strategy including both a Community Energy and Emissions Plan to achieve net-zero emissions by 2050 and this Climate Change Impact Adaptation Plan to reduce climate consequences for Hamilton residents and businesses. Key milestones leading up to City Council's Climate Emergency Declaration can be found in Figure 2 below.

In October 2015, Council endorsed "Taking Action on Climate Change in Hamilton – A Community Plan (2015)." The Plan, developed as a collaborative effort from multiple City departments and community partners, identified ten "Priority Actions" including "Develop a Community Energy Plan to guide the Hamilton community's energy future," and "Conduct a local community vulnerability assessment of public health impacts from climate change." The Terms of Reference for the Community Energy Plan (later the Community Energy and Emissions Plan, or CEEP) was approved in 2018, with a successful application for funding to the province made in 2020.

On May 16, 2018, General Issues Committee (GIC) approved the Climate Reserve and Adaptation Planning motion, which directed Hamilton's Senior Leadership Team "to work with all City Departments to develop climate change adaptation plans that may be eligible for funding from a Climate Change Reserve and funding from the Provincial and Federal Governments."

On March 27, 2019, Council declared a climate change emergency and directed Staff to form a Corporate Climate Change Task Force (CCCTF) to investigate additional actions to reach net zero by 2050. In December 2019, the CCCTF completed the "Corporate Goals and Areas of Focus for Climate Change Mitigation and Adaptation." Goal 7, on Climate Adaptation, directed staff to complete an Adaptation Plan, including a Vulnerability and Risk Assessment through ICLEI's BARC) framework.

In 2022, Hamilton staff will be bringing the CEEP and Climate Change Impact Adaptation Plan (CCIAP) together under Hamilton's Climate Action Strategy (HCAS), a coordinated strategy to address mitigation and adaptation in support of the City's Vision, "To be the best place to raise a child and age successfully."



Figure 2: City of Hamilton's Climate Change Work (1994 - 2019)

The purpose of the Climate Change Impact Adaptation Plan (CCIAP) is to continually improve Hamilton's resilience to extreme weather and climate change impacts by increasing our local adaptive capacity and decreasing our sensitivity to these changes. This plan emphasizes a community-based adaptation approach to build resilience while reducing vulnerability via meaningful engagement of organizations and residents through the entire process of adaptation. By involving a wide range of stakeholders and individuals, Hamilton was able to collaboratively co-develop an adaptation plan that addresses climate risks across multiple sectors and systems. In employing this process, the City recognizes and aims to shift the power dynamics between decision-makers and other individuals within the participatory process. Local knowledge and assets of community members are incorporated and inform local adaptation planning and implementation.

8. Vision Statement

Drawing on the contributions from internal and external stakeholders and their priority values for a Climate Change Impact Adaptation Plan, we created the following Vision Statement to guide its implementation:

“The City of Hamilton will be a national leader on Climate Adaptation: a healthy, equitable, vibrant, and sustainable community that responds to the needs of residents, businesses and institutions, and is resilient in the face of a changing climate.”



9. Climate Science, Local Impacts and Risks

ICLEI Canada's Building Adaptive and Resilient Communities (BARC) Framework

Development of the City of Hamilton's CCIAP was guided by ICLEI Canada's Building Adaptive and Resilient Communities (BARC) Framework. BARC is a five-milestone planning framework for local governments aimed at preparing communities for the impacts of climate change. The comprehensive planning methodology guides municipalities through areas of research and climate impact assessment methods, plan development, action-setting processes, implementation planning, and monitoring and review strategies (see the figure below). Through this project, Hamilton worked through and completed Milestone 1, 2 and 3 of the framework, which culminated in the creation of a climate change impact adaptation plan.

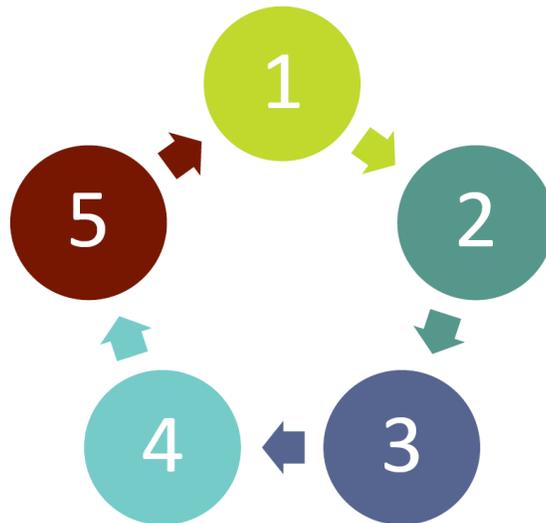


Figure 3: BARC 5-Milestone Framework

MILESTONE ONE - INITIATE

Within this milestone, communities identify stakeholders to review and understand existing knowledge on how the regional climate is changing, followed by a brainstorming exercise to identify potential climate change impacts.

MILESTONE TWO—RESEARCH

The second milestone is meant to further develop a community's understanding of climate change impacts and the major service areas which are likely to feel these impacts most acutely. Within this milestone, a municipality will scope the climate change impacts for the region and conduct both a vulnerability and risk assessment.

MILESTONE THREE - PLAN

The third milestone provides guidance on how to establish a vision, set adaptation goals and objectives, identify adaptation options, and examine possible constraints and drivers to various actions. From there, a community will draft a Local Adaptation Strategy. Baseline data is collected and recorded, financing and budget issues are addressed, an implementation schedule is drafted, implementation responsibilities are determined, and progress and effectiveness indicators are identified in the Plan.

MILESTONE FOUR - IMPLEMENT

In the fourth milestone, communities work to ensure that they have the approval and support of council, municipal staff and the community in order to move forward on implementation. Communities will also make sure they have the appropriate implementation tools to ensure the ongoing success of the Strategy.

MILESTONE FIVE – MONITOR & REVIEW

The fifth and final milestone serves to assess whether the goals and objectives of the Strategy have been achieved, and helps communities identify any problems that have been encountered and develop solutions. Additionally, the fifth milestone helps communities communicate their progress to council and the general public.

Engagement and Outreach Approach

The CCIAP was developed through an iterative and collaborative process, building upon the knowledge and expertise of Council, City staff, and local stakeholders, partners, and experts. As such, the CCIAP is reflective of the needs and priorities of our community as we move toward a new climate-adjusted reality.

2015-2017

The process originally commenced in 2016 and continued into 2017 with the completion of Milestone 1 and 2 of the BARC process. A Core Internal Group that made key decisions regarding the CCIAP and provided strategic direction to the overall development of the Plan was formed. This group was comprised of key staff across all City departments. A larger Climate Adaptation Team, made up of City staff and community representatives, worked closely with the Project Team to develop the Plan, contributing their knowledge, expertise and guidance to each step of the planning process.

It was quickly identified that the vulnerabilities and risks associated with climate change impacts would extend beyond just the City's Corporate assets and systems. Staff decided to pause the internal process to focus on bringing the entire community into the

climate adaptation work. City of Hamilton Staff participated in ICLEI Canada's Training-the-Trainers project which helped municipalities convene local workshops learn and refine their climate adaptation facilitation skills. Throughout 2017 City Staff completed several community-based workshops on climate vulnerability and risk assessment to bring Hamilton's community groups and organizations into the discussion.

In 2018 the project was put on pause due to Staff capacity to develop a regional climate change structure now known as the Bay Area Climate Change Council.

2020-2022

The process was resumed in 2020 where the City of Hamilton re-engaged in Milestone 2 of the project to ensure updated the Science of Climate Change Report to take into account update climate projections and more recent weather events in the City. The City worked to also rescore climate change impacts in the vulnerability and risk assessment.

During this time, the unforeseen circumstances brought forward by the COVID-19 pandemic continued to impact Ontario and the globe, and during this time, climate change did not halt. Over the past two years, we have seen flooding in parts of Canada, drought conditions and extreme heat in the summer, and more inclement weather in the fall. The impacts of climate change tend to disproportionately impact our most vulnerable community members and reinforce existing demographic inequities – highlighting an unfortunate commonality between climate change and COVID-19. For this reason, it is important that we continue to learn from this pandemic and identify ways in which we can apply these lessons in the fight against climate change.

Once it was appropriate to slowly resume planning efforts during the COVID-19 pandemic, the Project Team pivoted to using a variety of online platforms and mechanisms (i.e. online workshops, meetings surveys, interactive applications, etc.) to ensure ample meaningful opportunities were provided to stakeholders and staff to contribute to the overall vision, objectives, and actions within the Plan.

Throughout the adaptation planning process, the Project Team provided a number of engagement opportunities and hosted several workshops and meetings. A summary of this engagement is provided below.

Year	Type of Engagement	Number of sessions/ opportunities
2015-2017	Internal Vulnerability and Risk Assessment Workshop	1

	Internal Working Group Meetings	Multiple
	Community Workshops	2
	Standalone Meetings	4
	Committee Presentations	3
2020-2022	Internal Adaptation Core Team Meetings	15
	Community Workshops	7
	Standalone Workshops Tools	2
	Feedback Worksheets	1
	Corporate Workshops	1
	Focused Departmental Meetings	11
	Combined Corporate and Community Workshop	1
	Community Stakeholder Meetings	21
	Committee Presentations	3
	Targeted Online Surveys	2

Figure 4: Summary of CCIAP Engagement

Climate Science and Projections

ICLEI Canada relied on national and global climate models as incorporated into Canada's Climate Atlas, using several different emissions scenarios, to paint a picture of what Hamilton's climate might be through the 21st century, and described these in their *Science of Climate Change* report. An infographic summarizing these projections can be found in Appendix B to this report.

Readers will notice that projections from a near-term decarbonization scenario and a Business-as-Planned scenario do not differ substantially in climate impacts until the 2070s. This is because the global carbon cycle is very slow, and it takes time for the natural biological and geological processes to draw carbon down from the atmosphere and store it permanently. Any carbon emitted now, in the absence of widescale carbon removal and sequestration technology, is effectively permanent and will continue to affect the climate for at least several decades to come.

Impact Identification

Changes to the climate affect weather patterns, and these weather pattern changes affect people's lives, their properties, it affects the built environment including buildings and transportation systems, as well the natural environment and ecosystem functioning, disease vectors, and so on. It is these effects that are described as *climate change impacts*.

From the BARC perspective, climate change impact statements are concise statements that outline locally relevant projected threats and how those changes are expected to

affect the built, natural, social, and economic systems across the city. Based on the City of Hamilton's Climate Science Report, these statements are the foundation of the Vulnerability and Risk Assessments and are formed by answering the following questions:

- What are the climatic changes?
- What are the outcomes of these changes?
- What are the consequences associated with these outcomes?

City staff consulted widely internally and externally, with institutional, commercial and social stakeholders, to fully understand how local climate impacts would affect different communities. Hamilton then compiled an initial set of internal climate change impact Statements in 2016, and added to them several community impact statements through 2017. In 2020, this list was revisited and revised as needed.

Vulnerability Assessment

Vulnerability is a function of two criteria – the **sensitivity** of the community to a given climate change impact, and its **adaptive capacity** (ability to respond, recover and/or cope). To determine sensitivity, how the functionality of the community would be affected should the impact occur today is considered. This includes considering how the impact would affect the community's ability to deliver and access services, continue regular functionality, etc. Adaptive capacity refers to the ability of systems, institutions, humans, and other organisms to adjust to potential damage, take advantage of opportunities, or respond to consequences.^{vi} To determine adaptive capacity, we consider the time and resources required to restore the community to its previous functionality should the impact occur today, as well as consider any plans, policies, and actions already in place to address this issue.

The City conducted two separate vulnerability assessments, one in 2016/17 and one in 2021.

Ultimately, a combined 73 impacts statements were considered through a vulnerability assessment.

Risk Assessment

The next step in the process was to carry out a risk assessment. Similar to vulnerability, risk is a function of two criteria – namely the **likelihood** of the impact occurring and its negative **consequences**. It can be expressed as a function of risk = likelihood x consequence. Likelihood refers to the probability of a projected impact occurring, and consequence refers to the known or estimated consequences of a particular climate change impact.

Based on the results of both assessments, the project team prioritized 13 impacts to move forward into planning. These are impacts that had an overall score of Medium or higher, as identified through the corporate vulnerability and risk assessment, as well as those that posed a high risk for the community, identified through qualitative discussions with community stakeholders as well as through the community vulnerability and risk assessment process. The full list of prioritized impacts is included in the next section.

A full explanation of the Vulnerability and Risk Assessment process can be found in the Vulnerability and Risk Assessment report, available on the City of Hamilton's website here: <https://www.hamilton.ca/city-initiatives/strategies-actions/climate-change-action>

Priority Climate Change Impacts

Through the vulnerability and risk assessment process and results, we arrived at a list of *priority climate change impacts*, described in Figure 5.0 below. It is these impacts that this first iteration of the Climate Change Impact Adaptation Plan will primarily address. Other climate impacts are, of course, still important, and for some residents and businesses will be the most important; we are compiling additional reporting on these to allow interested residents, businesses and organizations to work towards addressing them in complement to this overall plan.

Some impacts are inherently more or less negative or consequential than others and can vary widely for different demographic groups. For the list of priority impacts outlined below, Examples of particular vulnerabilities for some impacts have been included in the table below. This is not an exhaustive explanation but is meant to help readers understand the complexity of addressing climate impacts and the necessity of doing so through an equity lens.

Flooding	
1. Reduced capacity of flood protection measures and water storage caused by an increase in rainfall intensity leading to flooding.	Low-income tenants of basement apartments are particularly vulnerable, especially if displaced by repairs and renovations.
2. Changes in the frequency of extreme rainfall events will result in increased instances of flooding on private and public properties.	
Extreme Heat	
3. Increased instances of heat-related issues due to extreme heat.	
4. Drier, hotter and longer summers may affect the health and safety of local vulnerable populations.	Seniors, unhoused, and residents with some medical

5. More frequent and intense heatwaves will increase instances of heat-related health and safety issues, particularly for households without access to reliable air conditioning and the homeless.	conditions are more vulnerable to health impacts from extreme heat.
6. Rising summer temperatures and extreme heat will increase energy demand for air conditioning, causing a financial burden for low-income households.	Low-income households will struggle most to pay increased electricity bills, or go without a/c.
Water Quality	
7. Increased intensity of rainfall leading to increasing runoff into rivers and lakes, and washing of sediment, nutrients, pollutants and other materials.	
8. More intense summer precipitation combined with increasing temperatures lowering water supply as well as increasing water demand for drinking, landscaping, and irrigation (rural).	
Health and Safety	
9. Increased intensity and frequency of ice storms leading to increased hazardous roads, pathways and sidewalk conditions.	Residents using mobility devices and new parents with children in strollers will be more vulnerable to poor sidewalk conditions.
10. Increased temperatures and changes in precipitation increasing incidences of infectious diseases and vector borne diseases as result of longer transmission periods of changes in geographic distribution of disease vectors.	Unhoused residents more exposed to vectors such as ticks and mosquitoes.
Erosion and Infrastructure Damage	
11. Changes in precipitation resulting in erosion of natural systems (i.e. water banks, escarpment erosion) leading to washouts of bridges and roadways.	Residents and businesses dependent on escarpment access roads will be more vulnerable.
Power Outages	
12. Prolonged power outages during winter months due to an increase in ice storms resulting in public safety concerns.	Residents depending on electricity for medical or mobility needs (respiration, electric wheelchairs, etc.) will be more vulnerable to power outages.
Food Insecurity	

13. Increase in average annual temperatures (especially in the summer) leading to increased food insecurity in the region (i.e. decrease in local crop yield, food cost fluctuations, etc.).	Low-income households are more vulnerable, and this will also affect community resources attempting to address this need (e.g. food banks).
--	---

Figure 5: Priority Climate Change Impacts for the City of Hamilton

Action Development and Prioritization

Adaptative actions identify how the community will overcome the impacts of climate change. There are a variety of these actions, including activities that are taken before an impact is observed (anticipatory) or after an impact has occurred (reactive). In most instances, anticipatory adaptation action will be more effective and result in lower costs in the long term.^{vi}

ICLEI conducted a best practices review of Adaptation Plans throughout Canada, and workshops and consultations with City staff and external stakeholders were held to identify ideas for objectives and actions, both big and small, to reduce these risks and build resilience in our community. A total of 71 action options were identified through the community actions workshop and over 200 action options were identified through the corporate actions workshop. In reviewing these actions, the Project Team shortlisted commonly identified actions and made sure to fill any gaps that existed.

Once actions were shortlisted, they were further evaluated using action prioritization criteria adapted from the Canadian Communities Guidebook for Adaptation to Climate Change. These criteria are shown in Figure 6 below. The purpose of this activity was to identify if the actions shortlisted were effective/urgent, affordable, feasible, acceptable, equitable, and flexible. Internal stakeholders were asked to rank adaptive actions relevant to their work on all six criteria; community organizations ranked actions on three: feasibility, acceptability and equity. In turn, through ranking these actions across these five criteria, the Project Team was able to determine which actions should be categorized as “urgent” priority (i.e. in the community’s best interest to complete this over the short-term, which is 2 years or less), “high” priority (i.e. completed over the medium-term, which is between 2 to 5 years) or “medium” priority (i.e. completed over the long-term, which is 5+ years).

Next, a strategic analysis was conducted with City of Hamilton staff to ensure the anticipated timing of each action identified through the action prioritization exercise was achievable. In doing so, some actions were updated to more accurately reflect the

timelines needed to secure any necessary funding and carry out the projects or initiatives themselves.

The results highlighted 2 actions as “Urgent” priority, 19 actions as “High” priority, and 6 actions as “Medium” priority.

Criteria	Score			
	1	2	3	4
Effectiveness/ Urgency	Minor contribution to management of risk; Not urgent	←→		Vital to effective management of risk and achievement of objectives; High urgency
Affordability	Requires significant budget for implementation	←→		Can be completed within planned budgets
Feasibility	Lack of human, legal, knowledge, technical or administrative capacity to implement	←→		Sufficient human, legal, knowledge, technical and administrative capacity to implement
Acceptability	Significant pushback likely from specific stakeholders, elected officials	←→		Supported by the majority of stakeholders, elected officials
Equity	Minimal improvement in the livelihood of equity-seeking groups*	←→		Provides clear and distinct benefits for equity-seeking groups*
Flexibility	Difficult to reverse, inflexible	←→		Easy to scale up or down, flexible, no- regret

Figure 6: Action Prioritization Criteria

***Equity-seeking groups:** are communities that face significant collective challenges in participating in society. This marginalization could be created by attitudinal, historic, social, and environmental barriers based on age, ethnicity, disability, economic status, gender, nationality, race, sexual orientation and transgender status, etc. Equity-seeking groups are those that identify barriers to equal access, opportunities, and resources due to disadvantage and discrimination and actively seek social justice and reparation.

10. The Path to a Climate Resilient Hamilton: Themes, Objectives, and Actions

The prioritized Adaptive Actions were grouped into four themes and eleven objectives to meet the identified priority Climate Impacts. These groupings are shown below. Under each proposed action contains additional information that builds and supports that action including:

- **Action Details** – Description of the intent of the action, what it hopes to achieve, and its relative scope;
- **Supporting Actions** – Actions to help support the implementation of the actions, or steps that need to be taken before the action itself can be considered; and
- **Current Practice** – Related initiatives, programs, or policies that are currently happening in the community or corporation that speak to, are in alignment with, or are coordinated with this action.

In addition, through the Implementation Planning process, two enabling actions were identified as critical to support the success of the other 27.

Enabling Actions	
E.1	Establish a Climate Change Office with staff dedicated to implementing and tracking the Climate Change Impact Adaptation Plan.
E.2	Designate key metrics for climate impacts in the City and task staff with collecting and tracking data over time (e.g. traffic accident reports, basement flood reports, etc.).

RESILIENT THEME #1: BUILT ENVIRONMENT

Objective 1: Incorporate climate change into future land use, development and construction

Action 1.1 (ID#1) – Develop requirements for the incorporation of Low Impact Development (LID) features and green infrastructure into new development and redevelopment projects, and consider watershed and landscape scales in the development of plans and objectives.

Supporting Actions

- Identify and prioritize green infrastructure sites as part of stormwater management planning, including a vulnerability assessment.
- Incorporate Green Infrastructure into asset management plans with multi-year budgets.

ACTION DETAILS

Low Impact Development (LID) and green infrastructure encompasses a range of strategies (infrastructure, land-use features, etc.) to increase the infiltration of rainwater into the ground to reduce runoff and risk of flooding. LID features also provide social and economic benefits, including health benefits, and improved property aesthetics and property value.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
2021 assessment using global climate modelling and IDF technical analysis.	Canadian Water Resources Association and McMaster University rain garden design
Currently developing Green Development Standards and Guidelines for Stormwater Management	Some Conservation Authorities offer small grants to homeowners for LID projects
Environmental Assessment data collection is used to inform Sub-Watershed Master Plans	

Action 1.2 (ID#2): Develop guidelines and incentives for homeowners and landlords to improve the resilience of residential buildings to climate-related risks through upgrades and/or retrofits.

Supporting Actions

- Low-cost or no-cost flood-proofing retrofits are identified and provided to residents through future building retrofit program(s).
- Investigate the possibility of offering rebates and resources and implementing a stormwater fee rate system.
- Facilitate and promote conversion of lawns to naturalization to reduce runoff and capture moisture.

ACTION DETAILS

The creation of guidelines and incentives to improve the resilience of homeowners and landlords can help reach and encourage community members to reduce risk from flooding, extreme heat, wind, and other climate-related hazards to their buildings and property.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City has existing zoning bylaw(s) that limits the amount of impervious surfaces	Green Venture's DePave Paradise Program: https://greenventure.ca/depave-paradise/
Protective Plumbing Program: https://www.hamilton.ca/home-property-and-development/water-sewer/protective-plumbing-program	Many annual free tree giveaways from non-profits/community organizations (i.e. Environment Hamilton, Hamilton Naturalist Club etc.)
Beach Blvd flood mitigation Environmental Assessment	Mohawk College disability/aging-in-place retrofit research

Action 1.3 (ID#3): Conduct more studies or reviews to determine flooding and other risks throughout the City & develop plans (e.g. relocating sites where appropriate) to improve the resilience of infrastructure (i.e. buildings, roads, water/wastewater infrastructure, etc.) to climate-related risks from extreme weather and temperatures.

Supporting Actions

- Conduct frequent inspections and monitoring of mountain access and waterfront trail systems.
- Re-run recently developed climate modelling and conduct specific risk/vulnerability assessments on existing infrastructure using standard protocols (e.g. PIEVC) to quantify impact and flooding ‘hotspots’.

ACTION DETAILS

It is important to continuously conduct studies and reviews to spatially map and better understand the risks of climate change on our built environment. In doing so, we determine how flooding, fluctuating and overall warmer temperatures, wind, and other climate hazards will continue to impact our City and what steps we can take to ensure their protection and resilience into the future.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Asset Management rock scaling program	Hamilton Conservation Authority flood mapping updates
Hamilton Water Environmental Assessment's urban flooding and other available/ongoing studies.	McMaster University's monitoring and modelling research



Objective 2: Reduce transportation disruptions due to extreme weather events and improve the safety of travel on roads, sidewalks, and trails (i.e. including washouts)

Action 2.1 (ID#4): Improve winter travel conditions through further expanding sidewalk clearing.

Supporting Actions

- Monitor outcomes of revised sidewalk clearing to determine feasibility and necessity of further expanding it.
- Explore revamping the 'Snow Angels' program (i.e. recruit volunteers, identify what areas are not being serviced, etc.)

ACTION DETAILS

Snowy and icy conditions in the winter season make travel much more challenging for everyone. Slippery conditions on walkways and paved areas can cause major safety concerns (i.e. slips, falls, reduced ability to go outside, etc.). With the climate science indicating an increase in fluctuating temperatures and extreme weather, there is a greater need to improve winter travel conditions and for pedestrians and sidewalk users through expansion of the City's existing sidewalk clearing efforts.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Existing Snow Angel Program	Just Recovery Network's ongoing advocacy
Active and Sustainable School Travel Planning identifying routes and what can be done to support sidewalk shoveling/safety.	McMaster University's monitoring and modelling research

Action 2.2 (ID#5): Encourage and promote safer travel practices, choices, and alternatives through considering all users of Hamilton's transportation network and by working with local groups to create a communications campaign around the benefits of work-from-home

Supporting Actions

- Continue to consider all users of Hamilton's transportation networks using an equity and inclusions lens.

ACTION DETAILS
 Debris from storm damage, icy roads, strong winds, flooding, and other instances of extreme weather can make it dangerous to travel within Hamilton.

- Work with local groups to create a communication campaign outlining the benefits of work-from-home option during extreme weather and consider safer transportation options for essential works who must be on-site.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Current Light Rail Transit planning	Environment Hamilton's Friendly Streets Project
Hamilton @ Work – flexible work models for City staff	Ongoing neighbourhood audits being done by various groups



RESILIENT THEME #2: PEOPLE AND HEALTH

Objective 3: Help vulnerable populations (i.e. seniors, youth, outdoor workers, those experiencing homelessness, with pre-existing health conditions, etc.) avoid or reduce health-related impacts of extreme weather and temperatures (including flooding).

Action 3.1 (ID#6): Develop and implement a response program for vulnerable populations to protect residents from climate-related risks (i.e. extreme cold, extreme heat, etc.)

Supporting Actions

- Work with local non-profits, tenants’ groups, landlords and other relevant stakeholders in the planning and implementation of site-specific extreme weather-related emergency management plans.
- Work with financial assistance bodies and upper-levels of government to explore provisions of low, or zero-carbon, electrical back-up to those with essential medical devices.

ACTION DETAILS
Marginalized communities typically experience varying and overlapping barriers when accessing emergency services and supports (e.g. physical accessibility, language barriers, operating hours, etc.). This action will investigate and reduce these barriers over time by proposing and implementing response programs that meet the needs of marginalized communities.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Public Health Extreme Heat and Extreme Cold Alerts	Environment Hamilton’s City Lab and City Staff heat mapping of larger towers
Emergency Management work with City Housing Hamilton on emergency preparedness.	Community Resilience to Extreme Weather (CREW) and Environment Hamilton working with faith-based organizations on emergency preparedness.

Action 3.2 (ID#7): Consolidate existing vulnerable persons’ contact lists and update/expand them to guide emergency response and/or other assistance programs.

Supporting Actions

- Identify who is vulnerable to climate-related risks through vulnerable population mapping (e.g. urban heat island, flood plains etc.), building on maps that already exist.
- Consider separating lists to be separated by type of extreme weather event/climatic threat (e.g. flooding, extreme heat, ice/wind storms etc.) and variety of location.

ACTION DETAILS

Extreme weather events often come with great public health and safety concerns, especially to vulnerable populations including children, the elderly, those experiencing homelessness, and those with special existing health conditions. To better guide emergency response and other assistance programs during extreme weather events (i.e. flooding, extreme heat, ice/wind storms, etc.), the City will work towards consolidating existing vulnerable persons contact lists. In doing so, efforts will be made to house them under one central database that can be used to further update these lists and expand them as necessary.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Homelessness and Encampment team created at City of Hamilton	Landlords keeps list of vulnerable populations in building
Housing Services Dashboard	Many social organizations working with vulnerable populations across the City with expertise
City has list of social organizations – distribution list via Extreme Heat/Cold Alerts	

Action 3.3 (ID#8): Coordinate local efforts to address excessive indoor temperatures in rental housing

Supporting Actions

- Establish community working group to investigate and pilot measures to provide safe housing for all during extreme heat events.
- Develop plans for both short-term (e.g. cooling rooms) as well as long-term solutions including policies and/or by-laws regarding excessive heat as regulatory trigger.

ACTION DETAILS

Excessive indoor temperatures can cause significant health concerns to building occupants, especially to vulnerable populations (i.e. older adults and seniors, children, etc.). As summer temperatures and extreme heat days are projected to increase throughout the 2050s and 2080s, there is an increased need to coordinate efforts throughout the City and work towards improving summer indoor temperatures. In doing so, pilot measures, and both short- and long-term measures will be investigated.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Public Health Services Extreme Heat Alerts	Cooling Centres across Hamilton
Public Health Services promotional webinars to landlords	Green Venture tree and canopy inventory project(s) at social housing properties

Action 3.4 (ID#9): Align ongoing efforts within the City to continue expanding affordable housing to protect vulnerable populations to reduce climate-related impacts from extreme weather and temperatures.

Supporting Actions

- Investigate incentives for green developers to build more affordable housing.
- Examine availability of shelter space and work towards expansion and accessibility.

ACTION DETAILS

Access to affordable housing is a necessary way in which people and families can reduce their exposure to extreme temperatures and extreme weather events. The City has been conducting ongoing work to continue and expand the provision of safe and stable shelters so vulnerable populations are less exposed and/or less affected by climatic impacts now and into the future. As well, plans are underway to expand long-term, permanent affordable housing.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Ongoing City work of ~55 units/ year with stretch goal of 300 units per year.	Hamilton Alliance for Tiny Shelters (HATS)
Ongoing work in City Shelter Space	Indwell and City Housing collaborations and ongoing work.

Objective 4: Improve community preparedness and resilience to respond to climate-related risks from extreme weather and temperatures, including flooding.

Action 4.1 (ID#10): Create educational campaigns on communicating the risks associated with climate change (i.e. health impacts, property damage, etc.) and what residents can do to prepare (GDS, LID, etc.)

Supporting Actions

- Launch public health education campaign(s) based on feedback received during adaptation planning to target vulnerable population (e.x. outdoor workers, low-income, BIPOC).
- Utilize existing channels for communication and/or distribution (e.g. EarlyON Centres, child care, public health nurses etc.) and work towards reducing barriers that prevent vulnerable populations from access this information.

ACTION DETAILS
 Given the expected increase in weather-related emergencies and hazards, community members need to be better informed on what the various risks associated with climate change are and how they can prepare. The City will employ various communications channels and methods to develop and launch education campaigns targeted at residents highlighting existing and future climate change impacts, with an emphasis on ensuring information is reaching more vulnerable community members.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Public Health Services Nurses and other front line staff interacting with vulnerable populations on a daily basis	Enbridge programming to ensure low-income community members have equitable access to energy

Children and Community Services distribution channels	ADC/Climate Action Team previous education events
Public Health Services Healthy Families Hamilton Facebook groups	Seniors for Climate Sanity

Action 4.2 (ID#11): Evaluate and select programs for making emergency preparedness kits accessible to all residents, regardless of income (e.g. means-tested programs, subsidies or free distribution campaigns)

Supporting Actions

- Update or create communications on what emergency kits are, different types of kits, why people need them and how to access it etc.
- Support distribution of emergency preparedness kits through existing channels (e.g. EarlyON and Family Centres, home visits, clinics etc.).

ACTION DETAILS

In a weather-related emergency, people may be without basic services (i.e. electricity, water, food, etc.) for an extended period. To maintain the safety of community members, they need to be aware of what items are needed to ensure households can be self-sufficient for at least 72 hours. In addition to these efforts, the City will also work towards increasing the accessibility of emergency preparedness kits through supporting the distribution of free kits through existing partners and channels.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
72hr kit promotion by Hamilton Fire – Emergency Management	United Way Halton & Hamilton kit assembly workshops with donated goods
Some distribution channels already setup	Existing Snow Angels Program

Action 4.3 (ID#12): Establish buddy systems/help-your-neighbour programs to implement during extreme weather events.

Supporting Actions

- Together, in partnership with community groups and other local institutions, establish social networks that increase awareness of climate risks and enable/support neighbourhood check-ins during extreme weather event of vulnerable/isolated residents.

ACTION DETAILS

Extreme temperatures and extreme weather events will affect some community members more than others. Residents and community members need to be aware of their responsibility to take individual action to proactively participate in collective responses to maintaining the safety of their neighbours and community. Establishing buddy systems/help-your-neighbour programs better enable neighborhood connections and could greatly reduce the risk of illness and injury within a community.

- Investigate existing information and lists from Paramedics and other agencies for residents that have medical equipment or potential for isolation.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City of Hamilton Housing door-to-door wellness check through COVID-19	Snow Angel Program
Neighbourhood Action Strategy work	Neighbour-to-Neighbour App
	Faith and the Common Good resiliency hubs

Objective 5: Monitor and plan for the potential introduction of new vectors and increased vector-borne illnesses in the community.

Action 5.1 (ID#13): Work with local partners to ensure vulnerable groups are informed about and have the means to be adequately protected from vector-borne diseases (e.g. West Nile Virus, Lyme Disease, etc.).

Supporting Actions

- Conduct education campaign(s) to the public and builder owners on measures to decrease risk of exposure to applicable vector species.
- Supporting sharing messages through existing channels (e.g. television screen at clinics, EarlyON & Family Centres etc.) to target interventions to marginalized and racialized communities.

ACTION DETAILS

Over the coming decades, climate change will bring an increased risk and spread of vector-borne diseases. These are diseases that are spread to humans from other living creatures. The most commonly occurring disease vectors in Ontario are mosquitoes (carriers of West Nile Virus) and black-legged ticks (carriers of Lyme Disease). The City will continue to work with local partners to ensure community members have increased knowledge and understanding of vector-borne diseases and the steps they can take to protect themselves.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Public Health Services Healthy Hazards & Vector-Borne Disease Programming	YWCA expertise in infection control in congregate settings.
Existing signs at parks and natural spaces	Hamilton Conservation Authority education programming

Action 5.2 (ID#14): In conjunction with the Biodiversity Action Plan, develop an Open Space Management Plan to guide City of Hamilton Natural Open Space Stewardship, including placement and design of natural spaces to minimize contact with vectors (e.g. plants and animals, such as mosquitoes, that can bring diseases to human communities (e.g. Rabies, West Nile, Lyme Disease).

Supporting Actions

- Conduct research and best practices on native plant species and design that maximizes biodiversity while minimizing exposure and/or conflicts with humans.
- Continue to support the Biodiversity Action Plan and ensure there are no conflicting goals in other Master Plans (e.g. forthcoming Parks Master Plan) and other relevant management plans, policies and procedures.

ACTION DETAILS

Over the coming decades, climate change will bring an increased risk and spread of vector-borne diseases. These are diseases that are spread to humans from other living creatures. The most commonly occurring disease vectors in Ontario are mosquitoes (carriers of West Nile Virus) and black-legged ticks (carriers of Lyme Disease). The City will continue to work with local partners to ensure community members have increased knowledge and understanding of vector-borne diseases and the steps they can take to protect themselves.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Public Health Services Healthy Hazards & Vector-Borne Disease Programming	Hamilton Naturalist Club community engagement and involvement with Biodiversity Action Plan
Existing signs at parks and natural spaces	Hamilton Conservation Authority education programming

Objective 6: Create conditions to minimize health and safety risks to outdoor workers and community members.

Action 6.1 (ID#15): Continue to update existing municipal plans and policies to decrease health and safety risks associated with extreme weather and temperatures to outdoor workers.

Supporting Actions

- Review existing guidelines, by-laws and policies, and plans in conjunction with climate risk and future scenarios to identify gaps and any additional measures required.
- Develop/update additional by-laws, policies and plans (e.g. climate standards by-law, alternate working hours protocol) to protect workers and provide guidance.

ACTION DETAILS

Outdoor workers who are exposed to extreme weather (i.e. heat, cold, hazardous conditions from ice, snow, wind, etc.) are at risk of injury, illness, and reduced productivity. This risk is magnified as summer temperatures, heavy rainfall, and other extreme weather are expected to increase. Though worker safety best practices are already developed and disseminated to employers and employees by Provincial and Federal government agencies, there is a role for the City to continuously update existing plans, procedures, and policies to minimize health and safety risks to all outdoor workers from climate hazards.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Existing City of Hamilton policies and procedures for outdoor workers	Ongoing work and policies in the construction sector
Joint Health and Safety Committees	LEED standards for reducing asphalt

Action 6.2 (ID#15): Explore opportunities to expand current cooling & warming centre programming and interventions.

Supporting Actions

- Increase the presence and maintenance of back-up electrical supply (such as storage/batteries) for buildings greater than 3 story's.
- Understand obstacles in accessing or enjoying cooling/warming centres (e.g. lack of transport, entertainment, pet-friendly etc.) and create strategies to overcome them.

ACTION DETAILS

Extreme heat and cold can pose significant health risks to residents in Hamilton, especially vulnerable populations. Given the projected increase in extreme heat and extreme weather events, pursuing various cooling and warming strategies within the City will help to reduce the risk of injury/illness. The City will continue to explore opportunities to provide improved and/or additional spaces for extreme temperature relief.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City Libraries and Recreation Centres used for cooling	Hamilton Airport has cooling centre for nearby communities
Healthy and Safe Communities protocols during extreme heat/cold events	

Action 6.3 (ID#15): Improve monitoring, data collection, and notification surrounding flooding & extreme weather/temperatures.

Supporting Actions

- Advocate for provincial-wide extreme heat related health surveillance through existing ministry and health associations.

ACTION DETAILS

Climate change adaptation planning is an iterative process and a constantly evolving field. As such, it is important to enable a culture and process within the City to continuously improve data collection, monitoring, and notification surrounding flooding, extreme temperatures, and extreme weather.

- Develop local surveillance during/after extreme weather events with connection to marginalization index/heat vulnerability index and work towards improving real-time communications to the community.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City's real time Combined Sewer Overflow (CSO) monitoring and reporting	Environment and Climate Change Canada meteorology
Public Health Services existing surveillance and data sources	Conservation Authorities' riverine flooding warning system and duty officers



RESILIENT THEME #3: NATURAL ENVIRONMENT, AGRICULTURE AND WATER

Objective 7: Proactively conserve and protect surface water and groundwater resources.

Action 7.1 (ID#18): Continue to enhance the management and restoration of existing natural areas and seek opportunities to dedicate land and natural areas for conservation.

Supporting Actions

- Implement flood and erosion protection measures for parks, trails, and other outdoor recreational spaces.
- Complete city-wide assessment and prioritization list of sites to acquire, manage, enhance in coordination with stakeholders and use that to inform future updates to official planning policies and master plans.
- Review and implement strategies to improve management practices and allocation of proper and consistent resources (e.g. staffing and funding).

ACTION DETAILS
 In addition to educational, economic, and recreational benefits, protected and restored natural areas can help address climate change by conserving biodiversity, capturing and storing carbon, and protecting ecosystem services (e.g. erosion control, water infiltration and flood control, etc.). While natural landscapes may be low maintenance and self-renewing, they do still require ongoing maintenance to keep valuable ecological functions intact.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City of Hamilton existing natural heritage mapping	Hamilton Conservation Authority land securement strategy
City of Hamilton existing Natural Areas Acquisition Fund	Hamilton Naturalist Club Land Trust

Objective 8: Monitor, maintain and improve the diversity and resiliency of urban trees and forests.

Action 8.1 (ID#19): Work with local partners to continue tree planting and preservation, explore community partnerships and naturalization programs to reduce urban heat island and enhance ecosystem function.

Supporting Actions

- Continue and expand the protection of corridor/connected tree canopy within the public and private spaces (e.g. urban streets, commercial shopping centres, hydro-corridors etc.) to improve areas of shade cover and ecological connectivity.

ACTION DETAILS

Natural and forested areas offer many community benefits including helping reduce the urban heat island effect, better manage stormwater runoff, strengthen the protection of watercourse corridors, create habitat for local wildlife and pollinators, and provide intangible benefits to communities, such as improved psychological and social well-being. The City will look to continue to work with local partners and organizations to increase tree planting efforts and explore opportunities to protect and enhance Hamilton's natural landscape.

- Review education practices with tree-planting organizations (e.g. Environment Hamilton, Green Venture, Hamilton Naturalist Club etc.) to increase more uptake of trees and encourage diversity in planting and conduct community outreach through additional staff hiring.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City Forestry replacement tree requirements	Hamilton Conservation Authority tree planting and iTree analysis programming
Developing Watershed Action Plan	Naturehoods rebates program

Action 8.2 (ID#20): Implement the Urban Forest Strategy and consider additional measures to support it or expand its impact.

Supporting Actions

- Using appropriate planning measures and controls, work towards achieving the 3-30-300 urban forest rule (i.e. each resident has access to 3 trees, 30% canopy cover within their neighbourhood, and is within 300 metres of green space).
- Revisit private tree protection by-law and the inclusion/designation of heritage trees.

ACTION DETAILS

The City of Hamilton’s Urban Forest Strategy will provide tools for growing and maintaining a healthy and resilient urban forest. This includes trees in ROWs, parks, and natural areas. The strategy will look to provide direction on all aspects of the maintaining an urban forest, identify challenges and opportunities for improving the urban forest, set goals and objectives for the long-term sustainability, recommend actions including programs, policies, and partnerships, and project short and long-term resource requirements and monitoring indicators.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City Forestry Street Tree Program	Many Non-Profit Organizations tree planting and free tree giveaways
Existing tree protection by-laws and tree preservation requirements	Naturehoods rebates program



Objective 9: Strengthen food security in the City.

Action 9.1 (ID#21): Educate and encourage the community to participate in growing food locally (e.g. lot level or urban farms/gardens).

Supporting Actions

- Advocate, plan and implement community food production strategies and projects (e.g. hydroponics, rooftop greenhouses etc.) through new and existing programs (e.g. EarlyON & Family Centres) that includes increase dissemination of additional resources.
- Utilize the Food Strategy as a guide to create additional supporting actions and other needed initiatives to improve food security (e.g. income supports) should be investigated over time.

ACTION DETAILS

Climate change represents an important health concern as it relates to food system impacts and food insecurity. Improving education, allowing residents to grow their own food (i.e. through backyard/community gardens, urban farms, etc.) and working to address vulnerable and low-income populations will all serve to improve food security throughout the Hamilton 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.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
McQuesten Urban Farm	Neighbour to Neighbour Hamilton Community Garden
City helps to manage and develop community gardens	Green Venture seed programming

Action 9.2 (ID#22): Expand rain water capture (i.e. rain barrels, cisterns, etc.) as an irrigation source for more localized food production (i.e. backyard farming, urban gardens, soft landscapes, etc.).

Supporting Actions

- Explore pilot projects at multi-residential buildings and/or schools for water capture/irrigation and food gardening.
- Investigate and enact potential incentive programs (e.g. funding call outs at licensed child care centres) to promote the development of food gardens, natural playgrounds, and rain gardens.

ACTION DETAILS
 Climate change is expected to cause short and intense micro-bursts of precipitation with also potential for long periods with out rain. This will make capturing and storing water very important for stormwater management but can also be used as source of irrigation. By utilizing rain water capture this can reduce pressure of water demand during drought periods and potential to reduce costs for water treatment and distribution

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City rain barrel sale through rainbarrel.ca	Sustainability Leadership’s water management framework
	Naturehoods program installing many forms of green infrastructure



Action 9.3 (ID#23): Engage with local agricultural leaders to understand existing resources for farmers in addressing climate adaptation, and how the City can support or expand on those efforts.

Supporting Actions

- In collaboration with City's Agricultural & Rural Affairs Committee and local, provincial and national farming associations develop inventory of resources and guides and determine best dissemination strategies.
- Engage local agricultural community and identify greater collaboration opportunities (e.g. funding applications, promoting agritourism/agribusinesses) in the City.

ACTION DETAILS
 Farming has always required adaptation to seasonal variability and changing growing conditions, however, farmers and farm businesses are facing increasingly larger climate change-related challenges in the operation of their farms. Localized impacts of wetter winters, heavy rainfall, and increased temperature variability can affect crop and livestock loss, increased pest survival rates, washouts and runoff issues, and more. Often recognized as environmental stewards, farmers have also been adopting best practices and implementing adaptive measures to combat some of these impacts.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Hamilton Food Advisory Strategy	Ontario Federation of Agriculture Benefit Program
City's Agricultural & Rural Affairs Sub-Committee of Council	Golden Horseshoe Food and Farming Alliance ongoing research

Action 9.4 (ID#24): Develop an educational campaign directed at restaurant and grocery industries, local farms and other possible food sources to better reduce and divert food waste and explore opportunities to reduce food waste.

Supporting Actions

- Establish a Community Working Group focused on food waste and insecurity involving restaurant, grocery, market industries and relevant community partners, and PHS; including a mandate for food waste diversion & uptake.

ACTION DETAILS
 Reducing food waste from landfills will help to reduce methane emissions, which are a very potent greenhouse gas (GHG) that contributes to climate change. By reducing food waste and throwing less of it away can help reduce the carbon footprint of food, but also help to save money and reduce food insecurity.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Hamilton Central Compost Facility diverts food waste and turns it into Renewable Natural Gas (RNG) for transit.	Environment Hamilton's food waste webinars
Municipal Waste Association	Food for Life, food recovery and distribution



RESILIENT THEME #4: ENERGY AND ECONOMY

Objective 10: Enable local businesses and organizations to plan for climate-related risks.

Action 10.1 (ID#24): Provide guidance to local businesses on how to maintain business continuity (e.g. supply chain) during extreme weather (i.e. through business continuity planning, green business practices, adaptation measures, etc.).

Supporting Actions

- Gauge local businesses' interest in establishing/ participating in a local best practices network (e.g. business continuity emergency planning, green business practices, adaptation measures) that meets annually (e.g. through business breakfast/open house event) to discuss adaptation measures in business operation.
- Investigate existing training opportunities (e.g. Sustainability Leadership) on business community climate risks and how to further support and enhance.

ACTION DETAILS
 Climate change is having, and will continue to have, a large impact on many businesses. In particular business continuity can be threatened in the event of power outages, or if local transportation networks are disrupted by extreme weather. By considering climate change in managing their business, local business owners in Hamilton can identify and mitigate risks and minimize disruption to operations in the face of increased weather-related disturbances and hazards.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
Hamilton Fire – Emergency Management business continuity policy	Chamber of Commerce work with businesses
Economic Development Action Plan	United Way Halton & Hamilton ConnectEd programs

Objective 11: Improve the resilience of energy infrastructure to weather-related disruptions.

Action 11.1 (ID#24): Work with local partners to conduct vulnerability and risk assessments on local energy systems and identify opportunities to increase local energy generation (e.g. microgrids) to increase reliability (potentially as part of planned CEEP priority actions around identifying renewable energy generation sites within the City).

Supporting Actions

- Establish working group with local utilities and the Independent Electricity System Operator to develop Terms of Reference for a city-wide project and investigate possible funding opportunities.

ACTION DETAILS

Climate change has and will continue to impact electrical utilities and all partners need to work together build the resiliency by identifying where and how local energy generation can be increased so as to import less energy and become more energy secure in the event of weather-related disruptions.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City of Hamilton 330 Wentworth solar rooftop	Rechargeables Inc work on microgrids
	Geothermal heating and cooling in construction industry

Action 11.2 (ID#24): Establish low-carbon back-up power systems in all City-owned facilities to serve as community hubs during emergencies, and create a policy to support and promote the use of low-or no-carbon emergency energy supplies such as batteries or energy storage for residents and businesses.

Supporting Actions

- Research and consider innovative opportunities/ technology for low-carbon emergency power (e.g. small-scale hydrogen, 2-way electric vehicle power, micro-grids etc.) to develop education/ communication campaign on available options.

ACTION DETAILS

Climate change poses a major threat to electricity infrastructure, including damage to power generation, distribution, and storage. The City will review existing practices and ensure all City-owned buildings and assets delivering critical services to the community have reliable low-carbon back-up power. Further, it will be important to increase the knowledge and capacity of residents and businesses to acquire low- or no-carbon emergency energy supplies to ensure their own health, safety, and business continuity during or following an extreme weather event.

- Identify and map community-hubs and mobility space requirements across the City in conjunction with socio-demographic mapping to maximize benefits.

Snap Shot of Current Practices

City Current Practices	Community Current Practices
City existing cooling/warming centres	Community Resilience to Extreme Weather (CREW)
	Existing faith-based climate resiliency hubs

11. Implementation

The Climate Change Impact Adaptation Plan is intended to guide the City of Hamilton and community agencies to prepare for the impacts of climate change. As such, a strong focus on implementation, governance, and monitoring is essential to the Plan's success. Changes to federal and provincial legislation and regulations, continued lived experience of the impacts of climate change, and technological advances are anticipated over the Plan horizon; this will impact the long-range strategies, underscoring the importance of periodic review and adjustments to the CCIAP. The flexibility will ensure the City is not constrained to certain parameters should new opportunities for implementation arise.

A preliminary implementation schedule has been developed to identify the considerations required to carry out the actions. This schedule was the result of extensive feedback and consultation with City staff and external stakeholders and is highly dependent on staff capacity and financial considerations. Additionally, actions that address higher risk impacts often require more resources. Therefore, actions identified as a higher priority may not always be completed first. The following implementation schedule does not include programmatic details explaining how each initiative will be delivered; in many cases, feasibility studies and further program design will be required. Programs and projects that are already underway are not included in this table, but will be described elsewhere as contributing to the overall success of the Plan.

Furthermore, the implementation schedule is a living document that is subject to changes due to new information, new adaptation priorities being identified, and new funding sources becoming available. The implementation schedule can be found in Appendix A. For each action, the Schedule includes:

Action and Approximate Timelines: Provides the key action and association timeline for how long implementation of that action will take (i.e. short-term = <2 years, medium-term = 2-5 years, and long-term = >5 years)
Immediate Next Steps: Immediate, specific next step(s) that would need to happen to begin implementation.
Lead Organization(s): The department(s)/organization(s) leading implementation of action.
Monitoring Metric(s): Metric(s) to monitor the action and evaluate progress.
Priority Impact(s) Addressed: Identification of which priority impact(s) (previously developed through the Vulnerability and Risk Assessment) are being addressed through these actions.

Monitoring and Review

Monitoring and review are an integral part of the adaptation planning process. In order to assist and ensure the actions in this plan are effectively implemented, we need to build in opportunities to examine the lessons learned throughout the development and implementation of the adaptation actions. In doing so, the City can continue to evaluate whether the context of the risks and vulnerabilities has changed, and can integrate these insights into future adaptation strategies.

Tracking progress enables the City to assess whether the actions outlined in this Plan are producing the desired results, while also providing an opportunity to communicate and celebrate our successes and accomplishments on the journey towards adapting to climate change.

Indicators

Indicators used in this Plan can be categorized into two types: process-based indicators and outcome-based indicators. Process-based indicators can be used to measure or track progress towards achieving a specific target, activities, or output, while outcome-based indicators can be used to measure whether expected effects or changes are being achieved. Many indicators in this Plan are process-based and where feasible, outcome-based indicators have been identified – especially those that capitalize on indicators that the City or community are already tracking^{vii}.

Central Climate Change Office and Plan Review

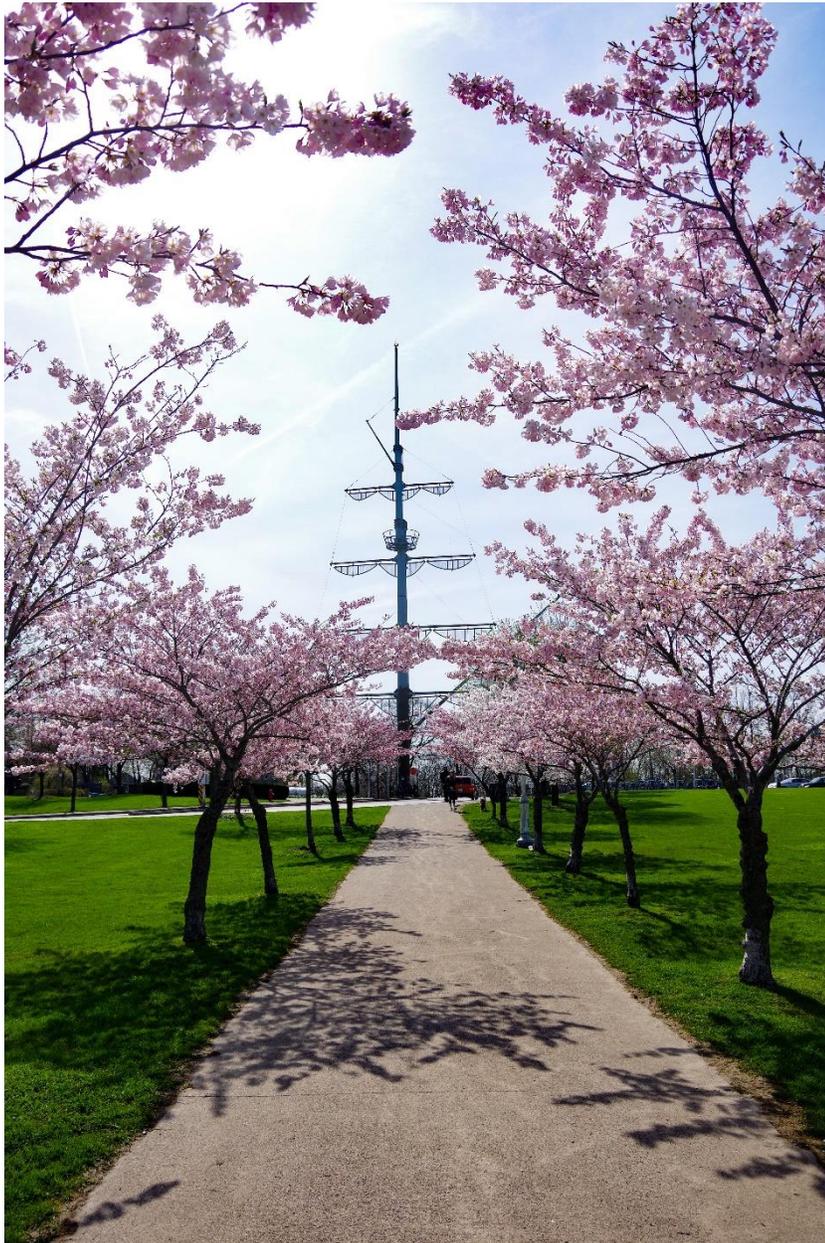
The recommended organizational model for implementing the CCIAP is a ‘City-led and Community Supported’ model. This model enables the City to take a leadership role while sharing responsibilities for implementation with community organizations and other external stakeholders, leveraging community capital to implement actions that are beyond municipal control or responsibility or those that would be better supported through the involvement of the community.

To coordinate and guide the implementation of the CCIAP, the City of Hamilton is proposing a multi-faceted governance model comprised of the following elements:

- A Central Climate Change Office (as per Enabling Action ##) that will lead the implementation and overall coordination of Hamilton’s Climate Change Action Strategy comprised of both the Community Energy and Emissions Plan (CEEP) and Climate Change Impact Adaptation Plan (CCIAP).
- A Director-level Multi-Departmental Working Group to help coordinate the implementation and ongoing reporting of the actions within both CEEP and CCIAP; and
- A Climate Advisory Committee(s) comprised of a diverse and equitable representation across Hamilton’s community.

It is recommended that within the proposed Central Climate Office there are adequate resources through designated staff that would be responsible for overseeing and coordinating the CCIAP's implementation, facilitating and coordinating meetings with the multi-department working group and other relevant internal and external stakeholders. They would be coordinating with lead and supporting organizations, as well as serving as the main point of contact for the CCIAP's implementation.

In addition, a formal review of the Climate Change Impact Adaptation Plan is planned to occur every three to five years, or as new information and technology become available. It is anticipated that a report to Council will occur every year once implementation begins.



Advancing Adaptation Project

Hamilton was selected as part of a group of 32 Ontario Municipalities to work with ICLEI Canada to increase climate change resilience over an 18-month period, as part of the 'Implementation through Collaboration' cohort. This project enabled local governments to take action on one of their adaptation actions or solutions already identified through a community-oriented project. ICLEI provided financial support and guidance on implementation issues, such as overcoming obstacles, building local support, and identifying performance indicators.

In addition to working on a significant climate impact for the Hamilton community, this project was seen as a way to test collaborative community implementation models, including Terms of Reference, shared decision making, engagement and consultation.

Extreme Heat Working Group: Consultation, Targeted Information, and In-Building Cooling

The Hamilton project team knows that extreme heat is the number one problem in the community and that relying on cooling centres, which are largely going unused during heat events, is not enough to save lives. An Extreme Heat Working Group, including representatives of four organizations on the city's Just Recovery Network (Environment Hamilton, ACORN Hamilton, the Hamilton Roundtable for Poverty Reduction, and Social Planning Research Council), and managers and residents of the city-owned apartment buildings, have been meeting monthly and contributing essential advice and insight to the structure and design of the program.

Hamilton has been moving ahead with impressive stakeholder engagement to address extreme heat in four City Housing downtown apartment complexes. This has been accomplished with thoughtfully planned surveys, in-person interactive engagements, and subsequent action identification to address issues identified. The project began with getting to know what the experiences are of residents during extreme heat events. On-site cooling features such as furniture for and promotions about in-building cooling rooms, in-room air conditioners, outdoor shade, identifying the closest public cooling centres, and more have been identified as actions in a layered approach to respond to what the project team has been hearing.

This project valued the time and effort of all project participants by providing gift cards to those who contributed to the survey or workshops, as well as providing food and drink. Significant time and effort were allocated to planning for the most effective means of communicating, virtually, by mail and in-person, around this project and this climate impact making this community-engaged climate adaptation action equitably delivered.

One-on-one discussions with participating community groups over the summer have confirmed that the Terms of Reference, collaborative decision-making models, meeting structure and timing, and level of effort all work well and participants have a high degree

of enthusiasm about the project. These should be used as templates for further community adaptation collaborative projects.

Acknowledgements

The Advancing Adaptation Project is made possible with funding from the Ontario Ministry of the Environment, Conservation and Parks (MECP) alongside financial support from the Government of Canada through the federal Department of Environment and Climate Change Canada.

12. Conclusion

City staff and community participants showed remarkable agreement on their Vision for a successful Adaptation Plan; all agreed that health, sustainability, prosperity and equity were important components and reflections of success, and the principles around which the Plan should be organized. Participants also recognized the importance of collaboration both within the City and with other regions and municipalities by valuing the necessity of leadership: working with ourselves and others to break the trails necessary to navigate the uncertain decades ahead. These values are reflected in our Adaptation Vision Statement:

“The City of Hamilton will be a national leader on Climate Adaptation: a healthy, equitable, vibrant, and sustainable community that responds to the needs of residents, businesses and institutions, and is resilient in the face of a changing climate.”

While the City recognizes its need to lead and support the implementation of the Plan and the majority of its adaptive actions, its success will depend on participation by the entire community: our businesses and industry, institutions and social organizations, business and neighborhood improvement associations, schools, and families and individuals. Homeowners and property owners will need to participate in adaptation building retrofit programs, land owners will need to landscape and manage their lands differently to reduce flood risks and biodiversity loss, landlords will need to develop plans to assist tenants during extreme weather and heat events, community gardens and the urban forest will need to grow, and we all can get to know our neighbours and offer support when needed.

A healthy city is one in which climate health impacts are prevented or cured; a vibrant community is one in which joy and prosperity are supported through and by mitigation and adaptive actions; a sustainable community is one in which the solutions to the climate emergency can continue to exist for decades or centuries to come; and an equitable community is one in which the protections and benefits of adaptive actions are

most accessible to those who most need them. The actions in our Plan and the implementation schedule will support these important goals.

We hope everyone in the City sees themselves and their needs reflected in this Plan, and a role to play in its implementation.



13. Appendices

Appendix A: Implementation Schedule

Objective 1: Incorporate climate change into future land use, development, and construction

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 1.1 (ID#1): Develop requirements for the incorporation of Low Impact Development (LID) features and green infrastructure into new development and redevelopment projects and consider watershed and landscape scales in the development of plans and objectives.</p> <p>Long-term (>5 years)</p>	<ul style="list-style-type: none"> Identify and set a baseline metric. Map where LID features should be prioritized for installation Meet with relevant external Potential Supporting Organization(s) to determine scope of the program and what guidelines are already available 	<ul style="list-style-type: none"> Co-led between Public Works (Hamilton Water) and Planning and Economic Development (Planning-Growth Planning) 	<ul style="list-style-type: none"> Other applicable Dept/Div. (Parks, Landscape Architecture, Planning etc.) Academics (Mohawk and McMaster) Environmental Organizations (e.x. Green Venture and Environment Hamilton) Bay Area Restoration Council Conservation Authorities Large Building and Property Owners Social Organizations and Affordable Housing Providers (e.x. Indwell, YWCA, Kiwanis Homes) 	<ul style="list-style-type: none"> City of Hamilton Official Plan updates that include LID implementation Diversion of stormwater (amount measured) Number of LID features implemented Locations of LID features reported in site plans Private property flooding reports Watershed conditions in priority areas (i.e. water quality, erosion sites, etc.)
<p>Action 1.2 (ID#2): Develop guidelines and incentives for homeowners and landlords to improve</p>	<ul style="list-style-type: none"> Compile list of existing incentives and organizations offering them 	<ul style="list-style-type: none"> Proposed Climate Change Office (CCO) 	<ul style="list-style-type: none"> Other applicable City Depts/Div. (Public Health, Municipal Law Enforcement, Planning) Bay Area Climate Change Council Insurance companies 	<ul style="list-style-type: none"> Number and type of incentives offered Number and type of retrofits (e.x. backflow

<p>the resilience of residential buildings to climate-related risks through upgrades and/or retrofits.</p> <p>Short-term (<2 years)</p>	<ul style="list-style-type: none"> • Use research and best practices from University of Waterloo Intact Centre, as well as other research to develop best practices/guidelines document • Continue to develop HERO retrofit incentive and explore adaptation retrofit options 		<ul style="list-style-type: none"> • Social Organizations (e.x. ACORN, Hamilton Round Table for Poverty Reduction, YWCA, Community Benefits Network) • Environmental Organizations (e.x. Green Venture • Conservation Authorities • Faith Based Organizations (e.x. Faith and the Common Good, Association of Dundas Churches/Climate Action Team, St. Paul's Presbyterian Church, Faith Footprints/United Church of Canada) • Mohawk College – Centre for Climate Change Management • Alectra • Hamilton Community Foundation 	<p>valves, downspout disconnections etc.)</p> <ul style="list-style-type: none"> • Number change in Protective Plumbing Program numbers • Building permit data
<p>Action 1.3 (ID#3): Conduct more studies or reviews to determine flooding and other risks throughout the City & develop plans (e.g. relocating sites where appropriate) to improve the resilience of infrastructure (i.e. buildings, roads, water/wastewater infrastructure, etc.) to climate-related</p>	<ul style="list-style-type: none"> • Conduct a review of existing relevant studies and identify where the gaps may exist. • Organize meetings with relevant external partners to discuss program scope and requirements and work towards joint work plans and proposals. 	<ul style="list-style-type: none"> • Proposed Climate Change Office (CCO) 	<ul style="list-style-type: none"> • All other applicable City Departments/ Divisions • McMaster Centre for Climate Change (MCCC) • Conservation Authorities • Niagara Escarpment Commission • Bay Area Restoration Council 	<ul style="list-style-type: none"> • Percentage of the City that has been studied (geographic metric) • Number of flood-related calls • Sites along the waterfront that are mitigated

risks from extreme weather and temperatures.				
Medium-term (2-5 years)				

Objective 2: Reduce transportation disruptions due to extreme weather events and improve the safety of travel on roads, sidewalks, and trails (i.e. including washouts)

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 2.1 (ID#4): Improve winter travel conditions through further expanding sidewalk clearing.</p> <p>Short-term (<2 years)</p>	<ul style="list-style-type: none"> Investigate where there is a need to fill in the gaps in the ‘Snow Angels program’. Analyze sidewalk clearing expansion in 2022/23 to determine successes and remaining gaps/issues 	<ul style="list-style-type: none"> Public Works Department (Roads Maintenance) 	<ul style="list-style-type: none"> Other City Departments/Divisions (E.x. Municipal Law Enforcement/PED) YWCA Social Planning and Research Council of Hamilton (SPRC) through Just Recovery Network 	<ul style="list-style-type: none"> Kilometres of sidewalks cleared Number of requests from ‘Snow Angels’ program Number of “angels” part of ‘Snow Angels’ program Number of slip/fall complaints
<p>Action 2.2 (ID#5): Encourage and promote safer travel practices, choices, and alternatives through considering all</p>	<ul style="list-style-type: none"> Engage with local organizations to form a working group to co-create communications campaign Review and update (as necessary) the 	<ul style="list-style-type: none"> Planning and Economic Development (Transportation Planning) 	<ul style="list-style-type: none"> Other applicable City Departments (e.x. Corporate Communications, Public Works, HSR etc.) Sub-Committees of Council (e.x. LRT, Cycling etc.) Environmental and Social Organizations (e.x. Environment 	<p>Formation of working group</p> <p>Number of meetings with local groups that receive communication campaign</p> <p>Traffic count numbers</p> <p>Number of road accidents</p>

<p>users of Hamilton's transportation network and by working with local groups to create a communications campaign around the benefits of work-from-home</p> <p>Medium-term (2-5 years)</p>	<p>inclement weather communication templates used by City of Hamilton's Communications Department and ensure that they encompass all climatic events</p>		<p>Hamilton, Cycle Hamilton, New Hope Community Bikes, Hamilton Bike Share, YWCA</p> <ul style="list-style-type: none"> • Hamilton Transit Riders Union • Neighborhood groups/associations 	
---	--	--	--	--

Objective 3: Help vulnerable populations (i.e. seniors, youth, outdoor workers, those experiencing homelessness, with pre-existing health conditions, etc.) avoid or reduce health-related impacts of extreme weather and temperatures (including flooding).

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 3.1 (ID#6): Develop and implement a response program for vulnerable populations to protect residents from climate-related risks (i.e. extreme cold, extreme heat, etc.)</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> • Develop program for in-building cooling rooms for high-rise residential buildings • Distribute resources/toolkits on benefits of emergency preparedness to landlords • Investigate/renew previous contact list(s) of those on medical devices 	<ul style="list-style-type: none"> • Proposed Climate Change Office (CCO) 	<ul style="list-style-type: none"> • Other applicable City Dept/Div. (e.x. Hamilton Fire – Emergency Management Hamilton, City Housing Hamilton etc.) • Social Organizations (e.x. YWCA, Networks of seniors/long-term care homes, Energy Justice, Disability Justice Network of Ontario, Hamilton Coalition on Aging, Immigrants Working Centre, Social Planning and Research Council of Hamilton, 	<ul style="list-style-type: none"> • Number of annual weather-related (e.g., heat related, cold related) emergency room visits for residents of Hamilton. • Number of annual weather-related (e.g., heat related, cold related) deaths for resident of Hamilton. • Number of weather-related calls (e.g., heat related, cold related) paramedic calls for residents of Hamilton.

			<p>Welcome Inn, United Way Halton & Hamilton)</p> <ul style="list-style-type: none"> • McMaster University • Private Home Builders/Developers 	
<p>Action 3.2 (ID#7): Consolidate existing vulnerable persons' contact lists and update/expand them to guide emergency response and/or other assistance programs.</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> • Investigate similar programming in other municipalities (e.g. City of Montreal) • Map areas that will need to be contacted and look to create lists based on climate hazard (e.g. extreme heat, extreme cold, flooding, wind, etc.) 	<ul style="list-style-type: none"> • Healthy and Safe Communities 	<ul style="list-style-type: none"> • Other applicable City Dept/Div (e.x. Public Health, Communications, Hamilton Fire-Emergency Management, Housing Services, City Housing Hamilton) • Social Organizations (e.x. Just Recovery Hamilton, Social Planning Research Council, United Way, Welcome Inn, CareMongering/ Disability Justice Network of Ontario, Hamilton Immigration, Partnership Council) • Environment Hamilton • City Councillors • City Enrichment Fund • Hamilton Community Foundation • Landlords • Tenant groups • Welcome Inn 	<ul style="list-style-type: none"> • Registry created • Number of users of registry • Number of people reached during a climate emergency
<p>Action 3.3 (ID#8): Coordinate local efforts to address excessive indoor</p>	<ul style="list-style-type: none"> • Conduct research on other what similar work has been done by other 	<ul style="list-style-type: none"> • Healthy and Safe Communities (Public Health Services) 	<ul style="list-style-type: none"> • Other applicable City Dept/Div. (Communications, Hamilton Fire - Emergency Management, Housing 	<ul style="list-style-type: none"> • Number of health promotion sessions delivered, number of attendees and number of resources provided for heat-related response (i.e. number

<p>temperatures in rental housing</p> <p>Medium-term (2-5 years)</p>	<p>communities (e.g. City of Toronto)</p> <ul style="list-style-type: none"> • Determine with building managers to what extent heat response plans exists 		<p>Services City Housing Hamilton)</p> <ul style="list-style-type: none"> • Social Organizations (e.x. Just Recovery Hamilton, Social Planning Research Council, United Way, CareMongering/ Disability Justice Network of Ontario, United Way, Welcome Inn, Hamilton Immigration Partnership Council • Environment Hamilton • City Councillors • City Enrichment Fund • Hamilton Community Foundation • Landlords • Tenant groups • Hamilton Immigration Partnership Council (HIPC) 	<p>of graphics, posters distributed, etc.)</p> <ul style="list-style-type: none"> • Creation and/or implementation of heat-related response plan • Website metrics (number of downloads/views) • Number of media releases on heat-related topics
<p>Action 3.4 (ID#9): Align ongoing efforts within the City to continue expanding affordable housing to protect vulnerable populations to reduce climate-related impacts from extreme weather and temperatures</p>	<ul style="list-style-type: none"> • Support council to continue their lobbying/advocacy to upper levels of government • Develop resources (e.g. factsheets, white papers etc.) on linkages between climate change and vulnerable populations • Determine how to collect data on 	<ul style="list-style-type: none"> • Healthy and Safe Communities (Housing Services), Planning and Economic Development • Public Health Services (Epidemiology Wellness & Communicable Diseases) 	<ul style="list-style-type: none"> • Social Organizations (e.x. Hamilton Community Benefits Network, Hamilton is Home Coalition, ACORN, Round Table for Poverty Reduction, Ontario Non-Profit Housing Association, Social Planning and Research Council, Sacajawea Non-Profit Housing, YWCA, Kiwanis) • Province and Federal Govt. for funding 	<ul style="list-style-type: none"> • Number of affordable housing units • Shelter expansion/Number of individuals who are more vulnerable served through expansion • Number of units with cooling interventions (fans, AC, awnings, etc.) • Housing prices in the City • Number on annual weather related (e.g. heat-related, cold-related) emergency visits, paramedic calls, and morbidity

<p>Long-term (>5 years)</p>	<p>health – for particular climatic events, of homeless populations, etc. and leverage existing data where possible.</p>		<ul style="list-style-type: none"> Hamilton Community Foundation 	<p>and mortality rates, with focus on vulnerable populations where possible.</p>
--------------------------------	--	--	---	--

Objective 4: Improve community preparedness and resilience to respond to climate-related risks from extreme weather and temperatures, including flooding.

<p>Action + Timelines for Completion</p>	<p>Immediate Next Steps</p>	<p>Lead Organizations</p>	<p>Potential Supporting Organizations</p>	<p>Potential Monitoring Metrics</p>
<p>Action 4.1 (ID#10): Create educational campaigns on communicating the risks associated with climate change (i.e. health impacts, property damage, etc.) and what residents can do to prepare (GDS, LID, etc.)</p> <p>Short-term (<2 years)</p>	<ul style="list-style-type: none"> Engage appropriate subject matter experts to inform content in the communications campaign(s). Look to existing City efforts to see where efforts can be combined (e.g. Emergency Preparedness Week) Review and update existing City communications materials to include climate 	<ul style="list-style-type: none"> Proposed Climate Change Office (CCO) 	<ul style="list-style-type: none"> Other applicable City Dept/Div. (e.x. Hamilton Fire – Emergency Services, Children & Community Services, Corporate Communications, Public Works, Public Health) Environmental Organizations (e.x. Environment Hamilton, Sustainability Leadership) Utilities (e.x. Alectra, Enbridge) Academics (e.x. Mohawk College, McMaster University) Hamilton Health Sciences School boards Personal Support workers Social Organizations (e.x. Immigrants Working Centre (IWC), ADC/ Climate Action Team, Seniors for Climate Sanity, Dundas Works/ Rotary Dundas Community Services, YWCA, Welcome Inn, 	<ul style="list-style-type: none"> Launch of campaigns City website analytics (e.g. number of visits, material downloads, etc.)

	change-related information		<p>Social Research Planning Council, United Way</p> <ul style="list-style-type: none"> • Private Large Building Owners (e.x. Lime Ridge Mall, • Insurance Providers • Conservation Authorities • Sub-Committees of Council (Seniors Advisory, Communications) 	
<p>Action 4.2 (ID#11): Evaluate and select programs for making emergency preparedness kits accessible to anyone, regardless of income (e.g. subsidies or free distribution campaigns)</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> • Determine what kit contents are needed • Determine who/where community members can connect with during climate-related emergencies to help support them • Determine who can fund kit creation and distribution 	<ul style="list-style-type: none"> • Healthy and Safe Communities 	<ul style="list-style-type: none"> • Applicable other City Dept/Div (e.x. Corporate Communications, Hamilton Fire - Emergency Management Hamilton, Tourism and Culture, Recreation, Facilities, Ontario Works) • United Way Halton & Hamilton • Social Housing Providers • Food banks (to distribute during times of crisis) • Red Cross • Museums • Libraries • Service Centres • School boards 	<p>Number of programs/organizations delivering emergency preparedness kits</p>
<p>Action 4.3 (ID#12): Establish buddy systems/help-your-neighbour programs to implement</p>	<ul style="list-style-type: none"> • Map what community groups cover what areas/locations in the City • Organize a meeting with 	<ul style="list-style-type: none"> • Healthy and Safe Communities • Possibly in partnership with United Way Halton & 	<ul style="list-style-type: none"> • Other applicable City Dept/Div. (Hamilton Fire-Emergency Management Hamilton, Neighbourhood Development) • Faith Based Organizations (e.x. Faith and the Common Good, Hamilton/Dundas Jewish Services) 	<ul style="list-style-type: none"> • Number of Neighbourhood organizations/groups (i.e. participating/ registered) • Number of people reached within each organization

<p>during extreme weather events</p> <p>Short-term (<2 years)</p>	<p>groups who have previously carried out similar work and determine what resources are needed to support them</p> <ul style="list-style-type: none"> • Networks of staff (built from vaccine ambassadors) 	<p>Hamilton (depending on scale and availability)</p>	<ul style="list-style-type: none"> • Social Organizations (e.x. Home Management Client Group program, Dundas Works, Dundas Community Services, Welcome Inn, Social Planning Research Council) • Cultural Organizations (e.x. African Canadian Caribbean Association (ACCA)) • Community Resilience to Extreme Weather • https://ca.nextdoor.com/ • Neighbourhood Facebook groups & Neighbour-to-Neighbour App – for communication • ADC/Climate Action Team • Hamilton Community Foundation 	
--	---	---	---	--

Objective 5: Monitor and plan for the potential introduction of new vectors and increased vector-borne illnesses in the community.

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 5.1 (ID# 13): Work with local partners to ensure vulnerable groups are informed about and have the means to be adequately protected from vector-borne</p>	<ul style="list-style-type: none"> • Determine what physical assets are needed (e.g. bug nets, mulching lawn edging, DEET, etc.) • Review property standards by-law 	<ul style="list-style-type: none"> • Healthy and Safe Communities (Public Health Services) 	<ul style="list-style-type: none"> • Other applicable City Dept/ Div. (e.x. Corporate Communications) • School boards • Hamilton Health Sciences • Social Organizations (e.x. United Way Halton & Hamilton, YWCA) • Local health providers • Pharmacists 	<ul style="list-style-type: none"> • City website analytics (i.e. number of views/downloads, etc.) • Number of cases of vector-borne disease related illnesses

<p>diseases (e.g. West Nile Virus, Lyme Disease, etc.)</p> <p>Long-term (>5 years)</p>	<p>for implications on disease vectors</p>		<ul style="list-style-type: none"> • Hamilton Community Foundation • McMaster University (Centre for Climate Change) 	
<p>Action 5.2 (ID# 14): In conjunction with the Biodiversity Action Plan, develop an Open Space Management Plan to guide City of Hamilton Natural Open Space Stewardship, including maintenance schedules to minimize ideal conditions for vectors (e.g. plants and animals, such as mosquitos, that can bring diseases, such as rabies, Lyme disease, to human populations)</p> <p>Long-term (>5 years)</p>	<ul style="list-style-type: none"> • Investigate ways in which capacity-related issues can be addressed in reviewing/updating an Open Space Management Plan 	<ul style="list-style-type: none"> • Public Works (Environmental Services) as open space management lead • Healthy and Safe Communities (Public Health Services - as education/ awareness lead) 	<ul style="list-style-type: none"> • Other applicable City Dept/Div. (e.x. Corporate Communications, Hamilton Water, Roads) • Hamilton Naturalists Club • Conservation Authorities • Agricultural societies upstream • Ontario Ministry of Natural Resources and Forestry • Bruce Trail Conservancy • Niagara Escarpment Commission • McMaster University (Centre for Climate Change) 	<p>Number of complaints/requests to cut grass</p> <p>Number of ticks submitted to public health per year</p>

Objective 6: Create conditions to minimize health and safety risks to outdoor workers and community members.

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 6.1 (ID#15): Continue to update existing municipal plans and policies to decrease health and safety risks associated with extreme weather and temperatures to outdoor workers</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> Determine how to collect data on health – for particular climatic events, of outdoor workers Review existing guidelines, by-laws and policies, and plans (e.g. extreme heat/cold work plans in response to an emergency) and identify gaps 	<ul style="list-style-type: none"> Human Resources Proposed Climate Change Office (CCO) 	<ul style="list-style-type: none"> Other applicable City Dept/Div. (e.x. Public Health, Human Resources, Joint Health and Safety Committees etc.) Ontario Ministry of Labour West End Home Builders Association Private businesses across the community 	<ul style="list-style-type: none"> Number of extreme weather-related injuries/deaths for outdoor workers Number of updated or new policies created
<p>Action 6.2 (ID#16): Explore opportunities to expand current cooling & warming centre programming and interventions.</p> <p>Short-term (<2 years)</p>	<ul style="list-style-type: none"> Connect with other municipalities who have done work around this (e.g. Toronto Public Health and their cooling/warming centre improvement) 	<ul style="list-style-type: none"> Healthy and Safe Communities (Public Health Services) 	<p>Buildings Owners and Locations with congregate floor area (e.x. Art Gallery of Hamilton, Hamilton Convention Centre, Churches, Malls, Museums, Public Libraries etc.)</p> <p>Academics (e.x. Mohawk College/ McMaster University)</p> <ul style="list-style-type: none"> Organizations with drop-in spaces Landlords Social workers Welcome Inn 	<ul style="list-style-type: none"> Number of facilities Number of users Quality of programming at facilities (to indicate improvement) Community feedback on cooling/warming centres (i.e. through surveys) Percentage of vulnerable populations that live within an accessible distance of a cooling/warming station/centre

<p>Action 6.3 (ID#17): Improve monitoring, data collection, and notification surrounding flooding & extreme weather/temperatures</p> <p>Long-term (>5 years)</p>	<ul style="list-style-type: none"> Determine threshold to execute communication strategy (i.e. what the triggers are, number of triggers, etc.) Prepare a plan to establish the feasibility, necessary components and ongoing resources required to establish an ongoing weather-related health event monitoring system for the City of Hamilton Consider making real-time City-collected rainfall data available to the Public as open data 	<ul style="list-style-type: none"> Healthy and Safe Communities (Public Health Services) 	<ul style="list-style-type: none"> Other applicable City Dept/Div. (Corporate Communications, Public Health Services, Paramedic Services etc.) Applicable Provincial Agencies across Ontario Ontario Farmer's Association Media Outlets City Councillors Conservation Authorities McMaster University (Centre for Climate Change) 	<ul style="list-style-type: none"> Number of heat alerts Number of users of splash pads, parks, community centres, etc. Flow and level meters in creeks and municipal sewer networks Time lapsed between communication to community and extreme weather event
---	---	---	--	---

Objective 7: Proactively conserve and protect surface water and groundwater resources.

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 7.1 (ID#18): Continue to enhance the management and restoration of existing natural areas and seek opportunities to dedicate land and</p>	<ul style="list-style-type: none"> Convene a working group with other managers/owners of natural lands (such as Conservation Authorities) to discuss current practices, priority 	<ul style="list-style-type: none"> Planning and Economic Development (Natural Heritage Planning) Public Works (Environmental Services) 	<ul style="list-style-type: none"> Other applicable City Dept/Div. (Hamilton Water), Planning Division, Economic Development, Public Health, etc.) Hamilton Naturalists Club Conservation Authorities 	<ul style="list-style-type: none"> Enhancement of natural areas identified in plan Acquisition of space to convert into natural areas to enhance core areas and linkages

<p>natural areas for conservation.</p> <p>Medium-term (2-5 years)</p>	<p>areas, and identify gaps</p> <ul style="list-style-type: none"> • Establish and support a Circle of Indigenous Knowledge Keepers to advise and consult on this initiative 		<ul style="list-style-type: none"> • Applicable Provincial Agencies (e.x. OMAFRA, OMNR etc.) • Save our Streams Hamilton • Royal Botanical Gardens • Joint Stewardship Board • Indigenous Water Protectors • Hamilton Community Land Trust • Red Hill Family Centre • Real Estate Boards and Associations • McMaster University (Centre for Climate Change) 	
---	---	--	--	--

Objective 8: Monitor, maintain and improve the diversity and resiliency of urban trees and forests.

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 8.1 (ID#19): Work with local partners to continue tree planting and preservation, explore community partnerships and naturalization programs to reduce urban heat island and enhance</p>	<ul style="list-style-type: none"> • Identify priority tree planting locations in urban Right of Ways, and commercial streets within dense urban areas. • Review funding and staffing gaps to increase capacity to undertake community tree planting initiatives 	<ul style="list-style-type: none"> • Public Works (Environmental Services) 	<ul style="list-style-type: none"> • Other applicable City Depts/Div. (e.x. proposed central climate change office, Economic Development, Healthy and Safe Communities, Transportation Planning, Engineering Services, Roads Operation/Maintenance etc.) 	<ul style="list-style-type: none"> • Number of trees planted and locations • Number of community tree planting events hosted • Compensation costs for public trees • Enforcement stats (e.x. # site visits, fines issues, complaints etc.)

<p>ecosystem function.</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> Review education component related to species diversity and public awareness Review plantable spaces appropriate for community planting and naturalization plantings Promote the Community Planting Program to expand number of events and build upon current successes Develop consistent metric/measurement methods for trees & urban forest 			<ul style="list-style-type: none"> Fees for/from contractor services to complete work on private property
<p>Action 8.2 (ID#20): Implement the Urban Forest Strategy (UFS), and consider additional measures to support it or expand its impact.</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> Establish interdepartmental working group including Circle of Indigenous Knowledge Keepers to consult on implementation Implement short term actions identified within the UFS and strategically plan to implement medium and long-term action items Determine a consistent metric and monitoring method to use going forward (e.g. LIDAR), and a 	<ul style="list-style-type: none"> Public Works (Environmental Services) 	<ul style="list-style-type: none"> Other applicable City Dept/Div (e.x. Municipal Law Enforcement, Proposed Interdepartmental Working Group etc.) Environmental Hamilton Hamilton Naturalists Club McMaster University (Centre for Climate Change) 	<ul style="list-style-type: none"> As proposed in UFS. Percentage of equitable canopy cover* Woodlot health* Invasive Species Distribution* <p>*If not proposed currently in UFS</p>

	funding model to support it's continued use <ul style="list-style-type: none"> • Revisit private tree by-law; may include Heritage Trees 			
--	---	--	--	--

Objective 9: Strengthen food security in the City.

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
Action 9.1 (ID#21): Educate and encourage community to participate in growing food locally (e.g. lot level or urban farms/gardens). Short-term (<2 years)	<ul style="list-style-type: none"> • Determine a group/entity to lead this work • Investigate Official Plan amendments to allow for large-scale urban agricultural production 	<ul style="list-style-type: none"> • TBD (potential for Public Health Services – with additional staff resources) 	<ul style="list-style-type: none"> • Determine a group to lead this work • Other applicable City Dept./Div (e.x. Healthy and Safe Communities, Public Works, Planning and Economic Development • Food Advisory Committee • Environmental Organizations (e.x. Green Venture, ADC/Climate Action Team) • Social Organizations (e.x. Dundas Works/Rotary, Dundas Community Services, YWCA, Good Shepherd, Social Planning Research Council, Unity Way Halton & Hamilton) • Farming and Food Production Organizations (e.x. Micro Fruit Orchards, Neighbour to Neighbour (N2) Community Garden Network, Aqua 12 permaculture Urban Farmers etc.) • Hamilton Victory Gardens • Neighbourhood Associations 	<ul style="list-style-type: none"> • Number of community gardens & users • User surveys from N2N garden network

<p>Action 9.2 (ID#22) : Expand rain water capture (i.e. rain barrels, cisterns, etc.) as an irrigation source for more localized food production (i.e. backyard farming, urban gardens, soft landscapes, etc.)</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> Identify organizations to lead this initiative Conduct scan of existing rain water capture programs, incentives across Hamilton and identify gaps and potential additional resourcing needs 	<ul style="list-style-type: none"> TBD Potential Public Works (Hamilton Water) Potential Green Venture (for community/homeowner with supporting resources) 	<ul style="list-style-type: none"> Other applicable City Dept/Div. (e.x. Environmental Services, Growth Management, Neighbourhood Development, Chronic Disease Prevention etc.) Green Venture (NaturHoods) Sustainability Leadership McMaster University (Centre for Climate Change) Conservation Authorities 	<ul style="list-style-type: none"> Number of rain barrels and cisterns installed N2N survey Number of community gardens with rainwater capture
<p>Action 9.3 (ID#23): Engage with local agricultural leaders to understand existing resources for farmers in addressing climate adaptation, and how the City can support or expand on those efforts.</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> Bring forward request to engage with the Agricultural & Rural Affairs Committee for detailed planning of this action Research and Engage agricultural organizations (e.x. Ontario Federation of Agriculture, Hamilton-Wentworth Federation of Agriculture etc.) to index current and upcoming 	<ul style="list-style-type: none"> City of Hamilton Agricultural and Rural Affairs Committee 	<ul style="list-style-type: none"> Other applicable City Dept/Div. (e.x. Public Health, Economic Development, etc.) Ontario Ministry of Agriculture and Rural Affairs Academics (e.x. University of Guelph, Niagara College) Ontario Fruit and Growers' Association Farmers markets and road farm sellers Golden Horseshoe food and farming alliance Food Advisory Committee Hamilton-Wentworth Federation of Agriculture Ontario Federation of Agriculture 	<ul style="list-style-type: none"> Creation of resource guide/dedicated digital link or webpage

	<p>resources available to farmers</p> <ul style="list-style-type: none"> • Develop resource inventory 			
<p>Action 9.4 (ID#24): Develop an educational campaign directed at restaurant and grocery industries, local farms and other possible food sources to better reduce and divert food waste and explore opportunities to reduce food waste.</p> <p>Medium-term (2-5 years)</p>	<ul style="list-style-type: none"> • Get up and running again post-pandemic- report to community/council • Look at Ottawa Food Bank farm (& farmer on staff) and consider rural area potential • Discuss with food retailers/grocery stores • Check with Hamilton Emergency Food Network/Food on current status/program stats 	<ul style="list-style-type: none"> • Public Works (Waste Management); and/or • Food Strategy Working Group 	<ul style="list-style-type: none"> • Other applicable City Dept/Div. (e.x. Public Health, Corporate Communications etc.) • Business Improvement Areas (BIA) with restaurants • Farmers market • Hamilton Health Sciences • School boards • Long Term Care homes • Second Harvest • Ontario Food Collaborative • Municipal Waste Association’s Food Reduction Working Group • Hamilton Emergency Food Network • Hamilton Food Share • YWCA • McMaster University (Centre for Climate Change) 	<ul style="list-style-type: none"> • Percent food waste diverted • Number of retailers/businesses/organizations participating

Objective 10: Enable local businesses and organizations to plan for climate-related risks.

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 10.1 (ID#25): Provide guidance to local businesses on how to maintain business continuity</p>	<ul style="list-style-type: none"> • Develop an emergency preparedness guides for businesses 	<ul style="list-style-type: none"> • Planning and Economic Development 	<ul style="list-style-type: none"> • Other applicable City Dept/Div. (Proposed Central Climate Change Office, Public Health etc.) • Sustainability Leadership 	<ul style="list-style-type: none"> • Uptake in programs being offered

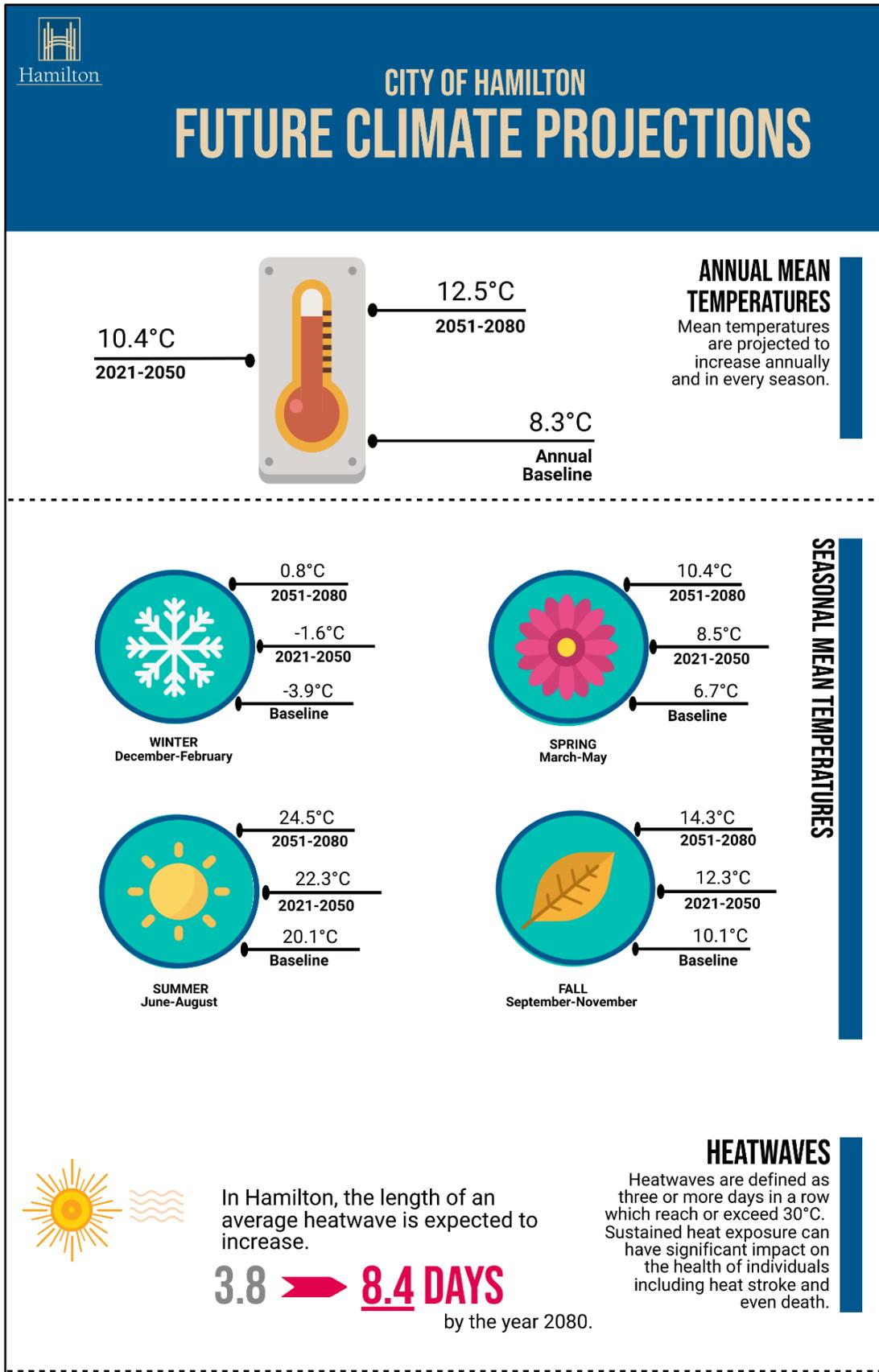
<p>(e.g. supply chain) during extreme weather (i.e. through business continuity planning, green business practices, adaptation measures, etc.)</p> <p>Long-term (>5 years)</p>	<ul style="list-style-type: none"> • Host Webinars on Disaster Preparedness & Economic Recovery 		<ul style="list-style-type: none"> • Chamber of Commerce – 3 Chambers • CF Lime Ridge • Business Improvement Areas • Innovation Factory • Business Investment & Sector Development • Hamilton Business Centre • Mohawk College (IDEAWorks-Energy & Power Innovation Centre) • Bay Area Climate Change Council (BACCC) • Hamilton Industrial Environmental Association (HIEA) • Supply Chain Canada • McMaster University (Centre for Climate Change) • United Way Halton & Hamilton 	<ul style="list-style-type: none"> • Number of businesses interested in a local best practice network
---	--	--	---	--

Objective 11: Improve the resilience of energy infrastructure to weather-related disruptions.

Action + Timelines for Completion	Immediate Next Steps	Lead Organizations	Potential Supporting Organizations	Potential Monitoring Metrics
<p>Action 11.1 (ID#26): Work with local partners to conduct vulnerability and risk assessments on local energy systems and identify opportunities to</p>	<ul style="list-style-type: none"> • In coordination with Community Energy and Emissions Plan implementation-Transformation 4 (Revolutionizing Renewables), establish a baseline 	<ul style="list-style-type: none"> • Utilities (Alectra, Hydro-One, Enbridge) 	<ul style="list-style-type: none"> • Other applicable City Dept/Div. (e.x. proposed Central Climate Change Office, Public Works, Planning and Economic Development) • Hamilton Community Enterprises • Hamilton Renewable Power Inc. 	<ul style="list-style-type: none"> • Local energy produced (private and public capacity of renewables within City) • Number of retrofits (that are being tracked) that include renewables

<p>increase local energy generation (e.g. microgrids) to increase reliability (potentially as part of planned CEEP priority actions around identifying renewable energy generation sites within the City).</p> <p>Medium-term (2-5 years)</p>	<p>for local energy production within the City and potential for near-future renewable projects in combination with energy storage</p>		<ul style="list-style-type: none"> • Sustainability Leadership • Rechargeables Inc. • Academics (e.x. Mohawk College - Energy & Power Innovation Centre, McMaster University- Centre for Climate Change) 	
<p>Action 11.2 (ID#27): Establish low-carbon back-up power systems in all City-owned facilities to serve as community hubs during emergencies, and create a policy to support and promote the use of low- or no-carbon emergency energy supplies such as batteries or energy storage for residents and businesses.</p> <p>Long-term (>5 years)</p>	<ul style="list-style-type: none"> • Through Economic Development's Corporate Calling – develop a program(s)/marketing material to capture all programming to share and educate the business community • Take stock of City's existing generators • Take stock of existing in-building cooling rooms in the City 		<ul style="list-style-type: none"> • Other applicable City Dept/Div. (Ex. Housing Services, Recreation, Facilities, Corporate Communications, Public Health, Economic Development etc) • Utilities (e.x. Alectra. Hydro-One) • Large building/land owners and institutional organizations (e.x. CF Lime Ridge, YWCA etc.) • Academics (e.x. Mohawk College- Energy & Power Innovation Centre, McMaster University – Centre for Climate Change) • Bay Area Climate Change Council (BACCC) • Sustainability Leadership 	<ul style="list-style-type: none"> • Number of zero and/or low carbon back-up retrofits • Annual Greenhouse gas emissions estimates from generators

Appendix B: Climate Science Infographic



Night-time temperatures above 20°C are expected to see a **fivefold increase** by 2080.



TROPICAL NIGHTS

Typically cooler nights can mitigate exposure to extreme heat, however, an increased number of tropical nights eliminates the possibility for relief and magnifies health risks, especially to vulnerable populations such as infants, older adults, and those who work outdoors.

DAYS WITH FREEZE-THAW CYCLES



FREEZE-THAW CYCLES

A decrease in freeze-thaw days is expected.

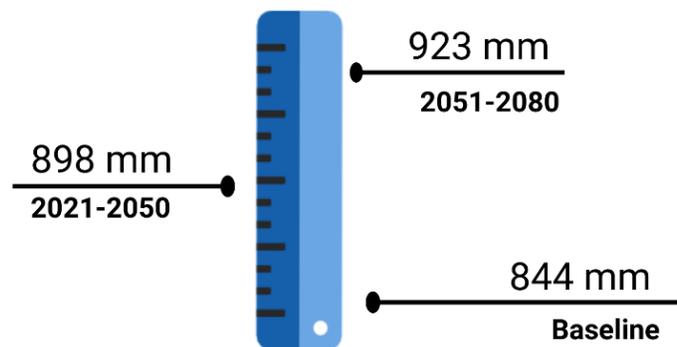
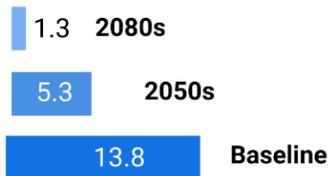
DAYS AT OR ABOVE 30°C



TEMPERATURE EXTREMES

More hot days, fewer cold days.

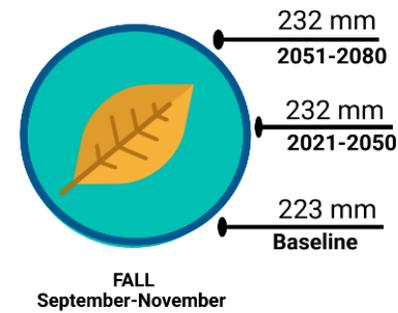
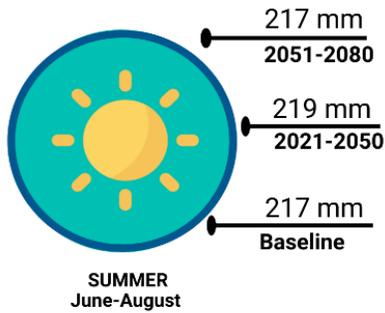
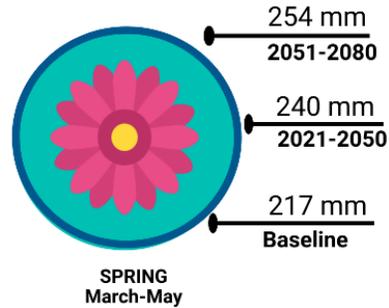
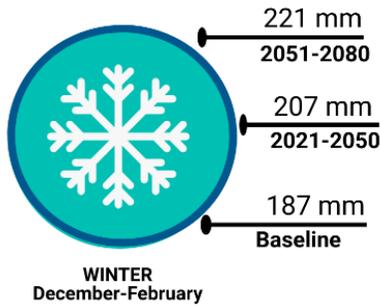
DAYS AT OR BELOW -15°C



ANNUAL MEAN PRECIPITATION

Increased precipitation can cause flooding, damage to infrastructure, and decreases to water quality.

SEASONAL MEAN PRECIPITATION



Precipitation will fall at a faster rate (mm/h)



Shorter storms will have an increasingly high intensity

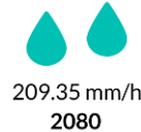


Return periods of heavy storms will shorten, meaning increased frequency

PRECIPITATION EVENTS

Precipitation events in general are projected to become more intense and extreme.

For Instance, 100-year rainfall events will see precipitation rates increase substantially from baseline in Hamilton. 5-minute downpour rates shown



Sources:

Health Canada. (2011). *Adapting to Extreme Heat Events: Guidelines for Assessing Health Vulnerability*. Ottawa, ON. Retrieved from <http://www.hc-sc.gc.ca/ewh-semt/pubs/climat/adapt/index-eng.php> (XIX)

Prairie Climate Centre (2020). *Climate Variables*. Climate Atlas of Canada. Retrieved from <https://climateatlas.ca/variables>

Western University. (2021). *IDF_CC Tool 4.5*. Retrieved from www.idf-cc-uwo.ca: <https://www.idf-cc-uwo.ca/home.aspx>

14. References

- ⁱ Provincial Policy Statement, 2020. (2020, May 1). Ontario Planning Act. Retrieved from <https://files.ontario.ca/mmah-provincial-policy-statement-2020-accessible-final-en-2020-02-14.pdf>
- ⁱⁱ Intergovernmental Panel on Climate Change. (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability Summary for Policy Makers. <https://www.ipcc.ch/report/ar6/wg2/resources/spm-headline-statements/>
- ⁱⁱⁱ Intergovernmental Panel on Climate Change. (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability Summary for Policy Makers. <https://www.ipcc.ch/report/ar6/wg2/resources/spm-headline-statements/>
- ^{iv} Intergovernmental Panel on Climate Change. (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability Summary for Policy Makers. <https://www.ipcc.ch/report/ar6/wg2/resources/spm-headline-statements/>
- ^v ICLEI Canada. (2010). Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation. <https://icleicanada.org/wp-content/uploads/2019/07/Guide.pdf>
- ^{vi} IPCC, 2014: Annex II: Glossary [Mach, K.J., S. Planton and C. von Stechow (eds.)]. In: Climate Change 2014 Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC Geneva, Switzerland, pp. 117-130.
- ^{vii} Richardson, G. R. A. (2010). Adapting to Climate Change: An Introduction for Canadian Municipalities. Ottawa, Ont.. Natural Resources Canada, 40 p. 2.
- ^{viii} ICLEI Canada. (2022). Introducing Indicators: A First Look at Using Indicators to Measure Adaptation Progress. https://icleicanada.org/wp-content/uploads/2022/06/Introducing-Indicators_FINAL.pdf