



TOWN OF HALTON HILLS

CLIMATE CHANGE ADAPTATION PLAN



PREPARED FOR:

Town of Halton Hills
Climate Change & Asset Management
1 Halton Hills Drive
Halton Hills Ontario

PREPARED BY:

Canadian Urban Institute
30 St. Patrick Street, 5 Floor
Toronto Ontario

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ACKNOWLEDGEMENTS

We would like to acknowledge the contributions of the following individuals:

Town of Halton Hills Project Team

Mike Dean, Senior Climate Change & Energy Planner, Climate Change & Asset Management
Rija Rasul, Senior Climate Change Specialist, Climate Change & Asset Management
Jennifer Spence, Climate Change Outreach Coordinator, Climate Change & Asset Management
Dharmen Dhaliah, Senior Manager, Climate Change & Asset Management

Town of Halton Hills Climate Change Adaptation Advisory Committee

Bill Andrews, Director, Engineering
Bronwyn Parker, Director, Planning Policy
Bruce Morrison, Deputy Chief, Operations, Halton Hills Fire Department
Jeff Jelsma, Manager, Development Engineering, Transportation & Public Works
Jeff Markowiak, Director, Development Review
Kevin Okimi, Director, Parks & Open Space
Moya Jane Leighton, Town Treasurer & Director of Accounting
Richard Cockfield, Director, Strategic Initiatives
Stephen Hamilton, Manager, Facility Capital Projects, Recreation & Parks

Youth Engagement Student Volunteers

Leslie Bastidas
Katharine Resznetnik

Consultant Team

Jeff Evenson, Senior Advisor, Canadian Urban Institute
Ariana Holt, Senior Planner, Canadian Urban Institute
Alexandra McDonough, Senior Planner, Canadian Urban Institute
Grant Kauffman, Vice-President, Ontario Region Senior Planning Ecologist, LGL
William Phillips, Consultant, Infrastructure Advisory, Mott MacDonald
Dave Van Rensburg, Senior Vice President, Mott MacDonald
Meiring Byers, Director, Co-founder, Klimatt
Michael Roth, Director, Co-founder, Klimatt
Mariko Uda, Civil Engineering Assistant, Rivercourt Engineering
Greg Allan, Senior Associate, Rivercourt Engineering
Kevin Best, Managing Director, Rivercourt Engineering

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EXECUTIVE SUMMARY

Climate change adaptation planning is about taking strategic action to minimize a community's vulnerability to climate impacts. It is built on the premise that appropriate actions are undertaken before major impacts occur or shortly after they take place, so that damage is anticipated and minimized.

The Town of Halton Hills developed this Climate Change Adaptation Plan (CCAP) in order to minimize the negative impacts of climate change, as well as take advantage of opportunities to strengthen the Town's resilience to climate change.

The Plan's vision, goals and actions guide the Town in strengthening current policies, developing new programs and practices, and identifying the steps necessary to integrate climate adaptation as a core practice within the Corporation and community.

In addition to a set of actions that are grouped under "Cross-Cutting," the Plan's five main goals are:

1. Halton Hills can Withstand Extreme Weather Events
2. Halton Hills is Resilient to the Impacts of Higher Temperatures and More Frequent Heat Waves
3. Halton Hills is Resilient to Increased Precipitation and Flooding
4. Halton Hills is Prepared for the Socio-Economic Impacts of Climate Change
5. Halton Hills Can Protect Residents from the Health and Safety Impacts of Climate Change

Three technical studies were conducted to inform and provide an evidence-based, locally specific foundation for the actions in the Plan.

These studies are:

- **Key Climate Indicators for Halton Hills:**
on the potential broad impacts of climate change
- **Facility Vulnerability Assessment Report:**
on the impacts on the Town's facilities
- **Geospatial Natural Capital Assessment Report:**
on the Town's significant natural resources

The Plan was developed through a collaborative process, involving Town staff from multiple departments and with input from community organizations and residents.

The public engagement process included public meetings, online surveys, and youth engagement. Staff heard valuable feedback from residents on key concerns and themes that have been integrated throughout the CCAP and its actions.

The Key Climate Indicators study lays out the major patterns that Halton Hills can expect as a result of climate change over the next 30 years: It's going to get warmer, it's going to get wetter, and the weather is going to be less predictable.

The Town has been a leader in sustainability for over a decade and continues to show leadership in climate change through this CCAP and the overarching Low-Carbon Resilience Framework.

The Town knows it cannot successfully tackle the challenges of climate change on its own: climate solutions require collaboration and partnerships with the community and across all levels of government and sectors. Appendix C: What You Can Do includes actions that residents and businesses can undertake at home and work to prepare for the impacts of climate change and to help implement this Plan.

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APPENDIX A – ACTION PLAN

A summary of the Plan’s actions, with details on implementation.

APPENDIX B – INDICATORS

A list of indicators for measuring and reporting on the Town’s progress in implementing this Plan.

APPENDIX C – WHAT YOU CAN DO

Actions that residents and businesses can undertake to adapt to the impacts of climate change and to help implement this Plan. Includes links to additional sources of information.

1. ABOUT THIS PLAN

1.1 WHY WE NEED TO PREPARE FOR A CHANGING CLIMATE

The need for Halton Hills to be prepared for climate change has never been greater.

While climate change is a complex, global issue, its impacts are experienced locally. Warming temperatures, changes in precipitation and the increasing frequency and intensity of extreme weather events; these climatic changes are having serious impacts on our health and safety, as well as the economic stability of our community.

Rising temperatures can lead to health issues for residents, like heat stroke and dehydration, especially among more vulnerable populations like young children, seniors, and low-income households without air conditioning. It can impact residents' ability to enjoy the outdoors, reducing participation in recreation and leisure activities. Higher temperatures also demand more energy in order to keep our homes, businesses, and municipal facilities cool, increasing costs to residents and the Town and putting more stress on its infrastructure.

Increased precipitation and big rain events can enhance the risk of flooding, and lead to individual property damage and service disruptions, such as to transportation. The Town's infrastructure will need to handle more precipitation, which will require new approaches to land-use development as well as greater upfront investment.

More frequent, extreme weather events like wind and ice storms can cause power outages and damage to individual homes and businesses, as well as roads and public buildings. Major storms disrupt access to community services and facilities such as schools and community centres, as well as interrupt communications. These damaging weather events create major issues for residents and local businesses, while at the same time increasing costs to the Town.

Climate change adaptation is about taking strategic action to minimize a community's vulnerability to these climate impacts. Municipalities are on the frontlines of climate change, both in terms of facing its impacts, and in terms of implementing solutions to protect communities. However, municipalities cannot do so alone; climate change solutions require collaboration and partnerships across all levels of government and all sectors.



1.2 HOW THIS PLAN HELPS US PREPARE

This Climate Change Adaptation Plan (Plan) was developed to increase Halton Hills' preparedness and ability to manage the impacts and risks posed by climate change.

The Plan provides direction for the Town to strengthen current policies, develop new programs and practices, and identify the steps necessary to integrate climate adaptation as a core practice within the Corporation.

It includes a planning framework and specific actions to minimize the negative impacts of climate change, as well as take advantage of opportunities to strengthen the Town's resilience to climate impacts. The Plan also provides direction to support residents in preparing their families, homes and businesses for climate change (see Appendix C - What You Can Do).

The Plan is built on climate data specific to Halton Hills, gathered to provide an evidence-based

understanding of the potential impacts of climate change, and assess the areas where Halton Hills is most vulnerable today and up to thirty years from now.

This data informed the development of the Plan's vision, goals and actions.

Being prepared for climate change and being proactive about integrating climate considerations into the Town's processes and decision-making will significantly reduce the individual, economic, environmental and community costs to Halton Hills, including to our natural and built environments.



2. ADAPTING TO A CHANGING CLIMATE IN HALTON HILLS

2.1 A LEADER IN SUSTAINABILITY

The Town of Halton Hills has built a strong reputation as a sustainability leader. It was one of the first municipalities in Ontario to develop a Green Plan, in 2007, which set out the Town's commitment to be proactive, rather than reactive, in protecting and enhancing the environment.

Since 2007, the Town has implemented many successful initiatives to reduce its impact on the environment and mitigate climate change. Launched in 2008, the Office of Sustainability successfully delivered the Community Sustainability Strategy (2013), Corporate Energy Plan (2014), the Green Development Standards (2014), the Mayor's Community Energy Plan (2015), Climate Emergency declaration (2019), Corporate Energy Plan Update (2020), and a variety of corporate and community engagement and education initiatives.

Through these initiatives, the Town has developed and strengthened partnerships with other levels of government, community groups, agencies and businesses. Community engagement has been key to the Town's sustainability and climate change efforts since the Green Plan was launched.

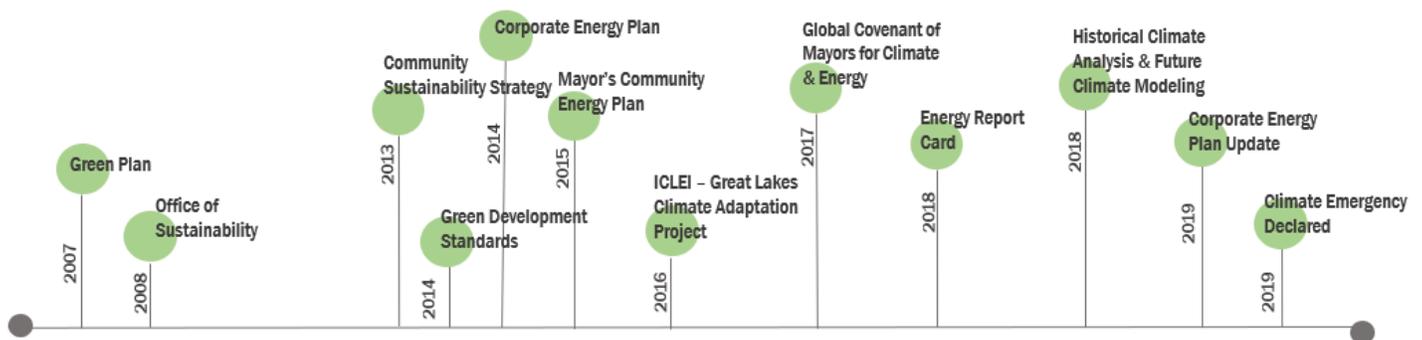


FIGURE 1: SUSTAINABILITY & CLIMATE INITIATIVES TIMELINE

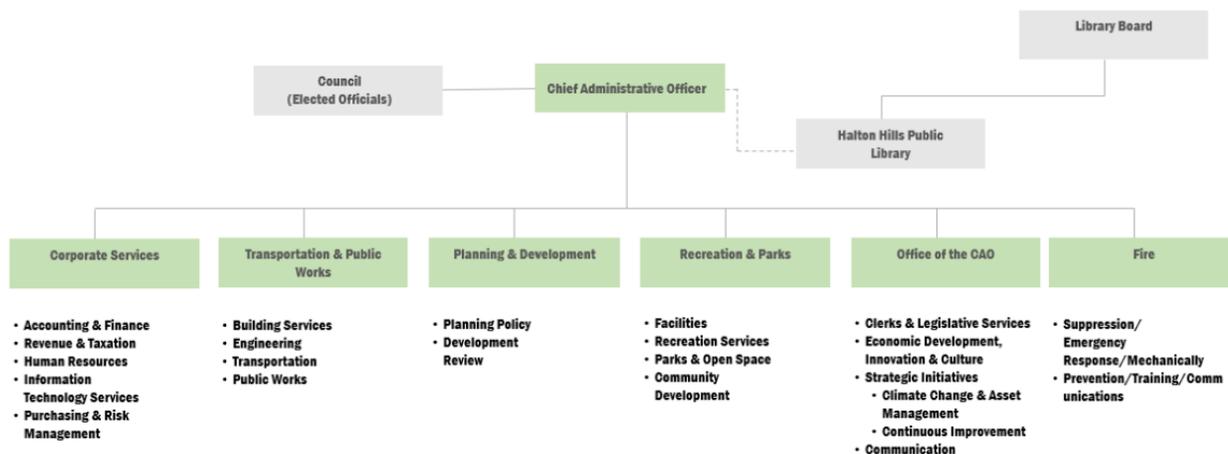


FIGURE 2: CORPORATE ORGANIZATIONAL CHART

2.2 ADDRESSING THE CLIMATE EMERGENCY

On May 6th, 2019 the Town declared a Climate Emergency¹ to signal Council’s understanding of climate change as “an emergency with no foreseeable conclusion” that requires “permanent, robust” changes to how the Town conducts its business. It identified the need to set departmental goals, particularly in Recreation and Parks, Transportation and Public Works, Planning and Development, and Fire Services.

The Town has since restructured the Office of Sustainability to create a new Climate Change and Asset Management (CCAM) division. This division reports to the Chief Administrative Officer (CAO) on advancing the Town’s climate change mitigation and adaptation programs as well as implementing the Corporate Asset Management (CAM) program.

Low-Carbon Resilience Framework

The CCAM division established a Low-Carbon Resilience Framework (LCRF) in late 2019 to support the Town’s aims of becoming a low-carbon resilient community.

The Framework establishes a coordinated approach to climate change mitigation and adaptation, within two guiding strategies: the Low-Carbon Transition Strategy and the Climate Change Resilience Strategy.

This Plan focuses on climate adaptation and will be the key driver of the Climate Change Resilience Strategy. The Town’s Low-Carbon Transition Strategy will focus on mitigation and will guide the Town’s work in this area.

Both adaptation and mitigation are foundational components of the Town's Low-Carbon Resilience Framework.

Adaption means increasing our ability to withstand the impacts that have already occurred and will occur as a result of climate change

Mitigation refers to reducing greenhouse gas emissions that cause climate change

Climate Change Action Task Force

The Town has established a Climate Change Action Task Force with a mandate to serve in an advisory role, providing staff with strategic direction and guidance on the development of the Town's Low-Carbon Resilience Framework and to support and influence its implementation within the Community.

Climate Change Resilience Steering Committee

The Climate Change Action Task Force is supported by two Steering Committees:

- Low-Carbon Transition Steering Committee (LCT-SC), whose mandate is centered on the Low-Carbon Transition Strategy;
- Climate Change Resilience Steering Committee (CCR-SC), who will govern the Climate Change Resilience Strategy

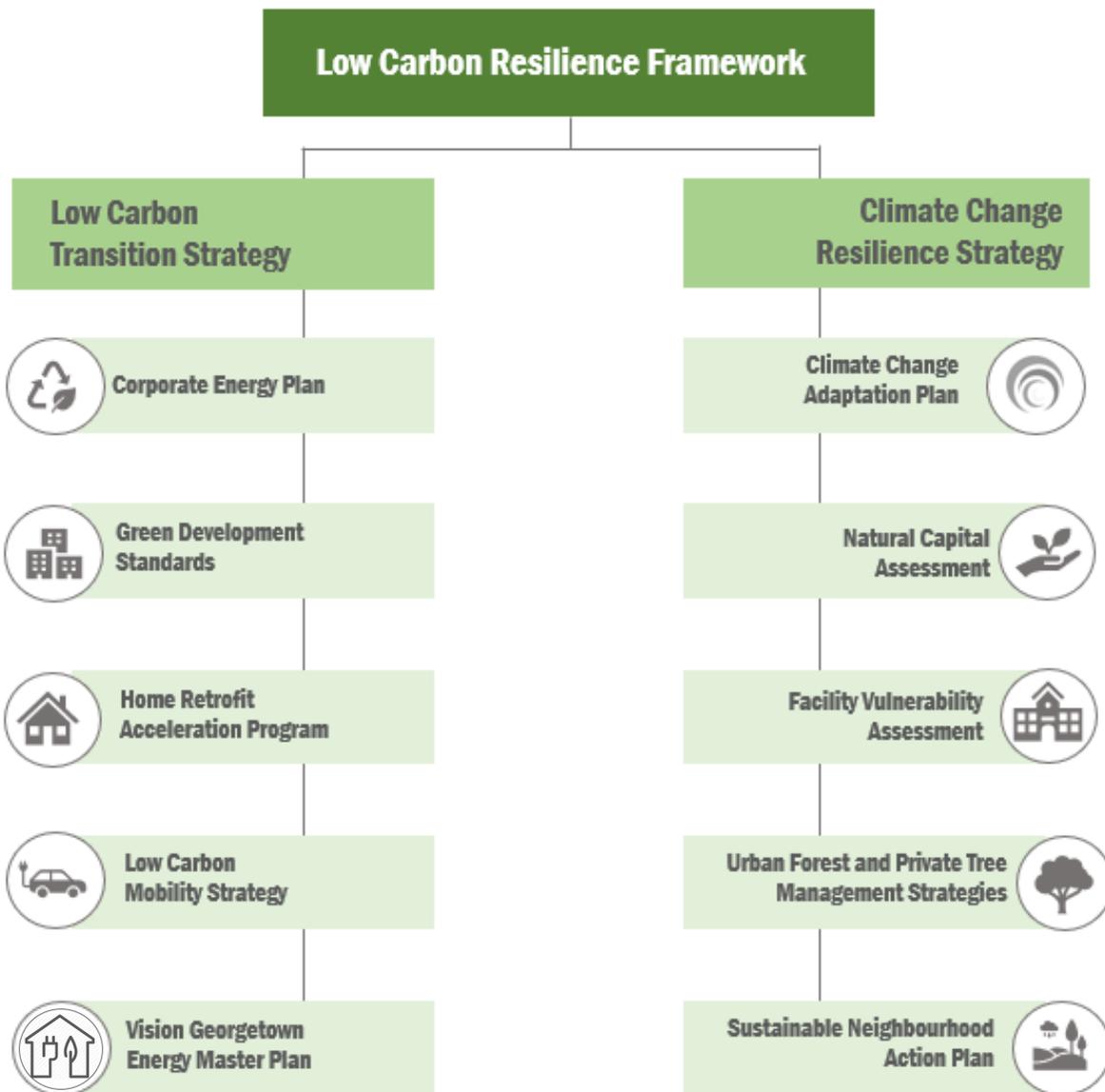


FIGURE 3: TOWN OF HALTON HILLS LOW-CARBON RESILIENCE FRAMEWORK

Mitigation, Adaptation & Resilience

While this Plan focuses on adaptation and it is generally helpful to focus on adaptation and mitigation individually, the Town recognizes the importance of identifying synergies between the two approaches. Actions that integrate climate change adaptation and mitigation reduce GHGs and simultaneously enhance and strengthen resilience. This integrated approach to low-carbon resilience planning can increase the Town's return on investments, help to save time and resources, while accelerating implementation and achieving co-benefits across efforts.

Resilience refers to the ability of a system to absorb withstand and bounce back after an adverse event.

Figure 4 shows examples of adaptation and mitigation measures and highlights the synergies between them that would be considered examples of green resilience. Examples of actions included in this Plan that integrate adaptation and mitigation include:

- Encouraging low-impact development for storm water management (3.2.4)
- Exploring opportunities to support local food production (4.2.1)
- Implementing new tree planting and maintenance programs (2.3.3)

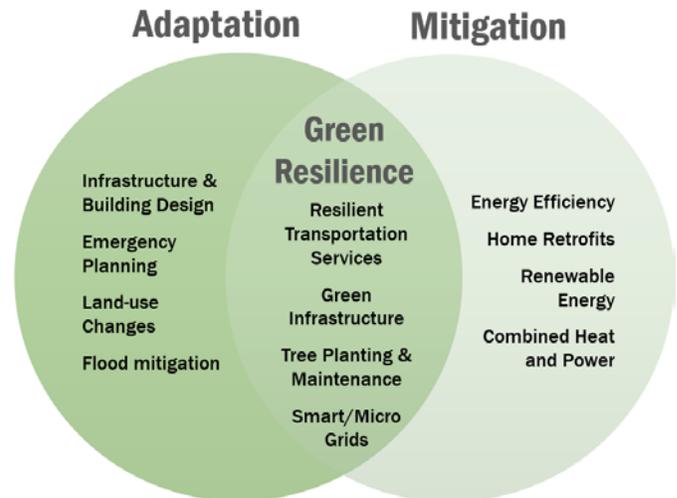


FIGURE 4: ADAPTATION, MITIGATION & RESILIENCE
(Adapted from Taking Action on Green Resilience Report, Adaptation Climate Change Team, 2017)

2.3 COSTS OF ACTION VS. INACTION

Climate adaptation is built on the premise that appropriate actions are undertaken before major impacts occur or shortly after they take place, so that damage is anticipated and minimized.

In most cases, planned adaptation will be more effective and have lower long-term costs to the Town. Adaptation actions also have the benefit of lowering insurance costs for the Town and others. Studies have shown a 6:1 return on investment on adaptation spending; meaning that for every dollar spent on adaptation measures, approximately \$6 is saved in future damages.¹

¹ The Cost of Climate Adaptation at the Local Level Report, Federation of Canadian Municipalities, 2020

2.4 VULNERABLE POPULATIONS AND CLIMATE ADAPTATION

Individual residents and communities will experience the impacts of climate change differently. Often those that are most affected by climate change are the ones who lack resources and are most vulnerable, such as Indigenous communities, young people and seniors, and people with low incomes. In particular, the children and seniors can be more vulnerable to extreme heat and disruptions to power and services.

People with lower socio-economic means are less likely to have adequate protection from heat and cold, or the resources to address damage that might result from an extreme weather event.

This Plan includes actions that are directed at ensuring the climate adaptation actions of the Town account for the needs of vulnerable populations.

2.5 TYPES OF ACTIONS

In developing this Plan, three proactive approaches for the Town were identified, which are in line with how local governments around the world are adapting to climate change:

-
- **Assess and Plan:** The Town can update Town policies and plans, and undertake related studies, plans and strategies to better understand and be prepared to adapt to the impacts of climate change.
-
- **Encourage:** The Town can encourage residents, community groups, developers and others to be better prepared for climate impacts by creating guidelines and design standards, developing education and public awareness campaigns, and advocating and partnering with other levels of government and the private sector.
-
- **Regulate:** The Town can update and introduce local regulations to advance climate adaptation measures, such as through the use of local improvement charges, planning regulations, or zoning and other by-laws to compel stakeholders to take action.
-



3. DEVELOPMENT OF THE PLAN

3.1 PLANNING PROCESS

This Climate Change Adaptation Plan was developed through a collaborative planning process led by the Climate Change and Asset Management (CCAM) division and involving Town staff from multiple departments, and a range of community organizations and residents. It was also informed by several technical studies that were commissioned to provide an evidence-based, locally specific foundation for the actions in the Plan.

The Plan's development was guided by the Building Adaptive and Resilient Communities (BARC) framework developed by the Canadian branch of the International Council for Local Environmental Initiatives (ICLEI). The process had five key steps, each one building off the findings of the one before. The process as a whole creates an opportunity to re-evaluate and review findings and decisions. The planning process officially started in June 2018 and was completed in February 2020.

Step 1: Initiate

The Town participated in ICLEI Canada's Great Lakes Climate Change Adaptation Project (GLCCAP) (2016-2017), aimed at building capacity for local resilience planning and implementation. ICLEI Canada assisted the Town in undertaking a vulnerability and risk assessment, which was a foundational piece of work for this Plan.

In February 2017, Halton Hills' Council approved a budget to initiate the Climate Change Adaption Plan. The Town's Office of Sustainability (now the CCAM division) hired a consultant in February 2018 to undertake the work.

The Climate Change Adaption Team was established to guide the planning process. This multi-disciplinary cross-departmental team included representatives from the Office of the CAO (Corporate Services, Senior Management), Recreation and Parks, Transportation and Public Works, and Planning and Development. The team met regularly to drive the development of this Plan.

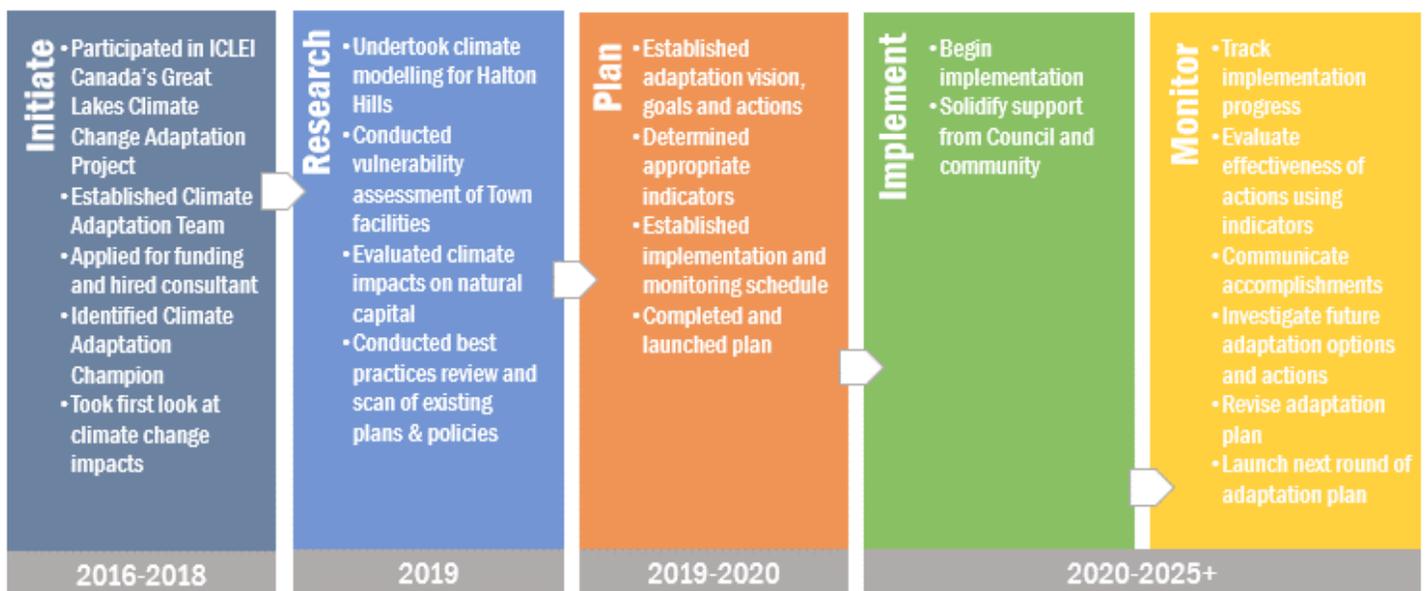


FIGURE 4: PLANNING PROCESS

Step 2: Research

Three technical studies, the Key Climate Indicators for Halton Hills, Facility Vulnerability Assessment Report, and Geospatial Natural Capital Assessment Report, were undertaken to inform the development of this Plan. These studies provided the data and evidence for the development of the Plan's vision, goals and actions. Highlights of the studies are included below.

Step 3: Plan

The Plan's vision, goals and actions were developed using the results of the technical studies, with the support of the Climate Change Adaption Team in consultation with community members.

The three technical studies provided an understanding the potential impacts of climate change on Halton Hills and an assessment of where Halton Hills is most vulnerable today and in the future.

The Climate Change Adaption Team also guided the development of the Action Plan (see Appendix A), the indicators and the implementation and monitoring schedule. The planning process was completed in February 2020 and the plan was launched publicly in May 2020.

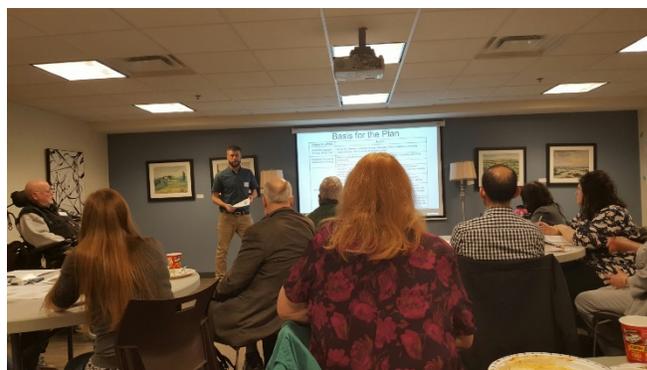
Step 4: Implementation

An Action Plan is provided in Appendix A. It identifies specific details for each action, including who will lead and support the actions, order of magnitude costs, and timelines. This Action Plan will be a key resource for the Town's Climate Change Resilience Strategy.

Step 5: Monitoring

Indicators were developed for each goal, and an implementation and monitoring schedule was developed to help ensure successful implementation of the Plan. More details about monitoring are included in Section 5 Implementation.

Implementation and monitoring will begin in 2020 and continue over the next five+ years.



3.2 PUBLIC ENGAGEMENT

Overview of Engagement Activities

This Plan was developed through an extensive public engagement process that included:

- **Public meetings:** Two meetings were held to gather input and feedback from residents, businesses and other community stakeholders about the Plan, and create a common forum for sharing information and ideas. More than 70 people attended the public meetings (July and December 2019).
- **Plan webpage:** The online platform Let's Talk Halton Hills (LetsTalkHaltonHills.ca) provided an overview of the Plan, background materials, updates on the planning process, information on how to get involved, and opportunities for residents to share their opinions, stories, ideas and questions about the development of the Plan.
- **Surveys:** Two surveys were posted on Let's Talk Halton Hills to encourage input to the development of the Plan (Spring/Summer 2019 and December 2019).
- **Youth engagement:** In the summer of 2019, two students conducted outreach at several events throughout Halton Hills. Their work contributed to the development of this Plan. The students worked in partnership with Halton Climate Collective to survey local residents to record actions residents take to reduce their impact on the environment.

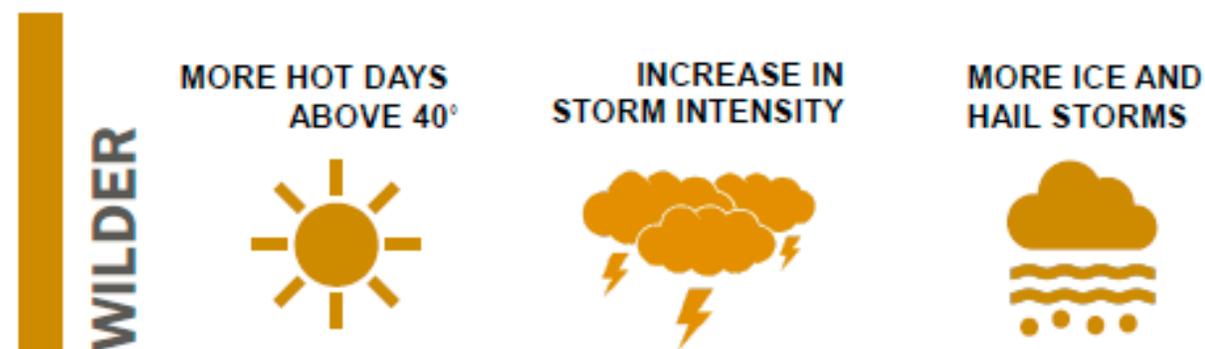
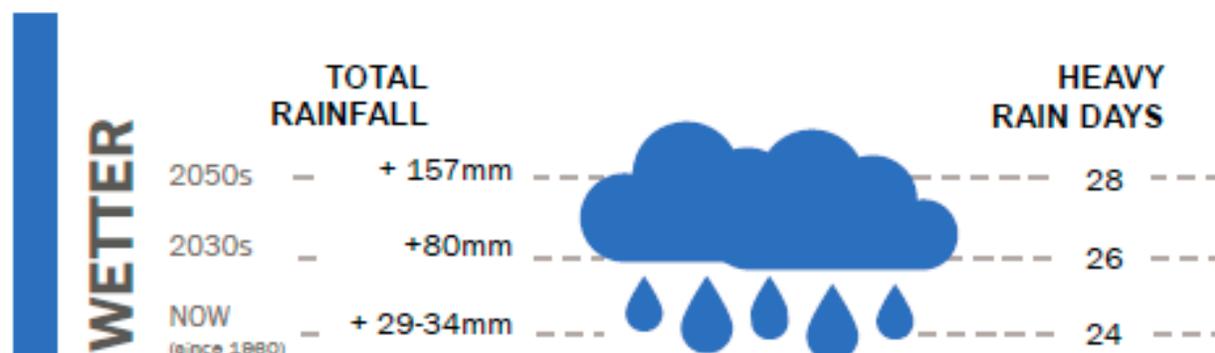
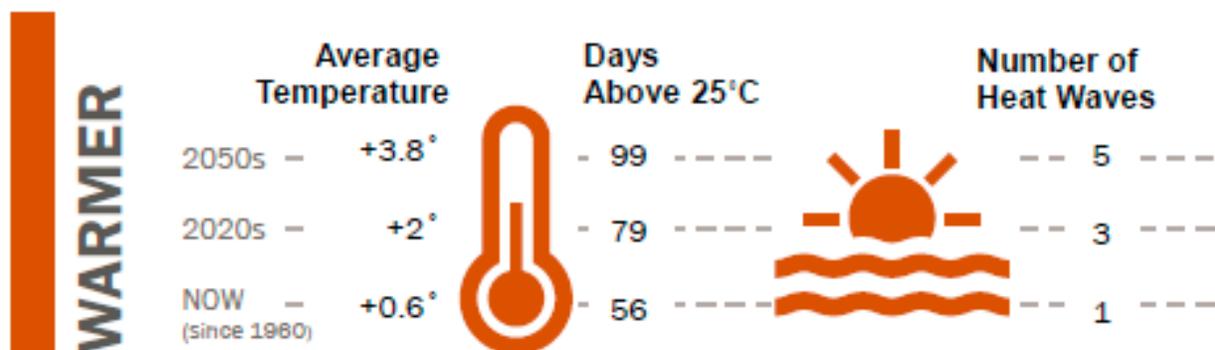
What We Heard

The following is a summary of key themes from the two public meetings and surveys conducted for the Halton Hills Climate Change Adaptation Plan.

- **There is awareness among residents about the increasing number of extreme weather events.** Members of the public recognize that there has been an increase in extreme weather events like wind and ice storms, as well as more brownouts (temporary disruption of energy in a system), increased risk related to walking on frozen sidewalks, property damage and increased insurance rates as a result of these events.
- **There have been observed changes to the natural environment, such as reduced pollinators, increasing invasive species, and fewer migratory birds.** Residents described more difficulty with things like cultivating successful gardens and birdwatching.
- **There have been negative impacts to physical and mental health and quality of life.** Some residents described a reduction in comfort and safety while doing activities. Residents noted increased cases of respiratory illness due to reduced air quality, prevalence of Lyme disease and expressed changes in their mental health due to increased uncertainty and stress.
- **The Plan should guide the Town and resident action.** The Plan should encourage both the community and the Town of Halton Hills to proactively work together on climate adaptation. The Plan should reflect that local businesses and community organizations as well as faith-based groups and hospitals play important roles in responding to weather-related emergencies and building resilience.
- **Residents want to see the Town taking leadership in climate change and identified actions, including:**
 - **Actions to preserve the natural environment.** Residents expressed shared values for mature trees, improved air quality and successful home gardens. Suggestions to support the natural environment included:
 - A tree protection plan for mature trees;
 - Planting a diversity of native species on Town-owned land;
 - Protecting water systems;
 - Flood prevention tools such as permeable pavements;
 - Banning plastic bottles/bags and eliminating microplastics; and
 - Maintaining arable land and considering local food sustainability.
- **Actions to reduce energy consumption and make energy systems and infrastructure more resilient.** Residents want to see the Town responding to the increase in brown outs and power outages. Suggestions to improve energy resilience included: Smart/micro grids, net-zero emissions, use of renewables; and financial incentives for home retrofits and electric vehicles.
- **Actions to increase density, public transit and walkability/active transportation and prevent urban sprawl.** Some suggestions included:
 - Incorporating low impact development into updated Green Development Standards;
 - Use zoning By-law amendments to encourage intensification and more compact urban form;
 - Improve public transit options;
 - More cycling infrastructure; and
 - Encourage secondary dwellings in single family homes.
- **Actions to protect vulnerable populations.** Residents discussed the importance of prioritizing for vulnerable populations, as well as animals that may be vulnerable to climate change. Food security is another important consideration for climate adaptation, according to residents.
- **Actions that engage and educate residents about climate change.** Many people noted that educating residents about climate change is critical and that this needs to be emphasized in the Plan.

HOW CLIMATE CHANGE WILL IMPACT HALTON HILLS

2020 CLIMATE CHANGE ADAPTATION PLAN



Source: Klimate Consulting & Innovation Inc., Key Climate Indicators for Halton Hills

3.3 RESEARCH FINDINGS

Key Climate Indicators for Halton Hills - Klimaat Consulting & Innovation Inc.

The purpose of this study was to establish a detailed understanding of the potential climate change impacts for Halton Hills. It has three components:

1. Historical climate data analysis for the Town;
2. Projection of local climate conditions to 2100 for three scenarios (ambitious, moderate, 'Business-as-Usual'); and
3. Assessment of historical and future climate trends.

Data was collected for the three emissions scenarios (reflecting the uncertainty of the world's ability to take action on climate change over the next century). The study found that the same climate change characteristics will develop by mid-century regardless of the global emissions scenario that may unfold. As most actions in this Plan will take place in this time frame, the 'Business-as-Usual' scenario predictions were used as a basis for decision-making.

Key Findings

This study lays out the three major weather patterns that Halton Hills can expect as a result of climate change over the next 30 years: It's going to get warmer, it's going to get wetter, and the weather is going to be less predictable.

Warmer

Temperatures have been rising in Halton Hills and will continue to rise for decades to come, largely due to greenhouse gases produced by human activities.

Key temperature-related weather changes Halton Hills can expect include:

- Warmer annual average temperatures
- More heat waves (3 or more days with average temperatures above 30 °C)
- More days with temperatures above 25 °C
- Warmer nights (more nights with temperatures over 20 °C)
- Fewer days with temperatures below 0 °C

Table 1: Examples of Warmer Weather Trends for Halton Hills

	Past	2020's	2050's
Average temperature	+ 0.6 °C since 1960	+ 2 °C	+ 3.8 °C
Days with temperatures above 25 °C per year	56	79	99
# of heat waves per year	1	3	5

Wetter

Halton Hills is going to see more rain and more precipitation. Total annual precipitation has increased in Halton Hills by approximately 17-23 mm since the 1960s and is expected to continue to increase. While the amount of snow is expected to decrease, there will be more rainfall and more precipitation overall.

Key weather changes Halton Hills can expect include:

- More rain
- More total precipitation
- More heavy rain events

Table 2: Examples of Wetter Weather Trends for Halton Hills

	Past	2020's	2050s
Total rainfall per year	+ 29-34mm since 1960	+ 80mm	+ 157mm
Heavy rain days (days per year with precipitation greater than 10mm)	24 days	26 days	28 days

Wilder

An important aspect of climate change is not just the shift in average daily temperature but also an associated change in the weather variability experienced day-to-day.

In Halton Hills, the day-to-day variability in temperature is expected to increase during summer and decrease in winter. There will be more hot days above 40°C, for example. Halton Hills is also expected to see an increase in total precipitation during five consecutive days, indicating an increase in intensity during storms. With more precipitation, Halton Hills can expect more thunderstorms, ice and hail storms, and wind storms.

Key weather changes Halton Hills can expect include:

- More variable temperatures in the summer with increasing day-to-day variability;
- Increase in total precipitation during five consecutive days, indicating an increase in intensity during storms; and
- More ice and hail storms, as a result of more overall precipitation.

Facility Vulnerability Assessment Report - Mott MacDonald

The purpose of this study was to undertake a risk assessment for ten of the Town's facilities to evaluate their ability to withstand the impacts of climate change. The study used the Public Infrastructure Engineering Vulnerability Committee (PIEVC) protocol to define the climate parameters, provide climate change impact projections, and make recommendations to enhance the resiliency of the Town's key facilities.

The study noted that gradual climatic changes are less of a concern than extreme weather events for buildings and infrastructure.

The study included data on the probability of extreme weather events such as ice storms/freezing rain and high winds based on global climate modelling; but it recognized that it is difficult to fully understand how big the impact of extreme weather will be.

Town Facilities included in the Risk Assessment

1. Acton Arena and Community Centre
2. Halton Hills Public Library (Acton)
3. Robert C. Austin Operations Centre
4. Fire Services (District One)
5. Fire Services (District Two)
6. Fire Services (Headquarters)
7. Gellert Community Centre
8. Halton Hills Cultural Centre and Library
9. Mold-Masters SportsPlex
10. Town Hall

Table 3. Event Thresholds and Probability Scores

Climate Change Event	Indicative Threshold Chosen	Probability Score*
Higher temperatures	Heat wave of at least 3 days maximum temperature >30 °C	7
Increased precipitation	Rainfall >50mm/day	5
High Winds	120 km/hr + wind gust	7
Ice Storms	25 mm ≈ 12.5mm radial ice buildup on branches or cables	7

*Ranked on a scale of 0 (Negligible) to 7 (Extreme/Frequent/Continuous Loss of Asset)



Key Findings

Variability Among Facilities

The Town's facilities have a large variability in their resilience to climate change-related weather events. At the time of the assessment, the Cultural Centre, Town Hall, and Halton Hills Public Library (Acton location) showed lower levels of resiliency than the other seven Town facilities.

Common vs. Individual Solutions

Some of the solutions are applicable to most, if not all of the facilities. These include developing procedures for pre-disaster preparations (e.g. maintaining facilities in a state of good repair) and post-disaster assessments by Town staff from various departments. Other recommendations are specific to individual facilities, such as the need to replace the Town Hall's generator and roof membrane.

Infrastructure is Interdependent

The Town's facilities are part of a larger system and are not immune to external disruptions to critical linear infrastructure such as power, water, and sewage systems, communications and roads. These relationships need to be better understood, and any 'weaknesses in the chain' need to be managed with proactive contingency planning.

Additional climate change vulnerability assessments need to be done on other Town infrastructure. This includes parks, roads, and bridges.

Geospatial Natural Capital Assessment Report – LGL Limited

The purpose of this study was to identify and map out Halton Hills' significant natural assets and understand their vulnerability to climate change.

Key components of the study were:

1. Selecting environmental features to be analyzed using Geographic Information Systems (GIS) data;
2. Integrating the climate projections from the three climate models developed by Klimaat Consulting & Innovation for this Plan;

3. Developing criteria to evaluate the environmental features; and
4. Using the criteria to map out climate change resilient and vulnerable natural areas and features.

The analysis identified the terrestrial, wetland and aquatic ecosystems that are most resilient to changes in temperature and rainfall to help the Town better understand the factors that make its natural features vulnerable to climate change and introduce the appropriate adaptive management and protection measures.

Key Findings

Prioritize the Most Resilient Assets

The natural capital assets that are the most resilient to the effects of climate change should be made the highest priority for protection, restoration and enhancement. This will maximize the sustainability of the asset, ameliorate the effects of climate change and protect the investment in infrastructure.

Protect Lower Quality Ecosystems

Lower quality ecosystems should continue to be protected. Their protection, however, is a lower priority than the most resilient assets, described above. The resilience of lower quality ecosystems can be maintained and enhanced through ecological restoration so that further degradation does not occur and quality improves.

Update Policies and Maps

The Town should use the results of this study to support its review of Halton Region's Official Plan update, which will inform the Town's own Official Plan. Policies and mapping should be developed to maintain additional habitat patches, wetlands, and waterbodies in the Town's Greenlands System and ensure that minimum buffers are applied to specific watercourses and waterbodies maintain the function of these important hydrological features.

4. VISION, GOALS & OBJECTIVES

This section includes the Plan's vision, a description of the five goals and the objectives for each goal, A full list of actions (i.e. the Action Plan) can be found in Appendix A.

4.1 VISION

Halton Hills is a climate action leader. The Town and its residents are continually taking steps to prepare for the impacts of a changing climate. The Town is ensuring that infrastructure and services are resilient, and that people are safe and prepared. Residents are informed and engaged in adapting to climate change.

4.2 GOALS & OBJECTIVES

CROSS-CUTTING

Cross-cutting goals and actions are those that apply to more than one of the five numbered goals and have over-arching implications beyond just one topic area.

Objectives:

- CC.1 A governance structure is in place to monitor plan implementation and progress
- CC.2 Climate adaptation considerations are integrated across Town strategies and processes
- CC.3 Greenspace and natural areas are protected and enhanced
- CC.4 Residents are educated and engaged in addressing climate change
- CC.5 Data is available to support climate change planning

GOAL #1 - HALTON HILLS CAN WITHSTAND EXTREME WEATHER EVENTS

Halton Hills has experienced some severe and devastating extreme weather events in the past, affecting infrastructure, livelihoods, and public safety, health and well-being.

High winds and intense storms can cause broken tree branches and other debris, leading to property damages and power outages. Ice storms (freezing rain) result in power outages which lead to interruptions in major infrastructure, inoperable critical facilities and power outages. When it comes to buildings, impacts include, but are not limited to, an inability to access sites and undertake maintenance, as well as increased loading and damage to structures.

Potential impacts include:

- Disruptions to the transportation network and local economy;
- Damage to trees, infrastructure and property that may make it difficult to access sites, undertake maintenance or increase loading that causes further damage to structures;
- Power outages leading to interruptions in major infrastructure and critical facilities;
- Potential groundwater contamination;
- Increased demand for Emergency Management Services;
- Increased demand for emergency preparedness including essential services and disaster recovery; and
- Greater financial demands on the Town

Objectives

- 1.1 The Town's infrastructure is resilient
- 1.2 New buildings are built to withstand damaging weather events
- 1.3 Critical facilities can continue to operate in case of a damaging weather event/related emergency

GOAL #2 - HALTON HILLS IS RESILIENT TO THE IMPACTS OF HIGHER TEMPERATURES AND MORE FREQUENT HEAT WAVES

Higher temperatures and more frequent heat waves are expected for Halton Hills as a result of climate change. This will likely have a significant impact on health and stress-related illnesses, mortality, and productivity, and especially on vulnerable populations such as children and seniors. Hotter weather will also impact recreation and work operations in the Town.

Air-conditioners will need to work harder, putting pressure on the Town's energy systems. Hotter weather will also reduce the capacity for Halton Hills' urban centres (and individual buildings) to shed heat at night. This has implications for how buildings should be designed and built.

Objectives

- 2.1 Buildings are designed to keep people cool
- 2.2 Parks and public spaces are designed for hotter temperatures
- 2.3 Halton Hills has a resilient, protected tree canopy
- 2.4 Groundwater sources are protected from drought
- 2.5 Vulnerable populations are protected from hotter temperatures

Potential impacts include:

- Adverse health effects on people, especially vulnerable populations
- Increased demand for air conditioning
- Increased peak demand for electricity and stresses on the electrical production and distribution systems
- Reduced capacity for facilities to shed heat at night, requiring consideration of building design and retrofits
- Increased need for public cooling and warming centres
- Increased demand for indoor recreation and improved park spaces (e.g. with shade)
- Altered spatial distribution and spread of vector-borne (i.e. West Nile Virus), water-borne and food-borne diseases.
- Alterations to existing biodiversity

- Increased degradation of natural areas and incidences of forest and brush fires
- Increases in pollen allergies and a longer allergy season

GOAL #3: HALTON HILLS IS RESILIENT TO INCREASED PRECIPITATION AND FLOODING

Big rain events and increased precipitation are likely to enhance flooding risks, especially in early spring while the ground is still frozen. Changes in precipitation will also impact planting schedules for agriculture.

Potential impacts include:

- More storm runoff that increase stress on the Town's stormwater management infrastructure;
- Increased incidences of infrastructure and facility failures, such as roads and bridges;
- Disruptions to transportation network and economy;
- Increased river flooding and wetland flooding;
- Increased lot-level flooding;
- Increased groundwater contamination;
- Decreased surface water quality; and
- Disruption to early season agricultural planting schedules

Objectives

- 3.1 Buildings and individual homes are protected from flooding
- 3.2 The Town's stormwater management infrastructure has adequate capacity
- 3.3 In urban areas, stormwater is managed on-site where possible

GOAL #4: HALTON HILLS IS PREPARED FOR THE SOCIO-ECONOMIC IMPACTS OF CLIMATE CHANGE

Climate change is a global issue that will have noticeable social and economic impacts on Canadians and citizens around the world.

Food availability and prices will almost certainly be affected, as a result of changing weather patterns, as well as the move towards new energy sources.

Mass migration has already begun in regions where climate change is taking its toll on food, water, and social destabilization. Municipalities like Halton Hills may be required to accommodate refugee populations in the future.

There is growing evidence supporting the idea that well-designed environmental policy, including GHG reduction policies, can also support innovation and create opportunities for economic growth.

Potential impacts include:

- Migrations of populations from uninhabitable areas to Halton Hills
- Increased cost of doing business (i.e. insurance, energy, utilities)
- Adverse effects on food security
- Increased financial burden on all residents and a disproportionate effect on vulnerable populations
- Changes to outdoor work operations, scheduling, and programming
- Longer growing seasons and challenges with production of agricultural crops

Objectives

- 4.1 Halton Hills is prepared for an increase in climate refugees
- 4.2 Local food security is protected
- 4.3 Local businesses and tourism are protected

GOAL #5: HALTON HILLS CAN PROTECT RESIDENTS FROM THE HEALTH AND SAFETY IMPACTS OF CLIMATE CHANGE

A top priority for the Town of Halton Hills and all local governments is emergency preparedness, and this includes protecting health and safety of residents. Climate change impacts introduce a need to re-evaluate emergency preparedness plans and strategies. This means being prepared with a plan and resources to protect residents from the impacts of more frequent and extreme weather events, and ensuring that Town staff, residents and local businesses know what to do to in an emergency.

Climate change also threatens public health. For example, climate change has led to an increase in water- and vector-borne diseases, such as Lyme disease, which are increasing in prevalence and are likely to continue due to warming temperatures expanding the geographic range of insects. Halton Region has a lead role in protecting public health and minimizing the spread of diseases, meaning the Town must also play a role in working with the Region.

Potential impacts could include:

- Increased demand for social services and financial burden on municipalities;
- Increased demand for public shelters, emergency preparedness and Emergency Management Services;
- Altered spatial distribution of infectious diseases and increased spread of vector-borne, water-borne and food-borne diseases;
- Adverse health effects on people, especially vulnerable populations (i.e. elderly, young, impoverished, disabled etc.); and
- Adverse effects on pets and livestock

Objectives

- 5.1 Impacts to public health are minimized
- 5.2 Town staff and residents are adequately prepared for emergencies exacerbated by climate change
- 5.3 The Town and residents are prepared to deal with the aftermaths of damaging weather events
- 5.4 People can stay connected during a weather-related emergency

5. IMPLEMENTATION

5.1 ACTION PLAN ELEMENTS

The Action Plan (Appendix A) describes how the Town will advance each of the 61 actions, including:

Lead: The Town department that is responsible for leading implementation of the action

Type of action: (see Section 2.4)

- Plan/Assess
 - Encourage
 - Regulate
-

Cost: The order of magnitude cost of implementing the action

- Low – under \$500,000
 - Medium – \$500,000 – \$2 Million
 - High – \$2M+.
-

Timeline: The timeframe in which the action needs to be implemented

- Short-term – 1 year
 - Medium-term – 2-3 years
 - Long-term – 4+ years
 - Recurring actions – on an ongoing basis
-

Status: To identify actions that have already begun

- IPR - In Progress

5.2 MEASURING AND REPORTING ON PROGRESS

The Town of Halton Hills is committed to measuring and reporting on its progress and the outcomes of implementing the actions in this Plan.

Indicators have been developed to track progress of the Plan and the success of the Town's adaptation efforts overtime. The indicators were selected based on what data is available to the Town and what information would best demonstrate the progress being made. Climate Change Impacts Indicators were also developed to help the Town track the progression of climate change and its impact on Halton Hills. The indicators are listed in Appendix B.

The Town's Climate Change and Asset Management division will prepare progress reports that provide data and an analysis on a selection of key indicators for each of the Plan's five goals and the cross-cutting actions, starting in 2021. The report will provide an opportunity to assess if the actions are producing the desired results, as well as communicate and celebrate the progress being made. The Town will also track its progress on adapting to climate change by recording the capital and operating expenditures related to adaptation in its annual budget.

The CCAM division will present progress reports to Council and convene other departments as needed to review progress.

5.3 UPDATING THE PLAN

The Town will review and update this Plan every five years. It may choose to update parts of the Plan more frequently, to be included as addendums.

The Town will need to conduct additional climate risk and vulnerability assessments on Town infrastructure and assets that were not included in the Facilities vulnerability assessment. The findings of these assessments will be incorporated into future updates of the Plan.

To review and update the Plan, the Town will:

- Integrate new climate science and vulnerability and risk assessments;
- Align with other important policy and guidance documents in the Town, including the:
 - Official Plan
 - Strategic Plan
 - Other Plans in the Low-Carbon Resilience Framework
- Engage Town departments, residents, businesses and community stakeholders in identifying new strategies and actions.

5.4 ONGOING ENGAGEMENT AND COMMUNICATION

An important component of the implementation of this Plan is communicating and engaging with members of the public and community stakeholders.

Progress reports will be an important tool for sharing information about the Plan's implementation. Corporate Communications, as well as the Climate Change Action Task Force, will play a key role in engaging and communicating with the public about climate adaptation. Key communication tools for engaging the public include: the Town of Halton Hills website, the online newsletter called The Current, online media and local print newspapers, and the Town's social media platforms.



Questions about this Plan or the Town's climate change initiatives?

Visit us at: haltonhills.ca/climatechange/ to learn more and to get in touch with the Town's Climate Change & Asset Management division.



APPENDIX A & B

ACTION PLAN & INDICATORS



Appendix A: Action Plan

Action	Lead	Partners	Cost	Type of Action	Timeline	Status
CROSS-CUTTING ACTIONS						
CC.1 A governance structure is in place to monitor plan implementation and progress						
CC.1 .1 Establish the Climate Change Resilience Steering Committee to help monitor progress and provide strategic direction on all actions identified in this Plan	CAO's Office (CC & AM)	Council	\$	All	Short-Long term	IPR
CC.2 Climate adaptation considerations are integrated across Town strategies and processes						
CC.2.1 Integrate climate change adaptation solutions into the Town's Official Plan and other relevant plans and strategies	Planning and Development	Recreation and Parks, CAO's Office (CC & AM), Transportation and Public Works (Engineering), Halton Region	\$\$\$	Assess/Plan, Regulate, Encourage	Long-term	
CC.2.2 Explore the use of lifecycle costing standards for all projects and alternatives (and integrate into town initiatives as is relevant)	CAO's Office (CC & AM)	All Town Departments, Purchasing, Finance	\$	Assess/Plan, Regulate	Short-term	IPR
CC.3 Green space and natural areas are protected and enhanced						
CC3.1 Inform policies in the Town's Official Plan by using data from the Natural Capital Assets Assessment to identify areas worthy of protection, restoration and enhancement	CAO's Office (CC & AM)	Planning and Development, Recreation and Parks, Conservation Authorities, Halton Region	\$	Assess/Plan	Medium-term	IPR
CC3.2 Continue to encourage intensification, and where appropriate, more compact urban form by focusing development away from highest quality/most resilient ecosystems within the Town	Planning and Development	Halton Region, Conservation Authorities	\$	Regulate, Encourage, Assess/Plan	Medium-term	IPR

LEGEND

Cost	Timeline	Status
Low - under \$500,000 Medium - \$500,000 - \$2 Million High - \$2M+	Short-term - 1 year Medium-term - 2-3 years Long-term - 4+ years	IPR - In Progress

CC.4 Residents are educated and engaged in addressing climate change						
CC.4.1 Improve local awareness of the Climate Change Resilience Strategy and strengthen climate change literacy by mainstreaming climate change into existing communications and programs, and developing materials and targeted outreach/educational campaigns for residents, youth/schools, and businesses in Halton Hills	CAO's Office (CC & AM)	Communications	\$	Encourage	Short-term	IPR
CC4.2 Engage local media to increase awareness of local climate resilience initiatives and encourage homeowner participation in existing incentive programs such as the Eco-roof Incentive program	CAO's Office (CC & AM)	Communications	\$	Encourage	Short-term	
CC4.3 Encourage homeowners to implement climate change resiliency measures (e.g. Appendix C - What you can do) such as lot-level LID and sustainable stormwater management practices	CAO's Office (CC & AM)	Communications, All Town Departments, Conservation Authorities	\$	Encourage	Medium-term	
CC.5 Data is available to support climate change planning						
CC.5.1 Obtain and track climate change and related data (daytime temperature, hottest day, extreme heat days, precipitation, flood event data) to support creation of maps to visualize data, to support integration of climate considerations in planning	CAO's Office (CC & AM)	Transportation and Public Works, Conservation Authorities, Halton Region	\$\$	Assess/Plan	Medium-term	
GOAL 1: HALTON HILLS CAN WITHSTAND DAMAGING WEATHER EVENTS						
1.1 The Town's infrastructure is resilient						
1.1.1 Conduct a vulnerability assessment of services that the Town is reliant upon to assess the level of service required by the Town in an extreme-weather related emergency to identify gaps	Transportation & Public Works	CAO's Office (CC&AM), Fire Services, Recreation and Parks, Public Works, Halton Region	\$	Assess/Plan	Short-term	
1.1.2 Conduct climate change vulnerability and lifecycle cost assessments on critical infrastructure to determine the appropriate time for replacement or upgrade	CAO's Office (CC & AM)	Transportation and Public Works, Recreation and Parks, Fire Services, IT Services	\$\$/\$\$\$	Assess/Plan	Short-term	IPR
1.1.3 Add climate vulnerability as a component of regular building and infrastructure condition assessments	CAO's Office (CC & AM)	Transportation and Public Works, Recreation and Parks, Fire Services, IT Services	\$	Assess/Plan	Medium-term	IPR
1.1.4 Assess opportunities to bury hydro cables in the Town, particularly in new developments	Halton Hills Hydro	Transportation and Public Works, Planning and Development	\$	Assess/Plan	Medium-term	

LEGEND

Cost	Timeline	Status
Low - under \$500,000 Medium - \$500,000 - \$2 Million High - \$2M+	Short-term - 1 year Medium-term - 2-3 years Long-term - 4+ years	IPR - In Progress

1.2 New buildings are built to withstand damaging weather events						
1.2.1 Use a climate change adaptation lens when updating the Town's Green Development Standards and integrate appropriate considerations	CAO's Office (CC & AM), Planning and Development	Transportation and Public Works, Recreation and Parks, Fire Services	\$	Assess/Plan, Regulate	Short-term	IPR
1.3 Critical facilities can continue to operate in case of a damaging weather event/related emergency						
1.3.1 Determine which Town facilities are critical in the event of an emergency and ensure that facility management teams have access to all critical areas within Town facilities	Recreation and Parks (Facilities)		\$	Assess/Plan	Short-term	
1.3.2 Provide backup generation systems for services needed in an emergency at critical Town facilities where none exist (Acton Arena and Community Centre, Halton Hills Public Library (Acton), Halton Hills Cultural Centre, MoldMasters SportsPlex,) and assess opportunities to use battery storage and/or microgrids as a part of the evaluation	Recreation and Parks (Facilities)	Recreation and Parks, IT Services, Finance	\$\$/\$\$\$	Assess/Plan	Medium-Term	
1.3.3 Develop a protocol for removing obstructions from areas surrounding Town facilities in case of an emergency	Transportation and Public Works	Recreation and Parks, Fire Services, Corporate Services	\$	Assess/Plan	Short-term	
1.3.4 Identify which local businesses are critical to residents in an emergency and provide guidance to on how to remain open during extreme weather events	CAO's Office	Communications, Fire Services, Transportation and Public Works	\$	Assess/Plan, Encourage	Short-Medium-term	
1.3.5 Engage public institutions and community groups including faith-based organizations, daycares and seniors' residences in planning and preparing hazardous weather protocols (e.g. guidance materials and best practice advice, emergency power requirements)	CAO's Office	Communications, Recreation and Parks, Halton Region, School Boards, Provincial Government	\$	Encourage	Short-term	
GOAL 2: HALTON HILLS IS RESILIENT TO THE IMPACTS OF HIGHER TEMPERATURES AND MORE HEAT WAVES						
2.1 Buildings are designed to keep people cool						
2.1.1 Review and implement recommendations from the Facilities Vulnerability Assessment Report	Recreation and Parks (Facilities)	CAO's Office (CC & AM), Finance	\$\$\$	Assess/Plan	Medium-term	
2.1.2 Explore opportunities for an incentive program to support climate change resiliency related retrofits in existing residential buildings	CAO's Office (CC & AM)	Planning and Development, Transportation and Public Works (Building)	\$\$\$	Encourage, Assess/Plan, Regulate	Long-term	

LEGEND

Cost	Timeline	Status
Low - under \$500,000	Short-term - 1 year	IPR - In Progress
Medium - \$500,000 - \$2 Million	Medium-term - 2-3 years	
High - \$2M+	Long-term - 4+ years	

2.2 Parks and public spaces are designed for hotter temperatures						
2.2.1 Develop design standards for parks based on shorter winters/less snow (e.g. installing irrigation infrastructure) and hotter summers (e.g. materials that reflect heat)	Recreation and Parks	Finance, CAO's Office (CC&AM)	\$\$\$	Assess/Plan	Long-term	
2.2.2 Provide more shade/shelter and cooling facilities such as splash pads, water fountains and misters in Town public spaces, where feasible/needed	Recreation and Parks	CAO's Office (CC & AM), Public Works	\$\$\$	Assess/Plan	Long-term	
2.2.3 Incorporate new ground cover/turf mixes in parks that can better withstand hotter temperatures, and more native and drought resistant plants in Town landscaping	Recreation and Parks	Public Works, CAO's Office (CC & AM)	\$	Assess/Plan	Long-term	
2.3 Halton Hills has a resilient and protected tree canopy						
2.3.1 Include trees on municipal land as a municipal asset in infrastructure assessments	CAO's Office (CC & AM)	Recreation and Parks, Transportation and Public Works	\$	Assess/Plan	Short-term	
2.3.2 Maintain existing tree planting programs and improve education around tree planting	CAO's Office (CC & AM)	Conservation Authorities, Recreation and Parks, Transportation and Public Works, Communications, Halton Region	\$	Encourage	Short-term	IPR
2.3.3 Implement Public Tree Management Plan and Privately-Owned Tree Management Strategy to encourage more tree planting and better tree maintenance	CAO's Office (CC & AM)	Planning and Development, Transportation and Public Works (Building), Recreation and Parks, Communications	\$	Assess/Plan, Encourage	Short-term	IPR
2.3.4 Encourage tree diversity (best species for a changing climate) as part of planting programs and in new developments	Recreation and Parks	Recreation and Parks, Planning and Development, Conservation Authorities	\$	Encourage, Assess/Plan	Medium-term	
2.4 Groundwater sources are protected from drought						
2.4.1 Explore potential incentive program for residents to conduct water conservation retrofits, rainwater harvesting, and non-potable landscape irrigation to improve resilience to drought	Transportation & Public Works	CAO's Office (CC & AM)	\$\$	Encourage	Medium-term	
2.4.2 Update planting standards in development agreements to encourage more drought resistant plants	Recreation and Parks	Planning and Development, Conservation Authorities	\$	Regulate	Medium-term	

LEGEND

Cost	Timeline	Status
Low - under \$500,000 Medium - \$500,000 - \$2 Million High - \$2M+	Short-term - 1 year Medium-term - 2-3 years Long-term - 4+ years	IPR - In Progress

2.5 Vulnerable populations are protected from hotter temperatures						
2.5.1 Develop a heat response plan for vulnerable populations including children, seniors, and animals	Fire Services	CAO's Office (CC & AM), Communications, Halton Region	\$	Assess/Plan	Short-term	
2.5.2 Assess the impacts of hotter temperatures on the local farming community	Halton Region	Planning and Development, CAO's Office (CC & AM), Halton Region	\$	Assess/Plan	Medium-term	
GOAL 3: HALTON HILLS CAN WITHSTAND INCREASED PRECIPITATION AND FLOODING						
3.1 Buildings and individual homes are protected from flooding						
3.1.1 Ensure the Town has funding available to respond to major flooding events	CAO's Office	Finance	\$\$\$	Assess/Plan	Short-term	IPR
3.1.2 Identify a preferred supplier for machinery needed to respond to floods (e.g. pumps) and set-up a purchasing clearance/pre-procurement arrangement	Transportation & Public Works	Finance, Transportation and Public Works, Fire Services	\$\$\$	Assess/Plan	Short-term	
3.1.3 Maintain the Halton Region basement flooding program	CAO's Office (CC & AM)	Transportation and Public Works (Engineering, Building)	\$	Encourage	Short-term	IPR
3.1.4 Evaluate conducting roof drainage studies at all three Fire Stations, , Mold-Masters SportsPlex , Halton Hills Cultural Centre and Library, and Acton Arena and Community Centre	CAO's Office (CC & AM)	Recreation and Parks (Facilities), Fire Services, Purchasing, Finance	\$	Assess/Plan	Short-term	
3.2 The Town's stormwater management infrastructure has adequate capacity						
3.2.1 Review current levels of stormwater management (SWM) service using climate change data and assess gaps	Transportation & Public Works	CAO's Office (CC & AM)	\$	Assess/Plan	Short-term	IPR
3.2.2 Increase funding for maintenance and replacement of SWM infrastructure	Transportation & Public Works	CAO's Office (CC & AM), Finance,	\$\$\$	Assess/Plan	Long-Term	
3.2.3 Incorporate climate change data in forthcoming Stormwater Master Plan, in collaboration with Conservation Authorities	Transportation & Public Works	CAO's Office (CC & AM), Conservation Authorities	\$	Assess/Plan	Short-term	
3.2.4 Invest in low-impact development solutions that retain and release water in a controlled manner	Transportation & Public Works	CAO's Office (CC & AM), Finance, Conservation Authorities	\$\$\$	Assess/Plan	Long-Term	
3.2.5 Consider climate change scenarios when doing flood studies for infrastructure	Transportation & Public Works	CAO's Office (CC & AM), Conservation Authorities	\$	Assess/Plan	Short-term	IPR

LEGEND

Cost	Timeline	Status
Low - under \$500,000 Medium - \$500,000 - \$2 Million High - \$2M+	Short-term - 1 year Medium-term - 2-3 years Long-term - 4+ years	IPR - In Progress

3.3 In urban areas, stormwater is managed on-site where possible						
3.3.1 Review/assess existing stormwater systems at Town facility parking lots and consider rainwater capture systems and the use of permeable pavements if applicable	Recreation and Parks (Facilities)	Transportation and Public Works (Engineering, Building)	\$	Assess/Plan, Do/Fund	Short-term	
3.3.2 Encourage low-impact development practices for on-site stormwater management (e.g. rain water harvesting, permeable pavements, rain gardens, green roofs)	Transportation and Public Works (Engineering, Building)	Planning and Development, CAO's Office (CC & AM), Conservation Authorities	\$	Encourage, Assess/Plan	Short-term	
GOAL 4: HALTON HILLS IS PREPARED FOR THE SOCIO-ECONOMIC IMPACTS OF CLIMATE CHANGE						
4.1 Halton Hills is prepared for an increase in climate refugees						
4.1.1 Begin planning for the impacts of increased global refugees (e.g. housing, infrastructure, employment, and social support) and assessing what services will be required	CAO's Office (CC & AM)	Planning and Development, Transportation & Public Works, Halton Region	\$\$	Assess/Plan	Long-term	
4.1.2 Identify means of welcoming and engaging refugee populations	CAO's Office (CC & AM)	Halton Region, Local Community Groups	\$	Assess/Plan	Long-term	
4.2 Local food security is protected						
4.2.1 Explore opportunities available to the Town to support local food production, including rooftop gardens, vertical farming, backyard farming, regenerative farming, greenhouses, farmers markets, local food processing and storage, and community gardens	CAO's Office (CC & AM)	Economic Development, Transportation and Public Works, Recreation and Parks	\$	Assess/Plan	Medium-term	IPR
4.2.2 Ensure sufficient lands remain available within the Town for agricultural use	Planning and Development	Communications, Halton Region, Provincial Government, Conservation Authorities	\$	Regulate	Medium-term	IPR
4.2.3 Support safety-net programs such as food banks and meal programs which can provide needed access to healthy food for low-income residents	Halton Region	Planning and Development, Economic Development, Communications, Public Works and Transportation, Halton Region	\$	Encourage	Long-term	
4.3 Local businesses and tourism are protected						
4.3.1 Assess new opportunities for different forms of tourism as a result of changing climate conditions	CAO's Office (CC & AM)	Economic Development	\$	Assess/Plan	Medium-term	
4.3.2 Encourage businesses to undertake climate change planning exercises	CAO's Office (CC & AM)	Economic Development, Communications	\$	Encourage	Medium-term	

LEGEND

Cost	Timeline	Status
Low - under \$500,000	Short-term - 1 year	IPR - In Progress
Medium - \$500,000 - \$2 Million	Medium-term - 2-3 years	
High - \$2M+	Long-term - 4+ years	

GOAL 5: HALTON HILLS CAN PROTECT RESIDENTS FROM THE HEALTH AND SAFETY IMPACTS OF CLIMATE CHANGE						
5.1 Impacts to public health are minimized						
5.1.1 Partner with the Halton Region Health Department to develop and promote educational materials and prevention programs related to the increased risk of water-borne and vector-borne illnesses such as West Nile and Lyme disease	CAO's Office (CC & AM)	Halton Region, Communications	\$	Encourage	Short-term	
5.1.2 Obtain data from the Region's tick and mosquito surveillance programs to support development of educational materials for residents	CAO's Office (CC & AM)	Halton Region, Communications	\$	Encourage	Medium-term	
5.2 Town staff and residents are adequately prepared for emergencies exacerbated by climate change						
5.2.1 Update the Halton Hills Emergency Response Plan to provide a more specific response protocol for extreme weather emergencies	Fire Services	All Town Departments	\$	Assess/Plan	Short-term	IPR
5.2.2 Incorporate climate change into existing emergency preparedness programs/outreach efforts targeted towards residents	Fire Services	Communications, CAO's Office (CC & AM)	\$	Encourage	Short-term	
5.2.3 Provide work-from-home solutions for non-emergency/non-essential Town staff	Corporate Services (Human Resources)	IT Services, Human Resources	\$\$	Assess/Plan	Short-term	IPR
5.2.4 Develop public education/outreach materials for Town residents and businesses regarding electricity outage planning	CAO's Office (CC & AM)	Communications, Halton Hills Hydro, Economic Development	\$	Encourage	Short-term	
5.3 The Town and residents are prepared to deal with the aftermaths of damaging weather events						
5.3.1 Implement post-disaster event inspections (e.g. a checklist) to quantify the impact of climatic events	CAO's Office (CC & AM)	Fire Services, All Town Departments	\$/\$\$	Assess/Plan	Medium-term	
5.3.2 Maintain business continuity for Town services needed in anticipation of increased maintenance and recovery associated with storms	Transportation & Public Works	Recreation and Parks, Finance	\$\$/\$\$\$	Assess/Plan	Medium-term	
5.3.3 Provide information for residents on storm recovery	CAO's Office (CC & AM)	Communications, Public Works, Halton Region, Halton Hills Hydro	\$	Encourage	Short-term	
5.4 People can stay connected during a weather-related emergency						
5.4.1 Identify and work with community and faith-based organizations to develop a process for looking after each other during extreme weather	CAO's Office (CC & AM)	Communications, Halton Region, Provincial Government	\$	Encourage	Short-term	
5.4.2 Provide education to residents on how to stay connected during storms and power outages	CAO's Office (CC & AM)	Communications, Halton Region, Halton Hills Hydro	\$	Encourage	Short-term	

LEGEND

Cost	Timeline	Status
Low - under \$500,000	Short-term - 1 year	IPR - In Progress
Medium - \$500,000 - \$2 Million	Medium-term - 2-3 years	
High - \$2M+	Long-term - 4+ years	

Appendix B: Progress Indicators

The Town's Climate Change and Asset Management division will prepare an annual progress report to measure and report on the status of the Plan's implementation by reporting on a selection of key starting in 2021.

Overall and Cross-Cutting Indicators

- A. Number of actions implemented
- B. Annual Town expenditures related to climate change adaptation (total cost and percent of total)
- C. Number of residents engaged through climate change adaptation programs, events and online
- D. Climate change vulnerable natural areas (km²) in Town ownership

Goal 1: Halton Hills can withstand damaging weather events

Indicators

- 1.1 Number of hours of building and services interruption after weather-related events
- 1.2 Percentage of Town critical infrastructure with backup power
- 1.3 Annual cost of sewer infrastructure maintenance, repairs and new construction

Goal 2: Halton Hills is resilient to the impacts of higher temperatures and more heat waves

Indicators

- 2.1 Number of shade structures and other cooling features in Town public spaces
- 2.2 Percent of municipality with tree canopy coverage
- 2.3 Number of trees planted (by Town and through homeowner tree planting programs)
- 2.4 Number of heat-related brownouts

Goal 3: Halton Hills can withstand increased precipitation and flooding

Indicators

- 3.1 Number of new green infrastructure or LID projects undertaken on municipal infrastructure
- 3.2 Number of new developments integrating LID and/or green infrastructure
- 3.3 Number of household flooding complaints
- 3.4 Number and volume of sanitary sewer overflows per year

Goal 4: Halton Hills' is prepared for the socio-economic impacts of climate change

Indicators

- 4.1 Number of businesses engaged in Town climate adaptation planning initiatives
- 4.2 Number of programs for new immigrants available in the Town
- 4.3 Amount of local food production (kg)

Goal 5: Halton Hills can protect residents from the health and safety impacts of climate change

Indicators

- 5.1 Number of cases of West Nile and Lyme disease
- 5.2 Number of calls to Town regarding service disruptions resulting from extreme weather events (e.g. road access, hydro)
- 5.3 Staff time spent on disaster recovery/clean up
- 5.4 Number of Staff with capacity to work from home

Climate Change Impacts

Indicators

- 6.1 Number of Environment Canada warnings per annum
- 6.2 Number of instances and # of days on flood watch and flood warning
- 6.3 Number of reported severe weather events
- 6.4 Total annual rainfall & precipitation
- 6.5 Average daily temperature
- 6.6 Number of days with temperature above 30°C
- 6.7 Number of deaths or injuries due to weather-related events
- 6.8 Total losses (dollars) incurred by the Town due to weather related events
- 6.9 Number of hours of power failures triggered in response to weather-related events
- 6.10 Number and cost (dollars) of Town insurance claims from weather-related events
- 6.11 Number of heat-related hospitalizations / deaths / emergency calls
- 6.12 Number of times and # of days fire response is triggered in response to weather-related events

Note: It is possible to collect this weather data on Environment Canada websites.

APPENDIX C



WHAT YOU CAN DO & ADDITIONAL RESOURCES



What You Can Do: Actions to Take at Home and Work

There are many actions you can take at home and at work to increase the resilience of your home, business and neighborhood.

CROSS-CUTTING ACTIONS

What Can You Do?

Get informed.

Being well-informed is an essential element of the response to climate change and it is important to find accurate information. The Canadian Centre for Climate Services helps Canadians understand and adapt to climate change by providing information through the ClimateData.ca portal. The Government of Canada also provides a wealth of information on climate change, including greenhouse gas emission data, climate projections, maps, and programs.



Know your neighbours.

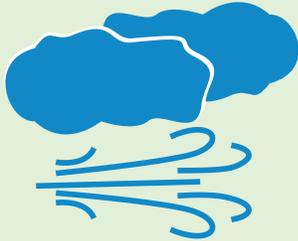
Fostering strong social connections is one of the best ways to promote resilience in the face of climate challenges. When extreme weather events occur, those in more connected communities tend to fare better. Neighbours can share resources and check up on each other in an emergency. If you don't know them already, consider introducing yourself to people who live in your building or on your block or get involved in a local group or organization.



Grow your own food.

Climate change will continue to impact food production, distribution and costs. One way to build resiliency as individuals, and as a community, is to grow your own food. A well-planned garden can provide your family with the freshest, most nutritious produce, plus a more secure, self-reliant lifestyle.



EXTREME WEATHER EVENTS**What Can You Expect?**

Extreme weather events such as ice and wind storms can cause broken trees and other debris, lead to property damage, power outages and other disruptions. Such damaging weather events can leave critical facilities like schools and businesses inoperable or inaccessible and create issues for getting around and accessing services.

What Can You Do?

Prepare your home. Before a storm, take time to prepare your home and property to avoid damage. Trim dead branches and cut down dead trees to reduce the danger of these falling onto your house during a storm. Clean gutters, drains and downpipes. Secure everything that might be blown around or torn loose outdoors.



Create a family or business emergency plan. Start by discussing what could happen and what you should do at home, at school or at work if a severe storm strikes. Things to consider: How will you receive emergency alerts and warnings? What is your shelter, food and water plan? What is your family/household/business communication plan? Write down and review your plan with the entire family. Don't forget pets in your emergency plan.



Create an emergency kit. Put together some basic supplies that you need to be self-sufficient for a few days. Items could include: a flashlight, radio, non-perishable food and water. The key is to make sure supplies are organized and easy to find. At home, store important family documents, such as birth certificates, passports, wills, financial documents, and insurance policies in a safe place.

Have a work from home plan. Talk to your employer about what to do in the case of extreme weather. If you have to drive to work, wait several hours after freezing rain ends so that road maintenance crews have enough time to spread sand or salt on icy roads. If you are a business owner, establish a protocol for staff to be able to work from home during extreme weather events.



Protect animals. Take precautions to protect animals and livestock during extreme weather, for example provide shelter to and move livestock away from potentially collapsing structures and flying objects.



HIGHER TEMPERATURES & MORE HEAT WAVES



What Can You Expect?

Higher temperatures and more frequent heat waves will increase the risk of heat stroke and heat exhaustion. Heat waves are especially hard on the elderly, children, people working outdoors and other vulnerable groups. This will increase the need for public cooling centres, as well as shade and cooling facilities in parks and public spaces. Warmer weather will increase demand for air conditioning and heating, putting stress on electrical distribution systems.

What Can You Do?

Update your home. Add insulation to help keep your home cool in the summer and reduce energy bills. Check your home's cooling mechanisms (e.g. fans, air conditioners, and other cooling equipment) to ensure they are working and replace any that are broken or inefficient. Clean air filters regularly to maintain efficiency and purify indoor air.



Install green roofs. Green roofs are gardens planted on rooftops that provide shade and reduce the temperature of the roof surface, as well as the surrounding air. Consider building your own at home, work, or school.

Tree planting. Planting trees supports both climate mitigation (e.g. trees absorb GHGs) and adaptation (provide relief from excessive heat). Trees provide shade on hot days; cool nearby buildings and ambient air; moderate the need for air conditioning and related stress on electrical transmission systems. They can also reduce stormwater runoff, erosion and surface water pollution; and minimize smog formation. Choose tree species more likely suited to warmer weather in order to increase resilience.



Make use of public cooling centers. The Town provides cooling centers during extreme heat. Look up the location of your nearest cooling centers in case you need to go there during a heat wave or summer power outage.

Use cool pavement materials for your driveway and interlocking. Consider replacing typical asphalt with pavement materials that stay cooler in the sun, to help reduce the heat island effect.

Stay healthy and hydrated. Heat illnesses are preventable. During extreme heat, keep cool and hydrated. Drink plenty of cool liquids (especially water) to decrease your risk of dehydration. If you must do physical activity in extreme heat, take extra breaks, remove gear to let your body cool off and drink lots of water.



INCREASED PRECIPITATION & FLOODING



What Can You Expect?

Big rain events and increased precipitation are likely to lead to enhanced flooding. The main risk to individual homeowners and local businesses is lot-level flooding. Disruptions to transportation network and regular business activity are also possible.

What Can You Do?

Know your risk. Consult your local Conservation Authority (CA) to understand whether you are in a flood prone area. Talk to your home insurer to find out about what's covered under your policy.



Conservation Halton and Credit Valley Conservation are the two CA's that govern Halton Hills; these are also great resources to learn more about flood risk and prevention.

Prepare your home. Protect your property from flooding by using water resistant building materials. Add weather protection sealant and flood barriers around basement windows and base of ground-level doors. Check your roof and eaves regularly.

Prepare your property. Be sure your lot is properly graded, so that water drains away from basement walls. Make sure that downspouts extend away from your basement wall and other neighbouring properties.

Know what to do with a flood risk. If you live somewhere with poor drainage or otherwise prone to flooding and a flood warning is in effect, shut off electricity to areas that are at risk of flooding. Move furniture, valuables, and electronics to areas in your home that are least likely to be affected by flooding.

The Intact Centre on Climate Adaptation and homefloodprotect.ca is another great resource for homeowner, providing checklists, tips, and an online self-assessment tool.



Choose permeable surfaces around your home. Reducing the amount of paved area, installing green roofs, and choosing permeable pavements that let rain soak through can help to prevent local flooding and erosion during big rain events.

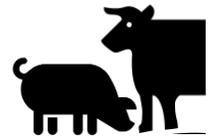


Plant a rain garden. A rain garden is designed to collect stormwater that runs off roofs, driveways, sidewalks, and other hard surfaces. Planting a rain garden helps reduce runoff around your home as well as the amount of stormwater making it to the sewer system.

Keep your home's water systems up to date. Update your home's pumping system to make sure it can withstand high volumes of water. Install backwater valves or plugs for drains, toilets and other sewer connections. Make sure your sump pump is working and install a battery-operated backup, in case of a power failure. You can also install a water alarm to let you know if water is accumulating in your basement.



Protect livestock. If you own livestock, remember that livestock will seek higher ground if possible. Design livestock operations in a way that gives animals access to higher ground in flood-prone areas.



Keep storm drains clear: Keep nearby storm drains clear of leaves and other debris that may clog flows and cause a backup during heavy rainfall.

Resources

INFORMATION

Town of Halton Hills – Climate Change

<https://www.haltonhills.ca/climatechange/index.php>

Government of Canada – Climate Change

<https://www.canada.ca/en/services/environment/weather/climatechange.html>

Government of Canada – Protecting Your Property from Floods

<https://www.canada.ca/en/campaign/flood-ready/protect-property.html>

Government of Canada – Preparing for Storms

<https://www.getprepared.gc.ca/cnt/rsrscs/pblctns/svrstrms-wtd/index-en.aspx#s2>

Government of Canada - Extreme Heat Safety

<https://www.canada.ca/en/health-canada/services/sun-safety/extreme-heat-heat-waves.html>

Government of Canada – Historical Weather Data

https://climate.weather.gc.ca/historical_data/search_historic_data_e.html

Canadian Centre for Climate Services

<https://www.canada.ca/en/environment-climate-change/services/climate-change/canadian-centre-climate-services.html>

ClimateData.ca

<https://climatedata.ca/>

Intact Centre on Climate Adaptation – Flood Protection Resources

https://www.intactcentreclimateadaptation.ca/programs/home_flood_protect/resources/

ORGANIZATIONS

United Nations – Climate Change

<https://www.un.org/en/climatechange/>

ICLEI Canada

<https://icleicanada.org/>

Credit Valley Conservation Authority

<https://cvc.ca/>

Conservation Halton

<https://www.conservationhalton.ca/>

Halton Hills Climate Collective

<https://haltonenvironet.ca/halton-climate-collective>