



TOGETHER FOR CHANGE

Dufferin's Climate Adaptation Strategy

2023



ACKNOWLEDGEMENTS

© 2023, The Corporation of the County of Dufferin. All Rights Reserved. Advice, guidance, and support on the development of the Dufferin Climate Adaptation Strategy was delivered by ICLEI Canada through the Planning cohort of the Advancing Adaptation: Train the Trainer project, funded through the Ministry of Environment, Conservation and Parks alongside support from Environment and Climate Change Canada.

PROJECT TEAM

Sara MacRae, Dufferin County
Kylie-Anne Grube, Dufferin County
Hiba Kariem, ICLEI Canada
Robert Wilson, ICLEI Canada

DUFFERIN CLIMATE ADAPTATION WORKING GROUP

This Strategy represents the culmination of efforts invested by many parties who offered their expertise and advice to the research and insights compiled in this report. We are grateful for the support of the members of the Climate Adaptation Working Group who committed their time and consideration to planning the future of our County.

Aimee Raves | Finance, Dufferin County
Alan Selby | Township of East Garafraxa
Bo Cheyne | Wellington-Dufferin-Guelph Public Health
Caroline Mach | County Forest, Dufferin County
Elaine Capes | DC MOVES
Gail Little | Dufferin Federation of Agriculture
Hilton Thomas | Orangeville Hydro
Jason Igras | Credit Valley Conservation Authority
Julie Vanderwerf | Community Services, Dufferin County
Karisa Downey | Economic Development, Dufferin County
Kate Thomson | Town of Orangeville
Louise Heyming | Grand River Conservation Authority
Meghan Townsend | Township of Grand Valley

Michelle Newson | Township of Mono
Mike Hooper | Engineering, Dufferin County
Rob Koekkoek | Dufferin Board of Trade & Orangeville Hydro
Ryan Johnson | University of Waterloo
Ryan Post | Nottawasaga Conservation Authority
Scott Martin | Operations, Dufferin County
Shirley Boxem | Township of Mulmur
Stephanie Shifflet | Grand River Conservation Authority
Stephen Ducharme | Facilities, Dufferin County
Steve Murphy | Emergency Preparedness, Dufferin County
Silva Yousif | Planning, Dufferin County
Wayne Hannon | Township of Melancthon



INDIGENOUS LAND ACKNOWLEDGEMENT

We respectfully acknowledge that Dufferin County resides within the traditional territory and ancestral lands of the Tionontati (Petun), Attawandaron (Neutral), Haudenosaunee (Six Nations), and Anishinaabe peoples.

We also acknowledge that various municipalities within the County of Dufferin reside within the treaty lands named under the Haldimand Deed of 1784 and two of the Williams Treaties of 1818: Treaty 18: the Nottawasaga Purchase, and Treaty 19: The Ajetance Treaty.

These traditional territories upon which we live and learn, are steeped in rich Indigenous history and traditions. It is with this statement that we declare to honour and respect the past and present connection of Indigenous peoples with this land, its waterways and resources.

CONTENTS

| | |
|--|-----------|
| ACKNOWLEDGEMENTS | 2 |
| INDIGENOUS LAND ACKNOWLEDGEMENT | 3 |
| GLOSSARY | 5 |
| EXECUTIVE SUMMARY | 8 |
| INTRODUCTION | 11 |
| Intention of the Strategy | 12 |
| Dufferin's Progress on Climate Action | 14 |
| Climate Emergency Declaration | 15 |
| THE CLIMATE CHALLENGE | 16 |
| Climate Basics | 16 |
| Monitoring Global Climate Change | 17 |
| Climate Projections: Dufferin County | 18 |
| PLANNING FOR CHANGE | 24 |
| Adaptation Action at All Levels | 24 |
| The Role of Local Municipalities | 26 |
| Strategy Development | 28 |
| TAKING ACTION | 34 |
| Key | 35 |
| Buildings & Infrastructure | 36 |
| Energy & Economy | 42 |
| Agriculture & Natural Environment | 46 |
| People & Health | 50 |
| Enabling Actions | 56 |
| First Priority Actions | 60 |
| IMPLEMENTING THE STRATEGY | 62 |
| Oversight and Governance | 62 |
| The Path Forward | 63 |
| APPENDICES | 64 |
| Appendix A: Climate Projections | 66 |
| Appendix B: Strategy Development | 71 |
| Appendix C: Implementation Schedule | 84 |
| Appendix D: Vulnerable Populations | 100 |
| Appendix F: Available Funding Programs | 102 |

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 Change 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 Change Data and Scenarios Tool | The Canadian Climate Data and Scenarios (CCDS) site was originally launched in February 2005 with support from Environment and Climate Change Canada, the Climate Change Adaptation Fund (CCAF) and the University of Regina. The CCDS supports climate change impact and adaptation research in Canada through the provision of climate model and observational data. |



| | |
|---------------------------------------|---|
| 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, hail storm, flood or heat wave, and is beyond the normal range of activity. An extreme weather event would normally occur very rarely or fall into the tenth percentile of probability. |
| Greenhouse Gas (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 vapour (H ₂ O), carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), ozone (O ₃), 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). |
| 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. |
| Low Carbon Resilience (LCR) | An approach to climate action that encourages coordination and co-evaluation of mitigation and adaptation measures to reduce greenhouse gas emissions while also building resilience. Applying a LCR lens bridges the gap between mitigation and adaptation silos by finding alignment in planning, policies and programs. LCR brings with it a number of operational benefits and climate action synergies including cost savings and resource efficiencies, reduced reliance on grey infrastructure, improved flood and heat management, improved carbon sequestration, as well as a number of co-benefits for health, air quality, infrastructure, equity, preserving ecosystem health and biodiversity. |

| | |
|---|---|
| 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 Pathway | 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. Resilience is not simply the ability to bounce back, but rather refers to bouncing forward – to transform and enhance the capacities of the community to prepare and respond to future climate impacts. |
| Risk | The combination of the likelihood of an event occurring and its negative consequences. Risk can be expressed as a function where Risk = likelihood x 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. |

EXECUTIVE SUMMARY

Around the world, the climate crisis is intensifying and Dufferin County is already experiencing the impacts of climate change. Complimenting the Dufferin Climate Action Plan (2021), the goal of the Dufferin Climate Adaptation Strategy is to proactively identify opportunities to advance climate resilience in Dufferin’s social, economic, built, and natural systems.

THE CLIMATE CHALLENGE

Local climate projections show that Dufferin can expect warmer year-round temperatures, including more frequent days with extreme heat. Annual precipitation is expected to increase with more frequent and intense rainfall and snowfall events.

Key climate impacts that Dufferin County will experience include:

- Extreme heat and droughts
- Loss of native biodiversity
- Illness and disease
- More ice days
- Mental health challenges
- Infrastructure damage
- Disruptions to the economy
- Soil erosion and nutrient loss

Without intervention, a changing climate threatens the social, environmental, and economic well-being of current and future generations of Dufferin County.

PLANNING FOR CHANGE

Investments in adaptation measures are critical to helping Dufferin adapt to a changing climate. The Dufferin Climate Adaptation Strategy is a strategy for the County, local municipalities, and community members to build climate resilience in the Dufferin County for current and future generations.

The Strategy was created through intensive research, and meaningful engagement with the Climate Adaptation Working Group (CAWG) to capture the needs, desires, and priorities of Dufferin’s rural and urban communities. Strategy development was supported by Dufferin County’s participation in ICLEI Canada’s Advancing Adaptation program and guided by the Building Adaptive and Resilient Communities (BARC) framework.

VISION

Dufferin County is a healthy and resilient community for all that is equitable, socially connected, economically diverse, and has a flourishing environment for current and future generations.

TAKING ACTION

The Dufferin Climate Adaptation Strategy is organized under 5 Focus Areas:

| | |
|--|--|
| Buildings and Infrastructure | Actions to minimize incidences of damage and wear on municipal and private infrastructure |
| Energy and Economy | Actions to support the maintenance and hardening of energy infrastructure and exploring alternative energy systems to increase system resiliency |
| Agriculture and Natural Environment | Actions to manage, rehabilitate, and enhance climate resilience in natural systems and increase resilience in the agriculture sector |
| People and Health | Actions to minimize the direct and indirect human health impacts of climate change |
| Enabling Actions | Actions to increase municipal capacity to respond to extreme weather events, effectively engage with and communicate risks to the public, and build financial capacity |

IMPLEMENTING THE STRATEGY

Dufferin County will adopt seven implementation strategies to maximize the positive environmental, social, and economic impacts of climate measures:

1. Building community relationships
2. Leveraging funding
3. Increasing staff capacity
4. Institutionalizing climate action
5. Strategic prioritization
6. Centering equity
7. Mobilizing a culture of climate action

Monitoring and evaluating the implementation of the Dufferin Climate Adaptation Strategy is critical to reaching our adaptation goals.

Dufferin County will establish an annual report card on the progress of the Dufferin Climate Adaptation Strategy. Further, the strategy will be reviewed and updated every 5 years to report on progress, set next steps, and ensure that climate planning continues to align with community priorities.

FIRST PRIORITY ACTIONS

In order to respond quickly and effectively to high-risk climate impacts, five actions will be prioritized for implementation over the next 5 years.

1. **Create framework for adopting a Green Development Standard** to build resiliency and complete communities (e.g. low-impact development, flood mitigation measures, access to green space, enhanced tree canopy). (BH.3)
2. **Encourage homeowners and property owners to improve climate resilience** of residential and private property through upgrades and/or retrofits. (BH.1)
3. **Establish and enhance emergency preparedness communications and programs** for residents to strengthen personal resiliency to climate impacts. (PH.3)
4. **Increase uptake of regenerative agricultural practices** in partnership with farmers to increase soil organic matter, reduce soil erosion, and improve water security. (AN.3)
5. **Incorporate a climate lens** into asset management, capital planning, and budgetary processes. (BH.4)



YOUR CALL TO ACTION!

The solution to climate change is community. Climate change effects everyone and everyone has a role to play – if we work together, we can accelerate climate action and transform our community vision into reality.

Discover how you can support climate action in your community.

VISIT [DUFFERINCOUNTY.CA/CLIMATECHANGE](https://dufferincounty.ca/climatechange)



INTRODUCTION

The climate crisis requires urgent action.

Around the world the climate crisis is intensifying: the past eight years are on track to be the eight warmest on record, fueled by rising greenhouse gas emissions globally.¹

“The greater the warming, the worse the impacts” ~ WMO Secretary-General Professor Petteri Taalas.

Dufferin County is already experiencing the impacts of climate change. In recent memory, a 100-year flood in June 2017 resulted in the closure of local roadways and strain on municipal drainage infrastructure. 2017 and 2019 saw record high temperatures and prolonged extreme heat warnings, and ice storms in 2013 and 2016 caused extensive damage to properties and widespread power outages.

These recent events have highlighted the need to be prepared for ongoing challenges. The Dufferin Climate Adaptation Strategy is a strategy for the County, local municipalities, and community members to build climate resilience in the Dufferin County for current and future generations.

¹ World Meteorological Association. 2022. “Eight warmest years on record witness upsurge in climate change impacts”. <https://public.wmo.int/en/media/press-release/eight-warmest-years-record-witness-upsurge-climate-change-impacts>

UNPACKING TERMINOLOGY²

ADAPTATION | A STATE

Adaptation is a process or action taken in response to actual or projected climate threat that reduces its impact in our community.

RESILIENCE | A CAPACITY

Resilience is the capacity of our community to cope, adapt, and transform ability to prepare for and respond to climate threats.

INTENTION OF THE STRATEGY

The goal of this Dufferin Climate Adaptation Strategy is to compliment the [Dufferin Climate Action Plan](#) by proactively identifying opportunities to advance climate resilience in our community's social, economic, built and natural systems.

The development of this Strategy took a broad approach that involved the community as well as municipal administration. The intent of this Strategy is to help organizations, institutions, businesses, vulnerable populations, and individuals of all ages adapt to current and future climate-related risks and opportunities. Although the County of Dufferin is the lead actor for many actions outlined in the Strategy, numerous climate-related risks extend beyond municipal jurisdiction, requiring the collaboration of important community service providers, local partnerships and other levels of government. As such, the climate actions presented in this Strategy were co-developed using the knowledge and experience of multiple municipal staff, community groups and organizations.

CREATING THE STRATEGY

The development of this Strategy was facilitated by the Municipality's participation in the [ICLEI Canada-led Advancing Adaptation project](#). Funded through a grant from the Ministry of the Environment, Conservation and Parks (MECP) under the Canada-Ontario Agreement (COA), Advancing Adaptation was a two-year initiative that engaged Ontario municipalities to build local capacity for climate change resilience and to advance efforts on adaptation.

Centered around the creation and drafting of an implementation-ready local climate change adaptation plan, the train-the-trainer Adaptation Planning project, brought together a cohort of eleven local governments between June 2021 and December 2022, to participate in multiple training workshops to network, learn, and share experiences about adaptation planning. ICLEI Canada provided expert advice, one-on-one training and consultation throughout the entire planning process, planning resources, training on stakeholder engagement, and support in the drafting and review of the final Dufferin Climate Adaptation Strategy.

2. Congressional Research Service. 2021. "Climate Change: Defining Adaptation and Resilience, with Implications for Policy." <https://sgp.fas.org/crs/misc/IF11827.pdf>

OUR PLACE

Dufferin County is situated on the traditional territory and ancestral lands of the Tionontati (Petun), Attawandaron (Neutral), Haudenosaunee (Six Nations), and Anishinaabe peoples.³

Dufferin County is an upper-tier municipality which is comprised of eight local municipalities:

Township of Amaranth
Township of East Garafraxa
Town of Grand Valley
Township of Melancthon

Town of Mono
Township of Mulmur
Town of Orangeville
Town of Shelburne

Dufferin County has a population of 66,257⁴ and is located in the north-western portion of the Greater Golden Horseshoe (GGH) Area, within the traditional territory and ancestral lands of the Tionontati (Petun), Attawandaron (Neutral), Haudenosaunee (Six Nations), and Anishinaabe Peoples. The beautiful Niagara Escarpment forms a dividing ridge through Dufferin County and it is easily accessed via the Bruce Trail or the Mono Cliffs Provincial Park. Dufferin County is commonly referred to as 'the Headwaters'; as the Saugeen, Nottawasaga, Credit, Grand, and Humber River all have headwaters in Dufferin. Dufferin County's urban areas have a small town feel and a balance with natural beauty, making the County an attractive place to base a business and to live, work, retire, and raise a family. Known for its rivers, rolling hills, and outdoor recreation opportunities, Dufferin County is a largely rural region. Land in Dufferin County is classified as 70% prime agricultural land, boasting 690 farms covering 156,593 acres. Dufferin County's agricultural sector benefits from high-quality agricultural land well-suited to potatoes and to cattle, dairy and mixed farming. The entrepreneurship of the farm community is evident in growing on-farm and farm-related ventures.

3. Museum of Dufferin, 2020. https://www.dufferinmuseum.com/wp-content/uploads/Dufferin-County-Indigenous-History-and-Treaty-Lands-Resource-Document_v1.5.pdf

4. Statistics Canada, 2021. Dufferin County Statistics Profile. shorturl.at/rzIP3



DUFFERIN'S PROGRESS ON CLIMATE ACTION

In May 2018, Dufferin County became part of the [Partners for Climate Protection \(PCP\) program](#), joining a national network of over 500 municipalities across Canada in a commitment to reducing local greenhouse gas (GHG) emissions at both the corporate and community level. The PCP program consists of a five-step Milestone Framework to support local GHG reductions while also creating jobs, improving air quality, resident health, and financial savings. Dufferin County is currently on Milestone 5 of the framework after the adoption of the Dufferin Climate Action Plan in March 2021.

The [Dufferin Climate Action Plan](#) is a strategy for the community to reach net-zero greenhouse gas emissions by 2050. Designed with community well-being at the forefront, the Dufferin Climate Action Plan is anticipated to generate many social, cultural, environmental, and economic benefits in the County. The Plan features 34 key actions under 6 Focus Areas: On the Move, In Our Buildings, For Our Land, Planning Our County, In Our Bins, and Empowering Our Community. While the plan is primarily focused on mitigation, the County applied a low-carbon resilience lens to strategically align greenhouse gas emissions reductions with climate adaptation “to enhance the effectiveness of both strategies, avoid risks, and general economic, ecological, and social benefits”.⁵

To foster accountability, the County has committed to 5-year Plan updates, in addition to an annual report card, to reflect on progress, set next steps, and ensure that climate planning continues to align with community priorities. The next update of the Dufferin Climate Action Plan is scheduled for 2025.

UNPACKING TERMINOLOGY

MITIGATION | AVOIDING THE UNMANAGEABLE

Mitigation is taking action to reduce local greenhouse gas emissions and/or sequester greenhouse gases from the atmosphere. Climate change mitigation refers to the implementation of policy, regulatory and project-based measures that contribute to the stabilization or reduction of greenhouse gas concentrations in the atmosphere. These include anti-idling by-laws, building retrofits to conserve energy, and transitioning to low-carbon energy sources

ADAPTATION | MANAGING THE UNAVOIDABLE

Taking action to adapt to the impacts of climate change such as the increasing frequency and severity of storms, floods, heatwaves, or droughts. This is especially important to protect community members who are most vulnerable to climate change.

Adaptation efforts may focus on changing individual behaviours, updating municipal by-laws and policies, enhancing the capacity of physical infrastructure, and improving ecological services. A community-based adaptation approach can further support local governments in building resilience while reducing vulnerability via meaningful engagement of communities and residents throughout the entire process of adaptation.

The effects of climate change are wide-ranging and will require a range of responses. Both adaptation and mitigation are necessary in responding to climate change. This is because, even if the emission of GHGs were to end tomorrow, the climate will continue to change, due to the inherent lag in the climate system.

Warming Stripes (2018) by Ed Hawkins

CLIMATE EMERGENCY DECLARATION

On September 8, 2022, Dufferin County Council passed a motion to declare a climate emergency, reaffirming the County's commitment to climate action.

The declaration of a climate emergency signals a commitment to urgent climate action to reduce greenhouse gas emissions and adapt to the impacts of a changing climate. With this declaration, Dufferin County is joining 644 Canadian municipalities and over 1,200 jurisdictions globally in acknowledging that climate change poses a serious risk to the environment, infrastructure, and people.

The creation of the Dufferin Climate Adaptation Strategy fulfills one of the commitments the County made as part of the Climate Emergency Declaration.

“Dufferin County is joining municipalities across the world in declaring a climate emergency and committing to further climate action.

As the County continues to integrate climate considerations in policies, strategies, and budgets, this climate emergency declaration will help us respond with the necessary urgency to ensure Dufferin County continues to thrive and embrace new opportunities in a changing climate.”

~ Sonya Pritchard, Chief Administrative Officer

READ THE PRESS RELEASE AT:

[DUFFERINCOUNTY.CA/CLIMATEEMERGENCY](https://dufferincounty.ca/climateemergency)

THE CLIMATE CHALLENGE

CLIMATE BASICS

Climate change is the shift in long-term weather conditions measured by changes in temperature, precipitation, wind, and snow cover, among other indicators, over a period of 30 years or more.⁶ Climate change also refers to changes in the frequency and severity of extreme events such as floods, droughts, fires, heat waves, and storms.

The climate is changing at an alarming rate. Global temperatures have risen by an average of 1.1°C since the late 1800's.⁷ As fossil fuel extraction and consumption continues around the world, warming is accelerating at a faster rate. Earth's average surface temperature in 2020 tied 2016 for the hottest years since record-keeping began in the 1880s.⁸ July 2019 was the second hottest month ever recorded, shrinking Arctic and Antarctic sea ice to historic lows 19.8% below average.⁹

Similar to global trends, Canada has been warming over the last six decades, with annual average surface air temperatures over land warming by 1.7°C since 1948.¹⁰ Weather records from across Canada show that every year since 1998 has been warmer than the 20th century average¹¹, meaning an entire generation of Canadians has never experienced what most of modern history considered a "normal" Canadian climate.

Canada's rate of warming is almost double the global average reported over the same period.

Climate scientists overwhelmingly agree that climate change over the past century is due to human activity: Our energy use, waste management practices, land-use decisions, and agricultural practices produce greenhouse gases linked to current climate change. In fact there is a 99.9% consensus in published research that climate change is caused by human activities.¹²

6. Government of Canada, 2020. <https://www.canada.ca/en/environment-climate-change/services/climate-change/causes.html>

7. Government of Canada, 2020. <https://www.canada.ca/en/environment-climate-change/services/climate-change/causes.html>

8. World Meteorological Association. 2022. "Eight warmest years on record witness upsurge in climate change impacts". <https://public.wmo.int/en/media/press-release/eight-warmest-years-record-witness-upsurge-climate-change-impacts>

9. World Meteorological Association. 2022. "Eight warmest years on record witness upsurge in climate change impacts". <https://public.wmo.int/en/media/press-release/eight-warmest-years-record-witness-upsurge-climate-change-impacts>

10. National Oceanic and Atmospheric Administration (2022). 2021 was World's 6th-warmest Year on Record. NOAA. <https://www.noaa.gov/news/2021-was-worlds-6th-warmest-year-on-record>

11. Prairie Climate Centre, 2020. <http://prairieclimatecentre.ca/>

12. Mark Lynas et al. 2021. "Greater than 99% consensus on human caused climate change in the peer-reviewed scientific literature". <https://iopscience.iop.org/article/10.1088/1748-9326/ac2966>

MONITORING GLOBAL CLIMATE CHANGE

The United Nations 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. The IPCC has been working since 1988 to provide governments at all levels with scientific information on climate change. Thousands of people from all over the world contribute to the IPCC who are responsible for providing regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

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 that:

"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".¹³

As the most urgent report to date, the AR6 reports 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".¹⁴



WHY IS A FEW DEGREES OF CHANGE SO SIGNIFICANT?

Warming of just a few degrees can cause widespread changes in regional and local temperature and precipitation patterns, as well as increase the severity and frequency of extreme weather events.

These changes are associated with a variety of impacts to our society at the local, national, and global scale.



HASN'T EARTH'S CLIMATE ALWAYS BEEN CHANGING? WHY WORRY NOW ?

Although Earth's climate has always fluctuated, human activity has dramatically increased the rate of climate change. It is important to note that all major climatic changes, even natural ones, have been highly disruptive. The speed at which our climate is changing makes it difficult for both human societies and the natural world to adapt.

13. Intergovernmental Panel on Climate Change. 2022. Sixth Assessment Report. <https://www.ipcc.ch/assessment-report/ar6/>

14. Intergovernmental Panel on Climate Change. 2022. Sixth Assessment Report. <https://www.ipcc.ch/assessment-report/ar6/>

CLIMATE PROJECTIONS: DUFFERIN COUNTY

Climate projections capture the relationships between human choices, our emissions, and climate change to help us adapt to future climate conditions. The following data highlights the projected impacts of climate change in Dufferin County. A detailed overview of climate projections for Dufferin County is available in Appendix A.

WHERE DO DUFFERIN'S CLIMATE PROJECTIONS COME FROM?

The Climate Atlas of Canada¹⁵ was used to access downscaled regional climate data for Dufferin County. The Climate Atlas of Canada combines climate science, mapping, and storytelling together with Indigenous Knowledges and community-based research and video to inspire awareness and action.

The average temperature in Dufferin is rising – by about 1°C since 1948, to be exact!

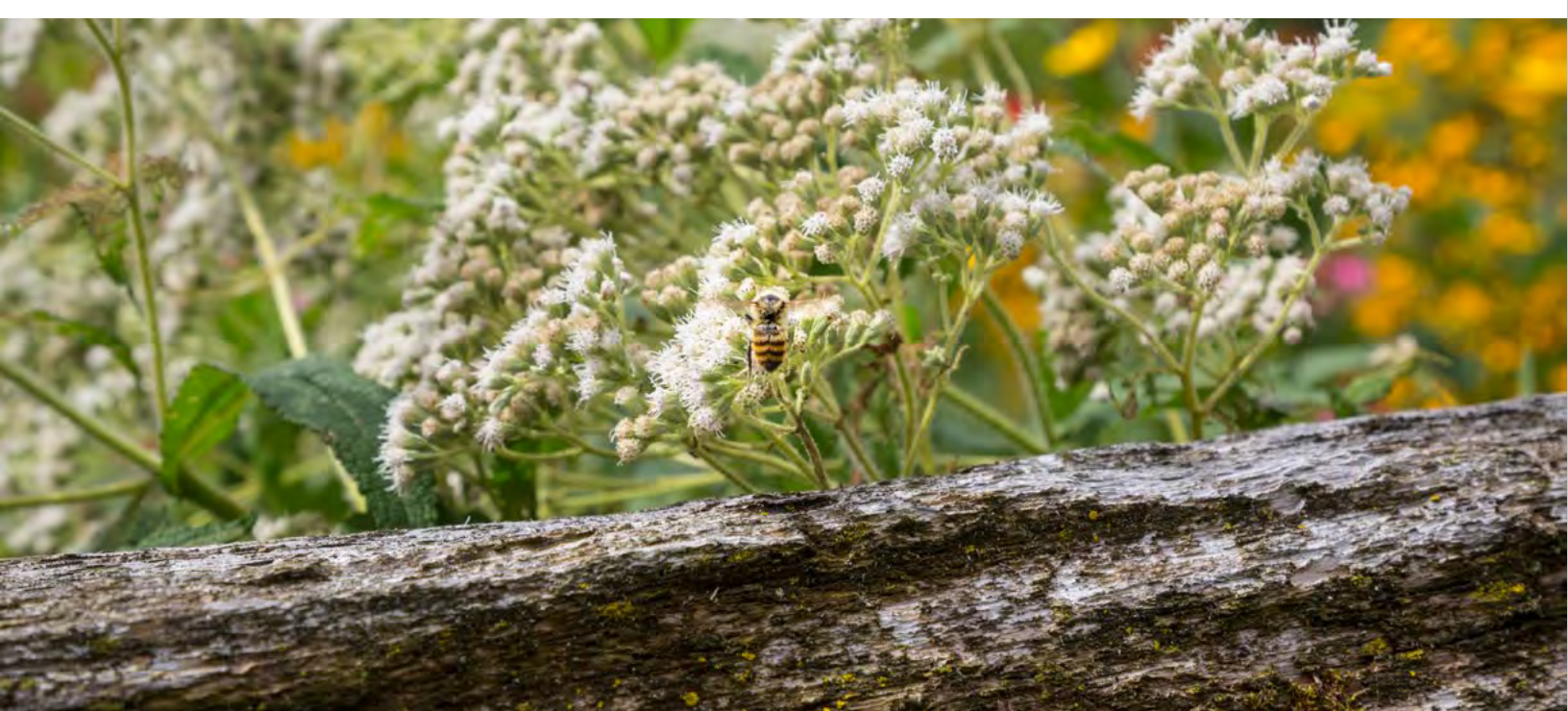
Local climate projections are telling us that we can expect warmer year-round temperatures, including more frequent days with extreme heat. Annual precipitation is expected to increase with more frequent and intense rainfall and snowfall events.

HOW DOES CLIMATE INFORMATION SUPPORT ADAPTATION?

According to the Federation of Canadian Municipalities, "understanding and assessing climatic changes enables local governments to assess climate change risks and plan for adaptation. To understand climatic changes, decision-makers can refer to climate information, which are the results of high-level climate data analysis and trends, while climate variables are those that specifically describe one part of the Earth's climate. Climate information allows for highly contextualized climate adaptation efforts that are not only more accurate and targeted, but are much more robust and effective over the long-term".¹⁶

15. Climate Atlas of Canada. 2022. <https://climateatlas.ca>

16. Talking it Through: A Discussion Guide for Local Government Staff on Climate Adaptation, 2020. <https://data.fcm.ca/documents/resources/MCIP/talking-it-through-discussion-guide.pdf>



SEPTEMBER 2021

FUTURE CLIMATE PROJECTIONS DUFFERIN COUNTY

This infographic was created by ICLEI Canada

Sources: Canadian Climate Data and Scenarios Network, Climate Atlas of Canada Tool, IPCC Special Report on the Ocean and Cryosphere in a Changing Climate.

ANNUAL MEAN TEMPERATURE

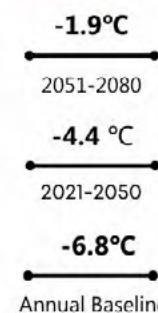
Mean temperatures are projected to increase annually and in every season.



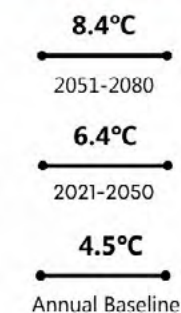
SEASONAL MEAN TEMPERATURES



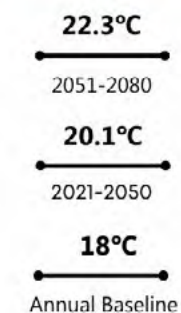
WINTER
DEC - FEB



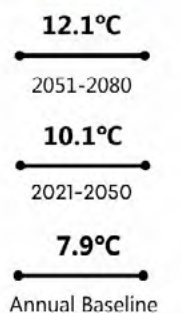
SPRING
MAR - MAY



SUMMER
JUN - AUG



FALL
SEP - NOV



Baseline period: 1990s (1976-2005).

TEMPERATURE EXTREMES



DAYS ABOVE 30°C



DAYS BELOW -15°C



ICING DAYS



FROST DAYS



ANNUAL MEAN FREEZE-THAW CYCLES

There will be a decrease in freeze-thaw cycles, where the daily max. temperature is higher than 0°C and the daily min. temperature is less than or equal to -1°C.



GROWING SEASONS

First frost dates will be later, and last frost days will be earlier.

ANNUAL MEAN PRECIPITATION

Annual precipitation is expected to increase. Winter and Spring are projected to get significantly wetter, with a slight decline in the Summer.



Baseline period: 1990s (1976-2005).

SEASONAL MEAN PRECIPITATION



WINTER
DEC - FEB



SPRING
MAR - MAY



SUMMER
JUN - AUG



FALL
SEP - NOV



HEAVY RAINFALL DAYS

Days with precipitation over 10mm are considered Heavy Rainfall days, and are projected to increase.



PRECIPITATION EVENTS

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



FREQUENCY

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



INTENSITY

Shorter storms will have an increasingly high intensity



DURATION

Return periods of heavy storm will shorten (increased frequency)



FREEZING RAIN EVENTS

Severe freezing rain events (>6 h per day) are projected to increase up to 30% by 2100. Freezing rain events are expected to increase slightly during January, slightly change in December, and decrease in November, March, and April.

WATER TEMPERATURES

Lake basin temperatures will increase. This can negatively impact wetlands, habitats, and biodiversity.



23%

Loss of coldwater stream habitat (<19°C)

WATER LEVELS

Lake Ontario water levels are expected to be lower as water shortages and temperatures increase. Ice cover break-up dates are expected to be earlier while freeze-up dates are expected to be later. Projected warming, particularly in winter months, and less ice cover results in greater loss of water through evaporation.



LOWER WATER

In the long term, warmer temp translates into expectations of lower water levels in the Great Lakes system.



LOSS OF WETLAND

Loss of wetland water budget and abundance of wetland birds, fish, and vegetation, communities.

28.9°C

2051-2080

27.1°C

2021-2050

23.9°C

Lake Basin max. surface temp in 2014



MAXIMUM SURFACE WATER TEMPERATURE

Maximum surface water temperature includes all wetlands and tributaries.





PLANNING FOR CHANGE

ADAPTATION ACTION AT ALL LEVELS

All orders of government and sectors of society have a responsibility to become informed and to take appropriate action to prepare for and adapt to the impacts of climate change.

GLOBAL ACTION

In 2015, Canada was one of 195 countries to sign the [Paris Agreement](#), a global commitment to keep global average temperature rise below 2°C, and as close to 1.5°C as possible. In terms of adaptation, the Agreement has a goal to enhance adaptive capacity, strengthen resilience and reduce vulnerability to global climate change, in line with the temperature goal.

In 2021 at COP26, countries adopted the [Glasgow Climate Pact](#), which calls for a doubling of finance to support developing countries in adapting to the impacts of climate change and building resilience. Glasgow also established a work programme to define a global goal on adaptation, which will identify collective needs and solutions to the climate crisis already affecting many countries.

Climate action is also listed as one of the United Nations' 17 Sustainable Development Goals in a recognition that addressing the climate crisis must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth.

NATIONAL ACTION

In November 2022, the Government of Canada release its first adaptation plan: [“Canada’s National Adaptation Strategy: Building Resilient Communities and a Strong Economy”](#). The strategy outlines a shared path and targeted measures to build climate resilience in five key areas: Disaster Resilience; Health and Wellbeing; Nature and Biodiversity; Infrastructure and; Economy and Workers.

The Strategy reflects two years of engagement with provincial, territorial, and municipal governments; First Nations, Inuit, and Métis Nation representatives; key experts and stakeholders; and people from across Canada. The federal government has also published a map of adaptation actions highlighting case studies from across Canada that explore how communities and sectors are adapting to a changing climate.

The new National Adaptation Strategy builds on the Government of Canada’s strengthened mitigation plan: [“A Healthy Environment and a Healthy Economy”](#). The strengthened mitigation plan is a federal strategy to achieve net-zero emissions by 2050 and exceed the 2030 GHG reduction target of 30% below 2005 levels. The plan includes 64 new measures that build on the 2016 [“Pan-Canadian Framework on Clean Growth and Climate Change”](#). Actions and levers available to the federal government include vehicle fuel-efficiency standards, model national building codes,

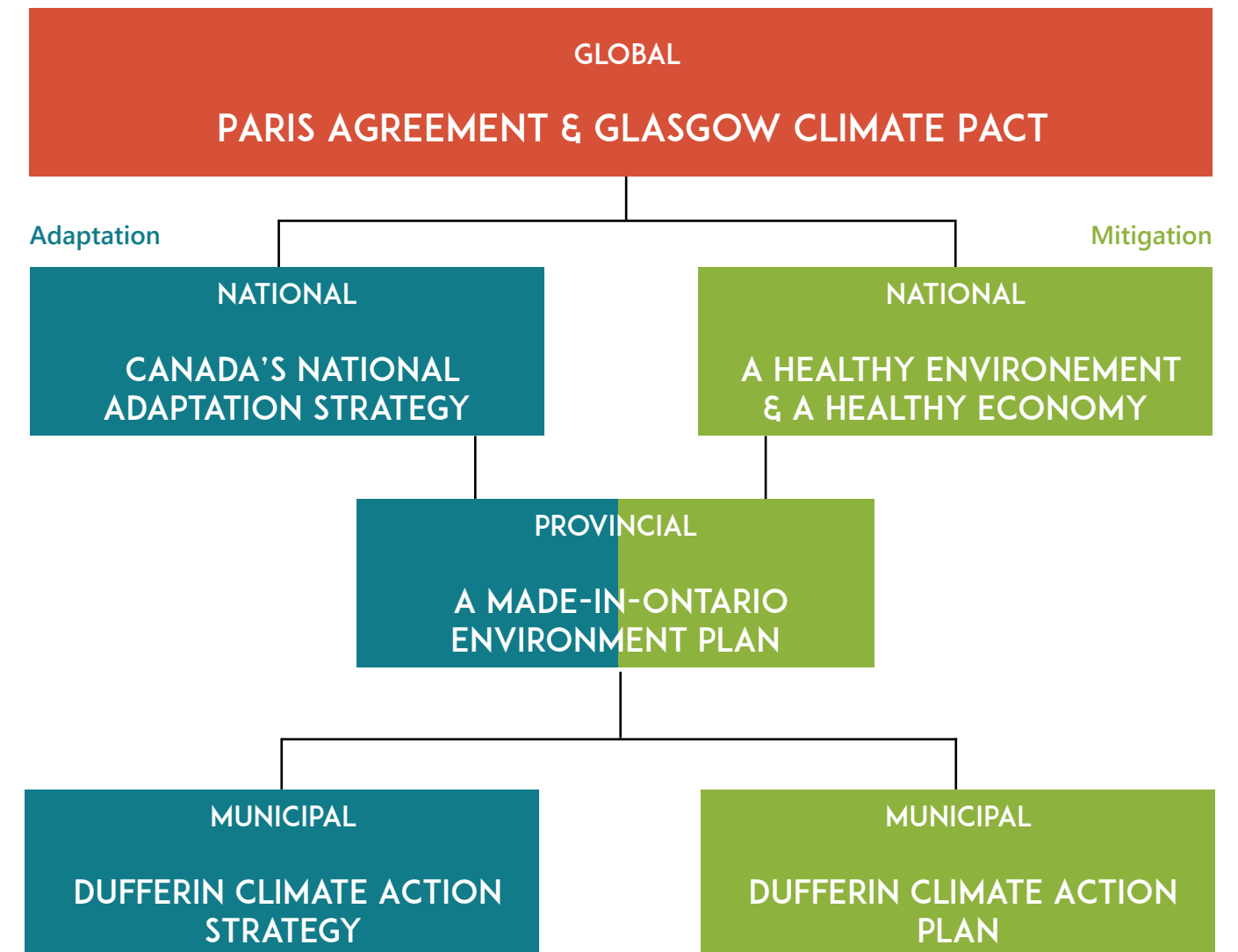
energy ratings, and carbon pricing. Other resources developed by the Government of Canada include the [“Canada in a Changing Climate”](#) report series which provide a national perspective on how climate is impacting Canadian communities, the environment, and its economies.

PROVINCIAL ACTION

In 2018, the Provincial government released [“A Made-in-Ontario Environment Plan”](#) committing to reduce emissions by 30% from 2005 levels by 2030, in alignment with the Federal government’s Paris commitment, and advancing adaptation efforts in Ontario. Strategies to achieve this 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 and includes climate change decision making in land-use and development policy, and enhanced stormwater management policies to enhance climate resilience.

Figure 1: Climate Action Plans - Global to Municipal





THE ROLE OF LOCAL MUNICIPALITIES

Municipalities are on the frontline of the climate crisis. 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.

Adaptation planning at the local level is a key avenue to ensure a place-based approach to a region's unique climate challenges. "As local governments are on the front lines to respond to impacts to key service areas affected by climate change (e.g. infrastructure, parks and recreation, health, transportation, etc.), they have a vested interest in preparing for these impacts, and are uniquely positioned to undertake these efforts".¹⁷

Municipalities cannot shoulder the cost of responding to climate change alone. Climate action is a shared responsibility among all orders of government, and will require a long-term commitment to action. Partnerships between all levels of government and the leveraging of opportunities for investments in the private sector is crucial in financing the robust system change required to address the impacts of climate change and to reduce risk.

17. Talking it Through: A Discussion Guide for Local Government Staff on Climate Adaptation, 2020. <https://data.fcm.ca/documents/resources/MCIP/talking-it-through-discussion-guide.pdf>

However, the future cost of inaction is greater than the investments required today:¹⁸

- By 2025, climate impacts will be slowing Canada's economic growth by \$25 billion annually, which is equal to 50 per cent of projected GDP growth
- All households will lose income, and low-income households will suffer the most. Low-income households could see income losses of 12 per cent in a low emissions scenario and 19 percent in a high emissions scenario by the end of the century — markedly higher losses than the median income group.
- Climate change is a job-killer. Job losses could double by mid-century, and increase to 2.9 million by end-of-century.
- Adaption pays off big. Every dollar spent on adaptation measures saves \$13-\$15, including both direct and indirect economy-wide benefits

Proactive investments in adaptation measures are critical to helping local communities adapt to the changing climate and to reduce risks to residents from acute shocks such as extreme weather as well as chronic climate stressors.

Figure 2: The Municipal Role in Climate Action



18. Canadian Climate Institute, 2022. <https://climateinstitute.ca/reports/the-costs-of-climate-change/#:~:text=Without%20adaptation%2C%20national%20costs%20from,year%20in%20the%20next%20decade.&text=Climate%2Dinduced%20damages%20slow%20Canada's,projected%20GDP%20growth%20in%202025>



Dufferin County is a healthy and resilient community for all that is equitable, socially connected, economically diverse, and has a flourishing environment for current and future generations.

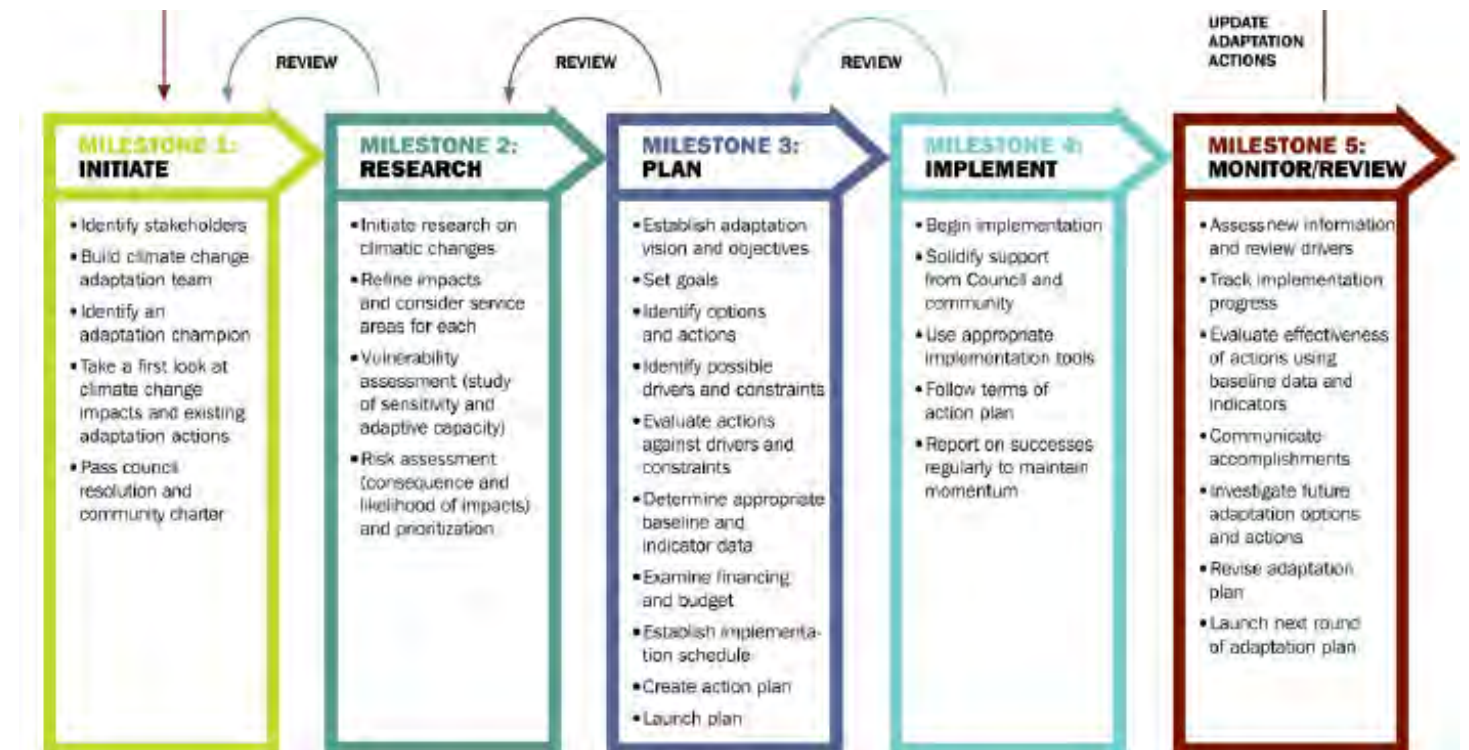
Development of the Strategy was guided by ICLEI Canada’s Building Adaptive and Resilient Communities (BARC program).

BARC is a five-milestone Planning framework for local governments aimed at preparing communities for the impacts of climate change. BARC is a comprehensive planning methodology that guides municipalities through areas of research and climate impact assessment methods, plan development, action-setting processes, implementation planning, and monitoring and review strategies.

As part of the Advancing Adaptation project, Dufferin County worked through and completed Milestone One, Two, and Three of the BARC Framework, culminating in the creation of this Dufferin Climate Adaptation Strategy.

The following sections provide a summary of the work undertaken by the CAWG and Project Team to develop the Dufferin Climate Adaptation Strategy. A detailed overview of this process is available in Appendix B.

Figure 3: BARC Milestone Framework



STRATEGY DEVELOPMENT

“The cost of inaction when it comes to climate change is measurable and mounting. We need to put adaptation and mitigation measures in place now to avoid severe damage to our economy, society, health, and well-being.”

—Rick Smith, President, Canadian Climate Institute

The Dufferin Climate Adaptation Strategy is a strategy for the County, local municipalities, and community members to build climate resilience in the Dufferin County for current and future.

VISION

Throughout 2022, the Climate Adaptation Working Group was engaged to imagine their vision for the future of the municipality. From this, the following vision statement was developed, encompassing the goals of the Dufferin Climate Adaptation Strategy:

UNPACKING TERMINOLOGY

WHAT ARE IMPACT STATEMENTS?

Impact statements are brief statements that summarize the climate related threats to a community. They are created by looking at local climate projections and identifying the potential threats a community might face and how they might affect built, natural, social, and economic systems.

WHAT IS CLIMATE VULNERABILITY?

Climate vulnerability is the degree to which our community is:

1. Sensitive to a climate impact
2. Able to respond to and recover from a climate impact

WHAT IS CLIMATE RISK?

Climate risk is a combination of:

1. The likelihood of a climate impact occurring
2. The severity of the known and estimated social, environmental, and economic consequences of a climate impact

MILESTONE ONE: INITIATE

Fulfilling the criteria of Milestone One, Dufferin County identified a core group of community stakeholders to participate in the adaptation planning process as part of a Climate Change Adaptation Working Group (CAWG).

The working group was crucial in providing topic-specific knowledge and input, ensuring that the Strategy aligned with community needs. Invitees to the working group participated in meetings and workshops to develop the Dufferin Climate Adaptation Strategy and/or were kept informed of progress and were encouraged to provide feedback throughout the development of the Strategy.

MILESTONE TWO: RESEARCH

Milestone Two focused on developing an understanding of local climate change impacts and the major service areas which are likely to be most acutely affected. This was done by developing impact statements and completing a Risk and Vulnerability Assessment.

In September 2021, a Climate Science Report was prepared for Dufferin County by ICLEI Canada. The report used climate models, emission scenarios, and historical weather data to summarize projected changes in temperature and precipitation patterns. These localized projections serve as foundational data to support the identification of vulnerabilities and risks the County will face in a changing climate.

Using the data provided in the Climate Science Report, the CAWG developed 34 impact statements to outline the projected climate threats that Dufferin may face in the short, medium, and long-term.

Afterwards, the CAWG completed a vulnerability assessment for each statement. The purpose of this assessment was to identify what climate impacts Dufferin is most vulnerable to so they are prioritized in adaptation planning. After assigning each impact statement a vulnerability ranking, the CAWG completed a risk assessment. The purpose of this assessment was to further prioritize the climate impacts that pose the greatest risks to Dufferin in adaptation planning. A full summary of the Vulnerability and Risk Assessment Results are available in Appendix C.

Through the vulnerability and risk assessment process 15 climate impacts were prioritized for adaptation planning in Dufferin County.

It is important to note that climate impacts are likely to be felt disproportionately throughout the community. Climate change poses the greatest risk to equity-deserving groups who face deep-rooted social inequities. For instance, seniors, children, persons with disabilities or chronic health conditions, Indigenous, racialized, and low-income populations were identified by the CAWG to be particularly vulnerable to extreme weather events.

Adaptation planning must attend to the task of addressing inequities to ensure that those most impacted by climate change contribute to, access, and benefit from climate solutions.



WHAT ARE EQUITY-DESERVING GROUPS?

Equity-deserving groups are communities that face significant systemic barriers 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-deserving groups are those that identify systemic barriers to equal access, opportunities, and resources due to disadvantage and discrimination and actively seek social justice and reparation.

Table 1: Dufferin County Climate Impact Statements

| Impact Statement | Risk Ranking |
|---|--------------|
| Impact #15: Increased precipitation in Winter and Spring seasons and freezing rain events, resulting in more salt use, damaging water ecosystems and leading to damage to public assets and infrastructure (i.e. buildings, roads, bridges, trees, streetlights, signs, etc.). | High |
| Impact #17: Increase in the frequency/intensity of extreme weather events resulting in the loss of natural features (i.e., flora/fauna mortality, closures of parks, trails, green spaces, loss of landscapes, etc.) and the loss of seasonal or cultural traditions and recreation (i.e., loss of time/physical activity outside, relationship with natural world, etc.) | High |
| Impact #22: Increase in the frequency and intensity of precipitation events causing increased flooding resulting in damage to private assets and infrastructure (i.e., homes, businesses, property, products/inventory, reduced long-term property value, etc.) | High |
| Impact #10: Increase in average winter temperature resulting in destabilization of the snowpack, reducing water recharge, resulting in a reduction of water quantity in the system, including wetlands. | Medium-high |
| Impact #23: Increased frequency/intensity of extreme weather events & Winter/Spring precipitation resulting in more frequent accidents (vehicular and active) and dangerous conditions on sidewalks and walking paths resulting in more legal and financial implications for the County and municipalities (i.e., higher insurance premiums, claims against the municipalities, etc.) | Medium-high |
| Impact #25: Increased frequency/intensity of extreme weather events (especially freezing rain) resulting in increased damage to municipally owned assets and infrastructure (e.g., buildings, signs, streetlights, roads, etc.) resulting in increased maintenance, relocation, or redevelopment of assets and infrastructure. | Medium-high |
| Impact #3: Increased frequency and intensity of precipitation events, resulting in increased runoff from roads and/or agricultural land, leading to erosion of riverbanks and hillsides and the loss of riparian habitat and sediment load for in-stream habitat | Medium-high |
| Impact #18: Increased frequency and duration of hot days (>30°C) resulting in the deterioration of and increased maintenance requirements for roads, culverts, sidewalks, trails, and parking lots. | Medium-high |
| Impact #13: Increased precipitation in Winter and Spring seasons, resulting in more frequent flooding of agriculture fields and soil erosion leading to stressed or failed crops, loss of viable farmland and increased resources to restore degraded land | Medium |
| Impact #12: Increased frequency and intensity of precipitation events (especially in Winter and Spring) and freezing rain events, resulting in increased runoff from roads and agricultural land and more salt use causing contamination of source water | Medium |
| Impact #6: Increased frequency and intensity of precipitation events, resulting in flooding of homes, businesses, and institutions, causing more displacement or evacuation of residents from homes, physical injuries, and mental health impacts/stress (e.g., insurance costs, mold, etc.). | Medium |
| Impact #19: Increased frequency and duration of hot days (>30°C) resulting in project delays, reduced productivity (e.g., from heat stress to workers) and increased need to redesign infrastructure to adhere to higher resiliency standards (i.e. more research, staff capacity, cost, etc.). | Medium |
| Impact #14: Increased precipitation in Winter and Spring seasons (e.g., more standing water) and rising average annual temperatures resulting in a rise in invasive species (e.g., phragmites) and increased risk and spread of vector- borne diseases (e.g. Lyme and West Nile) | Medium |

| Impact Statement | Risk Ranking |
|--|--------------|
| Impact #21: Increased frequency and duration of hot days (>30°C) resulting increased demand and pressure on electric grid, causing more power outages (blackouts and brown outs) and service disruptions (i.e. business, flow of goods/services, etc.) | Medium |
| Impact #27: Increased frequency and duration of hot days (>30°C) resulting in the potential failures of critical systems (e.g., HVAC) and reduced access to cooling resources, leading to increased demand on County operations (e.g., increased call volumes to facility managers). | Medium |

MILESTONE THREE: PLAN

Milestone Three of the BARC Framework is focused on the creation of an adaptation strategy in collaboration with CAWG members and a wide range of community stakeholders.

The development of the Dufferin Climate Adaptation Strategy involved multiple steps including:

- Identifying and addressing gaps in the Vulnerability and Risk Assessment
- Establishing a final list of community climate risks
- Creating a long-term adaptation vision, goals, and objectives
- Identifying and prioritizing adaptation action options
- Developing implementation schedules and a process for action monitoring and review





TAKING ACTION

The Dufferin Climate Adaptation Strategy is organized under 5 Focus Areas:

| | |
|--|--|
| Buildings and Infrastructure | Actions to minimize incidences of damage and wear on municipal and private infrastructure |
| Energy and Economy | Actions to support the maintenance and hardening of energy infrastructure and exploring alternative energy systems to increase system resiliency |
| Agriculture and Natural Environment | Actions to manage, rehabilitate, and enhance climate resilience in natural systems and increase resilience in the agriculture sector |
| People and Health | Actions to minimize the direct and indirect human health impacts of climate change |
| Enabling Actions | Actions to increase municipal capacity to respond to extreme weather events, effectively engage with and communicate risks to the public, and build financial capacity |

KEY

In addition to presenting recommended actions for each focus area, the Dufferin Climate Adaptation Strategy identifies a variety of other elements central to each action item, the implementation timeframe, supporting partners, and a list of potential co-benefits associated with each action. Further implementation details for each action item can be found in Appendix D of this strategy.

The schematic below provides an overview of elements present in the action tables.

OBJECTIVE

These are “big picture” goals that will contribute to a significant reduction of community GHG emissions and/or build community capacity and resilience.

ACTION

These are the initiatives that will be undertaken to achieve each objective.

What This Will Look Like

These are the detailed activities required to support the core actions and objectives.

TIME FRAME

Each action scheduled to begin implementation in either the:

Short Term (>2 years)

Medium Term (2 – 5 years)

Long Term (5+ years)

LEAD

identifies department, division, or external partner who will lead or co-lead the implementation of the action.

SUPPORTING PARTNERS

Community partners such as organizations, businesses, institutions, utilities, or conservation authorities who can collaborate with the County on the planning and implementation of climate action items.

***Note: DC = Dufferin County**



BUILDINGS & INFRASTRUCTURE

“Taking proactive adaptation measures can cut the costs of climate change impacts and provide a strong return on investment, saving money in the long-term while paving the way for a more sustainable and prosperous future for Canadians.”

~ Susan McGeachie, Head of BMO Climate Institute, BMO Financial Group

In recent years, the County of Dufferin has experienced increased incidences of damage and wear on municipal infrastructure and private properties.

The impacts are linked to more frequent extreme weather events including increased intensity of rainfall, runoff and erosion, more frequent flooding, and changes to freeze-thaw cycles. These changing conditions will affect the ways in which buildings, road infrastructure and landscapes are designed, constructed, managed, and maintained.

Dufferin County is committed to strengthening the resilience it’s infrastructure systems by incorporating a climate lens into capital planning, designing and construction of buildings and roads. By investing now in climate resilient infrastructure, the County can mitigate the costs of future climate impacts and protect the health and safety of the community.

The actions outlined in Buildings and Infrastructure fall under two objectives that are focused on minimizing incidences of damage and wear on municipal and private infrastructure.

OBJECTIVE 1

Strengthen the resilience of private buildings and infrastructure to climate-related risks and impacts.

ACTION BI.1

Encourage homeowners and property owners to improve the climate resilience of residential and private property through upgrades and/or retrofits.

WHAT THIS WILL LOOK LIKE

- Incorporate climate resiliency assessments into Home Energy Retrofit Program design
- Include and distribute educational resources on climate-resilient building materials, best practices in construction for local climate resiliency, and available incentive programs (e.g. County Hurricane Clip Program) to the building permitting process.

TIMEFRAME

- Short

LEAD

- DC: Climate & Energy
- DC: Building

SUPPORTING PARTNERS

- DC: Finance
- Local municipalities
- Homebuilders Association
- Ontario Contractors Association
- Dufferin Board of Trade

ACTION BI.2

Encourage home and property owners to implement best practices in stormwater management on their home or property to reduce flooding risk

WHAT THIS WILL LOOK LIKE

- Increase offerings of educational workshops and resources to home and property owners to increase flood prevention and effective stormwater management measures (e.g. rain barrels, rain gardens, back flow valves)
- Explore creating an on-property stormwater management incentive program (e.g. County-wide rain barrel program)

TIMEFRAME

- Short

LEAD

- DC: Climate & Energy
- DC: Building

SUPPORTING PARTNERS

- DC: Finance
- Local municipalities
- Homebuilders Association
- Ontario Contractors Association
- Dufferin Board of Trade

ACTION BI.3

Create framework for adopting a Green Development Standard to build resiliency and complete communities (e.g. low-impact development, flood mitigation measures, access to green space, enhanced tree canopy).

WHAT THIS WILL LOOK LIKE

- Partner with local municipalities, planners, and Conservation Authorities to protect existing natural assets (e.g., wetlands, forests, and other greenspaces) and enhance new communities.
- Build partnerships to provide updated mapping and data to support the creation of localized resiliency standards
- Investigate best practices in other municipalities that have implemented GDS
- Explore opportunities to increase climate resiliency in new buildings by promoting higher building standards, and updating by-laws, development guidelines, and zoning regulations.
- Encourage the province to adopt progressive building codes that reflect current climate projections.

TIMEFRAME

- Short

LEAD

- DC: Planning
- DC: Climate & Energy

SUPPORTING PARTNERS

- Local municipal staff and planners
- Conservation Authorities



OBJECTIVE 2

Strengthen resilience of corporate assets and infrastructure to climate-related risks and impacts.

ACTION BI.4

Incorporate a climate lens into asset management, capital planning, and budgetary processes.

WHAT THIS WILL LOOK LIKE

- Identify changing risks of chronic climatic impacts and adapt asset management accordingly and include more frequent infrastructure condition assessments (e.g. increased runoff, erosion, freeze-thaw cycles leading to increased road wash outs).
- Identify opportunities to increase resiliency in buildings when retrofits or renovations are planned.
- Identify opportunities to increase resiliency in road infrastructure when replacements, reconstructions or renewals are planned.

TIMEFRAME

- Short

LEAD

- DC: Finance
- DC: Climate & Energy
- DC: Engineering
- DC: Operations
- DC: Facilities

SUPPORTING PARTNERS

- DC: Procurement
- Funding Partners: FCM/GMF, CCBF tax
- Private sector partnerships

ACTION BI.5

Periodically review and implement best practices in climate resilient infrastructure, design, materials, stormwater management and flood mitigation measures.

WHAT THIS WILL LOOK LIKE

- Create working group or community of practice to share key findings with Dufferin municipalities
- Identify ongoing training and education opportunities on climate resilient infrastructure for staff
- Seek opportunities, partners, and funding to implement nature-based solutions for stormwater management on municipal and private property (e.g. creation of wetlands)
- Create inventory and assess storm structures to determine vulnerability and to improve their adaptive capacity
- Require that infrastructure projects (e.g. upsize culvert replacements where applicable, etc.) use IDF curves that reflect localized climate modelling
- Educate homeowners on right-sizing and locating trees to avoid hydro lines

TIMEFRAME

- Short

LEAD

- DC: Engineering
- DC: Operations
- DC: Building
- DC: Planning
- DC: Climate & Energy

SUPPORTING PARTNERS

- Local municipal staff and planners

ACTION BI.6

Develop a County road infrastructure resiliency program.

WHAT THIS WILL LOOK LIKE

- Complete inventory and State of Infrastructure Review to understand performance and condition of assets
- Identify economic and emergency routes and roads most at risk to prioritize for resiliency upgrades
- Review and update standard cross section (including embankments)
- Review and improve drainage corridors
- Explore the use of technology (e.g. AI, drones) to improve efficiency of monitoring and reporting of critical road infrastructure

TIMEFRAME

- Short

LEAD

- DC: Engineering
- DC: Operations

SUPPORTING PARTNERS

- DC: Climate & Energy





ENERGY & ECONOMY

“The cost of inaction when it comes to climate change is measurable and mounting. We need to put adaptation and mitigation measures in place now to avoid severe damage to our economy, society, health, and well-being.”

~ Rick Smith, President, Canadian Climate Institute

Climate change can pose significant risks to the local economy, not only for business’ operations, but also to their suppliers, employees, customers, and people living in the areas in which they operate.

Dufferin County will support businesses in becoming climate-ready to ensure the continuity of operations, improve their ability to reduce and manage risk, and build and maintain a positive reputation within the community.

The engine that drives the local economy is reliant on a consistent supply and reliable energy grid for heating and cooling, the delivery of essential services and the function of business. The importance of a resilient electrical grid will only grow as we increasingly electrify our transportation systems, our homes and businesses. The County will continue to work with local utilities to support the maintenance and hardening of energy infrastructure, while also exploring alternative energy systems to increase system resiliency.

The actions in Energy & Economy fall under two objectives focused on supporting the maintenance and hardening of energy infrastructure and exploring alternative energy systems to increase system resiliency.

OBJECTIVE 1

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

ACTION EE.1

Provide guidance to local businesses on how to maintain business continuity (e.g. supply chain) during extreme weather

WHAT THIS WILL LOOK LIKE

- Partner with BIAs and gauge local businesses’ interest in establishing/participating in a local best practice network (e.g. business continuity and emergency planning, green business practices, adaptation measures) that meets annually to discuss adaptation measures in business operations.
- Explore different avenues (e.g. a business breakfast, open houses, workshops, etc.) to host a climate change and business event.

TIMEFRAME

- Medium

LEAD

- DC: Economic Development
- DC: Climate & Energy

SUPPORTING PARTNERS

- Local Business Improvement Areas
- Dufferin Board of Trade
- Local municipal businesses
- Local municipal Staff



OBJECTIVE 2

Increase the resilience of energy distribution infrastructure to extreme weather through strategic planning and retrofits.

ACTION EE.2

Increase the resilience of energy distribution infrastructure to extreme weather through strategic planning and retrofits.

WHAT THIS WILL LOOK LIKE

- Explore opportunities and feasibility of decentralized energy generation, storage and distribution in the County
- Partner with utility companies to conduct localized vulnerability assessment infrastructure Investigate feasibility of burying powerlines in localized areas to prevent power outages caused by extreme weather (i.e. ice, wind, snow, heavy rain, etc.)
- Track long-term indirect and direct costs of power outages/damages for full-cost accounting to help justify upgrades/system hardening.
- Explore opportunities and feasibility of decentralized energy generation, storage and distribution in the County

TIMEFRAME

- Medium

LEAD

- Local Utilities
- DC: Climate & Energy

SUPPORTING PARTNERS

- IESO
- Private Sector

ACTION EE.3

Ensure all municipal-owned facilities providing critical services (i.e. critical road intersections, vulnerable population facilities such as LTC homes, etc.) have reliable, low-carbon, back-up power systems in place.

WHAT THIS WILL LOOK LIKE

- Conduct a feasibility study investigating strategic back-up battery storage and photovoltaic solar systems at critical buildings to support continuity of municipal services.
- Investigate mobile generator for the interim, including relevant equipment installed at buildings to receive standby power.
- Periodically review best practices, innovations and emerging technologies

TIMEFRAME

- Long

LEAD

- DC: Facilities
- DC: Climate & Energy

SUPPORTING PARTNERS

- Local Utilities
- Private Sector



AGRICULTURE & NATURAL ENVIRONMENT

“A farmer’s connection to climate is inextricable. We rely on being able to work with the weather. This used to be a more reasonable expectation, but in recent years extreme weather scenarios mean at every farm conference the topic of Climate Change Adaptation is being talked about.”

~ Shannon, Local Farmer

Changing seasonal patterns, water availability, extreme weather events, and pest and disease present challenges for Dufferin’s agriculture sector and natural environment.

Dufferin County has a rich natural heritage and vibrant agricultural community. Land in Dufferin County is classified as 70% prime agricultural land and the County boasts 690 farms covering 156,593 acres. Dufferin is also an important headwater area, as it offers the source of five major river systems in the Province: The Credit, Humber, Grand, Saugeen and Nottawasaga.

Agriculture, by nature, is sensitive to a changing climate. Increasing temperatures, shifting precipitation patterns, and changes in the frequency and intensity of severe weather events are currently and projected to affect crops and livestock operations. Adoption of regenerative agriculture practices — including improved fertilizer management, adoption of no-till practices to minimize soil disturbance, and improved water-use efficiency— can help the sector strengthen resilience to climate change.

In Dufferin, our natural environment provides us with important services such as clean air, water, among many other ecosystem services. It also helps us mitigate climate change by sequestering carbon from the atmosphere. As the climate continues to change and ecosystems shift in response, their capacity to provide these services will be affected. Maintaining, restoring and managing ecosystems to address climatic stressors are key to reducing their vulnerability in the face of climate change.

The actions outlined in Agriculture and Natural Environment fall under two objectives that are focused on managing, rehabilitating, and enhancing natural systems and supporting Dufferin farmers in accelerating the adoption of regenerative agriculture practices.

OBJECTIVE 1

Support the protection, rehabilitation, and enhancement of natural systems to foster climate resiliency.

ACTION AN.1

Increase uptake of sustainable land use and management practices by residents and landowners

WHAT THIS WILL LOOK LIKE

- Research barriers to participation in existing forest management programs and explore options to fill gaps and increase uptake
- Increase awareness of external programs that support landowners in adopting sustainable land use practices by sharing information through County communication channels
- Increase awareness and participation in County-funded land enhancement programs by sharing information through County communication channels and hosting educational workshops
- Provide ongoing educational resources and co-host workshops with local experts on sustainable land use management practices

TIMEFRAME

Short

LEAD

- Conservation Authorities
- DC: Climate and Energy

SUPPORTING PARTNERS

- DC: Forest
- DC: Finance
- Dufferin Federation of Agriculture
- Local municipalities
- Dufferin Board of Trade





ACTION AN.2

Implement and support nature-based solutions to enhance water security, habitat restoration, and reduce habitat fragmentation.

WHAT THIS WILL LOOK LIKE

- Actively partner with organizations and leverage funding opportunities to support habitat restoration projects
- Work with County and local municipal planners to minimize the replacement, degradation, or fragmentation of existing natural assets through zoning and site plan approvals
- Review Rural Water Quality Program with an increased focus on supporting climate resilience
- Investigate options to increase climate-resilient tree plantings on private properties

TIMEFRAME

- Short

LEAD

- DC: Climate and Energy
- DC: Forest
- DC: Planning
- Conservation Authorities

SUPPORTING PARTNERS

- Dufferin Federation of Agriculture
- Ontario Soil and Crop
- Ontario Woodlot Association
- Restoration and conservation-focused not-for-profits

OBJECTIVE 2

Support best practices within agricultural management systems to enhance climate resilience.

ACTION AN.3

Increase uptake of regenerative agricultural practices in partnership with farmers to increase soil organic matter, reduce soil erosion, and improve water security.

WHAT THIS WILL LOOK LIKE

- Actively seek opportunities to participate in research projects investigating the link between climate resilience and regenerative agriculture
- Continue to leverage partnerships to incentivize the adoption of regenerative agriculture practices and explore expansion of existing programs (e.g. Experimental Acres)
- Support and share communications from existing organizations that encourage long-term climate friendly practices tailored to diverse producers.

TIMEFRAME

- Short

LEAD

- DC: Climate and Energy

SUPPORTING PARTNERS

- Dufferin Federation of Agriculture
- Conservation Authorities
- Ontario Woodlot Association
- Ontario Soil and Crop
- Regional municipalities
- Headwaters Food and Farming Alliance
- Academic Institutions



PEOPLE & HEALTH

“Public health has made tremendous gains over the past century in improving the health and lives of people in Canada and around the world. Working with other sectors, we must build on these strengths to better prepare for and respond to what the World Health Organization calls the greatest health threat of our time.”

~ Dr. Theresa Tam, Canada’s Chief Public Health Officer

Climate change poses both direct and indirect risks to the health and well-being of our community.

Direct health risks result from exposures to severe weather events such as floods, storms, or heatwaves. Indirect risks are connected to a range of social, environmental, cultural, and economic conditions that effect health. It is important to note that these related health risks are not experienced the same within a community. These vulnerable populations include:

- Seniors
- Children
- Indigenous and racialized populations
- 2SLGBTQIA+ individuals
- Recent immigrants
- Outdoor workers
- Socially and physically isolated individuals
- Individuals with low socio-economic status
- Individuals with existing chronic diseases
- Individuals with mental health conditions, and individuals with disabilities/disabled often experience greater health impacts of climate change¹⁹

19. Region of Waterloo Public Health and Wellington-Dufferin-Guelph Public Health Unit, 2022. <https://wdgpublichealth.ca/reports/climate-change-and-health-vulnerability-assessment>

Refer to Appendix E for a detailed overview of key vulnerable populations of concern in the Wellington-Dufferin-Guelph Public Health Unit.

Action is required now to prevent these impacts and ensure our community is resilient to the growing threats to health. The actions outlined in People and Health fall under three objectives that are focused on increasing resilience to the health impacts of climate related emergencies and stressors.

OBJECTIVE 1

Minimize and manage climate-related health and safety risks for municipal staff.

ACTION PH.1

Review, develop and update policies, procedures, and training to ensure County staff are safe during extreme weather conditions and encourage local municipalities to adopt similar policies and procedures.

WHAT THIS WILL LOOK LIKE

- Review and update policies and procedures with climate resiliency lens (e.g. Inoculation, PPE, Heat Stress and No Working Alone policies, etc.)

TIMEFRAME

- Medium

LEAD

- Dufferin County: Health and Safety

SUPPORTING PARTNERS

- DC: Emergency Management Division
- DC: Climate and Energy Division
- DC: Information Technology
- Local Municipal Staff



OBJECTIVE 2

Enhance social infrastructure in order to minimize and manage climate-related health and safety risks for residents.

ACTION PH.2

Establish and enhance emergency preparedness communications and programs for residents to strengthen personal resiliency to climate impacts

WHAT THIS WILL LOOK LIKE

- Explore community-wide surveys to determine gaps in emergency preparedness programs and communications
- Expand emergency preparedness programming and provision of emergency kits to residents (e.g. emergency kits for new residents; partner with local organizations)
- Connect residents to existing mental health supports after an extreme weather event
- Educate residents on potential insurance coverage gaps and encourage extended coverage where appropriate
- Develop a media toolkit that can be strategically deployed during periods of high news coverage and public attention on extreme weather events

TIMEFRAME

- Short

LEAD

- DC: Emergency Preparedness Division
- DC: Climate and Energy

SUPPORTING PARTNERS

- DC: Community Services
- DC: Fire and Paramedic Services
- Public Health
- Community Newcomer Organizations

ACTION PH.3

Review, develop and update policies, and procedures to ensure residents, in particular those most vulnerable, are safe during extreme weather conditions.

WHAT THIS WILL LOOK LIKE

- Establish social infrastructure designed to meet the needs of vulnerable populations in order to minimize and manage climate-related health and safety risks for residents (e.g. strategically located heating/cooling centres with transportation plans)
- Update evacuation and shelter-in-place plans to integrate increasing risks from climate change; revitalize plans with recovery sections to support damage repairs
- Explore options for emergency notification system
- Develop response plan for prolonged periods of extreme heat (3+ days over 30°C)

TIMEFRAME

- Medium

LEAD

- DC: Emergency Preparedness Division

SUPPORTING PARTNERS

- DC: Climate and Energy
- DC: Paramedics
- DC: Community Services
- Dufferin County Managing, Organizing, Validating, Engagement Strategy (DC MOVES)
- Public Health
- Home and community care organizations

ACTION PH.4

Enhance community connectivity to increase emergency response capacity during climate change related emergencies

WHAT THIS WILL LOOK LIKE

- Provide grants to community-led initiatives that strengthen social connectivity and build capacity for emergency response
- Develop a training program for community volunteers and service club members to provide response and assistance to residents and businesses in times of weather emergency
- Explore options for neighbourhood emergency hubs and kits

TIMEFRAME

- Short

LEAD

- DC: Emergency Preparedness Division
- DC: Climate and Energy
- HCIA

SUPPORTING PARTNERS

- Museum of Dufferin
- DC: Community Services
- Neighbourhood Groups
- Public Health

ACTION PH.5

Monitor and plan for increasing risk of vector-borne disease in the community

WHAT THIS WILL LOOK LIKE

- Partner with Wellington-Dufferin-Guelph Public Health to amplify awareness and educational communications about vector-borne diseases to the public (e.g. West Nile virus)

TIMEFRAME

- Ongoing

LEAD

- Public Health

SUPPORTING PARTNERS

- DC: Climate and Energy Division
- DC: Forest
- DC: Community Services
- DC: Emergency Management
- DC: Early ON
- Local municipalities
- Conservation Authorities



OBJECTIVE 3

Protect tenants in multi-residential buildings from excessive heat in their units.

ACTION PH.6

Establish maximum-temperature by-law for rental properties

WHAT THIS WILL LOOK LIKE

- Determine maximum temperature allowance
- Investigate grant programs for tenants to mitigate potential financial burden
- Prepare a common municipal property standards by-law and enforcement program for the approval of local councils across Dufferin
- Launch awareness programs for tenants and landlords
- Conduct training for municipal by-law enforcements officers

TIMEFRAME

- Short

LEAD

- Dufferin County: Climate and Energy

SUPPORTING PARTNERS

- DC: Housing Services
- DC: Facilities
- Local municipalities
- Local housing providers
- Wellington-Dufferin-Guelph Public



ENABLING ACTIONS

“Increasing our adaptive capacity is a worthwhile investment. The scale of funds and efforts necessary to advance climate action today is far less than the costs associated with delayed action and damages from climate change impacts down the road”.

~ Sara MacRae, Manager of Climate and Energy, Dufferin County

The successful completion of adaptation actions requires a strategic approach and increased access to tools and information.

Dufferin County is moving forward to implement the actions outlined in the Dufferin Climate Adaptation Strategy. This requires a strategic approach to maximize the drivers for and overcome barriers to successful climate action implementation. According to a 2019 report developed by the Clean Air Partnership, examining climate action implementation in other Ontario municipalities, there are five key cross-sectorial drivers of climate action: funding, community partnerships, staff capacity, mainstreaming climate action, and strategic prioritization.

The actions outlined in Enabling Actions fall under three objectives that are focused increasing municipal capacity to respond to extreme weather events, effectively engage with and communicate risks to the public, and build financial capacity.



OBJECTIVE 1

Increase capacity of municipalities to respond to extreme weather (mitigating damages, restoring services, etc.).

ACTION EA.1

Secure new tools and technologies to accelerate and enhance adaptation initiatives.

WHAT THIS WILL LOOK LIKE

- Develop financial stream to support adoption of new technologies (See EA. 4)
- Research and adopt new tools and technologies

TIMEFRAME

- Short

LEAD

- DC: Operations
- DC: Engineering
- DC: Climate and Energy
- DC: Finance

SUPPORTING PARTNERS

- Dufferin Federation of Agriculture
- Conservation Authorities
- Ontario Woodlot Association
- Ontario Soil and Crop
- Regional municipalities
- Headwaters Food and Farming Alliance
- Academic Institutions

ACTION EA.2

Build redundancies into operations to ensure service continuity and improve response to significant weather events and emergencies.

WHAT THIS WILL LOOK LIKE

- Develop Southern Operations Centre to improve response to significant weather events and emergencies
- Cross-training staff to break down silos and encourage collaborative workplace culture through measures like “bring-a-colleague-to-work-day”; giving all staff one cross-training day per year, managers work as their employees for a day, etc.
- Enhance relationships and partnership with local municipalities and other regional ops., including cross-training opportunities

TIMEFRAME

- Short

LEAD

- DC: People and Equity
- DC: Public Works

SUPPORTING PARTNERS

- Local municipalities

ACTION EA.3

Establish mandatory training for County and local municipal staff on climate change.

WHAT THIS WILL LOOK LIKE

- Develop climate change onboarding materials for new staff
- Deliver division specific training to empower staff to lead adaptation initiatives
- Connect staff with third-party training opportunities annually to enhance climate

TIMEFRAME

- Short

LEAD

- DC: Climate and Energy

SUPPORTING PARTNERS

- DC: Human Resources

OBJECTIVE 2

Optimize public communications strategies for extreme weather and other climate impacts.

ACTION EA.4

Enhance efficacy of public communications for emergency preparedness and response initiatives.

WHAT THIS WILL LOOK LIKE

- Collaborate with community stakeholders to identify effective communication channels to reach equity-deserving groups

TIMEFRAME

- Short

LEAD

- DC: Corporate Communications

SUPPORTING PARTNERS

- DC: Community Services
- DC: Climate and Energy
- DC: Emergency Management
-

OBJECTIVE 3

Build financial capacity to plan for and respond to climate related threats.

ACTION EA.5

Create a Climate Reserve Fund to build financial capacity to respond to impacts of climate change and build resiliency

WHAT THIS WILL LOOK LIKE

- Develop criteria to determine how and when reserve funds are utilized
- Allocate a portion of any budget surplus towards a climate response and mitigation reserve

TIMEFRAME

- Short

LEAD

- DC: Finance
- DC: Climate and Energy

SUPPORTING PARTNERS

- DC: Community Services
- DC: Climate and Energy
- DC: Emergency Management



FIRST PRIORITY ACTIONS

“As Dufferin County implements the Dufferin Climate Adaptation Strategy a strategic approach will be adopted to prioritize actions that address our greatest climate risks while also maximizing co-benefits in our community”.

~ Scott Burns, Director of Public Works & County Engineer, Dufferin County

In order to respond quickly and effectively to high-risk climate impacts, five actions will be prioritized for implementation over the next 5 years.



1. Create framework for adopting a Green Development Standard to build resiliency and complete communities (e.g. low-impact development, flood mitigation measures, access to green space, enhanced tree canopy). (BH.3)



2. Encourage homeowners and property owners to improve climate resilience of residential and private property through upgrades and/or retrofits. (BH.1)



3. Establish and enhance emergency preparedness communications and programs for residents to strengthen personal resiliency to climate impacts. (PH.3)



4. Increase uptake of regenerative agricultural practices in partnership with farmers to increase soil organic matter, reduce soil erosion, and improve water security. (AN.3)



5. Incorporate a climate lens into asset management, capital planning, and budgetary processes. (BH.4)



IMPLEMENTING THE STRATEGY

Dufferin County will adopt seven key implementation strategies to maximize the positive environmental, social, and economic impacts of climate action. Five of the implementation strategies align with the capacity building drivers identified by the Clean Air Partnership and two additional strategies will be adopted, focused on engagement and equity, to ensure the Dufferin Climate Adaptation Strategy is community focused:

1. Building community relationships
2. Leveraging funding
3. Increasing staff capacity
4. Institutionalizing climate action
5. Strategic prioritization
6. Centering equity
7. Mobilizing a culture of climate action

BUILDING COMMUNITY PARTNERSHIPS

Climate action is most effective and widespread when implementation is a shared responsibility between local governments and community delivery partners. Dufferin County can mobilize community delivery agents and partnerships during implementation to maximize the efficiency, reach, cost-effectiveness, and credibility of adaptation. Another advantage of the partnership approach is the reduction of municipal risk and the ability to build community capacity through the leveraging of municipal funding.

Potential partners on climate initiatives could include utilities, community groups, non-profit organizations, local schools, conservation authorities, local businesses and associations, academic institutions, and other municipalities.

LEVERAGING FUNDING

Dufferin County can effectively and efficiently implement the actions outlined in this Strategy by leveraging a range of funding programs from the Federal and Provincial Governments, as well as third-party organizations. A list of active funding programs is available in Appendix F. of the Strategy.

INCREASING STAFF CAPACITY

The Clean Air Partnership identifies sufficient staff capacity as a key driver of successful climate action implementation, and, conversely, the lack thereof as a key barrier to implementation. Climate action can be advanced by having staff capacity to coordinate climate actions internally across multiple departments, manage technical projects, apply to and administer grants, and to integrate a greater number of municipal policies, plans, and adaptation programs. In addition, staff capacity is also necessary to directly liaise with community partners, coordinate outreach, and raise awareness for climate programs. It is recommended that Council continue to support the securement of funding for climate staff to ensure the successful implementation of the Dufferin Climate Adaptation Strategy.

INSTITUTIONALIZING CLIMATE ACTION

To ensure long-term accountability and continuity, it is essential that adaptation action planning is embedded into the plans, policies, and procedures of Dufferin County and the local municipalities. Moving forward, Dufferin County can institutionalize climate planning by incorporating adaptation goals into Official Plans, secondary plans, budgets, by-laws, RFPs, and communication and reporting processes.

CENTERING EQUITY

The County recognizes its role in dismantling all forms of systemic racism derived from white supremacy, including but not limited to anti- Black and anti- Indigenous racism, sexism, ableism, transphobia, and homophobia that operate on the personal, interpersonal, and institutional levels. For adaptation initiatives to achieve and support equity goals within the Dufferin County, equity must be a core consideration in the planning and implementation phases of each individual action. A next step for Dufferin County will be the co-creation of evaluation criterion, in collaboration with People and Equity and equity-deserving communities, to ensure that all community members benefit from climate action initiatives and are not inequitably burdened by climate impacts.

MOBILIZING A CULTURE OF CLIMATE ACTION

Dufferin County is committed to facilitating ongoing conversations about climate action in the community. Communication, education, and outreach efforts will work to continually raise awareness of climate change impacts, facilitate knowledge sharing among community members, encourage action, develop community partnerships, and celebrate successes.



OVERSIGHT AND GOVERNANCE

Dufferin County Council will be responsible for the adoption and implementation of the Strategy, while local municipal councils will be encouraged to adopt or create their own community climate action plans to align with the County's direction.

The benefits of this model is that it enables the County to play a leadership role by planning for long-term financial and resource support, while sharing the responsibility for Strategy implementation, and leveraging the capital of the community, the private sector and other levels of government for those strategies that are beyond municipal responsibility.

The CAWG was instrumental in the creation of this Strategy and will be encouraged to continue to support both the broad implementation of the Dufferin Climate Adaptation Strategy and provide technical expertise in projects where appropriate.

MEASURING PROGRESS

Monitoring and evaluating the implementation of the Dufferin Climate Adaptation Strategy is critical to reaching our adaptation goals. Specific monitoring metrics have been identified for each action, outlined in Appendix D. The monitoring of these metrics on a regular basis will allow Dufferin County to determine how to best allocate resources to support implementation and measure the success of action items.

ANNUAL REPORT CARD

Dufferin County will establish an annual report card on the progress of the Dufferin Climate Adaptation Strategy. Report cards should include the status of the actions in the Strategy, and a brief commentary on required next steps, as well as amendments made to action items, if any. The Report Card will be presented to Council annually and made available to the public on the [Climate Action in Dufferin webpage](#).

STRATEGY UPDATES

The Dufferin Climate Adaptation Strategy is intended to function as a living document. As such, the Strategy will be formally reviewed and updated every 5 years to report on progress, set next steps, and ensure that climate planning continues to align with community priorities. The annual report card and 5-year strategy updates will also provide the County with an opportunity to review implementation success from an equity and justice perspective, reflecting on lessons learned, and further opportunities to work towards climate justice in the community.

BUILDING ORGANIZATIONAL CAPACITY

The implementation of the Dufferin Climate Adaptation Strategy will require resources, leadership, and partnerships to achieve local climate targets. The strategy will be complimented by detailed resourcing and divisional implementation plans outlining additional staff capacity, capital funds, and technical support that will be required to be successful.

These required resources must be understood in the context of the cost of inaction – that is, the scale of funds and efforts necessary to advance climate action today is far less than the costs associated with delayed action and damages from climate change impacts down the road.

THE PATH FORWARD

With meaningful action from the County, local municipalities, businesses, organizations, schools, and individuals we can create a prosperous future for the current and future generations of Dufferin County.

Adapting to the challenges posed by a changing climate is a monumental task, but it is also an enormous opportunity to tap into the numerous co-benefits of climate action. A dynamic community that embraces supports and enhances local agriculture, grows sustainable and vibrant urban centers, and protects land, water, and air, stimulates local economies, creates healthy and equitable neighbourhoods, is resilient in the face of climate change.

The solution to climate change is community. Climate change effects everyone and everyone has a role to play – if we work together, we can accelerate climate action and transform our community vision into reality.

CLIMATE ACTION TAKES A COMMUNITY!

This vision of our Dufferin Climate Adaptation Strategy is to build a healthy and resilient community for all that is socially connected, economically diverse, and has a flourishing environment for current and future generations.

But we can't do this alone! To succeed, climate action must be a shared responsibility within our community. Everyone has a role to play and every role is important. Visit Dufferin County's Climate Hub to discover the high-impact actions you can take to help create Dufferin's climate-resilient future!

[Visit dufferincounty.ca/climatechange](https://dufferincounty.ca/climatechange)

APPENDICES

APPENDIX A: CLIMATE PROJECTIONS

TEMPERATURE

Temperatures in the Dufferin County are expected to rise in congruence with the provincial changes observed in the data above. The Climate Atlas of Canada tool was used to collect downscaled climate projections, using a baseline of 1976-2005. Within the tool, Orangeville (region) was selected to collect this information, as it was best available area with long-range observed historical data and future climate projections for the County.

In Dufferin County there is a projected annual temperature increase between 2.1°C in the immediate future and 4.3°C by 2080 from the baseline mean under scenario RCP 8.5. Table 2 depicts the projected temperatures using an ensemble of global climate models and applying the RCP 4.5 and RCP 8.5 (business as usual) scenario.

Table 2: Projected Mean Temperatures for Dufferin County (°C) by Season – RCP 4.5 and 8.5

| EMISSIONS SCENARIOS | T-MEAN (°C) | BASELINE (1976-2005) | 2021-2050 | | | 2051-2080 | | |
|---------------------|-------------|----------------------|-----------|------|------|-----------|------|------|
| | | | LOW | MEAN | HIGH | LOW | MEAN | HIGH |
| RCP 4.5 | Spring | 4.5 | 4.0 | 6.3 | 8.7 | 4.9 | 7.3 | 9.8 |
| | Summer | 18 | 18.3 | 19.8 | 21.4 | 19.0 | 20.9 | 22.9 |
| | Fall | 7.9 | 9.9 | 11.6 | 10 | 8.9 | 10.7 | 12.5 |
| | Winter | -6.8 | -7.3 | -4.6 | -1.8 | -6.2 | -3.3 | -0.5 |
| | Annual | 6.0 | 6.6 | 7.9 | 9.3 | 7.3 | 9.0 | 10.6 |
| RCP 8.5 | Spring | 4.5 | 4.0 | 6.4 | 8.9 | 5.9 | 8.4 | 11.0 |
| | Summer | 18 | 18.6 | 20.1 | 21.8 | 20.5 | 22.3 | 24.3 |
| | Fall | 7.9 | 8.4 | 10.1 | 11.9 | 10.2 | 12.1 | 13.9 |
| | Winter | -7.3 | -7.1 | -4.4 | -1.5 | -4.8 | -1.9 | 0.9 |
| | Annual | 6.0 | 6.7 | 8.1 | 9.5 | 8.7 | 10.3 | 11.9 |

HOT DAYS

Days where the daily maximum temperatures exceed 30°C present the greatest threats to community health due to heat-related illnesses. Examples of these include heat cramps, heat edema, heat exhaustion, or heat stroke. Specific groups, such as those who work outside, infants and young children, older adults (over the age of 65), those with chronic medical conditions, people experiencing homelessness, people planning outdoor sports or activities, and those with limited mobility may be more adversely affected. Moreover, while higher summer temperatures increase electricity demand for cooling, at the same time, it also can lower the ability of transmission lines to carry power, possibly leading to electricity reliability issues during heat waves.

The baseline average number of days when the maximum temperature was greater than or equal to 30°C was 5.1 days for Dufferin County. This is expected to increase to an average of 41.1 days in the 2051-2080 period under the RCP8.5 scenario. This means there will be close to eight times more days above 30°C by 2080 in the County.

Table 3: Extreme Heat Days (Tmax ≥30°C) for Dufferin County - RCP 4.5 and 8.5

| EMISSIONS SCENARIOS | TMAX (DAYS) | BASELINE (1976-2005) | 2021-2050 | | | 2051-2080 | | |
|---------------------|--------------|----------------------|-----------|------|------|-----------|------|------|
| | | | LOW | MEAN | HIGH | LOW | MEAN | HIGH |
| RCP 4.5 | 30°C or more | 5.1 | 3.8 | 16.7 | 33.4 | 7.5 | 26.2 | 48.2 |
| RCP 8.5 | 30°C or more | 5.1 | 5.3 | 18.5 | 34.6 | 18.5 | 41.1 | 64.3 |

With regards to the average length of heat waves (in days), the Dufferin County experienced an average of 1.4 days of heatwave conditions in the baseline period as displayed in Table 3. In the 2051-2080 period, according to RCP 8.5, Dufferin County can expect to see an average heatwave event occurring for 6.4 days – over quadruple the current length.

Overall, heatwave events are projected to occur more frequently and for longer periods of time. These changes become more pronounced as time goes on, and with regards to the higher emissions scenarios. Sustained over several days at a time, these extreme temperatures will have significant impacts on the health of individuals in Dufferin County – heat illnesses can manifest quickly, and lead to long-term health problems and even death. Overexposure to extreme heat is especially dangerous for children and elderly adults, and those who work outside or are physically active in the outdoors.

FREEZE THAW

A freeze-thaw cycle is any day where the minimum temperature is below 0°C and the maximum temperature is above 0°C. The RCP 8.5 ensembles project that freeze-thaw cycles will decrease due to overall warmer temperatures. This is likely due to the fact that overall, the days are getting warmer, and Dufferin County is likely to experience an decrease in the number of days that reach a minimum temperature below 0°C.

Under these conditions, it is likely that some water at the surface was both liquid and ice at some point during the 24-hour period. Freeze-thaw cycles can have major impacts on infrastructure. Water expands when it freezes, so the freezing, melting and refreezing of water can over time cause significant damage to roadways, sidewalks, and other outdoor structures. Potholes that form during the spring, or during mid-winter melts, are good examples of the damage caused by this process.

Table 4: Average Annual Freeze-Thaw Cycles for Dufferin County – RCP 4.5 and 8.5

| EMISSIONS SCENARIOS | BASELINE (1976-2005) | 2021-2050 | | | 2051-2080 | | |
|---------------------|----------------------|-----------|------|------|-----------|------|------|
| | | LOW | MEAN | HIGH | LOW | MEAN | HIGH |
| RCP 4.5 | 68.4 | 49.2 | 66.0 | 83.9 | 47.3 | 64.7 | 81.7 |
| RCP 8.5 | 68.4 | 48.2 | 65.0 | 82.1 | 43.1 | 59.4 | 75.3 |

PRECIPITATION

On a seasonal basis, in Dufferin County, spring, winter and autumn precipitation accumulations are projected to increase by the end of the century with spring and winter experiencing the greatest increases. These seasonal trends, including relatively stable summer rainfall amounts paired with the projected increases in summer temperatures and heatwave lengths may lead to increased instances of drought. Table 5 presents the precipitation accumulation projections for Dufferin County according to seasons under RCP4.5 and 8.5.

For Dufferin County, the baseline average annual precipitation 905 mm. In a high emission scenario, Dufferin County can expect to experience an average annual precipitation increase of 55 mm during 2021-2050 and 81 mm during 2051-2080.

Table 5: Projected Annual Precipitation (mm) by Season for Dufferin County – RCP. 4.5 and 8.5

| EMISSIONS SCENARIOS | T-MEAN (°C) | BASELINE (1976-2005) | 2021-2050 | | | 2051-2080 | | |
|---------------------|-------------|----------------------|-----------|------|------|-----------|------|------|
| | | | LOW | MEAN | HIGH | LOW | MEAN | HIGH |
| RCP 4.5 | Spring | 220 | 160 | 235 | 318 | 165 | 242 | 329 |
| | Summer | 236 | 150 | 239 | 345 | 143 | 240 | 349 |
| | Fall | 244 | 166 | 251 | 347 | 171 | 262 | 362 |
| | Winter | 205 | 157 | 223 | 296 | 164 | 231 | 303 |
| | Annual | 905 | 784 | 948 | 1116 | 783 | 975 | 1174 |
| RCP 8.5 | Spring | 220 | 165 | 242 | 330 | 175 | 256 | 347 |
| | Summer | 236 | 141 | 238 | 345 | 138 | 234 | 352 |
| | Fall | 244 | 167 | 254 | 350 | 165 | 254 | 358 |
| | Winter | 205 | 161 | 226 | 299 | 171 | 242 | 319 |
| | Annual | 905 | 780 | 960 | 1150 | 801 | 986 | 1176 |

HEAVY OR EXTREME PRECIPITATION

Heavy Precipitation Days (both 10 mm and 20 mm) are days on which at least a total of 10 mm (or 20 mm) of rain or frozen precipitation falls. Frozen precipitation is measured according to its liquid equivalent: 10 cm of snow is usually about 10 mm of precipitation. Max 1-Day precipitation and Max-5 Day precipitation indicate the amount of precipitation that falls on the wettest day of the year, and the five wettest days of the year respectively. The Max 1-Day precipitation amount could be the result of a short but intense precipitation event such as a storm or because a moderate amount of snow/rain falls continuously all day, rather than all at once.

Across the County, heavy precipitation days are expected to increase by approximately 3 days for 10 mm days and 2 days for 20 mm days according to RCP 8.5 by 2051-2080. Maximum 1-Day and 5-day events are also expected to increase across the County, with the greatest increase in 5-day events. For example, Max 5-Day events are projected to increase from a baseline of 64 mm to 73 mm by 2051-2080 for RCP 8.5.

Table 6: Heavy Precipitation Days for Dufferin County - RCP 4.5 and 8.5

| VARIABLE | EMISSIONS SCENARIOS | BASELINE (1976-2005) | 2021-2050 | | | 2051-2080 | | |
|---------------------------------|---------------------|----------------------|-----------|------|------|-----------|------|------|
| | | | LOW | MEAN | HIGH | LOW | MEAN | HIGH |
| HEAVY PRECIPITATION DAY (10 MM) | RCP 4.5 | 25.7 | 20.0 | 27.3 | 35.0 | 20.2 | 28.4 | 37.0 |
| | RCP 8.5 | 25.7 | 20.0 | 28.0 | 36.7 | 21.2 | 28.8 | 37.1 |
| HEAVY PRECIPITATION DAY (20 MM) | RCP 4.5 | 6.3 | 3.4 | 7.2 | 11.0 | 4.0 | 7.9 | 12.3 |
| | RCP 8.5 | 6.3 | 3.5 | 7.4 | 11.6 | 4.2 | 8.4 | 12.8 |
| MAX 1-DAY PRECIPITATION (MM) | RCP 4.5 | 41 | 29 | 44 | 67 | 30 | 45 | 67 |
| | RCP 8.5 | 41 | 29 | 44 | 65 | 31 | 47 | 71 |
| MAX 5-DAY PRECIPITATION (MM) | RCP 4.5 | 64 | 48 | 68 | 98 | 49 | 71 | 103 |
| | RCP 8.5 | 64 | 48 | 69 | 97 | 50 | 73 | 103 |



APPENDIX B: STRATEGY DEVELOPMENT

MILESTONE ONE: INITIATE

Fulfilling the criteria of Milestone One, Dufferin County identified a core group of community stakeholders to participate in the adaptation planning process as part of a climate change adaptation working group (CAWG).

Climate change is expected to impact a wide range of areas in Dufferin County such as health, infrastructure, agriculture, and the natural environment. As such diverse community stakeholder were invited to participate in the CAWG.

The working group was crucial in providing topic-specific knowledge and input, ensuring that the Strategy aligned with community needs. By building upon the expertise of these individuals, the CCCAP is reflective of a wide range of perspectives and identifies needs and priorities for Dufferin County. Invitees to the working group participated in meetings and workshops to develop the CCCAP and/or were kept informed of progress and were encouraged to provide feedback throughout the development of the Strategy.

MILESTONE TWO: RESEARCH

Milestone Two focused on developing an understanding of local climate change impacts and the major service areas which are likely to be most acutely affected. This was done by developing impact statements and completing a Risk and Vulnerability Assessment.

IMPACT IDENTIFICATION

The CAWG developed 34 impact statements to outline the projected climate threats that Dufferin may face in the short, medium, and long-term.

Climate-related impact statements are the foundation of the vulnerability and risk assessment process. These are concise statements that outline locally relevant projected threats and how these changes are expected to affect the built, natural, social, and economic systems across the District. They bring together knowledge of climate change and projected changes into the medium- and long-term as well as knowledge of the local conditions in the jurisdiction that is being studied.

Over 42 potential impacts were identified but through revisions and discussions this was reduced to 34. These impacts cover a range of affected areas including infrastructure, the natural environment, public health and safety, tourism, and more. Impact statements were further organized by climate event to help the CAWG better understand the focus and scope of each impact. Climate event categories include:

- Increased in temperature (annual, fall, spring, summer, winter)
- Changing water temperatures and water levels
- Increased temperature variability (moving from high to low)
- Drier conditions (summer)
- Increasing extreme summer temperatures and heatwaves
- Changes in precipitation (annual, all seasons) and changes in Intensity-Duration-Frequency (IDF)
- Increased frequency and intensity of freezing rain
- Increased extreme weather events (e.g. freezing rain, wind, thunderstorms, tornadoes, etc.)

VULNERABILITY ASSESSMENT

After the CAWG developed impact statements, they completed a vulnerability assessment for each statement. The purpose of this assessment was to identify what climate impacts Dufferin is most vulnerable to so they are prioritized in adaptation planning.

Vulnerability is a function of two criteria – the sensitivity of the community to a given climate change impact, and its adaptive capacity, or ability to cope, with given climate change impacts.

Sensitivity is determined by assessing 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, maintain regular functionality, etc. In contrast, adaptive capacity refers to the ability of systems, institutions, individuals, and other assets to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. To determine adaptive capacity, participants considered the time and resources required to restore the community or assets 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 vulnerability assessment was carried out using an online survey and was completed by the CAWG. A 'dotmocracy' methodology was used, and under the premise of the impact occurring today, both sensitivity and adaptive capacity were considered when assigning a vulnerability ranking to each of the 34 impact statements.

To determine sensitivity, how the functionality of the community would be affected should the impact occur today is considered. This includes assessing how the impact would affect the community's ability to deliver and access services, maintain regular functionality, etc. In contrast, adaptive capacity refers to the ability of systems, institutions, individuals, and other assets to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. To determine adaptive capacity, participants considered the time and resources required to restore the community or assets 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 results from this vulnerability assessment provided a first look at prioritizing the 34 impact statements before doing a more in-depth consideration of future risk. Vulnerability rankings that are "high" indicate the impacts to which the County is sensitive or has low adaptive capacity (ability to cope or recover). The results of the vulnerability assessment identified 7 high ranking impacts, 22 medium ranking impacts, and 5 low ranking impacts.

Table 7: Vulnerability Ranking Summary

| Vulnerability Ranking | Number of Impacts |
|---|-------------------|
| High Vulnerability Very vulnerable to harm arising from the impact | 7 |
| Medium Vulnerability Somewhat vulnerable to harm arising from the impact | 22 |
| Low Vulnerability Not/not at all vulnerable to the harm arising from the impact | 5 |

Impacts that received a "low" ranking were not carried forward into the risk assessment process, leaving a total of 29 impacts that were further analyzed.

RISK ASSESSMENT

After assigning each impact statement a vulnerability ranking the CAWG completed a risk assessment. The purpose of this assessment was to further prioritize the 29 climate impacts that pose the greatest risks to Dufferin in adaptation planning.

Risk is the combination of the probability of an event occurring and its negative consequences. It can be expressed as a function of likelihood x 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. When determining likelihood, both recurring (flooding, extreme weather) and slow-onset events (biodiversity loss, shifting eco regions) were considered and rated on a scale of 1 – 5, with 1 being 'rare', and 5 being 'almost certain'. These ratings were informed both by the localized climate change projections, as well as local knowledge and expertise of current conditions.

Table 8: Likelihood Scoring Criteria

| Likelihood | Rating | Recurrent Impact | Slow Onset |
|----------------|--------|---|---|
| Almost Certain | 5 | At least once per year (Annual chance: 100%) | Almost certain - 95% or greater chance of occurrence in next 50 years |
| Likely | 4 | Once in 1 to 5 years (Annual chance: 20%-100%) | Likely - 65% to 90% chance of occurrence in next 50 years |
| Possible | 3 | Once in 5 to 10 years (Annual chance: 10% to 20%) | Possible - 35%-65% chance of occurrence in next 50 years |
| Unlikely | 2 | Once in 10 to 50 years (Annual chance: 2% to 10%) | Unlikely - 5% to 35% chance of occurrence in next 50 years |
| Very unlikely | 1 | Once in 50 years or more (Annual chance: <2%) | Very unlikely - less than 5% chance of occurrence in next 50 years |

Consequences referred to the known or estimated consequences of a particular impact. To determine consequences, the working group assessed the impacts across twelve different consequence criteria divided into three categories – economic, social, and environmental.

Table 9: Consequence Scoring Categories

| Social Consequences | Economic Consequences | Environmental Consequences |
|---------------------|------------------------|----------------------------|
| Health & Safety | Property Damage | Air |
| Displacement | Local Economy & Growth | Soil and Vegetation |
| Loss of Livelihood | Community Livability | Water |
| Cultural Aspects | Public Administration | Ecosystem Function |

Each of the twelve criteria receive a score from 1 – 5, ranking from 'negligible' to 'catastrophic'. As such, each impact receives a risk score for each category, as well as one overall risk score. This was intended to demonstrate that while certain impacts may not rank high in one category, it may have significant consequences in another. As such, both category risks and overall risk scores were used to prioritize the impacts moving forward into planning.

Impacts were prioritized if they had an overall risk score of medium or higher, or if they had an overall risk score of medium-low but at least one category-specific risk score that was medium or higher. This was done to ensure that impacts that posed a significant risk to a specific category were not left out of the process.

The complete results of the risk assessment are outlined below in Table 10.

Table 10: Risk and Vulnerability Assessment Results

| IMPACT ID | IMPACT STATEMENT | VULNERABILITY RANKING | LIKELIHOOD (/5) | SOCIAL RISK SCORE (/100) | ECONOMIC RISK SCORE (/100) | RISK SCORE (/100) | TOTAL RISK SCORE (/300) | OVERALL RISK RANKING |
|-----------|--|-----------------------|-----------------|--------------------------|----------------------------|-------------------|-------------------------|----------------------|
| 1 | Increased frequency and duration of hot days (>30°C), resulting in increased dry days/drought conditions and heat stress on livestock and crops, leading to increased demand for appropriate resources (e.g. water to cool animals and for irrigation, shading structures, etc.) | High | 4 | 28 | 36 | 40 | 104 | Medium-low |
| 2 | Increased frequency and duration of hot days (>30°C) resulting in higher risk of grass and wildfires, causing damage to farms, and damaging sensitive ecosystems, as well as causing physical health impacts from lower air quality and mental health impacts on those that are displaced. | High | 3 | 33 | 36 | 48 | 117 | Medium-low |
| 3 | Increased frequency and intensity of precipitation events, resulting in increased runoff from roads and/or agricultural land, leading to erosion of riverbanks and hillsides and the loss of riparian habitat and sediment load for in-stream habitat | Medium | 5 | 40 | 60 | 65 | 165 | Medium-high |
| 4 | Increase in extreme weather events, including more frequent and intense precipitation & severe freezing rain events resulting in disruptions to or failure of hydro infrastructure and telecommunication lines, prolonging outages and potentially resulting in compounding concurrent climate events (e.g., sump pump can't operate during power outage, leading to flooding). | High | 5 | 45 | 50 | 40 | 135 | Medium |
| 5 | Increase in hot days over 30°C resulting in heatwaves & reduced air quality leading to health and safety risks (e.g. domestic violence/violent altercations, cardiovascular disorders, heat stress, food-borne/water-borne illnesses, etc.) to vulnerable populations (e.g. Seniors, women, children, those with chronic health conditions, temporary foreign workers, those without AC, etc.) | High | 5 | 50 | 40 | 30 | 120 | Medium-low |

| IMPACT ID | IMPACT STATEMENT | VULNERABILITY RANKING | LIKELIHOOD (/5) | SOCIAL RISK SCORE (/100) | ECONOMIC RISK SCORE (/100) | RISK SCORE (/100) | TOTAL RISK SCORE (/300) | OVERALL RISK RANKING |
|-----------|--|-----------------------|-----------------|--------------------------|----------------------------|-------------------|-------------------------|----------------------|
| 6 | Increased frequency and intensity of precipitation events, resulting in flooding of homes, businesses, and institutions, causing more displacement or evacuation of residents from homes, physical injuries, and mental health impacts/stress (e.g. insurance costs, mold, etc.). | High | 5 | 60 | 55 | 30 | 145 | Medium |
| 7 | Increased frequency and intensity of precipitation events, resulting in overburdening and stress on sewers and waste water treatment facilities, including more raw sewage bypass discharges to local watercourses, contaminating local water. | Medium | 5 | 30 | 25 | 40 | 95 | Medium-low |
| 8 | Increase in average annual temperature and decrease in cold days, resulting in potential livestock mortality/crop failure (i.e. disrupted growth cycles and growing regions of temperature sensitive plants/crops, more invasive species, etc.) leading to loss of livelihood | High | 3 | 24 | 48 | 39 | 108 | Medium-low |
| 9 | INcreased hot days (>30°C) and increase in average annual resulting in drought events, low water levels, and low base flow, leading to stress on natural ecosystems (e.g. changing wetland boundaries, plant mortality, biodiversity loss, pollinator impacts, decreased shade canopy) and reduce water quality. | High | 3 | 21 | 21 | 27 | 69 | Low |
| 10 | Increase in average winter temperature resulting in destabilization of the snowpack, reducing water recharge, resulting in a reduction of water quantity in the system, including wetlands. | High | 5 | 40 | 75 | 65 | 180 | Medium-high |
| 11 | Increase in water temperatures, resulting in more frequent algae blooms resulting in reduced oxygen levels in water causing potential species die off | High | 2 | 16 | 14 | 18 | 48 | Very-low |

| IMPACT ID | IMPACT STATEMENT | VULNERABILITY RANKING | LIKELIHOOD (/5) | SOCIAL RISK SCORE (/100) | ECONOMIC RISK SCORE (/100) | RISK SCORE (/100) | TOTAL RISK SCORE (/300) | OVERALL RISK RANKING |
|-----------|---|-----------------------|-----------------|--------------------------|----------------------------|-------------------|-------------------------|----------------------|
| 12 | Increased frequency and intensity of precipitation events (especially in Winter and Spring) and freezing rain events, resulting in increased runoff from roads and agricultural land and more salt use causing contamination of source water | High | 5 | 40 | 65 | 50 | 155 | Medium |
| 13 | Increased precipitation in Winter and Spring seasons, resulting in more frequent flooding of agriculture fields and soil erosion leading to stressed or failed crops, loss of viable farmland and increased resources to restore degraded land | High | 4 | 40 | 60 | 56 | 156 | Medium |
| 14 | Increased precipitation in Winter and Spring seasons (e.g., more standing water) and rising average annual temperatures resulting in a rise in invasive species (e.g. phragmites) and increased risk and spread of vector-borne diseases (e.g. Lyme and West Nile) | High | 5 | 55 | 45 | 35 | 135 | Medium |
| 15 | Increased precipitation in Winter and Spring seasons and freezing rain events, resulting in more salt use, damaging water ecosystems and leading to damage to public assets and infrastructure (i.e. buildings, roads, bridges, trees, streetlights, signs, etc.). | Low | 5 | 75 | 75 | 65 | 215 | High |
| 16 | Increased frequency and intensity of extreme weather events and increased intensity/frequency of precipitation events, resulting in more damage to natural systems, leading to a decreased ability for natural systems to provide ecosystem services (i.e. reduced shading from extreme heat, landscape more vulnerable to flooding, depleted aquifer recharge abilities, reduced air quality from tree decline, etc.). | High | 3 | 36 | 45 | 45 | 126 | Medium |

| IMPACT ID | IMPACT STATEMENT | VULNERABILITY RANKING | LIKELIHOOD (/5) | SOCIAL RISK SCORE (/100) | ECONOMIC RISK SCORE (/100) | RISK SCORE (/100) | TOTAL RISK SCORE (/300) | OVERALL RISK RANKING |
|-----------|---|-----------------------|-----------------|--------------------------|----------------------------|-------------------|-------------------------|----------------------|
| 17 | Increase in the frequency/intensity of extreme weather events resulting in the loss of natural features (i.e. flora/fauna mortality, closures of parks, trails, green spaces, loss of landscapes, etc.) and the loss of seasonal or cultural traditions and recreation (i.e. loss of time/physical activity outside, relationship with natural world, etc.) | High | 4 | 64 | 64 | 68 | 196 | High |
| 18 | Increased frequency and duration of hot days (>30°C) resulting in the deterioration of and increased maintenance requirements for roads, culverts, sidewalks, trails, and parking lots. | High | 5 | 35 | 65 | 60 | 160 | Medium-high |
| 19 | Increased frequency and duration of hot days (>30°C) resulting in project delays, reduced productivity (e.g. from heat stress to workers) and increased need to redesign infrastructure to adhere to higher resiliency standards (i.e. more research, staff capacity, cost, etc.). | High | 5 | 40 | 55 | 45 | 140 | Medium |
| 20 | Increased frequency and duration of hot days (>30°C) resulting in increased energy demand (i.e. costs) for cooling for businesses, residents, and institutions | High | 5 | 30 | 55 | 25 | 110 | Medium-low |
| 21 | Increased frequency and duration of hot days (>30°C) resulting increased demand and pressure on electric grid, causing more power outages (blackouts and brown outs) and service disruptions (i.e. business, flow of goods/services, etc.) | Medium | 5 | 45 | 55 | 30 | 130 | Medium |
| 22 | Increase in the frequency and intensity of precipitation events causing increased flooding resulting in damage to private assets and infrastructure (i.e. homes, businesses, property, products/inventory, reduced long-term property value, etc.) | High | 5 | 60 | 70 | 65 | 195 | High |

| IMPACT ID | IMPACT STATEMENT | VULNERABILITY RANKING | LIKELIHOOD (/5) | SOCIAL RISK SCORE (/100) | ECONOMIC RISK SCORE (/100) | RISK SCORE (/100) | TOTAL RISK SCORE (/300) | OVERALL RISK RANKING |
|-----------|--|-----------------------|-----------------|--------------------------|----------------------------|-------------------|-------------------------|----------------------|
| 23 | Increased frequency/intensity of extreme weather events & Winter/Spring precipitation resulting in more frequent accidents (vehicular and active) and dangerous conditions on sidewalks and walking paths resulting in more legal and financial implications for the County and municipalities (i.e. higher insurance premiums, claims against the municipalities, etc.) | Medium | 5 | 60 | 65 | 50 | 175 | Medium-High |
| 24 | Increase in extreme weather events resulting in demand for emergency shelters (i.e. heating, cooling, power generation) requiring increased emergency planning and resources for municipalities. | High | 4 | 44 | 36 | 24 | 104 | Medium-Low |
| 25 | Increased frequency/intensity of extreme weather events (especially freezing rain) resulting in increased damage to municipally owned assets and infrastructure (e.g. buildings, signs, streetlights, roads, etc.) resulting in increased maintenance, relocation, redevelopment of assets and infrastructure | High | 5 | 55 | 65 | 55 | 175 | Medium-High |
| 26 | Increased extreme weather events (including severe freezing rain events and precipitation) resulting in unsafe road and travel conditions, resulting in disruptions to all transportation (active & vehicular), emergency services, and other essential services (i.e. food systems, medical care/hospitals, airports, etc.) | Medium | 4 | 44 | 48 | 44 | 136 | Medium |
| 27 | Increased frequency and duration of hot days (>30°C) resulting in the potential failures of critical systems (e.g., HVAC) and reduced access to cooling resources, leading to increased demand on County operations (e.g., increased call volumes to facility managers). | Medium | 5 | 50 | 55 | 25 | 130 | Medium |

| IMPACT ID | IMPACT STATEMENT | VULNERABILITY RANKING | LIKELIHOOD (/5) | SOCIAL RISK SCORE (/100) | ECONOMIC RISK SCORE (/100) | RISK SCORE (/100) | TOTAL RISK SCORE (/300) | OVERALL RISK RANKING |
|-----------|--|-----------------------|-----------------|--------------------------|----------------------------|-------------------|-------------------------|----------------------|
| 28 | Increased frequency and duration of hot days (>30°C) resulting in heat-related stress and illness to outdoor workers (i.e. maintenance, construction, etc.) | Medium | 5 | 35 | 45 | 20 | 100 | Medium-Low |
| 29 | Increase in the frequency/intensity of extreme weather events & back-to-back events resulting in higher mental and physical health implications (from hazardous travel/living conditions, power outages, unsafe food safety practices, etc.) for residents | High | 4 | 44 | 28 | 16 | 88 | Medium-Low |

The distribution of the Risk Assessment results is displayed in below:

Table 11: Risk Assessment Results Summarized

| Risk Ranking | Number of Impacts |
|--------------|-------------------|
| High | 3 |
| Medium-High | 5 |
| Medium | 10 |
| Medium-Low | 9 |
| Low | 1 |
| Very-Low | 1 |

The purpose of the Vulnerability and Risk Assessment process was to prioritize impacts that pose a significant threat to Dufferin County. It is intended that those impacts which scored the highest in the assessment process will be brought forward into Milestone Three (planning phase) of the BARC Framework, where the County and the community will brainstorm adaptive actions to address them. When selecting priority impacts to be considered as part of the planning phase, the Project Team included impacts that had an overall risk score of 'Medium-high' or higher. Additionally, the Project Team reviewed the 'Medium' ranking impacts in greater depth to assess whether any of them should be brought forward into the planning stage

Throughout the vulnerability and risk assessment process, the CAWG emphasized that climate impacts are likely to be felt disproportionately throughout the community. Climate change poses the greatest risk to equity-deserving groups who face deep-rooted systemic inequities. For instance, seniors, children, persons with disabilities, chronic health conditions, Indigenous, racialized, and low-income populations were identified by the CAWG to be particularly vulnerable to extreme weather events.

PRIORITY CLIMATE CHANGE IMPACTS

In total there were 15 impacts brought forward into the planning phase and 21 impacts that scored medium-low, low, and very-low that were not brought forward. Climate impact statements evaluated as a medium-low, low, and very-low risk will be monitored for any changes in their likelihood and consequence and will be considered in future iterations of the Strategy once re-evaluated.

Table 12: Dufferin County Climate Impact Statements Selected for Planning Phase

| Impact Statement | Risk Ranking |
|---|--------------|
| Impact #15: Increased precipitation in Winter and Spring seasons and freezing rain events, resulting in more salt use, damaging water ecosystems and leading to damage to public assets and infrastructure (i.e. buildings, roads, bridges, trees, streetlights, signs, etc.). | High |
| Impact #17: Increase in the frequency/intensity of extreme weather events resulting in the loss of natural features (i.e., flora/fauna mortality, closures of parks, trails, green spaces, loss of landscapes, etc.) and the loss of seasonal or cultural traditions and recreation (i.e., loss of time/physical activity outside, relationship with natural world, etc.) | High |
| Impact #22: Increase in the frequency and intensity of precipitation events causing increased flooding resulting in damage to private assets and infrastructure (i.e., homes, businesses, property, products/inventory, reduced long-term property value, etc.) | High |
| Impact #10: Increase in average winter temperature resulting in destabilization of the snowpack, reducing water recharge, resulting in a reduction of water quantity in the system, including wetlands. | Medium-high |

| Impact Statement | Risk Ranking |
|---|--------------|
| Impact #23: Increased frequency/intensity of extreme weather events & Winter/Spring precipitation resulting in more frequent accidents (vehicular and active) and dangerous conditions on sidewalks and walking paths resulting in more legal and financial implications for the County and municipalities (i.e., higher insurance premiums, claims against the municipalities, etc.) | Medium-high |
| Impact #25: Increased frequency/intensity of extreme weather events (especially freezing rain) resulting in increased damage to municipally owned assets and infrastructure (e.g., buildings, signs, streetlights, roads, etc.) resulting in increased maintenance, relocation, or redevelopment of assets and infrastructure. | Medium-high |
| Impact #3: Increased frequency and intensity of precipitation events, resulting in increased runoff from roads and/or agricultural land, leading to erosion of riverbanks and hillsides and the loss of riparian habitat and sediment load for in-stream habitat | Medium-high |
| Impact #18: Increased frequency and duration of hot days (>30°C) resulting in the deterioration of and increased maintenance requirements for roads, culverts, sidewalks, trails, and parking lots. | Medium-high |
| Impact #13: Increased precipitation in Winter and Spring seasons, resulting in more frequent flooding of agriculture fields and soil erosion leading to stressed or failed crops, loss of viable farmland and increased resources to restore degraded land | Medium |
| Impact #12: Increased frequency and intensity of precipitation events (especially in Winter and Spring) and freezing rain events, resulting in increased runoff from roads and agricultural land and more salt use causing contamination of source water | Medium |
| Impact #6: Increased frequency and intensity of precipitation events, resulting in flooding of homes, businesses, and institutions, causing more displacement or evacuation of residents from homes, physical injuries, and mental health impacts/stress (e.g., insurance costs, mold, etc.). | Medium |
| Impact #19: Increased frequency and duration of hot days (>30°C) resulting in project delays, reduced productivity (e.g., from heat stress to workers) and increased need to redesign infrastructure to adhere to higher resiliency standards (i.e. more research, staff capacity, cost, etc.). | Medium |
| Impact #14: Increased precipitation in Winter and Spring seasons (e.g., more standing water) and rising average annual temperatures resulting in a rise in invasive species (e.g., phragmites) and increased risk and spread of vector- borne diseases (e.g. Lyme and West Nile) | Medium |
| Impact #21: Increased frequency and duration of hot days (>30°C) resulting increased demand and pressure on electric grid, causing more power outages (blackouts and brown outs) and service disruptions (i.e. business, flow of goods/services, etc.) | Medium |
| Impact #27: Increased frequency and duration of hot days (>30°C) resulting in the potential failures of critical systems (e.g., HVAC) and reduced access to cooling resources, leading to increased demand on County operations (e.g., increased call volumes to facility managers). | Medium |

MILESTONE THREE: PLAN

Milestone Three of the BARC Framework is focused on the creation of an adaptation strategy in collaboration with CAWG members and a wide range of community stakeholders.

The development of the Dufferin Climate Adaptation Strategy involved multiple steps including:

- Identifying and addressing gaps in the Vulnerability and Risk Assessment
- Establishing a final list of community climate risks
- Creating a long-term adaptation vision, goals, and objectives
- Identifying and prioritizing adaptation action options
- Developing implementation schedules and a process for action monitoring and review

ACTION IDENTIFICATION AND PRIORITIZATION

In June 2022 an action brainstorming workshop was held with the CAWG. A total of 89 actions and associated sub-actions were identified by the CAWG, which were then evaluated and streamlined by the Project Team where necessary, resulting in a total of 23 actions within five key focus areas.

The 23 actions were further evaluated using prioritization criteria adapted from the Canadian Communities Guidebook for Adaptation to Climate Change. Each action received a score for the following criteria to determine which actions should be of urgent, high, and medium priority:

- Effectiveness/ Urgency
- Affordability
- Feasibility
- Acceptability
- Equity
- Flexibility

Urgent Priority = Action to be completed in 2 years or less

Medium Priority = Action to be completed between 2 to 5 years

High Priority = Action to be completed in 5+ years

IMPLEMENTATION

An implementation workshop was held with members of the CAWG in September 2022 to develop implementation schedules for each action. The implementation schedules are intended to be a living document, and will be further refined as implementation progresses. Updates may be made to accommodate changes in policies, staff or financial resources, and unexpected extreme weather events. This flexibility will ensure Dufferin County and community partners are not constrained to certain parameters should new opportunities for implementation arise.

The implementation schedules were developed to identify and allocate resources required to implement priority actions. Alongside every priority action, the Implementation Schedule includes:

Action Name: The name of the identified action

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 action, or steps that need to be taken before the action itself can be considered.

Lead Organization: department/organization that will lead implementation.

Potential Supporting Organization(s): The department(s)/organization(s) that will support implementation of the action.

Current Practice: Related programs, initiatives, or policies that are already underway or happening that speak to or are in alignment with the action.

Anticipated timing: How long implementation of action would take (i.e. short-term (<2 years), medium-term (2-5 years), long-term (5+ years))

Immediate Next Steps: Immediate next steps that need to be taken to kick-start implementation

Monitoring Metric: Indicator(s) to monitor the action and evaluate progress on achieving the identified objectives.

The complete implementation schedules for each action can be found in Appendix C.

APPENDIX C: IMPLEMENTATION SCHEDULE

BUILDINGS & INFRASTRUCTURE

Table 13: Buildings & Infrastructure Implementation Schedule

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|---|--|--|-------|--------------------------------------|---|--|---|--|
| Objective: Strengthen the resilience of private buildings and infrastructure to climate-related risks and impacts | | | | | | | | |
| BI.1 | Encourage homeowners and property owners to improve the climate resilience of residential and private property through upgrades and/or retrofits | <p>Incorporate climate resiliency assessments into Home Energy Retrofit Program design</p> <p>Include and distribute educational resources on climate-resilient building materials, best practices in construction for local climate resiliency, and available incentive programs (e.g. County hurricane clip program) to the building permitting process.</p> | Short | DC: Climate & Energy DC: Building | DC: Finance Local municipalities Homebuilders Association Ontario Contractors Association Dufferin Board of Trade | <p>Home Flood Protection Campaign</p> <p>Hurricane Clip program</p> | <p>Review best practices to include in Residential Energy Retrofit Program.</p> <p>Review existing education resources and training available to contractors and building inspectors.</p> <p>Engage building department to help develop and distribute materials to residents.</p> <p>Survey to DBOT members/contractors on education materials and current level of knowledge.</p> | <p>Home resiliency guidance document created</p> <p># of trainings completed for Builder Inspectors</p> <p># of new stakeholders engaged</p> |
| BI.2 | Encourage home and property owners to implement best practices in stormwater management on their home or property to reduce flooding risk | <p>Increase offerings of educational workshops and resources to home and property owners to increase flood prevention and effective stormwater management measures (e.g. rain barrels, rain gardens, back flow valves, etc.)</p> <p>Explore creating an on-property stormwater management incentive program (e.g. County-wide rain barrel program)</p> | Short | DC: Climate & Energy | DC: Engineering DC: Planning DC: Emergency Preparedness Local munis INTACT Centre for Flood Protection | <p>Various local municipal stormwater Initiatives</p> <p>County-led annual Home Flood Protection Campaign</p> <p>Inventory of Stormwater management assets</p> | Continue and expand flood prevention education program | # of homeowners reached in campaign |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|-----------|---|--|-------|--------------------------------------|--|---|---|--|
| BI.3 | Create framework for adopting a Green Development Standard to build resiliency and complete communities (e.g. low-impact development, flood mitigation measures, access to green space, enhanced tree canopy) | <p>Partner with local municipalities, planners, and Conservation Authorities to protect existing natural assets (e.g., wetlands, forests, and other greenspaces) and enhance new communities.</p> <p>Build partnerships to provide updated mapping and data to support the creation of localized resiliency standards (e.g. identify areas of high risk for urban heat island effect and respond with increased tree canopy requirements)</p> <p>Investigate best practices in other municipalities that have implemented GDS; collaborate with neighbouring municipalities</p> <p>Explore opportunities to increase climate resiliency in new buildings by promoting higher building standards, and updating by-laws, development guidelines, and zoning regulations</p> <p>Encourage the province to adopt progressive building codes that reflect current climate projections</p> | Short | DC: Climate & Energy DC: Planning | Local municipal planners Conservation Authorities | <p>Currently exploring collaborative approach across region to develop GDS</p> <p>Municipal Comprehensive Review process underway</p> | <p>Identify additional funding sources and ensure budget is approved</p> <p>Determine scope of work and partnership governance structure</p> <p>Create education and engagement plan</p> <p>Build council support</p> | <p>Education sessions delivered</p> <p>Standards created and applied to development applications</p> <p>Number of developments build using standards or applications processed</p> |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|--|---|--|-------|--|---|---|---|---|
| Objective: Strengthen resilience of corporate assets and infrastructure to climate-related risks and impacts | | | | | | | | |
| BI.4 | Incorporate a climate lens into asset management, capital planning, and budgetary processes | <p>Identify changing risks of chronic climatic impacts and adapt asset management accordingly and include more frequent infrastructure condition assessments (e.g. increased runoff, erosion, freeze-thaw cycles leading to increased road wash outs)</p> <p>Identify opportunities to increase resiliency in buildings when retrofits or renovations are planned</p> <p>Identify opportunities to increase resiliency in road infrastructure when replacements, reconstructions or renewals are planned</p> <p>Develop reporting system for tracking significant weather events and associated response costs in order to monitor trends</p> <p>Shift procurement practices to include climate considerations in RFP development and when evaluating submissions.</p> <p>Create a Climate Reserve to build financial capacity to respond to impacts of climate change and build resiliency (see EA.5)</p> | Short | DC: Finance DC: Climate & Energy DC: Engineering DC: Operations DC: Facilities | DC: Procurement Funding Partners: FCM/GMF, CCBF tax Private sector partnerships | Building Conditions Assessments (BCA) ever 5 years Asset management plan updated every 5 years Capital forecast plans completed for 5 and 20 year | Complete FCM framework/matrix for risk assessment of current assets Identify staff to attend training and share learnings – e.g. AMONT, FCM, CNAM, OSPE Community of Practice amongst municipal staff Identify mechanisms and criteria to begin developing Climate Reserve | # of significant weather events, system established, cost captured Upgraded materials and assets are used to break the like-for-like replacement cycle Tracking system established for changes and initiatives that municipality has done and bring to insurance to reduce premiums # of RFPs issued that include climate considerations # of trainings attended/number of staff trained # of annual dollars allocated to and from Climate Reserve |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|-----------|---|---|--------|---|------------------------------------|---|--|--|
| BI.5 | Periodically review and implement best practices in climate resilient infrastructure, design, materials, stormwater management and flood mitigation measures. | <p>Create Community of Practice to share key findings with Dufferin municipalities</p> <p>Seeking/require ongoing training and education opportunities for knowledge building and sharing of climate resilient infrastructure</p> <p>Seek opportunities, partners, and funding to implement nature-based solutions for stormwater management on municipal and private property (e.g. creation of wetlands)</p> <p>Inventory and assess storm structures to determine vulnerability and to improve their adaptive capacity</p> <p>Require that the most current of forward IDF curves that reflect localized climate modelling to infrastructure projects (e.g. upsize culvert replacements where applicable, etc.) are regularly integrated into projects</p> <p>Educate homeowners on right-sizing and locating trees to avoid hydro lines</p> | Medium | DC: Climate & Energy DC: Engineering DC: Operations DC: Building DC: Planning | Local municipal staff and planners | Actively participation in discussions with utility standards forum for updating engineering standards Ontario province standards are updated regularly for roads Quality control for material testing on roads – following minimum maintenance requirements | Develop materials for educating homeowners Create municipal community of practice for resilient infrastructure Pursue LiDAR data to cover whole county to help better identify flood risks | Education campaigns created for residents Regular COP meetings Updated LiDAR data covering whole county complete |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|-----------|--|---|-------|-----------------------------------|----------------------|---|--|--|
| B1.6 | Develop a County road infrastructure resiliency program. | <p>Complete an inventory and State of Infrastructure Review to understand current performance and condition of assets</p> <p>Identify economic and emergency routes and roads most at risk to prioritize for resiliency upgrades</p> <p>Review and update standard cross section (including embankments)</p> <p>Review and improve drainage corridors</p> <p>Explore the use of technology (e.g. AI, drones) to improve efficiency of monitoring and reporting of critical road infrastructure (e.g. integrate into vehicles to track road status and quality like thermal mapping to determine changes in infrastructure, where to plant trees to mitigate problems, etc.)</p> | Short | DC: Engineering DC: Operations | DC: Climate & Energy | <p>Roads Needs Study: Biennial road inspections</p> <p>OSIM: Structure Inspections above 3m (e.g. bridges, culverts, etc) (biennially)</p> <p>Drainage reviewed during capital planning and construction (localized areas)</p> <p>Best practices implemented to extend road life (e.g. grading, sealing cracks, asphalt-concrete mix)</p> <p>Currently use minimum maintenance standards (O.Reg 239/02)</p> | <p>For RFPs, include section that goes beyond condition and function, but also includes climate risks (can be separated out for costing for upsizing); intended outcome to re-prioritize work when climate risks are considered</p> <p>Investigate additional funding sources to create plan</p> | Program established, implemented and monitored |

ENERGY & ECONOMY

Table 14: Energy & Economy Implementation Schedule

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|--|---|---|--------|--|--|--|---|--|
| Objective: Enable local businesses and organizations to plan for climate-related risks | | | | | | | | |
| EE.1 | Provide guidance to local businesses on how to maintain business continuity | <p>Partner with BIAs and gauge local businesses' interest in establishing/participating in a local best practice network (e.g. Business continuity and emergency planning, green business practices, adaptation measures) that meets annually to discuss adaptation measures in business operations.</p> <p>Explore different avenues (e.g. a business breakfast, open houses, workshops, etc.) to host a climate change and business event</p> | Medium | DC: Economic Development DC: Climate & Energy | <p>BIAs</p> <p>Dufferin Board of Trade</p> <p>Local businesses</p> <p>Local municipalities</p> | N/A | Partner with Economic Development Officers, BIAs | Network formed # of new partnerships |
| Objective: Improve the resilience of energy infrastructure to weather-related disruptions | | | | | | | | |
| EE.2 | Increase the resilience of energy distribution infrastructure to extreme weather through strategic planning and retrofits | <p>Explore opportunities and feasibility of decentralized energy generation, storage and distribution in the County</p> <p>Partner with utility companies to conduct localized vulnerability assessment infrastructure</p> <p>Track long-term indirect and direct costs of power outages/damages for full-cost accounting to help justify upgrades/system hardening.</p> <p>Encourage burying powerlines in localized areas to prevent power outages caused by extreme weather where feasible</p> <p>Explore opportunities and feasibility of decentralized energy generation, storage and distribution in the County</p> | Medium | Local Utilities DC: Climate & Energy | <p>Independent Electricity Systems Operator (IESO)</p> <p>Private Sector</p> | <p>OV Hydro participates in OEB reliability working group</p> <p>Identifies opportunities to rebuild when infrastructure fails (not like-for-like)</p> <p>Regularly evaluating the feasibility of burying lines.</p> | <p>Scan for best practices of tracking damages and costing</p> <p>Identify potential partners for future alternative energy systems</p> | <p>Scan completed</p> <p># of partnerships identified and formed</p> |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|-----------|---|---|---|---|----------------------|---|--|--|
| EE.3 | Ensure all municipal-owned facilities providing critical services (i.e. critical road intersections, vulnerable population facilities such as LTC homes, etc.) have reliable, low-carbon, back-up power systems in place. | <p>Conduct a feasibility study investigating strategic back-up battery storage and PV solar systems at critical buildings to support continuity of municipal services.</p> <p>Investigate mobile generator for interim, including relevant equipment installed at buildings to receive standby power</p> <p>Periodically review best practices, innovations and emerging technologies</p> | <p>Short - interim fossil fuel solution</p> <p>Long - battery back up systems</p> | <p>DC: Facilities</p> <p>DC: Emergency Management</p> | DC: Climate & Energy | <p>Some buildings have back-up generators, all fossil fuel</p> <p>Some critical facilities already have permanent back up generators on site: Dufferin Oaks (Diesel), Zina (Diesel), Primrose (CNG), OV Ambulance (Diesel); GV and Shelburne Ambulance Stations equipped for mobile units that are rented as needed</p> | <p>Short-term: Investigate installing equipment to receive standby power at the Edelbrock Centre (admin building)</p> <p>Investigate purchasing mobile generator</p> <p>Long Term: Investigate funding sources for feasibility study of battery backup systems.</p> <p>Investigate Bi-directional charging, microgrids</p> | <p>Studies and costing completed</p> <p>Having systems in place</p> <p>Generator purchased</p> <p>Buildings equipped to received standby power</p> |

AGRICULTURE & NATURAL ENVIRONMENT

Table 15: Agriculture & Natural Environment Implementation Schedule

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|---|--|--|-------|---|---|--|--|---|
| Objective: Support the protection, rehabilitation, and enhancement of natural systems to foster climate resiliency | | | | | | | | |
| AN.1 | Increase uptake of sustainable land use and management practices by residents and landowners | <p>Research barriers to participation in existing forest management programs and explore options to fill gaps and increase uptake.</p> <p>Increase awareness of external programs that support landowners in adopting sustainable land use practices by sharing information through County communication channels</p> <p>Increase awareness and participation in County-funded land enhancement programs by sharing information through County communication channels and hosting educational workshops</p> <p>Provide ongoing educational resources and co-host workshops with local experts on sustainable land use management practices</p> | Short | <p>Conservation Authorities</p> <p>DC: Climate and Energy</p> | <p>DC: Forest</p> <p>DC: Finance</p> <p>Dufferin Federation of Agriculture</p> <p>Local municipalities</p> <p>Dufferin Board of Trade</p> | <p>Rural Water Quality Program</p> <p>Experimental Acres Pilot</p> <p>Living Snow Fence Program</p> <p>Sharing information on provincial programs</p> | <p>Create communications plan for County funded programs</p> <p>Complete scan of municipal programs supporting forest management</p> | <p># of applications received annually to County funded programs</p> <p># of dollars awarded annually through County funded programs</p> <p># of acres enhanced through County funded programs</p> <p># of resources shared annually on external programs</p> |
| AN.2 | Implement and support nature-based solutions to enhance water security, habitat restoration, and reduce habitat fragmentation. | <p>Actively partner with organizations and leverage funding opportunities to support habitat restoration projects</p> <p>Work with county and local municipal planners to minimize the replacement, degradation, or fragmentation of existing natural assets through zoning and site plan approvals</p> <p>Review Rural Water Quality Program with an increased focus on supporting climate resilience</p> <p>Investigate options to increase climate-resilient tree plantings on private properties</p> | Short | <p>DC: Climate and Energy</p> <p>DC: Forest</p> <p>DC: Planning</p> <p>Conservation Authorities</p> | <p>Dufferin Federation of Agriculture</p> <p>Ontario Soil and Crop</p> <p>Ontario Woodlot Association</p> <p>Restoration and conservation focused not-for-profits</p> | <p>Regular review of Rural Water Quality Program Development guidelines</p> <p>Identify funding opportunities to implement nature-based solutions</p> <p>Research options to increase climate-resilient tree plantings (e.g. tree nursery)</p> | <p>Establish Rural Water Quality Program Review Committee</p> <p>Identify funding opportunities to implement nature-based solutions</p> <p>Research options to increase climate-resilient tree plantings (e.g. tree nursery)</p> | <p># of acres protected, restored, or enhanced through County project annually</p> <p># of new tree plantings annually</p> <p>Annual increase in tree coverage in urban areas</p> |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|--|--|---|-------|------------------------|--|---|--|--|
| Objective: Support best practices within agricultural management systems to enhance climate resilience | | | | | | | | |
| AN.3 | Increase uptake of regenerative agricultural practices in partnership with farmers to increase soil organic matter, reduce soil erosion, and improve water security. | Actively seek opportunities to participate in research projects investigating the link between climate resilience and regenerative agriculture Continue to leverage partnerships to incentivize the adoption of regenerative agriculture practices and explore expansion of existing programs (e.g. Experimental Acres) Support and share communications from existing organizations that encourage long-term climate friendly practices tailored to diverse producers. | Short | DC: Climate and Energy | Ontario Woodlot Association Ontario Soil and Crop Regional municipalities Headwaters Food and Farming Alliance Academic Institutions | Experimental Acres Pilot Building connections with academic researchers Share external resources and funding opportunities with agriculture community via County communication channels | Continue to work with agriculture community and sector partners to activate and expand programming | # of research partnerships established annually # of external resources shared annually |

PEOPLE & HEALTH

Table 16: People & Health Implementation Schedule

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|--|--|--|--------|---|---|--|--|--|
| Objective: Minimize and manage climate-related health and safety risks for municipal staff | | | | | | | | |
| PH.1 | Review, develop and update policies, procedures, and training to ensure County staff are safe during extreme weather conditions and encourage local municipalities to adopt similar policies and procedures. | Review and update policies and procedures with climate resiliency lens (e.g. Inoculation, PPE, No Working Alone policies, etc.). Develop reporting system for tracking significant weather events and associated response costs in order to monitor trends (see BI.4) | Medium | DC: Health and Safety | DC: Emergency Management Division DC: Climate and Energy Division DC: Information Technology Local Municipal Staff | No Working Alone Policy Heat Stress Policy | Complete literature review to identify best practices Review current policies and identify necessary additions or enhancements in collaboration with affected departments | # of measures/policies that directly or indirectly address safety for staff during extreme weather events # of adjusted workdays per year due to extreme weather conditions |
| Objective: Enhance social infrastructure in order to minimize and manage climate-related health and safety risks for residents | | | | | | | | |
| PH.2 | Establish and enhance emergency preparedness communications and programs for residents to strengthen personal resiliency to climate impacts. | Explore community-wide survey to determine gaps in emergency preparedness programs and communications Expand emergency preparedness programming and provision of emergency kits to residents (e.g. emergency kits for new residents; partner with local organizations) Connect residents to existing mental health supports after an extreme weather event Educate residents on potential insurance coverage gaps and encourage extended coverage where appropriate Develop media toolkit that can be strategically deployed during periods of high news coverage and public attention on extreme weather events | Short | DC: Emergency Management Division DC: Climate and Energy | DC: Community Services DC: Fire and Paramedic Services Public Health Community Newcomer Organizations | Public education campaigns, videos, and presentations/workshops Provide preparedness resources as prizes to community members | Explore options to increase capacity of Emergency Management Division Explore partnership opportunities with community organizations | # of households prepared for a 7-day emergency # Emergency preparedness events and attendees # of emergency kits distributed # of engagements and reach on social media and website content |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|-----------|---|--|--------|----------------------------|--|---|--|---|
| PH.3 | Review, develop and update policies, and procedures to ensure residents, in particular those most vulnerable, are safe during extreme weather conditions. | <p>Establish social infrastructure designed to meet the needs of vulnerable populations in order to minimize and manage climate-related health and safety risks for residents (e.g. strategically placed heating/cooling centres with transportation plans)</p> <p>Update evacuation and shelter-in-place plans to integrate increasing risks from climate change; revitalize plans with recovery sections to support damage repairs</p> <p>Explore options for emergency notification system</p> <p>Develop response plan for prolonged periods of extreme heat (3+ days over 30°C)</p> | Medium | DC: Emergency Preparedness | DC: Climate and Energy DC: Paramedics DC: Community Services Dufferin County Managing, Organizing, Validating, Engagement Strategy (DC MOVES) Public Health Home and community care organizations | Emergency Preparedness distributes public information brochures on extreme heat Emergency Management Plans Severe Weather Annex Local municipal heating and cooling centres | Identifying multi-residential buildings without cooling as starting point for identifying hotspots for transportation Review and update existing emergency plans Scan of emergency notification software options | Capacity of cooling/heating/emergency shelters Average distance to cooling/heating/emergency shelters from known hotspots/vulnerable population location Emergency plans updated to reflect climate priorities Community emergency notification system option selected |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|-----------|--|--|---------|--|---|--|--|---|
| PH.4 | Enhance community connectivity to increase emergency response capacity during climate change related emergencies | <p>Provide grants to community-led initiatives that strengthen social connectivity and build capacity for emergency response</p> <p>Develop a training program for community volunteers and service club members to provide response and assistance to residents and businesses in times of weather emergency</p> <p>Explore options for neighbourhood emergency hubs and kits</p> | Short | DC: Emergency Preparedness DC: Climate and Energy HCIA | Museum of Dufferin DC: Community Services Neighbourhood Groups Public Health | Public education campaigns, videos, and presentations/workshops Provide preparedness resources as prizes to community members | Complete community asset mapping and scan of municipal examples Complete scan and review of existing training programs for emergency response volunteers Complete scan and review of options for neighbourhood emergency hubs Establish a dedicated financial stream to fund climate community grants | #of volunteers trained for emergency response # of new partnerships developed with local organizations # of applications to community climate grant program # of annual dollars distributed as community climate grants # of emergency hubs established |
| PH.5 | Monitor and plan for increasing risk of vector-borne diseases in the community | Partner with Wellington-Dufferin-Guelph Public Health to amplify awareness and educational communications about vector-borne diseases to the public (e.g. West Nile virus) | Ongoing | Public Health | DC: Climate and Energy Division DC: Forest DC: Community Services DC: Emergency Preparedness DC: Early ON Local municipalities Conservation Authorities | Public Health initiatives include: Public information services Events and Giveaways Tick identification Protocol development for active tick surveillance West Nile prevention and surveillance | Establish communication chain with Public Health for resource amplification Scan and compilation of currently available resources | # of informational resources amplified annually |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|--|--|--|-------|---------------------------------|---|----------------------------|--|---|
| Objective: Protect tenants in multi-residential buildings from excessive heat in their units | | | | | | | | |
| PH.6 | Establish maximum-temperature by-law for rental properties | <p>Determine maximum temperature allowance</p> <p>Investigate grant programs for tenants to mitigate potential financial burden</p> <p>Prepare a common municipal property standards by-law and enforcement program for the approval of local councils across Dufferin</p> <p>Launch awareness programs for tenants and landlords</p> <p>Conduct training for municipal by-law enforcements officers</p> | Short | DC: Climate and Energy Division | <p>DC: Housing Services</p> <p>DC: Facilities</p> <p>Local municipalities</p> <p>Local housing providers</p> <p>Wellington-Dufferin-Guelph Public Health Unit</p> | Minimum temperature by-law | Scan of existing municipal temperature bylaws and best practices | <p>Scan complete with recommendations</p> <p>By-law adopted</p> |

ENABLING ACTIONS

Table 17: Enabling Actions Implementation Schedule

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|---|---|---|-------|---|---|---|--|---|
| Objective: Increase capacity of municipalities to respond to extreme weather (mitigating damages, restoring services, etc.) | | | | | | | | |
| EA.1 | Secure new tools and technologies to accelerate and enhance adaptation initiatives | <p>Develop financial stream to support adoption of new technologies (See EA. 4)</p> <p>Research and adopt new tools and technologies</p> | Short | <p>DC: Operations</p> <p>DC: Engineering</p> <p>DC: Climate and Energy</p> <p>DC: Finance</p> | | Ongoing review of emerging technologies | Identify capacity or informational gaps that new tools or technologies could fill to accelerate and enhance adaption work | <p># of new tools or technologies adopted</p> <p># of annual dollars spent</p> |
| EA.2 | Build redundancies into operations to ensure service continuity and improve response to significant weather events and emergencies. | <p>Develop Southern Operations Centre to improve response to significant weather events and emergencies</p> <p>Cross-training staff to break down silos and encourage collaborative workplace culture through measures like "bring-a-colleague-to-work-day"; giving all staff one PD cross-training day per year, managers work as their employees for a day, etc.</p> <p>Enhance relationships and partnership with local municipalities and other regional ops., including cross-training opportunities</p> | Short | <p>DC: People and Equity</p> <p>DC: Public Works</p> <p>DC: Finance</p> | <p>DC: Finance</p> <p>DC: Procurement</p> <p>Local municipalities</p> | <p>Collaboration and resource sharing between County and local municipal Operations staff</p> <p>Emergency Management Disaster School</p> <p>Remote Work policy in place</p> <p>Southern Operations Centre Planning</p> | <p>Scan of other municipal cross training programs</p> <p>Identification of priority roles for cross training</p> <p>Begin scoping land needs for Southern Operations Centre</p> | <p>Land purchased for Southern Operations Centre</p> <p>Southern Operations Centre designed and built</p> <p># of staff cross trained to support priority roles</p> |
| EA.3 | Establish mandatory training for County and local municipal staff on climate change | <p>Develop climate change onboarding materials for new staff</p> <p>Deliver division specific training to empower staff to lead adaptation initiatives</p> <p>Connect staff with third-party training opportunities annually to enhance climate</p> | Short | DC: Climate and Energy | DC: People & Equity | Climate training completed by municipal staff as opportunities arise | <p>Develop training plan for new and existing staff</p> <p>Establish reporting requirements for climate training</p> | <p># of County and local municipal staff trained</p> <p># of trainings completed annually</p> |

| ACTION ID | ACTION | WHAT THIS WILL LOOK LIKE | TIME | LEAD(S) | SUPPORTING PARTNERS | CURRENT PRACTICES | NEXT STEPS | MONITORING METRICS |
|--|--|--|-------|---------------------------------------|--|---------------------------------------|---|---|
| Objective: Optimize public communications strategies for extreme weather and other climate impacts | | | | | | | | |
| EA.4 | Enhance efficacy of public communications for emergency preparedness and response | Collaborate with community stakeholders to identify effective communication channels to reach equity-deserving groups | Short | DC: Communications | DC: Community Services DC: Climate and Energy DC: Emergency Preparedness | Division specific communication plans | Conduct review of existing communications strategy and channels | Communications strategy developed # of external organizations engaged |
| Objective: Build financial capacity to plan for and respond to climate related threats | | | | | | | | |
| EA.5 | Create a Climate Reserve Fund to build financial capacity to respond to impacts of climate change and build resiliency | Allocate a portion of any budget surplus towards a climate response and mitigation reserve. Develop criteria to determine how and when reserve funds are utilized | Short | DC: Finance DC: Climate and Energy | | N/A | Complete scan of climate reserve structures adopted by other municipalities | Climate Reserve created # of annual dollars allocated and spent from reserve |



APPENDIX D: VULNERABLE POPULATIONS

Table 18: Populations Vulnerable to Climate Change in Wellington-Dufferin-Guelph and Waterloo Region²⁰

| Vulnerability to Climate Change | | Study Area Socio-Demographics |
|--|--|--|
| Children | More time spent outdoors than the average population as well as physiological sensitivity mean that children experience a higher burden of preventable illnesses and death from environmental hazards. Developing immune systems also translate to higher risk of poor air quality related asthma. | The proportion of children aged 0-14 relative to the total population is identical across both health unit regions at 17.8%. |
| Seniors | Older adults may be more vulnerable to higher temperatures and chronic dehydration by virtue of natural physiological changes. Reduced lung function also leaves older adults more vulnerable to air quality related health complications | Wellington-Dufferin-Guelph contains a senior population of 15.8% while that number in Waterloo Region is 14.4%. The proportion of seniors in Ontario is projected to double by 2030. |
| Individuals with Low Socioeconomic Status | Those with fewer material resources tend to have less access to health and social services, higher stress, are more likely to be underemployed and may struggle to access housing and nutritious food. These factors can lead to a lower capacity to adapt to the impacts of climate change. | After-tax low-income prevalence rates are 9.9% in Wellington-Dufferin-Guelph and 12.2% in Waterloo Region compared to 14.4% provincially as of 2016. |
| Recent Immigrants | Linguistic isolation and misunderstanding of climate related alerts may increase vulnerability. | The proportion of recent immigrants (immigrated 2011-2016) is 9.7% in Wellington-Dufferin-Guelph, 11.8% in Waterloo Region, and 3.6% provincially. |
| Outdoor Workers and Activity | Those who spend long periods of time outdoors for work or leisure are more exposed to the impacts of climate change including extreme weather, extreme temperatures, ultraviolet radiation, low air quality, and vector-borne diseases. | Outdoor workers account for 10.8% of the Wellington-Dufferin-Guelph population and 8% of Waterloo Region. |
| Socially and Physically Isolated Individuals | Social connectedness may strengthen resilience and adaptive capacity by creating access to health promotion resources and social supports. Isolation may be experienced due to a host of factors including language barriers and mental health conditions which may increase vulnerability. Physical isolation may present itself in areas which are rural or remote and may create challenges when people attempt to leave impacted areas (e.g., during flooding events). | Social isolation is difficult to quantify as it may affect all sections of the population and is quite fluid. However, linguistic isolation may be used as a partial indicator of total social isolation. In the Waterloo Region 1.8% of the population speaks neither English nor French while this number is 0.9% in Wellington-Dufferin-Guelph. Physical isolation can present risks to residents of the study area who may require medical services only offered in major urban centres. |

20. Climate Change and Health Vulnerability Assessment Report, 2022. https://wdgpublichealth.ca/sites/default/files/climate_change_and_health_vulnerability_assessment_report.pdf#page=01

| Vulnerability to Climate Change | | Study Area Socio-Demographics |
|--|--|---|
| Individuals with Existing Chronic Diseases | Chronic conditions may present a wide range of challenges which may impede adaptive capacity including dependence on caregivers, mobility challenges, cognitive impairments, and others. | 50.2% of the population of Wellington-Dufferin-Guelph and 50.8% of the Waterloo Region are living with a chronic condition as of 2016. 80% of Ontarians 45 years of age and older live with at least one chronic condition. |
| Individuals with Mental Health Conditions | Those with mental health conditions may encounter increases in social isolation and stigmatization leading to increased vulnerability. | According to the CMHA, 20% of Canadians will experience a mental health problem or illness in a given year; however, stigmatization and underreporting leave the topic difficult to quantify. |

APPENDIX F: AVAILABLE FUNDING PROGRAMS

Table 19: Available Funding Programs

| PROGRAM | FUNDING SOURCE | DESCRIPTION |
|---|---|---|
| Climate Action and Awareness Fund | Government of Canada | Support for projects that raise awareness of climate change. |
| Nature Smart Climate Solutions Fund | Government of Canada | Support for projects that restore wetlands, peatlands, and grasslands to store and capture carbon and support biodiversity |
| Habitat Stewardship Program | Government of Canada | Funds projects that contribute directly to the recovery of species at risk and prevent others from becoming a conservation concern. |
| Disaster Mitigation and Adaptation Fund | Government of Canada | In 2018, the Government of Canada launched the Disaster Mitigation and Adaptation Fund (DMAF), committing \$2 billion over 10 years to invest in structural and natural infrastructure projects to increase the resilience of communities that are impacted by natural disasters triggered by climate change. |
| Canada Community-Building Fund | Government of Canada | The Canada Community-Building Fund (CCBF) is a permanent source of funding provided up front, twice-a-year, to provinces and territories, who in turn flow this funding to their municipalities to support local infrastructure priorities. Municipalities can pool, bank and borrow against this funding, providing significant financial flexibility. |
| Natural Infrastructure Fund | Government of Canada | While this fund is no longer accepting applications, it may open another intake in the future. Announced in June 2021, the \$200 million Natural Infrastructure Fund supports projects that use natural or hybrid approaches to protect the natural environment, support healthy and resilient communities, and contribute to economic growth and jobs. |
| Green Municipal Fund | Federation of Canadian Municipalities | Grants are available for planning, studies and pilot projects. Loans are available for capital projects, and most recipients receive an additional grant of up to 15% of their loan amount. |
| Municipal Asset Management Program | Federation of Canadian Municipalities | FCM offers funding, training and capacity-building activities to increase skills within municipalities and local governments to sustainably maintain their asset management programs now and in the future. Eligible project activities include the development of risk assessments or asset risk management plans. |
| Various and ongoing | Municipal Natural Assets Initiative | MNAI has ongoing opportunities for municipalities to become engaged in natural asset management planning. The MNAI team provides scientific, economic and municipal expertise to support and guide local governments in identifying, valuing and accounting for natural assets in their financial planning and asset management programs and developing leading-edge, sustainable and climate-resilient infrastructure. |
| Affordable Housing Innovation Fund | Canadian Mortgaging and Housing Corporation | The Affordable Housing Innovation Fund supports new ideas that will drive change and disrupt the industry – ideas and approaches that will evolve the affordable housing sector and create the next generation of housing in Canada. |

