



CLIMATE ADAPTATION **PLAN**





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ACKNOWLEDGEMENTS

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INTRODUCTION

The City of Niagara Falls is nestled on the edge of the Niagara River, with Niagara-on-the-Lake to the north, Fort Erie to the south, and Welland and Thorold to the west, representing a total land coverage of 213 square km.

The City itself has a network of 1,183 km of roadways, 481 km of watermain and 434 km of sanitary sewer, servicing a population of over 86,760 residents – which increases exponentially during the tourist season.

In the summer of 2019, the City of Niagara Falls along with 6 other local Municipalities formed a partnership with Brock University's Environmental Sustainability Research Centre to create "Niagara Adapts".

The goal of Niagara Adapts is to cultivate a community of practice for climate change adaptation planning and build communities resilient to the impacts of climate change in the Niagara Region for future generations.

Niagara Adapts performed public consultation and surveys with each respective Municipality, ensuring each community had an opportunity to provide input on climate vulnerability, Vision statement and Climate Adaptation Plan goals.

CLIMATE CHANGE AND CLIMATE CHANGE SCIENCE

According to the Intergovernmental Panel on Climate Change (IPCC), climate change can be defined as a change in the state of the climate that can be identified by changes in the mean and/or variability of its properties and that persists for an extended period, typically decades or longer.

Climate change may be due to natural processes or persistent anthropogenic changes in the composition of the atmosphere or in the land use.ⁱ

These anthropogenic changes include carbon dioxide production and deforestation, etc.

The 2019 report entitled “Canada’s Changing Climate Report” published by Environment and Climate Change Canada provides evidence identifying that Canada’s climate has warmed and will warm further in the future, driven by human influence.ⁱⁱ

The report further warns that the effects of widespread warming are already evident in many parts of Canada. These impacts include:

- Warmer climate will intensify some weather extremes in the future, including extreme hot temperatures becoming more frequent and intense.
- Seasonal availability of freshwater is changing, with an increased risk of water supply shortage in the summer.
- Less extreme cold, shorter snow and ice cover seasons, thinning glaciers and thawing permafrost all leading to rising sea levels.ⁱⁱⁱ





CLIMATE CHANGE AND **CLIMATE CHANGE SCIENCE**

A review of the climate statistics for Niagara Falls can be found under the “Climate Vulnerability and Risk” section of the plan.

These impacts have a ripple effect throughout the environment and economy.

Climate change is putting strain on our community impacting the natural environment, infrastructure and property:

- Less extreme cold and shorter snow season has resulted in the tick population increasing, impacting outdoor enjoyment.
- Rain events are becoming more frequent with higher intensity, resulting in infrastructure capacity constraints.
- Wind damage during intense storms causing property damage and impacting home owner insurance.

CLIMATE ADAPTATION

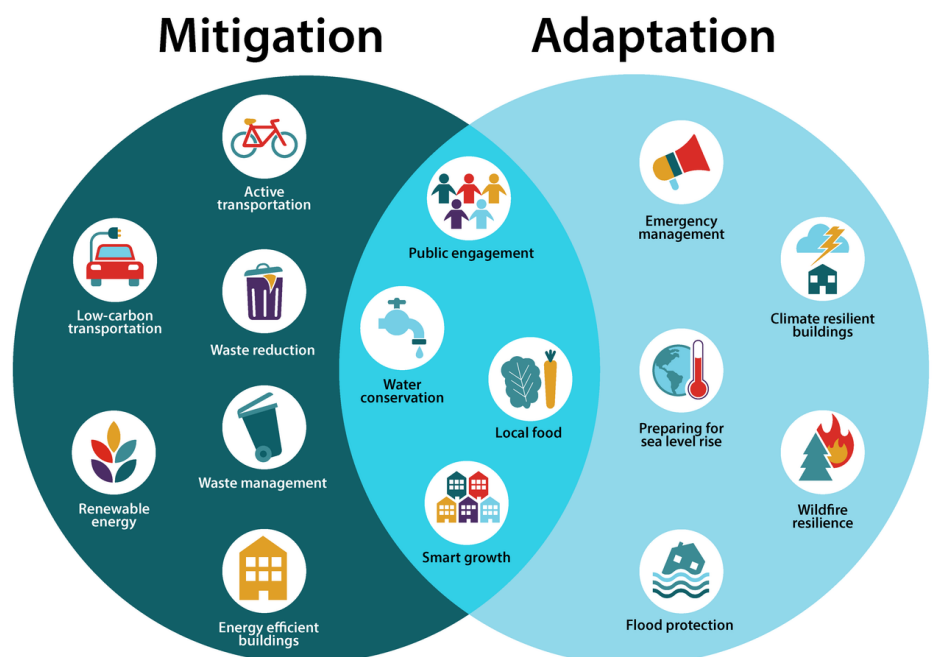
Climate adaptation can be defined as the actions taken to reduce the negative impact of climate change while taking advantage of potential new opportunities.

This involves adjusting policies and actions because of observed or expected changes in the climate. Adaptation can be either reactive to past events, or proactive via anticipation of climate impacts before they are observed.^{iv}

Climate adaptation is different than climate action/mitigation.

However, the two concepts are not independent of each other and do overlap. The focus of this plan is climate adaptation – determining ways Niagara Falls can adapt and evolve to address the expected and anticipated changes in the climate.

CLIMATE ADAPTATION	CLIMATE ACTION/MITIGATION
The strategy for adapting to climate change	The strategy for reducing the impact of climate change
Takes appropriate measures to prevent the impacts of climate change	Aimed at reducing greenhouse gases
Long term efforts and strategies	Short term goals
Localized in scale and scope	National/ Global in scale



CLIMATE VULNERABILITY IN NIAGARA FALLS

noun / vul • ner • a • bil • i • ty

Vulnerability

"The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity." ^{vi}

As part of reviewing climate vulnerability, projected climate data is used to gauge future susceptibility.

Projected climate data was obtained from climatedata.ca, a collaboration between Environment and Climate Change Canada (ECCC), the Computer Research Institute of Montréal (CRIM), Ouranos, the Pacific Climate Impacts Consortium (PCIC), the Prairie Climate Centre (PCC), and HabitatSeven.

The Niagara Adapts group agreed to use a representative concentration pathway (RCP) of 8.5, when reviewing projected climate data. An RCP 8.5 works under the assumption that greenhouse gas, aerosols and chemically active gas concentrations will continue to increase at the same rate they are today.



CLIMATE VULNERABILITY IN NIAGARA FALLS



Present day land use pattern changes, deforestation rates and land cover are also assumed to continue under an RCP 8.5 assumption.

This is the worst case scenario and is appropriate when reviewing vulnerability.

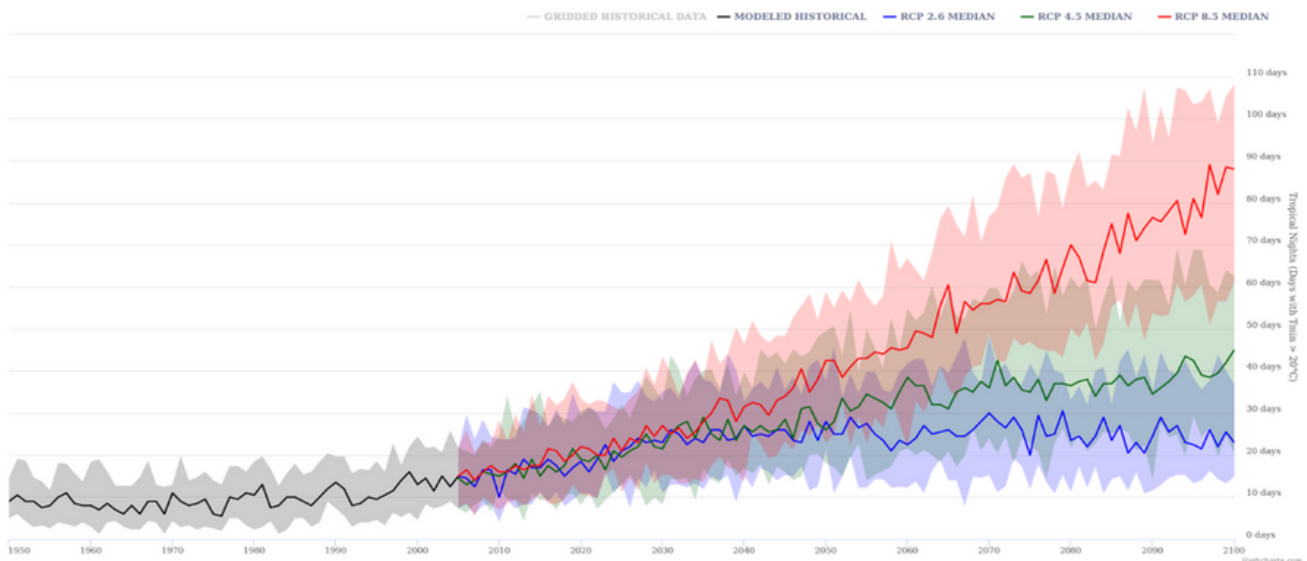
The chart below depicts a series of different main threats and changes specific to Niagara Falls.

The climate scenario data sets below use a historical data average from 1950 to 2005, a projected value at the year 2050 and a projected value at the year 2100 assuming an RCP of 8.5.

The data available through climatedata.ca offers a range of pathways or RCP, ranging from best case to the worst case used in this plan.

Tropical Nights in Niagara Falls 1950 - 2100

www.climatedata.ca



NIAGARA FALLS CLIMATE DATA

HISTORICAL AND PROJECTED

DATA SET	1950 TO 2005 AVG	2050	2100
Annual Mean Temperature	8.6°C	11.81°C	15.34°C
Extreme Heat Days (>30°C)	7 days	45 days	94 days
Extreme Heat Days (>37°C)	0 days	0 days	10 days
Extreme Cold Days (<-15°C)	8 days	0 days	0 days
Days Without Frost	187 days	214 days	256 days
Annual Total Precipitation Extreme Wet Days (>10mm)	26 days	34 days	29 days
Annual Total Precipitation Extreme Wet Days (>20mm)	7 days	9 days	10 days
Annual Total Precipitation	884 mm	1045 mm	1024 mm
Tropical Nights (>22°C)	2 days	19 days	57 days

CLIMATE VULNERABILITY STUDY RESULTS

The projected changes to the climate speak to what Niagara Falls may experience in the future, and the risks associated with those changes. However, the impacts of climate change are being felt today.

In the fall of 2019, a vulnerability study was conducted by Niagara Adapts seeking public participation and comment on the impacts of and exposure to climate change.

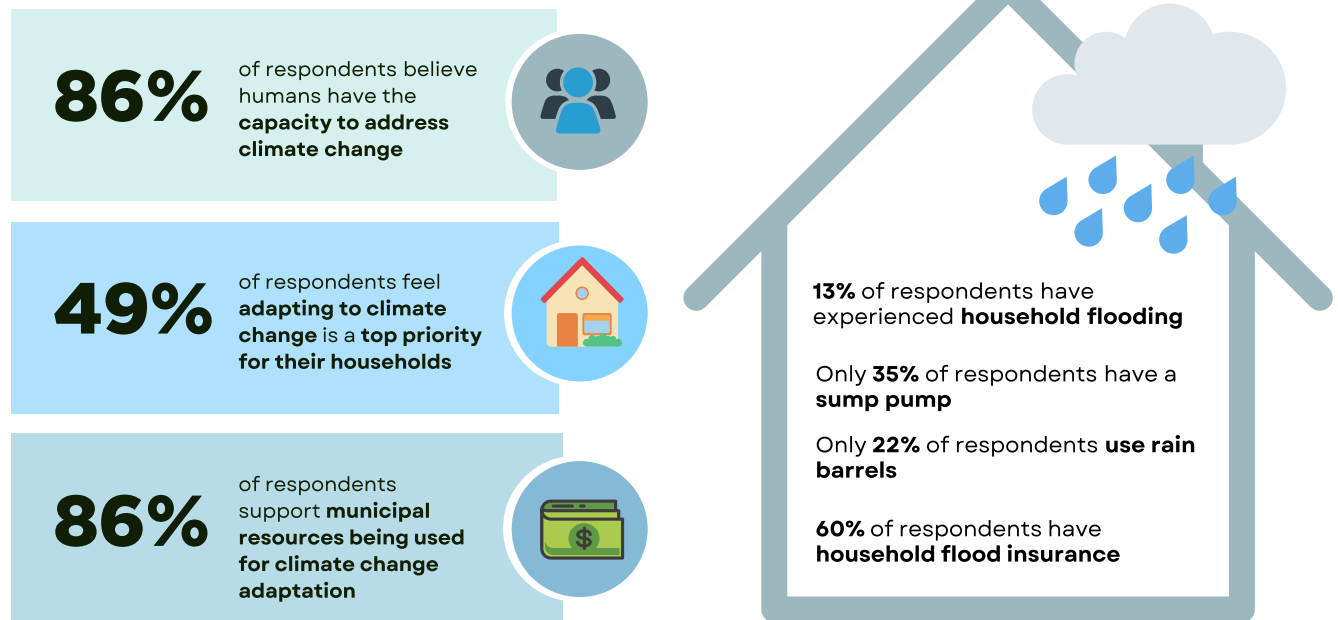
There were 153 respondents to the survey who provided insight on whether they have experienced any impacts of climate change, how prepared they feel the City Of Niagara Falls is to adapt to climate change, and if Municipal resources should be spent climate change adaptation.

The graphic on the next page illustrates a summary of the results.

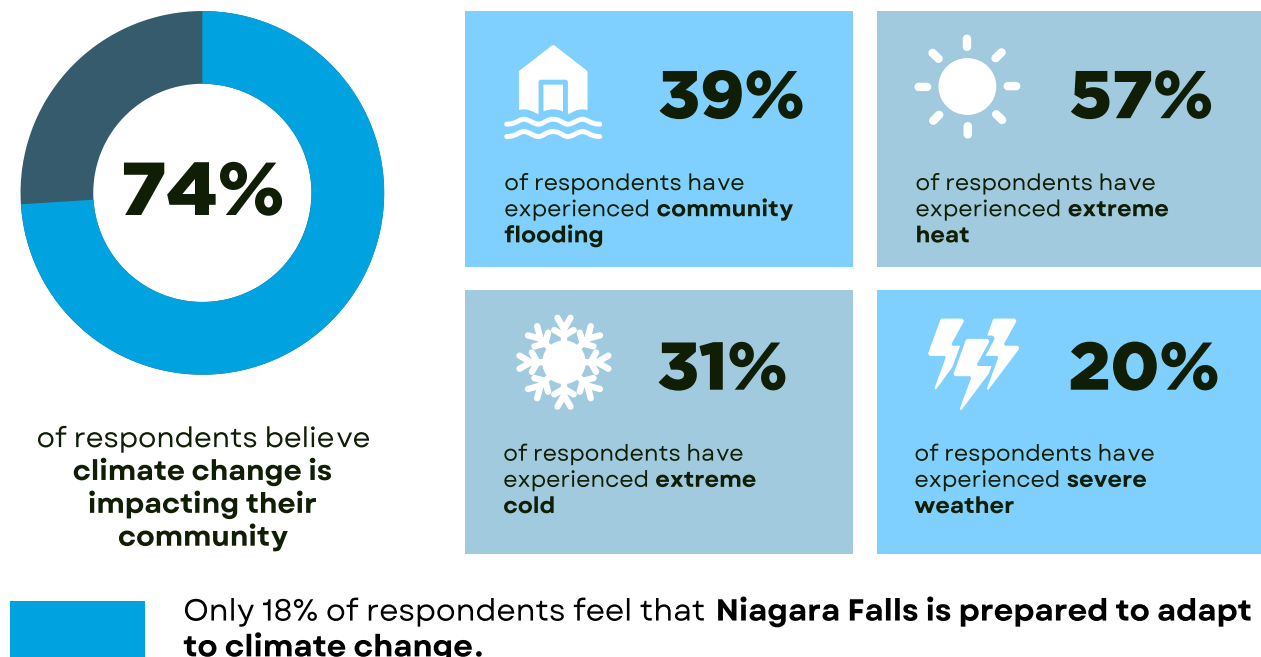


CLIMATE VULNERABILITY STUDY RESULTS

OPPORTUNITIES FOR ADAPTATION



EXPOSURE TO CLIMATE CHANGE IN NIAGARA FALLS



Note: Percentages on this page reflect the 153 people who completed surveys in Niagara Falls.

CLIMATE VULNERABILITY STUDY RESULTS

The following are excerpts of the full survey, which can be found as an appendix to this document.

Please briefly explain the consequences of extreme heat

"PHYSICALLY SICK"

"I work in a restaurant that is so hot, they have ac but it doesn't put a dent in the extreme heat because the building is so old. I ride my bicycle to work in the heat and then sweat all day working hard in front of an oven and then ride home in the blazing afternoon sun. Some days the heat makes me physically sick."

"HEAT STROKE & EXHAUSTION"

"Both my husband and my daughter work outdoors and in the last two years they each suffered severe heat stroke and heat exhaustion while on their jobs."

"CONCERNED FOR FAMILY"

"Unable to spend a lot of time outside. Kids activities are either cancelled or cut back in their intensity. Worried about my mom who is older and does not have air conditioning."



CLIMATE VULNERABILITY STUDY RESULTS

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The following are excerpts of the full survey, which can be found as an appendix to this document.

Please briefly explain how you coped/ responded to extreme heat

"COOL DOWN CAR"

"The hot humid air affects my asthma, so I have to stay indoors in air conditioning. If I need to go to work, I remote start my car a few minutes before I drive to let the air conditioning cool the interior of the vehicle. My workplace is also air conditioned. I like to walk for exercise, and I am unable to walk outside."

"ADJUST WORK HOURS"

"I've attempted to work later in the afternoon and earlier in the morning (with some success), but temperatures early in the day or in the evening remain very hard for me to deal with."

"COOLING CENTRE"

"STAYED INSIDE"

"AIR CONDITIONING"

"LUCKILY WE HAVE A GOOD AIR CONDITIONING SYSTEM"

”

Niagara Falls is committed to protecting the City and the natural environment from the impacts of climate change. Niagara Falls will look for ways to adapt to the changes that will be experienced, ensuring Niagara Falls is a great City for generations to come.

VISION STATEMENT

CLIMATE ADAPATION PLAN

GOALS

Ten goals were created using Niagara Falls City Council's Strategic Priorities as a base concept. Each goal was provided to the public for survey and feedback, the goals were further refined in five main goals.



Goal #1

Increase climate change literacy among staff and public.



Goal #2

Invest in infrastructure and assets that are prepared for the impacts of climate change.



Goal #3

Encourage green methods of transportation.



Goal #4

Create and implement energy conservation strategies for City facilities.



Goal #5

Mitigate consequences of extreme weather, emergency events and safety risk to the community.

CLIMATE ADAPATION PLAN

ACTIONS



City Intranet

Utilize City intranet to provide educational links and information regarding climate change and climate change science.



Partnerships

Work with Municipal and Educational partners in promoting climate change awareness with consistent messaging.



**Increase
climate change
literacy among
staff and public**

Education

Educate staff on Low Impact Development (LID) and other storm management practices that promote groundwater recharge.

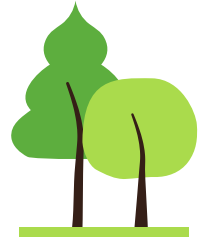


Committees

Utilize existing City committees such as Park in the City and Mayor's Youth advisory to continue to promote climate change awareness.

CLIMATE ADAPATION PLAN

ACTIONS



Update Standards

Update engineering and design standards to create a more resilient infrastructure network.



Tree Protection

Strengthen tree protection through species diversification and enhancement of tree canopy.



Invest in infrastructure and assets that are prepared for the impacts of climate change

Groundwater Recharge

Increase LID and other storm water management philosophies to promote groundwater recharge.

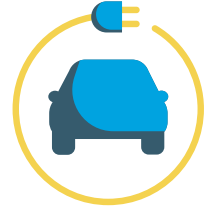


Green Spaces

Ensure new development, redevelopment and intensification preserve and contribute to quality green spaces.

CLIMATE ADAPATION PLAN

ACTIONS



Alternative Methods of Travel

Continue to connect trails, pathways and bike paths to create alternative methods of travel within the City



Electric Vehicles

Encourage electric vehicle charging as part of new development



**Encourage
green methods
of
transportation**



GO Transit

Continue to work to enhance GO Transit levels of service to full day, year-round service

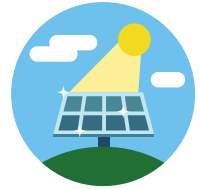


Inter-Municipal Transit

Continue promotion of the inter-municipal transit system, making public transportation convenient and timely

CLIMATE ADAPATION PLAN

ACTIONS



Energy Audits

Perform energy audits of City facilities to provide base level understanding of current efficiency levels.



Government Programs and Grants

Leverage upper level government programs and grants to retro fit existing facilities to improve energy efficiency .



Create and implement energy conservation strategies for City facilities

Alternate Energy Strategies

Investigate alternative energy strategies to reduce reliance on carbon fuels.



Shading and Cooling Options

Enhance shading and cooling options in new facility and parks, including green roofs and non-permeable surface options.

CLIMATE ADAPATION PLAN

ACTIONS



Reduce inflow and infiltration

Reduce all sources of inflow and infiltration into the sanitary sewer system including public and private property sources



**Mitigate
consequences of
extreme weather,
emergency
events and safety
risk to the
community**

Heating and Cooling Centres

Continue to provide and promote easy access to heating and cooling centres to all residents



Climate Risk Assessments

Ensure all Risk Assessments within the Corporation are updated to include climate change considerations



Emergency Preparedness

Continue to promote emergency preparedness week and 72 hour emergency kits.

MONITORING & CONTINUOUS **IMPROVEMENT**

The City Of Niagara Falls Climate Adaptation Plan is a living document, and requires annual review and update.

This ensures goals and actions are appropriate and representative of present day climatic challenges. The annual update also will provide insight into successes that have taken place over the previous year.

This is also an opportunity to provide an update identifying challenges including budgetary constraints, upper tier governmental concerns and new climatic concerns that may arise.



REFERENCES

- [i] IPCC Special Report Global Warming of 1.5 °C, 2020
<https://www.ipcc.ch/sr15/chapter/glossary/>
- [ii] Environment and Climate Change Canada, Canada's Changing Climate Report, 2019
https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/Climate-change/pdf/CCCR_FULLREPORT-EN-FINAL.pdf
- [iii] Ibid
- [iv] Adapting to Climate Change: An Introduction for Canadian Municipalities, 2010
<https://www.nrcan.gc.ca/changements-climatiques/impacts-adaptation/chapter-1-introduction-climate-change-adaptation/10081>
- [v] District of Squamish
<https://squamish.ca/climateaction/climate-adaptation/>
- [vi] IPCC Climate Change 2001: Impacts, Adaptation, and Vulnerability
https://www.ipcc.ch/site/assets/uploads/2018/03/WGII_TAR_full_report-2.pdf