Community Climate Risk and Vulnerability Assessment

County of Huron | June 2025

www.HuronCounty.ca/climate-change-and-energy

RURAL ONTARIO INSTITUTE

HURON COUNTY

Table of Contents

Land Acknowledgment

We acknowledge that the land we stand upon today is the traditional territories of the Anishinaabe, Haudenosaunee, and Neutral peoples and is connected to the Dish with One Spoon wampum, under which multiple nations agreed to care for the land and its resources by the Great Lakes in peace.

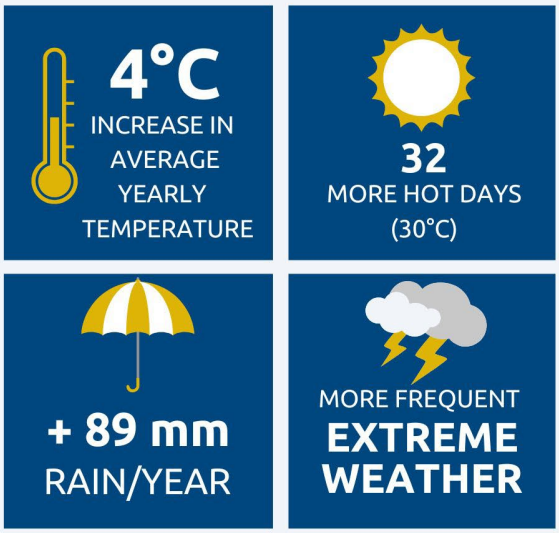
We also acknowledge the Upper Canada Treaties signed in regards to this land, which include Treaty #29 and Treaty #45 ½.

We recognize First Peoples' continued stewardship of the land and water as well as the historical and ongoing injustices they face in Canada. We accept responsibility as a public institution and as treaty people to renew relationships with First Nation, Métis, and Inuit Peoples through reconciliation, community service, and respect.

Introduction

The County of Huron is committed to being a leader in taking action to reduce, respond to, and recover from the impacts of climate change on the corporation and our communities. The effects of climate change are already visible in Huron County. In recent years, changing conditions have led to more extreme weather events, localized flooding, and variable weather patterns.

By 2050, Huron County is projected to experience the following climate impacts...



These are based on historical weather data and future greenhouse gas emission scenarios for Clinton, Ontario, from ClimateData.ca (2024).

To prepare for the future, the corporation and community must understand the potential impacts of climate change in Huron County. A community climate risk and vulnerability assessment identifies the likelihood of future climate hazards and their potential consequences on social, economic, and environmental assets within a community.

The purpose of this report is to provide information on the process and results of the community climate risk and vulnerability assessment in Huron County. The climate risk assessment involved participation from various community partner organizations to develop both qualitative and quantitative results. The identified climate impacts, risks, and vulnerabilities from this assessment will inform the development of the Climate Action Strategy for Huron County, which builds on the progress made through the Corporate Climate Change Adaptation Plan (2020-2025).

Working Group

A climate risk assessment needs a variety of perspectives to examine climate projections, impacts, vulnerabilities, and risks to Huron County. This process brought

together collaborators from different focus areas to learn from existing regional partners and build future connections that can sustain climate action moving forward.

The working group was comprised of representatives from community partners and the County of Huron.

The following service areas were represented by local organizations:

- Community Safety and Wellbeing
- Public Health
- Climate Change
- Economic Development
- Emergency Management
- Natural Environment
- Local Immigration
- Social Equity
- Community Planning
- Culture and Recreation

This climate risk assessment was possible due to the staff expertise and resources created by the Rural Ontario Institute (ROI), specifically, the Wellbeing Dashboard. The Dashboard can help municipalities practice evidence-based decision-making to inform policies, programs, and initiatives.

The Dashboard provides access to 62 community-level wellbeing indicators, such as demographics, economics, housing, health, society, and environment.

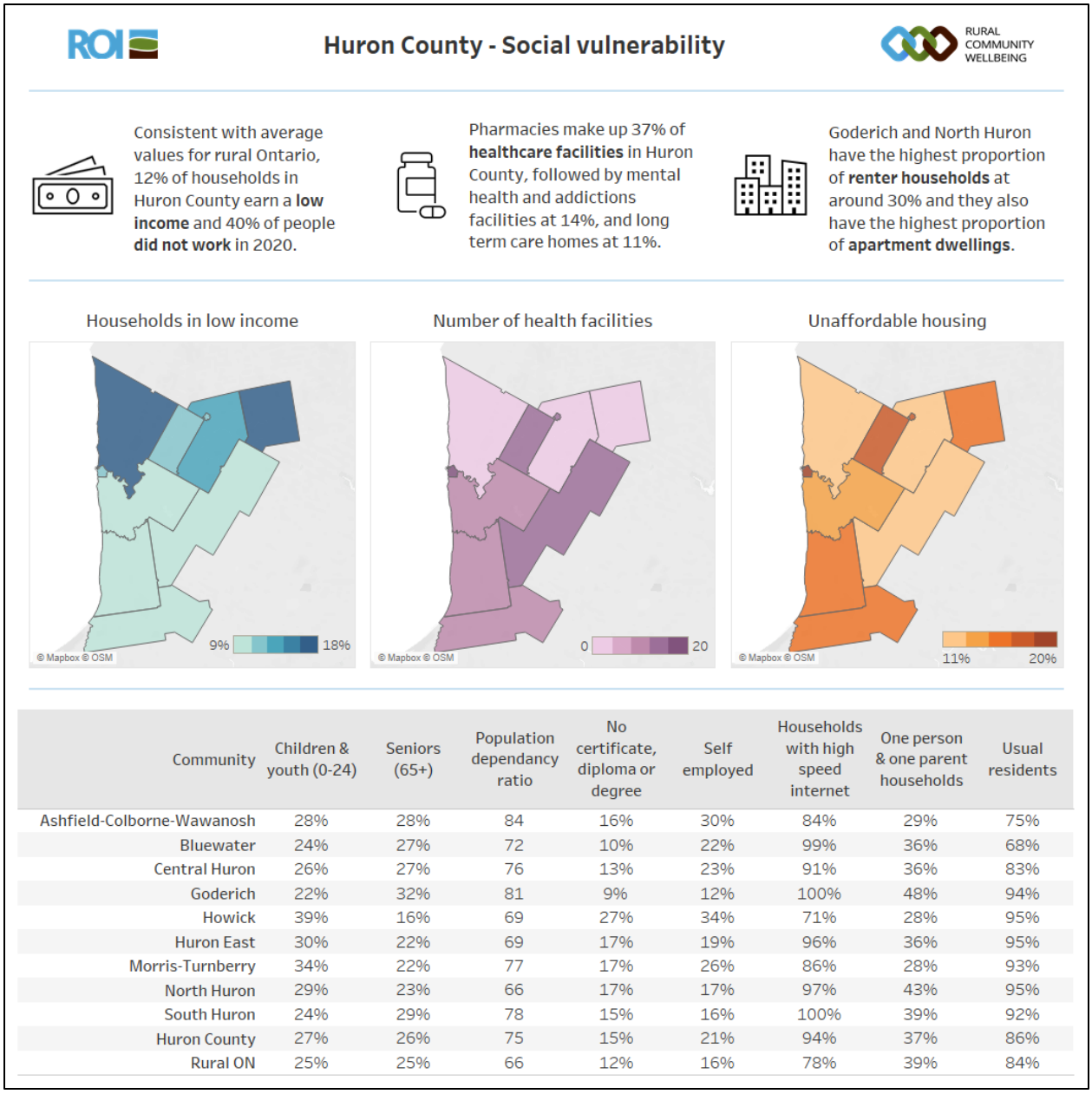
A large number of the indicators were informed by the data gathered during the 2021 Statistics Canada Census Profile, which gave residents opportunities to share valuable information and perspectives with the federal government.

Climate Risk and Vulnerability Assessment Process

The purpose of the community climate risk and vulnerability assessment process is to prioritize climate impacts that pose a significant risk to the community. In a climate risk assessment, risk is a combination of the likelihood of a climate hazard occurring and the local consequences of that event, which could be positive or negative.

Data Required

The results of climate risk assessments are only as good as the available data, perspectives, and expertise that contribute to them. The climate risk assessment was informed by local wellbeing indicator data available through ROI's Wellbeing Dashboard. ROI staff synthesized data for all nine local municipalities to understand social, economic, and environmental factors that would influence climate risk, vulnerabilities, or adaptive capacity related to climate impacts. Indicator data was translated into visuals for ease of comparison and understanding across disciplines. An example is the social vulnerability data related to households in low-income, unaffordable housing, and the number of health facilities within each local municipality in Huron County (Figure 1).



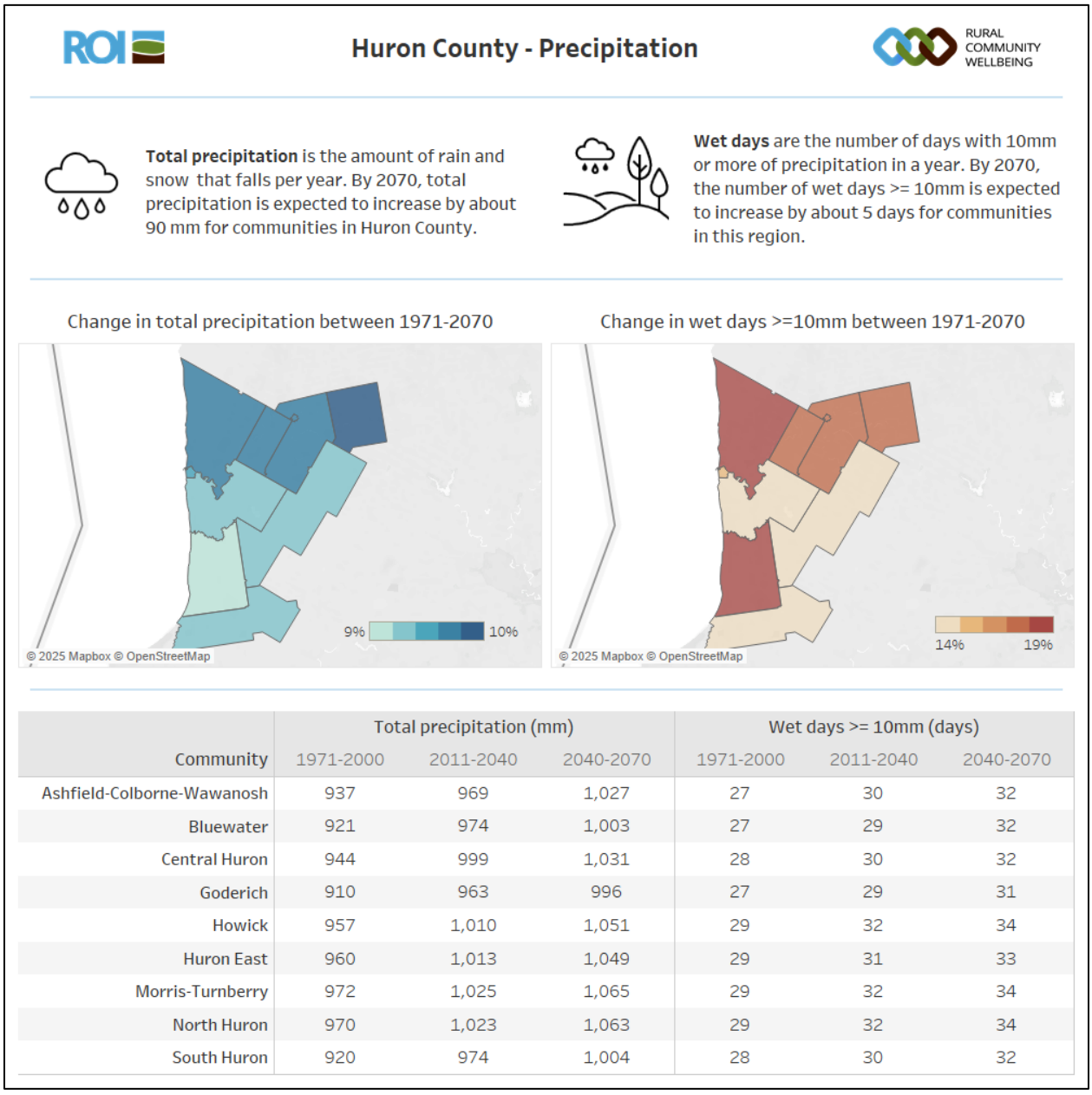
Community	Children & youth (0-24)	Seniors (65+)	Population dependancy ratio	No certificate, diploma or degree	Self employed	Households with high speed internet	One person & one parent households	Usual residents
Ashfield-Colborne-Wawanosh	28%	28%	84	16%	30%	84%	29%	75%
Bluewater	24%	27%	72	10%	22%	99%	36%	68%
Central Huron	26%	27%	76	13%	23%	91%	36%	83%
Goderich	22%	32%	81	9%	12%	100%	48%	94%
Howick	39%	16%	69	27%	34%	71%	28%	95%
Huron East	30%	22%	69	17%	19%	96%	36%	95%
Morris-Turnberry	34%	22%	77	17%	26%	86%	28%	93%
North Huron	29%	23%	66	17%	17%	97%	43%	95%
South Huron	24%	29%	78	15%	16%	100%	39%	92%
Huron County	27%	26%	75	15%	21%	94%	37%	86%
Rural ON	25%	25%	66	12%	16%	78%	39%	84%

Figure 1. Visual representation of social vulnerability data for Huron County.

Climate Impact Statements

The first step was to determine the future climate hazard projections for Huron County and all local municipalities. Climate hazard data was collected from ClimateData.ca and Climate Atlas of Canada, which both use historic climate trends to show future climate projections. It is important to note that there is uncertainty in predicting how climate change will affect each local area, as it is based on variable conditions and emission levels, which can change over time. ClimateData.ca provided

local climate data for all nine municipalities (see Figure 2), whereas Climate Atlas of Canada provided county-wide data for heatwaves, which did not vary significantly between local municipalities.



Community	Total precipitation (mm)			Wet days >= 10mm (days)		
	1971-2000	2011-2040	2040-2070	1971-2000	2011-2040	2040-2070
Ashfield-Colborne-Wawanosh	937	969	1,027	27	30	32
Bluewater	921	974	1,003	27	29	32
Central Huron	944	999	1,031	28	30	32
Goderich	910	963	996	27	29	31
Howick	957	1,010	1,051	29	32	34
Huron East	960	1,013	1,049	29	31	33
Morris-Turnberry	972	1,025	1,065	29	32	34
North Huron	970	1,023	1,063	29	32	34
South Huron	920	974	1,004	28	30	32

Figure 2. Visual representation of climate data for precipitation in Huron County.

The assessment used five climate hazard categories, including growing season, winter season, heat, precipitation, and extreme weather, to group 29 climate impact statements (see Appendix A). All working group members had opportunities to add or change impact statements based on local knowledge.

Likelihood Scores

The second step of the climate risk assessment was to determine the likelihood of climate hazards occurring in Huron County and the nine local municipalities. Using local knowledge of current conditions paired with the climate hazard projections from ClimateData.ca and Climate Atlas of Canada, staff determined initial likelihood scores on a scale from 1 to 5, whereby 1 indicates a "Rare" occurrence, and 5 indicates an "Almost Certain" occurrence. Working group participants reviewed and recommended adjustments to scores based on their local experience and expertise.

Table 1. Likelihood score descriptions.

Likelihood	Score	Description
Very low/Rare	1	Not likely to occur in the 2040-2070 period
Low/Unlikely	2	May occur once per decade
Moderate/Possible	3	More likely than not to occur once per decade, may occur multiple times per decade
High/Likely	4	More likely than not to occur multiple times per decade, may occur annually
Very High/Almost Certain	5	Likely annually, ongoing occurrences

Consequence Scores

The third step of the climate risk assessment was to assign consequence scores. Consequence scores ranged from 1 to 5, whereby 1 indicates a "Negligible" consequence on the community and 5 indicates a "Catastrophic" consequence for the community for each of the three consequence criteria – social, environmental, and economic.

Table 2: Consequence score descriptions.

Consequence	Score	Description
Negligible	1	Very Low impact on people/places/assets
Minor	2	Low impact on people/places/assets
Moderate	3	Moderate impact on people/places/assets
Major	4	High impact on people/places/assets
Catastrophic	5	Very High impact on people/places/assets

As a collective, working group participants were asked to consider how each climate impact statement would affect each local municipality, including their sensitivity and adaptive capacity, based on their local knowledge and data gathered from the ROI wellbeing dashboard. The group was asked to consider events that had happened in each community before, areas of the community that may already be experiencing

stress, and if there are any mitigating factors in place to help manage a climate hazard.

In addition to the quantitative scores, the working group recorded qualitative justifications for each score to provide transparency for future reference and evaluations.

Risk Results

The final step of the climate risk assessment assigns risk scores to each climate impact statement under each local municipality and for the county as a whole. Risk scores are determined based on the likelihood score and the three consequence scores (social, environmental, and economic). Based on the established thresholds, the county was given a very low (0-12), low (13-23), moderate (24-44), or high (45-75) risk score for each climate impact statement (see Appendix B).

Table 3: Climate risk score matrix.

Likelihood Scores	Negligible	Minor	Moderate	Major	Catastrophic
Almost Certain (5)	15	30	45	60	75
Likely (4)	12	24	36	48	60
Possible (3)	9	18	27	36	45
Unlikely (2)	6	12	18	24	30
Rare (1)	3	6	9	12	15

Consequence Scores

The risk scores help demonstrate whether the county is vulnerable or at risk of specific climate impact statements. Based on the climate risk assessment results, Huron County is at the highest risk for the following five climate impact statements:

- More extreme rainfall events could lead to impacts on infrastructure (roads, culverts, bridges) and displacement from flooded buildings/homes/roads.
- More frequent and extreme weather events during any season will exacerbate existing inequities for low-income and vulnerable populations.
- More wet days or extreme rainfall events may cause flooding for farming operations and fields.
- More lake-effect snow and ice storms can create hazardous travel conditions and increase demand for snow removal and road salt application.
- More frequent and extreme weather events during any season can lead to more accidents and emergencies.

Action Brainstorming

To build on the climate risk assessment results, the working group participated in a brainstorming activity to compile opportunities to address the climate impact statements and build adaptive capacity within the community. Potential actions to address vulnerabilities were organized under the five climate hazard categories and connected to one specific climate impact statement when appropriate. Actions that addressed multiple climate impact statements were also encouraged.

Actions were brainstormed under extreme weather, growing season, heat, winter season, and precipitation.

After the working group brainstormed ideas, they voted on which actions they would like to see implemented in Huron County. The composition of the working group led to a large number of actions related to their specific service area or actions that their organizations could accomplish. Some of those actions include:

- Continue to promote and adapt the Huron Clean Water Project categories to meet the needs of the community under a changing climate
- Focus the built environment around placemaking to encourage more neighbourhood connections
- Offer emergency kits for vulnerable and low-income households
- Consider smart salt training programs for operators to reduce the impact of road salt on the natural environment
- Promote and develop best management practices to reduce runoff in rural and urban settings – control, trap, treat
- Tree planting for shade and to reduce urban heat island effect
- Create a heat and drought-tolerant landscaping guide

Limitations of the CRVA

It is important to recognize that climate risk and vulnerability assessments are subjective exercises that depend on available data and the perspectives of those who participated in the assessment. The data available through the ROI Wellbeing Dashboard was sourced through public organizations, including the federal government's 2021 census results, which are reported by individuals and, therefore, may not be accurate or representative of the entire community. While a variety of organizations were engaged to provide community input and expertise, individual community member perspectives and experiences were not captured at this time outside of the census data. As each individual or household's data cannot be confirmed, the assessment is unable to consider how/if each household or individual will recover from a climate event, their length of recovery, their adaptive capacity, or the compounding factors that influence their vulnerability or risk level.

It is also important to recognize that there was an effort made to ensure the list of climate impact statements was comprehensive and inclusive of the climate impacts that have been or could be experienced in Huron County, however, there may be some specific impacts that were missed during this assessment.

Next steps

The results from the climate risk assessment and action brainstorming will inform the update to Huron's Climate Action Strategy, which will start to consider community actions to increase resiliency and reduce risk to climate impacts.

The climate impact statements identified as having the highest risk by the working group will be prioritized when creating actions for the new climate action strategy. The highest risk climate impact statements will be assessed against the following criteria to ensure they align with corporate and community needs and desires:

1. Does the County have jurisdiction to help address the top risks?
2. Do the top community risks align with the top corporate risks?
3. Does this risk align with what we have experienced and need to focus on?
4. Is it related to a County Council strategic priority?

If a high-risk climate impact statement agrees with these criteria, then it will be used to prioritize the final actions within the climate action strategy.

Lessons Learned

As this was the County of Huron's first attempt to quantitatively and qualitatively assess climate risk and vulnerability in the community, it is important to recognize lessons learned and areas for improvement for future climate risk assessments.

Data

1. Climate risk and vulnerability assessments can be completed in-house using staff time and resources. Depending on your budget, tailor your climate risk and vulnerability assessment to the data and expertise you have available in your community. The ROI Wellbeing Dashboard provided the working group with free data for each local municipality based on responses from their residents or other credible sources to complement the local knowledge each professional brought to the exercise.

Climate impact statements

2. It can be hard to balance the need for broad and specific climate impact statements. Focusing each climate impact statement on one climate hazard and impact can help maintain focus and discussion relevant to the impact.
3. Be adaptable to changing the climate impact statements throughout the process as new information or perspectives are shared.

Likelihood, Consequence, and Risk Scores

4. Likelihood scores should have different definitions depending on whether the climate hazard is a recurring impact (i.e., flooding) or a single event impact (i.e., tornado).
5. It is easier to assign quantitative values to the likelihood scores, as it is based on climate projection data that is not subjective.
6. Determining quantitative consequence scores requires time for conversations. Creating more consequence score categories may allow for nuanced consequences to be captured (i.e., impact on specific demographics in a community or impacts to land, water, and air, etc.).
7. Consequence scores can be positive or negative – it is important to have a method to distinguish between the two in the risk score formula.

Process

8. Define key terminology at the beginning of the assessment to avoid confusion (i.e., who is included in 'vulnerable populations', climate hazard vs. impact, etc.).
9. An additional meeting at the beginning of the process to explain the background on the assessment, the data used, and gaps in data would have benefited the process.
10. Take the time to gather feedback and perspectives from working group participants. Leaving time for discussions allows participants to learn from and with each other by sharing their valuable perspectives and expertise.
11. A mixture of virtual and in-person workshops/conversations is necessary to build familiarity and trust, while accommodating the hybrid working environment.
12. Completing the climate risk assessment in four months through four meetings was respectful of participants' time, but it did not leave opportunities to bring in new working group participants to inform the process.

Working Group

13. Ensure that everyone knows why they have a seat at the table and the value they bring. Find connections between climate change and the work of each participant so they understand how they influence the climate and how the climate impacts their work and the people they serve.
14. Create an inclusive and respectful space for conversations. Participants will feel more comfortable if trust is built before sharing vulnerable information and experiences.

Conclusion

This initial climate risk and vulnerability assessment for Huron County demonstrates the impacts climate change can have on the community. Climate change will impact the length of the winter and growing season, create longer and more frequent heat events, cause more frequent and intense precipitation events, and lead to more extreme weather all year round. These climate hazards will have variable economic, social, and environmental impacts on Huron County communities and residents.

The risks outlined in the climate risk assessment offer areas to focus adaptation and mitigation actions to reduce vulnerabilities and increase resiliency to climate change in Huron County. These focus areas will be considered within the County of Huron's Climate Action Strategy update in 2025.

Appendix A – Climate Impact Statements

Climate Hazard	Climate Impact Sentence
Growing Season	Alterations to the growing season (longer, insufficient precipitation, etc.) could place more stress on agricultural systems (local food, producers, and water supply).
	A longer growing season with sufficient precipitation could lead to longer seasonal employment.
	A longer growing season with sufficient precipitation could lead to higher productivity of native vegetation and opportunities for new crop varieties.
	Longer growing seasons may make it easier for invasive species to thrive and become established.
	A longer growing season could allow tourism operators to extend their season.
Winter Season	Less ice formation due to warmer winter temperatures may increase erosion along the Lake Huron shoreline and local watercourses.
	Changes in the freeze-thaw cycle may cause damage to infrastructure (roads, buildings, water, sewers, homes, etc.).
	A shorter winter season could mean a longer construction season.
	A shorter winter season may cause new and existing allergies and respiratory illnesses to worsen.
	A shorter winter season could reduce the availability and options for winter recreational activities.
Heat	More humidity and longer heat waves will impact vulnerable populations and those with existing health conditions (i.e., no access to air conditioning).
	If precipitation decreases and droughts persist, it may affect groundwater reserves, leading to potable water shortages and restrictions on use (i.e., lawn maintenance).
	If there is more heat and longer heat waves, those working outdoors may experience heat-related illnesses.
	If there is more heat and longer heat waves, soil moisture may be reduced, impacting vegetation growth and livestock.
	Longer dry periods may increase fire risk to natural and built environments.
	More humidity and longer heat waves may reduce access to outdoor recreational opportunities while increasing demand for shoreline recreation.
	Hotter and drier weather could adversely impact air quality (i.e., through increased risk of stagnant air, forest fires, etc.) and increase indoor air conditioning use.
	Changes in seasonal temperatures (i.e., warmer temperatures) may impact aquatic ecology and lakeshore ecosystems.
	Longer heat waves could increase health concerns related to water quality and insect-borne illnesses.
Precipitation	More extreme rainfall events impact infrastructure (roads, culverts, bridges) and cause displacement from flooded buildings/homes/roads.
	More wet days or extreme rainfall events may cause farming operations and fields to flood.
	More extreme rain events and flood conditions could impact water quality through bank erosion and runoff into rivers and streams.
	Limited precipitation in the spring and summer may reduce water levels of rivers, lakes, and ponds.
	If there are more extreme precipitation events, upgrades to municipal drains and urban stormwater management infrastructure may be required.
Extreme Weather	More frequent and extreme weather events during any season can lead to more accidents and emergencies.
	More lake-effect snow and ice storms can create hazardous travel conditions and increase demand for snow removal and road salt application.
	Increases in freezing rain and snow/ice storms may increase damage to vegetation and utility lines, resulting in more frequent and longer power interruptions.
	More frequent and extreme weather events during any season will exacerbate existing inequities for low-income and vulnerable populations.
	Ontario is regularly becoming a hot spot for tornado activity. Higher wind speeds could impact people and cause damage, especially if tornadoes touch down.

Appendix B – County Climate Risk Scores

Based on the established thresholds, the county was given a very low (0-12=green), low (13-23=yellow), moderate (24-44=orange), or high (45-75=red) risk score for each climate impact statement.

Growing Season

Alterations to the growing season (longer, insufficient precipitation) could place more stress on agricultural systems (local food, producers and water supply).	
A longer growing season could allow tourism operators to extend their season.	
Longer growing seasons may make it easier for invasive species to thrive and become established.	
A longer growing season with sufficient precipitation could lead to longer seasonal employment.	
A longer growing season with sufficient precipitation could lead to higher productivity of native vegetation, and opportunities to grow new crop varieties.	

Winter Season

Less ice formation due to warmer winter temperatures may increase erosion along the Lake Huron shoreline and local watercourses.	
A shorter winter season may cause new and existing allergies and respiratory illnesses to worsen.	
A shorter winter season could mean a longer construction season.	
Changes in the freeze-thaw cycle may cause damage to infrastructure (roads, buildings, water, sewers, homes, etc.).	
A shorter winter season could reduce the availability and options for winter recreational activities.	

Precipitation

More extreme rainfall events impact infrastructure (roads, culverts, bridges) and cause displacement from flooded buildings/homes/roads.	
More wet days or extreme rainfall events may cause farming operations and fields to flood.	
More extreme rain events and flood conditions could impact water quality through bank erosion and runoff into rivers and streams.	
Limited precipitation in the spring and summer may reduce water levels of rivers, lakes, and ponds.	
If there are more extreme precipitation events, upgrades to municipal drains and urban stormwater management infrastructure may be required.	

Extreme Weather

More frequent and extreme weather events during any season will exacerbate existing inequities for low-income and vulnerable populations.	
More lake-effect snow and ice storms can create hazardous travel conditions and increase demand for snow removal and road salt application.	
More frequent and extreme weather events during any season can lead to more accidents and emergencies.	
Ontario is regularly becoming a hot spot for tornado activity. Higher wind speeds could impact people and cause damage, especially if tornadoes touch down.	
Increases in freezing rain and snow/ice storms may increase damage to vegetation and utility lines, resulting in more frequent and longer power interruptions.	

Heat

More humidity and longer heat waves will impact vulnerable populations and those with existing health conditions (i.e., no access to air conditioning).	
Changes in seasonal temperatures (i.e., warmer temperatures) may impact aquatic ecology and lakeshore ecosystems.	
If there is more heat and longer heat waves, soil moisture may be reduced, impacting vegetation growth and livestock.	
Hotter and drier weather could adversely impact air quality (i.e., through increased risk of stagnant air, forest fires, etc.) and increase indoor air conditioning use.	
Longer heat waves could increase health concerns related to water quality and insect-borne illnesses.	
Increased heat and precipitation may increase financial requirements for maintaining roads, buildings, and related equipment.	
More humidity and longer heat waves may reduce access to outdoor recreational opportunities while increasing demand for shoreline recreation.	
If there is more heat and longer heat waves, those working outdoors may experience heat-related illnesses.	
Longer dry periods may increase fire risk to natural and built environments.	
If precipitation decreases and droughts persist, it may affect groundwater reserves, leading to potable water shortages and restrictions on use (i.e., lawn maintenance).	