Durham Community Climate Adaptation Plan Update

Climate Science Report

Figure 1 Image Source: https://www.durham.ca/en/tourism/trails-and-conservation-areas.aspx

Recommended Citation:
Regional Municipality of Durham. (2026). Climate Science Report. Prepared by ICLEI Canada for the Regional Municipality of Durham.

Executive Summary

Durham Region is already experiencing the effects of a warming and more variable climate. Along with slower onset changes in temperature and precipitation that affect the natural, built and socioeconomic systems we depend upon, more drastic changes include an increasing frequency, severity, and compounding nature of climate-related hazards in the region. For example, severe rainfall and flooding in March 2024 demonstrated an anomaly of 85 millimetres of rain that exceeded March baseline levels by close to 30 mm. Ice storms, like the one experienced in March 2025, may also become more frequent as more days hovering near zero degrees in winter and the shoulder seasons create ideal conditions for freezing rain that can lead to power outages. Wildfire smoke and extreme heat, as experienced in June 2025, are also becoming more frequent. These observed conditions are consistent with broader trends across southern Ontario and, in the absence of appropriate adaptation measures, could escalate climate risks in the coming decades.

This report examines Durham Region's historical (baseline) climate conditions, along with near-, medium-, and long-term projections for a broad array of climate variables, with a primary focus on temperature and precipitation change. It represents an update to the Region's previously completed climate work, including the 2020 *Guide to Conducting a Climate Change Analysis at the Local Scale: Lessons Learned from Durham Region*[1]. The 2020 guide details climate projections, based on best modelling data available at the time (RCP 8.5 and 4.5[*]). This 2026 Climate Science Report provides a detailed assessment of modelled historical climate conditions and future projections for temperature, precipitation, extreme weather, and growing-season dynamics in Durham Region. The updated climate projections are drawn from an ensemble of statistically downscaled CMIP6 global climate models under the SSP5-8.5 scenario and SSP2-4.5 scenario as its high and intermediate planning references. This approach is consistent with current Canadian climate risk practice and the data available through climatedata.ca; while the 2026 CMIP7 update has refined the upper end of plausible emissions downward, SSP5-8.5 remains a defensible high-end bound for stress-testing long-lived infrastructure against severe but credible future conditions. Projection uncertainty is summarized using the 10th, 50th, and 90th ensemble percentiles. To reflect the full range of projected conditions, this report uses health region data as the primary spatial reference, supplemented by Brock and Ajax values as proxies for northern and southern extremes. Exceptions to this pattern do occur, in which case the Census subdivision (CSD) that most accurately represents the highest (🡅) or lowest (🡇) data range is used

---

[1] Delaney, F., Ng, P., Dokoska, K., Milner, G., Potter, K., and Notaro, M. 2020. *Guide to Conducting a Climate Change Analysis at the Local Scale: Lessons Learned from Durham Region*. Toronto, Ontario: Ontario Climate Consortium.

instead. These instances are noted where relevant throughout the report. This approach provides a reasonable representation of local climatic variability across the entire region.

* *Representative Concentration Pathways* (RCPs) are four greenhouse gas concentration scenarios adopted by the IPCC for its fifth Assessment Report (AR5) in 2014. RCP8.5 represents a high emissions scenario and RCP4.5 represents a middle-of-the-road emission scenario.

Key Findings

Based on best practices and in order to maintain consistency with Durham Region's previous climate projection work, the baseline period for each of the following variables is 1971-2000 and data has been projected up to 2100. Whereas all key findings below and throughout the report reflect the SSP5-8.5 high-emissions scenario, projections under the 'middle-of-the-road' SSP2-4.5 scenario can also be found in *Appendix D: 2025 Summary of Climate Variables - SSP2-4.5*.

1. Rapid and Persistent Warming

The average annual temperature in Durham Region is projected to increase by approximately **6.4°C by 2100**, relative to the 1971–2000 baseline. Seasonal warming is expected across all months, with the most pronounced increases occurring in summer and fall. Winter's average temperature will notably rise from a baseline below zero degrees to above zero degrees by 2100. The rate of warming is projected to be broadly consistent across the region; this is a separate matter from baseline temperatures, which vary geographically, with southern lakeshore communities remaining warmer overall and northern communities slightly cooler.

2. Extreme Heat Becoming a Dominant Hazard

Indicators of extreme heat increase sharply through the century:

- **Hottest day** rises **6.7˚C**, from a baseline of **32.5°C** to **39.2°C** by 2100.
- **Extreme Heat Days >30°C** increase tenfold—from a **7 day per year** baseline to **70 days per year** by 2100.
- **Humidex >30 days** increase from a baseline of **37 days per year** to **115 days per year** by 2100.
- **Tropical nights** (minimum temperature >20°C) rise from **3** to **55 nights per year** by 2100.
- **Heat waves** increase from roughly **1 per year** to **5–6 per year**, with average duration extending from **2.2 days** to **7.5 days** by 2080.

These shifts pose significant risks to human health, natural systems, electricity reliability, and critical infrastructure and will require expanded cooling strategies, risk communications, and preparedness planning.

3. Milder Winters with Fewer Cold Extremes

Cold-weather hazards decline substantially across Durham Region. Some strong indicators are:

- **Extreme cold days (Tmin < –15°C)** fall from **25 days** to **1 day** by 2100.
- **Frost days** decrease by **72 days** annually by 2100.
- **Ice days** decline from **62** to **15 days** by 2100.
- **Freeze–thaw cycles**, which affect pavement and building durability, decline from **71** to **50 per year** by 2100.

Heating degree days drop sharply, indicating reduced winter energy demand but also shifting requirements for building performance and winter operations.

4. Longer, Warmer Growing Seasons with New Agricultural Risks

The region's growing season is projected to expand from **153 days** to **220 days** per year by 2100—a **projected increase of more than 9 weeks**. Growing degree days (GDDs), a measure of accumulated heat above a 5°C threshold used to gauge how favourable conditions are for crop and plant development, are projected to rise from **2,070** to **3,591**—an **increase of approximately 73%**. While this accumulated warmth enables new crop opportunities, it also amplifies risks related to pests, water stress, heat injury to crops, and late-spring frost damage. Warmer winters will prolong the activity period of pests such as mosquitoes and black-legged ticks (though climate variables alone do not reliably predict tick activity).

5. Increasing Annual Precipitation but Higher Variability

Annual precipitation increases by **148 mm** by 2100, with the greatest increases in winter, spring, and fall. Summer precipitation returns to near-baseline levels by late century, but higher temperatures and longer dry spells elevate drought risk. Maximum consecutive dry days remain relatively stable but trend upward slightly.

6. Heavy Rainfall and Stormwater Hazards Intensify

Extreme precipitation indices for Durham Region show consistent increases:

- Wet days ≥10 mm: +7 days/year by 2100
- Wet days ≥20 mm: +3 days/year by 2100
- Maximum 1-day precipitation increases from a baseline of **38 mm** to **47 mm** by 2100

Climate-adjusted Intensity-Duration-Frequency (IDF) curves for the Oshawa WPCP station show substantial increases in rainfall intensity for 25-, 50-, and 100-year storms, with more rain falling in shorter periods. These changes heighten flood risk, exceed the design basis of legacy infrastructure, and require integration of climate-scaled IDF values into stormwater planning, as recommended by Environment and Climate Change Canada (ECCC) and Canadian Standards Association (CSA) W231:25. The same trend toward increasing rainfall intensities under climate change was identified by the Toronto and Region Conservation Authority in its Technical Memo "Data Source Selection for IDF Curves to be Used in the Region of Peel Flood Vulnerable Road and Crossing Hydraulic Capacity Assessment Project," which, after comparing projected IDF curves at nearby Lake Ontario shoreline stations (Toronto City and Toronto International Airport), found that legacy IDF curves had not been appropriately adjusted for projected climate change and recommended adopting a climate-informed data source for infrastructure planning.

Implications for Adaptation Planning

The climate projections presented here highlight a future characterized by more frequent and severe heat events, shifting agricultural conditions, and heightened risks from intense rainfall. These trends will interact with built, social, economic, health, and ecological systems, increasing exposure and potentially amplifying vulnerabilities across Durham Region in the absence of adaptation planning.

The findings provide the technical foundation for identifying priority climate risks and for developing sector-specific adaptation actions under the Building Adaptive and Resilient Communities (BARC) framework. They also underscore the importance of acknowledging uncertainty, using ensemble projections, and updating infrastructure design and policy assumptions to reflect a changing climate.

This report has been designed for adaptation planning purposes only; future infrastructure decisions should review climate projections with updated science of plausible scenarios over the service life of the asset at the time of design.

TABLE OF CONTENTS

Introduction

Climate change is imposing increasing pressures at local, regional, and national scales. Canada's climate is becoming warmer, wetter, and more volatile, placing greater stress and strain on the systems our communities depend on to maintain quality of life. These changes manifest across two interconnected dimensions. Slow variables–such as mean annual temperature and precipitation–shift gradually over years to decades and can be difficult for humans to perceive, yet they quietly reshape species distributions, agricultural practices, and infrastructure design thresholds. Extreme weather events, by contrast, tend to gain immediate attention. Recent flooding, extreme heat events, ice storms, and wildfire smoke serve as visceral reminders of the urgency facing communities as they work to strengthen preparedness for ongoing and intensifying climate-related risks. The figure below illustrates how in the past two years alone Durham Region has experienced a wide range of severe weather-related events, including heavy rainfall and flooding (March 2024), ice storms and power outages (March 2025), and wildfire smoke and extreme heat (June 2025). These extreme events can generate both direct and indirect health effects, place stress on local ecosystems, damage infrastructure, and lead to substantial economic losses.**

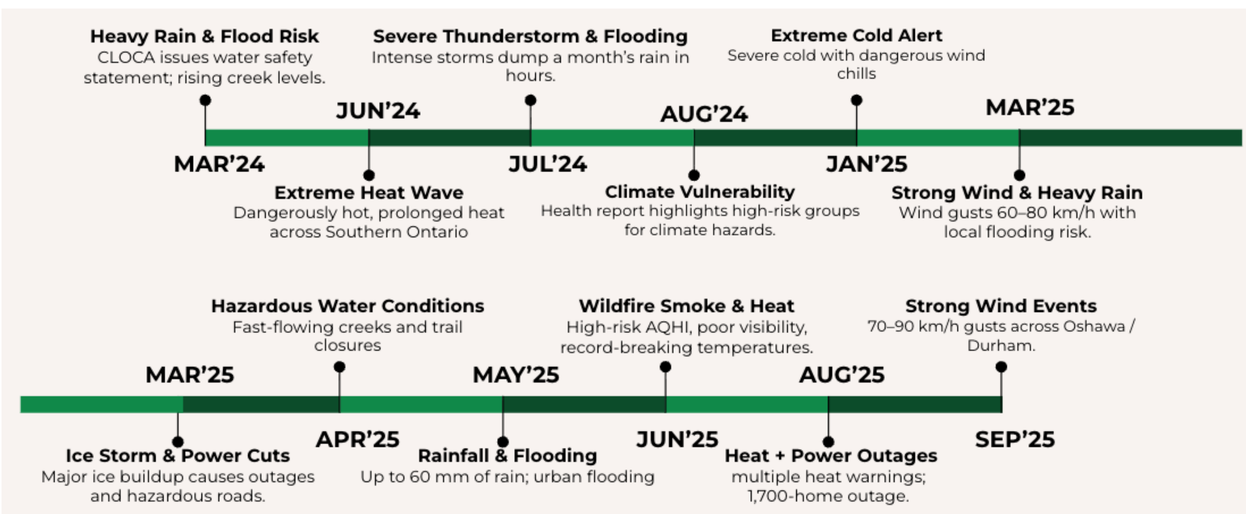

Figure 2: Climate-Related Events Experienced Across Durham Region 2024-2025 (Source: Media Scan)

**Although there is not an abundance of local insured-loss data for Durham Region, province-wide analogues from the insurance industry illustrate the potential scale of loss. For example, the July 2024 Southern Ontario flash flooding event incurred an estimated $880.5 million in insured damages, while the December 2022 Eastern Canada bomb cyclone and the December 2021 Eastern Canada windstorm caused $282.6 million and $145.4 million in insured losses respectively. Although these figures do not include uninsured or financially intangible losses, they provide a reasonable indication of the magnitude of costs that similar events could impose on communities across Durham Region.

This report examines Durham Region's historical (baseline) climate conditions, along with near-, medium-, and long-term projections for a broad array of climate variables, with a primary focus on temperature and precipitation change. It represents an update to the region's previous climate work done to date, including the 2020 *Guide to Conducting a Climate Change Analysis at the Local Scale: Lessons Learned from Durham Region*[2]. Climate variables included in this report are consistently available across climate model ensembles and serve as the foundational drivers of hazards such as extreme heat, drought, and heavy rainfall. The full list of climate data assessed can be found in *Appendix C: 2025 Summary of Climate Variables - SSP5-8.5*, and *Appendix D: 2025 Summary of Climate Variables - SSP2-4.5*. Climate projections support the identification of Durham Region's key climate vulnerabilities and risks, and provide the analytical basis for subsequent stages of the planning process.

This report constitutes Milestone 1 of ICLEI Canada's Building Adaptive and Resilient Communities (BARC) program, in which Durham Region is currently participating.

All climate projections carry inherent uncertainty arising from variability in emissions pathways, global climate sensitivity, and model structure. This uncertainty is acknowledged and discussed, alongside the modelling approach, in subsequent sections. Uncertainty is not however a basis for minimizing the scale of projected change: it bears chiefly on the magnitude of extremes rather than on the direction of long-term averages, which consistently point toward a warmer, wetter and wilder climate. Climate models have historically tended to underestimate observed changes such as increases in temperature and precipitation, meaning that projections may understate rather than overstate the impacts ahead. Notwithstanding these limitations, the report offers a robust, evidence-based foundation to support the development of the region's long-term climate resilience.

Data Collection and Reporting

Data for localized climate change projections were primarily collected from ClimateData.ca - a federally supported, publicly available online climate change data and scenarios tool.

Climate data was collected and analyzed at the ***health region*** spatial scale, which encompasses all eight municipal census subdivision**s** (CSDs) within Durham Region (**Figure 3**). This scale provides a consistent and comparable reference point across climate projection datasets and serves as a practical midpoint for regional interpretation — meaning that health region projections will generally fall between the higher and lower limits observed across individual CSDs.

[2] Delaney, F., Ng, P., Dokoska, K., Milner, G., Potter, K., and Notaro, M. 2020. *Guide to Conducting a Climate Change Analysis at the Local Scale: Lessons Learned from Durham Region*. Toronto, Ontario: Ontario Climate Consortium.

Figure 3: Durham Region Health Region (left) vs Census Subdivision areas, Ajax CSD highlighted (right) (ClimateData.ca)

Because Durham Region spans a considerable north–south gradient, Ajax CSD (along the Lake Ontario shoreline) and Brock CSD (the northernmost area) typically define the southern and northern projection extremes, respectively. To reflect the full range of projected conditions, this report uses health region data as the central reference, supplemented by Brock and Ajax values as proxies for northern and southern extremes by default. In cases where Brock or Ajax do not represent the extremes, the CSD that most accurately represents the highest (🡅) or lowest (🡇) data range is used instead; these instances are noted where relevant throughout the report. This approach provides a reasonable representation of local climatic variability across the entire region.

Reported projection ranges reflect the distribution of an ensemble of climate models: the low value corresponds to the 10th percentile, the median to the 50th percentile, and the high value to the 90th percentile. This structure provides a consistent summary of model spread and the inherent uncertainty in long-range climate projections.

Supplementary information relating to climate projections in this report was sourced from various academic and government reports which are identified and cited where applicable.

Climate Change Modelling and Downscaling

Wherever possible, this report draws on global climate models (GCMs) and emissions scenarios developed for the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6)[3]. Temperature and precipitation projections use data from the Coupled Model Intercomparison Project Phase 6 (CMIP6), the most current coordinated ensemble of global climate models for which data is currently available. CMIP6 expands on CMIP5 by incorporating a larger set of modelling centres and simulations, improving representation of key Earth system processes.

In April 2026, the international scientific community published an updated scenario framework for the next generation of climate models (CMIP7). This update refined the upper end of plausible limits downward, so that very high-emissions scenarios such as SSP5-8.5 and RCP-8.5 are now considered less likely than previously assessed, primarily because of falling renewable energy costs and the spread of climate policy. The update also found that the lowest-emissions scenarios are no longer attainable, as global emissions have not yet begun to fall, meaning that at least some overshoot of 1.5˚C of global warming is now expected. The plausible range has therefore narrowed from both ends, but the physical climate risks highlighted in forthcoming Vulnerability and Risk Assessment report remain serious and are not diminished by this revision. CMIP7 climate projection data is not yet available through climatedata.ca, so the CMIP6-based projections used in this report remain the best available federally supported data for Canadian municipalities. It is advised that Durham Region monitors the CMIP7 rollout and incorporates updated projections into its climate science reporting as they become available. This report has been designed for climate adaptation planning purposes only. Future infrastructure decisions should review climate projections against the most current science of plausible scenarios over the service life of the asset at the time of design.

Multiple approaches exist for constructing climate change scenarios, but GCMs remain the primary tools for assessing large-scale responses to increasing greenhouse gas concentrations. They use mathematical representations of atmospheric, oceanic, cryospheric, and land-surface processes to simulate how the climate system may evolve under different emissions pathways.

Because GCMs operate at spatial resolutions of hundreds of kilometres, their outputs are downscaled to finer spatial scales before being applied to regional and local planning contexts. Downscaling translates broad GCM signals into projections more representative of local conditions — accounting for regional topography, land cover, and other factors that influence climate at sub-grid scales. The climate projections presented in this report are drawn from climatedata.ca, which provides statistically downscaled data at a resolution appropriate for municipal-level analysis.

Wherever possible, this report uses a multi-model ensemble approach, which relies on a group of models rather than a single model — though the group of models may not necessarily be run by the

[3] IPCC. 2021. *AR6 WGI Summary for Policymakers Figure SPM.8, Panel A* [Data file]. Version 20210809. Didcot, United Kingdom: Centre for Environmental Data Analysis. Accessed December 2025. https://data.ceda.ac.uk/badc/ar6_wg1/data/spm/spm_08/v20210809/panel_a.

same modelling centre. Research has shown that this provides a more accurate projection of annual and seasonal temperatures and precipitation than a single model would on its own[4].

Greenhouse Gas Emissions Scenarios

Climate change scenarios are based on models developed by a series of international climate modeling centres. They are socioeconomic storylines used by analysts to make projections about future greenhouse gas emissions and to assess future vulnerability to climate change. Producing scenarios requires estimates of future population levels, economic activity, governance structures, social values, and patterns of technological change. In this report, climate change scenarios from the Fifth and Sixth IPCC Assessments are considered.

SSP Scenarios - IPCC Sixth Assessment Report (AR6)

For this report, where possible, projections are based on SSP5-8.5, a high-emissions scenario that assumes a world of high economic growth fuelled by fossil fuels, leading to high greenhouse gas emissions. SSP5-8.5 has been used here as a high-end planning reference, a tool for stress-testing infrastructure against severe but possible future conditions, rather than as a prediction of the most likely future. This scenario was selected because it has associated projections available from many different climate models, corresponds with Representative Concentration Pathway 8.5 (RCP8.5) used in the Intergovernmental Panel on Climate Change (IPCC)'s AR5 Report and in Durham Region's previous climate projections (TRCA, 2020), and ensures that the region, like most municipalities that are necessarily risk-averse when planning long-lived assets, is aware of the more severe potential effects of climate change. Projections for the intermediate "middle of the road" SSP2-4.5 scenario can be found in *Appendix D: 2025 Summary of Climate Variables - SSP2-4.5* and serve to provide for a planning range.

Shared Socio-economic Pathways (SSPs) are the latest available set of climate change scenarios that provide the basis for IPCC’s Sixth Assessment Report (AR6). Representative Concentration Pathways (RCPs) models were previously used in the IPCC’s Fifth Assessment Report (AR5) and Durham Region’s climate projections developed in 2020. The SSPs scenarios focus on mitigation targets to address physical climate change and on the underlying socioeconomic contexts which may present challenges to mitigation and/or adaptation policies. The SSPs incorporate socioeconomic characteristics and other human-caused climate drivers (e.g., population growth, education levels, GDP growth, income inequality, use of technology, energy use, political contexts, and land-use change) to derive scenarios that describe differing influences on greenhouse gas emissions and society’s ability to adapt. AR6 assesses and compares the RCP and SSP scenarios and incorporates new data, new models, and updated climate research from around the world to allow for a standardized comparison of society’s choices and their resulting levels of climate change. The premise is that every radiative forcing pathway (see *Appendix A: Glossary of Terms*) can result from a diverse range of socioeconomic and technological

[4] Government of Canada. (2023). Multi-model ensemble scenarios. Retrieved from The official website of the Government of Canada: https://climate-scenarios.canada.ca/?page=multimodel-ensembles

development scenarios. SSP-based scenarios are categorized by their relationship to both adaptation and mitigation challenges, and their approximate total radiative forcing in the year 2100 relative to pre-industrial levels, and are labeled as SSP1 to SSP5. **Table 1** provides a bulleted description of SSP scenarios 1, 2, 3, 4, and 5, while **Figure 4** illustrates the projected global warming associated with the scenarios.

Table 1: IPCC Sixth Assessment Report Climate Change Scenario Characteristics (ClimateData.ca)

Scenario	Description
Scenario 1 **SSP1-2.6 – Sustainability** ***Taking the Green Road***	● Low challenges to both mitigation and adaptation ● Policy focused on sustainable development ● Effective international cooperation ● Reduced inequality within and across countries ● Low consumption ● Low population growth
Scenario 2 **SSP2-4.5** **Middle of the Road**	● Medium challenges to both mitigation and adaptation ● Current development and consumption patterns continue ● National and global institutions are slow to achieve sustainable development goals ● Environmental systems decline ● Slow improvements to inequality ● Moderate population growth
Scenario 3 **SSP3-7.0** **Regional Rivalry** ***A Rocky Road***	● High challenges to mitigation and adaptation ● Policy focused on security ● Barriers to international trade ● High inequality ● Slow economic growth ● Low population growth in rich countries, high in other countries
Scenario 4 **SSP4-6.0** **Inequality** ***A Road Divided***	● Policy focused on elite ● High consumption ● High inequality ● Low to medium economic growth ● Low population growth in rich countries, high in other countries
Scenario 5 **SSP5-8.5 – Fossil-fueled Development** ***Taking the Highway***	● High challenges to mitigation, low challenges to adaptation ● Policy focused on free markets ● High consumption ● Effective international cooperation ● Reduced inequality ● High economic growth ● Low population growth

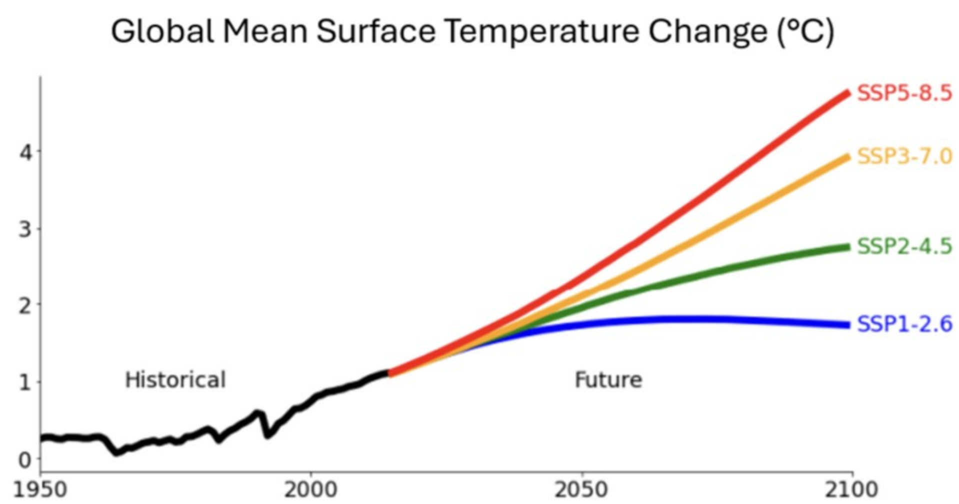

Figure 4: Projected Global Surface Temperature Change for CMIP6 SSP Scenarios (CEDA Archive)

Time Periods

This report establishes a consistent baseline period across all variables so that projections can be accurately compared with historical trends. When utilizing data from ClimateData.ca:

- The baseline is 1971–2000.
- The time periods used for this report are 2011-2040, 2041-2070, and 2071-2100.

Many climate indices are also divided into seasonal periods, defined in Table 2 below.

Table 2: Seasonal timeframes

Season	Months
Spring	March, April, May
Summer	June, July, August
Fall	September, October, November
Winter	December, January, February

Where ClimateData.ca did not provide the required data, projections from alternative sources using different time periods were applied.

Uncertainty

It is important to note that uncertainty is an integral part of the study of climate change. Uncertainty is factored into climate change scenarios, models, and data, and reflects the complex reality of environmental change and the evolving relationship between humans and the planet. Climate change cannot be predicted with absolute certainty in any given case, and all data must be considered with this in mind. While it is not possible to anticipate future climatic changes with absolute certainty, most contemporary climate analyses rely on an ensemble of climate models–drawing on multiple models or simulations to capture a broader range of plausible futures and minimize model-specific bias, i.e., the influence of any single model's structural assumptions. Climate change scenarios like SSP5-8.5 were developed to help create plausible representations of future climate conditions, and these conditions are based on assumptions of future atmospheric composition and on an understanding of the effects of increased atmospheric concentrations of greenhouse gases (GHG), particulates, and other pollutants.

Climate Projections

Temperature

Mean Temperature

Over the last six decades, Canada has become warmer, with average annual temperatures increasing by 1.3°C between 1948 and 2016. This rate of warming is almost double the global average reported over the same period[5]. Assuming emissions continue at the current rate of global output, Durham Region is projected to experience an annual average temperature increase of 6.4°C by the end of the century compared to its baseline. The most pronounced seasonal temperature increases are expected to occur in summer and fall and it should be noted that mean winter temperature is projected to climb from negative zero to above zero degree Celsius by the end of the century. **Table 3** below displays the projected annual and seasonal temperature changes in Durham Region based on the IPCC Sixth Assessment Report (AR6). Climate modelling suggests that these changes will continue, and the climate change associated risks will increase in the future. Putting this into context across Durham Region's geography, Durham *health region*'s data indicate mean temperature projections for the southern municipalities (Ajax used as example) tends to be ≥1˚C warmer, whereas northern municipalities (Brock used as an example) tend to be 0.5˚C colder.

Table 3: Annual and Seasonal Mean Temperature (˚C) - SSP5-8.5 (climatedata.ca)

Time-frame	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Annual	**7.1**	8.4	**8.9**	9.9	10.2	**11.1**	12.6	12.1	**13.5**	15.8
Winter	**-5.8**	-4.3	**-3.2**	-1.9	-2.1	**-0.9**	1.1	-0.2	**1.4**	4.1
Spring	**5.7**	6.7	**7.4**	8.0	8.6	**9.4**	10.3	10.4	**11.7**	13.0
Summer	**19.0**	20.2	**20.8**	21.8	21.8	**22.8**	24.6	23.2	**25.5**	27.8
Fall	**8.9**	10.1	**10.6**	11.4	11.7	**12.5**	14.5	13.2	**15.1**	18.4

[5] Douglas, A. G., & Pearson, D. (2022). Ontario. In F. J. Warren, N. Lulham, D. L. Dupuis, & D. S. Lemmen (Eds.), Canada in a changing climate: Regional perspectives report. Government of Canada.

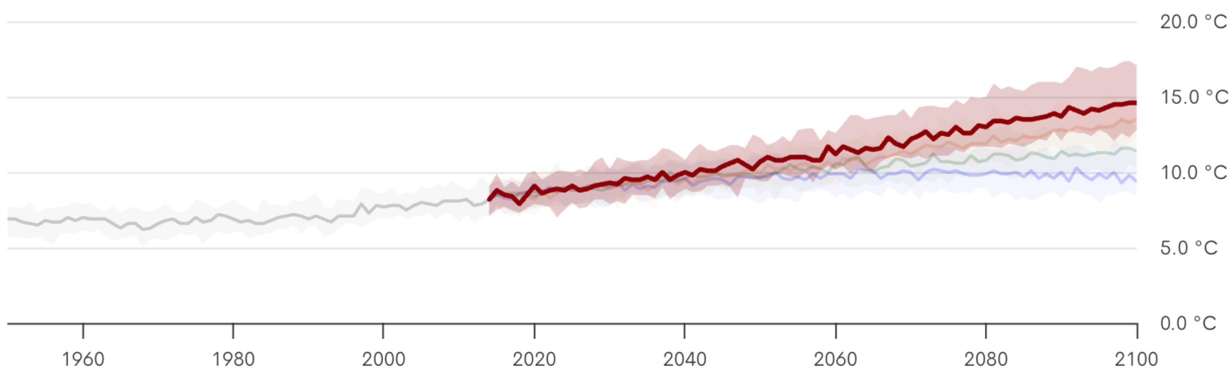

Figure 5: Projected Mean Temperature Change for Durham Region - SSP5-8.5

Hot Weather

Extreme heat is the best-documented natural hazard associated with health consequences and increased all-cause mortality. Still, the thresholds and duration of extreme heat days and events vary across the country[6]. Health impacts associated with extreme heat include dehydration, high heart rate, extreme fatigue, heat rash, heat cramps (muscle cramps), heat edema (swelling of hands, feet, ankles), heat syncope (fainting), heat exhaustion, perinatal complications, and heat stroke. Extreme heat also places significant strain on individuals with underlying heart and lung diseases, contributing to increased emergency department visits, higher rates of hospitalization, exacerbation of chronic conditions, and, in severe cases, death. Health Canada outlines the following at-risk groups for extreme heat event: older adults 60 years of age and older; infants and young children; pregnant individuals; Indigenous Peoples; people with chronic health conditions (e.g., chronic illnesses, disabilities, obesity, cognitive and mental health challenges and substance use challenges); socially and materially disadvantaged people; newcomers and transient populations such as tourists; and people who work or are physically active outdoors[7]. The health impacts and risks of extreme heat to Durham Region have also been documented in the Climate Change and Health Assessing the Impact of Extreme Heat vulnerability assessment[8] completed by the Durham Region Health Department in 2024.

While higher summer temperatures increase electricity demand for cooling, extreme temperatures can also reduce the capacity of transmission lines to carry electricity, potentially leading to reliability issues during heat waves[9]. High temperatures determine if plants and animals can thrive; they limit or enable outdoor activities, define how we design our buildings and vehicles, and shape our transportation and energy use.

---

6 Gosselin, P., Campagna, C., Demers-Bouffard, D., Qutob, S., & Flannigan, M. (2022). Natural hazards. In P. Berry & R. Schnitter (Eds.), Health of Canadians in a changing climate: Advancing our knowledge for action. Government of Canada.

7 Health Canada. (2024, May 7). Extreme heat events: Health risks and who is at risk of extreme heat events. Government of Canada. https://www.canada.ca/en/health-canada/services/climate-change-health/extreme-heat/who-is-at-risk.html

8 Durham Region Health Department. (2024). *Climate change and health vulnerability assessment: Extreme heat*. Region of Durham. https://www.durham.ca/en/health-and-wellness/resources/Documents/CCVA/CCHVA-Extreme-Heat-VA.pdf

9 Centre for Climate and Energy Solutions. (n.d.). Heat waves and climate change. C2ES. Retrieved from https://www.c2es.org/content/heat-waves-and-climate-change/

Hottest Day and Extreme Heat

The average hottest day in Durham Region is projected to increase by 7.3˚C, from a baseline of 32.5˚C in 1971- 2000 to 39.2˚C, by 2071-2100. While Brock and the northernmost CSDs' projections represent the lower range of temperatures for this variable and Ajax and the southernmost CSDs' projections represent the higher temperatures, the total range is no more than 1˚C across the whole region. Clarington's projections represent the lowest range across the region for this variable, which may be attributable to Clarington's more rural environment with forested areas and varied topography, along with the cooling effects from Lake Ontario.

Table 4: Hottest Day (˚C) – SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**32.5**	33.3	**34.3**	35.9	34.9	**36.3**	39.5	36.9	**39.2**	43.4
Ajax CSD (🡅)	**33.2**	33.8	**35.0**	36.6	35.5	**36.9**	40.1	37.4	**39.8**	43.8
Clarington CSD (🡇)	**32.2**	32.9	**34.1**	35.7	34.6	**36.0**	39.2	36.5	**38.8**	42.9

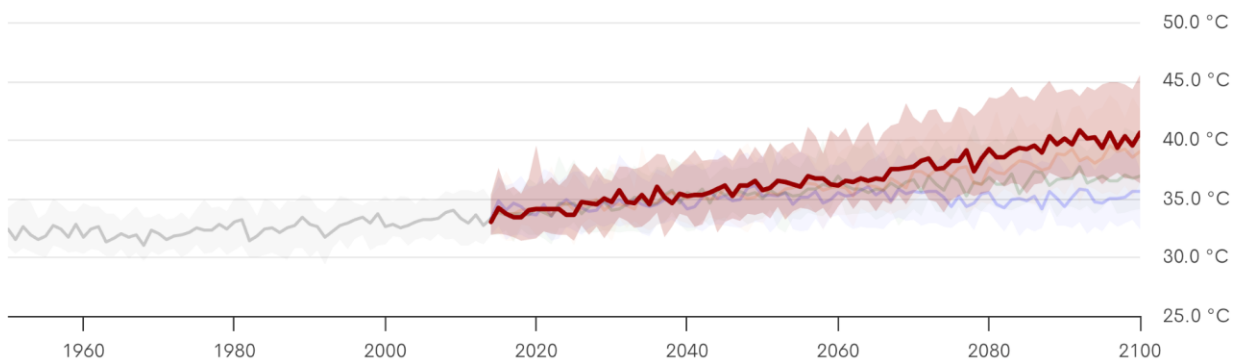

Figure 6: Projected Hottest Day for Durham Region - SSP5-8.5

The number of Extreme Heat Days (i.e., Days above Tmax +30˚C) in Durham Region will increase from a baseline of 7 days to 70 days by 2100. In general, Brock and the northernmost CSDs' projections tend to indicate the fewest days above 30˚C across the region. However, similar to the hottest day variable above, Clarington's projections continue to represent the lowest number of days above 30˚C. Notably, there is roughly a one week per year difference between the highest and lowest median Tmax >30˚C projections for the region.

Table 5: Number of days above Tmax 30°C – SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**7**	13	**18**	29	26	**40**	64	45	**70**	107
Ajax CSD (↑)	**10**	16	**22**	34	31	**45**	70	51	**77**	111
Pickering CSD	**9**	15	**20**	32	29	**43**	67	48	**73**	109
Whitby CSD	**8**	14	**20**	31	29	**43**	67	48	**74**	109
Brock CSD	**8**	14	**19**	30	27	**41**	65	46	**72**	107
Uxbridge CSD	**8**	13	**19**	29	27	**40**	63	45	**70**	106
Oshawa CSD	**7**	13	**18**	29	27	**41**	65	46	**72**	108
Scugog CSD	**7**	12	**17**	27	25	**38**	62	43	**68**	105
Clarington CSD (↓)	**6**	11	**16**	26	24	**37**	62	43	**69**	106

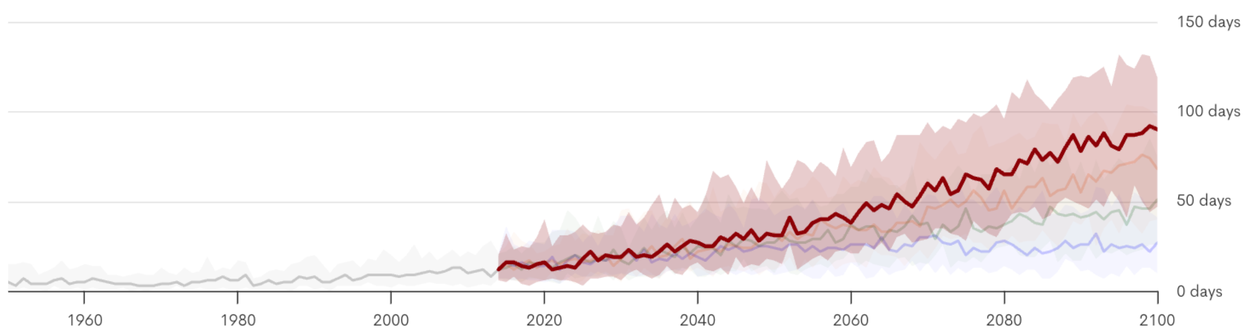

Figure 7: Projected Days Above Tmax >30˚C for Durham Region - SSP5-8.5

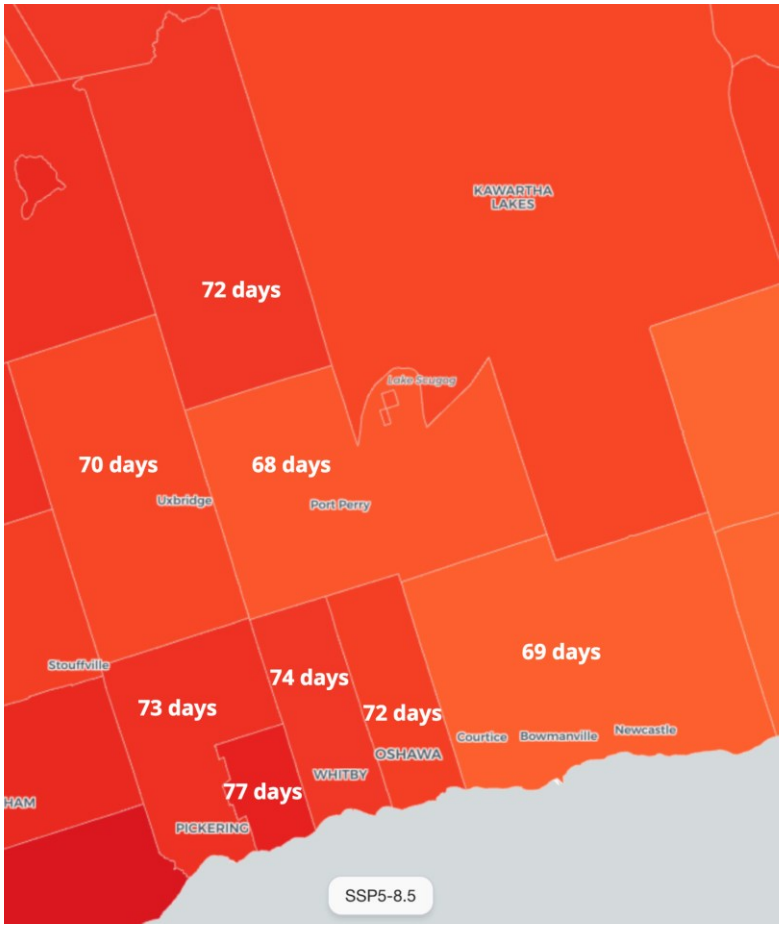

Figure 8: Days above Tmax >30˚C projected for Durham Region CSDs for 2071-2100 period

The Humidex days variable provides the number of days where the Humidex is greater than 30 (Hx>30). The Humidex index was developed by the Meteorological Service of Canada to describe how hot and humid the weather *feels* to the average person. In Canada, it is recommended that outdoor activities be limited or modified when the Humidex exceeds 30, and that all unnecessary physical activities be reduced when it passes 40[10].

The number of Hx>30 days is projected to increase from a baseline average of 37 days to 115 days by 2100 under the SSP5-8.5 scenario. For the 2071-2100 time period, Oshawa and Whitby CSDs are projected to have the highest number of days with Humidex above 30 (n=116) in Durham Region. For all preceding time periods, Ajax CSD data, along with Oshawa and Whitby CSDs data, represent the highest range across the region.

[10] Environment and Climate Change Canada. (n.d.). Humidex. Retrieved December 4, 2025, from https://www.canada.ca/en/services/environment/weather/severeweather/humidex.html

Table 6: Number of Days With Humidex >30 – SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**37**	52	**57**	69	76	**85**	96	92	**115**	134
Oshawa CSD (🡅)	**39**	55	**61**	72	78	**87**	98	94	**116**	135
Whitby CSD (🡅)	**39**	55	**61**	72	78	**87**	98	94	**116**	135
Ajax CSD	**39**	55	**61**	72	78	**87**	98	94	**114**	133
Brock CSD (🡇)	**35**	50	**55**	67	74	**84**	94	91	**114**	133

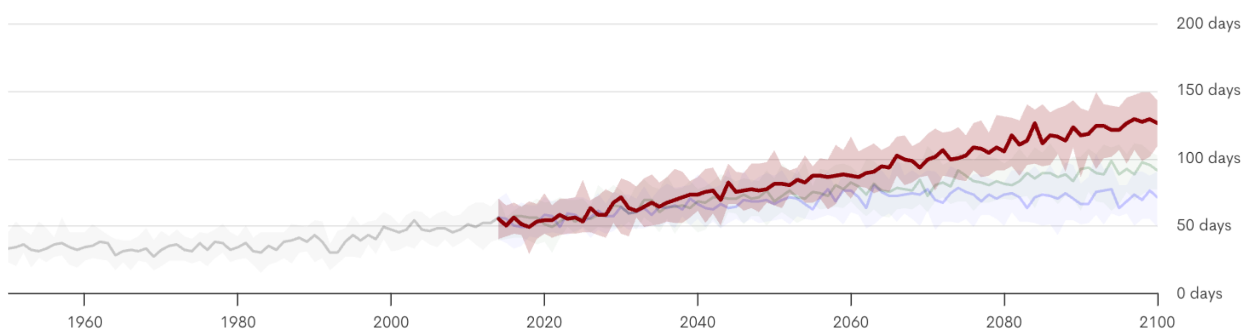

Figure 9: Projected Number of Humidex Days >30 for Durham Region - SSP5-8.5

Tropical Nights

Tropical nights—days when the minimum temperature remains above 20 °C—are a key indicator of prolonged heat exposure because they limit overnight cooling and reduce recovery time for people, infrastructure, and ecosystems. Projections for Durham Region show a clear increase in the frequency of tropical nights, consistent with regional warming and more persistent heat events. From its baseline of 3 days per year, the number of tropical nights is projected to rise to 55 days per year by 2100 across the region. This trend across all census subdivisions indicates that the number of tropical nights more than doubles from one thirty-year period to the next.

Table 7: Tropical Nights (number of days) – SSP5-8.5

Spatial Scale	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**3**	6	**9**	13	16	**24**	36	32	**55**	83
Ajax CSD (🡅)	**5**	10	**14**	19	24	**32**	45	42	**68**	95
Brock CSD	**2**	4	**7**	11	13	**20**	32	28	**49**	76
Clarington CSD (🡇)	**0**	1	**2**	5	5	**9**	19	12	**23**	41

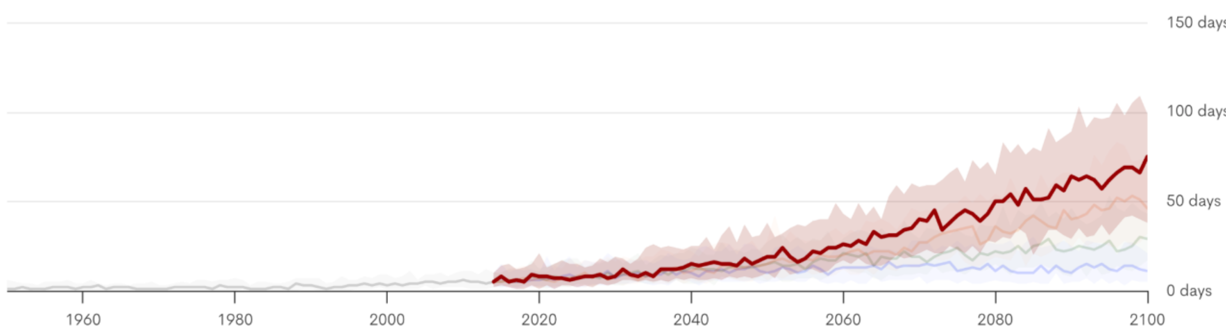

Figure 10: Projected Tropical Nights for Durham Region - SSP5-8.5

Heat Waves

Environment and Climate Change Canada (ECCC) issues a heat warning when ‘daytime highs’ are forecast to reach at least 31 °C (Tmax >31˚C) and ‘nightly lows’ are forecast to fall no lower than 20 °C (Tmin >20˚C), or when the Humidex is projected to reach 40, for two consecutive days. An extended heat warning applies when these conditions persist for three days or more. Public-health agencies integrate temperature, humidity, and nighttime cooling into warning thresholds to capture acute human-health risk.

Heat Wave Frequency

Heat wave frequency refers to how often heat waves occur in a specific area over a given time period. As shown in the table below, and based on the criteria above, the baseline frequency of heat waves in Durham Region is less than one heat wave per year. Climatedata.ca projections for SSP5-8.5 indicate that Durham Region is projected to experience 0.7 heat waves per year by 2040; three heat waves per year by 2070, and 6.8 heat waves per year by 2100 under the SSP5-8.5 scenario.

Table 8: Number of Heat Waves per year – SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**0.03**	0.01	**0.7**	2.7	0.9	**3.0**	6.1	3.7	**6.8**	9.8
Ajax CSD (🡅)	**0.1**	0.1	**1.3**	3.7	1.5	**4.1**	7.5	4.5	**7.4**	10.4
Brock CSD (🡇)	**0.0**	0.0	**0.5**	2.4	0.6	**2.6**	5.6	3.1	**6.6**	9.9

It is worth flagging that these models may be underpredicting the number of heat waves southern Durham is already experiencing in the current period (2011–2040). According to Environment and Climate Change Canada (ECCC)'s Ontario Heat Event Data Tables, which are shared with health units across the province, southern Durham has experienced four heat waves in both 2023 and 2024, and five in 2025. As seen in table below, these counts exceed the 90th percentile of the region's climate projections, meaning recent years have experienced more heat waves than the models anticipated even at the high end of their range. That said, heat wave duration reported over these three years does appear to fall within the projected ranges of southern Durham for the 2011-2040 period (see **Table 10**: Ajax CSD data).

Table 9: Reported Heat Waves and Duration in Southern Durham 2023-2025 (ECCC)

Durham Region Heat Warning Events and Impacted Days, 2023					
Date Issued/ Date Ended	May 31 / June 2	July 3 / July 6	July 25 / July 28	Sept 2 / Sept 6	
Number of Events	1	1	1	1	
Duration	2	3	3	4	
Durham Region Heat Warning Events and Impacted Days, 2024					
Date Issued/ Date Ended	June 16 / June 20	July 7 / Jul 9	July 13 / July 15	July 31 / Aug 1	
Number of Events	1	1	1	1	
Duration	4	2	2	2	
Durham Region Heat Warning Events and Impacted Days, 2025					
Date Issued/ Date Ended	June 22 / June 25	July 5 / July 6	July 11 / July 17	July 26 / July 29	August 8 / August 13
Number of Events	1	1	1	1	1
Duration	3	2	6	3	5

Heat Wave Duration

The average length of a heatwave event refers to the typical number of days a heatwave lasts in a specific area. For Durham Region, the baseline average length of heat waves is less than one day. The region is projected to experience heatwave events lasting 1.9 days by 2040, 10.2 days by 2070 and 34.9 days by 2100.

Table 10: Average Length of Heat Waves (in days) – SSP5-8.5 (climatedata.ca)

Spatial Scale	**Baseline 1971-2000**	**2011-2040**			**2041-2070**			**2071-2100**		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**0.0**	**0.0**	**1.9**	8.2	2.2	**10.2**	24.6	13.1	**34.9**	66.0
Ajax CSD (↑)	**0.1**	**0.1**	**3.9**	12.5	4.5	**15.3**	34.7	19.5	**46.1**	77.6
Brock CSD (↓)	**0.0**	**0.0**	**1.1**	6.8	1.5	**8.6**	22.1	10.9	**30.1**	60.8

Overall, heat wave events are projected to occur more frequently and for longer periods toward the end of the century. Sustained over several days, or weeks, at a time, extreme heat poses a significant risk to the health of individuals in Durham Region – heat illnesses can manifest quickly, and lead to long-term health problems and even death. According to Health Canada, extreme heat is especially dangerous for older adults, infants and young children, people with chronic illness (like breathing problems, mental illness and heart problems), people who are unable to keep their living space cool, people who work in the heat (indoors and outdoors), people experiencing homelessness, and people with low incomes[11]. Beyond human health, extended extreme heat events can cause accelerated wear and tear to built infrastructure, overwhelm the energy grid due to higher energy demand, and negatively impact regional ecosystems, wildlife and agriculture.

Cooling Degree Days

As extreme heat becomes more frequent and persistent, measures of cumulative heat exposure provide more insight into how temperature changes translate into impacts on buildings, energy use, and community well-being. Cooling degree days (CDD)—the sum of degrees by which daily mean temperature exceeds 18 °C per year—offer a way to assess how often and by how much conditions drive the need for mechanical cooling (air conditioning). Rising CDD values across Durham Region reflect both higher average temperatures and a greater number of days exceeding comfort thresholds. Incorporating CDD into the assessment of extreme heat helps illustrate how warming translates into increased cooling demand, with implications for electricity planning, building design, and vulnerability to heat-related stress. For this variable, Scugog CSD is projected to experience the lowest limit of CDDs across the region. However, the variance between Scugog and Brock is insignificant with a difference of only 0.8% in CDDs at the end of the century.

Table 11: Cooling Degree Days - SSP5-8.5

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**205**	292	**351 (+71%)**	441	458	**556 (+171%)**	775	648	**911 (+344%)**	1265
Ajax CSD (🡅)	**259**	365	**422 (+63%)**	519	537	**641 (+148%)**	874	736	**1016 (+292%)**	1386
Brock CSD	**191**	275	**331 (+73%)**	419	436	**528 (+176%)**	747	624	**886 (+364%)**	1230
Scugog CSD (🡇)	**188**	272	**329 (+75%)**	417	433	**530 (+182%)**	743	620	**879 (+368%)**	1225

[11] Health Canada. (2022, January 24; last modified 2024, May 7). *Extreme heat events: Health risks and who is at risk of extreme heat events*. Government of Canada. https://www.canada.ca/en/health-canada/services/climate-change-health/extreme-heat/who-is-at-risk.html

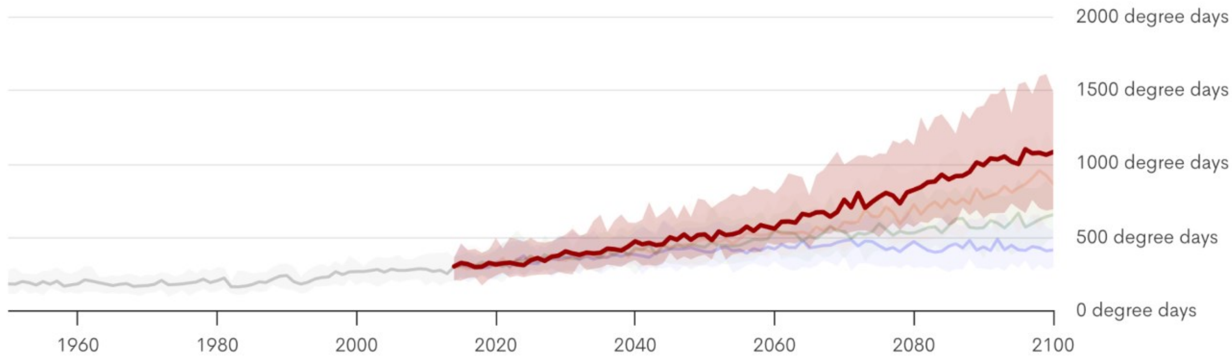

Figure 11: Projected Cooling Degree Days for Durham Region - SSP5-8.5

Cold Weather

Cold weather is an important aspect of life in Canada and many places in Canada are well adapted to very cold winters. Overall, the frequency and severity of cold days is decreasing across the country, and in Durham Region, the trend is the same. It is important to consider how cold weather temperatures will change in the future as these have implications for health and safety, factor into the feasibility of growing plants and raising animals, can limit or enable outdoor activities, define how we design our buildings and vehicles, and shape our transportation and energy use.

Coldest Day and Extreme Cold

The coldest day describes the lowest nighttime temperature in the selected time period. In general, the coldest day of the year occurs during the winter months. Given the warming of annual temperatures, the coldest day in Durham Region is projected to become warmer, from a baseline of -26˚C to -23˚C by 2040, to -18˚C by 2070 and -13˚C by 2100. Brock's coldest days are projected to be roughly 2˚C colder than the regional average and Ajax is projected to experience coldest days that are roughly 2˚C warmer than the regional average throughout the coming decades.

Table 12: Coldest Day (˚C) – SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**-26.2**	-24.0	**-22.7**	-19.6	-20.8	**-18.1**	-13.8	-16.4	**-13.4**	-7.9
Ajax CSD (🡅)	**-23.6**	-21.1	**-20.0**	-17.1	-18.0	**-15.5**	-11.2	-14.0	**-10.7**	-5.42
Brock CSD (🡇)	**-28.5**	-26.4	**-24.9**	-21.9	-23.0	**-20.2**	-15.7	-18.4	**-15.5**	-9.8

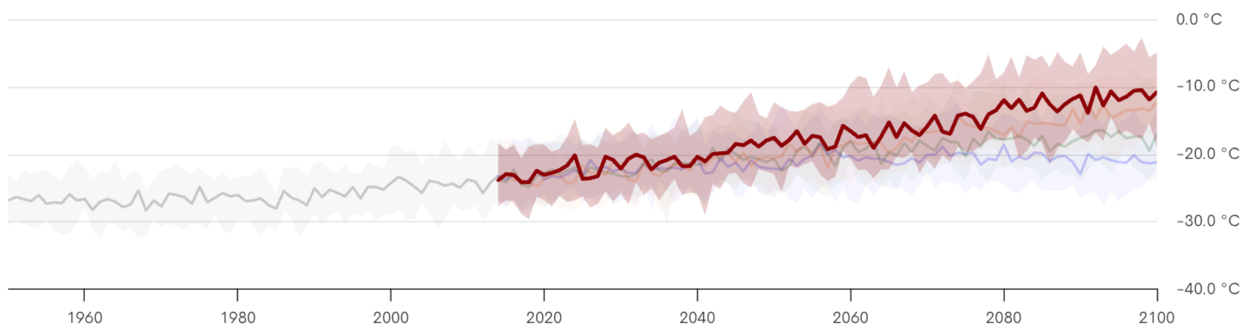

Figure 12: Projected Coldest Day for Durham Region SSP5-8.5

Extreme cold days, defined as a day where the temperature drops to at least -15°C, are projected to decrease significantly in Durham Region from a baseline of 25 days to 14 days per year by 2040; further decreasing to 5 days per year by 2070; down to one day by 2100. Brock, having a higher baseline of 31 Tmin<-15˚C days per year, is projected to experience the most dramatic decrease in extreme cold in the region by 2100.

Table 13: Days with Tmin <-15˚C – SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**25**	7	**14**	17	1	**5**	9	0	**1**	3
Ajax CSD (🡅)	**17**	3	**8**	10	0	**2**	4	0	**0**	1
Brock CSD (🡇)	**31**	10	**19**	23	2	**8**	13	0	**2**	5

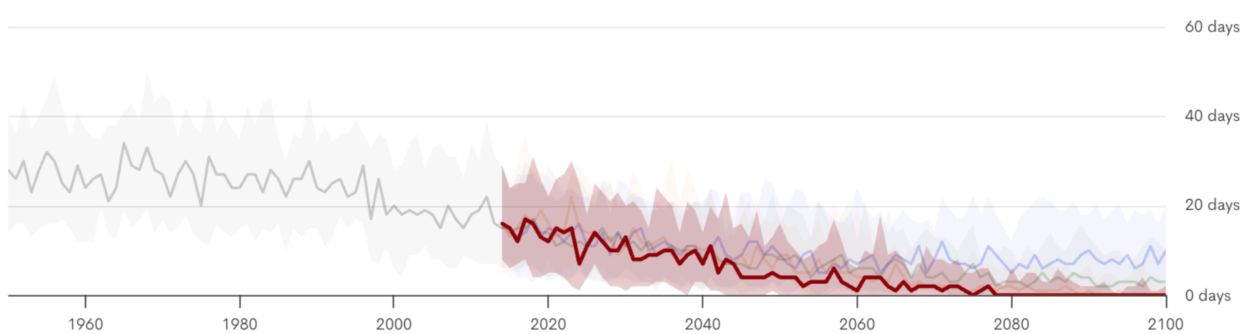

Figure 13: Projected Days with Tmin <-15˚C for Durham Region – SSP5-8.5

Heating Degree Days

Heating degree days (HDD) provide a measure of cumulative cold-season (heating) energy demand by summing the number of degrees for which daily mean temperatures fall below 18°C over a year. HDD values decrease as regional temperatures warm, indicating fewer days where indoor heating is required or where heating loads are substantial. Tracking changes in HDD helps illustrate how winter warming translates into shifting energy needs, building performance demands, and potential changes to seasonal operating costs. As evidenced in **Table 14** below, HDDs are expected to decrease over the coming century with the largest reduction projected for Brock. Percentage reduction from baseline is included.

Table 14: Heating Degree Days - SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**4205**	3371	**3651 (-13%)**	3814	2735	**3102 (-26%)**	3334	2120	**2535 (-40%)**	2773
Ajax CSD (🡇)	**3853**	3098	**3358 (-13%)**	3526	2487	**2841 (-26%)**	3062	1902	**2290 (-41%)**	2516
Brock CSD (🡅)	**4369**	3519	**3811 (-13%)**	3972	2871	**3247 (-26%)**	3484	2237	**2670 (-39%)**	2905

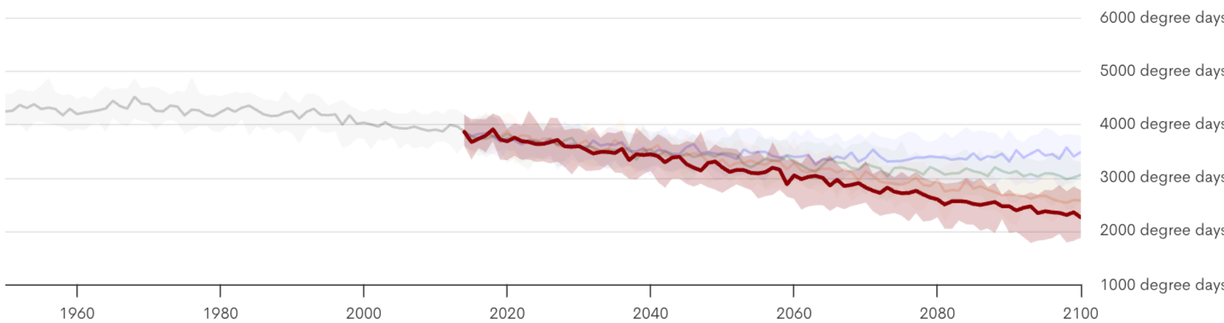

Figure 14: Projected Heating Degree Days for Durham Region - SSP5-8.5

Frost Days and Ice Days

Other indicators of cold weather conditions throughout Durham Region are frost days and ice days. These are correlated to risks relating to crop damage and agriculture, injury and mortality from traffic accidents, damage to roads and infrastructure, facility closures and more.

A frost day is a day in which the minimum temperature is below 0°C. From a baseline of 148 days, frost days in Durham Region are projected to decrease by 21 days per year by 2040; by 43 days per year by 2070; and by 72 days per year by 2100. Although all CSDs across Durham Region are projected to follow the same downward trend, Ajax is projected to experience roughly 10-15 less frost days per year than the region's average and Brock is projected to experience 8-9 more frost days than region's average. By 2100, this represents a difference of 25 frost days per year between the warmest and coldest parts of the region - roughly an extra month of frost days in the north compared to the south.

Table 15: Frost Days - SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**148**	118	**127**	134	82	**105**	115	40	**76**	89
Ajax CSD (↓)	**132**	98	**110**	118	58	**85**	98	22	**59**	73
Brock CSD (↑)	**157**	129	**135**	142	95	**114**	123	50	**84**	99

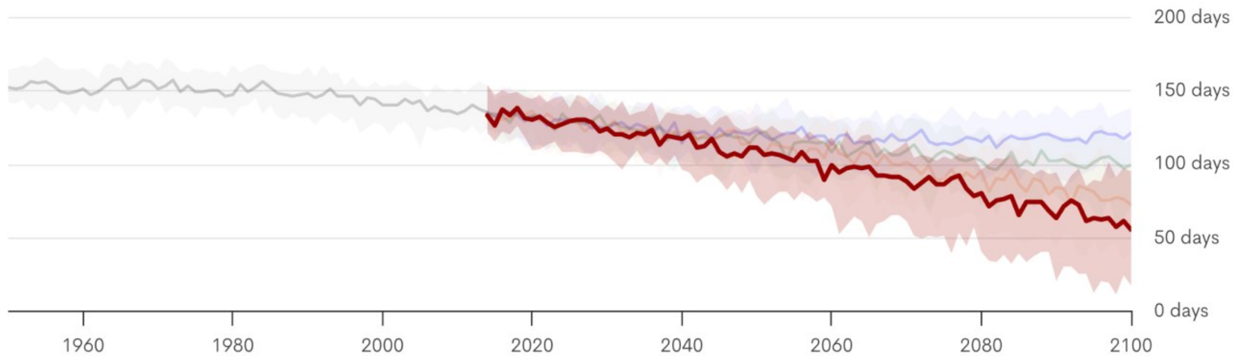

Figure 15: Projected Frost Days for Durham Region - SSP5-8.5

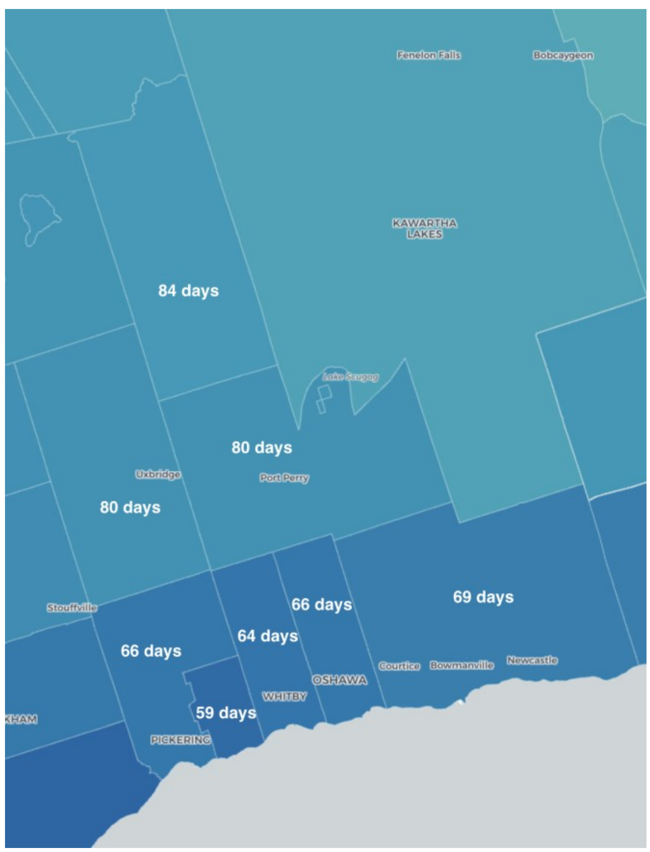

Figure 16: Projected Frost Days by 2100 for Durham Region CSDs (ClimateData.ca)

Similarly to frost days, the number of ice days are projected to decrease in Durham Region. Ice days are the total number of days when the daily maximum temperature is at or below 0°C. Ice days are projected to decrease from a baseline of 62 days to 45 days by 2040; to 30 days by 2070; down to 15 days by 2100. As a proxy for the southern lakeshore municipalities, Ajax CSD drops from a baseline of 53 ice days to just 8 ice days by 2100 — an 84.9% reduction. Communities located along the shore of Lake Ontario are projected to lose almost all meaningful winter ice formation. For practical purposes, Lake Ontario's southern Durham shoreline is expected to transition from a seasonally ice-influenced coast to an effectively ice-free one under SSP5-8.5.

Table 16: Ice Days - SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**62**	36	**45**	53	17	**30**	385	4	**15**	20
Ajax CSD (↓)	**53**	26	**36**	44	12	**21**	29	2	**8**	13
Brock CSD (↑)	**69**	42	**51**	58	21	**35**	43	6	**18**	26

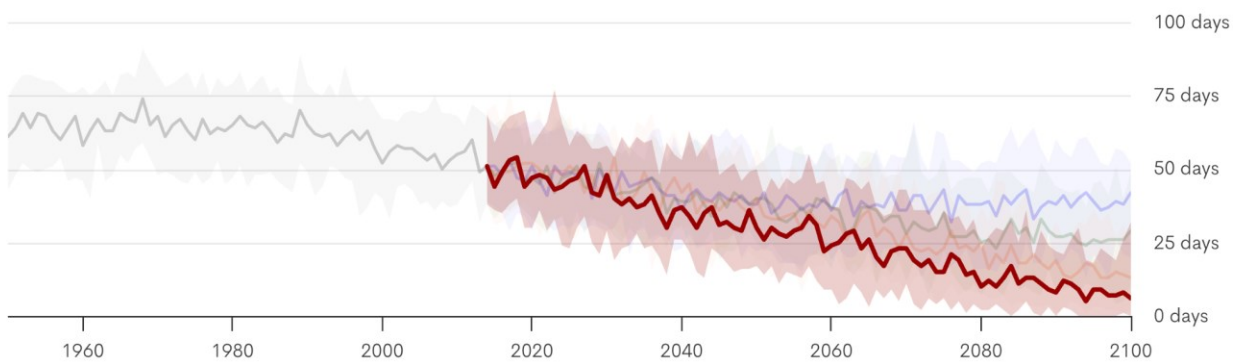

Figure 17: Projected Ice Days for Durham Region - SSP5-8.5

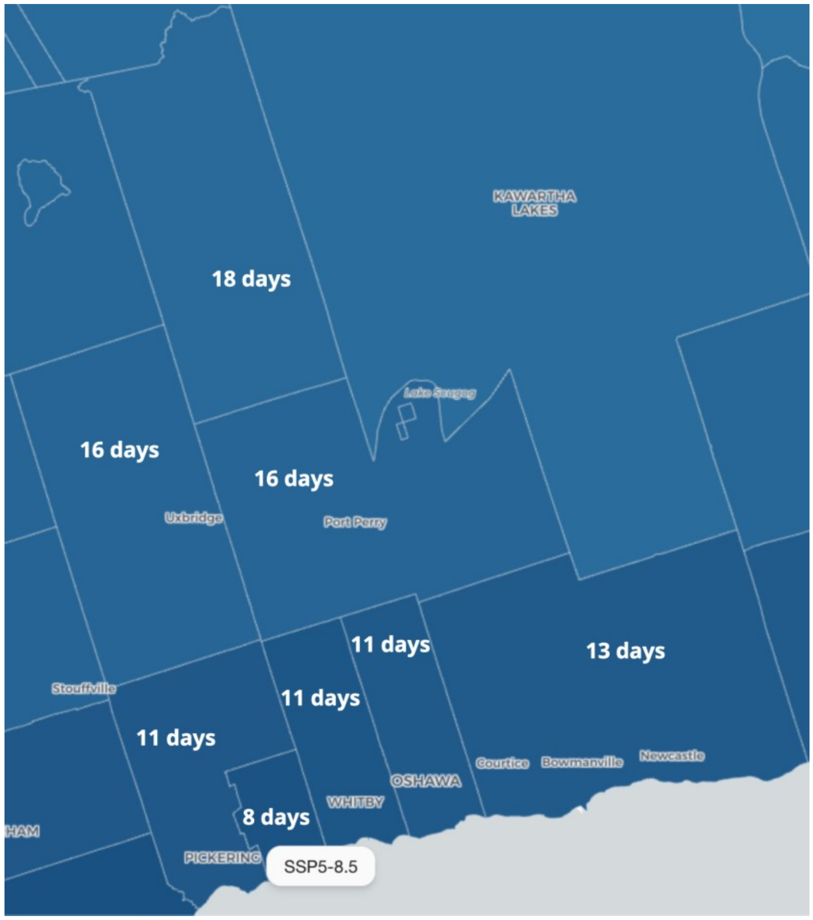

Figure 18: Projected Ice Days by 2100 for Durham Region CSDs (ClimateData.ca)

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. Under these conditions, it is likely that some water at the surface is 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 re-freezing 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.

Freeze-thaw cycles are projected to decrease due to overall warmer temperatures. This projection is likely due to the fact that days are getting warmer and Durham Region is expected to experience fewer days per year that reach a minimum temperature below 0°C. As shown in the table below, freeze-thaw cycles are projected to decrease from a baseline of 71 days per year to 66 days per year by 2040; to 59 days per year by 2070; down to 50 days per year by 2100.

Table 17: Annual Freeze-Thaw Cycles - SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**71**	61	**66**	71	46	**59**	65	25	**50**	57
Ajax CSD (🡻)	**65**	54	**59**	62	31	**50**	56	12	**35**	47
Brock CSD (🡹)	**73**	65	**69**	74	52	**62**	70	37	**54**	64

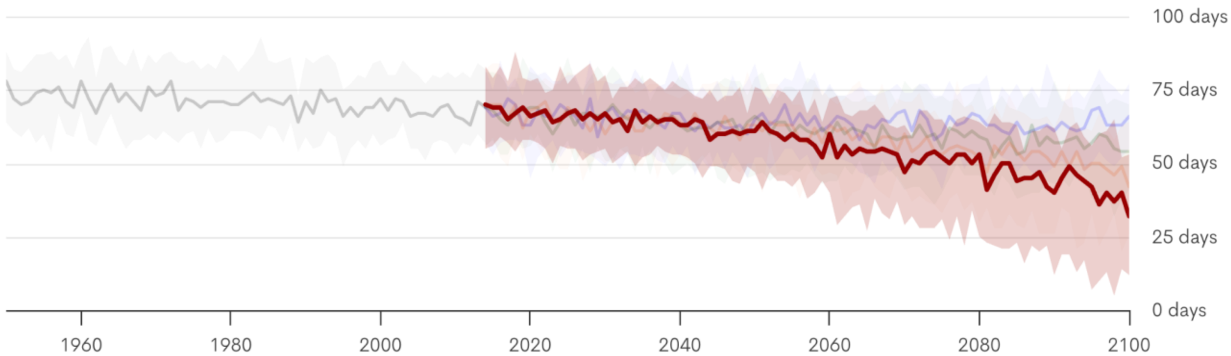

Figure 19: Projected Freeze-Thaw Cycles for Durham Region - SSP5-8.5

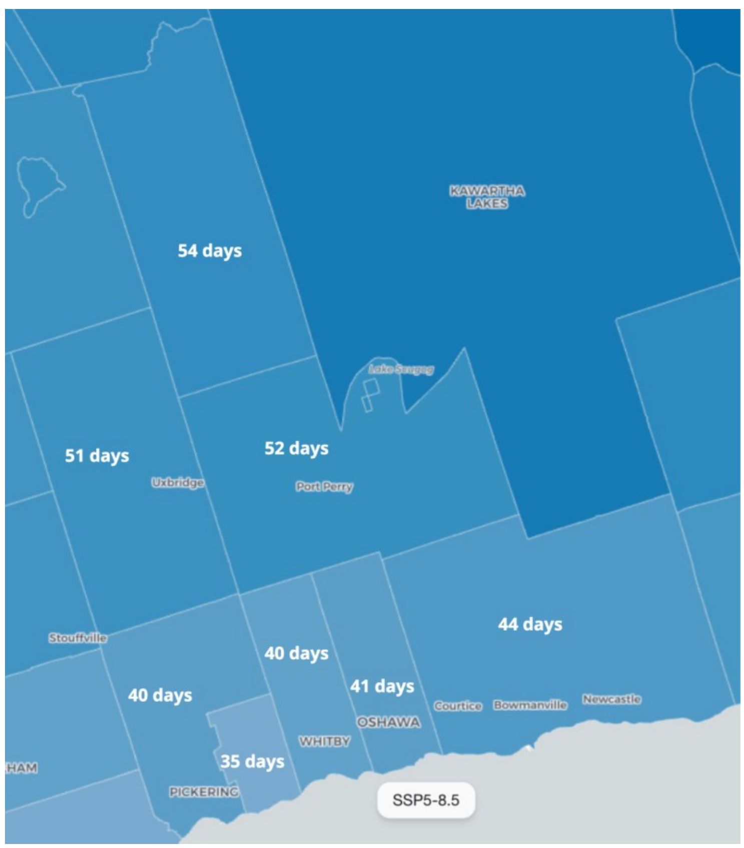

Figure 20: Projected annual freeze-thaw cycles for the 2071-2100 period under SSP5-8.5 (ClimateData.ca)

Agricultural Indices

Growing-Season Dynamics and Heat Availability

Climate change is altering seasonal temperature patterns, precipitation regimes, and the overall length of the growing season in Ontario, with direct implications for agriculture and related ecosystems in Durham Region. Longer frost-free periods and warmer average temperatures may expand the range of crops that can be grown, but these potential benefits are also offset by increasing risks. Higher temperatures and more sporadic precipitation patterns throughout the growing season can elevate the likelihood of drought, reduce water availability for irrigation, disrupt pollination processes, and create more favourable conditions for certain pests and pathogens. For example, warmer winters are extending the activity period of black-legged ticks—typically active in late spring and summer[12]–which can increase health risks to livestock and workers. Managing increased agricultural productivity and working to reduce risks under climate change will require careful consideration of changing weather and climate conditions, as well as key landscape and soil characteristics, crop suitability, farm management options, and policy and program support[13].

Growing Season Length

The growing season is defined by the time between the last frost of spring and first frost of autumn, also known as the 'frost-free season'. Compared to a baseline of 153 days, the growing season is projected to increase by 16 days per year by 2040; 36 days by 2070; and by 67 days by 2100. In other words, the annual growing season is projected to increase by approximately 9 weeks within a century.

Table 18: Growing Season Length - SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**153**	158	**171**	181	182	**190**	213	205	**220**	253
Ajax CSD (↑)	**171**	178	**187**	199	198	**210**	232	222	**239**	290
Brock CSD (↓)	**144**	149	**162**	173	171	**183**	203	194	**209**	241

[12] *Whereas warmer temperatures can be attributed to greater black-legged tick activity, no single climate variable provides a reliable proxy for tick abundance or Lyme disease risk.*

[13] Ontario Climate Consortium for Integrated Assessment and Research (OCCIAR). (2017). The Ontario climate and agriculture assessment framework. Retrieved from http://www.climateontario.ca/doc/p_OCAAF/OCAAF_FinalReport_June2017.pdf

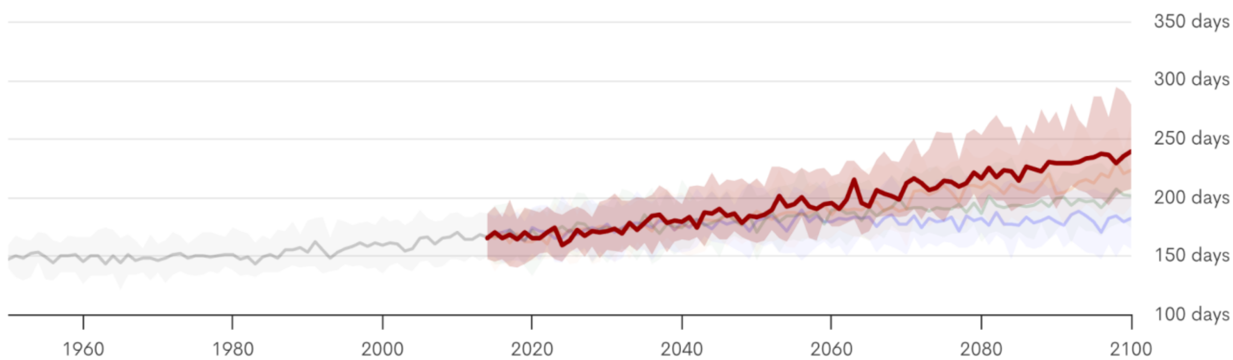

Figure 21: Projected Growing Season Length for Durham Region - SSP5-8.5

Growing Degree Days

Plant and insect development rates depend largely on the amount of heat they receive throughout the growing season, from planting to harvest. This heat accumulation is quantified using growing degree days (GDD). GDD measures the difference between the average daily temperature and a specific base temperature, which varies for different species[14]. Each plant species has a unique base temperature, below which its growth is limited. To account for varying heat requirements, different base temperatures are used for different organisms: +5°C GDDs are typically used for canola and forage crops; +10°C GDDs are more suitable for crops like corn and beans; and +15°C GDDs are often applied to assess the growth and development of insects and pests. This approach helps in understanding and predicting the growth patterns and developmental stages of various species based on their specific thermal needs[15].

Climate change is increasing the number of GDDs, which can both extend growing seasons and shift agricultural and ecological dynamics, introducing new opportunities and risks. With more GDDs, crops may mature earlier in the season, potentially producing more food and growing different types of crops. However, this warming trend also brings challenges, such as increased water stress, more favourable conditions for pests and diseases, and altered timing for key events like pollination. Additionally, more variability in spring and fall temperatures can stress fruit trees causing blossom loss due to late frosts[16]. In Durham Region, growing degree days are projected to increase from the baseline of 2070 degree-days per year to 2419 degree days by 2040; 2868 by 2070; and 3591 by 2100. This trend indicates longer and potentially more productive growing seasons but also highlights the need for adaptation strategies in agricultural management to address the impacts of climate change.

---

[14] Climate Central. (2022). Growing degree days. Retrieved from Climate Central: https://www.climatecentral.org/climate-matters/growing-degree-days

[15] Climate Atlas of Canada. (n.d.). Growing degree days. Retrieved from Climate Atlas of Canada: https://ClimateAtlas.ca/map/canada/dd5_2060_85

[16] Agriculture and Agri-Food Canada. (2020, January 31). Climate change impacts on agriculture. https://agriculture.canada.ca/en/environment/climate-change/climate-change-impacts-agriculture

Table 19: Growing Degree Days (>5°C) - SSP5-8.5 (climatedata.ca)

Spatial Scale	Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	**2070**	2297	**2419 (+17%)**	2624	2714	**2868 (+39%)**	3328	3050	**3591 (+74%)**	4152
Ajax CSD (🡅)	**2232**	2469	**2594 (+16%)**	2804	2900	**3065 (+37%)**	3436	3254	**3803 (+70%)**	4386
Brock CSD (🡇)	**2015**	2239	**2358 (+17%)**	2561	2648	**2793 (+39%)**	3155	2977	**3516 (+75%)**	4065

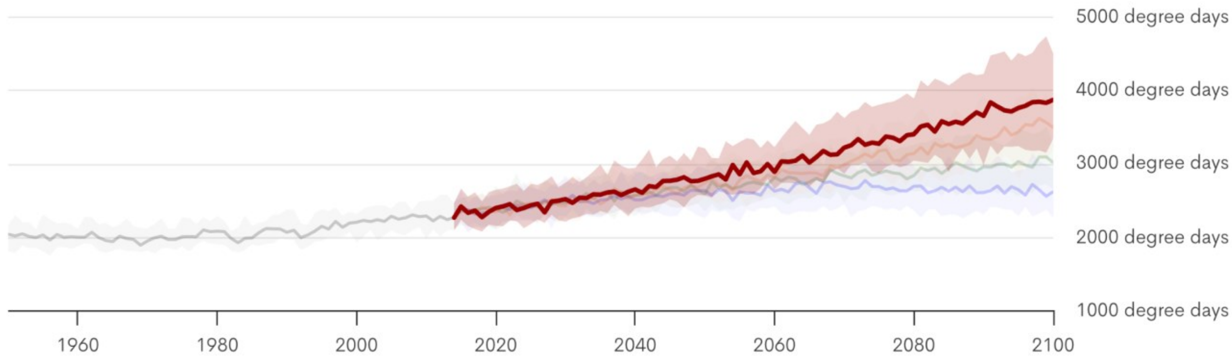

Figure 22: Projected Growing Degree Days for Durham Region - SSP5-8.5

Precipitation

Canada has become wetter over the past several decades, with increases in average annual precipitation in many regions. Some parts of the country are projected to see a significant percentage increase in precipitation, particularly in Northern Canada. Projections for Durham Region show somewhat less dramatic but still significant changes to precipitation patterns.

Total Precipitation

On a seasonal basis, Durham's spring, winter and autumn precipitation accumulations are projected to increase by the end of the century. Projected summer precipitation is projected to increase by 2040 before returning to just above baseline levels by 2100. 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.

For Durham Region, the baseline average annual precipitation is 907 mm. In a high emission scenario, Durham Region is projected to experience an average annual precipitation increase from 1971-2000 levels of 63mm by 2040; 93mm by 2070; and 148mm by 2100. The table below presents the precipitation accumulation projections for Durham Region. It should be noted that there is not a significant variation in total precipitation trends across the region; the projections for 2100 only show a minor variance of less than 4% across the region. As such, the precipitation data is only reported at the regional level.

At the time of writing this report, snowfall projections are not available through climatedata.ca.

Table 20: Annual and Seasonal Precipitation (mm) - SSP5-8.5 (climatedata.ca)

	Baseline 1971 -2000	2011-2040			2041-2070			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Annual	**907**	917	**970**	997	970	**1000**	1040	986	**1055**	1112
Winter	**214**	234	**234**	250	237	**248**	268	260	**274**	310
Spring	**222**	223	**237**	252	232	**256**	275	249	**267**	299
Summer	**229**	212	**239**	257	207	**236**	252	190	**231**	262
Fall	**244**	236	**254**	278	246	**267**	277	249	**274**	302

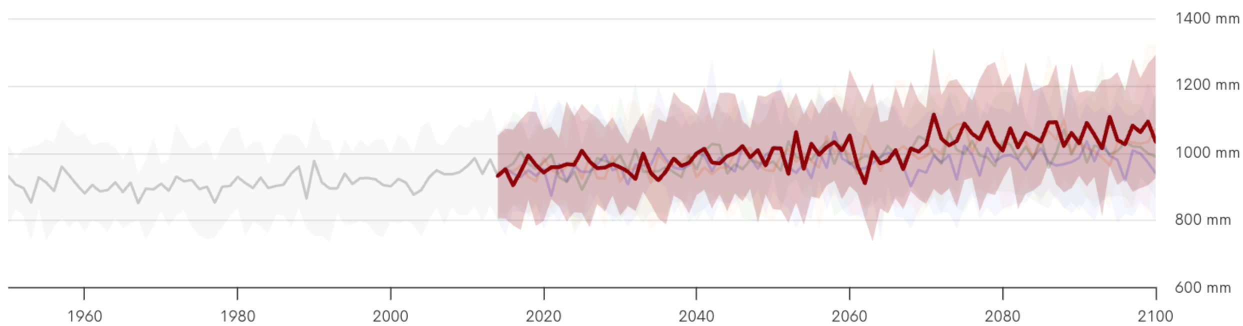

Figure 23: Projected Annual Precipitation for Durham Region – SSP5-8.5

Maximum Consecutive Dry Days

Maximum consecutive dry days indicate the maximum number of consecutive days with precipitation below 1mm/day, within the selected time period. Periods of dry weather can directly impact water availability, irrigation for agriculture, and energy demand. Drought conditions may result when dry periods are long-lasting. As shown in the table below, maximum consecutive dry days are projected to be relatively stable, albeit with a slight tendency to increase, over the coming century. This trend is consistent across the region with very little data variation from north to south census subdivision areas.

Table 21: Maximum Consecutive Dry Days - SSP5-8.5 (climatedata.ca)

Baseline 1971-2000	2011-2040			2041-2070			2071-2100		
	Low	Median	High	Low	Median	High	Low	Median	High
14	13	**14**	15	13	**14**	15	13	**15**	17

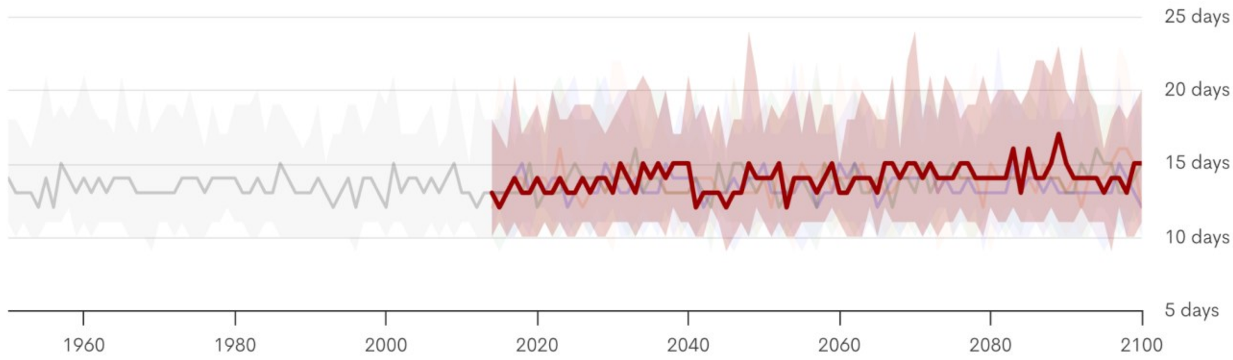

Figure 24: Maximum Consecutive Dry Days for Durham Region - SSP5-8.5

Extreme Precipitation

In the past decade, Canada has been experiencing more frequent and intense extreme weather events that significantly affect our population and industries. These events come in the form of heat waves, wildfires, more frequent and intense extreme precipitation and flooding events, and wind and ice storms. Over the last forty years, extreme weather events have resulted in damages of $31 billion in Canada alone, with global costs estimated at nearly $5 trillion. The likelihood and the severity of these events are increasing with climate change, and are projected to cause hundreds of trillions of dollars in economic damage globally. Extreme weather events will affect communities across Canada, from damage to infrastructure and critical services, to economic and industry productivity, and in particular the health of at-risk populations[17]. Future extreme weather models predict shorter return periods of extreme events – that is, an increase in the likelihood of 25, 50, and 100 year events – in the future.

Heavy or Extreme Precipitation

Increased intensity and frequency of heavy rainfall and storm events are among the major climate hazards facing Ontario's infrastructure and communities under climate change[18]. As Southern Ontario is the most intensely urbanized area of the province, the magnitude and costs to insured and uninsured damages associated with flooding is significantly higher than elsewhere in the province[19]. Extreme rain and flood events have frequently been experienced in the Durham Region in the last 10 years, and with projected increases in annual precipitation there is the potential of increased flood risk and high intensity storms.

[17] Feltmate, B., & Moudrak, M. (2021). Climate change and the preparedness of 16 major Canadian cities to limit flood risk. Intact Centre on Climate Adaptation, University of Waterloo.

[18] Ontario Ministry of the Environment, Conservation and Parks. (2023, August). Ontario Provincial Climate Change Impact Assessment.https://www.ontario.ca/files/2023-08/mecp-ontario-provincial-climate-change-impact-assessment-en-2023-08-17.pdf

[19] Feltmate, B., & Moudrak, M. (2021). Climate change and the preparedness of 16 major Canadian cities to limit flood risk. Intact Centre on Climate Adaptation, University of Waterloo.

The projections of several extreme precipitation indices are presented in this section. Wet days 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[20].

Max 1-day precipitation indicates the amount of precipitation that falls on the wettest day of the year, calculated by averaging the annual maximums over the 30-year period being projected. 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.

The table below shows the projected wet days (both 10 mm and 20 mm), as well as the max 1-day precipitation for Durham Region. Wet days that experience more than 10mm of precipitation are projected to increase by 7 days per year by 2100 and wet days that experience more than 20mm per year are projected to increase by 3 days per year by 2100. Maximum 1-day precipitation is also projected to increase from the baseline of 38mm to 47mm per year by 2100.

Table 22: Extreme Precipitation Indices - SSP5-8.5 (climatedata.ca)

Variable	Baseline 1971 -2000	2011-2040			2041-2071			2071-2100		
		Low	Median	High	Low	Median	High	Low	Median	High
Wet Days (≥10 mm)	**26**	26	**29**	30	29	**31**	33	30	**33**	36
Wet Days (≥20 mm)	**6**	6	**7**	8	7	**8**	9	9	**9**	11
Max 1-Day Precipitation (mm)	**38**	39	**41**	44	40	**44**	47	43	**47**	51

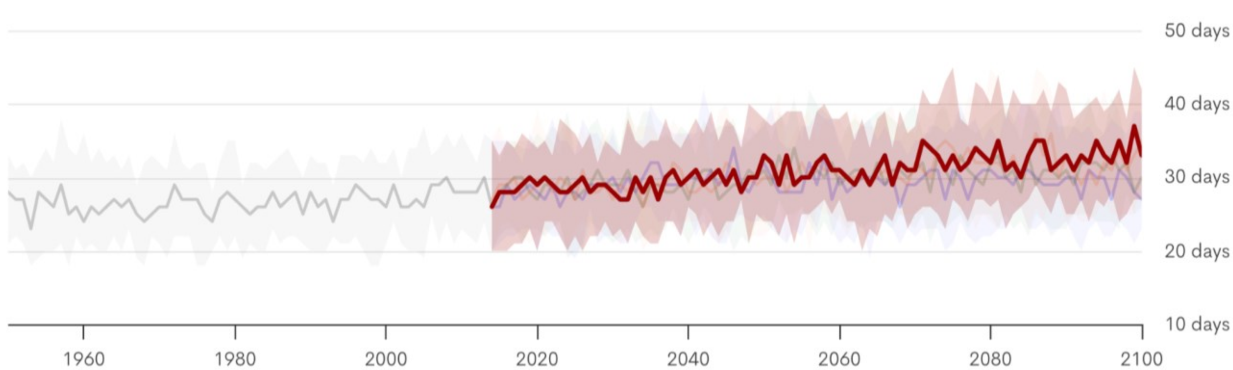

Figure 25: Projected Wet Days ≥10mm for Durham Region - SSP5-8.5

[20] Prairie Climate Centre (2020). Climate Variables. Climate Atlas of Canada. Retrieved from https://ClimateAtlas.ca/variables

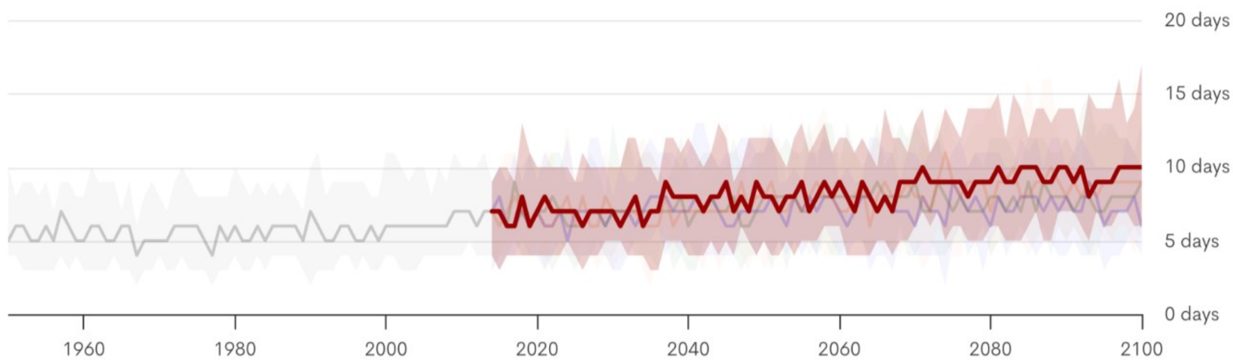

Figure 26: Projected Wet Days ≥20mm for Durham Region - SSP5-8.5

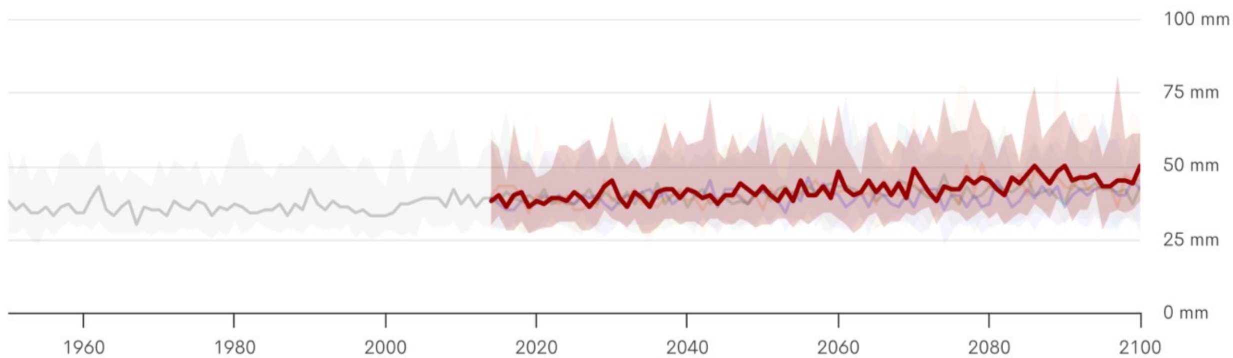

Figure 27: Projected Maximum 1-Day Precipitation for Durham Region - SSP5-8.5

Intensity-Duration-Frequency

Intensity-duration-frequency (IDF) curves represent a way to analyze and predict heavy precipitation under a changing climate. They graphically represent the probability that a given average rainfall intensity will occur. IDF curves are used to design stormwater infrastructure. To date, much of storm water infrastructure has been built to historical rainfall intensities. Rainfall intensity (mm/hr), rainfall duration (how many hours it rained at that intensity) and rainfall frequency/ return period (how often that rain storm repeats itself) are the parameters that make up the axes an IDF curve graph[21].

Due to the changing climate, using IDF curves based on historical observations alone are inappropriate for long-term decision-making. To account for climate change impacts to extreme rainfall and IDF curves, Environment and Climate Change Canada (ECCC) recommends the use of a scaling methodology as there is strong evidence that the intensity of precipitation is closely linked to temperature increases, by a general factor of around 7% for every 1°C increase in temperature. This methodology is described in more detail in CSA W231:25 'Developing and interpreting intensity-duration-frequency (IDF) information under a changing climate'[22]. ClimateData.ca provides historical and climate change-scaled IDF data for all ECCC IDF stations in Canada.

[21] IDF Curve. (n.d.). The Climate Workspace. Retrieved from http://www.glisaclimate.org/node/2341

[22] ClimateData.ca. (n.d.). IDF Data and Climate Change. https://ClimateData.ca/resource/idf-data-and-climate-change/

The station selected to produce localized IDF curves for Durham Region was the Oshawa Water Pollution Control Plant (WPCP). Projections are based on increases from the precipitation rate baseline, which is the average amount of precipitation in the years the station was active. For the Oshawa WPCP station, this baseline was calculated between 1970 and 2016. **Table 23** below depicts baseline precipitation intensity.

Table 23: Historical Return Period Rainfall Amounts (mm) and Return Period Rainfall Rates (mm/hr) (1970-2016) (ClimateData.ca)

	Return Period Rainfall Amounts (mm)						Return Period Rainfall Rates (mm/hr)					
T (years)	2	5	10	25	50	100	2	5	10	25	50	100
5 min	7	9.6	11.3	13.4	15	16.6	84.3	115	135.3	161	180	198.9
10 min	9.9	13.6	16	19.1	21.4	23.7	59.4	81.5	96.1	114.6	128.3	141.9
15 min	12.1	16.4	19.3	23	25.7	28.4	48.2	65.7	77.2	91.9	102.7	113.5
30 min	15.7	21.2	24.8	29.3	32.7	36.1	21.5	42.3	49.6	58.7	65.4	72.1
1 h	19.1	26.3	31.1	37.1	41.5	46	19.1	26.3	31.1	37.1	41.5	46
2h	23.9	32.6	38.4	45.7	51.2	56.6	12	16.3	19.2	22.9	25.6	28.3
6 h	32.3	42.6	49.4	58	64.3	70.7	5.4	7.1	8.2	9.7	10.7	11.8
12h	38.4	57.1	69.4	85	96.6	108	3.2	4.8	5.8	7.1	8	9
24 h	44.5	62.5	74.5	89.7	100.9	112	1.9	2.6	3.1	3.7	4.2	4.7

Tables 24, 25 and **26** represent the change in IDF curves under the SSP5-8.5 emission scenario. The projections cover a 30-year frame from 2011-2040, 2041-2070 and 2071-2100. As shown in these tables, the intensity of rainfall is projected to increase. While longer, more frequent rainfall events (e.g. a typical rainy day) will bring slightly higher amounts of rain, the intensity of rainfall during more infrequent, extreme storms (i.e. 1 in 25, 50, 100-year storms) is projected to significantly increase. The projected IDFs demonstrate that the intensity (mm/h) of rainfall will increase, with more rain falling in shorter time periods. Storms that occur less frequently (e.g. 100-year storms) are projected to see the greatest increase in intensity. Furthermore, such heavy precipitation events are projected to become more common than they once were.

Table 24: Projected Return Period Rainfall Amounts (mm) and Return Period Rainfall Rates (mm/hr) Baseline Precipitation Intensity Rates (mm/h) (2011-2040) - SSP5-8.5 (ClimateData.ca)

	Return Period Rainfall Amounts (mm)						Return Period Rainfall Rates (mm/hr)					
T(years)	2	5	10	25	50	100	2	5	10	25	50	100
5 min	8.0	10.8	12.8	15.3	17.0	18.8	96	130	153	183	204	226
10 min	11.2	15.3	18.2	21.7	24.2	26.8	67	92	109	130	145	161
15 min	13.8	18.5	22.0	26.0	29.0	32.3	55	74	88	104	116	129
30 min	18.0	24.0	28.0	33.5	37.0	41.0	36	48	56	67	74	82
1 h	22.0	30.0	35.0	42.0	47.0	52.0	22	30	35	42	47	52
2h	28.0	16.0	44.0	52.0	58.0	64.0	14	8	22	26	29	32
6 h	36.6	48.0	55.8	66.0	72.0	78.0	6.1	8	9.3	11	12	13
12h	43.2	64.8	79.2	96.0	109.2	120.0	3.6	5.4	6.6	8	9.1	10
24 h	52.8	69.6	84.0	100.8	115.2	127.2	2.2	2.9	3.5	4.2	4.8	5.3

Table 25: Projected Return Period Rainfall Amounts (mm) and Return Period Rainfall Rates (mm/hr) Baseline Precipitation Intensity Rates (mm/h) (2041-2070) - SSP5-8.5 (ClimateData.ca)

	Return Period Rainfall Amounts (mm)						Return Period Rainfall Rates (mm/hr)					
T(years)	2	5	10	25	50	100	2	5	10	25	50	100
5 min	9.1	12.4	14.6	17.4	19.4	21.5	109.0	149.0	175.0	209.0	233.0	258.0
10 min	12.8	17.7	20.8	24.8	27.7	30.7	77.0	106.0	125.0	149.0	166.0	184.0
15 min	15.5	21.3	25.0	29.8	33.3	36.8	62.0	85.0	100.0	119.0	133.0	147.0
30 min	20.5	27.5	32.0	38.0	42.5	46.5	41.0	55.0	64.0	76.0	85.0	93.0
1 h	25.0	34.0	40.0	48.0	54.0	60.0	25.0	34.0	40.0	48.0	54.0	60.0
2h	32.0	42.0	50.0	60.0	66.0	74.0	16.0	21.0	25.0	30.0	33.0	37.0
6 h	42.0	55.2	66.0	78.0	84.0	90.0	7.0	9.2	11.0	13.0	14.0	15.0
12h	49.2	74.4	90.0	110.4	120.0	144.0	4.1	6.2	7.5	9.2	10.0	12.0
24 h	60.0	81.6	96.0	115.2	129.6	146.4	2.5	3.4	4.0	4.8	5.4	6.1

Table 26: Projected Return Period Rainfall Amounts (mm) and Return Period Rainfall Rates (mm/hr) Baseline Precipitation Intensity Rates (mm/h) (2071-2100) - SSP5-8.5 (ClimateData.ca)

	Return Period Rainfall Amounts (mm)						Return Period Rainfall Rates (mm/hr)					
T(years)	2	5	10	25	50	100	2	5	10	25	50	100
5 min	10.7	14.6	17.2	20.4	22.8	25.2	128.0	175.0	206.0	245.0	274.0	302.0
10 min	15.0	20.7	24.3	29.0	32.5	36.0	90.0	124.0	146.0	174.0	195.0	216.0
15 min	18.3	25.0	29.3	35.0	39.0	43.3	73.0	100.0	117.0	140.0	156.0	173.0
30 min	24.0	32.0	37.5	44.5	49.5	55.0	48.0	64.0	75.0	89.0	99.0	110.0
1 h	29.0	40.0	47.0	56.0	63.0	70.0	29.0	40.0	47.0	56.0	63.0	70.0
2h	36.0	50.0	58.0	70.0	78.0	86.0	18.0	25.0	29.0	35.0	39.0	43.0
6 h	49.2	66.0	72.0	90.0	96.0	108.0	8.2	11.0	12.0	15.0	16.0	18.0
12h	58.8	87.6	105.6	132.0	144.0	168.0	4.9	7.3	8.8	11.0	12.0	14.0
24 h	69.6	96.0	112.8	134.4	153.6	177.6	2.9	4.0	4.7	5.6	6.4	7.4

Figure 28, below, illustrates how the 24-hour rainfall volume (mm) will change in the future. Historically, a 1:100-year event was represented by a total rainfall volume of 112 mm over a 24-hour period. Under the SSP5-8.5 climate scenario, the future 1:100-year event in the time frame of 2071-2100 will see a total rainfall volume of 177.6 or a 58.5% increase. Another way to note this change, is that a 24-hour rainfall event that historically resulted in 112mm is projected to have a return period of less than 50 years between 2011-2040; a return period of less than 25 years between 2041-2070; and a return period of less than 10 years between 2071-2100. The increasing intensity of rainfall events may have implications for stormwater systems designed to historical rainfall patterns affecting the Region’s ability to maintain service levels into the future.

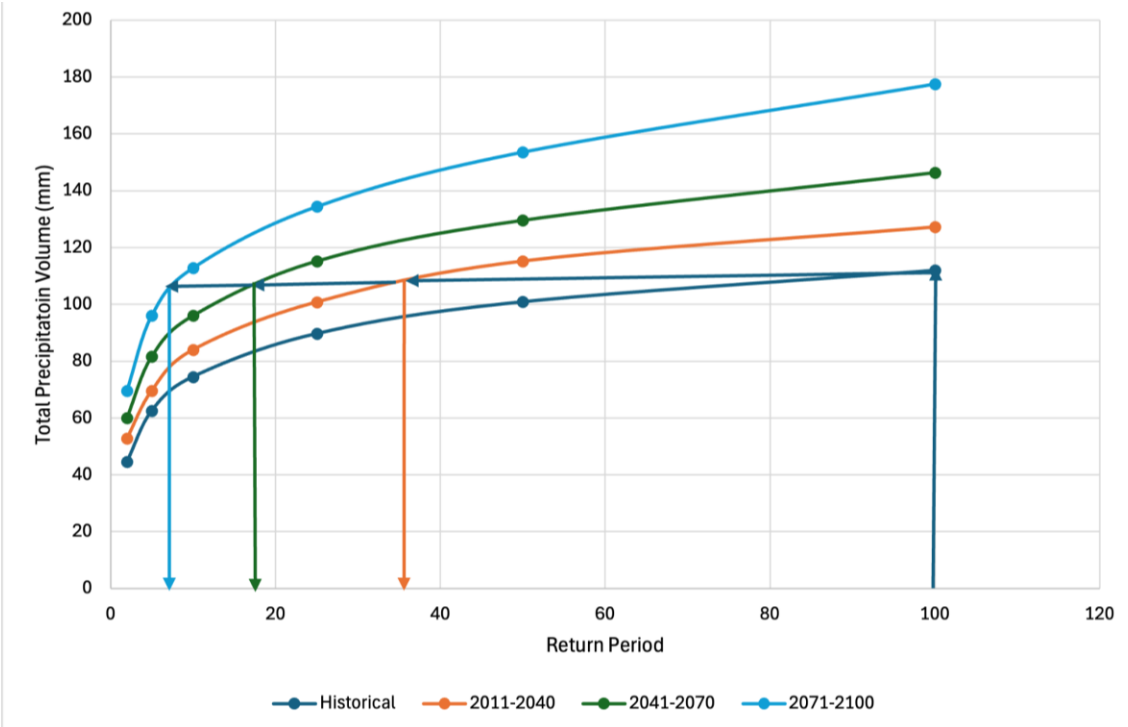

Figure 28: 24-Hour Rainfall Volumes by Return Period for Oshawa Monitoring Station

Great Lakes

Throughout the year, the Great Lakes help to moderate temperatures, cooling nearby lands in the summer and warming them in the winter, which support agriculture and other industries[23]. Bordering on Lake Ontario, Durham Region is influenced by fluctuations in the Lake's over-land air temperature, water levels, ice cover and water temperature, all of which are influenced by climate change.

Lake Water Levels

Great Lakes water levels are shaped by multiple interacting factors, including precipitation falling directly on the lakes, runoff from the surrounding drainage basin, evaporation from lake surfaces, inflows from upstream lakes, outflows to downstream lakes, water diversions, consumptive water use, and regulation plans governing outflows from Lake Superior and Lake Ontario[24]. The range and variability of water levels are projected to expand with the potential for more extreme highs in the future[25]. Within the coming century, Lake Ontario is expected to experience some of the greatest

[23] Wuebbles, D., Cardinale, B., Cherkauer, K., Davidson-Arnott, R., Hellmann, J., Infante, D., Johnson, L., & de Loë, R. (2019). An Assessment of the Impacts of Climate Change on the Great Lakes by Scientists and Experts from Universities and Institutions in the Great Lakes Region. Environmental Law & Policy Center. https://elpc.org/resources/the-impacts-of-climatechange-on-the-great-lakes/

[24] Lam, S., and Dokoska, K. 2022. Climate Change in the Great Lakes Basin: Summary of Trends and Impacts. Toronto, Ontario: Toronto and Region Conservation Authority.

[25] Government of Canada. (2019b). Fluctuations in Lake Levels-Types. Fisheries and Oceans Canada. https://www.waterlevels.gc.ca/C&A/fluctuations-eng.html

variation out of the Great Lakes and although outflows from Lake Ontario are regulated, inflows are uncontrolled[26]. There are also limits to the amount of outflow that can be released from Lake Ontario due to the flow capacity of the St. Lawrence River. An increase in projected extreme water levels could have significant implications for infrastructure design (e.g., stormwater systems, wastewater facilities) and include increased erosion, bluff recession/ shoreline retreat, flood risk and ecosystem management challenges along Lake Ontario's shoreline.

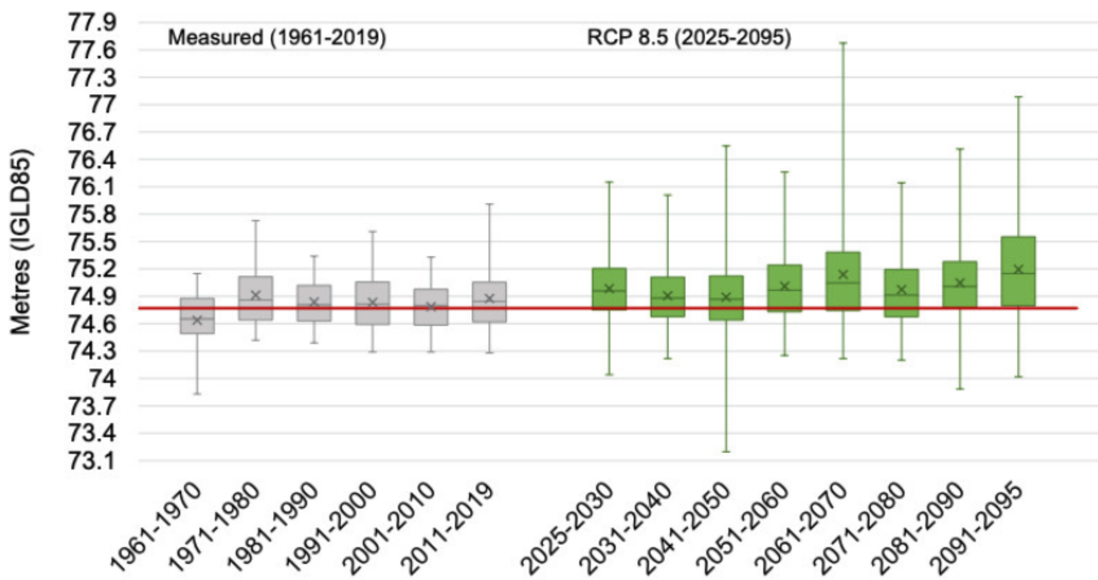

Figure 29: Historical and projected decadal average lake levels for Lake Ontario under RCP8.5 (Lam, S. and Dokoska, K. 2022)

Ice Cover and Water Temperatures

Projections indicate substantial reductions in ice cover across the Great Lakes, with Lake Michigan showing the largest decline in average ice-season, followed by Lakes Erie and Ontario—especially in February and March. As the smallest Great Lake by surface area, Lake Ontario is particularly sensitive to changes associated with warming water temperatures, including the inhibition of vertical mixing. This increase in thermal stratification can accelerate oxygen depletion in the lower strata of the lake, creating dead zones that can lead to massive fish kills and damage fisheries. This can also generate toxic algal blooms, affect drinking-water supplies, raise treatment costs and stress filtration systems. With higher risks to water quality, cultural and recreational uses of the lake may also be increasingly affected.

[26] Seglenieks, F., Feng, M., & Hayhoe, K. (2022). Future water levels of the Great Lakes under 1.5 °C to 3 °C warming. Journal of Great Lakes Research.

Conclusion

This Climate Science Report is the baseline that will inform the update of the Durham Community Climate Adaptation Plan Update and it offers updated climate data to support informed decision making as the Region advances the consolidation of a refreshed plan.

The climate data in this report offers a clear indication that climate change is affecting Canada, Ontario, and Durham Region. Rising temperatures, changes in precipitation, and an increase in extreme weather events result in significant climate impacts that will have potential ecological, infrastructural, socioeconomic and cultural implications for the community.

Future climate projections for Durham Region show significant and multifaceted changes. With rising annual temperatures and increased frequency and intensity of heat waves, the community faces heightened risks of heat-related illnesses and impacts, especially for populations that are more highly exposed and have a lower capacity to adapt. Additionally, the projected decrease in extreme cold days and frost days, coupled with changes in precipitation, could disrupt ecosystems and exacerbate challenges like water availability and the spread of vector-borne diseases. These changes signify the urgent need for comprehensive adaptation strategies to safeguard public health, infrastructure, and natural resources in Durham Region.

Appendix A: Glossary of Terms

Definitions have been adapted from the Intergovernmental Panel on Climate Change (IPCC) and ClimateData.ca.

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.

Census Subdivision (CSD)
A municipal-level geographic unit defined by Statistics Canada, used here as one of the finer spatial scales available on ClimateData.ca for climate projections. CSDs provide more localized information than larger reporting units such as health regions or Watersheds.

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 Projections
A projection of the response of the climate system to emissions or concentration scenarios of greenhouse gases and aerosols. These projections depend upon the climate change (or emission) scenario used, which are based on assumptions concerning future socioeconomic and technological developments that may or may not be realized and are therefore subject to uncertainty.

Climate Change Scenario
A climate change scenario is a plausible description of future climate conditions based on assumptions about greenhouse gas emissions and related socioeconomic factors. It represents how the climate may differ from today under specific emission pathways, using scientific models to explore potential future outcomes. See Representative Concentration Pathways (RCPs) and Shared Socio-economic Pathways (SSPs).

Coupled Model Intercomparison Project (CMIP)
An international framework that coordinates standardized climate-model experiments so results from different global climate models can be compared, evaluated, and used in climate-change research. Successive phases—CMIP5 and CMIP6—provide the model outputs that underpin many climate scenarios, including RCPs and SSPs.

Heat Warning
Also known as a 'Heat Wave', heat warnings notify the public about upcoming heat events and are triggered by temperatures defined by Ontario's Ministry of Health. In Durham Region, a Heat Warning is issued when temperatures are projected to be at least 31°C during the day and overnight temperatures are at least 20°C or Humidex is at least 40. An **Extended Heat Warning** is issued when these conditions are expected for more than two days.

Ensemble Approach

As input to climate projections, 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 heatwave, 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.

General Circulation Models (GCM)
Based on physical laws and physically-based empirical relationships and are mathematical representations of the atmosphere, ocean, ice caps and land surface processes. They are therefore the only tools that estimate changes in climate due to increased greenhouse gases for a large number of climate variables in a physically consistent manner.

Greenhouse Gas (GHG) Emissions
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_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and chlorofluorocarbons (CFCs) are the six primary greenhouse gases in the Earth's atmosphere in order of abundance.

Health Region
An administrative geographic unit defined by provincial health authorities and Statistics Canada. In ClimateData.ca, health regions represent an intermediate spatial scale for climate projections, offering broader regional context while remaining more detailed than provincial or watershed-level reporting. In Durham Region, the health region is the same geographic boundary as the Regional Municipality of Durham.

Extreme Heat Days
An extreme heat day occurs when temperatures meet or exceed 30°C. When using ClimateData.ca, this variable is referred to as 'Days above Tmax +30˚C'.

Intensity-Duration-Frequency curve (IDF Curve)
A graphical representation of the probability that a given average rainfall intensity will occur. Rainfall Intensity (mm/hr), Rainfall Duration (how many hours it rained at that intensity) and Rainfall Frequency/Return Period (how often that rainstorm repeats itself) are the parameters that make up the axes of the graph of the IDF curve. An IDF curve is created with long term rainfall records collected at a rainfall monitoring station.

Over-Land Air Temperature
The air temperature measured over land surfaces surrounding a water body, such as the Great Lakes. It reflects atmospheric conditions influenced by both regional climate patterns and local land–lake interactions, and is used to assess how warming trends affect adjacent terrestrial environments.

Radiative forcing
The change in the value of the net radiative flux (i.e. the incoming flux minus the outgoing flux) at the top of the atmosphere in response to some perturbation, in this case, the presence of greenhouse gases.

Representative Concentration Pathways (RCPs)

These 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.

Shared Socio-economic Pathways (SSPs)
Scenarios used to characterize possible future development pathways for human societies, particularly in relation to its use of fossil fuels and the social and economic factors which drive fossil fuel use.

Temperature anomaly
A departure from a reference value or long-term average. A positive anomaly indicates that the observed temperature was warmer than the reference value, while a negative anomaly indicates that the observed temperature was cooler than the reference value.

Appendix B: Climate Variable Definitions

The climate variables included in this report are listed and defined below.

CLIMATIC DRIVER	CLIMATE VARIABLE	DESCRIPTION	UNITS
Hot Temperature	Mean Temperature	The average seasonal (or annual) temperature.	°C
	Hottest Day	The warmest daytime temperature in a given year.	°C
	Extreme Heat Days Days above Tmax +30˚C	Days when the temperature rises to at least +30 °C.	Days
	Humidex Days	Days where the humidex is greater than 30.	Days
	Tropical Nights	Nights when the minimum temperature remains above +20 °C.	Days
	Heat Wave (Heat Warning) Frequency	The average number of heat waves per year, where a heat event is defined as 2+ consecutive days with Tmax ≥ 31 °C and Tmin ≤ 20˚C, or humidex > 40.	Number of heat wave events
	Heat Wave (Heat Warning) Duration	The total amount of heat wave days, where a heat wave is defined as 2+ consecutive days with Tmax ≥ 31 °C and Tmin ≤ 20˚C, or humidex > 40.	Days
	Cooling Degree Days	Cooling degree days indicate how much and how often temperatures rise above +18 °C in ways that contribute to the need for air conditioning.	Days
Cold Temperature	Coldest Day	The lowest nighttime temperature recorded in a given year.	°C
	Days Below Tmin -15°C	Days where daily minimum temperature is below a threshold of -15°C.	Days
	Heating Degree Days	Heating degree days indicate how much and how often temperatures fall below +18 °C in ways that contribute to the need for space heating.	Days
	Frost Days	Days on which the coldest temperature of the day is lower than 0°C.	Days
	Icing Days	Days on which the air temperature does not go above freezing (0°C).	Days

	Freeze-Thaw Cycles	Days when the air temperature fluctuates between freezing and non-freezing temperatures.	Days
Changing Seasons	Growing Season Length	The number of days between the growing season start date and end date (also known as the frost-free season).	Days
	Growing Degree Days (>5˚C)	A measure of heat available for plant growth, calculated by summing each day's average temperature above +5 °C. Higher totals indicate a longer or warmer growing season.	Degree-Days (cumulative unit)
Precipitation	Annual Total Precipitation	The total amount of precipitation (rain and snow combined) that falls within a year.	mm
	Seasonal Total Precipitation	The total amount of precipitation (rain and snow combined) that falls within a given season (winter, spring, summer, fall).	mm
	Maximum Consecutive Dry Days	The maximum number of consecutive days with precipitation below 1mm/day, within a given year.	Days
Extreme Weather	Wet Days (>=10mm)	A Wet Day (10 mm) is a day on which at least a total of 10 mm of rain or frozen precipitation falls.	Days
	Wet Days (>=20mm)	A Wet Day (20 mm) is a day on which at least a total of 20 mm of rain or frozen precipitation falls.	mm
	Max. 1-Day Precipitation	The amount of precipitation that falls on the wettest day of the year.	mm
	Rainfall IDF Curves	The annual maximum rainfall intensity for specific durations. Common durations for design applications are: 5-min, 10-min, 15-min, 30-min, 1-hr, 2-hr, 6-hr, 12-hr, and 24-hr.	mm/h

Appendix C: 2025 Summary of Climate Variables - SSP5-8.5

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP5-8.5								
				2011-2040			2041-2070			2071-2100		
				Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	Mean Temperature - Annual	°C	**7.1**	8.4	**8.9**	9.9	10.2	**11.1**	12.6	12.1	**13.5**	15.8
Ajax CSD	Mean Temperature - Annual	°C	**8.0**	9.3	**9.9**	10.9	11.1	**12.0**	13.5	13.1	**14.4**	16.7
Brock CSD	Mean Temperature - Annual	°C	**6.6**	7.9	**8.4**	9.4	9.7	**10.6**	12.1	11.7	**13.0**	15.3
Durham Health Region	Mean Temperature - Spring	°C	**5.7**	6.7	**7.4**	8.0	8.6	**9.4**	10.3	10.4	**11.7**	13.0
Ajax CSD	Mean Temperature - Spring	°C	**6.6**	7.6	**8.3**	8.9	8.6	**9.4**	11.1	11.2	**12.4**	13.8
Brock CSD	Mean Temperature - Spring	°C	**5.4**	6.4	**7.0**	7.7	8.3	**9.1**	10.0	10.1	**11.4**	12.7
Durham Health Region	Mean Temperature - Summer	°C	**19.0**	20.2	**20.8**	21.8	21.8	**22.8**	24.6	23.2	**25.5**	27.8
Ajax CSD	Mean Temperature - Summer	°C	**19.8**	21.0	**21.5**	22.5	22.5	**23.5**	25.4	24.1	**26.3**	28.5
Brock CSD	Mean Temperature - Summer	°C	**18.8**	20.0	**20.5**	21.5	21.5	**22.5**	24.4	23.1	**25.3**	27.5
Durham Health Region	Mean Temperature - Fall	°C	**8.9**	10.1	**10.6**	11.4	11.7	**12.5**	14.5	13.2	**15.1**	18.4
Ajax CSD	Mean Temperature - Fall	°C	**9.9**	11.1	**11.6**	12.4	12.6	**13.5**	15.5	14.1	**16.1**	19.3
Brock CSD	Mean Temperature - Fall	°C	**8.5**	9.7	**10.2**	11.0	11.2	**12.1**	14.1	12.7	**14.7**	18.0
Durham Health Region	Mean Temperature - Winter	°C	**-5.8**	-4.3	**-3.2**	-1.9	-2.1	**-0.9**	1.1	-0.2	**1.4**	4.1
Ajax CSD	Mean Temperature - Winter	°C	**-4.4**	-2.9	**-1.9**	-0.6	-0.8	**0.4**	2.4	1.5	**2.7**	5.4
Brock CSD	Mean Temperature - Winter	°C	**-6.7**	-5.1	**-4.1**	-2.7	-3.0	**-1.7**	0.3	-0.6	**0.6**	3.3
Durham Health Region	Minimum Temperature - Annual	°C	**2.2**	3.6	**4.2**	4.9	5.4	**6.2**	7.6	7.6	**8.7**	10.9
Ajax CSD	Minimum Temperature - Annual	°C	**3.4**	4.8	**5.4**	6.1	6.6	**7.4**	8.8	8.7	**9.9**	12.0
Brock CSD	Minimum Temperature - Annual	°C	**1.4**	2.9	**3.5**	4.2	4.7	**5.5**	7.0	6.9	**8.0**	10.2
Durham Health Region	Minimum Temperature - Spring	°C	**0.6**	1.6	**2.3**	2.8	3.6	**4.1**	4.9	5.4	**6.4**	7.7
Ajax CSD	Minimum Temperature - Spring	°C	**1.7**	2.7	**3.4**	3.8	4.6	**5.2**	6.0	6.5	**7.3**	8.8
Brock CSD	Minimum Temperature - Spring	°C	**-0.1**	1.0	**1.6**	2.1	3.0	**3.5**	4.3	4.8	**5.8**	7.2
Durham Health Region	Minimum Temperature - Summer	°C	**13.4**	14.6	**15.1**	15.8	16.1	**17.1**	18.2	17.9	**19.2**	21.5
Ajax CSD	Minimum Temperature - Summer	°C	**14.4**	15.6	**16.1**	16.8	17.1	**18.1**	19.2	18.9	**20.7**	22.5
Brock CSD	Minimum Temperature - Summer	°C	**12.9**	14.0	**14.6**	15.3	15.6	**16.1**	17.7	17.4	**19.2**	21.1
Durham Health Region	Minimum Temperature - Fall	°C	**4.3**	5.5	**5.9**	6.6	7.0	**7.6**	9.7	8.6	**10.1**	13.4
Ajax CSD	Minimum Temperature - Fall	°C	**5.5**	6.6	**7.1**	7.8	8.2	**8.8**	10.8	9.7	**11.3**	14.5
Brock CSD	Minimum Temperature - Fall	°C	**3.8**	4.9	**5.4**	6.1	6.5	**7.2**	9.1	8.0	**9.6**	12.9
Durham Health Region	Minimum Temperature - Winter	°C	**-9.9**	-8.3	**-7.2**	-5.3	-5.8	**-4.4**	-1.8	-3.2	**-1.7**	1.3
Ajax CSD	Minimum Temperature - Winter	°C	**-8.3**	-6.6	**-5.6**	-3.7	-4.2	**-2.8**	-0.3	-1.6	**-0.2**	2.6
Brock CSD	Minimum Temperature - Winter	°C	**-11.1**	-9.4	**-8.3**	-6.3	-6.8	**-5.4**	-2.8	-4.2	**-2.6**	0.3
Durham Health Region	Maximum Temperature - Annual	°C	**11.9**	12.1	**13.7**	14.6	14.9	**15.7**	17.5	16.7	**18.3**	20.7
Ajax CSD	Maximum Temperature - Annual	°C	**12.7**	13.8	**14.4**	15.4	15.6	**16.5**	18.2	17.4	**19.1**	21.4
Brock CSD	Maximum Temperature - Annual	°C	**11.7**	12.8	**13.4**	14.4	14.7	**15.5**	17.3	16.5	**18.1**	20.4
Durham Health Region	Maximum Temperature - Spring	°C	**10.8**	11.8	**12.5**	13.4	13.7	**14.6**	15.6	15.3	**17.0**	18.4
Ajax CSD	Maximum Temperature - Spring	°C	**11.4**	12.4	**13.0**	14.0	14.2	**15.2**	16.2	15.9	**17.5**	19.9
Brock CSD	Maximum Temperature - Spring	°C	**10.8**	11.7	**12.4**	13.2	13.6	**14.5**	15.6	15.3	**17.0**	18.3

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP5-8.5								
				2011-2040			2041-2070			2071-2100		
				Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	Maximum Temperature - Summer	°C	**24.7**	25.8	**26.5**	27.7	27.4	**28.6**	30.8	28.8	**31.2**	34.8
Ajax CSD	Maximum Temperature - Summer	°C	**25.2**	26.4	**27.0**	28.2	27.9	**29.1**	31.3	29.3	**31.7**	35.3
Brock CSD	Maximum Temperature - Summer	°C	**24.7**	25.8	**26.5**	27.7	27.4	**28.6**	30.8	28.3	**30.4**	33.6
Durham Health Region	Maximum Temperature - Fall	°C	**13.5**	14.7	**15.1**	16.5	16.3	**17.1**	19.2	17.7	**19.8**	23.2
Ajax CSD	Maximum Temperature - Fall	°C	**14.3**	15.5	**15.9**	17.3	17.1	**17.9**	20.0	18.5	**20.6**	24.0
Brock CSD	Maximum Temperature - Fall	°C	**13.2**	14.4	**14.9**	16.2	16.0	**16.6**	18.9	17.4	**19.6**	22.9
Durham Health Region	Maximum Temperature - Winter	°C	**-1.8**	-0.4	**0.6**	1.6	1.4	**2.6**	4.0	3.6	**4.8**	6.6
Ajax CSD	Maximum Temperature - Winter	°C	**-0.5**	0.7	**1.7**	2.6	2.5	**3.7**	5.0	4.7	**5.9**	7.6
Brock CSD	Maximum Temperature - Winter	°C	**-2.3**	-1.0	**-0.1**	-0.9	0.8	**2.0**	3.4	3.0	**4.2**	6.0
Durham Health Region	Hottest Day	°C	**32.5**	33.3	**34.3**	35.9	34.9	**36.3**	39.5	36.9	**39.2**	43.4
Ajax CSD	Hottest Day	°C	**33.2**	33.8	**35.0**	36.6	35.5	**36.9**	40.1	37.4	**39.8**	43.8
***Clarington CSD**	Hottest Day	°C	**32.2**	32.9	**34.1**	35.7	34.6	**36.0**	39.2	36.5	**38.8**	42.9
Durham Health Region	Days with Tmax > 30°C	Days	**7**	13	**18**	29	26	**40**	64	45	**70**	107
Ajax CSD	Days with Tmax > 30°C	Days	**10**	16	**22**	34	31	**45**	70	51	**77**	111
***Clarington CSD**	Days with Tmax > 30°C	Days	**6**	11	**16**	26	24	**37**	62	43	**69**	106
Durham Health Region	Days with Tmax > 25°C	Days	**53**	68	**76**	91	90	**99**	120	107	**127**	154
Ajax CSD	Days with Tmax > 25°C	Days	**59**	74	**82**	96	95	**105**	125	111	**131**	159
***Clarington CSD**	Days with Tmax > 25°C	Days	**51**	66	**75**	89	88	**98**	119	106	**127**	155
Durham Health Region	Days with Humidex > 30	Days	**37**	52	**57**	69	76	**85**	96	92	**115**	134
Ajax CSD	Days with Humidex > 30	Days	**39**	55	**61**	72	78	**87**	98	94	**114**	133
Brock CSD	Days with Humidex > 30	Days	**35**	50	**55**	67	74	**84**	94	91	**114**	133
Durham Health Region	Tropical Nights (Days with Tmin > 20°C)	Days	**3**	6	**9**	13	16	**24**	36	32	**55**	83
Ajax CSD	Tropical Nights (Days with Tmin > 20°C)	Days	**5**	10	**14**	19	24	**32**	45	42	**68**	95
Brock CSD	Tropical Nights (Days with Tmin > 20°C)	Days	**2**	4	**7**	11	13	**20**	32	28	**49**	76
Durham Health Region	Heat Wave Frequency	Events	**0.03**	0.01	**0.7**	2.7	0.9	**3**	6.1	3.7	**6.8**	9.8
Ajax CSD	Heat Wave Frequency	Events	**0.1**	0.1	**1.3**	3.7	1.5	**4.1**	7.5	4.5	**7.4**	10.4
Brock CSD	Heat Wave Frequency	Events	**0.0**	0	**0.5**	2.4	0.6	**2.6**	5.6	3.1	**6.6**	9.9
Durham Health Region	Heat Wave Total Duration	Days	**0**	0	**2**	8	2	**10**	25	13	**35**	66
Ajax CSD	Heat Wave Total Duration	Days	**0**	0	**4**	13	5	**15**	35	20	**46**	78
Brock CSD	Heat Wave Total Duration	Days	**0**	0	**1**	7	2	**9**	22	11	**30**	61
Durham Health Region	Cooling Degree Days	Degree Days	**205**	292	**351**	441	458	**556**	775	648	**911**	1265
Ajax CSD	Cooling Degree Days	Degree Days	**259**	365	**422**	519	537	**641**	874	736	**1016**	1386
***Scugog CSD**	Cooling Degree Days	Degree Days	**188**	272	**329**	417	433	**530**	743	620	**879**	1225
Durham Health Region	Coldest Day	˚C	**-26.2**	-24.0	**-22.7**	-19.6	-20.8	**-18.1**	-13.8	-16.4	**-13.4**	-7.9
Ajax CSD	Coldest Day	˚C	**-23.6**	-21.1	**-20.0**	-17.1	-18.0	**-15.5**	-11.2	-14.0	**-10.7**	-5.4
Brock CSD	Coldest Day	˚C	**-28.5**	-26.4	**-24.9**	-21.9	-23.0	**-20.2**	-15.7	-18.4	**-15.5**	-9.8

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP5-8.5								
				2011-2040			2041-2070			2071-2100		
				Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	Days with Tmin < -15°C	Days	**25**	7	**14**	17	1	**5**	9	0	**1**	3
Ajax CSD	Days with Tmin < -15°C	Days	**17**	3	**8**	10	0	**2**	4	0	**0**	1
Brock CSD	Days with Tmin < -15°C	Days	**31**	10	**19**	23	2	**8**	13	0	**2**	5
Durham Health Region	Heating Degree Days	Degree Days	**4205**	3371	**3651**	3814	2735	**3102**	3334	2120	**2535**	2773
Ajax CSD	Heating Degree Days	Degree Days	**3853**	3098	**3358**	3526	2487	**2841**	3062	1902	**2290**	2516
Brock CSD	Heating Degree Days	Degree Days	**4369**	3519	**3811**	3972	2871	**3247**	3484	2237	**2670**	2905
Durham Health Region	Frost Days	Days	**148**	118	**127**	134	82	**105**	115	40	**76**	89
Ajax CSD	Frost Days	Days	**132**	98	**110**	118	58	**85**	98	22	**59**	73
Brock CSD	Frost Days	Days	**157**	129	**135**	142	95	**114**	123	50	**84**	99
Durham Health Region	Ice days (or Icing Days)	Days	**62**	36	**45**	53	17	**30**	385	4	**15**	20
Ajax CSD	Ice days (or Icing Days)	Days	**53**	26	**36**	44	12	**21**	29	2	**8**	13
Brock CSD	Ice days (or Icing Days)	Days	**69**	42	**51**	58	21	**35**	43	6	**18**	26
Durham Health Region	Freeze-Thaw Cycles	Days	**71**	61	**66**	71	46	**59**	65	25	**50**	57
Ajax CSD	Freeze-Thaw Cycles	Days	**65**	54	**59**	62	31	**50**	56	12	**35**	47
Brock CSD	Freeze-Thaw Cycles	Days	**73**	65	**69**	74	52	**62**	70	37	**54**	64
Durham Health Region	Last Spring Frost	Date	**May 5**	Apr 22	**Apr 28**	May 4	Apr 6	**Apr 19**	Apr 23	Mar 21	**Apr 4**	Apr 13
Ajax CSD	Last Spring Frost	Date	**Apr 27**	Apr 13	**Apr 21**	Apr 24	Mar 29	**Apr 9**	Apr 16	Mar 5	**Mar 26**	Apr5
Brock CSD	Last Spring Frost	Date	**May 9**	Apr 26	**May 2**	May 11	Apr 11	**Apr 24**	Apr 29	Mar 26	**Apr 10**	Apr 18
Durham Health Region	First Fall Frost	Date	**Oct 7**	Oct 11	**Oct 17**	Oct 21	Oct 22	**Oct 27**	Nov 10	Nov 2	**Nov 11**	Nov 27
Ajax CSD	First Fall Frost	Date	**Oct 16**	Oct 19	**Oct 25**	Oct 31	Oct 29	**Nov 5**	Nov 17	Nov 10	**Nov 19**	Dec 2
Brock CSD	First Fall Frost	Date	**Oct 2**	Oct 6	**Oct 13**	Oct 17	Oct 16	**Oct 23**	Nov 6	Oct 29	**Nov 7**	Nov 23
Durham Health Region	Growing Season/ Frost Free Season	Days	**153**	158	**171**	181	182	**190**	213	205	**220**	253
Ajax CSD	Growing Season/ Frost Free Season	Days	**171**	178	**187**	199	198	**210**	232	222	**239**	290
Brock CSD	Growing Season/ Frost Free Season	Days	**144**	149	**162**	173	171	**183**	203	194	**209**	241
Durham Health Region	Growing Degree-Days Above 5°C	Degree Days	**2070**	2297	**2419**	2624	2714	**2868**	3328	3050	**3591**	4152
Ajax CSD	Growing Degree-Days Above 5°C	Degree Days	**2232**	2469	**2594**	2804	2900	**3065**	3436	3254	**3803**	4386
Brock CSD	Growing Degree-Days Above 5°C	Degree Days	**2015**	2239	**2358**	2561	2648	**2793**	3155	2977	**3516**	4065
Durham Health Region	Cumulative Degree-Days Above 0°C	Degree Days	**3250**	3548	**3695**	3909	4044	**4265**	4682	4550	**5601**	5740
Ajax CSD	Cumulative Degree-Days Above 0°C	Degree Days	**3468**	3780	**3942**	4157	4296	**4538**	4975	4844	**5341**	6060
Brock CSD	Cumulative Degree-Days Above 0°C	Degree Days	**3169**	3460	**3592**	3811	3945	**4153**	4562	4421	**4942**	5605

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP5-8.5								
				2011-2040			2041-2070			2071-2100		
				Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	Total Precipitation - Annual	mm	**907**	917	**970**	997	970	**1000**	1040	986	**1055**	1112
Ajax CSD	Total Precipitation - Annual	mm	**882**	892	**942**	968	941	**971**	1013	960	**1031**	1085
Brock CSD	Total Precipitation - Annual	mm	**921**	932	**984**	1016	986	**1013**	1056	999	**1069**	1134
Durham Health Region	Total Precipitation - Spring	mm	**222**	223	**237**	252	232	**256**	275	249	**267**	299
Ajax CSD	Total Precipitation - Spring	mm	**220**	222	**235**	249	231	**254**	273	246	**275**	295
Brock CSD	Total Precipitation - Spring	mm	**219**	218	**234**	249	228	**253**	275	245	**271**	297
Durham Health Region	Total Precipitation - Summer	mm	**229**	212	**239**	257	207	**236**	252	190	**231**	262
Ajax CSD	Total Precipitation - Summer	mm	**220**	204	**229**	248	198	**227**	243	182	**221**	252
Brock CSD	Total Precipitation - Summer	mm	**233**	215	**244**	259	211	**238**	256	193	**237**	266
Durham Health Region	Total Precipitation - Fall	mm	**244**	236	**254**	278	246	**267**	277	249	**274**	302
Ajax CSD	Total Precipitation - Fall	mm	**234**	226	**242**	268	235	**255**	267	238	**263**	290
Brock CSD	Total Precipitation - Fall	mm	**252**	241	**261**	284	253	**272**	284	256	**279**	309
Durham Health Region	Total Precipitation - Winter	mm	**214**	234	**234**	250	237	**248**	268	260	**274**	310
Ajax CSD	Total Precipitation - Winter	mm	**208**	212	**227**	244	230	**242**	261	254	**268**	303
Brock CSD	Total Precipitation - Winter	mm	**222**	225	**243**	260	246	**259**	278	270	**285**	322
Durham Health Region	Maximum Number of Consecutive Dry Days	Days	**14**	13	**14**	15	13	**14**	15	13	**15**	17
Ajax CSD	Maximum Number of Consecutive Dry Days	Days	**15**	14	**15**	16	14	**15**	16	14	**16**	18
Brock CSD	Maximum Number of Consecutive Dry Days	Days	**13**	13	**14**	15	13	**14**	14	13	**15**	16
Durham Health Region	Maximum 1-Day Total Precipitation	mm	**38**	39	**41**	44	40	**44**	47	43	**47**	51
Ajax CSD	Maximum 1-Day Total Precipitation	mm	**38**	39	**41**	45	40	**44**	47	45	**47**	52
Brock CSD	Maximum 1-Day Total Precipitation	mm	**37**	38	**40**	44	39	**42**	46	41	**47**	50
Durham Health Region	Wet Days >= 10mm	Days	**26**	26	**29**	30	29	**31**	33	30	**33**	36
Ajax CSD	Wet Days >= 10mm	Days	**27**	26	**29**	30	29	**31**	33	30	**34**	36
Brock CSD	Wet Days >= 10mm	Days	**25**	26	**28**	30	28	**30**	32	30	**33**	35
Durham Health Region	Wet Days >= 20mm	Days	**6**	6	**7**	8	7	**8**	9	9	**9**	11
Ajax CSD	Wet Days >= 20mm	Days	**6**	6	**7**	8	7	**8**	9	9	**10**	12
Brock CSD	Wet Days >= 20mm	Days	**5**	6	**6**	7	6	**7**	9	8	**9**	10

Appendix D: 2025 Summary of Climate Variables - SSP2-4.5

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP2-4.5: 2011-2040			RESULTS under SSP2-4.5: 2041-2070			RESULTS under SSP2-4.5: 2071-2100		
				Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	Mean Temperature - Annual	°C	**7.1**	8.5	**8.8**	9.9	9.4	**10.1**	11.3	10.1	**11.0**	12.5
Ajax CSD	Mean Temperature - Annual	°C	**8.0**	9.4	**9.8**	10.9	10.3	**11.1**	12.2	11.1	**12.0**	13.5
Brock CSD	Mean Temperature - Annual	°C	**6.6**	8.0	**8.3**	9.4	8.9	**9.7**	10.8	9.7	**10.5**	12.1
Durham Health Region	Mean Temperature - Spring	°C	**5.7**	7.0	**7.4**	8.0	7.9	**8.6**	9.4	8.6	**9.3**	10.6
Ajax CSD	Mean Temperature - Spring	°C	**6.6**	7.9	**8.2**	8.8	8.7	**9.4**	10.2	9.4	**10.1**	11.5
Brock CSD	Mean Temperature - Spring	°C	**5.4**	6.6	**7.0**	7.6	7.6	**8.2**	9.0	8.2	**8.9**	10.3
Durham Health Region	Mean Temperature - Summer	°C	**19.0**	20.1	**20.6**	21.7	21.1	**21.9**	23.1	21.6	**22.9**	24.5
Ajax CSD	Mean Temperature - Summer	°C	**19.8**	20.9	**21.4**	22.4	21.9	**22.7**	23.9	22.4	**23.7**	25.2
Brock CSD	Mean Temperature - Summer	°C	**18.8**	19.9	**20.4**	21.4	20.8	**21.6**	22.9	21.4	**22.7**	24.3
Durham Health Region	Mean Temperature - Fall	°C	**8.9**	10.1	**10.6**	12.0	11.0	**11.7**	13.2	11.6	**12.5**	14.2
Ajax CSD	Mean Temperature - Fall	°C	**9.9**	11.1	**11.5**	12.9	11.9	**12.6**	14.1	12.5	**13.2**	15.0
Brock CSD	Mean Temperature - Fall	°C	**8.5**	9.7	**10.2**	11.6	10.6	**11.2**	12.8	11.2	**12.1**	13.8
Durham Health Region	Mean Temperature - Winter	°C	**-5.8**	-4.3	**-3.7**	-2.5	-3.0	**-2.4**	-0.6	-2.0	**-1.1**	1.2
Ajax CSD	Mean Temperature - Winter	°C	**-4.4**	-3.0	**-2.4**	-1.1	-1.6	**-1.0**	0.7	-0.6	**0.3**	2.5
Brock CSD	Mean Temperature - Winter	°C	**-6.7**	-5.2	**-4.6**	-3.3	-3.9	**-3.3**	-1.5	-2.8	**-1.9**	0.3
Durham Health Region	Minimum Temperature - Annual	°C	**2.2**	3.6	**3.9**	4.8	4.6	**5.2**	6.4	4.9	**5.6**	7.0
Ajax CSD	Minimum Temperature - Annual	°C	**3.4**	4.8	**5.1**	6.0	5.8	**6.4**	7.6	6.6	**7.4**	9.1
Brock CSD	Minimum Temperature - Annual	°C	**1.4**	2.9	**3.2**	4.1	3.9	**4.5**	5.7	4.8	**5.5**	7.3
Durham Health Region	Minimum Temperature - Spring	°C	**0.6**	1.8	**2.3**	2.9	2.8	**3.4**	4.0	3.6	**4.0**	5.6
Ajax CSD	Minimum Temperature - Spring	°C	**1.7**	2.9	**3.4**	4.0	3.9	**4.5**	5.1	4.6	**5.1**	6.6
Brock CSD	Minimum Temperature - Spring	°C	**-0.1**	1.2	**1.6**	2.3	2.1	**2.8**	3.4	2.9	**3.4**	5.0
Durham Health Region	Minimum Temperature - Summer	°C	**13.4**	14.5	**14.9**	15.5	15.5	**16.0**	17.1	16.0	**17.1**	18.3
Ajax CSD	Minimum Temperature - Summer	°C	**14.4**	15.5	**15.9**	16.5	16.4	**17.0**	18.1	16.9	**18.1**	19.2
Brock CSD	Minimum Temperature - Summer	°C	**12.9**	14.0	**14.4**	15.0	14.9	**15.5**	16.6	15.4	**16.5**	17.8
Durham Health Region	Minimum Temperature - Fall	°C	**4.3**	5.4	**5.9**	7.2	6.3	**7.1**	8.4	6.8	**7.8**	9.6
Ajax CSD	Minimum Temperature - Fall	°C	**5.5**	6.6	**7.0**	8.3	7.5	**8.2**	9.5	7.9	**8.9**	10.7
Brock CSD	Minimum Temperature - Fall	°C	**3.8**	4.9	**5.3**	6.6	5.8	**6.5**	7.8	6.2	**7.2**	9.1
Durham Health Region	Minimum Temperature - Winter	°C	**-9.9**	-8.2	**-7.7**	-5.9	-6.8	**-5.9**	-4.0	-5.9	**-5.0**	-2.5
Ajax CSD	Minimum Temperature - Winter	°C	**-8.3**	-6.6	**-6.0**	-4.3	-5.1	**-4.3**	-2.4	-4.0	**-3.0**	-0.6
Brock CSD	Minimum Temperature - Winter	°C	**-11.1**	-9.4	**-8.8**	-7.0	-7.9	**-7.0**	-4.9	-7.4	**-6.4**	-4.0
Durham Health Region	Maximum Temperature - Annual	°C	**11.9**	13.3	**13.6**	14.7	14.1	**15.1**	16.2	14.8	**15.8**	17.4
Ajax CSD	Maximum Temperature - Annual	°C	**12.7**	14.0	**14.4**	15.4	14.8	**15.8**	16.9	15.5	**16.5**	18.3
Brock CSD	Maximum Temperature - Annual	°C	**11.7**	13.0	**13.4**	14.4	13.8	**14.8**	16.0	14.6	**15.5**	17.3
Durham Health Region	Maximum Temperature - Spring	°C	**10.8**	12.2	**12.6**	13.1	13.0	**14.0**	14.5	13.5	**14.5**	15.9
Ajax CSD	Maximum Temperature - Spring	°C	**11.4**	12.8	**13.1**	13.7	13.3	**14.2**	14.7	14.1	**15.1**	16.5
Brock CSD	Maximum Temperature - Spring	°C	**10.8**	12.1	**12.5**	13.0	12.9	**14.0**	14.5	13.4	**14.5**	15.9
Durham Health Region	Maximum Temperature - Summer	°C	**24.7**	25.7	**26.4**	27.5	26.8	**27.7**	29.3	27.3	**28.7**	30.8
Ajax CSD	Maximum Temperature - Summer	°C	**25.2**	26.3	**26.9**	28.0	27.3	**28.2**	29.9	27.9	**29.3**	31.4
Brock CSD	Maximum Temperature - Summer	°C	**24.7**	25.8	**26.4**	27.5	26.7	**27.7**	29.4	27.3	**28.7**	30.9

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP2-4.5								
				2011-2040			2041-2070			2071-2100		
				Low	Median	High	Low	Median	High	Low	Median	High
Durham Health Region	Minimum Temperature - Fall	°C	**4.3**	5.4	**5.9**	7.2	6.3	**7.1**	8.4	6.8	**7.8**	9.6
Ajax CSD	Minimum Temperature - Fall	°C	**5.5**	6.6	**7.0**	8.3	7.5	**8.2**	9.5	7.9	**8.9**	10.7
Brock CSD	Minimum Temperature - Fall	°C	**3.8**	4.9	**5.3**	6.6	5.8	**6.5**	7.8	6.2	**7.2**	9.1
Durham Health Region	Minimum Temperature - Winter	°C	**-9.9**	-8.2	**-7.7**	-5.9	-6.8	**-5.9**	-4.0	-5.9	**-5.0**	-2.5
Ajax CSD	Minimum Temperature - Winter	°C	**-8.3**	-6.6	**-6.0**	-4.3	-5.1	**-4.3**	-2.4	-4.0	**-3.0**	-0.6
Brock CSD	Minimum Temperature - Winter	°C	**-11.1**	-9.4	**-8.8**	-7.0	-7.9	**-7.0**	-4.9	-7.4	**-6.4**	-4.0
Durham Health Region	Maximum Temperature - Annual	°C	**11.9**	13.3	**13.6**	14.7	14.1	**15.1**	16.2	14.8	**15.8**	17.4
Ajax CSD	Maximum Temperature - Annual	°C	**12.7**	14.0	**14.4**	15.4	14.8	**15.8**	16.9	15.5	**16.5**	18.3
Brock CSD	Maximum Temperature - Annual	°C	**11.7**	13.0	**13.4**	14.4	13.8	**14.8**	16.0	14.6	**15.5**	17.3
Durham Health Region	Maximum Temperature - Spring	°C	**10.8**	12.2	**12.6**	13.1	13.0	**14.0**	14.5	13.5	**14.5**	15.9
Ajax CSD	Maximum Temperature - Spring	°C	**11.4**	12.8	**13.1**	13.7	13.3	**14.2**	14.7	14.1	**15.1**	16.5
Brock CSD	Maximum Temperature - Spring	°C	**10.8**	12.1	**12.5**	13.0	12.9	**14.0**	14.5	13.4	**14.5**	15.9
Durham Health Region	Maximum Temperature - Summer	°C	**24.7**	25.7	**26.4**	27.5	26.8	**27.7**	29.3	27.3	**28.7**	30.8
Ajax CSD	Maximum Temperature - Summer	°C	**25.2**	26.3	**26.9**	28.0	27.3	**28.2**	29.9	27.9	**29.3**	31.4
Brock CSD	Maximum Temperature - Summer	°C	**24.7**	25.8	**26.4**	27.5	26.7	**27.7**	29.4	27.3	**28.7**	30.9
Durham Health Region	Maximum Temperature - Fall	°C	**13.5**	14.7	**15.2**	16.7	15.5	**16.4**	18.1	16.2	**17.2**	19.0
Ajax CSD	Maximum Temperature - Fall	°C	**14.3**	15.5	**16.0**	17.5	16.3	**17.2**	18.9	16.6	**17.5**	19.4
Brock CSD	Maximum Temperature - Fall	°C	**13.2**	14.4	**15.0**	16.4	15.3	**16.1**	17.8	15.9	**16.9**	18.7
Durham Health Region	Maximum Temperature - Winter	°C	**-1.8**	-0.4	**0.2**	1.0	0.7	**1.3**	2.8	1.5	**2.6**	4.1
Ajax CSD	Maximum Temperature - Winter	°C	**-0.5**	0.7	**1.3**	2.1	1.8	**2.4**	3.8	2.6	**3.7**	5.2
Brock CSD	Maximum Temperature - Winter	°C	**-2.3**	-1.1	**-0.4**	0.4	0.1	**0.6**	2.1	0.9	**1.9**	3.5
Durham Health Region	Hottest Day	°C	**32.5**	33.4	**34.3**	35.8	34.4	**35.6**	37.4	35.1	**36.4**	39.4
Ajax CSD	Hottest Day	°C	**33.2**	34.0	**34.9**	36.4	35.1	**36.3**	38.1	35.7	**37.0**	40.1
*Clarington CSD	Hottest Day	°C	**32.2**	33.1	**34.0**	35.5	34.2	**35.4**	37.1	34.8	**36.1**	39.1
Durham Health Region	Days with Tmax > 30°C	Days	**7**	14	**17**	25	20	**29**	47	26	**41**	63
Ajax CSD	Days with Tmax > 30°C	Days	**10**	17	**21**	30	24	**34**	52	31	**46**	69
*Clarington CSD	Days with Tmax > 30°C	Days	**6**	12	**15**	23	17	**27**	45	24	**38**	61
Durham Health Region	Days with Tmax > 25°C	Days	**53**	68	**74**	89	80	**92**	107	88	**103**	122
Ajax CSD	Days with Tmax > 25°C	Days	**59**	74	**81**	95	86	**98**	112	94	**109**	126
*Clarington CSD	Days with Tmax > 25°C	Days	**51**	66	**73**	88	79	**91**	106	87	**102**	121
Durham Health Region	Days with Humidex > 30	Days	**37**	52	**57**	64	63	**73**	85	74	**86**	102
Ajax CSD	Days with Humidex > 30	Days	**39**	55	**60**	68	66	**76**	87	76	**88**	103
Brock CSD	Days with Humidex > 30	Days	**35**	50	**55**	62	62	**71**	84	72	**84**	101
Durham Health Region	Tropical Nights (Days with Tmin > 20°C)	Days	**3**	7	**8**	13	12	**16**	23	14	**18**	26
Ajax CSD	Tropical Nights (Days with Tmin > 20°C)	Days	**5**	11	**13**	19	18	**23**	32	20	**26**	35
Brock CSD	Tropical Nights (Days with Tmin > 20°C)	Days	**2**	5	**6**	10	10	**14**	19	13	**20**	30

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP2-4.5								
				2011-2040			2041-2070			2071-2100		
				Low	Median	High	Low	Median	High	Low	Median	High
Ajax CSD	Heat Wave Frequency	Events	0.1	0.1	1.3	3.5	0.8	2.9	5.8	1.6	4.2	7.6
Brock CSD	Heat Wave Frequency	Events	0.0	0	0.4	2	0.2	1.7	3.9	0.5	2.7	5.7
Durham Health Region	Heat Wave Total Duration	Days	0	0	2	7	1	6	16	2	10	26
Ajax CSD	Heat Wave Total Duration	Days	0	0	4	11	2	10	22	5	15	34
Brock CSD	Heat Wave Total Duration	Days	0	0	1	6	1	5	14	1	8	22
Durham Health Region	Cooling Degree Days	Degree Days	205	293	336	432	385	461	612	444	572	738
Ajax CSD	Cooling Degree Days	Degree Days	259	359	404	511	458	541	701	523	658	829
***Scugog CSD**	Cooling Degree Days	Degree Days	188	272	314	407	362	436	584	419	544	709
Durham Health Region	Coldest Day	˚C	-26.2	-24.3	-23.0	-19.5	-22.1	-19.9	-16.2	-20.2	-18.4	-12.5
Ajax CSD	Coldest Day	˚C	-23.6	-21.6	-20.3	-16.7	-19.5	-17.1	-13.7	-18.2	-16.2	-10.9
Brock CSD	Coldest Day	˚C	-28.5	-26.7	-25.4	-21.8	-24.3	-22.2	-18.3	-22.5	-20.7	-14.7
Durham Health Region	Days with Tmin < -15°C	Days	25	8	15	18	3	9	12	2	7	11
Ajax CSD	Days with Tmin < -15°C	Days	17	3	8	11	1	4	6	0	2	3
Brock CSD	Days with Tmin < -15°C	Days	31	13	20	23	5	13	17	1	8	12
Durham Health Region	Heating Degree Days	Degree Days	4205	3386	3691	3819	3070	3368	3542	2687	3155	3377
Ajax CSD	Heating Degree Days	Degree Days	3853	3114	3398	3528	2813	3091	3261	2665	3014	3190
Brock CSD	Heating Degree Days	Degree Days	4369	3533	3853	3978	3207	3518	3697	2821	3301	3521
Durham Health Region	Frost Days	Days	148	119	130	134	100	114	123	95	110	120
Ajax CSD	Frost Days	Days	132	98	113	118	76	97	106	71	93	103
Brock CSD	Frost Days	Days	157	128	138	142	112	123	131	93	114	122
Durham Health Region	Ice days (or Icing Days)	Days	62	57	59	62	26	39	45	14	30	41
Ajax CSD	Ice days (or Icing Days)	Days	53	31	38	43	19	31	35	11	24	31
Brock CSD	Ice days (or Icing Days)	Days	69	45	53	59	31	44	51	18	35	47
Durham Health Region	Freeze-Thaw Cycles	Days	71	61	67	71	52	63	68	47	57	67
Ajax CSD	Freeze-Thaw Cycles	Days	65	54	60	65	43	54	60	34	50	57
Brock CSD	Freeze-Thaw Cycles	Days	73	64	69	73	56	67	72	54	63	70
Durham Health Region	Last Spring Frost	Date	May 5	Apr 19	Apr 29	May 4	Apr 12	Apr 23	Apr 28	Apr 7	Apr 21	Apr 24
Ajax CSD	Last Spring Frost	Date	Apr 27	Apr 10	Apr 21	Apr 25	Apr 3	Apr 15	Apr 20	Mar 26	Apr 9	Apr 16
Brock CSD	Last Spring Frost	Date	May 9	Apr 24	May 4	May 9	Apr 17	Apr 27	May 4	Apr 9	Apr 24	Apr 30
Durham Health Region	First Fall Frost	Date	Oct 7	Oct 10	Oct 16	Oct 26	Oct 18	Oct 23	Nov 2	Oct 21	Oct 29	Nov 13
Ajax CSD	First Fall Frost	Date	Oct 16	Oct 21	Oct 25	Nov 3	Oct 26	Nov 1	Nov 12	Oct 28	Nov 7	Nov 24
Brock CSD	First Fall Frost	Date	Oct 2	Oct 5	Oct 12	Oct 22	Oct 13	Oct 19	Oct 29	Oct 16	Oct 25	Nov 9
Durham Health Region	Growing Season/ Frost Free Season	Days	153	157	170	185	172	183	199	177	193	218
Ajax CSD	Growing Season/ Frost Free Season	Days	171	178	184	202	189	202	218	197	212	236
Brock CSD	Growing Season/ Frost Free Season	Days	144	146	160	177	160	175	189	167	184	209

Spatial Scale	Variable	Unit	1971-2000 Baseline	RESULTS under SSP2-4.5 2011-2040 Low	2011-2040 Median	2011-2040 High	2041-2070 Low	2041-2070 Median	2041-2070 High	2071-2100 Low	2071-2100 Median	2071-2100 High
Durham Health Region	Growing Degree-Days Above 5°C	Degree Days	**2070**	2328	**2399**	2640	2510	**2694**	2930	2666	**2923**	3237
Ajax CSD	Growing Degree-Days Above 5°C	Degree Days	**2232**	2502	**2575**	2819	2693	**2892**	3120	2856	**3127**	3446
Brock CSD	Growing Degree-Days Above 5°C	Degree Days	**2015**	2268	**2341**	2578	2449	**2621**	2863	2601	**2845**	3166
Durham Health Region	Cumulative Degree-Days Above 0°C	Degree Days	**3250**	3583	**3682**	3917	3776	**3938**	4126	4020	**4288**	4709
Ajax CSD	Cumulative Degree-Days Above 0°C	Degree Days	**3468**	3821	**3922**	4161	4065	**4308**	4548	4132	**4392**	4703
Brock CSD	Cumulative Degree-Days Above 0°C	Degree Days	**3169**	3491	**3585**	3821	3717	**3943**	4173	3856	**4081**	4484
Durham Health Region	Total Precipitation - Annual	mm	**907**	924	**957**	992	950	**999**	1032	969	**1006**	1053
Ajax CSD	Total Precipitation - Annual	mm	**882**	899	**931**	963	922	**972**	1001	951	**975**	1011
Brock CSD	Total Precipitation - Annual	mm	**921**	937	**973**	1008	966	**992**	1038	986	**1028**	1072
Durham Health Region	Total Precipitation - Spring	mm	**222**	224	**238**	252	231	**252**	262	242	**254**	277
Ajax CSD	Total Precipitation - Spring	mm	**220**	222	**236**	250	229	**248**	261	240	**251**	274
Brock CSD	Total Precipitation - Spring	mm	**219**	221	**237**	247	228	**249**	257	238	**251**	272
Durham Health Region	Total Precipitation - Summer	mm	**229**	218	**235**	250	211	**239**	254	210	**241**	263
Ajax CSD	Total Precipitation - Summer	mm	**220**	209	**226**	241	203	**230**	244	204	**229**	251
Brock CSD	Total Precipitation - Summer	mm	**233**	221	**240**	255	216	**244**	258	216	**241**	264
Durham Health Region	Total Precipitation - Fall	mm	**244**	237	**255**	275	250	**263**	287	241	**265**	279
Ajax CSD	Total Precipitation - Fall	mm	**234**	227	**243**	262	240	**252**	274	232	**255**	268
Brock CSD	Total Precipitation - Fall	mm	**252**	243	**261**	282	257	**268**	297	249	**273**	289
Durham Health Region	Total Precipitation - Winter	mm	**214**	218	**232**	244	227	**245**	257	232	**257**	277
Ajax CSD	Total Precipitation - Winter	mm	**208**	212	**227**	237	222	**240**	250	227	**248**	261
Brock CSD	Total Precipitation - Winter	mm	**222**	227	**241**	255	237	**253**	266	241	**266**	287
Durham Health Region	Maximum Number of Consecutive Dry Days	Days	**14**	13	**14**	15	13	**14**	16	13	**15**	16
Ajax CSD	Maximum Number of Consecutive Dry Days	Days	**15**	13	**15**	16	14	**15**	17	14	**15**	17
Brock CSD	Maximum Number of Consecutive Dry Days	Days	**13**	12	**14**	14	12	**13**	15	13	**14**	15
Durham Health Region	Maximum 1-Day Total Precipitation	mm	**38**	38	**41**	43	40	**43**	46	40	**44**	47
Ajax CSD	Maximum 1-Day Total Precipitation	mm	**38**	39	**40**	43	40	**44**	46	41	**44**	47
Brock CSD	Maximum 1-Day Total Precipitation	mm	**37**	38	**40**	43	39	**42**	45	40	**43**	46
Durham Health Region	Wet Days >= 10mm	Days	**26**	27	**29**	30	28	**31**	32	29	**31**	33
Ajax CSD	Wet Days >= 10mm	Days	**27**	27	**29**	30	28	**31**	32	29	**31**	33
Brock CSD	Wet Days >= 10mm	Days	**25**	26	**28**	30	27	**30**	31	28	**30**	33
Durham Health Region	Wet Days >= 20mm	Days	**6**	6	**7**	8	7	**8**	9	7	**8**	9
Ajax CSD	Wet Days >= 20mm	Days	**6**	6	**7**	8	7	**8**	9	8	**7**	10
Brock CSD	Wet Days >= 20mm	Days	**5**	6	**6**	7	6	**7**	8	7	**7**	8

Appendix E: 2020 Summary of Climate Variables - RCP 8.5

(2020 Guide to Conducting a Climate Change Analysis at the Local Scale: Lessons Learned from Durham Region)

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Level
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Mean Temperature (˚C)												
Mean Annual Temperature	Average annual air temperature over a time period.	**7.1**	*6.5*	**8.6**	*11.4*	8.3	**10.1**	13.0	*10.2*	**12.08**	*15.3*	high evidence high agreement
Mean Winter Temperature	Average winter (D-J-F) air temperature over a time period.	**-3.0**	*-4.4*	**-1.4**	*1.8*	*-3.1*	**-0.0**	*3.0*	*-1.4*	**1.89**	*4.7*	
Mean Spring Temperature	Average spring (M-A-M) air temperature over a time period.	**3.7**	*3.5*	**4.9**	*6.4*	*4.9*	**6.2**	*7.9*	*6.1*	**7.86**	*10.1*	
Mean Summer Temperature	Average summer (J-J-A) air temperature over a time period.	**17.1**	*15.9*	**18.7**	*21.7*	*17.2*	**20.3**	*23.6*	*18.6*	**22.32**	*26.2*	
Mean Fall Temperature	Average fall (S-O-N) air temperature over a time period.	**10.1**	*9.0*	**11.6**	*14.8*	*10.8*	**13.1**	*16.4*	*13.1*	**15.02**	*18.9*	
Maximum Temperature (˚C)												
Annual Mean Maximum Daily Air Temperature	Average maximum annual air temperature over a time period.	**11.6**	*10.8*	**12.9**	*16.1*	*12.5*	**14.5**	*17.6*	*14.1*	**16.4**	*19.9*	high evidence high agreement
Winter Mean Maximum Daily Air Temperature	Average maximum winter (D-J-F) air temperature over a time period.	**2.1**	*1.2*	**3.4**	*6.1*	*0.9*	**4.4**	*7.1*	*3.5*	**6.3**	*8.8*	
Spring Mean Maximum Daily Air Temperature	Average spring (M-A-M) air temperature over a time period.	**8.3**	*7.8*	**9.5**	*11.2*	*9.1*	**10.6**	*12.5*	*10.5*	**12.3**	*14.6*	
Summer Mean Maximum Daily Air Temperature	Average maximum summer (J-J-A) air temperature over a time period.	**21.4**	*19.5*	**23.0**	*25.8*	*20.9*	**24.4**	*27.7*	*22.2*	**26.6**	*30.2*	
Fall Mean Maximum Daily Air Temperature	Average maximum fall (S-O-N) air temperature over a time period.	**14.5**	*13.6*	**16.0**	*19.1*	*14.1*	**17.2**	*20.6*	*16.6*	**19.3**	*23.0*	
Minimum Temperature (˚C)												
Annual Mean Minimum Daily Air Temperature	Average minimum annual air temperature over a time period.	**2.5**	*1.8*	**4.1**	*6.7*	*3.7*	**5.7**	*8.4*	*5.9*	**7.9**	*10.8*	high evidence high agreement
Winter Mean Minimum Daily Air Temperature	Average minimum winter (D-J-F) air temperature over a time period.	**-8.0**	*-8.4*	**-5.8**	*-2.7*	*-7.1*	**-4.5**	*-0.7*	*-6.4*	**-2.6**	*0.5*	
Spring Mean Minimum Daily Air Temperature	Average minimum (M-A-M) air temperature over a time period.	**-1.0**	*-1.3*	**0.4**	*2.1*	*0.5*	**2.0**	*4.2*	*1.6*	**3.5**	*5.8*	

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Level
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Summer Mean Minimum Daily Air Temperature	Average minimum summer (J-J-A) air temperature over a time period.	**12.8**	*11.9*	**14.1**	*16.6*	*13.4*	**16.1**	*19.0*	*14.8*	**18.0**	*21.3*	high evidence high agreement
Fall Mean Minimum Daily Air Temperature	Average minimum fall (S-O-N) air temperature over a time period.	**5.7**	*4.8*	**7.4**	*10.7*	*6.2*	**8.9**	*11.3*	*8.6*	**10.7**	*14.8*	
Extreme Heat (days per year)												
Days Above 35˚C	Total number of days of the year with maximum temperatures above 35˚C.	**0.2**	*0.0*	**1.2**	*3.3*	*0.1*	**4.0**	*12.3*	*0.2*	**10.8**	*32.2*	high evidence high agreement
Days Above 30˚C	Total number of days of the year with maximum temperatures above 30˚C.	**7.6**	*1.4*	**15.9**	*38.9*	*4.7*	**27.4**	*63.0*	*10.6*	**46.9**	*97.1*	
Days Above 25˚C	Total number of days of the year with maximum temperatures above 25˚C.	**42.1**	*23.9*	**59.2**	*100.6*	*39.1*	**78.2**	*120.4*	*61.0*	**100.3**	*144.0*	
Tropical Nights	Total number of days of the year with minimum temperatures above 20˚C.	**100.6**	*92.1*	**117.0**	*147.8*	*109.0*	**132.0**	*161.5*	*121.8*	**148.1**	*181.4*	
Extreme Cold (days per year)												
Days Below -20˚C	Total number of days of the year with minimum temperatures below -20˚C.	**8.6**	*0.3*	**4.2**	*4.0*	*0.0*	**2.3**	*2.2*	*0.0*	**0.5**	*0.3*	high evidence high agreement
Days Below -15˚C	Total number of days of the year with minimum temperatures below -15˚C.	**22.7**	*2.0*	**13.1**	*19.8*	*0.7*	**7.9**	*14.3*	*0.0*	**2.6**	*4.7*	
Days Below -10˚C	Total number of days of the year with minimum temperatures below -10˚C.	**49.0**	*11.9*	**34.4**	*53.2*	*6.6*	**23.5**	*43.8*	*0.7*	**11.3**	*25.4*	
Days Below -5˚C	Total number of days of the year with minimum temperatures below -5˚C.	**89.0**	*43.4*	**71.6**	*98.8*	*31.1*	**57.0**	*84.1*	*12.4*	**37.0**	*62.0*	
Days Below 0˚C (Freezing Days)	Total number of days of the year with minimum temperatures below 0˚C.	**146.8**	*100.2*	**129.1**	*152.9*	*84.3*	**114.0**	*136.6*	*58.4*	**91.1**	*118.4*	
Total Precipitation (mm per time period)												
Total Average Annual Precipitation (mm)	Total amount of precipitation throughout the year falling on wet days (where precipitation is greater than 0.2 mm).	**952.4**	*944.3*	**1075.0**	*1194.5*	*948.6*	**1117.5**	*1242.4*	*1052.5*	**1231.6**	*1419.5*	high evidence medium agreement
Total Average Winter Precipitation (mm)	Total amount of precipitation throughout the winter (D-J-F) falling on wet days (where precipitation is greater than 0.2 mm).	**228.3**	*191.3*	**250.1**	*300.3*	*209.9*	**252.4**	*298.9*	*232.1*	**276.6**	*331.4*	

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Level
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Total Average Spring Precipitation (mm)	Total amount of precipitation throughout the spring (M-A-M) falling on wet days (where precipitation is greater than 0.2 mm).	**217.3**	*187.0*	**233.0**	*269.2*	*211.5*	**251.2**	*293.4*	*247.0*	**277.6**	*309.9*	high evidence medium agreement
Total Average Summer Precipitation (mm)	Total amount of precipitation throughout the summer (J-J-A) falling on wet days (where precipitation is greater than 0.2 mm).	**231.0**	*193.0*	**239.7**	*274.9*	*177.2*	**247.4**	*291.7*	*159.7*	**282.4**	*308.8*	
Total Average Fall Precipitation (mm)	Total amount of precipitation throughout the fall (S-O-N) falling on wet days (where precipitation is greater than 0.2 mm).	**275.8**	*253.5*	**285.5**	*320.8*	*249.5*	**297.2**	*340.9*	*272.8*	**311.9**	*346.4*	
Extreme Precipitation												
Max Precipitation in 1 day (mm)	Annual 1-day maximum precipitation accumulation.	**33.8**	*34.7*	**37.9**	*40.8*	*36.4*	**40.4**	*43.9*	*40.8*	**44.0**	*46.5*	high evidence medium agreement
Max Precipitation in 3 day (mm)	Annual 3-day maximum precipitation accumulation.	**54.9**	*53.8*	**58.0**	*62.2*	*55.4*	**61.8**	*68.0*	*61.6*	**67.7**	*73.9*	
Extreme Precipitation Days (days/year)	The annual average amount of days where precipitation exceeds 25 mm.	**3.2**	*3.1*	**4.1**	*4.9*	*3.8*	**5.0**	*6.0*	*5.0*	**6.6**	*8.3*	
Annual Simple Daily Intensity Index (SDII) (mm/day)	The average amount of precipitation which occurs per wet day (more than 0.2 mm/day) on average in a year.	**2.6**	*2.6*	**2.9**	*3.3*	*2.6*	**3.1**	*3.4*	*2.9*	**3.4**	*3.9*	
Winter SDII (mm/day)	The average amount of precipitation which occurs per wet day (more than 0.2 mm/day) on average in a year.	**2.5**	*2.1*	**2.7**	*3.3*	*2.3*	**2.8**	*3.3*	*2.5*	**3.0**	*3.6*	
Spring SDII (mm/day)	The average amount of precipitation which occurs per wet day (more than 0.2 mm/day) on average in a year.	**2.4**	*2.1*	**2.6**	*3.0*	*2.3*	**2.8**	*3.2*	*2.7*	**3.0**	*3.4*	
Summer SDII (mm/day)	The average amount of precipitation which occurs per wet day (more than 0.2 mm/day) on average in a year.	**2.5**	*2.1*	**2.6**	*3.0*	*1.9*	**2.7**	*3.2*	*1.8*	**3.1**	*3.4*	
Fall SDII (mm/day)	The average amount of precipitation which occurs per wet day (more than 0.2 mm/day) on average in a year.	**3.0**	*2.8*	**3.1**	*3.5*	*2.7*	**3.3**	*3.7*	*3.0*	**3.4**	*3.8*	
95th Percentile Precipitation (mm)	The percent of the total annual precipitation when precipitation is greater or equal to the 95th percentile.	**36.1**	*34.1*	**36.2**	*38.4*	*35.0*	**37.0**	*39.7*	*34.2*	**37.2**	*40.2*	
99th Percentile Precipitation (mm)	The percent of the total annual precipitation when precipitation is greater or equal to the 99th percentile.	**11.2**	*10.4*	**11.1**	*11.7*	*10.6*	**11.3**	*12.2*	*10.2*	**11.4**	*12.7*	

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Level
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Dry Days (days per year)												
Total Annual (days)	Total annual number of days where precipitation was less than 0.2 mm.	**145.3**	113.4	140.4	155.8	*116.6*	**144.2**	*167.4*	*113.8*	**138.7**	*155*	low evidence high agreement
Maximum Total Consecutive Dry Days (days)	The number of consecutive days where annual total number of days where precipitation was less than 0.2 mm.	**18.2**	13	16.7	21	*13.5*	**18.3**	*23.5*	*13.5*	**17.8**	*21*	
Growing Season												
Growing Season Start Date (day of year)	The first day after 5 days of consecutive minimum temperatures above 5˚C was reached.	**14-May**	21-Apr	**1-May**	16-May	15-Apr	**30-Apr**	12-May	*2-Apr*	**19-Apr**	*4-May*	high evidence high agreement
Growing Season End Date (day of year)	The first day after 5 days of consecutive maximum temperatures below 5˚C was reached.	**24-Oct**	24-Oct	**31-Oct**	15-Nov	30-Oct	**9-Nov**	23-Nov	*9-Nov*	**18-Nov**	*30-Nov*	
Growing Season Length (days/year)	Annual number of days after having 5 consecutive days above 5˚C and before having five consecutive days below 5˚C.	**162 days**	162 days	**183 days**	208 days	176 days	**193 days**	220 days	*192 days*	**213 days**	*239 days*	
Cold Snap Events (years/climate normal period)	The number of years where there was more than one growing season (i.e. indicating a cold snap period).	**5.8 years**	3 years	**6.9 years**	11 years	4 years	**7.2 years**	14 years	*3.5 years*	**9 years**	*14 years*	
Agricultural Variables												
Corn Heat Units (CHUs)	Number of CHUs, indicating ideal climates for corn to fully mature (very generally, at least 2200 CHUs are required to mature most varieties of corn).	**3194**	*2959*	**3591**	*4516*	*3554*	**4196**	*5036*	*4007*	**4798**	*5847*	high evidence high agreement
Growing Degree Days (days/year)	Number of degree days > 0˚C per year.	**3198**	*3026*	**3579**	*4365*	*3471*	**4022**	*4850*	*3845*	**4495**	*5650*	
Canola Growing Degree Days (days/year)	Number of degree days > 4˚C per year.	**2236**	*2067*	**2547**	*3223*	*2439*	**2943**	*3652*	*2757*	**3403**	*4349*	
Forage Crops Growing Degree Days (days/ year)	Number of degree days > 5˚C per year.	**2024**	*1868*	**2319**	*2969*	*2205*	**2702**	*3383*	*2377*	**3084**	*4055*	

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Level
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Corn and Bean Growing Degree Days (days/year)	Number of degree days > 10˚C per year.	**1119**	*985*	**1338**	*1855*	*1200*	**1659**	*2230*	*1359*	**1974**	*2271*	high evidence high agreement
Days at Risk of Presence of Pests (days/year)	Number of degree days > 15˚C per year.	**463**	*320*	**617**	*992*	*488*	**858**	*1271*	*623*	**1078**	*1734*	
Freeze-Thaw Cycles and Ice Potential												
Freeze-Thaw Cycles (cycles/year)	Number of freeze thaw cycles, where the minimum temperature is equal to or below -1°C and the maximum temperature is above 0°C.	**80**	*62*	**78**	*84*	*53*	**68**	*81*	*43*	**59**	*76*	low evidence high agreement
Ice Potential (days/year)	Number of days where minimum temperature is greater than -2˚C and maximum temperature is under 2˚C.	**29**	*14*	**24**	*32*	*12*	**22**	*29*	*4*	**15**	*23*	

Appendix F: 2020 Summary of Climate Variables - RCP 4.5

(2020 Guide to Conducting a Climate Change Analysis at the Local Scale: Lessons Learned from Durham Region)

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Levels
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Mean Temperature (˚C)												
Mean Annual Temperature	Average annual air temperature over a time period.	**7.1**	*7.6*	**9.7**	*11.3*	8.6	**10.9**	12.6	*8.8*	**11.3**	*13.2*	high evidence high agreement
Mean Winter Temperature	Average winter (D-J-F) air temperature over a time period.	**-3.0**	*-1.7*	**0.3**	*1.8*	*-0.1*	**1.8**	*3.3*	*0.2*	**2.0**	*3.7*	
Mean Spring Temperature	Average spring (M-A-M) air temperature over a time period.	**3.7**	*2.6*	**4.7**	*6.2*	*3.4*	**5.9**	*7.6*	*3.7*	**6.3**	*8.2*	
Mean Summer Temperature	Average summer (J-J-A) air temperature over a time period.	**17.1**	*16.4*	**18.5**	*20.8*	*17.6*	**19.8**	*22.2*	*17.8*	**20.3**	*22.8*	
Mean Fall Temperature	Average fall (S-O-N) air temperature over a time period.	**10.1**	*11.5*	**13.3**	*14.8*	*12.4*	**14.4**	*16.0*	*12.4*	**14.8**	*16.7*	
Maximum Temperature (˚C)												
Maximum Annual Temperature	Average maximum annual air temperature over a time period.	**11.6**	*13.1*	**14.3**	*17.0*	*14.0*	**15.5**	*18.3*	*14.2*	**15.9**	*18.9*	high evidence high agreement
Maximum Winter Temperature	Average maximum winter (D-J-F) air temperature over a time period.	**2.1**	*2.9*	**4.6**	*5.9*	*2.1*	**5.1**	*7.2*	*4.1*	**6.0**	*7.5*	
Maximum Spring Temperature	Average spring (M-A-M) air temperature over a time period.	**8.3**	*7.1*	**9.2**	*10.8*	*5.7*	**9.5**	*12.3*	*8.0*	**10.8**	*12.9*	
Maximum Summer Temperature	Average maximum summer (J-J-A) air temperature over a time period.	**21.4**	*20.7*	**22.8**	*25.0*	*19.7*	**23.2**	*26.4*	*22.0*	**24.6**	*27.0*	
Maximum Fall Temperature	Average maximum fall (S-O-N) air temperature over a time period.	**14.5**	*15.8*	**17.6**	*19.1*	*14.6*	**17.8**	*20.3*	*16.6*	**19.1**	*21.0*	
Minimum Temperature (˚C)												
Minimum Annual Temperature	Average minimum annual air temperature over a time period.	**2.5**	*2.6*	**5.1**	*6.3*	*3.7*	**6.4**	*7.8*	*3.9*	**6.8**	*8.3*	high evidence high agreement

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Levels
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Minimum Winter Temperature	Average minimum winter (D-J-F) air temperature over a time period.	**-8.0**	*-6.2*	**-4.0**	*-2.2*	*-2.0*	**-1.3**	*-0.5*	*-4.6*	**-2.1**	*-0.1*	high evidence high agreement
Minimum Spring Temperature	Average minimum (M-A-M) air temperature over a time period.	**-1.0**	*-1.7*	**0.4**	*2.0*	*1.6*	**2.6**	*3.4*	*-0.5*	**2.1**	*4.0*	
Minimum Summer Temperature	Average minimum summer (J-J-A) air temperature over a time period.	**12.8**	*12.2*	**14.3**	*16.5*	*15.2*	**16.6**	*18.1*	*13.6*	**16.0**	*18.6*	
Minimum Fall Temperature	Average minimum fall (S-O-N) air temperature over a time period.	**5.7**	*7.3*	**9.2**	*10.6*	*10.7*	**11.3**	*11.7*	*8.2*	**10.7**	*12.5*	
Extreme Heat (days per year)												
Days Above 35˚C	Total number of days of the year with maximum temperatures above 35˚C.	**0.2**	*0.5*	**2.7**	*5.1*	*1.1*	**5.3**	*9.5*	*1.7*	**7.9**	*13.8*	high evidence high agreement
Days Above 30˚C	Total number of days of the year with maximum temperatures above 30˚C.	**7.6**	*8.4*	**25.3**	*39.7*	*11.0*	**35.1**	*54.4*	*15.9*	**42.7**	*64.1*	
Days Above 25˚C	Total number of days of the year with maximum temperatures above 25˚C.	**42.1**	*47.0*	**77.2**	*98.9*	*48.6*	**85.2**	*111.9*	*60.1*	**95.2**	*121.0*	
Tropical Nights	Total number of days of the year with minimum temperatures above 20˚C.	**100.6**	*106.1*	**129.4**	*146.9*	*105.6*	**134.7**	*155.6*	*116.5*	**142.3**	*161.1*	
Extreme Cold (days per year)												
Days Below -20˚C	Total number of days of the year with minimum temperatures below -20˚C.	**8.6**	*0.1*	**1.3**	*3.0*	*0.0*	**0.3**	*0.7*	*0.0*	**0.3**	*0.7*	high evidence high agreement
Days Below -15˚C	Total number of days of the year with minimum temperatures below -15˚C.	**22.7**	*1.8*	**6.9**	*14.0*	*0.4*	**2.6**	*5.7*	*0.2*	**3.2**	*7.4*	
Days Below -10˚C	Total number of days of the year with minimum temperatures below -10˚C.	**49.0**	*11.7*	**23.9**	*40.8*	*4.2*	**13.2**	*25.3*	*3.3*	**13.7**	*28.1*	
Days Below -5˚C	Total number of days of the year with minimum temperatures below -5˚C.	**89.0**	*41.4*	**59.6**	*83.8*	*21.8*	**41.9**	*67.7*	*19.1*	**41.6**	*70.0*	
Days Below 0˚C (Freezing Days)	Total number of days of the year with minimum temperatures below 0˚C.	**146.8**	*101.4*	**118.7**	*141.9*	*79.4*	**100.5**	*127.9*	*74.0*	**99.1**	*131.2*	
Total Precipitation (mm per time period)												

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Levels
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Total Average Annual Precipitation (mm)	Total amount of precipitation throughout the year falling on wet days (where precipitation is greater than 0.2 mm).	**952.4**	861.7	**943.3**	943.3	*873.7*	**960.3**	*1039.5*	*870.4*	**1009.3**	*1133.8*	high evidence medium agreement
Total Average Winter Precipitation (mm)	Total amount of precipitation throughout the winter (D-J-F) falling on wet days (where precipitation is greater than 0.2 mm).	**228.3**	*212.6*	**235.3**	*260.1*	*252.1*	**265.5**	*277.9*	*216.9*	**234.1**	*251.8*	
Total Average Spring Precipitation (mm)	Total amount of precipitation throughout the spring (M-A-M) falling on wet days (where precipitation is greater than 0.2 mm).	**217.3**	*188.1*	**212.1**	*231.2*	*170.2*	**200.3**	*236.5*	*198.4*	**226.5**	*250.0*	
Total Average Summer Precipitation (mm)	Total amount of precipitation throughout the summer (J-J-A) falling on wet days (where precipitation is greater than 0.2 mm).	**231.0**	*160.6*	**181.8**	*208.6*	*187.1*	**199.1**	*211.0*	*167.7*	**191.3**	*213.8*	
Total Average Fall Precipitation (mm)	Total amount of precipitation throughout the fall (S-O-N) falling on wet days (where precipitation is greater than 0.2 mm).	**275.8**	*253.2*	**295.0**	*335.4*	*297.1*	**319.2**	*340.9*	*241.2*	**281.8**	*312.3*	
Extreme Precipitation												
Max Precipitation in 1 day (mm)	Annual 1-day maximum precipitation accumulation.	**33.8**	*34.8*	**35.0**	*35.4*	*44.9*	**60.7**	*74.4*	*37.6*	**38.1**	*38.5*	high evidence medium agreement
Max Precipitation in 3 day (mm)	Annual 3-day maximum precipitation accumulation.	**54.9**	*54.6*	**55.2**	*56.2*	*54.8*	**57.4**	*60.3*	*55.3*	**58.0**	*60.5*	
Extreme Precipitation Days (days/year)	The annual average amount of days where precipitation exceeds 25 mm.	**3.2**	*3.2*	**3.4**	*3.6*	*3.4*	**3.9**	*4.4*	*3.3*	**4.2**	*5.0*	
Annual Simple Daily Intensity Index (SDII) (mm/day)	The average amount of precipitation which occurs per day on average in a year.	**2.6**	*2.4*	**2.6**	*2.8*	*2.4*	**2.6**	*2.8*	*2.4*	**2.6**	*3.1*	
Winter SDII (mm/day)	The average amount of precipitation which occurs per day on average in a year.	**2.5**	*2.3*	**2.6**	*2.9*	*2.8*	**2.9**	*3.0*	*2.4*	**2.6**	*2.8*	

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Levels
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Spring SDII (mm/day)	The average amount of precipitation which occurs per day on average in a year.	**2.4**	*2.1*	**2.3**	*2.5*	*1.9*	**2.2**	*2.6*	*2.2*	**2.5**	*2.7*	
Summer SDII (mm/day)	The average amount of precipitation which occurs per day on average in a year.	**2.5**	*1.8*	**2.0**	*2.3*	*2.1*	**2.2**	*2.3*	*1.8*	**2.1**	*2.3*	
Fall SDII (mm/day)	The average amount of precipitation which occurs per day on average in a year.	**3.0**	*2.8*	**3.2**	*3.7*	*3.3*	**3.5**	*3.7*	*2.6*	**3.1**	*3.4*	high evidence medium agreement
95th Percentile Precipitation (mm)	The percent of the total precipitation when precipitation is greater or equal to the 95th percentile.	**36.1**	*37.2*	**38.9**	*41.0*	*35.4*	**37.1**	*38.5*	*38.9*	**40.4**	*42.4*	
99th Percentile Precipitation (mm)	The percent of the total precipitation when precipitation is greater or equal to the 99th percentile.	**11.2**	*11.5*	**12.3**	*13.2*	*10.9*	**11.5**	*12.0*	*11.7*	**12.5**	*13.6*	
Dry Days												
Total Annual (days)	Total annual number of days where precipitation was less than 0.2 mm.	**145.3**	153.7	**161.1**	170.1	*126.1*	**144.0**	*157.5*	*155.0*	**163.7**	*174.2*	low evidence high agreement
Maximum Total Consecutive Dry Days (days)	The number of consecutive days where annual total number of days where precipitation was less than 0.2 mm.	**18.2**	15.4	**17.0**	18.6	*16.2*	**17.7**	*19.4*	*20.4*	**22.0**	*23.6*	
Growing Season												
Growing Season Start Date (day of year)	The first day after 5 days of consecutive minimum temperatures above 5˚C was reached.	**12-May**	28-Apr	**30-Apr**	3-May	20-Apr	**2-May**	15-May	*13-Apr*	**25-Apr**	*11-May*	
Growing Season End Date (day of year)	The first day after 5 days of consecutive maximum temperatures below 5˚C was reached.	**5-Nov**	31-Oct	**8-Nov**	15-Nov	7-Nov	**15-Nov**	22-Nov	*3-Nov*	**16-Nov**	*25-Nov*	high evidence high agreement
Growing Season Length (days/year)	Annual number of days after having 5 consecutive days above 5˚C and before having five consecutive days below 5˚C.	**177 days**	181 days	**192 days**	201 days	176 days	**197 days**	216 days	*176 days*	**205 days**	*226 days*	
Agricultural Variables												

Climate Parameter	Definition	Baseline Value (1971-2000)	Short-Term (2020s) (2011-2040)			Medium Term (2050s) (2041-2070)			Long Term (2080s) (2071-2100)			Confidence Levels
			10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	10th Percentile	Ensemble Mean	90th Percentile	
Corn Heat Units (CHUs)	Number of CHUs, indicating ideal climates for corn to fully mature (very generally, at least 2200 CHUs are required to mature most varieties of corn).	**3194**	*3259*	**3936**	*4505*	*3516*	**4293**	*4921*	*3619*	**4479**	*5159*	high evidence high agreement
Growing Degree Days (days/year)	Number of days > 0˚C.	**3198**	*3277*	**3861**	*4317*	*3462*	**4177**	*4715*	*3580*	**4346**	*4910*	
Canola Growing Degree Days (days/year)	Number of days > 4˚C.	**2236**	*2297*	**2792**	*3182*	*2452*	**3052**	*3508*	*2556*	**3207**	*3692*	
Forage Crops Growing Degree Days (days/ year)	Number of days > 5˚C.	**2024**	*2080*	**2555**	*2928*	*2229*	**2807**	*3238*	*2330*	**2952**	*3417*	
Corn and Bean Growing Degree Days (days/year)	Number of days > 10˚C.	**1119**	*1162*	**1533**	*1829*	*1277*	**1720**	*2061*	*1360*	**1845**	*2213*	
Days at Risk of Presence of Pests (days/year)	Number of days > 15˚C.	**463**	*500*	**764**	*976*	*574*	**900**	*1153*	*642*	**998**	*1269*	
Freeze-Thaw Cycles and Ice Potential												
Freeze-Thaw Cycles (cycles/year)	Number of freeze thaw cycles, where the minimum temperature is equal to or below -1°C and the maximum temperature is above 0°C.	**80**	*66*	**73**	*80*	*54*	**61**	*67*	*51*	**64**	*77*	low evidence high agreement
Ice Potential (days/year)	Number of days where minimum temperature is greater than -2˚C and maximum temperature is under 2˚C.	**29**	*11*	**18**	*27*	*9*	**21**	*38*	*6*	**14**	*24*	