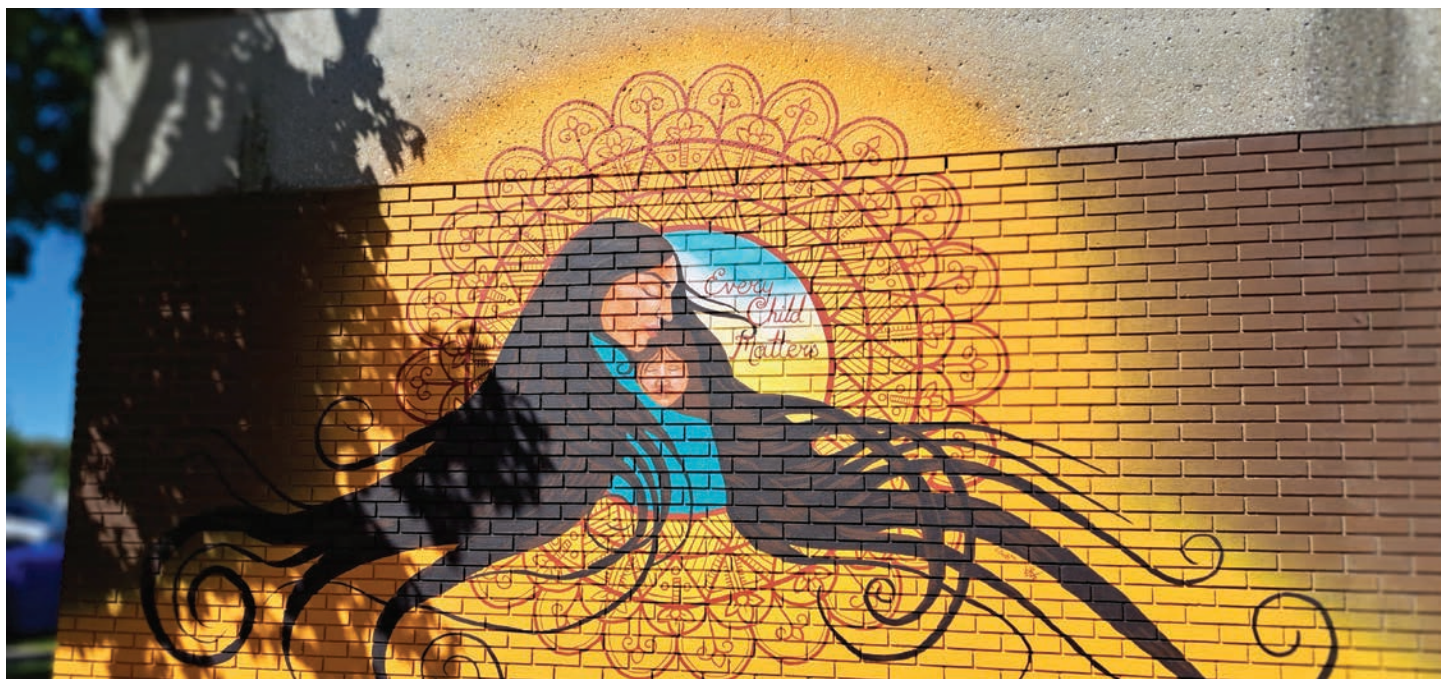


Climate Resilient Cornwall:

The City of Cornwall's Climate Adaptation Plan

May 2025



Land Acknowledgment

The City of Cornwall acknowledges the traditional territory of the Haudenosaunee peoples, the Mohawks of Akwasasne, the original keepers of this land. As settlers, we are grateful for the opportunity to live here, and we thank all the generations of people who have taken care of this land for thousands of years.

Acknowledgment

This plan represents the input and participation from a broad variety of community participants and City staff from several departments. Thank you to all participants for taking the time to contribute your expertise and knowledge to this initiative. The plan development process was supported by Pinna Sustainability Inc.



Executive Summary

Climate Resilient Cornwall will help the City of Cornwall (the City) get ready for the effects of climate change. As climate-related hazards like flooding, storms, and extreme heat become more frequent and intense, Cornwall must be ready. The main way that the City can make sure it is ready is by strengthening its resilience—the ability to prepare, adapt to, and recover from these changes.

This plan builds on the City's ongoing commitment to sustainability. It outlines a clear vision, goals, and actions to help the community reduce risks from climate change while building on its strengths. It is a ten-year plan that will guide decisions, policies, programs, and day-to-day practices across areas where the City has influence.

Climate Resilient Cornwall Vision

Cornwall is a sustainable and resilient city that takes collaborative and practical action to support low-carbon lifestyles, enhance community well-being, and adapt to the challenges of a changing climate.

The plan shows how future climate projections are expected to affect Cornwall, including:

- Milder winters with more rain
- Hotter summers with more extremely hot days and warmer nights
- Warmer shoulder seasons (spring and fall) and fewer days below zero, which may reduce freeze-thaw cycles

It also assesses the risks of key climate hazards—like extreme heat, drought, flooding—and identifies 10 potential impacts that pose an extreme level of risk, and 16 that pose a high level of risk. Some of the top risks include:

- **Extreme heat:** More people can get sick from heat
- **Invasives, pests and disease:** Higher risk of diseases like Lyme disease due to ticks and other pests moving north
- **Flooding:** Damage to roads, bridges, pipes, homes, and businesses, especially in low-lying areas
- **Storms:** More damage to buildings and power lines, causing service disruptions and economic impacts, and impacts to water quality from increased run-off

To address these risks, the plan sets out goals and actions across five areas to help Cornwall become more resilient to climate change (see Table 1). This table also outlines how the City will measure progress as the plan is put into action.

Everyone needs to help get Cornwall ready for climate change, not just the City. Residents, businesses, and community organizations all play an important role in strengthening Cornwall’s resilience. The City made sure to listen to many different voices while making this plan, including hosting workshops with different community representatives to make sure it reflects a wide range of experiences and priorities.

Some people are more affected by climate change than others. This plan makes sure that these people and their needs are taken into account in the risk assessment and action plan. Making sure that people are treated equitably is an important part of making the whole community safer and stronger. Cornwall’s adaptation efforts will also benefit and align with the needs of the surrounding counties and our neighbours in Akwasasne, who face many of the same environmental challenges.

Table ES-1: Summary of goals and indicators for the plan’s five action areas


ACTION AREA	GOALS	MEASURING PROGRESS
 <p>Energy Resilience and Buildings</p>	<p>Reduce energy-related risks by improving access to affordable and resilient energy solutions.</p> <hr/> <p>Enhance the climate-resilience of new and existing buildings in Cornwall.</p>	<ul style="list-style-type: none"> • Percentage of City-operated buildings retrofitted for energy efficiency measures and heat pumps. • Percentage of buildings across Cornwall using heat pumps that provide cooling. <hr/> <ul style="list-style-type: none"> • Number of City facility retrofits or new builds that incorporate climate resilience into design. • Number of building permits per year that have resilience upgrades, or are resilient new builds.

Table continues on next page

ACTION AREA	GOALS	MEASURING PROGRESS
 <p>Community Health and Safety</p>	<p>Protect the health, safety and well-being of residents, prioritizing vulnerable and underserved populations.</p> <hr/> <p>Enhance emergency management capacity for extreme events.</p>	<ul style="list-style-type: none"> Percentage of City policies or plans developed with an equity focus <hr/> <ul style="list-style-type: none"> Number of personnel hours/ days to provide emergency shelter (cooling / heating) per year. Number of emergency management initiatives/ programs implemented by the City per year.
 <p>Municipal Infrastructure and Services</p>	<p>Strengthen municipal infrastructure against current and future climate risks.</p>	<ul style="list-style-type: none"> Number of contingency plans developed / updated for essential services to reflect climate considerations. Total costs per year for climate-related infrastructure improvements. Quantity of road salt used and number of applications.
 <p>Natural Environment and Green Infrastructure</p>	<p>Expand and protect natural systems to mitigate climate impacts and enhance biodiversity.</p>	<ul style="list-style-type: none"> Percentage of tree cover per total area of jurisdiction. Percentage of wetland area per total area of jurisdiction. Water quality monitoring. Tick populations and number of cases of Lyme disease.
 <p>Strategic Planning and Decision-making</p>	<p>Incorporate climate resilience into municipal planning, policies and decision-making processes.</p> <hr/> <p>Strengthen community capacity for climate change resilience.</p>	<ul style="list-style-type: none"> Number of climate initiatives/ projects implemented per year. Total funding allocated to climate projects per year. <hr/> <ul style="list-style-type: none"> Number of engagement events on climate-related topics per year. Number of subscribers to Cornwall Emergency Notification website. Number of visitors to the Preparedness Program website.



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1 Introduction

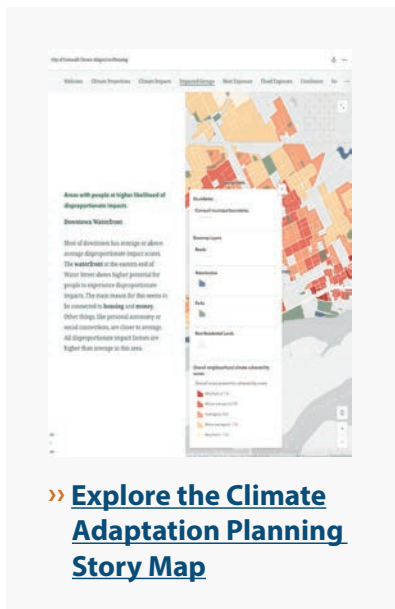
Like communities across the globe, Cornwall is facing the realities of a shifting climate. These go beyond long-term forecasts; the community is seeing real changes in local ecosystems, infrastructure resilience, and weather patterns. Climate events like floods and heatwaves are becoming more frequent and intense, posing major threats to health, safety, and financial stability of local residents. To compound the problem, the best available projections suggest that these trends will not reverse in the near future. This highlights the urgent need for Cornwall to take decisive action to adapt to the changes we are already seeing and those we anticipate. Doing so will require clear and practical actions which, while challenging, will also provide the opportunity to deliver valuable co-benefits to residents and will ensure a resilient and thriving community for current and future generations.

1.1 Purpose and Scope

This Climate Resilient Cornwall plan aims to enhance Cornwall's resilience and ability to adapt to a changing climate. It sets out a clear vision, goals and actions to guide the City of Cornwall's (the City) efforts to build resilience across the community. The plan explores and looks at the risks from climate impacts on Cornwall's residents and key assets, including health, infrastructure, emergency services, agriculture, natural areas, buildings, and businesses. Creating the plan also involved gathering input from community members with a range of perspectives, and to ensure equitable adaptation efforts. This document provides a 10-year plan that will direct policies, plans, programs, practices, procedures, and decision-making for the City. The plan aims to create a consistent approach to including climate adaptation in City policies and actions.

The plan aligns with national climate adaptation goals and Cornwall's current sustainability objectives and initiatives. Alignment with Cornwall's Climate Action Plan is especially important to help make sure adaptation measures support efforts to cut emissions, creating a more resilient future.

A **Story Map** is also available online that explores disproportionate impacts to different areas of the community based on factors such as financial insecurity, housing conditions, personal autonomy, and social challenges.



1.2 Social, Environmental, and Economic Co-benefits

Climate change affects all areas of our society—from healthcare to the sustainability of local businesses. Cornwall needs to be ready to respond when climate hazards occur, in order to reduce the impacts on the City and its residents.

Climate hazards, like flooding, can have ripple effects. For example, a severe flood along Highway 401 could stop transportation, which could have implications for supply chains, the livelihoods of commuters, and could interrupt emergency services.

However, adaptation strategies also have multiple, connected benefits. For instance, implementing resilient building codes and cooling strategies makes homes and workplaces safer, saves energy, reduces damage from climate hazards, and can lead to better health outcomes due to lower rates of exposure to hazards like extreme heat. These are what we call “co-benefits” of adaptation. While it may sometimes seem that climate adaptation adds strain to already stretched resources, the co-benefits of adaptation actions can directly enhance other existing priorities while helping communities prepare for future challenges.

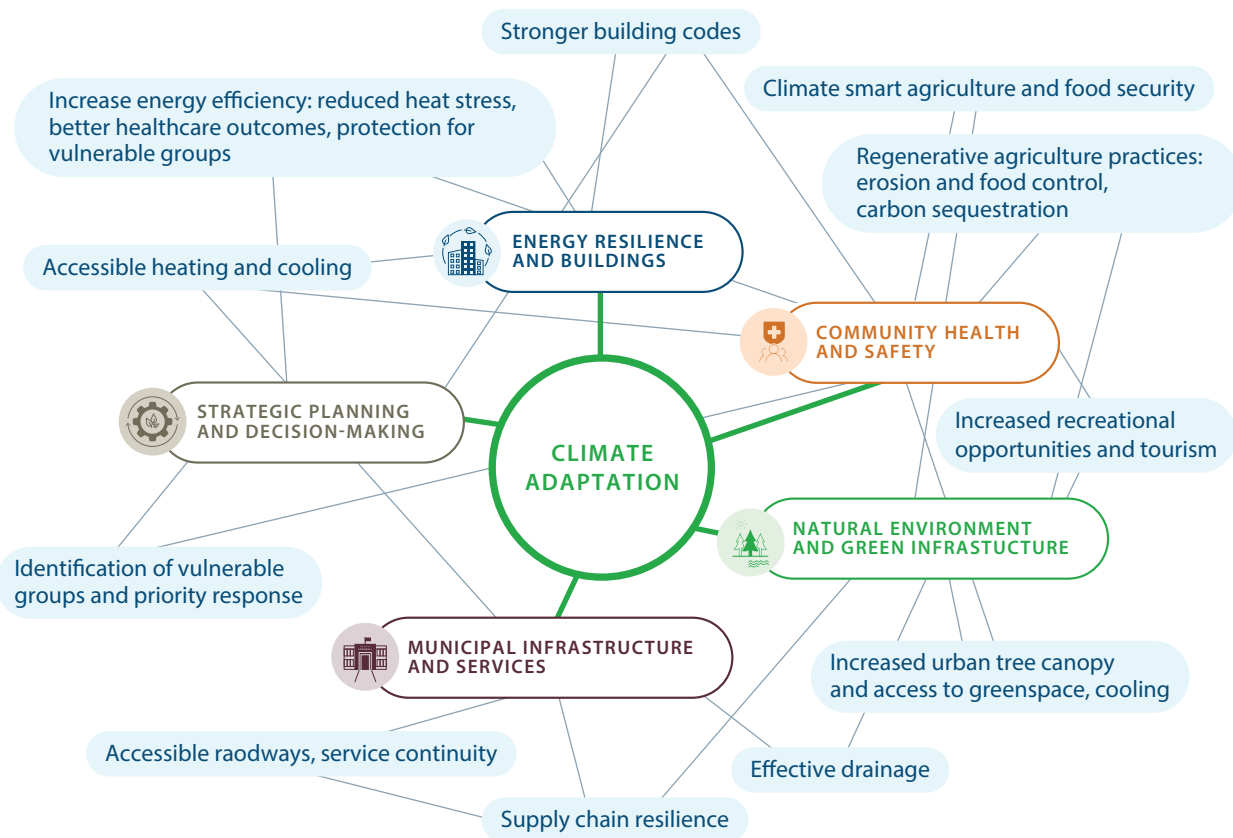


Some examples of adaptation co-benefits include:

- Protecting and restoring natural areas improves biodiversity, strengthens carbon sequestration, provides recreational and mental health benefits for residents, and boosts the local economy through increased tourism appeal.
- Expanding urban tree canopy provides cooling benefits that can buffer extreme heat and poor health outcomes, improves air quality, enhances stormwater management, and creates more livable urban spaces.
- Supporting local climate-smart agriculture helps ensure food security, protects farmers’ livelihoods, promotes sustainable farming practices that enrich soil and water resources, and helps cut greenhouse gas emissions by reducing fossil fuel use.

Making adaptation a key part of Cornwall’s policies and planning helps us build a sustainable future while minimizing risks and maximizing opportunities for all residents.

Figure 1: Climate adaptation co-benefits



1.3 Overview of the Community

Cornwall boasts a historic downtown, landmarks like the Cornwall Canal and recreational trail, a host of parks and recreational activities, a vibrant waterfront along the St. Lawrence River, diverse cultural attractions, and a strong sense of community. Taking effective climate action in Cornwall requires consideration of key attributes of the community including:

Unique geography shapes Cornwall's environment, economy, and way of life, making it essential to consider for a changing climate. Cornwall is nestled along the eastern edge of the province, along the banks of the St. Lawrence River within the St. Lawrence Lowlands, a region characterized by relatively flat terrain and fertile soils. The river itself is a defining feature for the community, offering scenic waterfronts, recreational opportunities, and a vital connection to the Great Lakes-St. Lawrence Seaway system.

Diverse population and socio-economic landscape influence how different community members experience and adapt to climate-related challenges, highlighting the need for an inclusive and equitable approach to climate planning. Cornwall is home to over 47,000 residents. Of these, roughly 11,800 are older adults and nearly 3,000 are classified as low-income. A larger population of over 110,000 people inhabit the surrounding region. The community boasts a diverse cultural heritage, marked by a blend of English, French, and Indigenous influences. The Mohawk Nation of Akwesasne, Huron-Wendat First Nation, and Metis Nation of Ontario each have ties to the community's current location and over 5% of the population is Indigenous.

Cornwall's economic landscape shapes the community's resilience, with key industries needing to adapt to changing climate conditions to ensure long-term sustainability and stability. Major local industries include the traditional manufacturing industry along with sectors such as retail, health care, and social services which have experienced recent growth. Surrounding farms play an important role in the local food system and economy. The community's strategic location along the St. Lawrence River between Toronto and Montreal has also solidified it as a hub for logistics and distribution firms.

Transportation infrastructure is vital for Cornwall's economy but also requires attention to ensure resilience to climate impacts such as flooding or extreme weather. Cornwall's location and highway and rail infrastructure provide access to key centres such as Montreal, Ottawa, Toronto, and via an international bridge to the U.S. Within the community, residents can travel via the Cornwall transit bus system, the sidewalk and pathway network, or via passenger cars which remain highly utilized by residents.

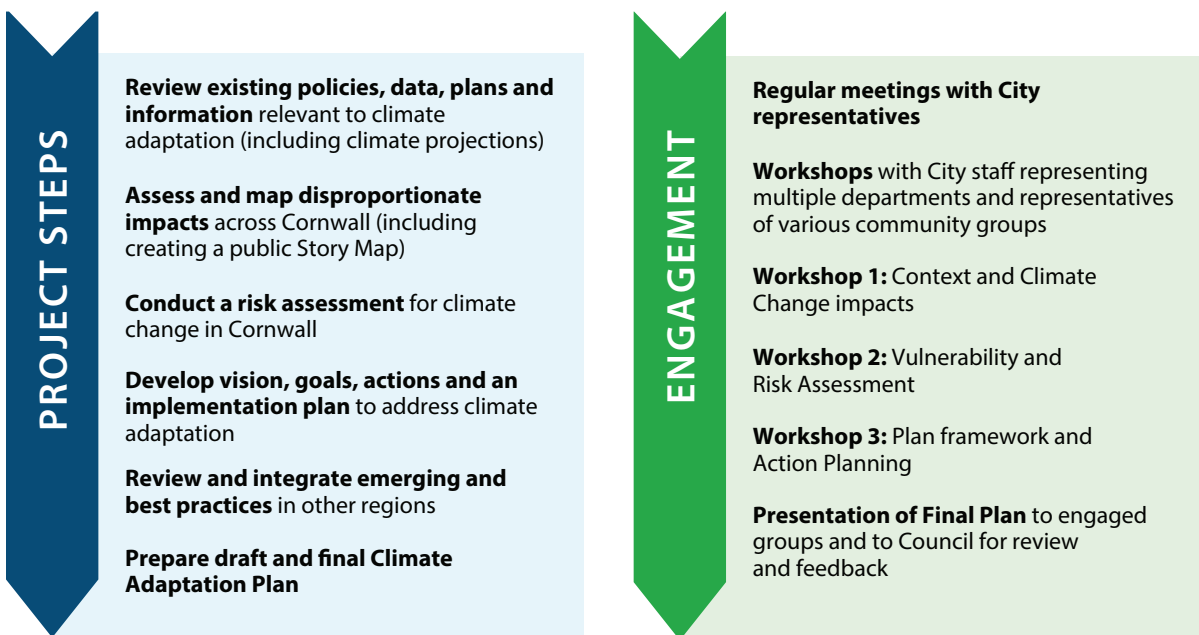
Cornwall’s natural resources offer potential for enhancing climate resilience but may also require conservation and adaptive management with the changing climate. The community’s green spaces, including parks and recreational areas, play an important role in both the community’s quality of life and its ecological health.

The energy landscape will help to identify opportunities for energy efficiency and renewable energy initiatives that support climate resilience. Cornwall’s energy infrastructure includes a mix of sources, such as hydroelectricity from Cornwall Electric, as well as natural gas, propane, and transportation fuels provided by a variety of vendors.

1.4 How this Plan was Developed

Climate Resilient Cornwall was developed over a nine-month period, and included a review of existing documents and literature, as well as a series of workshops with City staff and community representatives. Figure 2 below outlines the complete plan development process. The City is grateful to all those who dedicated time to participate in the community engagement process, including members of the Climate Adaptation Steering Committee (CASC), the City’s Environment and Climate Change Committee (ECCC) and Cornwall’s Youth for Climate Action Working Group (YFCA). Participants played an important role in ensuring that this plan addresses many of the concerns of Cornwall residents, and that it outlines goals, a vision, and actions that are practical and actionable for the City.

Figure 2: Climate Resilient Cornwall Plan Process and Engagement





2 Climate Change in Cornwall

2.1 Climate Projections

In the next few decades, Cornwall will likely experience significant changes in climate, leading to shifts in temperature and precipitation patterns generally, as well as more extreme weather events. These changes will have widespread implications for the community, affecting public health, infrastructure, local ecosystems, agriculture, and overall quality of life. This highlights the importance of planning and implementing climate resilience strategies to reduce the risks and take advantage of emerging opportunities. Below is a summary of some of the key findings in the climate projections for the immediate future (2021-2050)¹:

Milder, wetter winters: Winters are expected to be milder with more rain.

Significant changes are expected in the winter weather due to rising temperatures. This includes warmer winter days and nights, fewer frost and below zero days, and a decrease in heating degree days. By the 2030s, it is projected that the number of frost days will decrease from an average of 150 to approximately 120 days annually, and below zero days, where temperatures remain below 0°C, are projected to drop from 70 to 55 per year. This reduction in freezing events could impact ecosystems that rely on cold winters as well as winter recreation activities.

By the 2030s, the average annual total precipitation is projected to increase from 970 mm to over 1,000 mm. The most significant increases will occur in winter, with an expected average increase of 30 mm. This increase in wet conditions will be accompanied by more extreme rainfall events. Both single-day and five-day maximum precipitation amounts are expected to rise, indicating more intense storms and a higher risk of flooding.

Hotter summers: Summers will be hotter with more extreme heat days and warmer nights (called “tropical nights”).

Cornwall is expected to see a significant rise in extreme heat in the coming decades. By the 2030s, the average number of summer days with temperatures above 25°C is projected to increase from 60 to over 90 days each year, with coinciding higher humidity expected. Nights with temperatures above 20°C, known as tropical nights, will increase from 5 to approximately 20 nights per year, causing disruptions to sleep and leading to higher energy demand for cooling. Cooling degree days, which indicate the energy demand for cooling buildings,

¹ Cornwall climate projection data from [ClimateData.ca](https://climate-data.ca)

will rise dramatically from an annual average of 250 to approximately 460, signifying a need for more energy to keep homes and businesses cool during the increasingly warmer months.

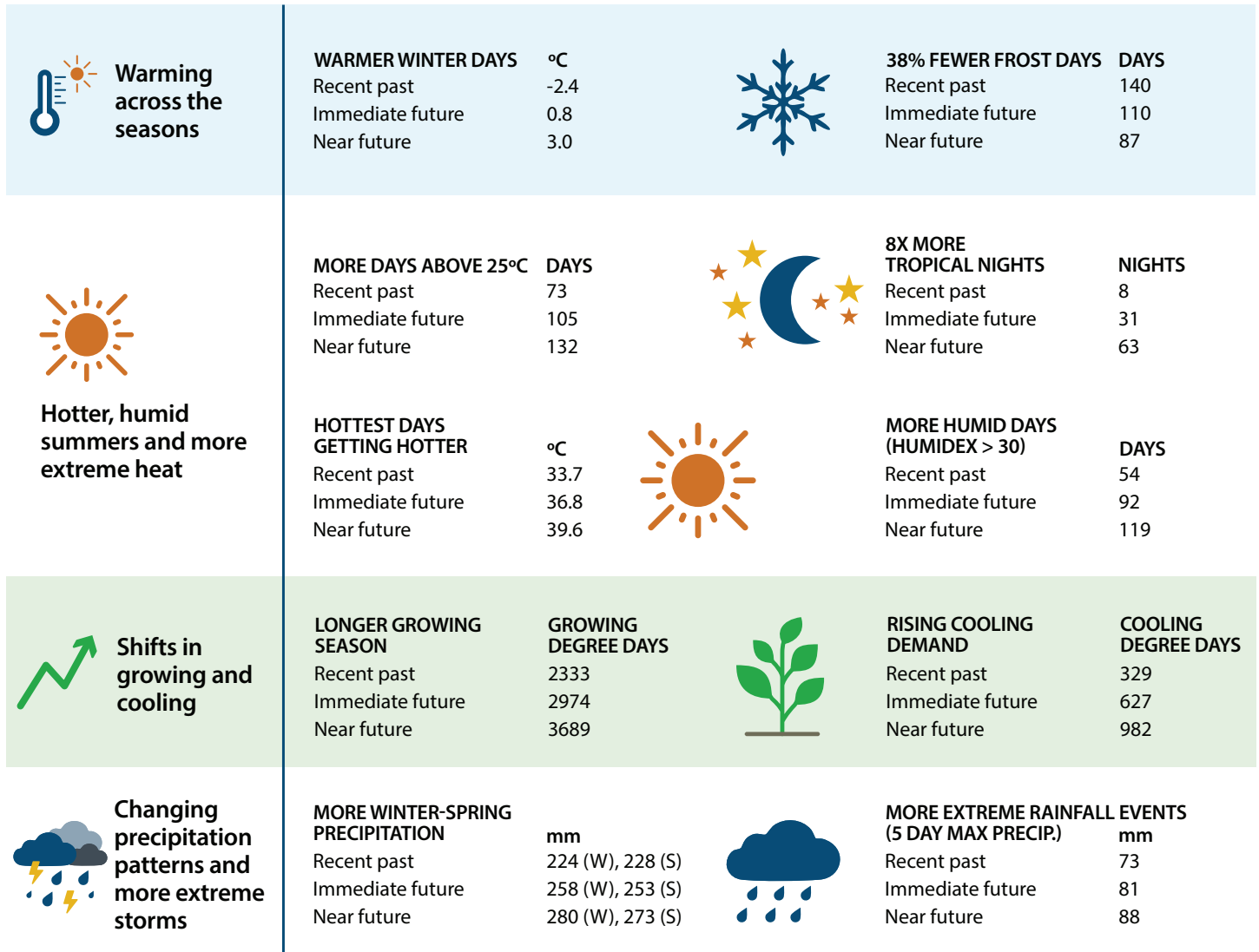
Fewer frost days and changing freeze-thaw cycles: There will be fewer days below zero and warming during shoulder seasons may reduce freezing fluctuations and cause earlier spring thawing, especially at shallow depths.

The climate in Cornwall is projected to significantly warm over the next few decades, with daytime highs and nighttime lows increasing in all seasons. By the 2030s, summer daytime highs could be almost 3°C warmer, and by the 2060s, they may rise by as much as 6°C, leading to much hotter summers. Nighttime lows will also rise, especially during winter. By the 2030s, winter nighttime temperatures could be nearly 3°C warmer than now. This warming trend may result in milder winters with fewer frosty nights and less intense cold spells. Overall, annual average temperatures are projected to rise steadily, with daytime highs and nighttime lows increasing by 2°C by the 2030s.

Climate Projection Definitions

- **Hottest day:** Describes the warmest daytime temperature in a specific time period. In general, the hottest day occurs during the summer months.
- **Days with Humidex > 30:** describes the number of days per year that the humidex (measures how hot and humid the weather feels to the average person) is greater than 30. In Canada, it is recommended that outdoor activities be modified when the humidex exceeds 30.
- **Tropical nights:** Describes the number of days that the nighttime low temperature is warmer than 18°C. Tropical nights make it more difficult for the body to cool down and recover from hot days.
- **Cooling degree days:** Describe the amount of space cooling (e.g., air conditioning) required to maintain comfortable indoor conditions when it is hot outside. When the average temperature is hotter than the threshold temperature (typically 18°C in Canada), cooling degree days are accumulated. Note that cooling degree days are expressed as “degree days,” rather than actual days. The number of cooling degree days accumulated in a single day depends on how much hotter that average temperature is than the threshold temperature (18°C). For instance, if the average temperature is 23°, the day would accumulate 5 cooling degree days.
- **Growing degree days:** Describes how quickly plants and insects will grow. It adds up daily warmth above a certain base temperature (generally 5°C in Canada) that’s needed for growth. A “Growing Degree Day” (GDD) represents one degree of warmth above the base temperature over a 24-hour period. Each day, the amount of heat above this base is added to the total, so if a day averages 7°C with a 5°C base, that day contributes 2 GDDs. Over time, these units add up to track the accumulated warmth needed for a plant or insect to reach new stages of growth.

Figure 3: Climate Projections for the City of Cornwall



Disclaimer: The projections presented in this report are based on data sourced from climatedata.ca, using the high-emissions scenario (RCP8.5). While global efforts and recent studies suggest that RCP8.5 is becoming less likely, this scenario remains a key benchmark for assessing climate risks and planning. The [Ontario Provincial Climate Change Impact Assessment](#) (2023) uses both RCP4.5 and RCP8.5 for evaluating climate risks.

Legend
 "W" = Winter
 "S" = Summer
 "PRECIP." = Precipitation

Note that the projections in Figure 3 are averages over a 30-year period (e.g., 2041-2070) rather than direct projections of what will happen in any given year. For simplicity, we refer to the period between 1991-2020 as **'the Past'**, between 2041-2070 as **'the 2050s'**, and between 2071-2100 as **'2080s'**.



3 Climate Risk Assessment

A climate risk assessment was developed using an adapted version of the Local Governments for Sustainability’s Building Adaptive and Resilient Communities (ICLEI-BARC) risk assessment framework, which was tailored to the specific needs and context of Cornwall. It incorporates vulnerability by examining how specific groups are more likely to be adversely affected by climate hazards. It takes into account that individuals and communities with intersecting socioeconomic, health, or situational factors are more susceptible to harm. For instance, older adults and individuals with chronic health conditions are particularly vulnerable to extreme heat events, which are expected to become more frequent and intense in the future.

Risk is defined as a function of the likelihood of an event occurring and the severity of its consequences, expressed as follows:

Risk = Likelihood × Consequence

To rate and prioritize risks, we plotted climate impacts on a risk matrix combining likelihood and consequence. This highlights the impacts of greatest concern that require immediate action in red, and those of lower priority in green (See Figure 4). The impacts of climate change selected for this risk assessment were gathered through a literature review and discussions with City of Cornwall staff and community representatives. For further information on how likelihood and consequence were rated, see **Appendix A**.

Figure 4: Risk Matrix

		Consequence				
		Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	Almost Certain 5	Moderate	High	Extreme	Extreme	Extreme
	Likely 4	Moderate	High	High	Extreme	Extreme
	Possible 3	Low	Moderate	High	High	Extreme
	Unlikely 2	Low	Moderate	Moderate	High	High
	Rare 1	Low	Low	Low	Moderate	Moderate

3.1 Disproportionately Impacted Groups

The impacts of climate hazards are not experienced uniformly across communities. People experience and are affected by climate hazards differently, depending on a combination of socioeconomic, health, or situational factors.² How adversely they are affected by hazards will depend on a combination of the following:

- **Exposure:** how exposed they are to the hazard.
- **Sensitivity:** how sensitive the individual is to the impacts.
- **Adaptive capacity:** how well the individual can respond to and recover.

For example, someone living in a very urban area may be more **exposed** to the effects of extreme heat due to the urban heat island effect (UHI). They may also be more **sensitive** to heat-related illness due to being elderly. Their **ability to adapt** by buying an A/C unit, for example, may be limited by a fixed and limited income.

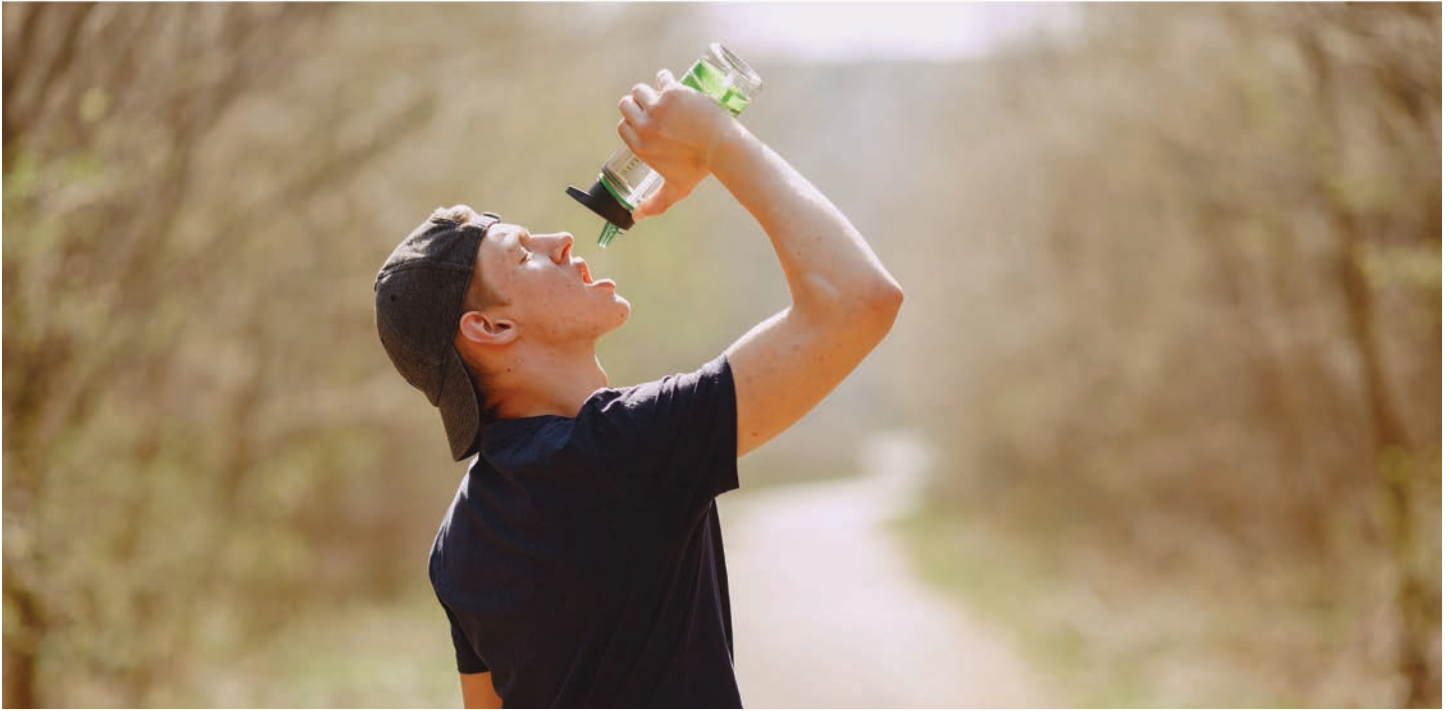
These disproportionate impacts increase the consequence of climate hazards, contributing to a higher level of risk for certain groups and individuals. Climate change is a risk multiplier, exacerbating existing inequities and disproportionately impacting certain parts of the population. Some of the groups that typically experience disproportionate impacts across climate hazards include^{3,4}:

- Older adults, infants, and people with health conditions
- Low and fixed-income households or renters
- People living with disabilities or mobility challenges
- People living in rural areas farther away from services (e.g., cooling centres)
- People without access to adequate housing
- Indigenous and racialized communities
- Newcomers and people with language barriers
- People who work outdoors (including agricultural producers)
- People experiencing job insecurity or unemployment
- Lone parents and people living alone
- People living in older buildings or unfit housing requiring major repairs

² Health Canada. (2020). Climate Change and Health Vulnerability and Adaptation Assessments: A knowledge to action resource guide. <https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/healthadapt-report-eng.pdf>

³ Extreme Heat. Ontario.ca. (n.d.). [www.ontario.ca. https://www.ontario.ca/page/extreme-heat](https://www.ontario.ca/page/extreme-heat).

⁴ CDC. Populations Impacted by Drought. <https://www.cdc.gov/drought-health/toolkit/vulnerable-populations.html>



The risk rating tables in the following section show specific groups that are disproportionately impacted by each hazard examined. Note that the groups listed above are often disproportionately impacted, but membership within this group does not necessarily mean that someone will be more impacted. Note also that individuals may fall into one or more of these categories. This reflects the intersectional nature of our identities, and points to a need to consider the impacts of climate hazards from a holistic perspective that takes into account the complexity of our identities.⁵

3.2 Climate Risks in Cornwall

Several hazards pose a risk to Cornwall, including extreme heat, drought, wildfire and smoke, flooding, and severe storms. Identifying these **risks** helps the City prioritize resources for climate adaptation.

The Table 1 summarizes the highest-risk climate hazards (**extreme** and **high**) and their key impacts. The impacts are ranked from highest to lowest risk, with a colour gradient indicating severity—darker red for **extreme** risks and darker orange for **high** risks. The table highlights key hazards and consequences for the City to address through this Climate Resilient Cornwall plan.

⁵ See also the Story Map that explores disproportionate impacts on different areas of the community: <https://storymaps.arcgis.com/stories/564323d3c5054c56b2c839762d9547b2>

Table 1: Summary of Risk Assessment














RISK RATING	HAZARD	IMPACT
EXTREME	 Extreme heat	Increased heat-related illnesses.
	 Invasives, Pests and Diseases	Increased prevalence of diseases like Lyme disease due to the northward spread of ticks and other vector-borne illnesses.
	 Cross-cutting	Rise in cumulative demands on health and emergency services with more frequent emergencies, including compounding crises like extreme heat followed by flooding, heightening evacuation needs and contributing to staff burnout.
	 Cross-cutting	Growing costs for adaptation measures, insurance, emergency preparedness, increased demands and stresses on assets, operations and services, and post-disaster recovery.
EXTREME	 Extreme heat	Heat stress on crops reducing agricultural yields, increasing irrigation demand and threatening local food production.
	 Extreme heat	Increased energy demand for cooling, increased energy costs and potential power outages.
	 Flooding	Damage to critical infrastructure, transportation networks, homes and businesses, especially in low-lying areas.
	 Storms	Increased damage to homes, businesses and public infrastructure leading to interruption of services and economic consequences.
	 Invasives, Pests and Diseases	Spread of invasive species and pests displacing native flora, disrupting ecosystems, urban forests, and impacting agriculture.
	 Storms	Lack of access to essential supplies like food, water, medication and fuel during prolonged storms.

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RISK RATING	HAZARD	IMPACT	
HIGH		Cross-cutting	Increased anxiety and stress across the population due to recurring climate risks and disruptions to daily life.
		Cross-cutting	Disruptions in quality of life, including water restrictions during droughts, limited outdoor activities and closures of parks and beaches due to extreme heat, drought and flooding.
		Gradual warming	Shifts in ecosystems result in altered species distributions, ecological balance, and challenges to the survival of native species.
		Smoke	Poor air quality during wildfire smoke events, leading to increased respiratory issues and hospital visits.
		Wildfire and Smoke	Smoke from wildfire causing closures of schools, recreational areas and limitations on outdoor events.
		Gradual warming	Extended growing seasons may benefit agriculture, but new pests and unpredictable growing conditions could pose challenges.
		Smoke	Older, ill-fitted buildings are more susceptible to poor indoor air quality during smoke events, which may be compounded by extreme heat events, leading to health impacts.
		Smoke	Economic impact from cancelled events, tourism losses, and increased healthcare costs during smoke events.
		Storms	Power outages due to storm damage to electrical infrastructure. As reliance on electricity increases, highlighting the potential need for expanded backup power systems.
		Drought	Reduced water flows affect sewer infrastructure causing odours and blockages requiring extra maintenance.
		Extreme heat	Heat stress on urban vegetation increasing irrigation demands and risk of vegetation loss.
		Extreme heat	Older buildings not designed for extreme heat may struggle to maintain comfortable indoor temperatures.

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RISK RATING	HAZARD	IMPACT
HIGH	 Flooding	Rising costs for insurance premiums and difficulties in insuring properties in flood-prone areas.
	 Flooding	Water contamination and mould from overwhelmed drainage systems and sewer overflows.
	 Storms	Damage to urban forests and (rural areas) from ice storms, heavy snow, and high winds.

The following pages outline the potential impacts, consequences, and disproportionately impacted groups for each climate hazard, using a representative event specific to that hazard.





3.2.1 Extreme Heat

Event Definition: An extreme heat event refers to a period of unusually high temperatures, usually sustained over multiple days. Environment Canada defines an extreme heat event as a period with more than three consecutive days of maximum temperatures at or above 32°C.⁶


Likelihood: To assess the likelihood of increased extreme heat events, we analyzed the expected climate projections for 2030.⁷ The data suggest the **likelihood of extreme heat events** is currently likely and is projected to be **almost certain in the future**.

Consequence: Extreme heat poses serious challenges to agriculture, infrastructure, health, and local ecosystems. In the table below, the consequence of health risks and heat-related illness is rated as “major,” while stress to local agriculture and food security, as well as increased energy demand and the potential for power outages, are rated “minor”. Participants in engagement were particularly concerned about the implications of extreme heat for people living with chronic health conditions, seniors, low-income households or those without access to cooling equipment, who may be more vulnerable to the effects of extreme heat.

⁶ Environment Canada. Extreme Heat Events Guidelines. <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/extreme-heat-events-guidelines-technical-guide-health-care-workers.html>

⁷ Climatedata.ca and climateatlas.ca

Table 2: Extreme Heat Risk Rating

	IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
	Increased heat-related illnesses	5 Almost Certain	4 Major	20 Extreme	Older adults, young children, outdoor workers, people with pre-existing health conditions
	Heat stress on crops reducing agricultural yields , increasing irrigation demand and threatening local food production	5 Almost Certain	3 Moderate	15 Extreme	Farmers, agricultural workers, low-income rural communities dependent on local agriculture.
	Increased energy demand for cooling , increased energy costs and potential power outages	5 Almost Certain	3 Moderate	15 Extreme	Low-income households, individuals in older buildings, seniors, and individuals with medical conditions reliant on air conditioning.
	Older buildings not designed for extreme heat may struggle to maintain comfortable indoor temperatures	5 Almost Certain	2 Minor	10 High	Residents in older or poorly designed buildings, renters and low-income households.
	Heat stress on urban vegetation increasing irrigation demands and risk of vegetation loss	5 Almost Certain	2 Minor	10 High	Urban residents, communities with limited green space or natural shade.



3.2.2 Drought


Event Definition: In general, drought can be defined as a period of low water availability due to a prolonged period of low rainfall. Drought is measured in different ways across Canada, depending on jurisdiction. In Ontario, a level 3 (high severity) drought is defined as a period when “supply may no longer meet demand; social and economic impacts are anticipated.”⁸

Likelihood: Cornwall’s climate has historically experienced few prolonged dry periods. The data suggest little to no increased likelihood of prolonged drought events in Cornwall. Therefore, the current and future likelihood of a severe drought (e.g., level 3) is rated as rare.

Consequence: Drought and declining water levels pose significant consequences for communities, ecosystems, and infrastructure. The table below summarizes some of the key impacts related to drought and the level of consequence. Research and engagement suggest that drought poses a low to moderate risk for impacts related to water stress. Participants in the engagement process indicated that the length of the event is a key consideration for most of these impacts and could increase or decrease the consequence rating provided. They emphasized how social and ecological systems are linked, where ecological damage ripples can reduce social ecosystem services such as recreation opportunities or drinking water quality.

⁸ Government of Ontario. Drought. <https://www.ontario.ca/page/drought>

Table 3: Drought Risk Rating

 IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
Reduced water flows affect sewer infrastructure causing odours and blockages requiring extra maintenance.	5 Almost Certain	2 Minor	10 High	Low-income households, older adults, renters, residents in low-lying areas
Lower water levels in local reservoirs and wells, leading to potential water restrictions .	2 Unlikely	3 Moderate	6 Moderate	Low-income, farmers and rural residents
Decline in water quality due to higher concentration of pollutants both in natural water bodies and drinking water sources, including wells.	2 Unlikely	3 Moderate	6 Moderate	Low-income, farmers and rural residents
Stress on local flora and fauna, especially in aquatic ecosystems, with potential biodiversity loss and loss of ecosystem services.	2 Unlikely	3 Moderate	6 Moderate	Rural populations dependent on local species for cultural or subsistence purposes
Service disruptions at the City water plant due to reduced water levels .	1 Rare	5 Moderate	5 Moderate	Low-income households, older adults, renters, rural residents
Reduced crop yields and stress on local food production due to water shortages and changes in growing conditions.	2 Unlikely	2 Minor	4 Moderate	Farmers, agricultural workers, local economies dependent on agriculture



3.2.3 Wildfire and Smoke

Event Definition: Large-scale wildfire events impacting human health or property involve a burn area of greater than 200 hectares. Smoke from wildfires significantly reduces air quality for an extended period, posing health risks and impacting visibility and daily activities.


Wildfire Likelihood: Fire activity across Canada is on the rise, with longer fire seasons, increased hot and dry days, and a rise in lightning strikes igniting fires.⁹ Cornwall's wildfire danger remains negligible when considering its landscape, land use patterns, and fuel availability. The data suggest the **likelihood of wildfires** is currently rare and projected to **remain rare in the future**.

Smoke Likelihood: As wildfires become more frequent and intense, largely due to longer fire seasons and increasingly dry conditions across the country, the likelihood of smoke impacting Cornwall increases. The frequency of smoke events impacting Cornwall is **currently possible** and projected to become **likely in the future**.

Consequence: The highest risks are associated with wildfires, damage to infrastructure, disruptions to essential services (such as utilities), property loss, and destruction of ecosystems. These issues can lead to biodiversity loss and degradation of water quality. However, due to the lower likelihood of wildfires occurring in the immediate area, these risks are considered less severe. On the other hand, while resulting in lower overall consequences, smoke events pose a higher risk because of their greater likelihood. The economic impact and poor air quality from these smoke events were rated the highest concerns.

⁹ Climatedata.ca. Learning Zone: Wildfires and Climate Change. <https://climatedata.ca/resource/wildfires-and-climate-change/>

Table 4: Wildfire and Smoke Risk Rating

 IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
Economic impact from cancelled events, tourism losses, and increased healthcare costs during smoke events.	4 Likely	3 Moderate	12 High	Local businesses
Poor air quality during wildfire smoke events, leading to increased respiratory issues and hospital visits.	4 Likely	3 Moderate	12 High	Older adults, individuals with pre-existing health conditions, outdoor workers, people living in older buildings
Older, ill-fitted buildings are more susceptible to poor indoor air quality during smoke events, which may be compounded by extreme heat events, leading to health impacts.	4 Likely	3 Moderate	12 High	Older adults, individuals with pre-existing health conditions, outdoor workers, people living in older buildings
Smoke and wildfire risk causing closures of schools, recreational areas and limitations on outdoor events.	4 Likely	3 Moderate	12 High	Low-income households, children
Damage to infrastructure, essential services (utilities) and property loss.	1 Rare	5 Catastrophic	5 Moderate	Low-income individuals, rural residents
Destruction of ecosystems , biodiversity loss, degradation of water quality.	1 Rare	4 Major	4 Moderate	Farmers, agricultural workers, local economies dependent on agriculture




3.2.4 Flooding

Event Definition: A flood event is defined as one in which water levels or flow rates exceed the threshold associated with a 1-in-10-year return period.

Likelihood: Data on Rainfall Intensity-Duration-Frequency indicates patterns of increased rainfall frequency and greater intensity of rainfall events. As a result, the likelihood of a 1-in-10-year flood event in the recent past is expected to **shift from possible to a likely rating**.

Consequence: The highest consequence impacts of flooding in Cornwall include damage to critical infrastructure, transportation networks, homes, and businesses. This impact is of significant concern due to its potential to disrupt essential services and require extensive recovery efforts, posing challenges to residents in flood-prone zones. Additional significant impacts include rising insurance costs and difficulties insuring properties in flood-prone areas, water contamination and mould from overwhelmed drainage systems, and sewer overflows presenting significant health risks, especially for residents in older or poorly maintained buildings and low-income individuals.

Table 5: Flooding Risk Rating

	IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
	<p>Damage to critical infrastructure, transportation networks, homes and businesses.</p>	<p>3 Possible</p>	<p>5 Catastrophic</p>	<p>15 Extreme</p>	<p>Residents and businesses in flood-prone areas</p>
	<p>Rising costs for insurance premiums and difficulties in insuring properties in flood-prone areas.</p>	<p>3 Possible</p>	<p>3 Moderate</p>	<p>9 High</p>	<p>Low-income households, residents in flood-prone areas</p>
	<p>Water contamination and mould from overwhelmed drainage systems and sewer overflows.</p>	<p>3 Possible</p>	<p>3 Moderate</p>	<p>9 High</p>	<p>Residents in older or need major repair buildings, low-income individuals</p>
	<p>Localized shoreline erosion along smaller rivers and local water bodies affecting land use and property values.</p>	<p>3 Possible</p>	<p>2 Minor</p>	<p>6 Moderate</p>	<p>Property owners along shorelines</p>
	<p>Flooding of the Raisin River leading to water contamination from agricultural sources, increasing public health risks.</p>	<p>3 Possible</p>	<p>2 Minor</p>	<p>6 Moderate</p>	<p>Farmers, agricultural workers, residents reliant on well sources</p>



3.2.5 Storms (Ice, Snow, Wind)

Event Definition: A **severe windstorm** is defined as a wind storm with wind speeds exceeding 80 km/h which can cause structural damage, uproot trees, and disrupt transportation systems. A **heavy ice storm** is characterized by the accumulation of more than 25 mm of ice over a short period, leading to power outages, damage to trees, and hazardous travel conditions. A **snowstorm** involves significant snowfall accumulation (typically over 15 cm in 24 hours) that disrupts daily life, transportation, and safety.

Likelihood: Cornwall has experienced various storm events, including ice storms, snowstorms, and severe winds (e.g., 1998 ice storm). The information available suggests that the likelihood of these significant **storm events is currently unlikely and projected to become possible in the future.**^{10, 11}


Consequence: The highest consequence impacts of storms in Cornwall include significant damage to homes, businesses, and public infrastructure, leading to service interruptions and economic repercussions. Vulnerable groups such as low-income households, individuals in older buildings, and seniors are particularly at risk due to limited resources for recovery and repair.

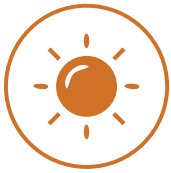
Prolonged storms may disrupt access to essential supplies like food, water, medication, and fuel, posing severe risks for older adults and low-income individuals. Additionally, power outages caused by storm damage to electrical infrastructure are a major concern, especially as reliance on electricity grows. Other impacts include road closures and dangerous travel conditions, which hinder emergency responses and daily life, disproportionately affecting individuals reliant on public transportation and those with limited mobility. Water bodies may be impacted by increased runoff that is carrying pollutants and excess nutrients.

¹⁰ Ministry of Health and Long-Term Care (2016). Ontario Climate Change and Health Modelling Study.

¹¹ Climatedata.ca. Hurricanes and Climate Change in Atlantic Canada.

Table 6: Storms Risk Rating

	IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
	Increased damage to homes, businesses and public infrastructure leading to interruption of services and economic consequences.	3 Possible	5 Catastrophic	15 Extreme	Low-income households, individuals in older buildings, seniors
	Lack of access to essential supplies like food, water, medication and fuel during prolonged storms.	3 Possible	5 Catastrophic	15 Extreme	Older adults, low-income individuals
	Power outages due to storm damage to electrical infrastructure. As reliance on electricity increases, highlighting the potential need for expanded backup power systems.	3 Possible	4 Major	12 Extreme	Seniors, people dependent on medical devices, residents in areas with unreliable electrical infrastructure
	Damage to urban forests from ice storms, heavy snow, and high winds.	3 Possible	3 Moderate	9 High	Residents and communities reliant on urban forests for recreation and economic activities
	Road closures and dangerous travel conditions during and after storms, affecting emergency response and daily life.	2 Unlikely	3 Moderate	6 Moderate	Residents reliant in public transportation, individuals with health conditions and those with limited mobility
	Increased runoff degrades water quality in water bodies from excess sediments and pollutants (nutrients and pesticides), and potentially increasing UV/chlorine resistant pathogens.	3 Possible	3 Moderate	9 High	Ecosystems, particularly affecting near-shore habitats.




3.2.6 Gradual Warming

Definition: Gradual warming refers to the long-term rise in global average temperatures caused by climate change. This increase in temperatures is expected to lead to warmer winters and longer growing seasons. The warming is affecting ecosystems, altering seasonal dynamics, and impacting weather patterns.

Gradual Warming Trends: As temperatures rise, ecosystems will shift, with some species adapting, migrating, or declining. The growing season is gradually lengthening, while winters are shortening. Fewer days below freezing will reduce freeze-thaw cycles, leading to earlier spring thawing and less temperature fluctuation around freezing.

Consequences: The primary concerns associated with gradual warming include shifts in ecosystems caused by changes in species distributions and ecological balances. These shifts can disrupt habitats, reduce biodiversity, and threaten the survival of native species, particularly impacting rural communities that depend on local ecosystems for cultural and subsistence needs. Additionally, while extended growing seasons may benefit agriculture, these advantages could be countered by challenges such as new pests, changing weather patterns, and increased unpredictability in growing conditions, all of which pose risks to farmers and agricultural economies.

Table 7: Gradual Warming Risk Rating

 IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
Shifts in ecosystems result in altered species distributions, ecological balance, and challenges to the survival of native species.	4 Likely	3 Moderate	12 High	Rural populations dependent on local species for cultural or subsistence purposes
Extended growing seasons may benefit agriculture, but new pests and unpredictable growing conditions could pose challenges.	4 Likely	3 Moderate	12 High	Farmers, agricultural workers, local economies dependent on agriculture
Shortened winter sports season and less snow and outdoor ice are available.	3 Possible	1 Negligible	3 Low	Local businesses reliant on tourism and sports




3.2.7 Pests, Diseases and Invasives

Likelihood: The likelihood of increasing impacts from pests, diseases, and invasive species is rising due to climate change. The data suggest that climate change is creating more favorable conditions for exotic species to expand, increasing the risk of ecological/economic disruption.¹² Similarly, infectious diseases like Lyme disease and West Nile virus are becoming more prevalent, with shorter winters and faster pathogen maturation cycles.^{13,14}

Consequences: The increased risks of diseases, invasive species, and pests were all as higher consequence impacts. Diseases pose significant threats to public health and safety, particularly for vulnerable populations such as older adults, children, and those with pre-existing conditions. Meanwhile, pests and invasive species threaten farmers, local economies reliant on agriculture, ecosystems, and urban forests, with potential long-term environmental and economic impacts.

Table 8: Pests, Diseases and Invasives Risk Rating

 IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
Increased prevalence of diseases like Lyme disease due to the northward spread of ticks and other vector-borne illnesses.	5 Almost Certain	4 Major	20 Extreme	Older adults, young children, people with pre-existing health conditions, low-income individuals
Spread of invasive species and pests displacing native flora, disrupting ecosystems, urban forests, and impacting agriculture.	5 Almost Certain	3 Moderate	15 Extreme	Farmers, agricultural workers, local economies dependent on agriculture

12 Canadian Council on Invasive Species (2024). National Invasive Species and Climate Change Network. <https://canadainvasives.ca/invasive-species/invasive-species-and-climate-change/#:~:text=As%20climate%20change%20warms%20the,to%20the%20reduced%20travel%20time>

13 The Public Health Agency of Canada. (2019). Volume 45-4, April 4, 2019: Climate change and infectious diseases: The challenges.

14 Ministry of Health and Long-Term Care (2016). Ontario Climate Change and Health Modelling Study.



3.2.8 Cross-Cutting Impacts


Event Definition: Cross-cutting impacts describe the common effects of hazards that span multiple sectors, systems, and areas of society, causing widespread consequences. The Government of Canada's National Adaptation Strategy¹⁵ uses several sectors and systems to define cross-cutting impacts, including disaster resilience and adaptation, health and wellbeing, nature and biodiversity, infrastructure, and economy and workers.

Likelihood: The likelihood of cross-cutting impacts taking place relies on the likelihood of these individual events (co-)occurring. Given that extreme heat events are currently likely and almost certain to take place in the future, the probability of **cross-cutting impacts occurring is similarly likely now and almost certain moving forward.**

Consequence: The increasing frequency and intensity of climate-related events have widespread impacts that affect multiple sectors and community well-being. As seen in Table 9, the consequence of cross-cutting impacts ranges from "moderate" to "major." Rising demand for health and emergency services and escalating costs for adaptation both have major and cascading implications for multiple sectors of the community. These impacts have immediate consequences for certain groups, such as healthcare workers, the municipality, and local small business owners, but also ripple effects for vulnerable groups, such as older adults, those living with health conditions, and low-income households.

¹⁵ Government of Canada. Canada's National Adaptation Strategy. <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/full-strategy.html>

Table 9: Cross-Cutting Risk Rating

	IMPACT	LIKELIHOOD	CONSEQUENCE	RISK RATING	DISPROPORTIONATELY IMPACTED GROUPS
	<p>Rise in cumulative demands on health and emergency services with more frequent emergencies, including compounding crises like extreme heat followed by flooding, heightening evacuation needs and contributing to staff burnout.</p>	<p>4 Likely</p>	<p>4 Major</p>	<p>16 Extreme</p>	<p>Emergency services and healthcare workers, those with chronic and acute health conditions, poor mental health, or disabilities, and older adults</p>
	<p>Growing costs for adaptation measures, insurance, emergency preparedness, increased demands and stresses on assets, operations and services, and post-disaster recovery.</p>	<p>4 Likely</p>	<p>4 Major</p>	<p>16 Extreme</p>	<p>Municipalities with limited budgets, low-income households, and small local businesses</p>
	<p>Increased anxiety and stress across the population due to recurring climate risks and disruptions to daily life.</p>	<p>4 Likely</p>	<p>3 Moderate</p>	<p>12 High</p>	<p>Older adults, those living with mental health conditions, displaced (evacuated) individuals and families, low-income households, children and youth</p>
	<p>Disruptions in quality of life, including water restrictions during droughts, limited outdoor activities and closures of parks and beaches due to extreme heat, drought and flooding.</p>	<p>4 Likely</p>	<p>3 Moderate</p>	<p>12 High</p>	<p>People who rely on outdoor activities for mental well-being, including families with young children</p>

3.2.9 Compounding Hazards

Event Definition: The National Adaptation Strategy of Canada¹⁶ defines compound hazards (or compounding events) as situations where multiple climate-related hazards occur simultaneously or in succession, leading to amplified impacts.

Likelihood: The likelihood of compounding hazards is inconclusive due to a lack of data indicating how often different hazards coincide. While the hazards explored in this report are expected to become more likely, it is not possible to say how likely it is that they will coincide within a given period of time.

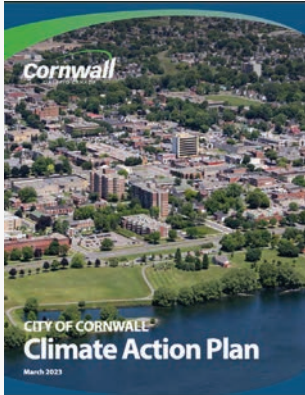
Consequence: Compounding hazard events create cascading effects that amplify risks and strain response systems across various sectors. The consequence of these compounding hazards depends on the type of hazards taking place. For instance, aggregating the individual consequence ratings of extreme heat and wildfire smoke will reveal the potential level and areas of consequence for a heatwave followed by smoky skies. Two examples of compounding events and their implications are included below.

- **Extreme heat, wildfire and smoke:** Extreme heat events increase the likelihood of wildfire, which produces smoke pollution, leading to poor air quality. These events may contribute to **impacts on public health, disruptions to outdoor activities, impacts to mental health**, and challenges for **infrastructural resilience** and **uncertain impacts on lifespan**.
- **Heavy rainfall, flooding and landslides:** Prolonged heavy rainfall can oversaturate soils and overwhelm stormwater infrastructure, resulting in flooding and shoreline erosion. These events may pose a threat to communities by causing **damage to transportation networks** that affect daily life and supply chains, **disrupting emergency response**, and **contaminating bodies of water**.

¹⁶ Government of Canada. Canada's National Adaptation Strategy. <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/full-strategy.html>



4 Climate Adaptation Plan



» [Read the Climate Action Plan](#)

Climate Resilient Cornwall provides an updated Vision that was originally set out in the 2023 Cornwall Climate Action Plan (CAP). As stated in the CAP, it is critical to providing a vision that inspires and motivates people to do their part and collectively take action and prepare and respond to the climate crisis. The vision outlined below was created through consultation with staff and community representatives. Adopting this vision, the City can ensure consistency and alignment across its climate change strategies.

Resilient Cornwall—Our Climate Vision:

Cornwall is a sustainable and resilient city that takes collaborative and practical action to support low-carbon lifestyles, enhance community well-being, and adapt to the challenges of a changing climate.

This Plan includes specific actions and an implementation plan, which build from existing plans and strategies to advance the Climate Vision. Actions focus on the role that the City can play in supporting climate adaptation. The City's role in climate adaptation varies and intersects with many other groups, including other levels of government, local groups and organizations, and property owners and tenants. The City therefore has the potential to make both direct (e.g., investments) and indirect (e.g., advocacy, by-law changes) contributions to strengthening climate adaptation across Cornwall. Actions identified in this plan were selected and refined through research into the climate adaptation efforts of comparable and leading municipalities, as well as multiple rounds of engagement with City staff and community representatives. Information regarding the timeframe,¹⁷ investment, and staffing requirements for each action are also provided in this section.

¹⁷ Timeframes are broken down into short (within 0-2 years), medium (3-6 years), and long (7+ years).

The actions in this plan are grouped into several goals, which fall into **five key themes**:



Energy Resilience and Buildings



Natural Environment and Green Infrastructure



Community Health and Safety



Strategic Planning and Decision-making



Municipal Infrastructure and Services

This Plan builds on and supports alignment with existing City plans and programs, leveraging ongoing initiatives to support the Climate Vision. By aligning with existing policies, this plan strengthens the City’s ability to proactively adapt to climate change while maximizing the effectiveness of current initiatives.

Estimated Costs and Resources

This section presents the actions together with rough cost and resource estimates to show the level of effort the City may need to make. These include early steps like studies or planning, as well as bigger investments that might follow—such as building something new or starting a program—over the next 10 years. In some cases, initial studies and analysis need to happen before costs can be estimated for implementation. More detailed costs will be worked out when actions are added to the City’s budget plans (see Section 5: Implementation and Reporting). The expected time and money needed for each action are shown using the ranges in Table 10.

Table 10: Investment and Staff Time Estimate Ranges

TIMEFRAME		INVESTMENT		STAFF RESOURCES	
SHORT	Years 1 and 2	\$	\$0-\$150,000	1 person icon	Less than 10% of one FTE*
MEDIUM	Years 3 and 4	\$\$	\$150,000-\$1,000,000	2 person icons	10-25% of one FTE
LONG	Years 5+	\$\$\$	\$1,000,000-\$5,000,000	3 person icons	25-75% of one FTE
		\$\$\$\$	\$5,000,000+	4 person icons	One+ employees dedicated

*Table note: An FTE means one full time employee's role



4.1 Energy Resilience and Buildings

4.1.1 Goals

- 1A.** Reduce energy-related risks by improving access to affordable and resilient energy solutions.
- 1B.** Enhance the climate-resilience of new and existing buildings in Cornwall.

4.1.2 Overview

As climate change intensifies, ensuring that our infrastructure and buildings can withstand and adapt to evolving conditions is critical to maintaining the well-being and resilience of the community. Cornwall faces challenges, including aging infrastructure, rising energy demands and costs, and the need for climate-resilient housing.¹⁸ At the same time, there are also opportunities to implement energy-efficient technologies, expand financial support programs, and adopt policies that strengthen the resilience of homes, businesses, and municipal buildings. Many of these strategies intersect and align with mitigation targets set out in Cornwall's Climate Action Plan.¹⁹

Strengthening energy and building resilience through the actions presented in this section can reduce risks and support Cornwall's transition to a climate-ready, livable and adaptive built environment.

¹⁸ City of Cornwall. (2022). Asset Management Plan. <https://www.cornwall.ca/en/live-here/resources/Roads/City-of-Cornwall-2022-Asset-Management-Plan.pdf>

¹⁹ City of Cornwall. (2023). Climate Action Plan. <https://pub-cornwall.escribemeetings.com/filestream.ashx?DocumentId=10443>

4.1.3 Current Initiatives

CITY ACTIONS AND RESOURCES

Ontario Renovates: A forgivable loan / grant program for low-to-moderate income homeowners in Cornwall, Stormont, Dundas and Glengarry to make essential home repairs and/or increase a homeowner's accessibility. Delivered with funding from federal and provincial governments.

Cornwall Housing Efficiency Upgrades: The City is advancing significant energy efficiency upgrades to 400 municipality-owned homes by 2027, with an investment of over \$6.7 million from City funds combined with funding from Canada Mortgage and Housing Corporation's Affordable Housing Fund.

Official Plan – Vegetation and Porous Surfaces Protection: Encourages low-impact development to maximize vegetation and porous surfaces within the settlement area, reducing the heat island effect and minimizing storm event impacts (Section 13.3).

Official Plan – Encourage Low Impact Development: Adjusts built environment standards to incorporate porous surfaces and sustainable design features, reducing the heat island effect and minimizing the impacts of storm events (Section 13.3).

Cornwall Recreation Master Plan – Floodplain and Natural Hazard Protection: Adjusts zoning standards to limit building and structure construction in floodplains and restricts development in Natural Hazard areas, including the St. Lawrence River floodplain (Sections 4.0, 4.2.12.1.i, 4.10, 9, 4.11A).

Energy Conservation and Demand Management Plan (ECDM): Continuously improve energy efficiency of City facilities and reduce operating costs through smart technologies, engineering standards, control (by-law) and the purchase of the highest efficiency equipment.

Cornwall City Low-Income Housing – Solar Wall Installation: The current low-income housing building at 222 Sixth Street East is equipped with a solar wall to enhance energy efficiency.

Flood Risk Reduction Rebate Program: Provides up to \$3,600 in rebates to homeowners for installing backwater valves and redirecting foundation drains and downspouts.





Table continues on next page

4.1.3 Current Initiatives, continued





FEDERAL AND PROVINCIAL INITIATIVES	COMMUNITY INITIATIVES
<p>Home Renovation Savings Program: Enbridge Gas and Save on Energy, with support from the Ontario Government, offer rebates for insulation, windows and doors, heat pumps, smart thermostats, and more. The program is available to homes that primarily heat with natural gas.</p> <p>Ontario Provincial Climate Change Impact Assessment – Infrastructure and Building Resilience: Implements adaptation measures to protect infrastructure from storm surges and extreme rainfall and strengthens building codes to withstand heavy storms and high winds (Sections 6.7.1, 6.7.3).</p> <p>Climate Ready: Ontario’s Adaptation Strategy and Action Plan – Building Code Resilience: The Ministry of Municipal Affairs and Housing is consulting on Building Code updates to improve resilience to climate change impacts and enhance water and energy conservation.</p> <p>Our Climate Change Plan: Ontario Power Generation’s plan includes a commitment to net zero operations, as well as a commitment to ensure operations are resilient to the impacts of a changing climate by integrating climate science into investment decisions and processes (page 36).</p>	<p>Building to Passive House Standard: Local designers and builders are exceeding the building code requirements to create net-zero new homes that minimize energy use, while improving indoor air quality and comfort (e.g., Pitt Street Passive Apartment).</p>

4.1.4 Actions

Goal 1A: Reduce energy-related risks by improving access to affordable and resilient energy solutions.

ACTION	
<p>1.1 Pilot heat control and cooling systems in new municipal facilities: Work with Procurement to conduct a financial evaluation to implement pilot programs for heat control and cooling systems in municipal facilities, such as green roofs, shade structures, improved insulation, and energy-efficient air conditioning. Implement and evaluate their effectiveness and scalability. Successful initiatives could be rolled out more broadly to improve indoor climate resilience across public buildings. Start by piloting heating and cooling systems in the Waste Water Treatment Plant admin building (Capital 2025 project). [CAP Actions 1.7, 1.9]</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>1.2 Expand home energy loan program: Extend the scope of a potential Home Energy Loan Program to incorporate climate adaptation measures, such as flood-proofing, enhanced insulation, and heat pump installation. Connect this program to Green Municipal Fund (GMF) funding opportunities to maximize access to financial support for climate-resilient upgrades. Include a public education component to communicate about energy efficiency and reducing energy-related risks. [CAP Action 1.3]</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$\$\$</p> <p>STAFF </p>
<p>1.3 Support energy-efficient and climate-resilient affordable housing: Examine feasibility of upgrading heating and cooling for The Lodge. Apply to available funding programs (e.g., GMF's New Construction of Sustainable Affordable Housing and Retrofit of Sustainable Affordable Housing) to support the construction and retrofitting of energy-efficient, climate-resilient affordable housing. This will contribute to the development of sustainable, low-carbon housing options for residents. [CAP Action 1.9]</p>	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$/\$\$</p> <p>STAFF </p>
<p>1.4 Investigate cooling requirements for rental buildings: Review the feasibility of enacting and enforcing an extreme heat bylaw that mandates the installation of cooling systems in residential buildings, particularly for tenants in multi-unit dwellings. This would set clear standards for ensuring tenant safety during heatwaves, such as maintaining safe indoor temperatures and ensuring access to cooling measures, especially for vulnerable populations.</p>	<p>TIMEFRAME Medium - Long</p> <p>INVESTMENT \$/\$\$</p> <p>STAFF </p>
<p>1.5 Engage with Cornwall Electric to advocate for energy resilience to address power outages: Advocate for investment in energy storage technologies with utility provider through franchise agreement. This can improve the reliability of the grid, reduce the impact of outages, and ensure continued service for critical infrastructure. Explore strategies to address cold weather power outages, including safety guidelines for alternative heating sources. [CAP Actions 1.8, 1.9]</p>	<p>TIMEFRAME Long</p> <p>INVESTMENT \$-\$\$\$</p> <p>STAFF </p>

Goal 2B: Enhance the climate-resilience of new and existing buildings in Cornwall.

ACTION	
<p>1.6 Review Site Plan Control for climate resilience: Conduct a review of the City’s Site Plan Control policies and guidelines to incorporate climate resilience measures, such as climate-resilient landscaping, appropriate shading, heat pump setbacks, enhanced stormwater management, and durable building materials. These changes will help to improve building and site resilience to climate-related challenges, such as flooding, high winds, and heatwaves. [CAP Action 1.6]</p>	<p>TIMEFRAME Short</p> <p>INVESTMENT \$</p> <p>STAFF </p>
<p>1.7 Engage with development and construction industry: Engage with representatives of the design, development and construction industry to raise awareness about the City’s climate vision and goals and discuss the challenges and opportunities for incorporating climate change adaptation and mitigation into new non-municipal buildings and renovations. Obtain insights on potential updates to development requirements and site control plan that support climate resilience and community safety. [CAP Action 1.6]</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>1.8 Address flooding issues in City-owned housing: This includes the basements of Cornwall Housing’s row-housing development and in the Lodge.</p>	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$\$\$/\$\$\$\$</p> <p>STAFF </p>
<p>1.9 Promote flood resilience in existing privately-owned buildings: Expand the existing Flood Risk Reduction Rebate Program to include a subsidized flood inspection program to identify flood vulnerabilities and provide tailored recommendations for flood-proofing measures in existing buildings (homes and businesses). Offer incentives to support implementing recommended flood-resilience measures, such as supporting sump pump and backwater valve installation, sewer lateral inspections and upgrades, downspout disconnection, and corrective grading prioritizing housing most at risk of flooding or with disproportionately impacted occupants.</p>	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$\$\$</p> <p>STAFF </p>

ACTION

1.10 Review and update requirements to address basement flooding: Align requirements and guidelines for new, rebuilt, and renovated homes with the CSA Guideline on Basement Flood Protection and Risk Reduction. These guidelines address flood prevention from overland flooding, storm and sanitary backwater, infiltration, and plumbing and drainage failures, and include protection tools such as backup power for sump pumps, access to foundation drainage, backwater valves, and more.

TIMEFRAME
Medium - Long

INVESTMENT
\$

STAFF
👤

1.11 Update floodplain designation mapping and provide for public use: Integrate floodplain mapping with flood construction levels from the Cornwall flood risk management strategy [Action 3.4] with the RRCA county-wide mapping currently underway. Educate the public on how to read, use and source the mapping through online and printed materials.

TIMEFRAME
Short - Medium

INVESTMENT
\$\$

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4.2 Community Health and Safety

4.2.1 Goals

- 2A.** Protect the health, safety and well-being of residents, prioritizing vulnerable and underserved populations.
- 2B.** Enhance emergency management capacity for extreme events.

4.2.2 Overview

As climate change progresses, Cornwall community members will face increasing risks from extreme heat and severe weather. This will disproportionately affect certain populations, such as seniors, low-income residents, and those living with pre-existing health conditions. It is therefore imperative that the City has effective services and emergency response systems ready to address evolving and often compounding hazards, to protect community well-being. Climate-related challenges to health and safety in Cornwall include the need to adapt infrastructure to changing conditions, improving public awareness of risks, and ensuring that there are adequate services and trained staff to support the population, including those who are particularly vulnerable to effects such as extreme heat. Emergency responders require adequate resources, training, and mental health support to effectively manage emergencies.

There are significant opportunities to strengthen community climate resilience by expanding public outreach, improving coordination with various service providers across the community, and integrating the latest climate data into emergency planning. Investing in municipal staff protections and using an equity-based lens to prioritize and provide targeted support for groups at risk may also improve health and safety outcomes during climate events.

4.2.3 Current Initiatives

CITY ACTIONS AND RESOURCES	FEDERAL AND PROVINCIAL INITIATIVES	COMMUNITY INITIATIVES
<p>Vibrant Communities: Our Safety and Well-Being Plan – Promotes social equity, strengthening local capacity to respond to climate-related challenges, and fostering collaboration to enhance safety and well-being in the face of changes (like climate change).</p> <p>Cornwall Civic Centre - Indoor Walking Track: The City provides an indoor walking track for social connection and physical activity during cold weather.</p>	<p>Ontario Climate Change and Health Vulnerability and Adaptation Assessment Guidelines – Health and Policy Adaptation: Identifies vulnerable populations and their sensitivity to climate-related health issues and creates an inventory of current policies/programs to assess their effectiveness for climate adaptation.</p>	<p>Eastern Ontario Health Unit (EOHU) has a number of initiatives that support adaptation, including:</p> <ul style="list-style-type: none"> • Heat Event Response Program (started in 2016) that aims to educate and raise awareness about heat-related illnesses, and provide alerts to those most at risk of heat-related illnesses during heat events. • Climate Change Health Vulnerability and Adaptation Assessment involves collaborating with partners to evaluate how climate change may affect community health, identify vulnerabilities and adaptive capacities, and provide guidance for reducing risks and protecting public well-being. • Issue EOHU Public Beach Advisories • Issue EOHU Drinking Water Advisories

4.2.4 Actions

Goal 2A: Protect the health, safety and well-being of residents, prioritizing vulnerable and underserved populations.

ACTION	
<p>2.1 Review and update cooling and warming service centres: Maintain designated cooling centres in accessible locations throughout the community where residents can seek relief during heatwaves, and review the need for additional centre(s) outside of downtown and/or extended hours to serve all areas of the community. This may also include:</p> <ul style="list-style-type: none"> Identify potential partnerships with local organizations, shelters and churches to host heating/cooling centres. Form partnerships and advocate for public access to privately owned pools in the City during extreme heat (e.g., DEV centre pool). Consider extending community pool hours and season. Review and adapt lifeguard services by extending lifeguard hours, keeping the pool open into the fall months, and providing entrance training for lifeguards on heat-related health risks. Educate the public on nearby cooling resources. Promote beaches in nearby counties as cooling spaces. 	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>2.2 Develop a heat stress awareness campaign: Develop a public education campaign to reduce heat stress, recognize heat exhaustion, and promote City services, such as cooling centres. This may involve:</p> <ul style="list-style-type: none"> Collaborate with the EOHU to align with their Heat Event Response Program. Collaborate with community service providers and other counties who support these populations to develop and deliver the outreach services in a targeted manner. Carry out outreach activities for disproportionately impacted populations during extreme heat events. 	<p>TIMEFRAME Short</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>2.3 Investigate and establish climate resiliency hubs: Investigate the potential to add climate resiliency hubs throughout the community (e.g., An outdoor community space that is more than just a place to sit — a place that reflects local character where residents can come together with neighbours, access wellness resources, attend a workshop, or rely on for help in times of need).²⁰</p>	<p>TIMEFRAME Medium - Long</p> <p>INVESTMENT \$\$\$</p> <p>STAFF </p>

²⁰ See also: [What are resilience hubs?](#)

Goal 2B: Enhance emergency management capacity for extreme events.

ACTION	
<p>2.4 Develop and maintain emergency response plans for climate-related events: Review and update existing emergency response plans to identify and address gaps in managing increasing frequency and severity of climate-related hazards, such as heatwaves, storms, and floods. Schedule regular updates to ensure the plans incorporate the latest climate data, emerging risks, and community feedback to improve response efficiency and effectiveness. Start by updating the Drinking Water Emergency Plan to support secondary water pump station and intake pipe.</p>	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$-\$</p> <p>STAFF 👤👤👤</p>
<p>2.5 Ensure emergency responders are supported, equipped and trained for climate hazards: Conduct a resource assessment to identify gaps in emergency response equipment and supplies needed to respond to climate hazards. Identify support needed to protect mental health for first responders. Determine training needs to address heat-related illnesses and flood response. Secure sustainable funding through grants, partnerships, and local budget allocations to provide ongoing support for mental health support, equipment procurement, training programs, and capacity-building for emergency responders.</p>	<p>TIMEFRAME Short - Long</p> <p>INVESTMENT \$\$</p> <p>STAFF 👤👤</p>





4.3 Municipal Infrastructure and Services

4.3.1 Goals

- 3A.** Strengthen municipal infrastructure against current and future climate risks.

4.3.2 Overview

City infrastructure and services can be damaged or disrupted by multiple climate hazards, leading to ripple effects that impact community members' daily lives and livelihoods. Infrastructure in Cornwall has been challenged in the past by severe flooding, for example, and sections of the City's municipal assets are aging and may not have been built to withstand the stressors being placed on them by climate change.²¹ The City currently provides a high level of service during and following events. As these events get more frequent and severe, City infrastructure, such as public roads, waste collection, or stormwater systems, must be designed to withstand the impacts of those climate hazards.

Proactive adaptation measures that consider these impacts and the effects to infrastructural lifespan could help the City maintain functional services during climate events (e.g., a severe storm). Opportunities to enhance the long-term resilience of municipal infrastructure and services include updating infrastructure standards, piloting Low Impact Development (LID) solutions, developing a municipal flood risk management strategy, and others discussed in this section. The City is a member of the Raisin Region Conservation Authority (RRCA), which works on managing flood risks, habitat management and enhancement, water quality monitoring and reporting, and pollution prevention. RRCA provides expert planning and develops collaborative projects with Cornwall and neighbouring communities on these projects.

²¹ Cornwall Asset Management Plan. (2016). https://www.cornwall.ca/en/city-hall/resources/Master-Plans/Asset_Management_Plan_2016_2.pdf

4.3.3 Current Initiatives

CITY ACTIONS AND RESOURCES
<p>Cornwall Energy Conservation and Demand Management Plan (2019-2023) – Water Metering, Appendix C: Implements water metering in all residential, industrial, commercial, and institutional facilities using water supplied by the City of Cornwall.</p>
<p>Municipal Works Administration Building – Net-Zero Ready Design: The new Municipal Works administration building was designed as a Net-Zero ready energy structure with enhanced insulation.</p>
<p>Cornwall Water Purification Plan Secondary Intake: To reduce risks associated with relying on one raw water intake for the Water Purification Plant, the City undertook an environmental assessment to identify suitable options for installing a secondary raw water intake. This would provide redundancy for clean drinking water supply to Cornwall in the event of a failure to the existing water intake.</p>

4.3.4 Actions

Goal 3A: Strengthen municipal infrastructure against current and future climate risks.



ACTION	
<p>3.1 Review and update infrastructure design standards: Conduct a review of existing infrastructure design standards and update to ensure that new infrastructure is built to withstand future climate conditions. Ensure that tender specifications are included in the documentation when updating design standards.</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>
<p>3.2 Develop contingency plan for essential services: Develop and implement contingency plans to ensure the uninterrupted delivery of essential services, such as public transit, road clearing, waste collection, waste water and drinking water during extreme weather events. These plans should address potential disruptions and outline alternative strategies, including resource allocation, operational adjustments, and communication protocols, to maintain service continuity under climate-related stress.</p> <ul style="list-style-type: none"> • Continue planning for building a secondary water intake to enhance resilience of the potable water supply. Advocate for funding support from Provincial and Federal governments to support large capital cost. • Develop a Harmful Algal Bloom Plan Guide consisting of a sampling and monitoring program for harmful algae and UV/chlorine resilient pathogens (e.g. cryptosporidium) that includes an action plan in place in the event of a widespread bloom. • Work with City vendors (e.g., waste and recycling collection) and departments (e.g., water, wastewater, road clearing) to ensure contingency plans are in place. 	<p>TIMEFRAME Medium - Long</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>

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ACTION

3.3 Pilot Low Impact Development (LID) solutions: Launch pilot projects that use LID techniques to manage stormwater runoff. Work with the RRCA to incorporate expertise on LID into stormwater management planning. This may include prioritizing nature-based solutions, such as wetlands, rain gardens, and replacing impervious surfaces with permeable, naturalized spaces. These projects will serve as models for future infrastructure development, showcasing the benefits of sustainable, climate-resilient stormwater management practices. Seek support from GMF and/or Intact climate resilience funding programs. One option may be to develop a rain garden program in Cornwall modeled after successful initiatives such as the Rain Ready Ottawa Program. This will encourage the installation of rain gardens on public and private property to manage stormwater runoff, reduce flooding and improve water quality. This program could provide education, technical support and incentives to encourage rain gardens.

- Develop a rain garden strategy that includes guidelines that prioritize native plants. **[Aligns with Goal 4A]**

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3.4 Develop a municipal flood risk management strategy, update plans, and perform required upgrades: Develop an urban flood risk management strategy utilizing available funding (e.g., Municipal Flood Risk Check-Up from the Intact Centre on Climate Adaptation) and collaborate with RRCA. This strategy will assess current flood risks, outline mitigation measures, and integrate long-term flood resilience planning for the community. The plan will focus on reducing flood impacts through infrastructure improvements and natural systems-based solutions. Additional components may include:

- Review and update the Pollution Prevention and Control Plan to reflect best practices in reducing water pollution from combined sewer overflows.
- Undertake a sewer and stormwater master servicing study to identify current and potential future system constraints using updated climate projections. Continue and build on recent efforts to address the most vulnerable infrastructure elements for retrofitting or replacement based on the anticipated impacts of climate risks such as flooding, extreme heat, severe storms, and drought. Address concerns of odours and blockages that arise from drought conditions.
- Consider mitigation strategies in the revision of stormwater master plans that reduce urban runoff and flooding risk such as incorporating the installation of holding tanks to reduce stormwater overflows and other measures to improve wastewater treatment.
- Identify mechanisms to ensure regular monitoring and cleaning of catch basins (e.g., "Adopt-A-Catch Basin" program or City operational updates) to improve water quality, decrease localized flooding, and reduce maintenance costs.

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3.5 Install and maintain air filtration in public buildings: Review public facilities and install MERV 13 or higher filters during wildfire episodes to maintain clean indoor air. Develop indoor air quality management plans and protocols for adjusting ventilation and activating filters when needed. Educate building occupants on how to reduce exposure and collaborate with the local health authority to stay informed about air quality conditions.

- Track the trade-offs related to temporary installment of MERV 13 or higher filters during wildfire smoke events, including labour costs and energy expenditures for increasing air quality in buildings.

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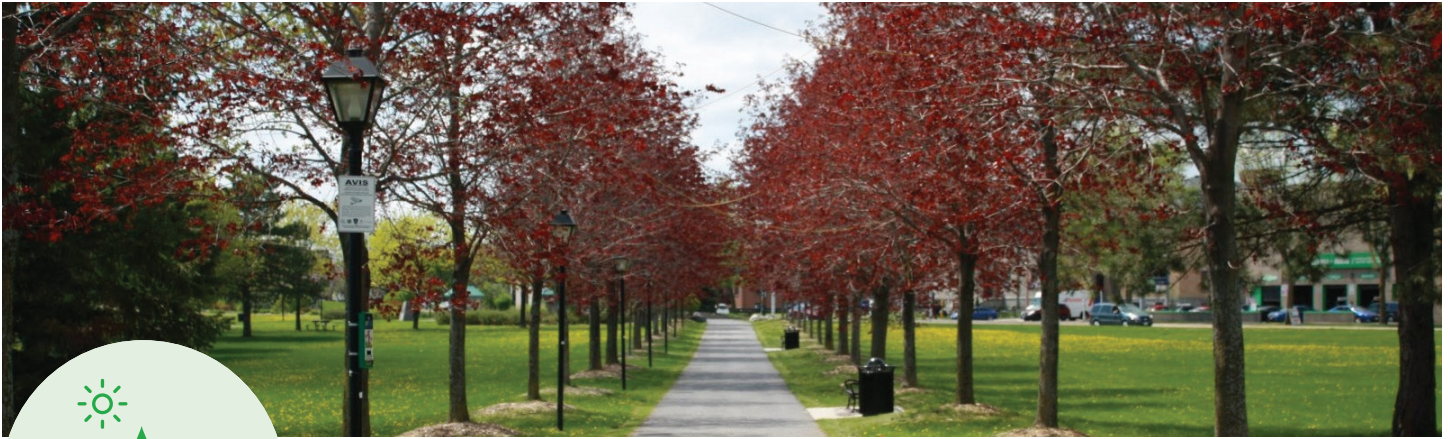
3.6 Explore the feasibility of road salt mitigation alternatives: Pre-wetting and advanced salt mixes may provide opportunities to reduce the impact of runoff carrying road salt into nearby water bodies, affecting water quality and biodiversity in nearshore habitats.

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4.4 Natural Environment and Green Infrastructure

4.4.1 Goals

- 4A.** Expand and protect natural systems to mitigate climate impacts and enhance biodiversity.

4.4.2 Overview

Cornwall's natural environment plays a key role in the community's wellbeing, prosperity, and identity.²² The natural environment and green infrastructure—such as urban forests or riparian buffers and ditches—provide key ecosystem services to the community.²³ Ecosystem services refer to the ways that ecosystems contribute to human wellbeing and quality of life. Some of the key ecosystem services provided by the natural environment and green infrastructure in Cornwall include regulating extreme temperatures, managing stormwater, improving air and water quality, providing landscapes for recreation, drawing in tourism dollars, and supporting local wildlife. These ecosystem services support the City's resilience by providing resources that make it easier for our human systems to withstand and bounce back from the effects of climate-related hazards.

Cornwall's environment is facing significant threats from invasive species, habitat fragmentation and tree canopy loss in urban areas.²⁴

²² City of Cornwall. (2020). Recreation Master Plan. <https://www.cornwall.ca/en/city-hall/resources/Master-Plans/RecMasterPlan.pdf>

²³ City of Cornwall. (2018). Community Plan. <https://www.cornwall.ca/en/city-hall/resources/Master-Plans/CityofCornwallOfficialPlan2018.pdf>

²⁴ City of Cornwall. (2020). Tree Canopy and Natural Vegetation Protection and Enhancement Strategy. <https://www.cornwall.ca/en/live-here/resources/Forestry/Tree-Canopy-and-Natural-Vegetation-Policy-Climate-Change---final-copy.pdf>

For example, the increasing presence of ticks due to milder winter conditions is affecting riparian zones, leading to ecosystem damage that ultimately affects the wellbeing of City residents. Efforts to manage these challenges are already underway, such as Cornwall’s Parkland Dedication By-law²⁵, and Tree Canopy and Natural Vegetation Protection and Enhancement Policy.²⁶ In addition to these efforts, there are opportunities to develop an Urban Forest Management Plan, expand biodiversity initiatives, and restore riparian efforts to maximize the ecosystem services provided by a healthy natural environment.

4.2.3 Current Initiatives

CITY ACTIONS AND RESOURCES	FEDERAL AND PROVINCIAL INITIATIVES	COMMUNITY INITIATIVES
<p>Cornwall Recreation Master Plan - Parkland protection and expansion: aims to protect and expand parklands - 2 hectares per 1,000 residents (Section 2.4 & Action 57).</p> <p>Cornwall Official Plan (OP) - Urban tree canopy expansion: aims to increase tree cover by 2030 (Section 3.4).</p> <p>Cornwall Tree Canopy and Natural Vegetation Protection and Enhancement Policy - Tree canopy and natural vegetation protection: prioritizes tree planting in low-canopy areas, promotes drought-resistant species, and expands urban and shoreline vegetation (Sections D & E).</p> <p>Temporary Tree Protection By-Law</p>	<p>Kunming-Montreal Global Biodiversity Framework (2022) - Halting biodiversity loss: sets 23 targets to halt and reverse biodiversity loss by 2030.</p> <p>Ontario Biodiversity Strategy (2023 - 2030) - Biodiversity protection and climate resilience: assessing ecosystem vulnerabilities, developing climate refugia plans, and expanding natural infrastructure.</p> <p>Ontario Provincial Climate Change Impact Assessment - Climate resilience: enhancing resilience by restoring habitats, conserving water, expanding urban tree canopy, and strengthening natural buffers to mitigate climate risks (Sections 5.7.3, 6.7.1, 7.7.1, 7.7.3, 7.7.4).</p>	<p>Natural Heritage Systems (NHS) study: identifies NHS (a network of interconnected natural features) for preservation, and policies that inform development, stewardship, climate change resiliency and conservation efforts. A partnership between the counties and South Nation Conservation.</p> <p>RRCA Grassland Stewardship: property owners can apply for funding to create, enhance or maintain grassland habitat projects on their land.</p> <p>RRCA Annual Tree Giveaway: nearly 60,000 trees have been distributed to community members via municipalities in the region since 2000.</p>

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25 City of Cornwall. (2022). By-law 2022-089. <https://www.cornwall.ca/en/do-business/resources/By-law-2022-089---Signed-Parkland-Dedication-By-law.pdf>

26 City of Cornwall. (2020). Tree Canopy and Natural Vegetation Protection and Enhancement Strategy. <https://www.cornwall.ca/en/live-here/resources/Forestry/Tree-Canopy-and-Natural-Vegetation-Policy-Climate-Change---final-copy.pdf>

CITY ACTIONS AND RESOURCES	FEDERAL AND PROVINCIAL INITIATIVES	COMMUNITY INITIATIVES
	<p>Ontario Invasive Species Strategic Plan - Invasive species management: enhancing invasive species control through cross-border collaboration, public awareness campaigns, and best management practices.</p> <p>2022 Environmental Strategy Update (Richmond Hill) - Invasive species management and education: educating residents, managing Emerald Ash Borer, and developing a strategy to control invasive species.</p> <p>MNRF Natural Resources Climate Adaptation Strategy - Natural resources climate adaptation: researching climate impacts, integrating Indigenous knowledge, and developing adaptation tools (Actions 1.4 & 3.3, Section 2.2).</p>	<p>St. Lawrence River Remedial Action Plan: a joint effort by governments and local partners to restore environmental health in the river by identifying issues, setting goals, and implementing actions to recover water quality.</p> <p>Great River Rapport: a collaborative, science-based initiative that integrates Indigenous knowledge, community engagement, and ecological monitoring to assess and enhance the resilience of the Upper St. Lawrence River ecosystem, aiming to inform climate change adaptation.</p> <p>St. Lawrence River Strategy: a collaborative initiative that integrates science research, Indigenous knowledge, and community engagement to enhance climate resilience along the river corridor, focusing on planting and ecosystem restoration.</p> <p>Watersheds Canada – Natural Edge Program: empowers waterfront property owners to enhance climate resilience by restoring shorelines with native vegetation, reducing erosion, improving water quality, and supporting biodiversity.</p> <p>Phragmites Action Program: supports collaborative, community-led projects to manage invasive Phragmites, enhancing climate resilience by protecting wetlands, biodiversity, and agricultural lands in Eastern Ontario.</p>

4.4.4 Actions

Goal 4A: Expand and protect natural systems to mitigate climate impacts and enhance biodiversity.





ACTION	
<p>4.1 Develop urban forest management plan: Develop an Urban Forest Management Plan that guides tree planting, canopy expansion, mandatory boulevard tree-planting, and the maintenance of urban forests in alignment with climate projections. This plan will ensure the resilience of tree cover and the continued delivery of vital ecosystem services, such as shading and cooling, particularly in areas of Cornwall that are most vulnerable to climate impacts. It will also support broader goals of carbon sequestration and biodiversity. Coordinate with RRCA. [CAP Actions 4.1, 4.5]</p> <ul style="list-style-type: none"> • Encourage the planting of “tiny forests” (small-scale, densely planted native urban forests) in locations such as Bell Park, Mattice Park, and the library. • Increase staff expertise in the area of urban forest management. 	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>4.2 Support invasive species management programs: Support partners (e.g. River Institute and RRCA) to advance a program that safeguards local ecosystems by identifying, monitoring, and controlling invasive species. This could build on existing programs and collaborative efforts to target invasive phragmites in Eastern Ontario. An expanded program will aim to reduce the spread of non-native species that threaten native biodiversity and ecosystem functions, ensuring the resilience of natural systems in the face of climate change.</p>	<p>TIMEFRAME Medium - Long</p> <p>INVESTMENT \$</p> <p>STAFF </p>
<p>4.3 Tick management: Implement measures to reduce tick presence along hiking trails, such as wood chip surfacing, to mitigate risks associated with milder winters, as well as public education campaigns to reduce exposure. Tick management measures will include aiming to create an environment less hospitable to ticks without harming other wildlife to improve biodiversity by employing biodiverse-friendly management strategies.</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>4.4 Continue to collaborate on riparian restoration: Update and review flood management plans in collaboration with conservation organizations, including the Raisin Region Conservation Authority, the River Institute, and Watersheds Canada. Continue riparian restoration to reduce erosion and improve waterway health and ensure shoreline protections are in place.</p> <ul style="list-style-type: none"> • Support grant applications and communicate updates on the City’s website. 	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>

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ACTION	
<p>4.5 Partner with local organizations to develop a biodiversity strategy: Collaborate with local organizations to develop and implement a biodiversity strategy aimed at increasing the amount and quality of natural areas in Cornwall. This strategy can build on the existing NHS to enhance biodiversity through habitat protection, restoration, and increased access to nature for residents. It will also support the establishment of wildlife corridors and the protection of critical habitats. Support may be available through Canada’s Nature Legacy program.</p> <ul style="list-style-type: none"> • Identify development guidelines that integrate green infrastructure and support and enhance biodiversity. • Incentivize property owners and local schools to adopt landscaping and watering practices that encourage biodiversity (e.g., Healthy Yards or Grow Zones programs; Leave the Leaves campaign in the fall). • Identify additional indicators to monitor biodiversity (e.g. wildlife corridor connectivity and species-at-risk monitoring and recovery). 	<p>TIMEFRAME Medium - Long</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>4.6 Prevent Water Contamination: Continue to promote awareness and best practices for preventing water contamination and ensuring safe usage through the Drinking Water Source Protection Plan with the Raisin Region Conservation Authority.</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>
<p>4.7 Explore an All-Season Farmers’ Market: Investigate the feasibility of providing land for an all-season farmers’ market to support local producers and makers and supporting fund-raising efforts with partners (e.g., Kinsmen Farmers’ Market) for establishing a covered market space. [CAP Action 4.6]</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>

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ACTION

4.8 Engage the community through outreach: To support natural environment, green infrastructure, and ecosystem initiatives and sustainable gardening initiatives. Participate in the RRCA Annual Tree Giveaway and amplify communications from other initiatives with aligned goals.

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4.9 Support protection of wetlands and other natural areas through land-use planning tools: Create a conservation strategy in collaboration with partners that identifies priority natural areas for protection—particularly wetlands—within Cornwall. Employ municipal planning tools, including updates to the Official Plan, zoning bylaw, and site plan control to support protection of identified areas.

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4.5 Strategic Planning and Decision-Making

4.5.1 Goals

- 5A.** Incorporate climate resilience into municipal planning, policies and decision-making processes.
- 5B.** Strengthen community capacity for climate change resilience.

4.5.2 Overview

Effective climate adaptation requires strong leadership, decision-making, and planning efforts. Integrating a climate resilience lens into municipal plans, policies, and governance structures, can support better adaptation across systems, teams, sectors and structures. There are opportunities to integrate a climate resilience lens into more City plans and policies, such as the Economic and Strategic Plan²⁷, Official Plan²⁸, and Emergency Response Plan.²⁹ Parts of these plans already highlight the need for integrating climate resilience into City planning and public awareness campaigns. For example, Cornwall's Strategic Plan outlines several operational strategies to respond to climate change and achieve net zero emissions by 2050 under its third pillar. However, other pillars, such as housing, community connection, and future planning, may also benefit from a climate lens, as the impacts of climate change will affect all of society.

²⁷ Cornwall Economic and Strategic Plan. (2016). <https://choosecornwall.ca/wp-content/uploads/2018/06/Cornwall-Economic-Development-Strategic-Plan-2016.pdf>

²⁸ Cornwall Official Plan. (2018). <https://www.cornwall.ca/en/city-hall/resources/Master-Plans/CityofCornwallOfficialPlan2018.pdf>

²⁹ Cornwall Emergency Response Plan. (2016). <https://www.cornwall.ca/en/city-hall/resources/Master-Plans/Cornwall-Emergency-Plan-Ver-6.16.1.pdf>

There may also be an opportunity to ensure that City investments, land-use planning, and emergency preparedness efforts are ready for and align with the current and future climate projections. Other opportunities for the City include using vulnerability mapping to inform urban planning priorities, strengthening emergency notification systems, and launching a community-wide climate preparedness program. Implementing strong strategic planning and decision-making that takes climate adaptation needs into account now can support the City in reducing its vulnerability and the costs of reactive rather than proactive adaptation over time.

4.5.3 Current Initiatives

The City has many strategic plans, which have been mentioned throughout this document. This section on strategic planning and decision-making is about how the City can start to incorporate and mobilize the actions laid out in key documents such as Cornwall's Strategic Plan and Official Plan through a climate adaptation lens. Additional federal and provincial level guidance at the strategic level that the City should seek to align adaptation action and policy to include:

Canada's National Adaptation Strategy³⁰: Provides a national framework for strengthening climate resilience by reducing risks, improving emergency management, supporting climate-resilient infrastructure, protecting biodiversity, and enhancing public health. It encourages municipalities to integrate adaptation into planning, infrastructure, and decision-making to better prepare for climate challenges.

Natural Resources Canada's Regional Adaptation Collaborative Program – Ontario Regional Adaptation Collaborative³¹: Establishes a collaborative framework to integrate climate adaptation into regional planning and creates partnerships with local governments and organizations to address climate impacts across jurisdictions.

Climate Ready: Ontario's Adaptation Strategy and Action Plan³²: Requires adaptation to be a key consideration in updating existing policies and programs, as well as in the development of new policies and programs.

30 Government of Canada. (2022). Canada's National Adaptation Strategy. <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/full-strategy.html>

31 Climate Risk Institute. (2018). Ontario Regional Adaptation Collaborative. <https://climateriskinstitute.ca/2019/09/13/ontario-regional-adaptation-collaborative-2018-2021/>

32 Government of Ontario. (2011). Climate Ready: Ontario's Adaptation Strategy and Action Plan. <https://docs.ontario.ca/documents/817/2-2-5-climate-ready-en.pdf>

Bill 198: Ontario’s Green Infrastructure and Emergency Preparedness Act³³:

Aims to improve climate resilience through enhanced green infrastructure, flood mitigation, and emergency preparedness. It emphasizes integrating nature-based solutions and strengthening local adaptation efforts.

4.5.4 Actions

Goal 5A: Incorporate climate resilience into municipal planning, policies and decision-making processes.







ACTION	
<p>5.1 Implement a Climate Lens for All Council Reports and Policies: Integrate a "Climate Lens" into all municipal decision-making processes, including Council reports, policies, procedures and procurement processes. This lens will evaluate climate mitigation and adaptation considerations, ensuring that municipal projects, initiatives, and strategies are assessed for their potential climate risks based on current climate projections. The Climate Lens will go beyond climate action plan alignment; it will evaluate the impacts of climate change on the initiative being reviewed and identify changes (mitigation and adaptation opportunities) to reduce risk. [CAP Action 5.1]</p> <ul style="list-style-type: none"> • Start by updating the Strategic Plan using a climate lens, rather than relying on referencing the CAP. • Consider including climate equity considerations as part of the climate lens, including support for disproportionately impacted groups and individuals. 	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>
<p>5.2 Implement a Climate Lens for the Official Plan Update: During the Official Plan update, review and update all policies to incorporate a climate lens that considers both emission reductions and climate adaptation. [CAP Action 2.6]</p>	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>
<p>5.3 Implement a Climate Lens for the Asset Management Plan: Incorporate climate change considerations into the City’s asset management plan to ensure resilient infrastructure that is designed, constructed, and maintained to withstand climate change. Align building and infrastructure design standards with current climate projections, employ lifecycle costing (e.g., Infrastructure Canada Lifecycle Costing Framework), and consider the role for natural assets as cost-effective flood and heat management solutions (e.g., Municipal Natural Assets Initiative). Seek resources and support from the federal Climate Toolkit for Housing and Infrastructure. [CAP Action 5.4]</p>	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>

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33 Legislative Assembly of Ontario. (2024). Bill 198, Ontario Climate Change Adaptation and Resilience Act. <https://www.ola.org/en/legislative-business/bills/parliament-43/session-1/bill-198#BK3>

ACTION	
<p>5.4 Propose a Climate Reserve/Budget and explore municipal green bonds: Create a proposal for a dedicated reserve fund for municipal climate action and present to council. The reserve should ensure consistent financial resources for climate-related projects (adaptation and mitigation) and support long-term planning.</p> <ul style="list-style-type: none"> Explore the use of a municipal green bond funding regime to finance capital projects that promote environmentally sustainable development across the community to mitigate or adapt to climate change. 	<p>TIMEFRAME Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>

Goal 5B: Strengthen community capacity for climate change resilience.

ACTION	
<p>5.5 Launch Community-Wide Emergency Preparedness Program: Develop and implement a community-wide emergency preparedness program that addresses and provides public education on extreme heat, wildfire smoke, and flooding. This program would provide resources, training, and community outreach to prepare residents for climate-related emergencies. Use social media, workshops, and local events to engage residents, providing information on how to protect themselves and their families during extreme weather events for 72 hours, and offer resources for staying safe. [CAP Action 5.8]</p>	<p>TIMEFRAME Short - Medium (ongoing)</p> <p>INVESTMENT \$\$</p> <p>STAFF </p>
<p>5.6 Include Climate-related Emergencies into the City-wide Emergency Notification System: The City is currently implementing a Mass Communication Alter System. This should include an emergency notification system that can provide real-time climate hazard alerts to residents. This system would send timely alerts regarding heatwaves, wildfires, flooding, and other climate-related threats, ensuring that residents have the information they need to take appropriate action.</p>	<p>TIMEFRAME Short - Medium</p> <p>INVESTMENT \$</p> <p>STAFF </p>
<p>5.7 Communication Gap Analysis: Undertake a gap analysis of existing communication processes related to climate change and extreme weather.</p>	<p>TIMEFRAME Short</p> <p>INVESTMENT \$</p> <p>STAFF </p>

5 Implementation and Reporting

5.1 Ownership and Accountability for the Plan

The adaptation actions outlined in the sections above span many City departments, and require a high degree of coordination to implement. Coordination will be required to ensure that targets, goals, and actions are appropriately integrated into department priorities, budgets, and work planning. Implementation of Climate Resilient Cornwall will take a similar approach to the Climate Action Plan (CAP):

- **Leadership of the Plan:** The Plan will be led by the Environmental Sustainability team in the Department of Infrastructure and Municipal Works, but each team identified in the implementation plan is responsible for advancing their actions.
- **Collaboration:** Ongoing collaboration and coordination with a working group with representatives from all key departments involved in implementing the plan will continue to meet regularly. This approach is already being used for the CAP, and collaboration can extend to adaptation priorities.
- **Reporting:** Departments will report to the Environmental Sustainability team on action progress.
- **Strategic Alignment:** To maintain alignment and accountability across City management, progress on this plan will be a standing item at senior management meetings. This will ensure that adaptation efforts remain a priority and are integrated into high-level decision-making processes.
- **Updates:** The City will continue to highlight sustainability progress in the monthly Eco Update public e-newsletter. Additional updates to promote transparency may be offered through City Council briefings, public reports and community engagement sessions.

5.2 City Resource Requirements

A general indication of the resources (cost and staffing) required for the implementation of adaptation actions is provided in the tables under the adaptation themes above. At a high level, the key resources required for the successful implementation of this plan are summarized below.

Table 11: City Resources Required for Implementation

STAFFING RESOURCES	BUDGET ALLOCATION	OTHER RESOURCES
<ul style="list-style-type: none"> • Dedicated staff time must be allocated within departmental work plans to implement priority actions. • Some actions may require cross-departmental collaboration, necessitating coordination efforts beyond regular workloads. • As new initiatives emerge, additional technical expertise or specialized roles (e.g., climate adaptation specialists, resilience planners, grant writers) may be needed to support effective implementation. 	<ul style="list-style-type: none"> • Departments may need to increase or reallocate budgets to fulfill the commitments outlined in the plan. The cost of implementation will vary depending on the complexity of actions, with some requiring long-term capital investment (e.g., infrastructure upgrades) while others may be incorporated into operational budgets. • Grant applications for funding from provincial and federal agencies will be a key strategy for financing adaptation measures. However, securing these funds will require dedicated staff time for researching opportunities, preparing applications, and managing reporting requirements. • Private-sector partnerships and external funding mechanisms may be explored to supplement municipal resources where appropriate. 	<ul style="list-style-type: none"> • Consultation costs may be necessary for feasibility studies, technical assessments, and public engagement initiatives to ensure actions are well-informed and effective. • External expertise may be required for specialized projects, such as climate risk assessments, legal reviews of policy changes, or engineering solutions for infrastructure resilience. • Investments in data collection and monitoring systems can support decision-making and justify further adaptation action.



5.3 Costs and Benefits of Climate Adaptation

Climate change is driving significant economic losses globally, as extreme weather events cause tens of billions of dollars in damage annually.³⁴ The economic impact of climate change is expected to grow substantially in the coming decades. Under a high-emissions scenario (RCP 8.5), annual climate change costs in Canada could reach \$140 billion by mid-century³⁵ and \$865 billion by the end of the century.³⁶

Canadian communities are facing a wide range of both direct and indirect impacts of climate change, with consequences for the built environment, socio-economic, and natural systems. Municipalities are facing the increased financial burden of keeping up with these consequences. Increased costs for municipalities are manifesting through increased need for repairs, increased operations and maintenance expenses, loss of service, and delivery and business interruptions, among others.³⁷ As climate change continues to intensify and the value of municipal assets grows, costs for municipalities are expected to rise. Climate change is also impacting the efficiency of municipalities through disruptions to work and staffing.³⁸ Without proactive adaptation measures, the costs of climate change for municipalities will increase, placing strain on already stretched budgets.

34 ICELI. (2022). The Cost of Doing Nothing: Primer document for building a local business case for adaptation. <https://icleicanada.org/wp-content/uploads/2022/11/CODN-Primer.pdf>

35 GHD. (2022). Aquanomics: The Economics of Water Risk and Future Resilience. <https://aquanomics.ghd.com/>

36 Sawyer, D., Ness, R., Lee, C., & Miller, S. (2022). Damage Control: Reducing the costs of climate impacts in Canada. Canadian Climate Institute. <https://climateinstitute.ca/reports/damage-control>

37 Boyd, R., & Markandya, A. (2021). Costs and Benefits of Climate Change Impacts and Adaptation, Chapter 6. In F. J. Warren & N. Lulham (Eds.), *Canada in a Changing Climate: National Issues Report*. Government of Canada. https://www.nrcan.gc.ca/sites/nrcan/files/pdf/National_Issues_Report_Final_EN.pdf

38 IBC & FCM [Insurance Bureau of Canada, & Federation of Canadian Municipalities]. (2020). *Investing in Canada's Future: The Cost of Climate Adaptation at the Local Level*. Federation of Canadian Municipalities. <https://data.fcm.ca/documents/reports/investing-in-canadas-future-the-cost-of-climate-adaptation.pdf>

Table 12: Direct vs. Indirect Costs Due to Climate Change**DIRECT COSTS**

- Damage to hard infrastructure and buildings (e.g., repair and replacement after a flood event).
- Increased wear and tear on infrastructure, leading to higher operations and maintenance costs.
- Physical and mental health impacts (e.g., medical treatment costs after extreme heat events).
- Damage to ecosystems (e.g., loss of tree canopy after windstorms, reducing ecosystem services).

INDIRECT COSTS

- Disruption or interruption of critical services (e.g., water supply and waste management).
- Worker absenteeism due to damaged transportation networks.
- Rising insurance premiums for flood-prone buildings.
- Long-term physical and mental health consequences.
- Economic losses for businesses reliant on directly affected industries.

There is evidence showing how proactive adaptation action can have a high return on investment and avoid delayed and compounded costs for municipalities in the future. Most of these assessments have used Cost-Benefit Analysis (CBA) to identify the potential savings from adaptation action. For example, the Canadian Climate Institute finds that "... each dollar invested in adaptation returns \$13-\$15 in direct and indirect benefits" and that when adaptation measures are combined with mitigation, the future costs of climate change could be reduced by 75%.³⁹ This highlights the importance of aligning adaptation strategies from this plan with mitigation strategies from Cornwall's Climate Action Plan. In another study for the Canadian Climate Institute, researchers looked at 60 different ways to adapt to climate hazards like flooding, drought, loss of forests, extreme heat, and poor air quality. They found that "soft" adaptation actions (e.g., changes to planning and pest control practices) were more cost-effective than "hard" or engineered options (e.g., dykes and sea walls).

³⁹ Canadian Climate Institute. (n.d.). Counting the Costs of Climate Change. <https://climateinstitute.ca/map-climate-costs-tracker/#:~:text=Indeed%2C%20Institute%20research%20finds%20that,more%20stable%20and%20affordable%20future.>

While the economic impacts of extreme weather events are increasingly well understood, the financial risks associated with slow-onset climate events, such as sea-level rise, remain poorly quantified. Keeping this in mind, the costs of doing nothing could be much higher, and the benefits of proactive adaptation more widespread than reported in these studies. Monitoring and Reporting

The following table outlines the Plan goals and corresponding indicators to track progress. Regular monitoring and reporting will help ensure Climate Resilient Cornwall remains relevant and effective. Public communication on progress will also be important to maintain engagement and support. Achieving these goals may require additional resources, external funding, and collaboration with other levels of government.

Table 13: Summary of Action Areas, Goals and Indicators


GOAL STATEMENT	INDICATORS	RESPONSIBLE
 Energy Resilience and Buildings		
Reduce energy-related risks by improving access to affordable and resilient energy solutions.	<ul style="list-style-type: none"> Total percentage of buildings across Cornwall using heat pumps that provide cooling. Total percentage of City-operated buildings are retrofitted for energy efficiency measures and heat pumps. 	<ul style="list-style-type: none"> Buildings Asset Management Energy Conservation and Demand Management
Enhance the climate-resilience of new and existing buildings in Cornwall.	<ul style="list-style-type: none"> Number of building permits a year that have resilience upgrades, or are resilient new builds.⁴⁰ Number of City facility retrofits or new builds that incorporate climate resilience into design. 	<ul style="list-style-type: none"> Buildings Asset Management Energy Conservation and Demand Management

Table continues on next page

⁴⁰ Feasibility of tracking to be determined. Example measures to track: <https://www.usgbc.org/credits/enhancedresilience>.





GOAL STATEMENT	INDICATORS	RESPONSIBLE
 Community Health and Safety		
Protect the health, safety and well-being of residents, prioritizing vulnerable and underserved populations.	<ul style="list-style-type: none"> Percentage of City policies or plans developed with equity focus. 	<ul style="list-style-type: none"> Strategic Planning
Enhance emergency management capacity for extreme events.	<ul style="list-style-type: none"> Number of personnel hours/ days to provide emergency shelter (cooling / heating) per year. Number of emergency management initiatives/ programs implemented by the City per year. 	<ul style="list-style-type: none"> Emergency Services
 Municipal Infrastructure and Services		
Strengthen municipal infrastructure against current and future climate risks.	<ul style="list-style-type: none"> Number of contingency plans developed / updated for essential services to reflect climate considerations. Total costs per year on climate-related infrastructure improvements. Percentage of pervious/permeable surfaces per total area of jurisdiction. Percentage of impervious surfaces per total area of jurisdiction. Quantity of road salt used and number of applications. 	<ul style="list-style-type: none"> Asset Management & Infrastructure and Municipal Works

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GOAL STATEMENT	INDICATORS	RESPONSIBLE
 Natural Environment and Green Infrastructure		
<p>Expand and protect natural systems to mitigate climate impacts and enhance biodiversity.</p>	<ul style="list-style-type: none"> • Percentage of mature tree cover area per total area of jurisdiction. • Percentage of provincially significant wetland area per total area of jurisdiction. • Water quality monitoring (TBD). • Tick populations and number of cases of lyme disease (obtaining data from the Eastern Ontario Health Unit). • Number of actions implemented / year to protect and improve biodiversity implemented. 	<ul style="list-style-type: none"> • Environmental Sustainability
 Strategic Planning and Decision Making		
<p>Incorporate climate resilience into municipal planning, policies and decision-making processes.</p>	<ul style="list-style-type: none"> • Number of climate initiatives/ projects implemented per year. • Total funding allocated to climate projects per year. 	<ul style="list-style-type: none"> • Environmental Sustainability
<p>Strengthen community capacity for climate change resilience.</p>	<ul style="list-style-type: none"> • Number of engagement events on climate-related topics per year. • Number of subscribers to Cornwall Emergency Notification website. • Number of visitors to the Preparedness Program website. 	<ul style="list-style-type: none"> • Communications



Appendix A: Risk Framework and Criteria

This climate risk assessment was developed using an adapted version of the Local Governments for Sustainability's Building Adaptive and Resilient Communities (ICLEI-BARC) risk assessment framework, which was tailored to the specific needs and context of Cornwall.

Risk is defined as a function of the likelihood of an event occurring and the severity of its consequences, expressed as follows:

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$

The impacts of climate change selected for this risk assessment were gathered through a literature review and discussions with City of Cornwall staff and community representatives. The rating frameworks for likelihood and consequence are included below.

Likelihood

To determine likelihood, we first considered whether the impact is **recurring** or a **single event**. For example, increased demand on water supply is a recurrent impact, whereas damage to engineered infrastructure from an extreme weather event is a single event. For each impact, we assigned a likelihood rating from 1 to 5 using the scale as seen below. These ratings were informed by historical records, climate projections, and local knowledge.

Table A-1: Likelihood Rating Framework

LIKELIHOOD RATING	RECURRENT IMPACT	SINGLE EVENT
5 Almost Certain	Could occur several times per year	More likely than not – probability greater than 50%
4 Likely	May arise about once per year	As likely as not – 50/50 chance
3 Possible	May arise once in 10 years	Less likely than not but still appreciable – probability less than 50% but still quite high
2 Unlikely	May arise once in 10 years to 25 years	Unlikely but not negligible – probability low but noticeably greater than zero
1 Rare	Unlikely during the next 25 years	Negligible – probability very small, close to zero

We also considered current and future likelihood. The table below outlines the current and future likelihood of various climate hazards based on projections of climate change trends and their expected impacts in Cornwall. These projections consider the increasing frequency and intensity of extreme weather events as a result of climate change.

Table A-2: Current and Future Likelihood Rating by Hazard

HAZARD	CURRENT LIKELIHOOD	FUTURE LIKELIHOOD
Extreme heat	4	5
Drought	1	2
Wildfire	1	1
Smoke	3	4
Flooding	2	3
Storms	2	3

Consequence Rating Framework

Consequence refers to the known or estimated consequences (to public health and safety, local economy, environment, and public infrastructure) of a particular impact. Consequence was determined through a review of the past impacts, the climate projections, and engagement with City of Cornwall staff and stakeholders. For each impact, we have assigned a consequence rating from 1 to 5 using the scale. These ratings were developed by reviewing past events, analyzing projected climate changes, and incorporating feedback from City of Cornwall staff and community representatives.

Table A-3: Consequence Rating Framework

CONSEQUENCE RATING	CRITERIA			
	Public health and safety	Local economy	Environment	Public infrastructure
5 Catastrophic	Large numbers of serious injuries or loss of lives	Regional decline leading to widespread business failure, loss of employment and hardship	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage	Widespread infrastructure failure disrupts essential services with major recovery needs
4 Major	Isolated instances of serious injuries or loss of life	Regional economic slowdown such that businesses are unable to thrive and employment does not keep pace with population growth	Severe loss of environmental assets and a danger of continuing environmental damage	Service disruptions in multiple key systems require significant, coordinated response efforts and resources for restoration.
3 Moderate	Small number of injuries	Significant general reduction in economic performance relative to current projections	Isolated but significant instances of environmental damage that might be reversed with intensive efforts	Service interruptions in key infrastructure cause temporary disruptions. Repairs are necessary but manageable

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CONSEQUENCE RATING	CRITERIA			
	Public health and safety	Local economy	Environment	Public infrastructure
2 Minor	Serious near misses or minor injuries	Individually significant but isolated areas of reduction in economic performance relative to current projections	Minor instances of environmental damage that could be reversed	Isolated infrastructure issues require minor repairs or adjustments; no significant service disruptions.
1 Negligible	Appearance of a threat but no actual harm	Minor shortfall relative to current projections	Minor or no environmental damage	Minor infrastructure issues cause brief delays, easily handled by routine maintenance



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