CITY OF YELLOWKNIFE

CLIMATE ACTION PLAN

2026 - 2036

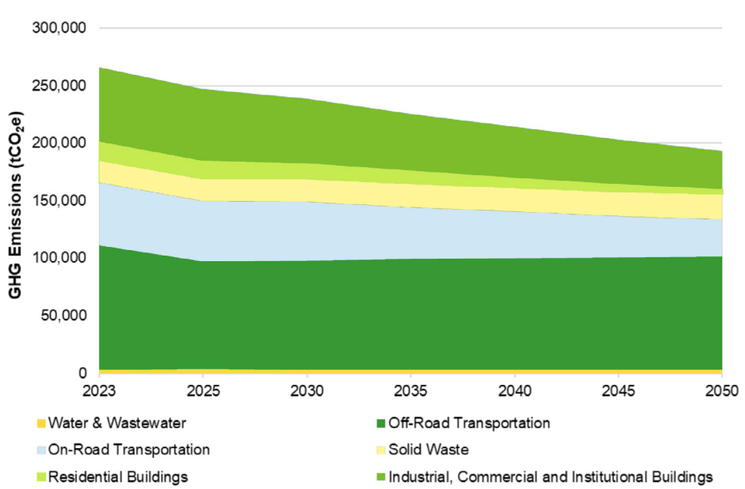
EXECUTIVE SUMMARY

OUR CLIMATE IS CHANGING AND SO MUST WE

Human-caused climate change poses serious risks to our natural environment and human health and well-being. Addressing the causes of climate change requires that all levels of government take immediate action. The City of Yellowknife, along with the Government of Canada and the Government of the Northwest Territories, are committed to reach net-zero emissions by 2050.

REDUCING OUR EMISSIONS

Prior action has led to a gradual decrease in Yellowknife's greenhouse gas (GHG) emissions since 2009, **but there's a long way to go to net zero.** Continuing with business-as-usual is not an option; substantial additional action is needed to put us on track.



Community Business-As-Usual GHG Emissions Forecast

ADAPTING TO OUR CHANGING CLIMATE

Yellowknife is experiencing the impacts of climate change. These include community-wide evacuations from wildfires, costly infrastructure damage due to permafrost thaw, and changes to our way of life. In the coming years, Yellowknife is expected to see **increasingly warmer and shorter winters, more precipitation in the form of snow, further permafrost degradation, hotter and drier summers, more intense wildfires, and more extreme weather** among other climate hazards.

By proactively planning for climate change, we can be better prepared for, and have increased capacity to respond to, the impacts of climate change – and save money down the road. Acting now will help prevent disruptions to our daily lives, service delivery, and economy, and keep Yellowknife safe for all.

THE PLAN

Together, we can make Yellowknife a healthy, resilient community for all, now and into the future. Through this 10-year Climate Action Plan, the City of Yellowknife will foster partnerships and implement impactful solutions that reduce our emissions while enhancing resilience to climate change.

The actions within this plan were designed to align with the following guiding principles, building upon existing City approaches and Council's Strategic Directions 2023-2026:

a) *Partnership-Driven Action*
b) *Feasible, Measurable, and Impactful Projects*
c) *Advocacy and Policy Support*
d) *Community Engagement and Education*
e) *Resilience and Adaptation*
f) *Community Wellbeing and Social Capital*

Actions within this plan focus on both corporate (e.g., City-owned or operated) and community assets and include direct actions the City will take, opportunities to incentivize and educate residents, prospective partnerships with community groups or Indigenous governments, and areas to advocate for policy changes or resource-sharing from other levels of government.

The Plan is made up of themes, goals, strategies, and actions.

THEME	PAGE	STRATEGIES
Sustainable Transportation	**41**	• Incorporate sustainable transportation in land-use planning • Enhance City operations and services • Enhance active transportation infrastructure • Increase low and zero-emission vehicle use and infrastructure
Waste Management	**45**	• Increase re-use of waste materials • Divert and reduce waste • Plan for emissions-capture in future Solid Waste Facility cells
Resilient and Efficient Buildings and Infrastructure	**49**	• Transition to renewable energy sources • Decarbonize and increase climate resilience of City buildings and infrastructure • Decarbonize and increase climate resilience of community buildings and infrastructure • Connect developers, building owners and residents with the resources they need
Responsible Land-Use and Planning	**53**	• Increase resilient and efficient land development • Increase the use of nature-based solutions • Increase local food production
Governance and Accountability	**56**	• Integrate climate action in all City departments • Implement the Climate Action Plan and report on progress • Improve communication and public engagement
Community Preparedness and Emergency Response	**60**	• Ensure equitable provision of support and resources • Communicate with residents on how to prepare for climate impacts • Support our neighbouring communities

IMPLEMENTING THE PLAN

Over the next 10 years, the City will allocate staff time and budget to ensure the Plan is implemented as efficiently as possible. This will require input from the public and support from all City departments as well as the GNWT. Throughout the implementation process, the City will:

- Report annually to Council;
- Regularly communicate updates with the public;
- Conduct a midway review of the Plan in 2031; and
- Conduct a final review in 2036.

CLIMATE ACTION IS GOOD FOR ALL OF US

This Climate Action Plan, while intended to drive emissions reductions and help Yellowknife adapt to our changing climate, brings a host of other benefits, or co-benefits, for our community. This includes bringing down energy costs, making life more affordable for tenants, protecting water quality and availability, physical and mental health benefits, and community-building opportunities. Other benefits include efficiencies for the City as a corporation and land-use planning.

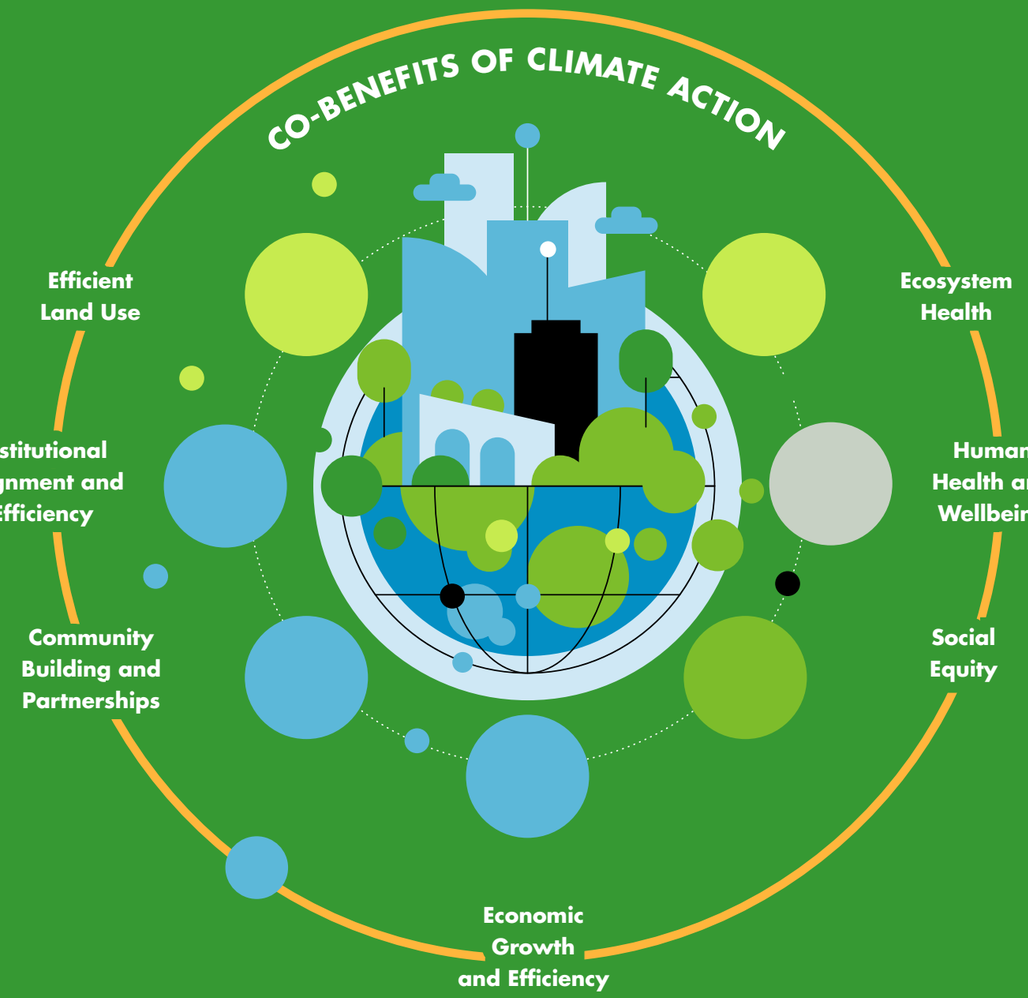


TABLE OF CONTENTS

MESSAGE FROM THE MAYOR

Every Yellowknifer feels the seasons in their daily life. Our lakes, trails, and neighborhoods change with each season, shaping the routines and traditions that make our city home. Our northern environment is something we cherish, but it is also on the front lines of climate change, with warmer winters, unpredictable weather, and growing pressures on our homes, streets, and natural spaces.

The 2026–2036 Climate Action Plan responds directly to these challenges. It reflects the voices of residents, local organizations, and Indigenous governments, translating shared priorities into practical actions that can be taken across city operations, workplaces, homes, and daily life. From enhancing active transportation and public transit, to expanding composting and recycling, to improving energy efficiency in buildings, this Plan provides concrete steps to reduce emissions, increase resilience, and protect the natural spaces that define Yellowknife.

Over the past several years, we've learned more about how climate change is impacting our city. We've created plans, taken action, and adapted along the way. As these changes increasingly touch our daily lives, our Plan continues to evolve, becoming more rooted in our reality, better suited to our northern environment, and more achievable through our collective efforts.

This Plan is really about shaping our City's future together. Each of us has a role to play. By acting collectively and with integrity, we strengthen our neighborhoods, protect our lakeshores and green spaces, and create a healthier, more resilient city for today and for future generations.

The Climate Action Plan aligns with the Council's Strategic Direction and our vision for 2050: a healthy, inclusive, and resilient Yellowknife that embraces sustainable growth, innovation, and well-being for all. I want to thank everyone who contributed their time, insights, and ideas. Our collective action today safeguards the experiences, places, and traditions that make Yellowknife home.

Ben Hendriksen
Mayor, City of Yellowknife

ACKNOWLEDGEMENTS

The City of Yellowknife would like to thank all those who contributed to the development of the Climate Action Plan including:

PROJECT TEAM

Grace Schaan, Environment and Climate Coordinator
Tatsuyuki Setta, Manager, Planning and Environment
Charlsey White, Director, Planning and Development
All City departments and division representatives

PUBLIC, RIGHTSHOLDER, AND STAKEHOLDER ENGAGEMENT PARTICIPANTS

Alternatives North
Arctic Energy Alliance
École St. Patrick High School Green Team
Ecology North
GNWT Department of Environment and Climate Change
GNWT Department of Infrastructure, Energy Division
Housing NWT
NAKA Power Utilities (NWT)
North Slave Métis Alliance
NWT Association of Communities
NWT Climate Change Youth Council
Seniors for Climate
SHIFT NWT
The Bottle Shop Recycling Depot
Yellowknife Catholic Schools
Yellowknife Community Garden Collective
Yellowknife Education District No. 1
Yellowknives Dene First Nation
YK Car Share Co-op
YWCA NWT

CONSULTING ORGANIZATIONS

Stantec Consulting Ltd. (GHG Emissions Inventory and Climate Vulnerability Assessment)
Purple Pulse Design & Communication Specialists (report design and layout)

GLOSSARY

- **Adaptation –** Adjusting decisions, activities and behaviours to prepare for current and future impacts of climate change
- **CAP –** Climate Action Plan
- **Climate –** The weather conditions prevailing in an area in the long term (i.e. over decades)
- **Climate change –** Long-term shifts in average weather conditions of a region
- **EV –** Electric vehicle
- **GHG –** Greenhouse gas
- **GNWT –** Government of the Northwest Territories
- **ICI –** Industrial, Commercial, and Institutional
- **Mitigation –** Efforts to avoid further climate change by reducing greenhouse gas emissions from human activities
- **Net Zero –** The total amount of greenhouse gas emissions produced is less than the amount being removed from the atmosphere
- **Resilience –** Ability to cope with, respond to, and recover from climate-related changes that are occurring or yet come
- **SWF –** Solid Waste Facility
- **Vulnerability –** The extent to which a community, region, or city is susceptible to, or unable to cope with, the negative effects of climate change
- **Weather –** The state of the atmosphere at a specific time. It is the short term or instantaneous variations of the atmosphere, as opposed to the long term, or climatic changes
- **YKDFN –** Yellowknives Dene First Nation
- **ZEV –** Zero-Emission Vehicle

CONTEXT FOR CLIMATE ACTION

Over the past century, the rise in greenhouse gas (GHG) emissions has led to significant and unprecedented changes in our climate. Human activities, primarily burning fossil fuels such as oil, gas, and coal, have produced more GHG emissions than our planet's natural systems can handle.[1] This has resulted in climate change: a long-term shift in the range of expected weather conditions.

This poses serious risks to our natural environment which is critical for human health and well-being. Climate change has already resulted in devastating climate events, causing loss of life, displacing thousands of people from their homes, disrupting livelihoods, and forever changing our natural environment. Recovery efforts have cost billions of dollars globally[2]. These changes are also worsening existing issues, such as social inequities, aging infrastructure, and exposing weaknesses in our emergency preparedness and response systems.

As the likelihood of more frequent and severe climate-related hazards increases, translating to increased risks to society, the Intergovernmental Panel on Climate Change (IPCC) released a special report in its sixth assessment, highlighting the significant and severe global consequences associated with a rise in global temperature beyond 1.5°C by the year 2100. Continuing with implemented policies only puts us on track to see a 2.2-3.5°C global increase by 2100. The report concludes that **we must reach net-zero GHG emissions** and that "**rapid and far-reaching transitions across all sectors and systems are necessary to achieve deep and sustained emissions reductions and secure a liveable and sustainable future for all**." Fortunately, feasible, effective, and low-cost options are already available and, if we act now, we can avoid the worst-case scenario.

Every level of government has a role to play in tackling climate change. In recent years, the federal government has implemented both industrial and consumer-focused regulations to drive emissions reductions and has supported a shift to green energy through targeted investments. Throughout the territory, the Government of the Northwest Territories has invested in communities and through supporting energy production and adaptation measures particularly for wildfire management. The City of Yellowknife has targeted efforts on reducing corporate emissions from transportation and buildings and plays a vital role in bringing residents together to foster community resilience.

1. IPCC, AR6 Synthesis Report Climate Change 2023
2. World Economic Forum, Climate change is costing the world $16 million per hour: study

YELLOWKNIFE'S GHG EMISSIONS

As of 2022, the Northwest Territories' per capita GHG emissions were the highest of the three northern territories at 30.3 tonnes of carbon dioxide equivalent (tCO2e)[3]. This is 67% higher than the Canadian average of 18.2 tCO2e per capita.

As part of the Climate Action Plan project, the City of Yellowknife released a report of 2023 corporate and community GHG emissions and energy data. Corporate emissions include emissions from infrastructure assets managed by the City (e.g., street lighting, City-owned buildings, and corporate fleet and public transit vehicles). Community emissions encompass all emissions that occur within the City's geographic boundaries, including all corporate emissions.

For more information on Yellowknife's GHG emissions, see the full Corporate and Community Energy and GHG Emissions Inventory Report in Appendix A.

RECENT GHG EMISSIONS

Community GHG emissions decreased by 20% from 2009 to 2023 (Figure 1) due to reductions from transportation and residential buildings. Transportation, namely air travel, emissions decreased as flight counts from the Yellowknife Airport in 2023 were lower relative to the 2009 baseline year. Residential buildings saw a decrease in emissions due to fuel switching from heating oil to biomass for building heating. Opposite to the overall Community trend, 2023 GHG emissions from Industrial, Commercial, and Institutional (ICI) buildings increased by approximately 40% of 2009 baseline levels as a result of a 55% increase in ICI building floor area.

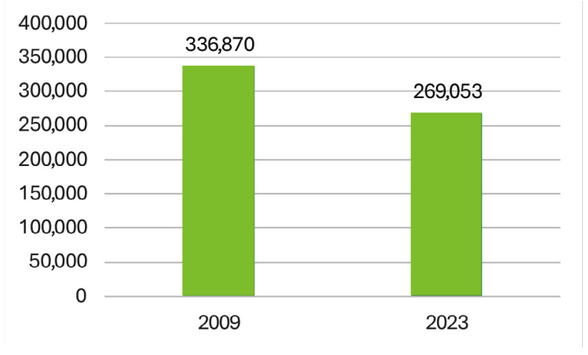


Figure 1 City of Yellowknife Community 2023 GHG emissions versus 2009 baseline

The Community GHG emissions trend from 2021 to 2023 is illustrated in Figure 2. Total Community GHG emissions increased from 231,814 tCO2e to 254,711 tCO2e (approximately 10%) from 2021 to 2022 and 254,711 tCO2e to 269, 053 tCO2e (approximately 6%) between 2022 and 2023. The increase in total Community emissions estimates between 2021 and 2023 is likely attributable to increased operations following shutdowns associated with the COVID-19 pandemic[4].

3. Canada Energy Regulator, Provincial and Territorial Energy Profiles – Northwest Territories
4. Community emissions activities, such as on-road and off-road travel, were significantly impacted by COVID-19 lockdowns This led to a large rebound in total Community GHG emissions post COVID-19 pandemic

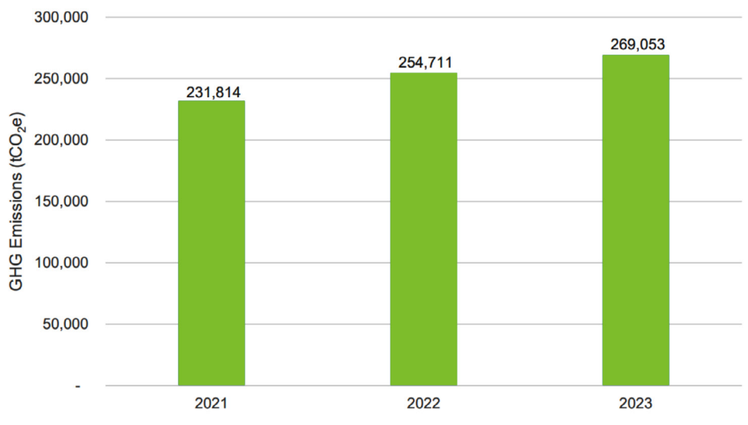


Figure 2 City of Yellowknife Community GHG Emissions Trend 2021 – 2023

CORPORATE EMISSIONS

2023 Corporate GHG emissions amount to 26,472 tCO2e, which represents 10% of the total 2023 Community GHG emissions of 269,053 tCO2e (Figure 3). Water and Wastewater facilities and Solid Waste are the primary contributors to the City's 2023 Corporate emissions profile. These sources account for approximately 13% (3,522 tCO2e) and 73% (19,402 tCO2e) of the total 2023 Corporate GHG emissions respectively. It should be noted that not all waste that is received at the Solid Waste Facility is collected from within City boundaries. In addition, the City is currently undergoing a Landfill Gas Assessment that will provide further clarity on fugitive methane emissions from solid waste. 2023 Corporate activities required consumption of 99,800 Gigajoules (GJ) of energy. Electricity and heating oil represent the largest contributors to 2023 Corporate energy use.

COMMUNITY EMISSIONS

GHG emissions from off-road transportation[5] (40% or 108,195 tCO2e), industrial, commercial and institutional (ICI) buildings (24% or 64,026 tCO2e) and on-road transportation (20% or 53,965 tCO2e) represent the major contributing sectors to the City's 2023 Community GHG emissions estimates (Figure 3). Together, these three sources account for approximately 84% of the City's Community GHG emissions and approximately 89% of Community energy use. All Community activities led to over 3.6 million GJ of energy.

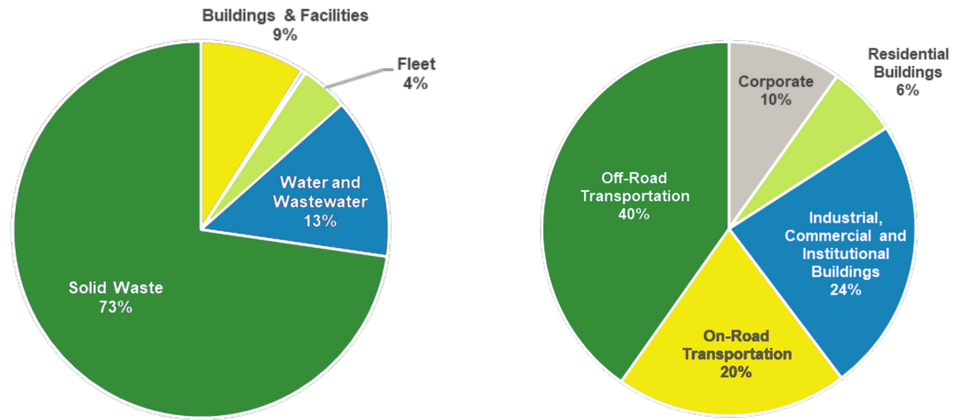


Figure 3 2023 Corporate (Left) and Community (Right) GHG Emissions Profile

BUSINESS-AS-USUAL GHG EMISSIONS FORECAST

To forecast future emissions, the report analyses 2023 emissions to determine how they will evolve to 2050 with only current and planned policies in place, or a business-as-usual (BAU) scenario.

CORPORATE BAU FORECAST

The Corporate forecast by sector (Figure 4) shows that most sectors' emissions will remain relatively constant under the BAU scenario. The forecast accounts for both the reduced electricity grid GHG intensity expected in the NWT and population growth-related energy and GHG emission increases. Solid Waste is the largest contributor to Corporate emissions as fugitive methane emissions from the landfill are expected to rise to 80% of total Corporate emissions by 2050, an increase from 73% in the City's total 2023 Corporate emissions inventory.

5 Off-road transportation emissions include from aviation turbojet fuel

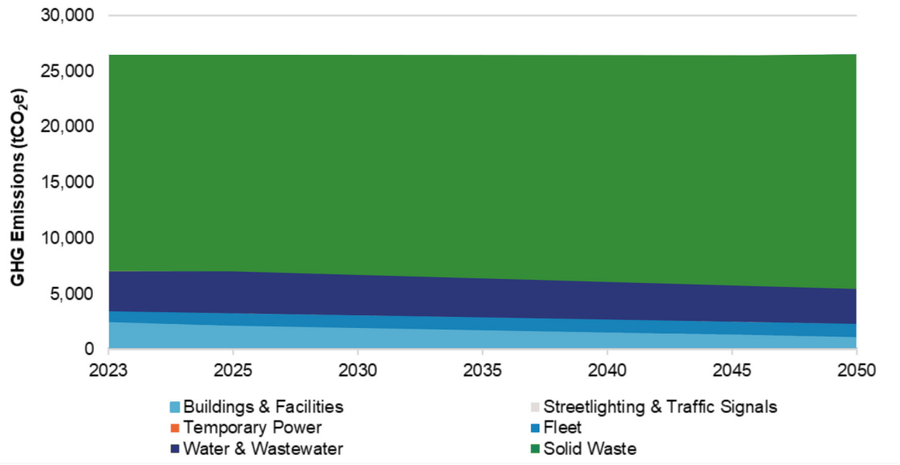


Figure 4 Business-As-Usual City of Yellowknife Corporate GHG Emissions by Sector

COMMUNITY BAU FORECAST

The forecast of Community GHG emissions to 2050 (Figure 5) shows an estimated decrease of 27% from 2023 to 2050. This forecast assumes that emissions will increase with growing energy demand associated with population growth, while emissions reductions will be seen from natural aging out of fossil fuel powered building heating systems, reduced GHG intensity of the NWT electricity grid and increased vehicle fuel efficiencies and battery-electric vehicle purchases.

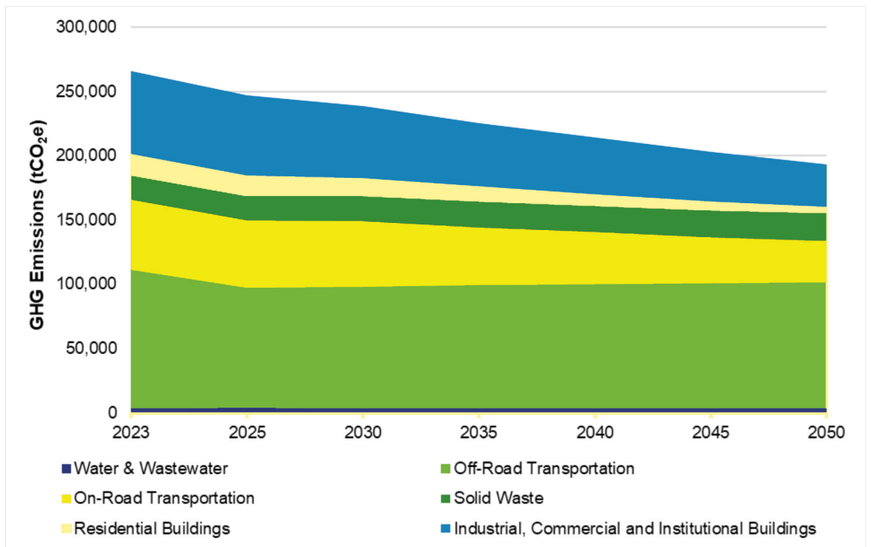


Figure 5 City of Yellowknife Business-As-Usual Community GHG Emissions Forecast[7]

By the year 2050, gasoline emissions from on-road passenger vehicles are expected to decrease by 56% due to regulatory improvements and a shift to electric vehicles[6], while heating oil emissions from residential and ICI buildings are projected to decline by 34% as buildings transition to lower carbon alternatives such as biomass. No reductions are expected from jet fuel combustion for community air travel.

LOCAL CLIMATE CHANGE PROJECTIONS

As a result of increasing GHG emissions globally and locally, Canada's North is warming around two to four times faster than global average temperatures.[8]

To better understand the complexities of how Yellowknife's climate is changing, the City conducted a Climate Vulnerability Assessment for the Climate Action Plan. The assessment followed international best practices[10] to analyze future climate projections and evaluate the susceptibility of Yellowknife's infrastructure, assets, and systems to climate-related hazards today and in the future. For more information on climate impacts in Yellowknife, see the full Climate Vulnerability Assessment in Appendix B.

In the coming years, Yellowknife is expected to see increasingly warmer and shorter winters, more precipitation in the form of snow, further permafrost degradation, hotter and drier summers, more intense wildfires, and more extreme weather among other climate hazards. Table 1 outlines the trends in climate hazards from the baseline period[11] to the end of the century, using arrows to represent whether we expect the climate hazard to increase (↗), decrease (↘), or remain stable (↔).

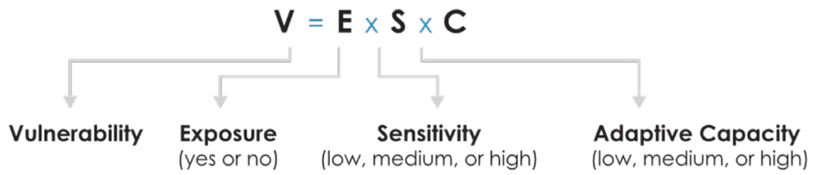
CLIMATE HAZARD	TREND (BASELINE TO END OF CENTURY)
Extreme Heat	↗
Relative Humidity	↔
Wildfire Interface	↗
Wildfire Smoke	↗
Drought	↗
Changes in Lake Level[9]	↔
Short Duration High Intensity Rainfall	↗
Long Duration Rainfall	↗
Extreme Cold	↘
Cold Snap	↘
Freeze Thaw - Winter	↗
Freezing Rain	↗
Snowstorms	↗
Permafrost Thaw	↗
High Winds	↗

Table 1 Yellowknife Climate Hazards and Trends

6. The BAU forecast was conducted prior to the announcement that the federal EV availability standard would be paused Pausing or eliminating this policy could slow the adoption of EVs and potentially slow progress on reducing emissions from on-road transportation
7. Sectors that contribute less than 1% of total Community GHG emissions are excluded from Figure 3. This includes GHG emissions from the following Corporate owned assets: City owned buildings, streetlighting and traffic signals, temporary electricity and fleet transportation
8. Nature, The Arctic has warmed nearly four times faster than the globe since 1979
9. Annual average lake level changes are steady to slightly decreasing, however there is high variability in the year-to-year high and low lake level extremes

VULNERABILITY OF CITY ASSETS

The Climate Vulnerability Assessment uses the following formula to gauge the vulnerability of assets within the city to projected climate impacts:



VULNERABILITY

Extent to which assets, infrastructure systems and services are susceptible to, or unable to cope with, the impacts of climate-related hazards

EXPOSURE

Nature or degree to which assets, infrastructure systems, or service areas would interact with climate-related hazards

SENSITIVITY

Degree to which assets, infrastructure systems, or service areas are positively or negatively affected by climate-related hazards

ADAPTIVE CAPACITY

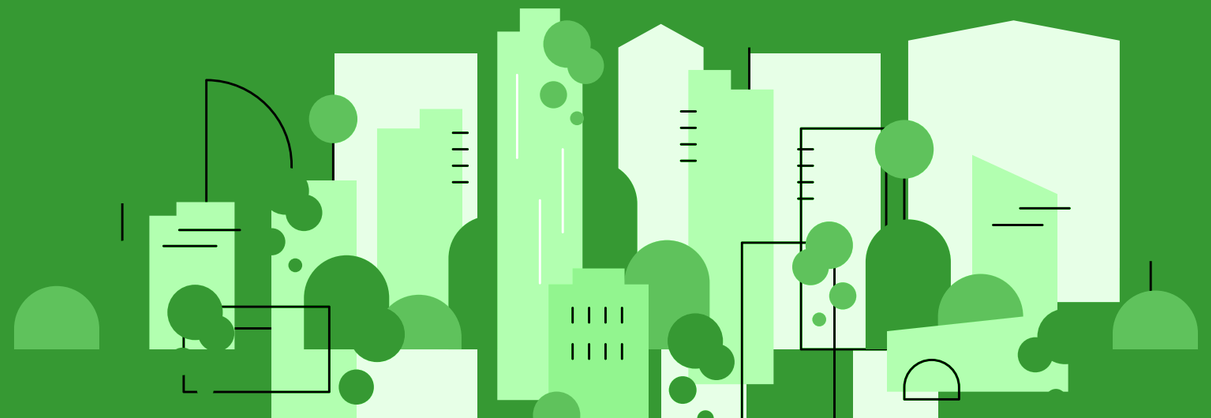
Ability to prepare for and respond to impacts and consequences

Based on the evaluations of sensitivity and adaptative capacity of identified assets, infrastructure, and systems within the city, twelve were identified to have high vulnerability as shown in the Table 2.

10. ISO 14091:2021 Adaptation to climate change: Guidelines on vulnerability, impacts and risk assessment and ISO/TS 14092:2020 *Adaptation to climate change: Requirements and guidance on adaptation planning for local governments and communities*
11. The baseline used for most climate hazards was 1991-2020 To align with previous studies and literature, 1981-2010 was used as the baseline for wildfire Insurance Bureau of Canada, Behchokǫ̀-Yellowknife and Hay River wildfires cause over $60 million in insured damage

ASSET/ARCHETYPE	SENSITIVITY	ADAPTIVE CAPACITY	VULNERABILITY
Transportation Networks	High	Medium	**High**
Land Use	Medium	Medium	**Medium**
Cemetery	Medium	Medium	**Medium**
Stormwater Systems	Medium	Medium	**Medium**
Water Treatment Plant and Collection / Distribution Network	High	Medium	**High**
Wastewater Treatment Network	High	Medium	**High**
Solid Waste Facility	Medium	Medium	**Medium**
Parks	High	Medium	**High**
Recreational Facilities and Associated Equipment	High	Medium	**High**
City-Owned Administrative / Operational Buildings	Medium	Medium	**Medium**
Yellowknife Firehall	High	Medium	**High**
Commercial / Industrial Buildings	Medium	Medium	**Medium**
Residential Buildings	High	Medium	**High**
Yellowknife Airport	High	Medium	**High**
Power Supply	High	Medium	**High**
Telecommunications and IT Networks	High	Medium	**High**
North Slave Correctional Facility	High	Medium	**High**
Stanton Territorial Hospital	High	Medium	**High**

Table 2 Results of the Climate Vulnerability Assessment



COMMUNITY IMPACTS

Below are examples of some of the anticipated community impacts identified in the Climate Vulnerability Assessment. These impacts associated with climate change are already occurring and causing adverse impacts in and around our community.

ECOSYSTEM SERVICES

- Warmer temperatures are shortening the ice road season because the ice is freezing later and thawing earlier. This has impacted winter recreation and hunting. A shorter ice road season also increases costs for transporting fuel and goods and reduces access to services in communities or mine sites otherwise inaccessible by all-season roads.

COMMUNITY-WIDE EVACUATIONS

- As of the time of writing, two communities have been forced to evacuate due to wildfires in 2025: Whatì and Fort Providence. An evacuation alert was issued for Jean Marie River.
- In 2023, wildfires in the region resulted in the evacuation of 12 communities in the NWT including approximately 20,000 people from the Yellowknife area. Insured losses in Yellowknife and Behchokǫ̀ were roughly $30 million[12]. While no buildings were lost within the city, the evacuation of residents was costly as were the economic losses of businesses.
- In 2022, Hay River and the Kátł'odeeche First Nation were ordered to evacuate due to flooding caused by an ice jam. Flooding resulted in at least six sites contaminated with petroleum hydrocarbon concentrations above the NWT criteria. The flood damage was estimated at $174 million, not including costs covered by private insurance[13].
- Wildfires in 2014 burned 3.4 million hectares of land[14] in the NWT. Most residents of Hay River were forced to evacuate. Firefighting alone cost $56.1 million.

INFRASTRUCTURE DAMAGE

- In September 2025, a wildfire destroyed the Nechalacho mining camp, including cabins, a dock and boat, and ignited a diesel storage tank, 100 km southeast of Yellowknife.
- 85-90% of the Hamlet of Enterprise burned, including homes and businesses, during the 2023 wildfire season[15].
- Following issues with shifting land at the Yellowknife airport runway in January 2023, the GNWT commissioned a geotechnical study that determined the shifting ground conditions were caused by thawing permafrost.
- In 2018, the Northern Frontier Visitor Center was forced to close due to sinking and shifting from permafrost thaw that led to structural problems.
- Permafrost thaw has damaged local paved roads that consequently required repairs.
- Extreme cold weather has caused pipes and water mains to freeze.

12. Insurance Bureau of Canada, Behchokǫ̀-Yellowknife and Hay River wildfires cause over $60 million in insured damage
13. Northwest Territories Legislative Assembly, Debates of October 19, 2022 (day 123)
14. Government of Northwest Territories, Report of the 2014 Fire Season Review now available
15. CBC News, Enterprise, N W T , '90 per cent gone' after wildfire ravages community

DISRUPTED SERVICES

- Highway 3 to Yellowknife was routinely closed, often with little or no notice, throughout the summer and fall of 2025 due to smoke and active wildfires. Highway closures have been a common occurrence during major wildfire years including 2014, 2015, and 2023.
- In September 2022, a tree collapsed on transmission lines at Snare Hydro during a high wind event which resulted in two days of power outages.
- Wildfires have also led to power outages, such as the city-wide power outage in July 2016, when a nearby fire damaged power lines.
- Climate impacts such as snowfall and freezing rain have led to delayed public transportation and caused dangerous driving conditions.

NEED FOR MITIGATION AND ADAPTATION

Based on the results of the BAU GHG emissions for Yellowknife and considering that the GNWT has committed to reach net-zero emissions by 2050, we know we must reduce our emissions drastically.

With the results of the Climate Vulnerability Assessment, we also have a good idea of what impacts are already occurring and others that we can expect in the near future. Combined, these results underscore the need for comprehensive climate action to both reduce further climate change through mitigation efforts and to prepare for the impacts of climate change with adaptation measures.

PREVENTION PAYS OFF

By proactively planning for climate change, we can be better prepared for, and have increased capacity to respond to, the impacts of climate change – and save money down the road. Taking action now will help prevent disruptions to our daily lives, service delivery, and economy, and keep Yellowknife safe for all.

PRIOR CLIMATE ACTION BY THE CITY

The Climate Action Plan ("the Plan") builds upon previous municipal plans, actions, strategies, bylaws and other policies focused on sustainability and climate resilience. The climate actions already undertaken and currently in progress by the City lay the groundwork for Yellowknife to further reduce its emissions and increase resilience.

Key municipal climate-related documents and their policy and action highlights include:

- **City of Yellowknife Community Energy Plan 2006-2014 (2006)**
  - Lays the foundation for energy and GHG reduction initiatives. The Community Energy Plan provides 12 recommendations to reduce energy consumption-based GHG emissions by adopting ambitious reduction targets, increasing renewable energy generation and use, and improving energy efficiency across various sectors. This first version of the City's energy plan was followed by more detailed plans and actions in subsequent years. The plan included three main targets:
    - Corporate energy use: 10% reduction by 2014 from 2004 levels.
    - Corporate GHG emissions: 20% reduction by 2014 from 2004 levels.
    - Community GHG emissions: 6% reduction by 2014 from 2004 levels.
  - The plan led to significant results including:
    - Corporate GHG emissions reduction of 26% by 2014 from 2004 levels.
    - Cumulative annual savings of over $650,000 from plan implementation projects in 2014.
    - 130 tonnes of CO_2 were reduced from optimizations at the Multiplex and increased insulation and monitoring of the Ruth Inch Memorial Pool's pellet boiler.

- **City of Yellowknife Smart Growth Plan (2009)**
  - Outlines Yellowknife's 50-year vision to guide growth and development in Yellowknife. The vision co-created by residents demonstrates a strong focus on protecting the environment and suggests development and transportation strategies to achieve the vision.
- **City of Yellowknife Corporate and Community Energy Action Plan 2015-2025 (2017)**
  - Aims to achieve significant reductions in GHG emissions, increase renewable energy use, and decrease the carbon intensity of energy use through sector-specific actions across transportation, heating and electricity, waste, and future innovation and legislative changes. The plan included the following emissions targets:
    - Corporate: 50% emissions reduction by 2025 from 2009 levels.
    - Community: 30% emissions reduction by 2025 from 2009 levels.
  - These emissions reduction targets were missed; however, the plan did result in several projects that were successfully completed including:
    - A centralized biomass boiler was installed at the Multiplex.
    - Building envelope upgrades were completed at the baling facility.
    - The City entered into an agreement with the Yellowknife Carshare Co-operative and an EV charger was installed at City Hall.
    - A hybrid vehicle was added to the City fleet.
- **City of Yellowknife Climate Change Engagement Summary Report (2022)**
  - In the summer of 2022, the City sought input on the interests and priorities of local industry and residents with respect to City actions on climate change mitigation, adaptation and resiliency, gathered through different engagement methods including virtual and in-person formats. That engagement laid the foundation for this CAP.
  - Actions ranked top priority by engagement participants included:
    - Adaptation: Implementation of food security projects, review and revision of municipal plans and policies.
    - Mitigation: Electrification of municipal vehicles, installation of electric vehicle charging stations, and retrofitting government/municipal buildings to increase energy efficiency.
    - Resilience: FireSmart projects and improvements to public safety communications.

ALIGNING CITY PLANS

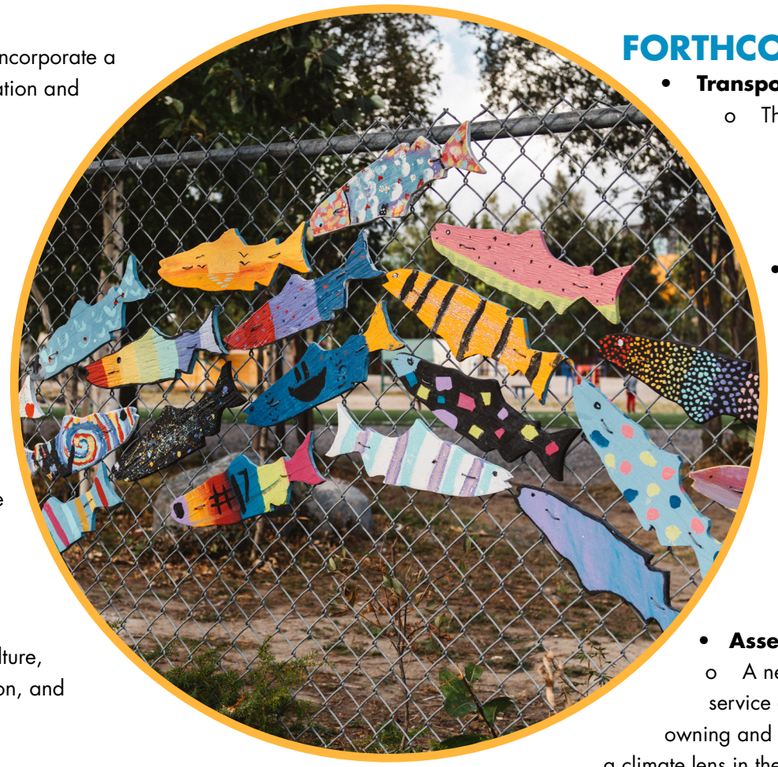
Climate change affects nearly all aspects of the City's operations and planning in some form, from how Public Works designs our roads and sidewalks to how Asset Management forecasts lifecycle costs.

Therefore, climate action must be a collaborative effort from all City departments and be integrated into all City plans. The Climate Action Plan aims to align with and build upon the work in existing City plans to streamline energy and emissions reductions and adaptation measures.

Other plans that are set to be released in the near future also provide an opportunity to incorporate a climate lens across departments. The Climate Action Plan outlines avenues to build mitigation and adaptation efforts into these forthcoming plans.

EXISTING PLANS

- **City of Yellowknife Strategic Waste Management Plan (2018)**
  - Aims to improve waste management by focusing on waste reduction and diversion initiatives. These efforts will help reduce GHG emissions from the Solid Waste Facility.
- **GROW: Yellowknife Food and Agriculture Strategy (2019)**
  - Sets out a long-range plan for increasing community and commercial urban food and agriculture opportunities. Its goal is to support the local economy, build connections to land and culture, improve food security, increase local food production, and link to regional and territorial initiatives. The Climate Action Plan seeks to support these ongoing efforts and find synergies for effective support, advocacy, and resource alignment.
- **City of Yellowknife Community Plan (2020)**
  - Encourages sustainability and resilience across sectors including climate mitigation and adaptation initiatives, energy efficiency incentives, smart growth and redevelopment, emergency management, waste management, urban agriculture, transportation, and others. These principles will guide the development, evaluation, and prioritization of proposed Climate Action Plan actions.
- **City of Yellowknife Council Strategic Directions 2023-2026 (2023)**
  - Outlines key initiatives for managing growth with environmental responsibility and economic diversity. These include advancing energy initiatives, implementing the City's Food and Agriculture Strategy and Solid Waste Management Plan.
  - Built on the following principles, these principles also served to guide the development of the Climate Action Plan:
    - People First - Facilitate a safe, accessible and inclusive community that supports the well-being of all through a focus on reconciliation, equitable housing and providing a liveable community.
    - Service Excellence - Optimize resource capacity to ensure reliable services and infrastructure for current and future needs through a focus on asset management, capacity and organizational culture.
    - Sustainable Future - Manage growth for environmental responsibility and economic diversity through a focus on promoting a resilient future, growth readiness and a robust economy.



- **City of Yellowknife Community Emergency Plan (2025)**
  - Outlines the City's plan to prepare for, respond to, and recover from emergencies or disasters, including those caused by climate change. The 2025 updated version includes lessons learned and recommendations following the 2023 wildfire season that led to a community-wide evacuation.
- **City of Yellowknife Community Wildfire Protection Plan (2025)**
  - Provides practical and operational wildland/urban interface risk mitigation strategies to reduce the threat of wildfire to development in the City. It provides a progress update since the 2019 version of the plan and includes specific recommendations for the City to take that have informed actions within this Climate Action Plan.

FORTHCOMING PLANS

- **Transportation Plan (2026)**
  - The City's forthcoming Transportation Plan will provide strategies to enhance active and public transportation in practical and cost-effective ways. The Transportation Plan will provide more elaborate detail on Climate Action Plan measures that relate to active and low-carbon transportation, and safe, reliable and sustainable public transportation networks.
- **Community Plan Comprehensive Update (2026)**
  - The City of Yellowknife is updating its Community Plan, our roadmap for how the city grows, moves, and thrives from now to 2050. The Community Plan update will lay the foundation for Yellowknife to:
    - Grow Together, Sustainably - Use land, housing, and infrastructure wisely so we can welcome new residents, strengthen communities, and avoid stretching our services too thin.
    - Care for the Environment - Protect the land, water, and natural spaces we love. Tackle climate change with thoughtful, responsible choices.
    - Build a Strong, Resilient Economy - Support local businesses, create good jobs, and grow key sectors like tourism and mining so everyone benefits from a thriving economy.
- **Asset Management Plan (2027)**
  - A new Asset Management Plan is being developed. It will guide how the City sets levels of service and approves capital projects. It will also provide guidance about the long-term costs of owning and operating assets that will help ensure the City's long-term financial stability. Incorporating a climate lens in the Asset Management Plan will ensure that decision-making regarding all City assets incorporates the current and future costs of climate change.
- **Water Master Plan and Sewage Master Plan (TBD)**
  - Both water and sewage master plans are under development with timelines to be determined.

ALIGNING WITH TERRITORIAL AND FEDERAL EFFORTS

FEDERAL CLIMATE ACTION

The Government of Canada, through the *Net-Zero Emissions Accountability Act*, has legislated a commitment to reach net-zero emissions by 2050[16] and an interim target of a 45-50% reduction from 2005 levels by 2035[17]. Key policies to achieve this level of emissions reduction include:

- *Electric Vehicle Availability Standard*[18] – requires 100% of light-duty vehicle sales be zero-emissions vehicles by 2035. The EV mandate is currently paused and will be waived for 2026 models as the government reviews the policy.
- *Greenhouse Gas Pollution Pricing Act*[19] – includes the Output-Based Pricing System, an industrial carbon price on heavy emitters. The consumer carbon price was repealed in April 2025.
- *Clean Fuel Regulations*[20] – to lower the carbon intensity of liquid fuels.
- *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations*[21] – to phase out coal-fired electricity by 2030.
- *Clean Electricity Regulations*[22] – a proposed emissions performance standard, beginning in 2035, to establish a net-zero electricity system by 2050.
- *Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds*[23] – this regulation, which limits the oil and gas sector's methane emissions, is expected to be amended in 2027 to achieve a 75% reduction from 2012 levels by 2030.

Aside from regulatory tools, the government has also invested nearly $10 billion in clean energy infrastructure programs such as the Smart Renewables Electrification Pathways Program and offers low-interest financing for clean electricity projects including the $15 billion Canada Growth Fund and $10 billion through the Canada Infrastructure Bank.

These, and other regulatory and incentive tools implemented by the federal government, are critical to guiding climate action in Yellowknife and the territory more broadly. These policies help ensure that our grid is powered with clean energy, there are clean jobs available and a thriving green economy, we have access to innovative science and technology, and that there is funding for municipal initiatives that make a difference in our community.

16. Government of Canada, Canadian Net-Zero Emissions Accountability Act
17. UNFCC, Canada's 2035 Nationally Determined Contribution
18. Government of Canada, Canada's Electric Vehicle Availability Standard (regulated targets for zero-emission vehicles)
19. Government of Canada, Greenhouse Gas Pollution Pricing Act
20. Government of Canada, Clean Fuel Regulations
21. Government of Canada, Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations
22. Government of Canada, Canada Gazette, Part I, Volume 157, Number 33: Clean Electricity Regulations
23. Government of Canada, Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector)

GNWT CLIMATE ACTION

The GNWT has committed to reaching net-zero emissions by 2050, and, as Yellowknife makes up roughly half of the NWT's population, it is critical that Yellowknife take substantive action for this goal to be achieved. The GNWT has also been "working with Indigenous governments and other partners to improve flood mapping, support wildfire mitigation, and help communities adapt to a changing climate"[24]. The GNWT also recently reached a new milestone by completing the Electric Vehicle Corridor that makes EV charging feasible from Yellowknife to the Alberta border[25].

The GNWT has invested approximately $45 million[26] to carry out their *2019-2023 Climate Change Action Plan*[27] and the *2030 Energy Strategy*[28]. Actions in these plans that are particularly relevant for Yellowknife include:

- Supporting participation in community scale renewable generation.
- Offering a low or zero-emissions vehicle pilot program for communities serviced by hydroelectricity.
- GNWT fleet management including right-sizing and integrating low and zero-emission vehicles.
- Supporting community-based initiatives such as for public transit and active transportation.
- Delivering energy efficiency programs and services through the Arctic Energy Alliance.
- Working with communities to identify potential cleaner air shelters and modifications required to reduce impacts of wildland fire smoke on human health.
- Monitoring changes to forest growth, productivity, health, and regeneration after disturbances.

The GNWT released a draft *2030 NWT Climate Change Strategic Framework: 2025-2029*[29] *Action Plan*, an update to their 2019-2023 Action Plan. After releasing the draft in November 2024, the GNWT announced in May 2025 that it is shifting directions and will release an integrated climate adaptation and energy strategy in Spring 2026[30].

The GNWT is also working to encourage waste reduction and diversion through their *Waste Resource Management Strategy and Implementation Plan*[31]. Highlights include:

- Updating and amending the Waste Reduction and Recovery Act, (WRRA) to enable an extended producer responsibility (EPR) framework.
- Working with the ICI sector to explore and implement options to reduce Construction, Renovation and Demolition waste (e.g. design for future deconstruction).

24. Government of Northwest Territories, Minister Macdonald Highlights Climate Action, Resilience, and Clean Energy on Earth Day Media Statement
25. Government of Northwest Territories, Electric Vehicle Corridor
26. Government of Northwest Territories, NWT Reports on Climate Action and Energy for 2022-2023
27. Government of Northwest Territories, 2030 NWT Climate Change Strategic Framework 2019-2023 Action Plan
28. Government of Northwest Territories, 2030 Energy Strategy
29. Government of Northwest Territories, 2030 NWT Climate Change Strategic Framework Draft 2025-2029 Action Plan for Public Engagement
30. Government of Northwest Territories, Jay Macdonald: Government of the Northwest Territories' New Approach to Energy and Climate Change
31. Government of Northwest Territories, Northwest Territories Waste Resource Management Strategy and Implementation Plan

The GNWT has been and will continue to be a critical partner in the ongoing success of Yellowknife's Climate Action Plan. In order for Yellowknife to meaningfully contribute to the GNWT's goals, and to implement the Plan, support is needed in the following areas:

- **Financial and Staff Resources**
  - The City of Yellowknife, like many municipalities, has limited financial and human resources. Implementing comprehensive climate change strategies requires substantial investment in infrastructure, technology, and human capital, which the City alone cannot afford.
- **Scale of Infrastructure and Environmental Impacts**
  - Much of Yellowknife's infrastructure and buildings was designed for historical weather events and standards and may not be compatible with future climate conditions. The potential loss of infrastructure in the Northwest Territories from permafrost thaw alone is estimated at $1.3 billion over the next 75 years[32]. The GNWT's involvement is crucial in providing the necessary funding and technical support to upgrade and maintain infrastructure to withstand climate impacts.
- **Coordination and Data Sharing**
  - Effective climate action requires coordination and data sharing across different levels of government. The GNWT has access to broader climate data and resources that can help Yellowknife target climate action where it is needed most.
- **Policy and Legislative Support**
  - The GNWT plays a critical role in setting policies and regulations that guide climate action across the territory. The GNWT's *Climate Change Action Plan* and *Energy Strategy* include initiatives such as flood mapping, wildfire mitigation, and transitioning to renewable energy sources. These policies provide a framework within which Yellowknife can develop its local strategies.
- **Economic and Social Dependencies**
  - The economic and social well-being of Yellowknife is closely tied to the broader NWT region. Climate change impacts such as wildfires, permafrost thaw, and extreme weather events have widespread effects that transcend municipal boundaries. Collaborative efforts with the GNWT ensure that climate actions are aligned and mutually supportive, reducing the risk of isolated actions that may not be as effective. This is especially important to consider in the context of recent evacuations and the role neighbouring communities play in supporting one another.

32. Canadian Climate Institute, Tip of the Iceberg: Navigating the Known and Uknown Costs of Climate Change for Canada

PLAN DEVELOPMENT PROCESS

In winter 2024, the City officially launched the development of the Climate Action Plan and began working with a consultant, Stantec Consulting Ltd. Over the course of seven months, Stantec completed a literature review, produced two key background reports, and began the engagement process.

From there, the City drafted actions for the Plan and completed a second round of engagement. City staff from various departments supported the development of the Plan throughout the entire process and participated in targeted staff workshops. See table 3 for an overview of the development process.

	2024		2025									
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Project launch												
Background & best practice review Existing mitigation & adaptation actions review												
Climate Vulnerability Assessment												
Energy & GHG Emissions Inventory												
Public & stakeholder engagement												
Selection of mitigation and adaptation actions Draft Climate Action Plan												
Public & stakeholder engagement on draft actions												
Update draft Climate Action Plan												
Draft Climate Action Plan prepared for Council												

Table 3 Climate Action Plan Development Timeline

LITERATURE REVIEW

As part of background information gathering, Stantec completed a literature review of existing City, Territorial, and Federal policies and documents outlining prior actions and guidance pertaining to climate change, mitigation, and adaptation. See Appendix C for all documents reviewed.

BACKGROUND REPORTS

In preparation for developing the Plan, Stantec created two key background reports: the Corporate and Community Energy and GHG Emissions Inventory and Forecast Report and the Climate Vulnerability Assessment Report.

- The emissions inventory report, in Appendix A, outlines recent energy use and emissions from corporate and community sources and projects future emissions in a business-as-usual scenario to 2050.
- The vulnerability assessment, in Appendix B, highlights current and future climate changes for Yellowknife, assesses the vulnerability of City assets and anticipates how these assets will be impacted.

RIGHTSHOLDER, STAKEHOLDER, AND PUBLIC ENGAGEMENT

The first phase of engagement aspired to:

- Find out how residents, community organizations, Indigenous governments, and the GNWT are acting on climate change.
- Invite residents, community organizations, local Indigenous governments, and the GNWT to share their perspectives on the City's current plans and help the City to establish vision and goals of the new Climate Action Plan.
- Discuss possible mitigation and adaptation strategies and collect feedback to understand the barriers and opportunities of each strategy.

Engagement tactics in this phase included a public roundtable, public survey, meetings with two GNWT departments, the Yellowknives Dene First Nation, utilities, and local NGOs.

Phase one culminated in the What We Heard Report – Phase 1 that is available on the City's website. The report finds that residents would like to see the City:

Lead by example

- Improve composting, recycling, and energy efficiency at City facilities.
- Invest in EV fleet, alternative energy, and active transportation.

Communicate with the public

- Provide updates on Climate Action Plan actions.
- Share data on climate change, emissions, and initiatives.
- Celebrate successes.

Educate and inform

- Provide guidance on preparing for climate impacts (like wildfire and smoke).
- Inform residents on emissions-reduction practices.

Improve food security and local food production

- Explore opportunities to increase local food growing initiatives.
- Mitigate emergency supply chain disruptions.

Improve active transportation

- Invest in network improvements and maintenance.
- Encourage residents to use active transportation.

Improve waste diversion

- Share information and raise awareness about waste management practices.
- Invest in waste-to-energy systems.
- Expand the composting program.

The City used the feedback from phase 1 of engagement to inform the creation of draft actions for the Plan. Draft actions were released publicly in June 2025.

The goal of the second phase of engagement was to report back on the results of the phase one engagement, share key findings from the Energy and GHG Emissions Inventory and the Climate Vulnerability Assessment, and seek feedback on the draft actions. This phase included a public roundtable, public survey, a booth at the Spring Tradeshow, presentation to the True North Rotary Club, and meetings with the Yellowknives Dene First Nation, North Slave Métis Alliance, two GNWT departments, and local NGOS.

Phase 2 culminated in the What We Heard Report – Phase 2 that is available on the City's website. Among other recommendations, residents proposed the following:

Sustainable Transportation

- Increase the availability of bike storage and make long-term investments in active transportation infrastructure including protected bike lanes and improved winter maintenance.
- Improve the bus service by increasing their frequency, expanding hours of operation, improving safety and cleanliness on board, and reducing bus fares.
- Promote the Yellowknife Car-share Co-op and require EV-ready charging in new multi-unit residential buildings.
- Improve communication and signage regarding active transportation.

Waste Management

- Consider establishing a re-use store while also examining other options for diverting construction waste and furniture.
- Target incentives or requirements for businesses and industry to reduce waste.
- Support recycling locally including the use of recycled materials.
- Expand compost collection to multi-unit residential buildings and businesses.
- Improve communication and awareness on composting, recycling, and waste reduction.

Resilient and Efficient Buildings and Infrastructure

- Provide support for property owners to retrofit existing buildings and require more stringent energy efficiency and climate resilience standards in new developments.
- Adapt critical infrastructure with nature-based solutions.

Responsible Land-Use and Planning

- Create an urban forest management plan and/or natural asset management plan and preserve existing greenspaces and natural assets.
- Update the Development & Design Standards to improve greenery along streets.
- Fund the implementation of the Yellowknife Food & Agriculture Strategy and support existing food-producing organizations and businesses.
- Address water level changes and protect our stormwater management system by increasing the use of permeable surfaces.

Governance and Accountability

- Improve accountability by including a timeline and prioritization of actions within the plan itself.
- Target communication of the Plan's implementation for different groups via different messaging and channels.
- Maintain healthy relationships with local Indigenous governments by enacting clear knowledge-sharing and mutual accountability protocols.
- Encourage council ownership of the Plan and implementation by creating a committee of council.
- Share full progress reports on the Plan's implementation every other year and regularly communicate progress in the interim.

Community Preparedness and Emergency Response

- Support community-led food systems and clarify the roles and responsibilities of each level of government in ensuring food and energy supply during emergencies.
- Clarify how the City defines vulnerability and design climate resilience support to reach vulnerable individuals.
- Designate shelters for poor air quality or extreme weather events, establish clear criteria for their use, and ensure adequate social support is available on site.

These results were used to inform revisions to the draft actions and finalize the Plan.

INTERNAL WORKSHOPS WITH CITY STAFF

The project team held two workshops with staff of various City departments, the first focusing on adaptation and the second on mitigation.

Each workshop was designed to inform staff of the current state of climate change in Yellowknife, as it related GHG emissions or climate impacts, and provide highlights of future projections. Staff then brainstormed possible solutions and what resources or policy changes would be necessary to achieve the desired mitigation or adaptation outcomes. Once draft actions for the Plan were created, City staff who had participated in the initial workshops attended another working session and had the opportunity to provide feedback on the proposed actions.

THE PLAN

Our Climate Action Plan provides a framework for the City to mitigate and adapt to climate change while also improving the quality of life and wellbeing of Yellowknife residents. As such, the Plan was developed to focus on actions within the City's authority and with a careful attention to resources the City owns, follow best practices of municipal climate policy, and reflect what we heard during public, stakeholder, and rightsholder engagement.

VISION

Our vision is to foster partnerships and implement impactful solutions that reduce our environmental impact while enhancing resilience to climate change through proactive planning, effective collaboration, and clear communication. Together, we can make Yellowknife a healthy, resilient community for all, now and into the future.

GUIDING PRINCIPLES

The following guiding principles lay the foundation for the Plan and will provide direction as we strive to turn our vision into reality. They reflect and build upon existing approaches and guidelines established by the City, including Council's Strategic Directions 2023-2026.

A) Partnership-Driven Action

We will collaborate with the GNWT, local Indigenous governments, NGOs, local businesses, and community members to drive meaningful climate action.

The City recognizes that climate action requires collective effort. By fostering strong partnerships, we will pool resources, share expertise, and implement practical solutions.

B) Feasible, Measurable, and Impactful Projects

We will focus on identifying and championing shovel-ready projects that deliver measurable results.

The City will prioritize projects that can be implemented quickly and effectively and increase our ability to measure and report progress. These projects will lay the groundwork to reduce energy use and GHG emissions, while also increasing community resilience to climate change.

C) Advocacy and Policy Support

We will advocate for other levels of government to adopt policy that advances climate action and supports local solutions that fit the Yellowknife context.

The City will work to secure the necessary legislative reforms and financial support from the territorial and federal governments. Advocacy efforts will focus on ensuring Yellowknife has the frameworks and resources needed to implement climate action successfully.

D) Community Engagement and Education

We will engage residents to ensure they are informed, involved, and empowered to contribute to climate action.

Through clear communication and educational initiatives, the City will foster a sense of shared responsibility. We will ensure that all community members understand their role in addressing climate change and are equipped with the information required to take action.

E) Resilience and Adaptation

We will enhance the community's resilience to the impacts of climate change using an equity lens.

The City will proactively address climate-related risks by adapting infrastructure and systems to be more resilient. We will prioritize actions that enhance equitable access to resources and protect public health, infrastructure, and the environment from the increasing effects of climate change.

F) Community Wellbeing and Social Capital

We will enhance the quality of life of our residents through climate action that maximizes co-benefits, including connecting residents with each other to increase social resilience and support networks.

The City's climate action will ensure that we can provide reliable services, affordable solutions, and accessible supports that keep people healthy and foster community-building.

SCOPE OF THE PLAN

MITIGATION AND ADAPTATION

The scope and purpose of the Plan is to provide a comprehensive framework for addressing climate change through both mitigation, avoiding further climate change by reducing the emission of GHGs, and adaptation efforts, preparing for the impacts of climate change that are already underway.

Mitigation includes approaches such as:

- Changing fuel sources used for energy production (e.g., switching from oil to renewable energy sources such as biomass, hydroelectric, solar, and wind, or other alternative energy sources).
- Improving the energy efficiency of vehicles, buildings, and appliances to reduce consumption.
- Improving resource use processes (e.g., materials extraction, processing, and manufacturing) and exploring models such as circular economies, to improve resource recovery and reduce landfill waste.

Adaptation measures include:

- Designing or retrofitting buildings and infrastructure using projected future climate scenarios.
- Preparing to respond to emergencies caused by extreme weather events.
- Increasing community resilience, or peoples' capacity to cope, to climate impacts (e.g., relationship-building or resource-sharing).

The Plan includes measures that are specifically geared for mitigation or adaptation or that accomplish both simultaneously, as shown in Figure 6.

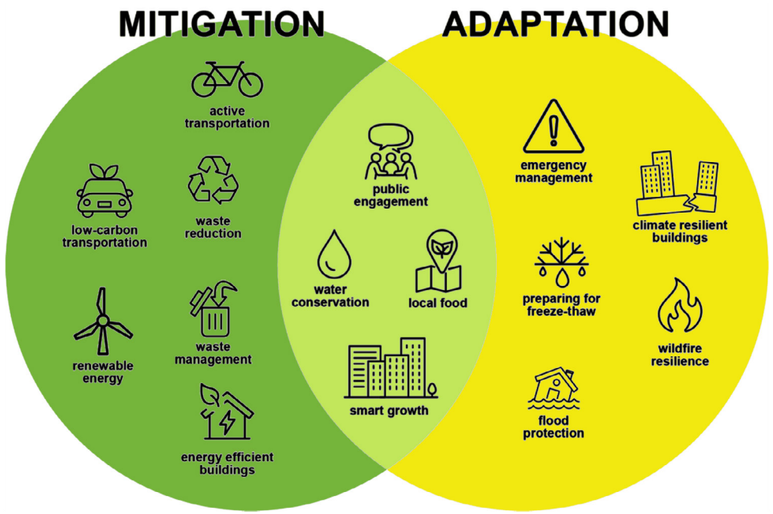


Figure 6 Example of the differences and synergies between climate change mitigation and adaptation measures

SPHERES OF INFLUENCE

The City has direct control over its own infrastructure, assets, programming, budget prioritization, and internal policies. As such, the City has the ability to make decisions and take action in these areas on its own.

For areas outside the City's jurisdiction, or beyond the City's means or capacity, the City can effect change by:

- **Incentivizing** – promote or encourage others to act by making the action more attractive or easier to do.
- **Educating** – improve understanding and awareness of how to take action and the benefits of acting.
- **Partnering** – collaborate with others to pool resources, share data, and take action together.
- **Advocating** – encourage others to create the policy environment, or provide the resources necessary, for the City to take action.
- **Leading by example** – demonstrating what is possible and modelling climate action can influence others to follow our lead.

The Plan outlines direct actions the City can take, but also identifies opportunities to incentivize and educate residents, prospective partnerships with community groups or Indigenous governments, and areas to advocate for policy changes or resource-sharing from other levels of government.

CORPORATE AND COMMUNITY FOCUS

The Plan includes mitigation and adaptation actions for both Corporate and Community domains. *Corporate* refers to that which is within the direct control of the City; i.e., it owns and operates the asset. *Community* encompasses assets within the City's geographic boundary, including but not limited to residential, industrial, commercial, and institutional buildings, as well as transportation. The City has a responsibility to lead by example and support residents to make changes in their activities and behaviours that reduce GHG emissions and build resilience to climate change.

CORPORATE	COMMUNITY
Municipal buildings	Residential buildings
Streetlighting and traffic signals	Industrial, Commercial and Institutional (ICI) buildings
Transportation (fleet and public transit)	Private land use and landscaping
Water and wastewater facilities	Transportation (air, on-road, and off-road travel)
Solid waste facility	Waste reduction and diversion
City-owned lands, parks, and greenspaces	Water conservation

CO-BENEFITS OF CLIMATE ACTION

Although the actions described in this Climate Action Plan are mitigation and/or adaptation focused, several actions that reduce GHGs or increase resiliency also provide additional benefits, or co-benefits, to the broader community and environment.

For example, improving active transportation options results in GHG reductions, but also has numerous co-benefits like reducing air pollution, improving health and well-being, and reducing indirect impacts to water ways. Potential co-benefits of actions are listed under each theme of the Plan and are grouped into the following categories:

Social Equity
Improves social equity by reducing disparities, providing access to opportunities and resources to equity-deserving groups, or ensuring fair distribution of benefits and burdens.

Economic Growth and Efficiency
Boosts the local economy by creating jobs, reducing costs, stimulating economic activity, or supporting the efficient use of resources and infrastructure.

Human Health and Wellbeing
Benefits physical or mental health by reducing rates of chronic disease, improving air quality, lowering heat stress, or reducing stress and anxiety.

Ecosystem Health
Benefits the local ecosystem by protecting freshwater quality or availability, biodiversity and their habitat, or soil quality.

Efficient Land Use
Makes efficient use of our land by promoting compact and connected land development, reducing sprawl, preserving natural areas, or maximizing use of existing infrastructure.

Institutional Alignment and Efficiency
Improves internal consistency and efficiency by enhancing coordination across departments or organizations, streamlining processes, or reducing redundancies and duplicated efforts.

Community-building and Partnerships
Fosters a sense of community by building trust and capacity among community members, creating opportunities for new or enhanced relationships, or fostering a spirit of collaboration.

STRUCTURE OF THE PLAN

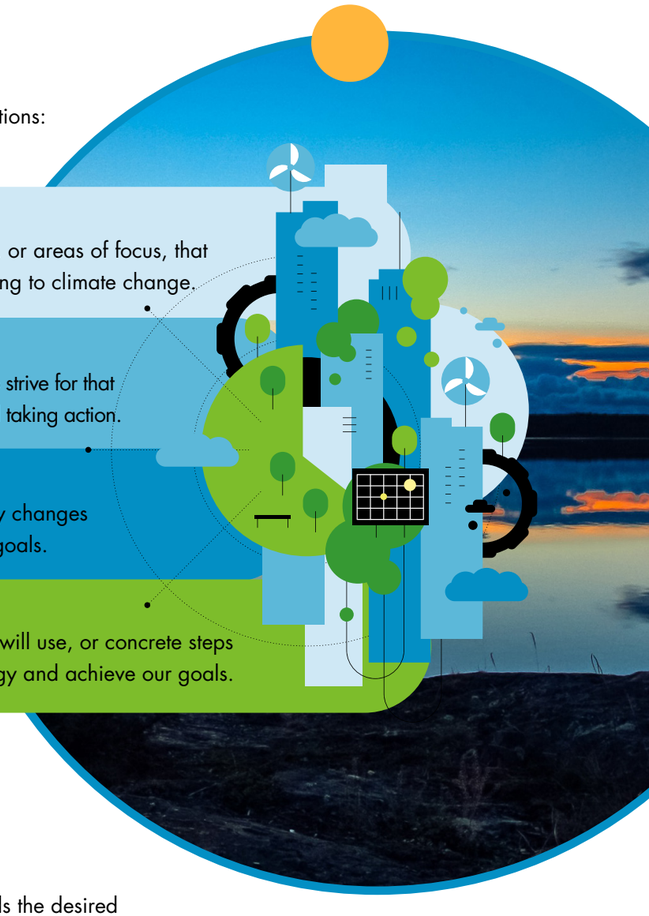
The Plan is made up of themes, goals, strategies, and actions:

THEMES
The City has selected six themes, or areas of focus, that are key to mitigating and adapting to climate change.

GOALS
For each of the themes, we have outlined goals to strive for that provide direction and show the motivation behind taking action.

STRATEGIES
Strategies lay out a pathway of key changes we must make for us to reach our goals.

ACTIONS
Actions are the mechanisms we will use, or concrete steps we will take, to execute a strategy and achieve our goals.



MEASURING SUCCESS

The City will use both primary and secondary indicators to track and measure the overall impact of implemented actions. Primary indicators directly track progress towards the desired reduction outcome of energy consumption and GHG emission levels. For example, as outlined in the Governance and Accountability theme below, the City will establish corporate energy and emissions targets for 2036 that would put us on track to reach corporate net zero by 2050. Progress towards these targets will be assessed in terms of tCO2e reduced from a baseline.

Secondary indicators provide an additional method of understanding whether progress is being made towards increasing climate resilience which is a challenging concept to measure. Examples of secondary indicators include tree cover, number of Net-Zero Energy Ready buildings, or total area of green infrastructure.

The City can also assess the successes and shortcomings of the Plan by observing co-benefits in the community and taking stock of public perceptions and feedback.

All of these indicators will tell us where we are succeeding, what challenges we face, and how we can refine our approach.

RESOURCES REQUIRED

Each of the actions in the Plan is categorized by resources required to show what is necessary for the action to be implemented. Resources required could include financial investment, staff time, or hiring additional staff.

- **Existing resources** – the action can be implemented within the existing budget and staff capacity.
- **Additional resources** – additional financial or staff resources will likely be required for the action to be implemented.
- **To be budgeted as required** – the action itself may not require additional resources for it to be implemented, though implementation of the action is likely to result in associated costs down the road.

1. SUSTAINABLE TRANSPORTATION

OVERVIEW

On-road transportation accounts for 20% of 2023 community GHG emissions. The City fleet makes up 4% of 2023 corporate GHG emissions[33].

Embracing active transportation and public transit and decarbonizing our fleet is key to reducing a significant amount of emissions while offering several co-benefits to the community.

Nearly a third (28.8%) of Yellowknife residents did not have a driver's license in 2023[34 35], and the actual number of residents who do not drive is likely higher. Therefore, planning for people, and not cars, but children, the elderly and others who do not own or drive a vehicle brings greater benefits to the community. The forthcoming Transportation Plan, to be released in 2026, will contain more details on the City's active and public transportation strategies.

GOALS

- Community transportation emissions are reduced by diversifying transportation modes.
- Residents have better access to low or zero-emission vehicle infrastructure.
- The City leads by example with plans for low and zero-emission fleet vehicles to reduce corporate emissions.
- Active and public transportation and resilient infrastructure are prioritized throughout City departments and plans.

CO-BENEFITS

Human Health and Wellbeing | Social Equity | Community-building and Partnerships | Institutional Alignment and Efficiency | Efficient Land-Use | Economic Growth and Efficiency| Ecosystem Health |

IMPLEMENTATION TIMELINE

2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1.1c)	1.1 c)	1.2 b)	1.1 b)	1.1 b)	1.3 d)	1.3 a)	1.4 e)	1.4 a)	1.4 e)
1.1 d)	1.3 c)	1.3 b)	1.2 b)	1.3 a)	1.3 e)				
	1.3 f)	1.3 c)	1.3 d)	1.4 b)	1.4 b)				
	1.4 f)	1.4 f)	1.3 e)	1.4 d)	1.4 c)				
			1.4 d)						

33. See Figure 3 on page 15 for the breakdown of corporate and community emissions
34. NWT Bureau of Statistics, Number of Drivers' Licenses by Region and Age, 1990 to 2023
35. NWT Bureau of Statistics, Population Estimates by Community, Community Totals, 2001-2024

STRATEGIES AND ACTIONS

1.1 INCORPORATE SUSTAINABLE TRANSPORTATION IN LAND-USE PLANNING

Action	Success Measure	Resources required
a) Integrate a climate lens in the Transportation Plan, Community Plan update, and other forthcoming plans by prioritizing active and public transportation, mixed-use development, intensification along active and public transportation corridors, and policies for increased ZEV infrastructure.	• Advocate for these objectives in the development of the Community Plan update, Transportation Plan, and other plans and policies • Monitor for, and record instances of, advancement of these objectives	To be budgeted as required
b) Adopt a Complete Streets[36] policy and guide to prioritize active transportation and public transit in street design for new and refurbished streets when opportunities present.	• Initial research complete by 2029 • Policy and guide adopted by 2030	To be budgeted as required
c) Update the Zoning By-law (No. 5045) to expand areas without off-street parking minimums and increase the minimum requirements for bicycle parking.	• Initial research complete by 2026 • Zoning By-law updated by 2027	Existing resources
d) Prioritize school zones and commuter routes to and from schools for trail development and active transportation infrastructure in the Community Plan update.	• Advocate for these objectives in the development of the 2026 Community Plan update • Monitor for, and record instances of, advancement of these objectives	Existing resources

1.2 ENHANCE CITY OPERATIONS AND SERVICES

Action	Success Measure	Resources required
a) Continue to improve the convenience of public transit, including by increasing the frequency of buses and expanding the hours of operation, in the Transportation Plan.	• The Transportation Plan includes measures for improving public transit convenience • Monitor for, and record instances of, improvements to convenience	Additional resources
b) Update road maintenance budgets to reflect the costs of climate impacts outlined in the Climate Vulnerability Assessment.	• Initial research complete by 2028 • Budget 2029 includes updated costs	To be budgeted as required

36. A Complete Streets policy is a formal commitment for streets to be planned, built, and maintained to serve all users – regardless of age, ability, or mode of transportation – safely and efficiently

1.3 ENHANCE ACTIVE TRANSPORTATION INFRASTRUCTURE

Action	Success Measure	Resources required
a) Partner with local organizations and other levels of government to provide incentives for active transportation such as bicycles, e-bikes, e-bike charging outlets, studded tires, or bike storage.	• Develop the incentive and identify partners by 2030 • Implement the incentive by 2032	Additional resources
b) Partner with local organizations to promote bike-share programs, such as SHIFT, and explore other micro mobility-sharing initiatives.	• Identify strategies to support local bike-share programs by 2028 • Initial research to explore other micro mobility-sharing initiatives complete by 2029	Additional resources
c) Ensure consistent signage is used for designating all multi-use paths and bike routes and increase wayfinding signage along active transportation routes.	• Identify locations for additional path markings and wayfinding signage updates by 2027 • Install signage by 2028	Additional resources
d) Expand the Highway Traffic By-law's sidewalk snow-clearing section (No. 5055, 95) to all areas of the City, investigate compliance rates, educate the public on their responsibility to clear side-walks, and improve enforcement.	• Initial research complete by 2029 • The By-law is updated by 2031 • Education and enforcement begin in 2031	Additional resources
e) Update the Highway Traffic By-law (No. 5055) to clarify where e-bikes, e-scooters, and other micro mobility vehicles may be operated and which vehicles may be operated on multiuse paths.	• Initial research complete by 2029 • The By-law is updated by 2031 • Education and enforcement begin in 2031	Existing resources
f) Advocate for the GNWT and federal government to increase funding for active transportation infra-structure and programming.	• Establish contact with the GNWT to advocate for these objectives by 2027 • Monitor for, and record instances of, advancement of these objectives	Existing resources

1.4 INCREASE LOW AND ZERO-EMISSION VEHICLE USE AND INFRASTRUCTURE

Action	Success Measure	Resources required
a) Work with utilities and the GNWT to develop a community EV charging infrastructure strategy including projecting future charging demand, utility requirements to increase EV charging capacity, and determining suitable charging locations.	• EV charging infrastructure strategy complete by 2034	Additional resources
b) Develop a corporate procurement policy, a funding plan, and a staff retraining plan to replace on- and off-road city fleet vehicles with low or zero-emission vehicles at the end of their lifespan.	• Initial research complete by 2030 • Corporate procurement policy, funding and staff retraining plans in place by 2031	To be budgeted as required
c) Assess the availability and feasibility of using biodiesel or alternative fuels where replacement with low or zero-emission vehicles is not possible for City fleet.	• Initial research complete by 2031	Existing resources
d) Implement a Right-Sizing policy[37] for City fleet vehicles to follow fleet management best practices.	• Initial research complete by 2029 • Policy developed and implemented by 2030	To be budgeted as required
e) Review the Development Incentives By-law to create a program to encourage EV-ready charging in multi-unit residential buildings or where opportunities exist and connect applicants with practical information on installing chargers.	• Initial research complete by 2033 • Development incentive in place by 2035	To be budgeted as required
f) Support car-share program providers in promoting EV use and improving public education on EV functionality in cold climates.	• Establish contact with the car-share provider by 2027 • Implement additional programming and education by 2028	Existing resources

37. A Right-Sizing policy is a formal framework that ensures the City maintains the appropriate number, type, and capacity of fleet vehicles to match operational needs while minimizing costs, fuel use, and emissions The policy sets expectations for evaluating asset utilization and guides procurement, retention, or retirement decisions

2. WASTE MANAGEMENT

OVERVIEW

Based on the GHG emissions inventory, solid waste was the largest contributing source of emissions, making up 73% of 2023 corporate GHG emissions. Solid waste emissions are high due to fugitive methane emissions generated from the buildup of waste since the landfill commenced as a community-operated, non-licensed, and unmonitored dump site in 1974. Although these emissions fall within the direct control of the City, they are logistically challenging to reduce.

It is, however, possible to limit the growth of these emissions. The Business-As-Usual (BAU) forecast[38] indicates that with no additional interventions, solid waste emissions are to account for 80% of corporate emissions by 2050. Reducing the amount of waste we produce, as well as diverting as much as possible – particularly organic materials – will limit the growth of solid waste emissions, lessen landfill impacts on our surrounding ecosystem, and increase the longevity of our landfill cells.

GOALS

- Reduce Solid Waste Facility (SWF) GHG emissions by:
  - Producing less waste as a community;
  - Increasing re-use; and
  - Increasing diversion.

IMPLEMENTATION TIMELINE

2026	2027	2028	2029	2030
2.2 b)	2.2 a)	2.1 b)	2.1 a)	2.1 a)
	2.2 c)	2.2 a)	2.2 f)	2.2 e)
		2.2 d)		

CO-BENEFITS

Ecosystem Health | Economic Growth and Efficiency | Community-building and Partnerships | Institutional Alignment and Efficiency |

38. The Business-As-Usual forecast projects that corporate emissions will remain relatively constant from the 2023 baseline to 2050 at just over 26,000 tCO2e

STRATEGIES AND ACTIONS

2.1 INCREASE RE-USE OF WASTE MATERIALS

Action	Success Measure	Resources required
a) Create an incentive for an operator of a re-sale store for building materials in a new location to encourage systematic disassembly over demolition in the construction sector.	• Initial research complete by 2029 • Incentive in place by 2030	Additional resources
b) Advocate for the GNWT to support business development for the use of Recycled Crushed Aggregate[39] and re-use of other waste such as building materials, plastic, or tin.	• Establish contact with the GNWT to advocate for these objectives by 2028 • Monitor for, and record instances of, advancement of these objectives	Existing resources

39. Recycled Crushed Aggregate is construction material produced by processing and crushing reclaimed concrete, asphalt, or other demolition debris into granular form. It serves as a substitute for natural aggregates (such as gravel or crushed stone) in construction applications

2.2 DIVERT AND REDUCE WASTE

Action	Success Measure	Resources required
a) Update the Solid Waste Management By-law (No. 4376) to require all multi-unit residential buildings and any businesses that generate organic waste to provide compost collection and support small businesses in the transition.	• Initial research complete by 2027 • Solid Waste By-law updated and support in place for small businesses by 2028	Additional resources
b) Support the Bottle Shop to run pop-up bottle and e-waste recycling collection or information-sharing booths at community events whenever feasible.	• Inform the Bottle Shop of where to find information on upcoming events and how to reach event organizers in 2026	Existing resources
c) Update the City's Event Guide and make it a requirement that garbage, recycling, and compost receptacles be available, clearly marked, and accessible at all events.	• Update the Event Guide by 2027 • Remind event organizers of their responsibilities on an ongoing basis	Existing resources
d) Upgrade all public waste receptacles to include clearly labeled garbage, recycling, and, where feasible, compost bins, and update signage at blue bin stations to align with actual processing streams.	• Public waste receptacles and blue bin station signage updated by 2028	Additional resources
e) Advocate for the GNWT to support development of a regional Material Recovery Facility (MRF)[40] and a plastic processing and remanufacturing facility.	• Establish contact with the GNWT to advocate for these objectives by 2030 • Monitor for, and record instances of, advancement of these objectives	Existing resources
f) Advocate for the GNWT to implement Extended Producer Responsibility (EPR)[41] policies.	• Establish contact with the GNWT to advocate for this objective by 2030 • Monitor for, and record instances of, advancement of these objectives	Existing resources

40. A Material Recovery Facility is a specialized plant where mixed recyclables or waste materials are received, sorted, processed, and prepared for marketing and sale to end-users. Its purpose is to maximize recovery of recyclable commodities while minimizing contamination and residual waste

41. Extended Producer Responsibility is a policy approach that makes producers (such as manufacturers, brand owners, or importers) responsible for the entire lifecycle of their products — including for take-back, recycling, and final disposal, thus incentivizing them to design products and packaging that are easier to reuse, recycle, or safely dispose of

2.3 PLAN FOR EMISSIONS-CAPTURE IN FUTURE SOLID WASTE FACILITY CELLS

Action	Success Measure	Resources required
a) Incorporate solid waste fugitive emissions data into decision-making rationale for implementing emissions-capturing technology in future landfill cells.	• Incorporate into decision-making during planning stages of the next new landfill cell	Existing resources

3. RESILIENT AND EFFICIENT BUILDINGS AND INFRASTRUCTURE

OVERVIEW

With climate-related hazards becoming increasingly common, and due to the high vulnerability of our buildings, we must rethink and redesign our buildings and infrastructure to withstand future projected climate for the continued safety and resiliency of residents and City service delivery.

Buildings are also a major source of GHG emissions. As of 2023, they account for approximately 30% of community emissions. Heating oil represents the major contributing source of these building emissions, and as such transitioning to lower carbon alternatives for heating and increasing energy efficiency will be vital to reducing our emissions and will save residents money on their monthly bills.

GOALS

- Our built environment is powered by greener energy sources.
- Our buildings and infrastructure are energy efficient and are designed to withstand future climate impacts.
- Developers, private property owners, and residents have access to resources to affordably decarbonize buildings and increase their resilience to climate change.

IMPLEMENTATION TIMELINE

2026	2027	2028	2029	2030	2031	2032	2034	2035
3.1 a)	3.1 a)	3.1 c)	3.2 c)	3.1 b)	3.1 b)	3.2 d)	3.1 a)	3.1 b)
3.3 a)	3.4 b)	3.3 c)	3.4 a)	3.2 a)	3.2 a)	3.3 b)	3.2 b)	3.2 b)
		3.3 d)	3.4 c)		3.2 c)		3.2 d)	
		3.4 a)			3.3 b)			
		3.4 b)						

CO-BENEFITS

Human Health and Wellbeing | Economic Growth and Efficiency | Social Equity | Community-building and Partnerships |

STRATEGIES AND ACTIONS

3.1 TRANSITION TO RENEWABLE ENERGY SOURCES

Action	Success Measure	Resources required
a) Adopt and implement the recommendations of the District Energy Policy Framework[42] (2022) including updates to the Community Plan and Zoning By-law (No. 5045).	• Initial research complete by 2026 • The Community Plan and Zoning-By-law updated by 2027 • Other recommendations implemented by 2034	Additional resources
b) Identify funding opportunities and partnerships to expand solar PV at City facilities and assess eligibility to participate in net metering programs.	• Initial research complete by 2030 • Funding and partnerships identified by 2031 • Solar PV installed at identified City facilities by 2035	Existing resources
c) Advocate for the GNWT to review and remove regulatory barriers to clean energy technologies such as the Canadian Standards Association (CSA) approval system for European Union biomass boilers.	• Establish contact with the GNWT to advocate for this objective by 2028 • Monitor for, and record instances of, advancement of these objectives	Existing resources

3.2 DECARBONIZE AND INCREASE CLIMATE RESILIENCE OF CITY BUILDINGS AND INFRASTRUCTURE

Action	Success Measure	Resources required
a) Establish a process and allocate resources to regularly conduct building condition assessments, including assessment of climate change resilience and energy audits, for all City buildings.	• Process for regularly conducting assessments established by 2030 • Building assessments begin by 2031	Existing resources
b) Create a schedule to retrofit City facilities for improved energy efficiency and climate resilience for all impacts outlined in the Climate Vulnerability Assessment.	• Schedule is created by 2034 • Retrofits of City facilities begin by 2035	Additional resources
c) Incorporate Climate-Adjusted Design Criteria[43] into the construction and renovation of all City assets including stormwater drainage systems, water distribution networks, the wastewater treatment system, and road infrastructure.	• Initial research complete by 2029 • Design criteria updated and implemented by 2031	Additional resources
d) Develop adaptation plans for existing infrastructure known to be on discontinuous permafrost.	• Initial research complete by 2032 • Adaptation plans created by 2034	Additional resources

42. District Energy is a centralized system that produces thermal energy and distributes it through a network of insulated underground pipes to multiple buildings The system can be fueled by renewable or non-renewable energy sources

43. Climate-Adjusted Design Criteria are engineering and planning standards that incorporate projected climate change impacts—such as increased rainfall, higher temperatures, permafrost thaw, or extreme weather—into the design, construction, and operation of infrastructure and buildings They move beyond historical climate data to include future climate scenarios

3.3 DECARBONIZE AND INCREASE CLIMATE RESILIENCE OF COMMUNITY BUILDINGS AND INFRASTRUCTURE

Action	Success Measure	Resources required
a) Update the Zoning By-law (No. 5045, 11.3.3) to require the use of fire-resistant materials for building façades that fit the character of the neighbourhood and ensure the Building By-law (No. 4469) requires fire-resistant façade materials for all buildings.	• Zoning By-law updated by 2026 • The Building By-law requires fire-resistant façade materials	Existing resources
b) Introduce a retrofit incentive program for multi-unit residential buildings to make renewable energy, energy efficiency, water conservation, and climate resilience improvements to existing buildings.	• Initial research complete by 2031 • An incentive program was created by 2032	Additional resources
c) Advocate for the GNWT to increase funding for energy audits in Yellowknife.	• Establish contact with the GNWT to advocate for this objective by 2028 • Monitor for, and record instances of, advancement of these objectives	Existing resources
d) Advocate for the GNWT to increase the local workforce of contractors and energy advisors/ professionals to meet rising demand and address existing backlogs.	• Establish contact with the GNWT to advocate for this objective by 2028 • Monitor for, and record instances of, advancement of these objectives	Existing resources

3.4 CONNECT DEVELOPERS, BUILDING OWNERS AND RESIDENTS WITH THE RESOURCES THEY NEED

Action	Success Measure	Resources required
a) Partner with community organizations to host workshops for residents to learn how to improve their energy efficiency, water consumption, FireSmart their homes and businesses, or take other measures to increase their climate resilience.	• Identify partners and workshop opportunities by 2028 • Workshops begin by 2029	Existing resources
b) Share resources on energy efficient and climate resilient design practices with development applicants during the application process, such as the FireSmart Residential Development Guide and Arctic Energy Alliance's Guide for New Energy Efficient Buildings.	• Identify resources to share and changes needed to internal development application process by 2027 • Begin sharing resources with developers by 2028	Existing resources
c) Partner with the GNWT to provide incentives to residents for increasing at-home climate resilience such as air purifiers, fans, and air conditioners.	• Establish contact with the GNWT on this objective by 2029 • Monitor development and delivery of the program	Existing resources

4. RESPONSIBLE LAND-USE AND PLANNING

OVERVIEW

Natural areas have a high vulnerability to climate hazards such as wildfires and drought. Incorporating nature-based solutions through land-use and planning can have multiple benefits for adapting to a changing climate and sequestering emissions.

Food insecurity is already high in Yellowknife and the NWT more broadly. Climate change compounds this issue by increasing the cost of food and causing delays or disruptions to transportation systems. Increasing local food production through land-use and planning can help build our community's resilience and improve food security while also reducing emissions produced by trucking food to Yellowknife.

GOALS

- Land-use and planning enhance the ability of natural assets to improve community resilience to climate impacts.
- Infrastructure and natural assets are protected from future climate impacts.
- Community food security is enhanced.

IMPLEMENTATION TIMELINE

2026	2027	2028	2030	2031
4.1 a)	4.2 b)	4.1 c)	4.2 a)	4.2 a)
4.1 b)	4.3 a)	4.2 b)		4.2 c)
4.1 c)	4.3 b)			4.3 b)
4.2 b)				
4.3 c)				

CO-BENEFITS

Ecosystem Health | Human Health and Wellbeing | Economic Growth and Efficiency | Social Equity | Community-building and Partnerships | Institutional Alignment and Efficiency | Efficient Land Use |

STRATEGIES AND ACTIONS

4.1 INCREASE RESILIENT AND EFFICIENT LAND DEVELOPMENT

Action	Success Measure	Resources required
a) Update the Community Plan to require that decisions for greenfield development factor in the value of maintaining greenspace for community resilience and carbon sequestration.	• Inclusion of this objective in the development of the 2026 Community Plan update	Existing resources
b) Update the Community Plan to require that all development and rezoning applications demonstrate conformity with the Climate Action Plan's goals.	• Inclusion of this objective in the development of the 2026 Community Plan update	Existing resources
c) Review and update the City's Community Plan, Development & Design Standards, and the Zoning By-law (No. 5045) to reflect FireSmart NWT best practices including landscaping standards and wildland fuels treatment.	• Inclusion of this objective in the development of the 2026 Community Plan update • Initial research to amend the Development & Design Standards and the Zoning By-law complete by 2026 • Development & Design Standards and the Zoning By-law are updated by 2028	Existing resources

4.2 INCREASE THE USE OF NATURE-BASED SOLUTIONS

Action	Success Measure	Resources required
a) Create an Urban Forest Management plan to enhance and protect City-owned natural spaces, including maintenance of new and existing trees, and incorporate FireSmart NWT best practices.	• Initial research complete by 2030 • Urban Forest Management plan created by 2031	Additional resources
b) Include green street design requirements, such as the use of green boulevards, new street trees, and permeable paving where feasible in the Transportation Plan, the Community Plan update, and Development & Design Standards.	• Advocate for this objective in the development of the 2026 Community Plan update and the Transportation Plan • Initial research to amend the Development & Design Standards complete by 2027 • Development & Design Standards are updated by 2028	Existing resources
c) Advocate for the GNWT to adopt urban forest management principles and FireSmart NWT best practices, that align with the City's, on GNWT-owned land within Yellowknife.	• Establish contact with the GNWT to advocate for this objective by 2031 • Monitor for, and record instances of, advancement of these objectives	Existing resources

4.3 INCREASE LOCAL FOOD PRODUCTION

Action	Success Measure	Resources required
a) Fund actions of the Yellowknife Food & Agriculture (GROW) Strategy.	• Review GROW actions and prioritize funding for GROW in the 10-year Capital Plan (2027-2037)	Additional resources
b) Partner with local organizations or other levels of government to create a year-round greenhouse initiative.	• Partners identified and initial research initiated by 2027 • Greenhouse in operation by 2031	Additional resources
c) Designate land for the sole purpose of agricultural use in the Community Plan update.	• Advocate for this objective in the development of the 2026 Community Plan update	Existing resources

5. GOVERNANCE AND ACCOUNTABILITY

OVERVIEW

Climate action requires a whole-of-government approach as it cannot be achieved by one single department. Therefore, our ability to reduce emissions and adapt to climate change hinges on interdepartmental collaboration within the City and integrating climate considerations into all operations and financial decision making.

We want to celebrate our wins, identify challenges, and be accountable for our shortcomings. This will require the involvement of our community and transparent communication throughout the implementation phase.

GOALS

- Climate action is factored into financial decision making and operations across all departments.
- Measures are in place for reporting on the Plan implementation progress.
- We communicate effectively with the public, and information we share is accurate and accessible.

IMPLEMENTATION TIMELINE

2026	2027	2028	2029	2031	2036
5.2 a)	5.1 c)	5.1 c)	5.1 d)	5.2 f)	5.2 f)
5.2 b)	5.2 d)	5.1 d)			
5.2 c)	5.3 b)	5.2 d)			
5.2 e)					
5.3 a)					
5.3 d)					

CO-BENEFITS

Economic Growth and Efficiency | Community-building and Partnerships | Institutional Alignment and Efficiency |

STRATEGIES AND ACTIONS

5.1 Integrate climate action in all City departments

	Action	Success Measure	Resources required
a)	Integrate mitigation and adaptation principles into the annual budget process and asset management plans, including levels of service, lifecycle management strategies, and capital planning business cases.	• Advocate for this objective in the development of asset management plans • Factor in mitigation and adaptation principles into annual budget planning	Existing resources
b)	Create annual Climate Action Plan implementation budgets to ensure actions are funded and to break down long-term actions into manageable yearly projects to 2036.	• Put forth a climate budget in advance of annual budget deliberations	Existing resources
c)	Review the current procurement policy and update it to include green purchasing guidelines for energy and emission reductions, waste reductions, and climate resilience improvements.	• Review the current procurement policy and identify green purchasing guidelines by 2027 • Procurement policy updated by 2028	Existing resources
d)	Integrate climate literacy into onboarding of all new City staff by including mandatory training on basic climate change science, local impacts, how City departments' work is impacted, and how staff can advance the Plan's goals.	• Identify available climate literacy courses by 2027 • Climate literacy course required for all new hires by 2028	Additional resources

5.2 Implement the Climate Action Plan and report on progress

Action	Success Measure	Resources required
a) Establish an implementation working group consisting of representatives of local Indigenous governments, youth, environmental organizations, and private business, to provide direction, assistance, and feedback on the Plan implementation.	• Determine roles and responsibilities of the committee by Q2 2026 • Recruit members to serve on the committee by Q3 2026 • Launch the first committee meeting by Q4 2026	Existing resources
b) Establish an interdepartmental implementation working group to help coordinate implementation and assign responsibility.	• Determine roles and responsibilities of the working group by Q1 2026 • Identify City staff to join the working group by Q2 2026 • Launch the first working group meeting by Q3 2026	Existing resources
c) Allocate resources to enable ongoing tracking of GHG emissions to compare to our 2023 emissions inventory baseline.	• Funding is allocated by Q2 2026 • A strategy to complete emissions tracking on an ongoing basis identified by Q4 2026	Additional resources
d) Establish corporate energy and emissions targets for 2036, that would put us on track to reach corporate net zero by 2050, and monitor and report progress towards these commitments.	• Initial research complete by 2027 • Targets set by 2028	Existing resources
e) Dedicate resources to identifying and applying for funding from various sources and for all aspects of the Plan.	• Funding identification is ongoing beginning in 2026	Existing resources
f) Communicate updates regularly with the public, report annually to council, publish a midway review of the Plan and make any necessary updates, and publish a final review of the Plan.	• Public updates are ongoing • Report to council annually • Midway review in 2031 • Final review in 2036	Existing resources

5.3 Improve communication and public engagement

Action	Success Measure	Resources required
a) Ensure the city website contains accurate, updated, and accessible information regarding climate and other environmental initiatives as well as Climate Action Plan progress.	• City web pages are reviewed and updated at least quarterly beginning in 2026	Existing resources
b) Create a visual dashboard on the city website to show Climate Action Plan implementation progress and other metrics such as GHG emissions, energy, and water use data.	• A visual dashboard is created by 2027 • The dashboard is updated annually	Additional resources
c) Maintain ongoing communication, partnership, and information-sharing on climate and other environmental issues with local Indigenous governments.	• Communication is ongoing	Existing resources
d) Target communication on Climate Action Plan implementation and opportunities for participation with specific messaging and outreach methods, including non-digital formats, to reach youth, Indigenous, and vulnerable members of our community.	• Communication plan, with methods and target audiences, complete by the end of 2026	Existing resources

6. COMMUNITY PREPAREDNESS AND EMERGENCY RESPONSE

OVERVIEW

Yellowknife residents are not affected equally by climate change, nor do they have equal access to resources to adapt to climate impacts. With extreme weather and poor air quality becoming ever more common, we must take steps now so that as a community we are prepared to act when needed.

Regional climate-related emergencies are also becoming more frequent and severe. As such, Yellowknife is increasingly becoming a support hub for neighbouring communities – from accepting regional disaster debris to sheltering evacuees from other communities. Proactive planning can help build our capacity to respond in these situations.

GOALS

- Build our community resilience so that all residents are prepared for climate change impacts.
- Increase our capacity to manage and support regional emergency response efforts.

IMPLEMENTATION TIMELINE

2027	2028	2029	2030	2031
6.1 a)	6.1 a)	6.1 b)	6.3 b)	6.3 c)
		6.2 b)		
		6.3 a)		

CO-BENEFITS

Human Health and Wellbeing | Social Equity | Community-building and Partnerships |

STRATEGIES AND ACTIONS

6.1 ENSURE EQUITABLE PROVISION OF SUPPORT AND RESOURCES

Action	Success Measure	Resources required
a) Update and implement the Better Air Facility guideline that allows free access to the Fieldhouse when the Air Quality Health Index is 7+ and: • Add additional better air facility locations; • Include a temperature threshold for access during extreme heat or cold events; • Detail supports available to facility users such as transportation options, access to water, social supports, and accessibility features; and • Share this information through City channels and community organizations.	• Initial research complete by 2027 • Better Air Facility guideline updated and implemented by 2028	To be budgeted as required
b) Advocate for the GNWT and local organizations to support vulnerable residents by: • Defining vulnerability; • Mapping vulnerable populations; • Identifying climate impacts faced by vulnerable residents; and • Addressing inequities and providing support.	• Establish contact with the GNWT to advocate for this objective by 2029 • Monitor for, and record instances of, advancement of this objective	Additional resources

6.2 COMMUNICATE WITH RESIDENTS ON HOW TO PREPARE FOR CLIMATE IMPACTS

Action	Success Measure	Resources required
a) Continue to provide residents with personal preparedness information and resources for climate impacts such as how to make an evacuation plan, power outage plan, extreme weather plan, create a safety kit, how to FireSmart properties, or other resilience-building actions.	• Information and resource sharing are ongoing	Existing resources
b) Create a communication strategy for sharing information on support and resources through non-digital formats for those without access to internet.	• Communication strategy created and implemented by 2029	Existing resources

6.3 SUPPORT OUR NEIGHBOURING COMMUNITIES

Action	Success Measure	Resources required
a) Advocate for the GNWT to: • Evaluate the current system for shelter operation and emergency response during regional evacuations; and • Increase funding and support so Yellowknife can continue to host regional evacuees.	• Establish contact with the GNWT to advocate for this objective by 2029 • Monitor for, and record instances of, advancement of this objective	Existing resources
b) Advocate for the GNWT and other levels of government to identify strategies to improve food security and distribution and other supply chain issues during emergencies.	• Establish contact with the GNWT to advocate for this objective by 2030 • Monitor for, and record instances of, advancement of this objective	Existing resources
c) Advocate for the GNWT to develop a plan to manage disaster debris in anticipation of increasing amounts of debris from regional climate impacts such as wildfires.	• Establish contact with the GNWT to advocate for this objective by 2031 • Monitor for, and record instances of, advancement of this objective	Existing resources

IMPLEMENTING THE PLAN

Over the next 10 years, the City will work diligently to allocate staff time and budget to ensure the Plan is implemented as efficiently as possible. Plan implementation will also require input from the public, Indigenous governments, and support from all City departments as well as the GNWT.

Over the course of this work, the City will provide regular updates and reports on progress to ensure transparency and accountability. See Table 11 below for a tentative timeline of next steps in the implementation process. This timeline is subject to change.

COMMUNITY INVOLVEMENT IN IMPLEMENTATION

Community involvement in the implementation of the Plan will be a critical success factor in achieving meaningful and impactful change. As such, a diverse range of community members will be invited to contribute their time, expertise, passion, and lived experiences to help implement our Climate Action Plan, in the form of an implementation working group. We will seek out representatives of local Indigenous governments, youth, environmental organizations, and private business.

The overarching goals of this group will be to:

- Provide guidance on action prioritization;
- Support monitoring and measuring progress;
- Cultivate further community involvement and ownership;
- Mobilize resources for implementing the Plan; and
- Hold the City and other actors accountable.

INTERDEPARTMENTAL COLLABORATION

Staff from all departments are required to use the Plan as a guide for decision-making and actions within the Plan are to be led and implemented by various departments. As such, success of the Plan relies on ongoing collaboration and participation across departments and divisions.

The City will establish an interdepartmental working group to help coordinate action and remove silos between departments. This will facilitate assigning responsibility among departments for leading implementation of each of the Plan actions.

FINANCING THE PLAN

Implementing the Plan will not be possible without securing and allocating funds. To do so, we will:

- Create annual Climate Action Plan implementation budgets to ensure actions are funded and to break down long-term actions into manageable yearly projects to 2036.
- Explore and secure funding for all aspects of the Plan.

Funding for our Climate Action Plan will be procured via multiple sources and using multiple stages and financing mechanisms. Every effort will be made to ensure the funding solutions that emerge are stable, sustainable, and equitable. Examples of funding opportunities that may be explored include grants, revolving funds, and increased or expanded service fees.

PROPOSED IMPLEMENTATION TIMELINE

The actions within the plan will be implemented over the span of the next ten years. Certain actions have been prioritized, and are set to be implemented sooner, for various reasons including the impact they have on emissions reduction and adaptation, their current feasibility, and support from the GNWT, utilities, the public, and local Indigenous governments. Lastly, some actions must be complete in order for others to be possible. See below for the proposed timeline of action implementation including a breakdown of their steps (timeline subject to change). Not all actions have been assigned a year for implementation.

2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
1.1 c)	1.1 c)	1.2 b)	1.1 b)	1.1 b)	1.3 d)	1.3 a)	1.4 e)	1.4 a)	1.4 e)	5.2 f)
1.1 d)	1.3 c)	1.3 b)	1.2 b)	1.3 a)	1.3 e)	3.2 d)		3.1 a)	3.1 b)	
2.2 b)	1.3 f)	1.3 c)	1.3 d)	1.4 b)	1.4 b)	3.3 b)		3.2 b)	3.2 b)	
3.1 a)	1.4 f)	1.4 f)	1.3 e)	1.4 d)	1.4 c)			3.2 d)		
3.3 a)	2.2 a)	2.1 b)	1.4 d)	2.1 a)	3.1 b)					
4.1 a)	2.2 c)	2.2 a)	2.1 a)	2.2 e)	3.2 a)					
4.1 b)	3.1 a)	2.2 d)	2.2 f)	3.1 b)	3.2 c)					
4.1 c)	3.4 b)	3.1 c)	3.2 c)	3.2 a)	3.3 b)					
4.2 b)	4.2 b)	3.3 c)	3.4 a)	4.2 a)	4.2 a)					
4.3 c)	4.3 a)	3.3 d)	3.4 c)	6.3 b)	4.2 c)					
5.2 a)	4.3 b)	3.4 a)	6.1 b)		4.3 b)					
5.2 b)	5.1 c)	3.4 b)	6.2 b)		5.2 f)					
5.2 c)	5.1 d)	4.1 c)	6.3 a)		6.3 c)					
5.2 e)	5.2 d)	4.2 b)	6.3 a)							
5.3 a)	5.3 b)	5.1 c)								
5.3 d)	6.1 a)	5.1 d)								
		5.2 d)								
		6.1 a)								

- Sustainable Transportation
- Waste Management
- Resilient and Efficient Buildings and Infrastructure
- Responsible Land-Use and Planning
- Governance and Accountability
- Community Preparedness and Emergency Response

Table 10 Timeline of action implementation

REPORTING ON PROGRESS

The City of Yellowknife will report annually to Council and will regularly communicate updates with the public regarding Climate Action Plan implementation and our progress towards mitigation and adaptation more broadly. To reflect on our successes and challenges, the City's annual reports may include:

- Updated corporate and community energy and GHG emissions inventories;
- Progress towards achieving corporate targets;
- Implementation status of all Climate Action Plan actions;
- Evolving climate impacts and risks; and
- Measurable impact to date (e.g., emissions, risks, co-benefits, and other key indicators).

The City will conduct a review of the Plan at the midway point in 2031 and the Plan will be updated at that time if required. Then, once this Climate Action Plan expires in 2036, a final review will be conducted and future plans for climate action will be discussed.

Year		2026				2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Quarter		1	2	3	4										
Next steps	Establish an implementation working group consisting of local representatives		■	■	■										
	Establish an interdepartmental implementation working group	■	■	■											
	Create annual Climate Action Plan implementation budgets	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Secure funding for Climate Action Plan actions	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Report annually to council and provide regular progress updates	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Midway review									■					
	Final review and planning for the future														■

Table 11 Next steps for Climate Action Plan implementation

CITY OF YELLOWKNIFE - **CLIMATE CHANGE ACTION PLAN**

APPENDIX A: CORPORATE AND COMMUNITY ENERGY AND GHG EMISSIONS INVENTORY REPORT

City of Yellowknife Corporate and Community Energy and GHG Emissions Inventory and Forecast Report

Stantec

Prepared for:
City of Yellowknife

Prepared by:
Stantec Consulting Ltd.

May 5, 2025

Project/File:
160963932

Stantec Consulting Ltd.

Disclaimer

The conclusions in the Report titled City of Yellowknife Corporate and Community Energy and GHG Emissions Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope

described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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Prepared by:

Signature

Brendan Robbins, M.A.Sc., Atmospheric Scientist

Printed Name

Reviewed by:

Signature

Daniel Hegg, Senior Associate, B.Comm., M.Sc.,

Approved by:

Signature

Shane O'Hanlon, Associate, M.Sc., B.Eng., Project Manager

Table of Contents

List of Tables

List of Figures

Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by the City of Yellowknife (the City) to complete the City's Climate Action Plan (CAP). As part of the CAP development process, Stantec has prepared the City's 2023 Corporate and Community greenhouse gas (GHG) emissions inventories and used this information to forecast GHG emissions to 2050 to provide an outlook of anticipated GHG emissions, trending with respect to the City's 2009 base year emissions levels, and to inform GHG emission reduction planning activities. This document presents the 2023 calendar year Corporate and Community emissions inventory and Corporate and Community Business-As-Usual (BAU) GHG emissions forecasts to 2050.

To monitor the impact on energy and GHG emissions, as well as track progress toward related targets, the City maintains and oversees two inventories: a Corporate GHG inventory and a Community GHG inventory. The Corporate GHG emission inventory focuses on emissions from assets managed by the City, while its Community GHG emission inventory encompasses emissions from all sources within the City's municipal boundaries. The City's 2023 Corporate inventory boundary includes GHG emissions from electricity and fuel use by City owned buildings, streetlighting and traffic signals, City owned transit and non-transit fleet vehicles and water and wastewater facilities, and fugitive GHG emissions from the Yellowknife Solid Waste facility and Fiddler's Lake wastewater treatment lagoon. The 2023 Community inventory boundary includes emissions sources captured within the Corporate inventory, as well as GHG emissions from electricity and fuel use by residential buildings, industrial, commercial and institutional (ICI) buildings, and on-road and off-road transportation vehicles. The total estimated 2023 Corporate GHG emissions from assets managed by the City amount to 26,472 tonnes of carbon dioxide equivalent (tCO_2e), which represents 10% of the total 2023 Community GHG emissions of 269,053 tCO_2e.

The City's 2023 emissions profile by sector for the Corporate and Community GHG inventory is presented in **Figure E1**. GHG emissions from solid waste and water and wastewater facilities represent the major contributors to the City's 2023 Corporate GHG emissions inventory, representing approximately 87% of total 2023 Corporate GHG emissions. The high contribution of solid waste to the City's Corporate GHG emissions inventory is a result of fugitive methane emissions from the buildup of waste at the City's landfill. For the City's 2023 Community inventory, GHG emissions are dominated by off-road transportation, on-road transportation and Industrial, Commercial and Institutional (ICI) buildings, which together represent approximately 84% of total 2023 Community GHG emissions. Within these major contributing sectors, aviation turbojet fuel represents 95% of estimated GHG emissions from off-road transportation, passenger light-duty gasoline and diesel vehicles represent 50% of estimated GHG emissions from on-road transportation and heating oil represents 66% of estimated GHG emissions from ICI buildings.

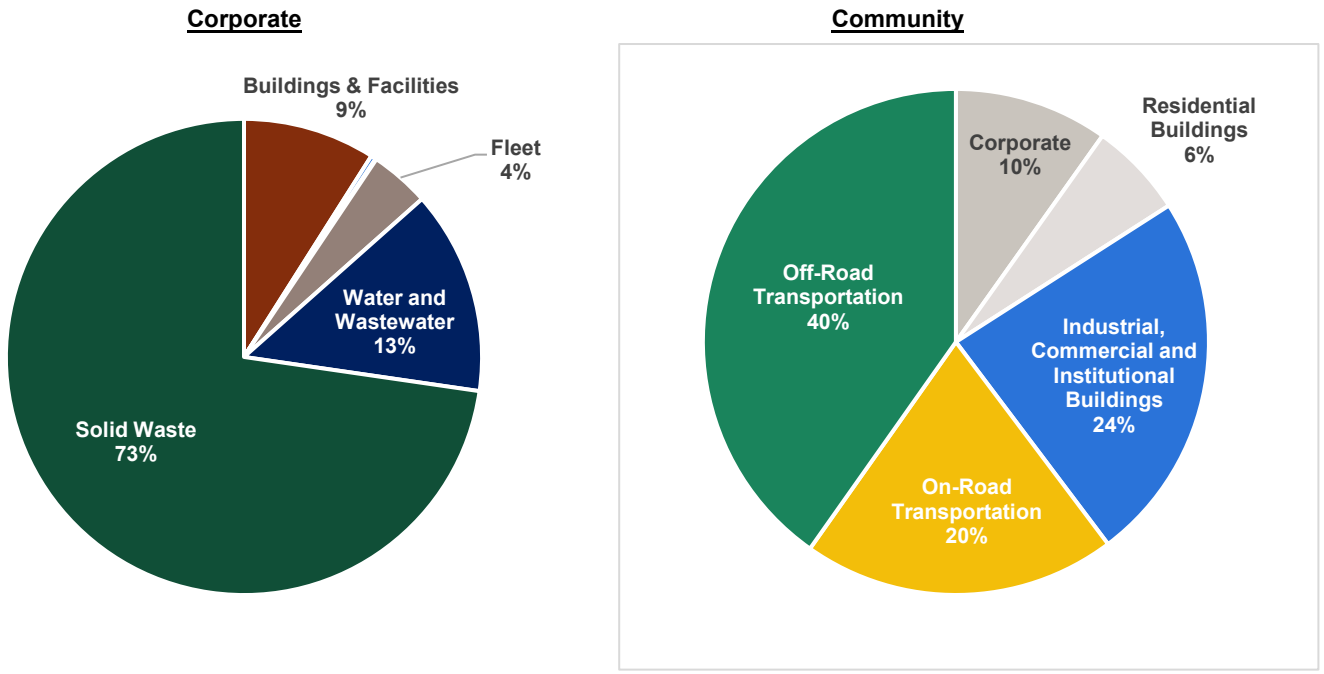


Figure E1: 2023 Corporate (Left) and Community (Right) GHG Emissions Profile[1][2]

Corporate and Community GHG emissions estimates from the last three years of quantification (2021 – 2023) indicate that total GHG emissions of both the Corporate and Community inventory increased from 2021 to 2023 with a total percent change of 3% and 16% for the Corporate and Community GHG inventories, respectively. The recent trend is likely a result of increased operations following the COVID-19 pandemic shutdowns, with Community inventory emissions activities such as on-road and off-road travel likely impacted more significantly by COVID-19 lockdowns, leading to a larger rebound in total Community GHG emissions post COVID-19 pandemic.

BAU forecasts were developed for the City's Corporate and Community GHG inventories. The forecast of the City's Corporate GHG emissions to 2050 is shown in **Figure E2**. Operations of City owned buildings and lighting infrastructure are assumed to remain stable under the BAU scenario, while operations and expected GHG emissions from Corporate and public transit fleet transportation, water and wastewater facilities and solid waste are expected to increase with the City of Yellowknife's projected population growth. Decarbonization of the Northwest Territories electricity grid represents the main source of Corporate emissions reductions under the BAU scenario. Solid waste represents the most significant contributor to the City's Corporate GHG emissions forecast. Fugitive methane emissions from the Yellowknife Solid Waste landfill are expected to contribute 80% of total Corporate emissions by 2050

[1] Sources that represent 1% or less of Corporate GHG emissions are excluded from Figure E1 (Left). This includes temporary electricity and streetlighting and traffic signals.

[2] GHG emissions in Figure E1 (Right) include all sectors captured within the Corporate energy and GHG inventory boundary. This includes Buildings and Facilities, Streetlighting and Traffic Signals, Temporary Power, Fleet Transportation, Water and Wastewater and Solid Waste.

under the BAU scenario, up 7% from its estimated 73% contribution to the City's total 2023 Corporate emissions.

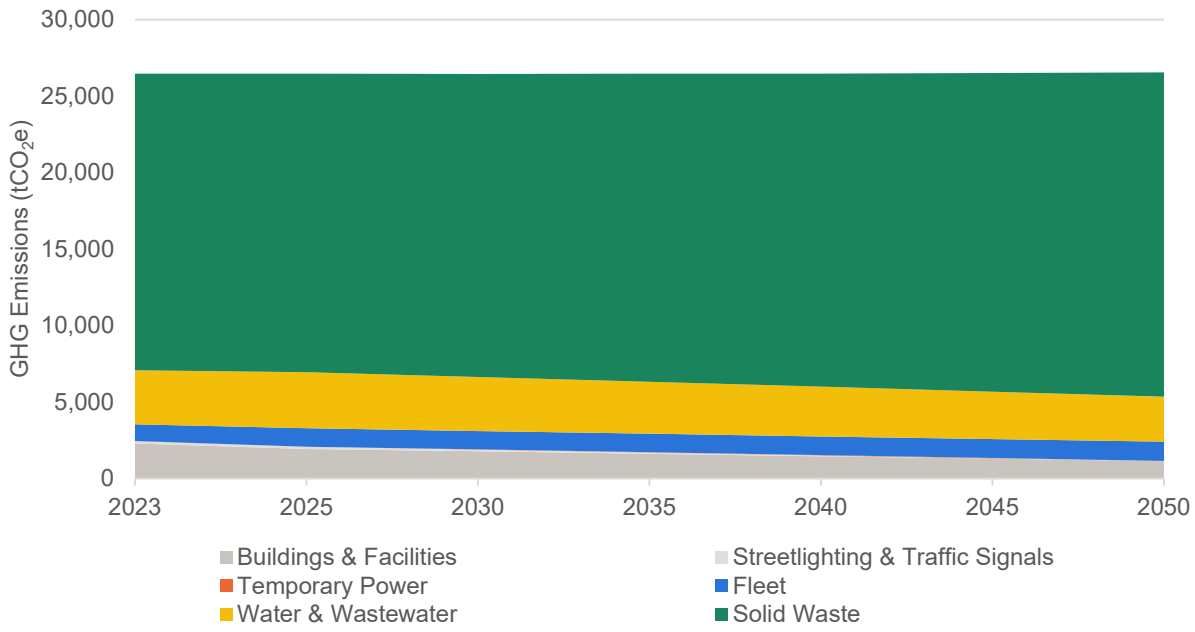


Figure E2: City of Yellowknife Business-As-Usual Corporate GHG Emissions

The forecast of the City's Community GHG emissions to 2050 is shown in **Figure E3.** The City's Community GHG forecast assumes increases in energy demand and emissions trend proportionally with population growth, while GHG reductions result from natural aging out of fossil fuel powered building heating systems and mobile vehicles, reduced GHG intensity of the Northwest Territories electricity grid and regulatory driven increases in vehicle efficiencies and battery-electric vehicle purchases. In the year 2050, under the BAU scenario, it is estimated that total Community GHG emissions will be around 195,302 tCO_2e, representing a reduction of approximately 27% from the estimated 2023 GHG emissions of 269,053 tCO_2e. Major contributing sources to the City's Community GHG emissions include gasoline from passenger vehicles, heating oil for ICI buildings and turbojet fuel for community air travel. Under the Community BAU scenario gasoline emissions from on-road passenger vehicles (not within Corporate control) are expected to decrease by approximately 56% from 2023 to 2050, with regulations driving increases in vehicle fuel efficiency and passenger vehicle fleet conversion to battery electric vehicles over fossil fuel vehicles. Heating oil emissions from residential and ICI buildings (not within Corporate control) are expected to decrease 34% from 2030 to 2050 under the BAU scenario, as heating oil systems age out and are replaced by lower carbon alternatives (e.g., electrification, biomass). No decreases in GHG emissions from jet fuel combustion for community air travel are expected under the current Community BAU scenario.

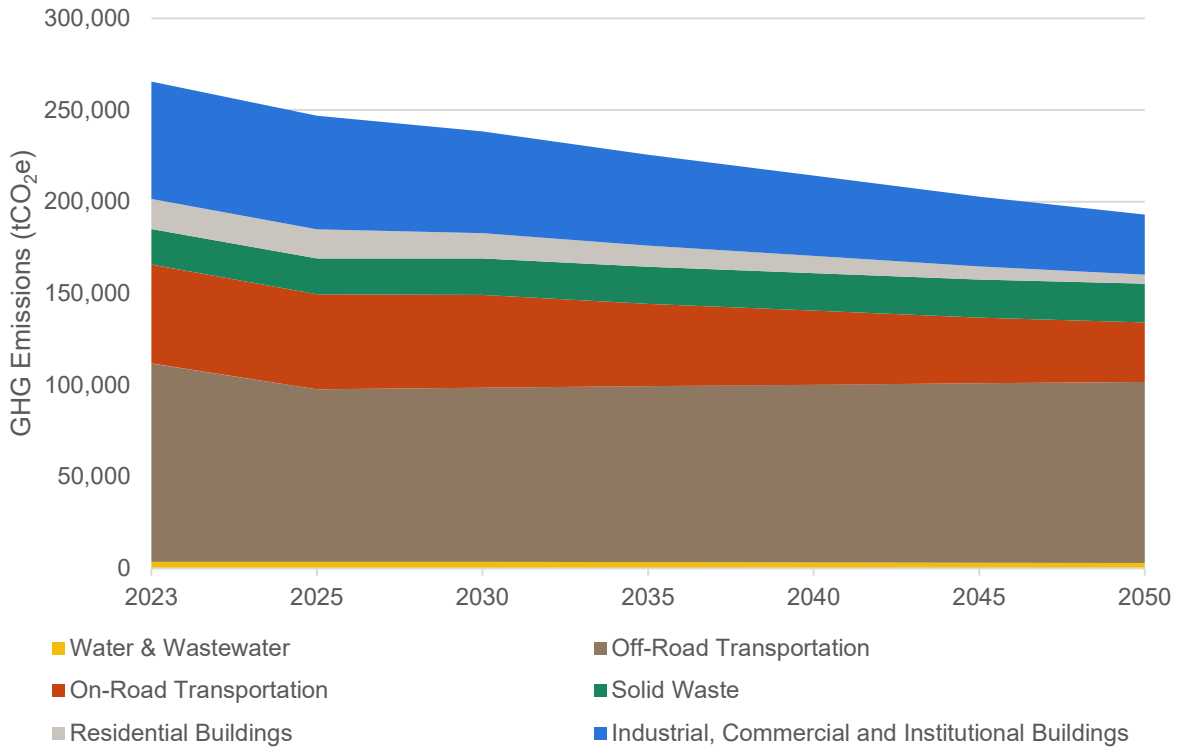


Figure E3: City of Yellowknife Business-As-Usual Community GHG Emissions[3]

The 2023 Corporate and Community GHG inventory and BAU GHG forecast results indicate that the City's most significant GHG emission sources include fugitive GHG emissions from the City's Solid Waste landfill, jet fuel combustion emissions from Community air travel, fuel combustion emissions from on-road passenger vehicle travel and heating oil combustion emissions from ICI buildings. Now that the City has developed a forecast of its expected BAU GHG emissions, the next step required for the City to achieve meaningful GHG emission reductions in line with Canada's GHG reduction targets will be to identify and evaluate relevant GHG mitigation actions. This will include reviewing best practices, policies, projects, programs and technologies being implemented by similar cities and evaluating the GHG reduction potential and technical and economic criteria required for implementation within the City of Yellowknife.

[3] Sectors that contribute less than 1% of total Community GHG emissions are excluded from Figure E3. This includes GHG emissions from the following Corporate owned assets: City owned buildings, streetlighting and traffic signals, temporary electricity and fleet transportation.

1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by the City of Yellowknife (the City) to develop a Climate Action Plan (CAP). As part of the CAP development Stantec reviewed and updated the City's current combined Corporate and Community greenhouse gas (GHG) emissions inventory tool based on recommendations provided by Stantec to the City to best align with the reporting requirements and guidance of the GHG Corporate Protocol[4] (the GHG Protocol) and the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (The GPC Protocol)[5]. Stantec used the updated GHG inventory tool to quantify 2021, 2022 and 2023 reporting year emissions using Corporate and Community activity data provided by the City and developed business-as-usual (BAU) forecasts to provide an outlook for the City's Corporate and Community energy and GHG emissions. This report provides a breakdown of the City's 2023 Corporate and Community GHG Inventories, the City's Corporate and Community GHG emission trends over the last 3 reporting years (2021 – 2023) and relative to the City's 2009 base year GHG emissions levels, and forecasted BAU Corporate and Community energy and GHG emissions by energy source and sector. All methodologies and assumptions used for quantification of the GHG inventory and BAU forecast estimates are provided.

2 Energy and GHG Emissions Boundary & Methodology

To monitor energy consumption and GHG emissions and track progress towards energy and GHG reduction targets, the City maintains a Corporate and Community energy and GHG inventory. As per the criteria of the GHG Protocol, the boundary of a municipalities Corporate GHG inventory includes energy consumption and GHG emissions from operations, buildings and services for which the municipality owns and has direct operational control over. The boundary of a Community GHG inventory however, as per the criteria of the GPC Protocol, is extended to include all energy consumption and GHG emissions occurring from activities that take place within the municipal geographic boundary. These include emissions from the residential, commercial and institutional, industrial, transportation, water and wastewater and solid waste sectors, as well as energy consumption and GHG emissions from activities captured within the Corporate inventory that occur within the City's municipal boundary.

An example of a typical Community GHG inventory boundary for a municipality is provided in **Figure *1***. Energy use and GHG emissions under the direct control of the municipality are captured within the municipalities Corporate inventory, while the Community inventory is extended to include energy use and

[4] The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (The GHG Protocol)

[5] The Global Protocol for Community Scale Greenhouse Gas Inventories (The GPC Protocol)

GHG emissions over which the municipality has indirect or no control over but occur from activities within the municipal boundary.

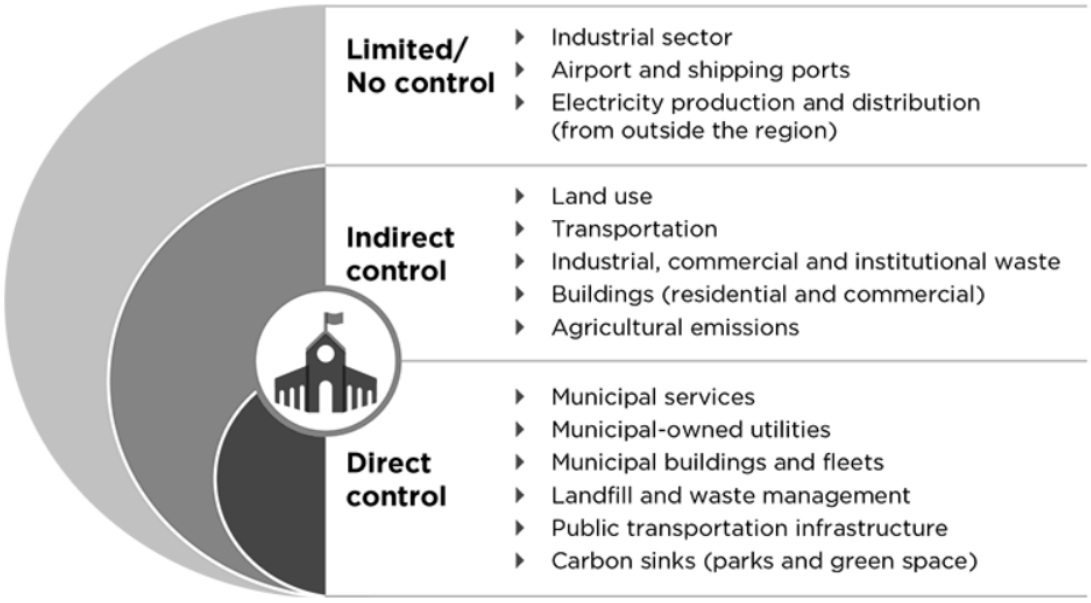


Figure 1: Example Community GHG Emissions Boundary[6]

The City's Corporate and Community GHG inventory was developed according to the described boundary criteria for municipalities from the GHG Protocol and the GPC Protocol. The following sections outline the sources captured within the City's Corporate and Community GHG inventory and the methodologies used to quantify energy use and/or GHG emissions.

2.1 Corporate & Community Inventory Breakdown

A summary of the City's Corporate and Community GHG inventories by included sectors and GHG emission sources is included in **Table *1***. The City's Corporate inventory includes GHG emissions from all assets managed by the City, while the Community GHG emission inventory encompasses emissions from all sources within the City's municipal boundaries.

Table 1: Corporate and Community GHG Inventory Breakdown

Corporate	Community
The Corporate inventory tracks energy and GHG emissions from major assets owned, leased, and operated by the City. The municipal inventory includes	The Community inventory tracks energy and GHG emissions from activities taking place within the geographic boundaries of the City of Yellowknife. The Community inventory includes the following energy and GHG emission sources:

[6] Green Municipal Fund: Factsheet: Municipal Governance for Deep Decarbonization

Corporate	Community
the following sectors and energy and GHG emission sources: • Buildings and Facilities: City owned facilities consume diesel, heating oil, biomass and electricity for heating, ventilation and air conditioning (HVAC), lighting and other building processes. • Streetlighting, Traffic Signals and Temporary Electricity: Streetlighting and Traffic signals within the City are powered exclusively by electricity. • Fleet Transportation: The City operates non-transit fleet vehicles for corporate use and transit fleet vehicles for resident transportation services. GHG emissions from this sector result from combustion of diesel, gasoline and propane in mobile vehicles. • Water and Wastewater: GHG emissions are released from diesel, heating oil, biomass and electricity consumed for operation of water and wastewater facilities and water conveyance systems. Fugitive methane and nitrous oxide emissions result from wastewater treatment. • Solid Waste: Waste does not directly consume energy, but when deposited into landfills or composted it decomposes and releases methane gas which is a potent GHG emissions source.	• Corporate: GHG emissions from Corporate Operations and the services delivered to the City of Yellowknife. Includes all sources included in the City of Yellowknife's Corporate inventory, including a**ll** community level fugitive emissions from the City owned wastewater treatment facility and landfill. • Residential Buildings: GHG emissions related to the operation of all residential buildings within City of Yellowknife. • Industrial, Commercial and Institutional Buildings: GHG emissions related to the operation of industrial, commercial and institutional buildings within City of Yellowknife. Institutional buildings includes First Nations, Federal, and Territorial government activities. • Transportation: GHG emissions related to the use of on-road, off-road (ATVs, ride on lawn mowers etc.) and aviation vehicles within the City of Yellowknife. • Waste: GHG emissions related to solid waste disposal at the landfill, composting, and wastewater treatment.

2.2 GHG Emissions Considered

A GHG can be any atmospheric gas that absorbs and re-emits infrared radiation, thereby acting as a thermal blanket for the planet and warming the lower levels of the atmosphere. Based on currently available data, the City currently includes the three most prevalent global GHGs: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), in the Corporate and Community GHG inventory. To compare CH_4 and N_2O on an equivalent global warming basis as CO_2, the 100-year global warming potentials from the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5)[7] listed below were used to convert CH_4 and N_2O emissions values into tonnes of carbon dioxide equivalent (tCO_2e).

- Carbon dioxide (CO_2) = 1
- Methane (CH_4) = 28
- Nitrous oxide (N_2O) = 265

[7] Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5)

3 Corporate Energy and GHG Emissions Inventory

3.1 Corporate GHG Inventory Boundary & Methodology

The sectors and associated energy use and GHG emission sources captured within the City's Corporate GHG inventory are provided in **Table 2**. These include energy use and GHG emissions from assets owned and under the direct control of the City. Using the Corporate boundary summarized in **Table 2**, Stantec quantified the City's 2021, 2022 and 2023 Corporate GHG inventory and used the energy use and GHG results to generate BAU GHG emission projections for years 2024 through 2050.

Table 2: Corporate GHG Quantification Boundary

Sector	GHG Emissions Source
City Owned Buildings	Diesel, Heating Oil, Biomass and Electricity
Streetlighting, Traffic Signals and Temporary Electricity	Electricity
City Corporate Fleet and Public Transit	Diesel, Gasoline, Propane
Water and Wastewater Facilities	Diesel, Heating Oil, Biomass, Electricity and Wastewater Fugitives
Solid Waste Facilities	Landfill Fugitives

A summary of the main quantification methodologies used to generate the 2021, 2022 and 2023 energy use and GHG emissions for Corporate sectors owned and directly controlled by the City is provided below. To translate activity data from the various Corporate sources into GHG emissions, emission factors from Canada's 2024 National Inventory Report (NIR)[8] were used.

3.1.1 Fuel and Electricity GHG Emissions from City Owned Assets

Fuel and electricity emissions for Corporate owned assets were quantified using fuel and electricity consumption data tracked directly by the City. Appropriate emission factors from Canada's NIR were used to translate annual fuel and energy consumption values into annual GHG emissions. As shown in **Table 2**, emissions from Corporate owned assets include electricity and fuel consumption by City owned buildings, electricity consumption by streetlighting, traffic signals and temporary electricity equipment, fuel consumption by City owned fleet vehicles and public transit vehicles, and fuel and electricity consumption from the City's water and wastewater and solid waste facilities.

[8] National Inventory Report: Greenhouse Gas Sources and Sinks in Canada

3.1.2 Fugitive GHG Emissions from Wastewater Treatment

Fugitive emissions from wastewater are calculated using the total annual volume of wastewater discharged to Fiddler's Lagoon from the City's annual water license reports as the main source of activity data. Using the latest methodologies from Canada's 2024 NIR, Part 2, Section A3.6.4, for quantification of CH_4 and N_2O emissions from wastewater treatment and discharge, and the annual volume discharged to Fiddler's lagoon, the 5-day Biological Oxygen Demand (BOD_5) and nitrogen concentration of the influent and effluent wastewater to the facultative lagoon, and subsequent GHG emissions are estimated. For wastewater treatment fugitives, CH_4 emissions were calculated using default emission factors from Canada's NIR, for facultative wastewater lagoons. As per default methodologies in Canada's 2024 NIR, N_2O emissions from facultative lagoon wastewater treatment are assumed negligible. For fugitive CH_4 and N_2O emissions from discharge of treated wastewater effluent to Great Slave Lake, default emission factors and methodologies from the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[9] for discharge to lakes are used.

3.1.3 Fugitive GHG Emissions from Solid Waste

Fugitive CH_4 emissions from decaying organic matter in the City's landfill are estimated using the Scholl Canyon model which is based on the first-order decay equation. This differs from the Waste-in-Place model (previously used in the City's GHG emissions methodology) as it accounts for both new waste deposits and ongoing decomposition, whereas the latter estimates GHG emissions based on total accumulated waste mass which tends to overlook past and current conditions of the landfill. The Scholl Canyon model considers key factors including the total tonnage of mixed solid waste landfilled annually, annual waste composition (i.e., food, garden, paper/cardboard, wood, textiles and inert), annual precipitation volumes and uses this information to estimate CH_4 generation potential. This represents a more accurate approach to quantifying total annual fugitive GHG emissions from the landfill.

To estimate annual fugitive CH_4 emissions emitted from the landfill, the City provided historic data dating back to 2007. To estimate landfill GHG emissions from when the landfill opened in 1974, the 2007 waste data was prorated based on population figures. Because annual waste compositions vary greatly between each year, there is a high level of uncertainly around the estimate of historical tonnages before 2007 (+/-20%). To account for the slower decomposition rates in northern climate conditions as reported by City staff, and based on literature review, the CH_4 generation rate constant (k) in the model was reduced by a conservative 25%. This constant determines the speed at which organic waste breaks down and releases CH_4, influenced by factors such as waste composition, moisture levels, temperature, and landfill management practices.

[9] 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

3.2 2023 Corporate GHG Emissions Inventory

A breakdown of the City's 2023 Corporate energy use and GHG emissions by Corporate inventory sector is provided in **Table 3**.

Table 3: City of Yellowknife 2023 Corporate Energy and GHG Emissions by Sector

Sector	2023 Energy Use (GJ)	% Energy Contribution	2023 GHG Emissions (tCO_2e)	% GHG Contribution
City Owned Buildings	46,839	47%	2,295	9%
Streetlighting and Traffic Signals	2,852	3%	151	0.6%
Temporary Electricity	335	0.3%	18	0.1%
Corporate Fleet and Public Transit	15,655	16%	1,084	4%
Water and Wastewater	34,118	34%	3,522	13%
Solid Waste	--	--	19,402	73%
Total	**99,800**	**100%**	**26,472**	**100%**

The City's total 2023 Corporate GHG emissions are estimated to be 26,472 tCO_2e. As is evident from **Figure 2** below, GHG emissions from Water and Wastewater facilities and Solid Waste dominate the 2023 emissions profile, representing approximately 13% and 73% of total 2023 Corporate GHG emissions respectively. The two most significant energy consuming Corporate sectors include City owned buildings and water and wastewater facilities, which represent 47% and 34% of total Corporate 2023 energy consumption respectively.

Energy Use (GJ) **GHG Emissions (tCO_2e)**

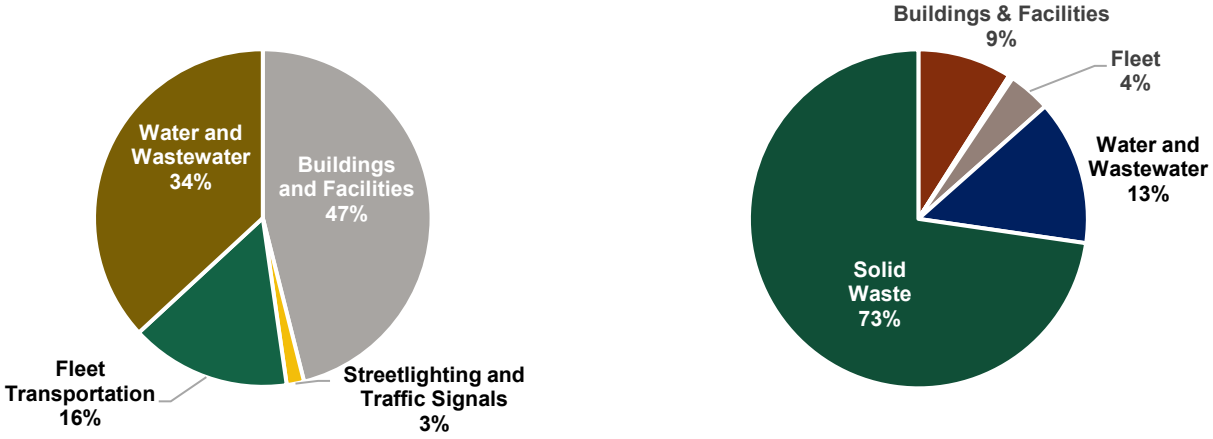


Figure 2: Breakdown of 2023 Corporate Energy Use (Left) and GHG Emissions (Right) by Sector[10]

Table 4 provides a breakdown of the City's 2023 Corporate energy and GHG emissions by source. As is evident from **Table 4**, electricity and heating oil represent the largest contributors to total 2023 Corporate energy use and GHG emissions by energy source, with both each representing 8% of total 2023 Corporate GHG emissions respectively. Outside of energy consumption, the City's fugitive emissions are highly material with landfill fugitive emissions and wastewater fugitive emissions representing approximately 73% and 6% of total 2023 Corporate GHG emissions respectively.

Table 4: City of Yellowknife 2023 Corporate Energy and GHG Emissions by Source

Source	2023 Energy Use (GJ)	% Energy Contribution	2023 GHG Emissions (tCO_2e)	% GHG Contribution
Biomass	16,262	16%	161	0.6%
Composting	--		49	0.2%
Diesel	10,762	11%	761	3%
Electricity	40,651	41%	2,145	8%
Gasoline	4,185	4%	280	1%
Heating Oil	27,229	27%	2,048	8%
Propane	711	0.7%	43	0.2%
Landfill Fugitives	--		19,353	73%

[10] Sources that represent 1% or less of Corporate energy use and GHG emissions are excluded from Figure 2. This includes temporary electricity for energy use and temporary electricity and streetlighting and traffic signals for GHG emissions.

Source	2023 Energy Use (GJ)	% Energy Contribution	2023 GHG Emissions (tCO_2e)	% GHG Contribution
Wastewater Fugitives	--	16%	1,631	6%
Total	**99,800**	**100%**	**26,472**	**100%**

3.3 Corporate GHG Emissions Trends

The City of Yellowknife Corporate GHG emissions trend from the years 2021 to 2023 is illustrated in **Figure 3**. Total Corporate GHG emissions are quantified to have increased from 25,720 tCO_2e to 26,610 tCO_2e (approximately 3%) from 2021 to 2022. The City's total Corporate GHG emission estimates between 2022 and 2023 are relatively constant with a difference of 139 tCO_2e or approximately 0.5%. The difference between 2021 and both 2022 and 2023 is likely attributable to increased operations following shutdowns associated with the COVID-19 pandemic.

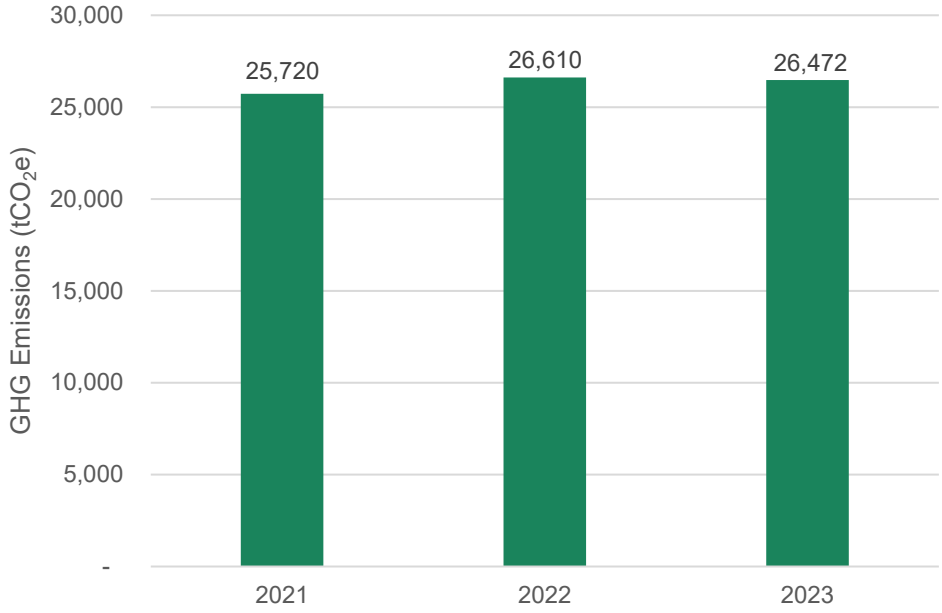


Figure 3: City of Yellowknife Corporate GHG Emissions Trend 2021 – 2023

Based on total estimated 2023 Corporate GHG emissions, the City's total Corporate GHG emissions as of 2023 represent a decline of 7% as compared to the City's 2009 base year emissions levels. For like-for-like comparison to 2009 base year emissions, the updated solid waste fugitive GHG emissions calculation methodology using the Scholl Canyon method was applied to 2009 base year emissions

3.4 Corporate GHG BAU Forecast

Figure 4 shows the City's estimated Corporate GHG emissions forecast to 2050 by energy source. For Corporate operations, consumption and GHG intensity of fuels is assumed to be relatively stable under the BAU scenario. Emissions associated with Corporate electricity use are expected to drop significantly with electricity grid decarbonization as per the Environment and Climate Change Canada (ECCC) electricity grid GHG intensity projections.

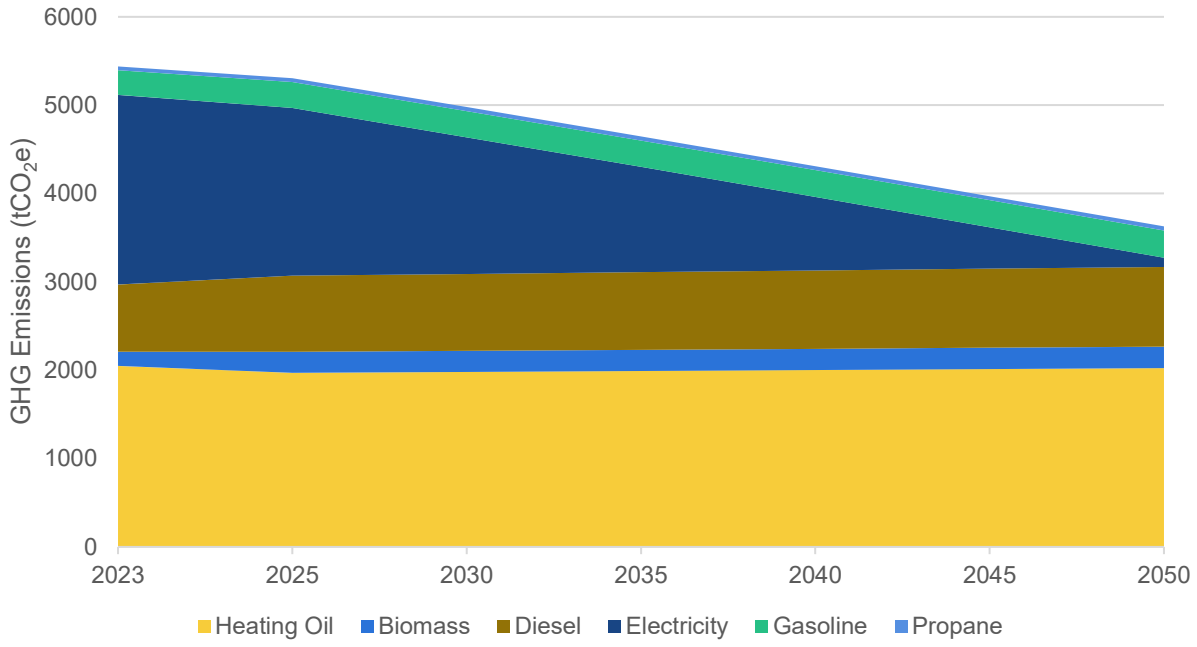


Figure 4: Business-As-Usual City of Yellowknife Corporate GHG Emissions by Source

A Corporate GHG emissions forecast by sector is provided in **Figure *5***. GHG emissions from most of the City's sectors are expected to stay relatively constant with increases in energy consumption with population growth countered by the projected reduction in the Northwest Territories (NWT)'s electricity grid GHG intensity. As is evident from **Figure 5,** the most significant contributor to Corporate emissions is Solid Waste. Fugitive methane emissions from the Yellowknife Solid Waste landfill are expected to contribute 80% of total Corporate emissions by 2050 under the BAU scenario, up 7% from its estimated 73% contribution to the City's total 2023 Corporate emissions.

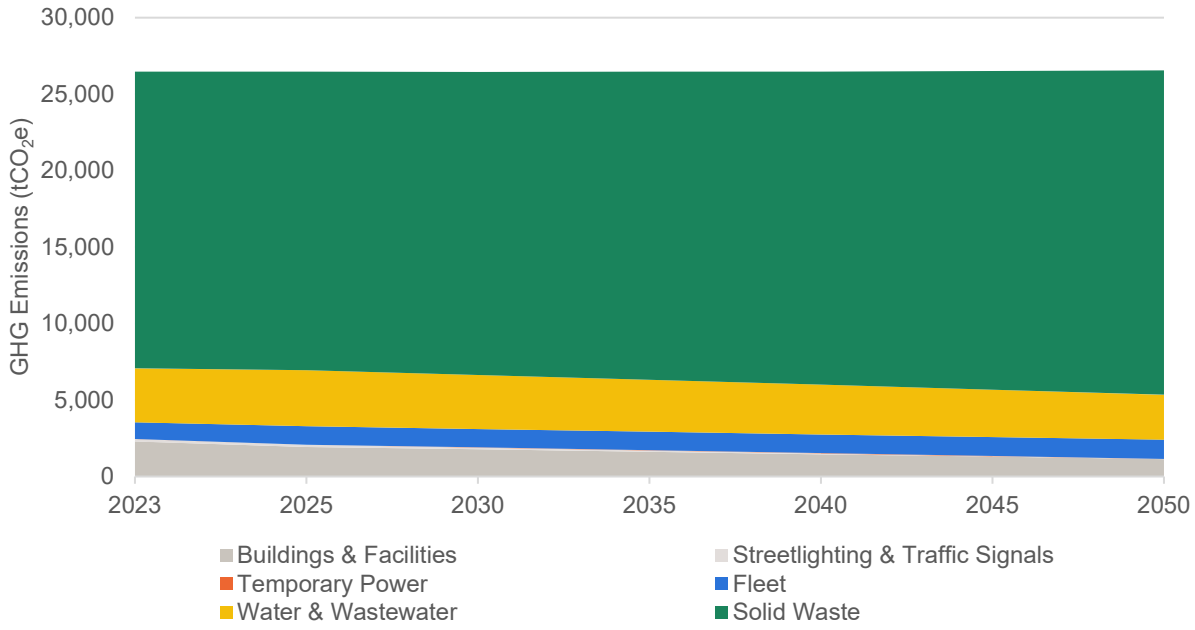


Figure 5: Business-As-Usual City of Yellowknife Corporate GHG Emissions by Sector

The Corporate BAU forecast assumes that under the BAU scenario Corporate operations and associated energy consumption and GHG emissions are relatively stable, with the exception of City owned fleet and public transit transportation, water and wastewater operations and solid waste management, where the City's projected population growth is expected to drive proportional increases in energy usage. It is assumed that reduced GHG intensity of the Northwest Territories electricity grid according to ECCC projections from the ECCC data catalogue[11], will drive GHG emission reductions associated with purchased electricity. A summary of the assumptions used to generate the Corporate BAU GHG emissions forecast is provided in **Table 5**.

Table 5: Corporate Business-As-Usual (BAU) Forecast Assumptions

Sector	Projection Assumptions
City Owned Buildings and Facilities	• Stationary energy use in city-owned buildings is assumed to remain constant.
Streetlighting, Traffic Signals and Temporary Power	• Stationary electricity use for streetlighting and traffic signals and temporary electricity uses is assumed to remain constant.
City Corporate Fleet and Public Transit	• An increase in demand for fleet vehicle and public transit services with a growing population is expected

[11] ECCC Data Catalogue

Sector	Projection Assumptions
	• Increased fuel demand is assumed to trend linearly with the Yellowknife population projections from the NWT Bureau of Statistics.[12]
Water and Wastewater Facilities	• An increase in water delivery and wastewater treatment services is expected to meet the capacity needs of a growing population. • Increased energy demand for water and wastewater services and increased fugitive emissions from wastewater treatment and discharge is assumed to trend linearly with the Yellowknife population projections from the NWT Bureau of Statistics.
Solid Waste Facilities	• Total annual municipal solid waste generation and disposal tonnages are expected to increase with a growing population. • Increased landfill fugitive emissions and composting emissions are assumed to trend linearly with the Yellowknife population projections from the NWT Bureau of Statistics.

[12] NWT Bureau of Statistics Population Projections (2023 – 2043)

4 Community Energy and GHG Emissions Inventory

4.1 Community GHG Inventory Boundary & Methodology

The sectors and associated energy use and GHG emission sources captured within the City's overall Community GHG inventory are provided in **Table *6***. GHG emissions sources from emissions generating activities occurring within the geographic boundary of the City are captured, including energy use and GHG emissions from Corporate owned assets captured within the Corporate inventory. Using the Community boundary summarized in **Table *6***, Stantec quantified the City's 2021, 2022 and 2023 Community GHG inventory and used the energy use and GHG results to generate BAU GHG emission projections for years 2024 through 2050.

Table 6: Community GHG Quantification Boundary

Sector	GHG Emissions Source	Boundary Details
City Owned Buildings	Diesel, Heating Oil, Biomass and Electricity	From Corporate Inventory
Streetlighting, Traffic Signals and Temporary Electricity	Electricity	From Corporate Inventory
City Corporate Fleet and Public Transit	Diesel, Gasoline, Propane	From Corporate Inventory
Water and Wastewater Facilities	Diesel, Heating Oil, Biomass, Electricity Wastewater Fugitives	From Corporate Inventory
Solid Waste Facilities	Landfill Fugitives	From Corporate Inventory
Residential Buildings	Heating Oil, Biomass, Propane, Electricity	Community Specific Scope
Industrial, Commercial and Institutional (ICI) Buildings	Heating oil, Biomass, Propane, Electricity	Community Specific Scope
Community Transportation	Aviation Gasoline, Jet Fuel, Diesel, Motor Gasoline, Propane Electricity	Community Specific Scope

A summary of the main quantification methodologies used to generate the 2021, 2022 and 2023 energy use and GHG emissions for sectors falling within the City's Community GHG inventory boundary is provided below. In alignment with the Corporate inventory quantification, emission factors from Canada's 2024 NIR[13] were used to translate activity data into resultant GHG emissions..

[13] National Inventory Report: Greenhouse Gas Sources and Sinks in Canada

4.1.1 GHG Emissions from City Owned Assets

2021, 2022 and 2023 GHG emissions from all City Owned Assets are included in the City's Community GHG inventory boundary. These emissions are equivalent to the emissions quantified for the City's Corporate inventory and include all GHG emissions from City owned buildings, streetlighting, traffic signals and temporary electricity usage, City owned fleet vehicles and public transit vehicles, water and wastewater facilities and solid waste facilities. Including the Corporate emissions sources into the Community inventory does not result in double counting as the Corporate and Community inventories represent two distinct inventories at two different reporting scales. This is similar to how Yellowknife's Community GHG inventory would be incorporated into the NWT's GHG inventory, despite being reported separately by the City of Yellowknife. For a summary of the methodologies used to quantify these emissions see Section 3.1.

4.1.2 GHG Emissions from Residential and ICI Buildings

Fuel consumption in residential and Industrial, Commercial and Institutional (ICI) buildings are estimated using GIS residential and commercial floor area data tracked by the City and energy use intensity per unit floor area data by building type and fuel type from Natural Resource Canada's Comprehensive Energy Use Database 2021[14].

Electricity emissions from residential and ICI buildings are estimated using electricity consumption data provided directly by Northland Utilities. Consumption data is converted into expected GHG emissions using Northwest Territories consumption-based electricity emission factors from Canada's 2024 NIR.

4.1.3 GHG Emissions from Community Transportation

Emissions from air travel are estimated using Statistics Canada 2024 Aircraft Movements data for Yellowknife Airport, Inuvik Airport, and Norman Wells Airport[15], and aviation gasoline and jet fuel consumption data from Government of Northwest Territories (GNWT) annual carbon tax reports[16]. The percentage of total Northwest Territories (NWT) flight counts representing counts from Yellowknife Airport was used to estimate the percentage of NWT aviation gasoline and jet fuel consumption attributable to Yellowknife Airport, assuming flight counts trend proportionally with fuel consumption. Calculated total fuel consumption was then multiplied by aviation fuel emission factors from Canada's 2024 NIR to generate GHG emissions values from air travel.

Emissions from on-road and off-road vehicle travel are estimated using vehicle registration by vehicle and fuel type data and the estimated total vehicle kilometers travelled within Yellowknife provided by the GNWT. The total vehicle kilometers travelled within Yellowknife is attributed to vehicle and fuel types

[14] Natural Resources Canada (NRCAN) Comprehensive Energy Use Database

[15] Statistics Canada Aircraft Movement and Civil Aviation Statistics (March 2024)

[16] Government of Northwest Territories Annual Carbon Tax Reports

based on the ratio of vehicle registrations by vehicle type to total NWT vehicle registrations, assuming total vehicle kilometers travelled trends proportionally to vehicle registrations. The average fuel consumption associated with each vehicle and fuel type pairing sourced from the publicly available Community Energy and Emissions Inventory (CEEI) data from the Government of British Columbia[17] is then used to convert estimated vehicle kilometers travelled to fuel and/or electricity consumption. The GHG inventory was updated to include emissions from battery-electric and hybrid-electric vehicles, in addition to diesel, gasoline and propane vehicles. To generate total GHG emissions, calculated total fuel consumption by fuel type was then multiplied by mobile combustion emission factors from Canada's 2024 NIR.

4.2 2023 Community GHG Emissions Inventory

A breakdown of the City's 2023 Community energy use and GHG emissions by inventory sector is provided in Table 7.

Table 7: City of Yellowknife 2023 Community GHG Emissions by Sector

Sector	2023 Energy Use (GJ)	% Contribution Energy	2023 GHG Emissions (tCO_2e)	% Contribution GHG
Buildings and Facilities	46,839	1%	2,295	1%
Streetlighting and Traffic Signals	2,852	0.1%	151	0.1%
Temporary Power	335	0.01%	18	0.01%
Fleet Transportation	15,655	0.4%	1,084	0.4%
Water and Wastewater	34,118	1%	3,522	1%
Solid Waste			19,402	7%
Residential Buildings	303,639	8%	16,396	6%
Industrial, Commercial and Institutional Buildings	986,433	27%	64,026	24%
On-Road Transportation	765,338	21%	53,965	20%
Off-Road Transportation	1,493,379	41%	108,195	40%
Total	**3,648,588**	**100%**	**269,053**	**100%**

The City's total 2023 Community GHG emissions are estimated to be 269,053 tCO_2e. As is illustrated in **Figure 6**, GHG emissions from off-road transportation, on-road transportation and ICI buildings represent

[17] BC Community Energy and Emissions Inventory Data (2007 – 2022)

the major contributing sectors to the City's 2023 Community energy and GHG emissions inventory, representing 40%, 20% and 24% of total 2023 Community GHG emission estimates respectively. Together these sources represent approximately 84% of the City's 2023 Community GHG emissions estimates and approximately 89% of the City's 2023 Community energy use. 2023 Community GHG emissions estimates indicate that emissions from the City's Corporate owned assets represent approximately 10% of total Community GHG emissions.

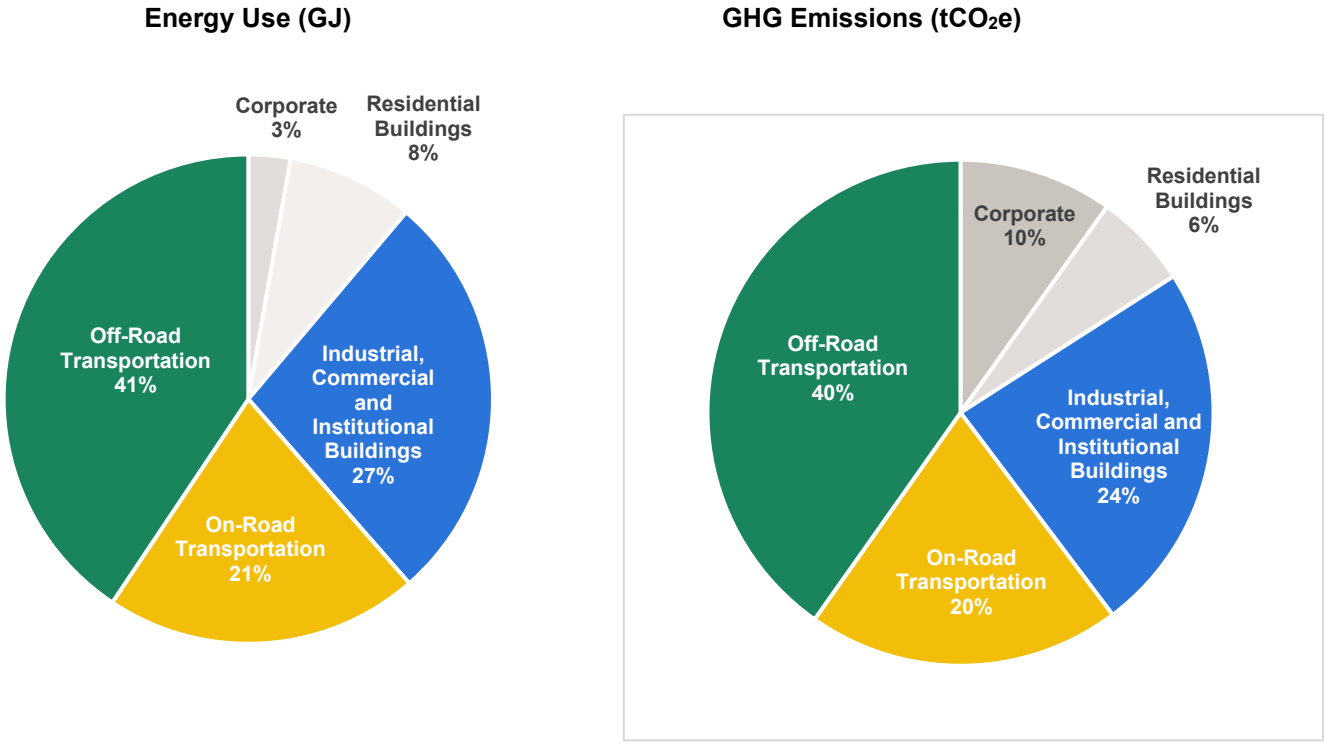


Figure 6: Breakdown of 2023 Corporate Energy Use (Left) and GHG Emissions (Right) by Sector[18]

4.3 Community GHG Emissions Trends

The City of Yellowknife Community GHG emissions trend from the years 2021 to 2023 is illustrated in **Figure 7.** Total Community GHG emissions are quantified to have increased from 231,814 tCO_2e to 254,711 tCO_2e (approximately 10%) from 2021 to 2022. The City's total Community GHG emission estimates increase again between 2022 and 2023 from 254,711 tCO_2e to 269,053 tCO_2e (approximately 6%). The increase in total Community emissions estimates between 2021 and 2023 is likely attributable

[18] Corporate energy use and GHG emissions in Figure 6 includes all sectors captured within the Corporate energy and GHG inventory boundary. This includes Buildings and Facilities, Streetlighting and Traffic Signals, Temporary Power, Fleet Transportation, Water and Wastewater and Solid Waste.

to increased operations following shutdowns associated with the COVID-19 pandemic.

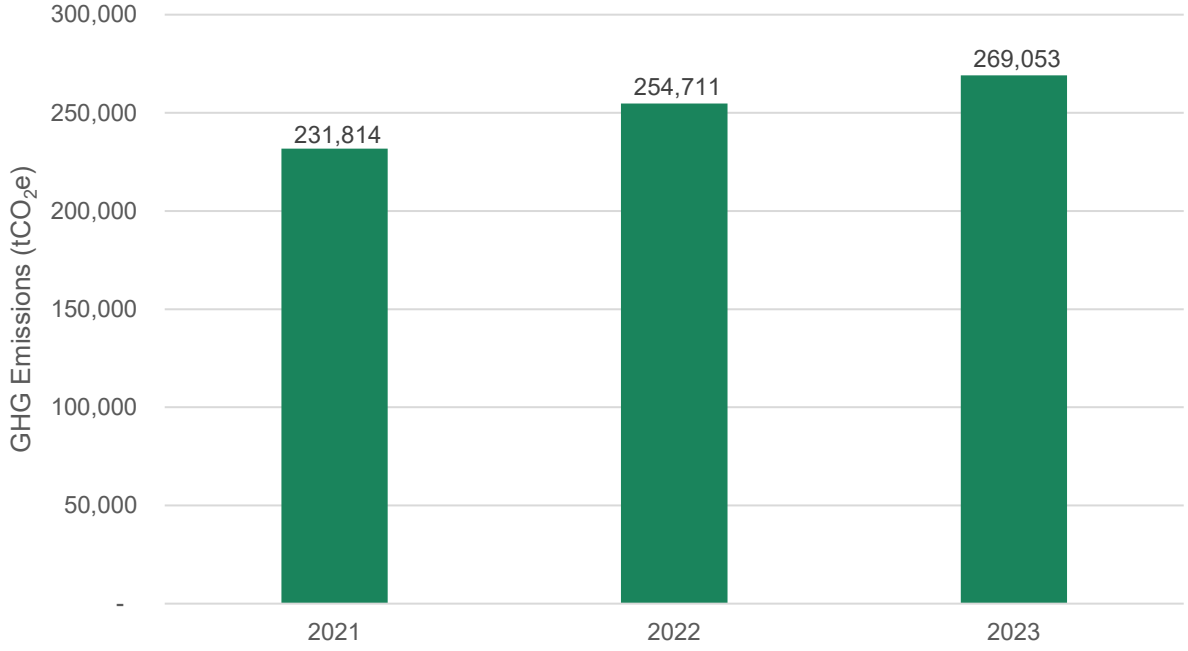


Figure 7: City of Yellowknife Community GHG Emissions Trend 2021 – 2023

Based on total estimated 2023 Community GHG emissions, the City's total Community GHG emissions as of 2023 have decreased approximately 20% as compared to the City's 2009 base year GHG emissions levels. As is evident from **Table 8**, the decrease in Community GHG emissions relative to the City's baseline year is driven largely by decreases in GHG emissions from transportation and residential buildings. The decrease in transportation emissions is largely a result of decreases in off-road air travel GHG emissions driven by decreased flight counts from the Yellowknife Airport in 2023 relative to the 2009 baseline year. For residential buildings the decrease in emissions from 2009 baseline year levels to 2023 results from fuel switching from heating oil to electricity for building heating as evident by the NRC Comprehensive Energy Use Database (2021).

Opposite to the overall Community trend, 2023 GHG emissions from ICI buildings are estimated to have increased by approximately 40% of 2009 baseline levels. The increase is a result of a 55% increase in ICI building floor area (according to updated City of Yellowknife building GIS data), driving up total energy consumption from ICI Buildings.

Table 8: City of Yellowknife Community 2023 GHG Emissions vs. Baseline (2009) GHG Emissions

Sector	Updated Baseline (2009) GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	% Change
Buildings and Facilities	2,055	2,295	12%
Streetlighting and Traffic Signals	527	151	-71%
Temporary Power	--	18	--
Fleet Transportation	860	1,084	26%
Water and Wastewater	2,745	3,522	28%
Solid Waste	14,842	19,402	31%
Residential	43,620	16,396	-62%
Industrial, Commercial and Institutional	45,576	64,026	40%
Transportation (On-Road and Off-Road)	226,645	162,160	-28%
Total	**336,870**	**269,053**	**-20%**

4.4 Community GHG BAU Forecast

Figure 8 shows the City's Community GHG emissions forecast to 2050 by energy source. The City's Community GHG forecast assumes increases in energy demand and emissions trend proportionally with population growth, while GHG reductions result from natural aging out of fossil fuel powered building heating systems and mobile vehicles, reduced GHG intensity of the Northwest Territories electricity grid and regulatory driven increases in vehicle efficiencies and battery-electric vehicle purchases

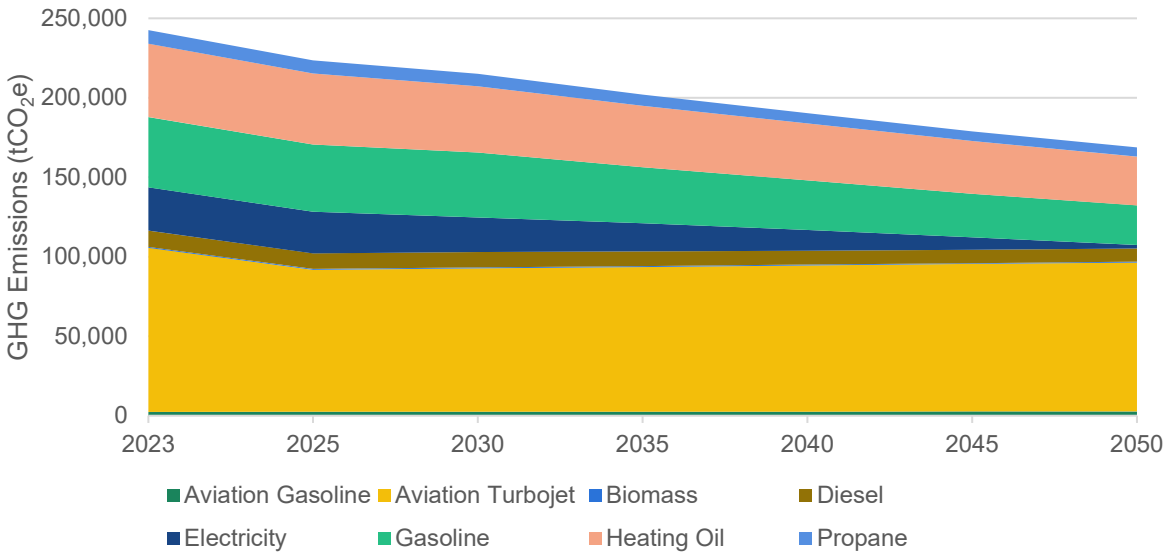


Figure 8: Business-As-Usual Community GHG Emissions by Energy Source.

The estimated Community GHG emissions outlook to 2050 by sector is shown in **Figure 9**. In the year 2050, under the BAU scenario, it is estimated that total Community GHG emissions will be around 195,302 tCO_2e, representing a reduction of approximately 27% from the estimated 2023 GHG emissions of 269,053 tCO_2e. Major contributing sources to the City's 2023 Community GHG emissions include gasoline from passenger vehicles, heating oil for ICI buildings and turbojet fuel for community air travel. Under the Community BAU scenario gasoline emissions from on-road passenger vehicles are expected to decrease by approximately 56% from 2023 to 2050, with regulations driving increases in vehicle fuel efficiency and passenger vehicle fleet conversion to battery electric vehicles over fossil fuel vehicles. Heating oil emissions from residential and ICI buildings are expected to decrease 34% from 2023 to 2050 under the BAU scenario, as heating oil systems age out and are replaced by lower carbon alternatives (e.g., electrification, biomass). No decreases in GHG emissions from jet fuel combustion for community air travel are expected under the current Community BAU scenario.

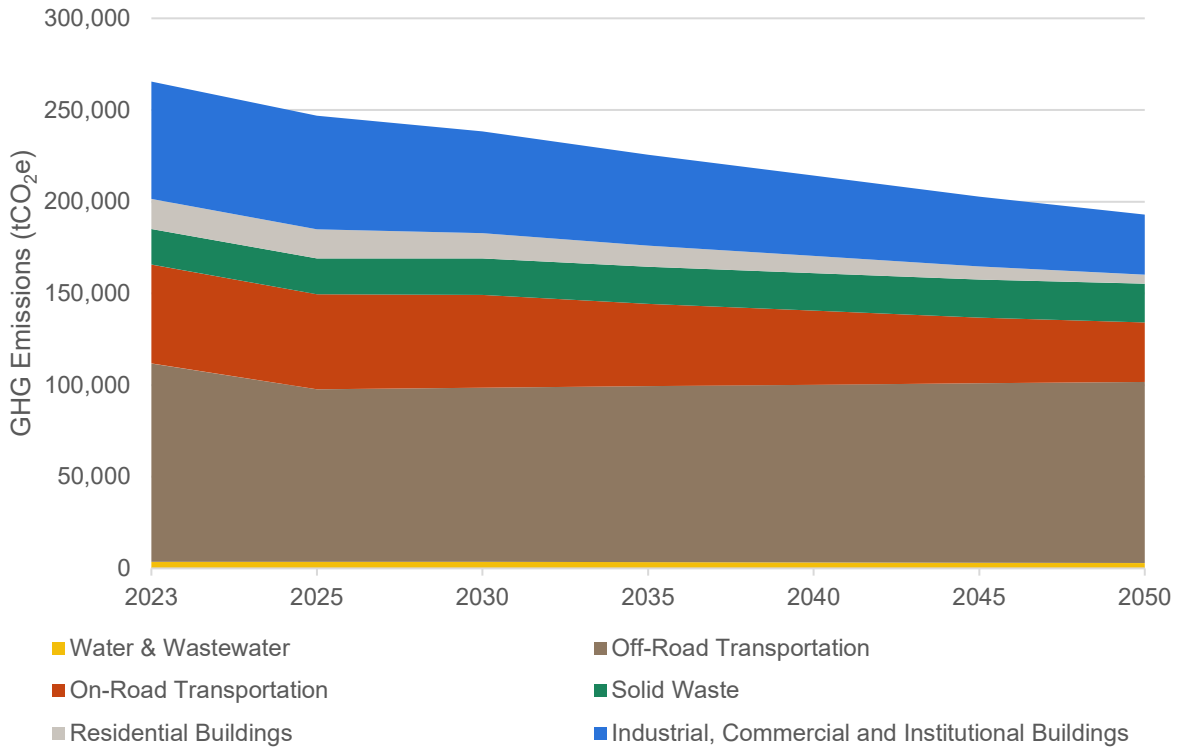


Figure 9: Business-As-Usual Total Community GHG Emissions by Sector[19]

The GHG emissions projected to remain in the year 2050 under the BAU scenario indicate the importance of implementing GHG reduction measures that extend beyond the current BAU scenario. To achieve significant near-term GHG emission reductions, decarbonization initiatives for sectors and sources contributing the most to total GHG emissions should be prioritized. In the case of the City's total estimated Community GHG emissions, recommended sources of focus include jet fuel consumption from Yellowknife Airport air travel, gasoline and diesel consumption for on-road vehicle travel, heating oil and propane use for City owned, residential and ICI buildings and landfill fugitive emissions from the Solid Waste facility.

A summary of the assumptions used to generate the Corporate BAU GHG emissions forecast is provided in **Table 9**.

[19] Sectors that contribute less than 1% of total Community GHG emissions are excluded from Figure 9. This includes GHG emissions from the following Corporate owned assets: City owned buildings, streetlighting and traffic signals, temporary electricity and fleet transportation.

Table 9: Community Business-As-Usual (BAU) Forecast Assumptions

Sector	Projection Assumptions
City Owned Buildings	• Stationary energy use in city-owned buildings is assumed to remain constant.
Streetlighting, Traffic Signals and Temporary Power	• Stationary electricity use for streetlighting and traffic signals and temporary electricity uses is assumed to remain constant.
City Corporate Fleet and Public Transit	• An increase in demand for fleet vehicle and public transit services with a growing population is expected • Increased fuel demand is assumed to trend linearly with the Yellowknife population projections from the NWT Bureau of Statistics.[20]
Water and Wastewater Facilities	• An increase in water delivery and wastewater treatment services is expected to meet the capacity needs of a growing population. • Increased energy demand for water and wastewater services and increased fugitive emissions from wastewater treatment and discharge is assumed to trend linearly with the Yellowknife population projections from the NWT Bureau of Statistics.
Solid Waste Facilities	• Total annual municipal solid waste generation and disposal tonnages are expected to increase with a growing population. • Increased landfill fugitive emissions and composting emissions are assumed to trend linearly with the Yellowknife population projections from the NWT Bureau of Statistics.
Residential Buildings	• The total gross floor area of residential buildings is expected to increase with population growth and increase total energy consumed by residential buildings within the City. • The per capita residential floor area was used to scale the total residential floor area with population growth, assuming a linear trend with the Yellowknife population projections from the NWT Bureau of Statistics. • Using the average EUI estimated for residential buildings for electricity and biomass heating, the assumed increase in residential floor area with population was used to estimate projected energy use. The higher carbon intensive energy sources of heating oil and propane are assumed to not increase with population growth due to phase out for lower carbon alternatives. • The GHG intensive stationary energy sources used by residential building systems within the City (i.e., heating oil, propane) are assumed to naturally decline in use as the systems age out and are replaced by lower GHG intensive biomass heating. • The natural phasing out of heating oil and propane heating with biomass alternatives is assumed to occur at a rate of 2.5% per year, with a reduction of 1 kg of heating oil assumed to result in the added consumption of 2.1 kg biomass and the reduction of 1 kg of propane assumed to result in the added consumption of 1.5 kg biomass.

[20] NWT Bureau of Statistics Population Projections (2023 – 2043)

Sector	Projection Assumptions
Industrial, Commercial and Institutional (ICI) Buildings	• Energy demand from ICI buildings is expected to remain stable with population growth, assuming no significant expansion in operations under the BAU scenario • The GHG intensive stationary energy sources used by ICI building systems within the City (i.e., heating oil, propane) are assumed to naturally decline in use as the systems age out and are replaced by lower GHG intensive biomass heating. • The natural phasing out of heating oil and propane heating with biomass alternatives is assumed to occur at a rate of 2.5% per year, with a reduction of 1 kg of heating oil assumed to result in the added consumption of 2.1 kg biomass and the reduction of 1 kg of propane assumed to result in the added consumption of 1.5 kg biomass.
Community Transportation	• Yellowknife airport flight counts are expected to increase with population growth. It is assumed that flight counts and aviation gasoline and jet fuel consumption increase linearly with population growth projections from the NWT Bureau of Statistics (NWT Bureau of statistics, 2023). • Mobile energy consumption from all on-road and off-road vehicle types (with the exception of government vehicles) is expected to increase linearly with population growth projections from the NWT Bureau of Statistics. Government vehicle energy consumption is assumed stable under the BAU scenario. • Reductions in energy consumption and GHG emissions from commercial vehicles, construction vehicles, off-road vehicles, trailers and motorhomes are assumed to occur as a result of both updated vehicle fuel efficiency standards (a 1.3% increase in vehicle fuel efficiency from 2027 to 2037) and a regulatory driven shift in the new vehicle population from fossil fuel vehicles to battery electric vehicles (starting in 2045 and linearly reaching 100% conversion over a 12-year span). The shift to battery electric vehicles is assumed to occur later than in passenger vehicles. • Reductions in energy consumption and GHG emissions from passenger vehicles (including motorcycles) are assumed to occur as a result of updated vehicle fuel efficiency standards (a 1.3% increase in vehicle fuel efficiency from 2027 to 2037), operational turnover of existing fossil fuel vehicles to battery electric vehicles (1% per year) and a regulatory driven shift in the new vehicle population from fossil fuel vehicles to battery electric vehicles (starting in 2024 and linearly reaching 100% conversion by 2035). • As government vehicle energy consumption is assumed to trend independently from population under the BAU scenario, reductions in fuel consumption and GHG emissions are assumed to result from operational turnover (1% per year starting in 2030) and a regulatory driven shift to battery electric vehicles (starting in 2030 and linearly reaching 100% conversion by 2045). The conversion of school buses to battery electric vehicles is assumed to occur equivalently to government vehicles, however total energy consumption by school buses is expected to trend linearly with population growth, similar to the assumption made for City owned transit vehicles.

5 Conclusions and Next Steps

As of 2023 the City's Community GHG emissions profile is dominated by Community sources not owned and under the direct control of the City of Yellowknife, which make up approximately 90% of total Yellowknife 2023 Community GHG emissions. Under the BAU scenario, this trend is expected to remain up to 2050, with Community transportation emissions from on-road and off-road travel estimated to represent approximately 67% of total 2050 Community GHG emissions under the BAU scenario. Of GHG emissions from Corporate owned assets, emissions from the Solid Waste facility are most significant, estimated to represent 7% of total 2023 Community GHG emissions and 73% of total 2023 Corporate GHG emissions. Although it is anticipated that the NWT's electricity grid will decarbonize and governmental regulations will lower the GHG intensity of community on-road vehicles, BAU projections illustrate that additional GHG reduction initiatives will need to be implemented for the City to completely decarbonize in line with the Canadian and Paris Agreement target of net zero GHG emissions by 2050.

Now that the City has developed a forecast of its expected BAU GHG emissions, the next step required for the City to achieve meaningful GHG emission reductions in line with Canada's GHG reduction targets will be to identify and evaluate relevant GHG mitigation actions. This will include reviewing best practices, policies, projects, programs and technologies being implemented by similar cities and evaluating the GHG reduction potential and technical and economic criteria required for implementation within the City of Yellowknife.

APPENDIX B: CLIMATE VULNERABILITY ASSESSMENT

CITY OF YELLOWKNIFE - **CLIMATE CHANGE ACTION PLAN**

Stantec

Memo

To:	City of Yellowknife	From:	Kimberly Stephenson Climate Scientist Stantec Consulting Ltd.
Project/File:	160963932 Yellowknife CAP	Date:	May 5, 2025

Reference: Yellowknife CAP – Climate Vulnerability Assessment

1 Overview

The City of Yellowknife ("the City") has engaged Stantec to develop a Climate Action Plan (CAP). The overarching goals of the CAP are to determine the extent to which climate change considerations are considered in the City's goals and to develop a strategy to mainstream climate change mitigation and adaptation actions throughout the City's short and long-term planning.

As part of this project, a climate vulnerability assessment (CVA) was conducted on the City's infrastructure portfolio to establish which climate-related hazards are applicable to the City, identify the impacts they have had to infrastructure, services, and the community in the past, and provide guidance for climate action and adaptation measures to build the City's resilience to climate change.

This memo presents an overview of the CVA process and results of the assessment. These results were compiled from a desktop review of City documents and through engagement with Yellowknife staff and stakeholders in a series of engagement sessions in January-March 2025.

2 The CVA Process

A high-level, portfolio CVA was conducted for the City of Yellowknife. The portfolio CVA process followed the ISO 14091 and ISO 14092 Adaptation to Climate Change standards[1] and involved the following steps, also shown in Figure 1:

- **Step 1** – Identify the critical infrastructure and assets.
- **Step 2** – Identify relevant climate hazards.
- **Step 3** – Evaluate past impacts of climate hazards on infrastructure and assets.

[1] ISO 14091:2021 *Adaptation to climate change: Guidelines on vulnerability, impacts and risk assessment* and ISO/TS 14092:2020 *Adaptation to climate change: Requirements and guidance on adaptation planning for local governments and communities*.

- **Step 4** – Determine vulnerability of assets to climate hazards.

These steps were completed through a desktop assessment of City provided documents and with input from the engagement sessions.

Vulnerability is the measure of the extent to which assets, infrastructure systems and services are susceptible to, or unable to cope with, the impacts of climate-related hazards. The vulnerability of an asset is determined using the formula **V = E x S x C**, where:

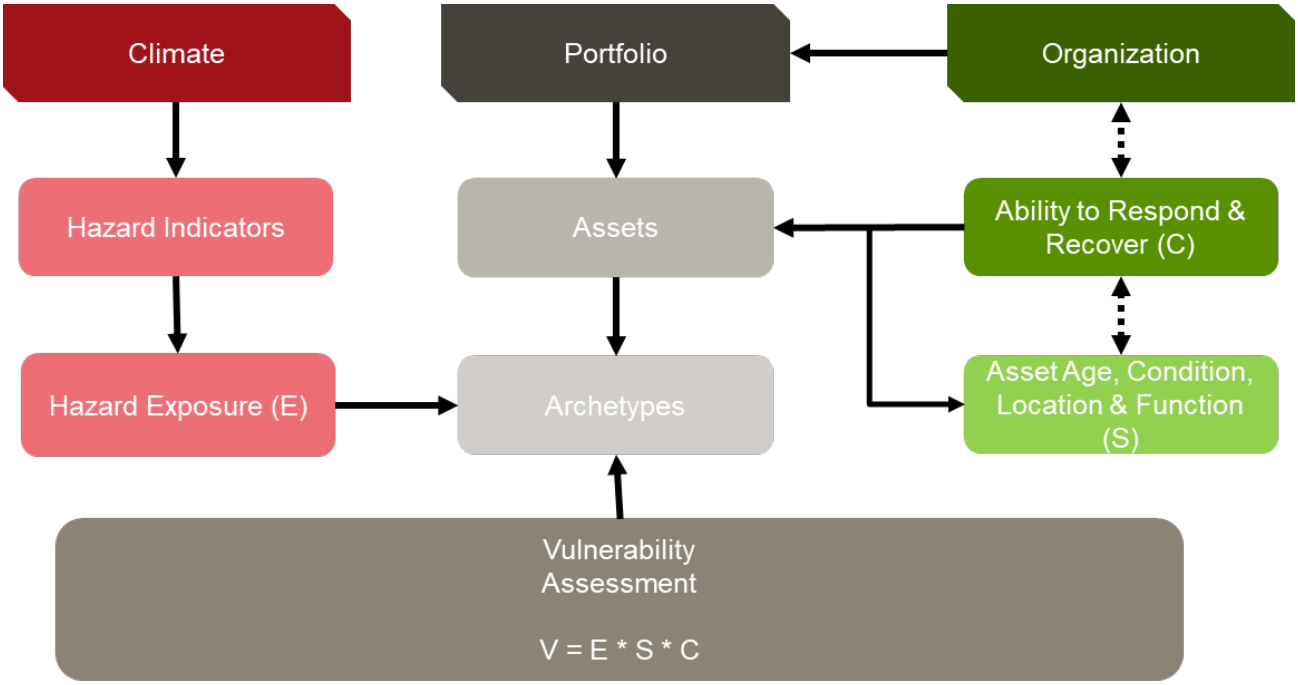
V = Vulnerability
E = Exposure (yes or no)
S = Sensitivity (low, medium, or high)
C = Adaptive Capacity (low, medium, or high)

Vulnerability is a function of an asset, infrastructure system, or service area's exposure, sensitivity, and adaptive capacity but also broader socioeconomic and environmental cross effects as well. These are defined as follows.

- **Exposure (E)** – The nature or degree to which assets, infrastructure systems, or service areas would interact with climate hazards. Exposure to climate-related hazards varies based on location and setting, design features, users, and other factors, which can change as climate impacts vary, interact, and compound.
- **Sensitivity (S)** – The degree to which assets, infrastructure systems, or service areas are either positively or negatively influenced/impacted by climate hazards. The degree of sensitivity to climatic hazards depends not only on asset/infrastructure and geographic conditions (e.g., age and condition) but also on socio-economic factors such as population and social equity. Indicators of sensitivity can encompass geographical conditions, land use, demographic characteristics, etc. In this assessment, sensitivity was considered in relation to general age and condition of assets and archetypes, complexity of assets and archetypes, the majority of users (e.g., seniors), and previous exposure to climate impacts.
- **Adaptive Capacity (C)** – The ability to prepare for and respond to impacts and consequences. Adaptive capacity depends on physical resources, access to technology and information, varieties of infrastructure, institutional capability, and the distribution of resources. Key determinants of adaptive capacity include economic and social resources, level of technology, available information and skills, social capital, and the effectiveness of existing institutions, etc. At an asset or asset component level, factors like age, design setting, load, service levels, etc. can also come into consideration. The adaptive capacity assessment considered the City's resources, emergency plans, redundancies (e.g., power supply, access routes), supply chain security, and potential duration of recovery efforts following climate-related disaster. Due to the City's response challenges (e.g., financial and staffing resources, limited major access routes, past impacts from wildfires and other severe hazards) the adaptive capacity was set to medium.

Reference: **Yellowknife CAP - CVA Preliminary Results**

Figure 1 **Schematic Diagram of the PIEVC Vulnerability Assessment Process**



By examining the climate-related hazards and possible interactions (exposure and sensitivity) with assets, infrastructure systems, and services as well as the ability to respond (adaptive capacity), the overall vulnerability to climate-related hazards can be determined using the heat map shown in Table 1. For example, an asset archetype with high exposure to climate risks, high sensitivity to climate hazard interactions, and low adaptive capacity to respond and recover to events is classified with high vulnerability.

Table 1 **Vulnerability Assessment Matrix**

		Sensitivity		
		Low	**Medium**	**High**
Adaptive Capacity	**Low**	Medium Vulnerability	High Vulnerability	High Vulnerability
	Medium	Low Vulnerability	Medium Vulnerability	High Vulnerability
	High	Low Vulnerability	Low Vulnerability	Medium Vulnerability

3 CVA Results

Assets, climate hazards, and exposures were identified for the CVA using information gathered from City provided documents. These exposures were updated through engagement sessions, during which information was gathered on impacts, sensitivity, and adaptive capacity of the City's assets. Results of the CVA are presented in the following subsections.

3.1 Step 1: Infrastructure and Assets

A list of assets, infrastructure, and systems considered in the CVA was developed from City provided documents and validated during staff engagement sessions. The list consists of archetypes (e.g., transportation networks, city-owned buildings) as well as individual, unique assets (e.g., Firehall, water treatment plant) as follows:

City-owned:

- Transportation networks (roadways, bridges, bike lanes, sidewalks)
- Land use
- Stormwater (including culverts and storm drains)
- Yellowknife Bay water treatment plant and collection/distribution network
- Wastewater treatment network (e.g., Fiddlers Lake sewage lagoon, wetland filtration area, sewage systems)
- Solid Waste Facility (SWF)
- Parks (green spaces, parks, playgrounds, trails, fields, docks)
- Recreational facilities and associated equipment (e.g., the Multiplex, heritage monuments and other structures)
- City-owned Administrative/operational buildings
- Yellowknife Firehall
- Cemetery

Not City-Owned:

- Commercial/industrial buildings (e.g., Engle Business District)
- Residential buildings
- Yellowknife Airport
- Power supply
- Telecommunications and IT networks
- North Slave Correctional Facility
- Stanton Territorial Hospital

3.2 Step 2: Climate Hazards Overview

A list of climate hazards was developed from City provided documents and Stantec's climate science expertise. The climate hazards, thresholds, and trends used in the CVA are presented in *Table 2*.

Table 2 Climate Hazards Used in the CVA.

Climate Hazard	Climate Threshold	Trend (Baseline to 2080s)
Higher Average Temperatures	Annual mean temperature (°C)	↗
Heating Degree Day (HDD)	Annual heating degree day	↘
Cooling Degree Day (CDD)	Annual cooling degree day	↗
Extreme Heat	Annual number of days where maximum temperature ≥ 25°C	↗
Extreme Cold	Annual Number of Days where Minimum Temperature is ≤ -35°C	↘
Cold Snap	Annual number of days where minimum temperature is ≤ -40°C	↘
Freeze Thaw - Winter	Annual number of days where maximum temperature > 0°C and minimum temperature ≤ -1°C in winter	↗
Freezing Rain	Annual median hours of freezing rain	↗
Snowstorms	Annual number of days with ≥ 5cm of snow with wind gusts ≥ 50 km/hr	↗
Seasonal Snow Cover	Relative Change from baseline	↘
Permafrost Thaw	Changes to permafrost active layer thickness	↗
Short Duration High Intensity Rainfall	Occurrence of 1:50 yr, 1 hour duration events (23.9 mm)	↗
Long Duration Rainfall	Occurrence of 1:50 yr, 24 hour duration event (70.3 mm)	↗
Drought*	Annual standardized Precipitation Evapotranspiration Index (12 month SPEI)	↘
Changes in Lake Level**	Changes in lake level - Yellowknife at Great slave lake - average annual lake level (m)	↔
Relative Humidity	Annual relative humidity	↔
High Winds	Annual number of days with wind gusts ≥ 90 km/hr	↗
Wildfire Interface	Annual number of large fires per year per 100, 000 km2	↗
	Annual area burned by large fire	↗

Climate Hazard	Climate Threshold	Trend (Baseline to 2080s)
Wildfire Smoke	Annual fire season length	↗

***A decreasing SPEI trend signals drier conditions**

****Annual average lake level changes are steady to slightly decreasing, however high variability in the year-to-year high and low extremes lake levels**

Yellowknife is located in a region of extensive discontinuous permafrost with medium to low ground ice content, meaning that 50-90% of the land in the area is underlain by permafrost and that up to 20% of the permafrost soil is made of ice, but there are patches of ground that remain unfrozen throughout the year. The ice content affects how the ground behaves when it thaws; areas with higher ice content are more prone to ground subsidence and instability when the ice melts. The active layer thickness is the top layer of soil that thaws and refreezes seasonally. The thickness of the active layer affects the stability of the underlying permafrost. Thicker active layers can lead to more significant seasonal ground movement, which can destabilize the permafrost beneath as well as allow more heat to reach the permafrost, potentially leading to deeper thawing and permafrost degradation. It is noted that permafrost thaw has impacted assets in some sections of the City (e.g., the airport) and can impact major entry and exit routes, such as the Mackenzie Highway. As such, permafrost thaw was retained in this assessment despite being discontinuous.

3.3 Step 3: Exposure and Impacts of Climate Hazards

The exposure and impacts assessment evaluates how current and future climate-related hazards might materialize as impacts to assets, operations, and residents of the City. Possible exposure and impacts can be used to determine vulnerability of each asset to the relevant climate hazards and develop recommendations for appropriate adaptive responses.

Exposures and impacts were identified from a desktop review of climate events that have impacted the City and were updated based on discussions with City of Yellowknife Council, staff, and stakeholders during the engagement sessions. Potential impacts.

Specific impacts noted in the desktop assessment and engagement are shown below.

- In January 2023, continued problems with settling in an area of the Yellowknife airport runway prompted the GNWT to commission a geotechnical study to investigate and determine long term solutions. The issue is thought to be shifting ground conditions brought on by thawing permafrost.
- The 2023 wildfires resulted in 12 community evacuations in NWT, including in Yellowknife, with insured losses from the city of Yellowknife and Behchokǫ̀ totaled around $30 million. No buildings were lost within the city of Yellowknife's municipal boundaries, however there were significant costs related to the evacuation of residents.

- In September 2022 there was series of power outages over two days due to a downed tree on transmission lines at Snare Hydro from high winds, problems maintaining electrical stability and Jackfish Lake generator issues.
- A city-wide power outage occurred in July 2016 due to a wildfire near Yellowknife damaging power lines from the Snare Lake hydro system.
- In 2014 385 fires burned 3.4 M hectares of forest land in the NWTs, costing $56.1 M in firefighting costs alone.
- Permafrost thaw has led to ground shifting, settlement, and damage to infrastructure in some areas of the City.
- Low water levels have reduced the output of the Snare and Talston Hydro systems, leading to increased dependence on diesel powered generators. Disruptions to power supply have also been experienced during periods of extreme heat and cold.
- Low water levels have raised concerns for availability of water for City uses (e.g., potable water from Yellowknife River).
- Stormwater drainage systems have been overwhelmed during heavy rainfall events, leading to localized flooding, erosion, and infrastructure damage.
- Transportation within the city (e.g., public transit) has been impacted by climate hazards that influence road conditions, such as snowfall and freezing rain.
- Winter weather impacts on transportation and distribution networks have resulted in disruption of supply routes.
- Extreme cold and winter hazards have made commuting more difficult for public transit users and result in delays in transportation of goods to and from the City.
- High winds have removed siding and roof shingles.
- Higher humidity has increased mould growth, particularly in homes with minimal HVAC and ventilation.
- Increased demand for air conditioning due to extreme heat has led to higher energy consumption.
- Periods of low rainfall and drought have led to increased need for grounds maintenance in natural areas and parks.
- Heavy snow accumulation can restrict access to parks, reducing public use.
- Ice accumulation and freeze-thaw cycles can lead to cracks, potholes, and uneven surfaces, making trails hazardous for pedestrians and cyclists. Increased freeze thaw cycles have accelerated road deterioration of roadways.
- The length of the winter season and period of ice formation on waterways has decreased, which has impacted winter recreation and hunting.

Additional impacts typical to infrastructure were also included based on the CVA team's experience with climate hazards occurring in the region and are presented in Table 3. These include impacts to buildings, transportation networks, water and wastewater infrastructure, natural areas, and power supply. Exposures of City assets to climate hazards identified through the desktop assessment are shown in Table 4.

Table 3 Summary of Possible Climate Impacts to Asset Categories by Climate Hazard.

Climate Hazard	Buildings	Transportation Networks	Power Supply	Water and Wastewater Systems	Natural Areas and Land Use
Heat and Humidity (Extreme Heat, Higher Average Temperatures, Relative Humidity)	• Increased cooling demands, leading to higher energy costs and GHG emissions. • Decreased asset life of HVAC systems due to increased use and greater need for repair / renewals. • Increased health and safety risks to staff and users (in buildings without A/C) and prolonged periods of inadequate indoor environmental conditions. • More frequent repairs and renewals to building roof, envelope, and seals due to deterioration (e.g., buckling, bowing, etc.). • Failure of electrical components including transformers due to maximum operating temperatures being exceeded (cascading impacts to IT and security systems). • Delay of regularly scheduled maintenance programs, procedures, and construction windows due to potential for heat-related illnesses. • Delay or cancelation of regularly scheduled programming of community buildings due to concerns of heat stroke in attendees and users. • Higher humidity and increased condensation inside buildings, leading to mould growth and mould-related illnesses.	• Deterioration of asphalt pavement, leading to cracking, rutting, surface depressions, and buckling. • Increased need for maintenance.	• Reduction in efficiency of sensitive equipment due to maximum operating temperatures being exceeded (e.g., SCADA). • Reduced efficiency of cooling systems. • Overheating of communications equipment, resulting in equipment failure and increased need for replacement.	• Reduction in efficiency of sensitive equipment due to maximum operating temperatures being exceeded (e.g., SCADA). • Reduced efficiency of cooling systems. • Overheating of communications equipment, resulting in equipment failure and increased need for replacement. • Overheating and malfunction of pumps and other machinery if ventilation and cooling are insufficient to maintain optimal temperatures.	• Wilting and damage to vegetation. • Ecological shifts and increased pest infestations due to warming.

Wildfire Interface and Smoke	• Poor air quality leading to respiratory and other illnesses in staff and users.
	• Smoke-related impacts to HVAC systems, leading to filters becoming blocked and needing increased maintenance.
	• Cascading impacts from surrounding wildfires, such as:
	  ○ Loss of City services on which facilities depend.
	  ○ Extended power outages affecting building and facility operations.
		• Loss of visibility for users, leading to accidents and injuries.
		• Fire damage to roads, requiring replacement of road sections.
			• Damage and loss of power infrastructure, leading to prolonged power outages.	• Damage and loss of surface infrastructure, leading to prolonged service delays.	• Increased need for urban / rural fire interface and vegetation management.

Reference: **Yellowknife CAP - CVA Preliminary Results**

Climate Hazard	Buildings	Transportation Networks	Power Supply	Water and Wastewater Systems	Natural Areas and Land Use
	○ Increased pressure on emergency response. ○ Increased insurance premiums.				
Low Water Levels (Drought, Changes in Lake Level)	• Increased water requirements for drinking and domestic use. • Poor air quality due to increased dust.		• Loss of hydropower generation capacity, leading to increased dependence on diesel generators.	• Reduced water availability from sources of potable and domestic water. • Low water levels making it difficult for water and wastewater pumps to operate, leading to stagnation, corrosion, and sediment buildup. • Decreased infiltration and inflow (I&I) into wastewater systems, resulting in increased sewage concentration passing through piping, long-term corrosion, and unpleasant odours from deposited solids. • Increased concentrations of pollutants in wastewater systems, creating higher demands on treatment equipment.	• Wilting vegetation due to lack of water availability. • Increased water requirements for irrigation.
Heavy Rainfall	• Water ingress and damage to structural building components due to localized flooding (e.g., foundations). • Compromised facility/building functionality and reduced level of service to the community. • More frequent repairs and renewals to buildings due to water-related damage, growth of organic material, and gradual deterioration of external components (e.g., flat roofs, window, foundation). • Increased need for emergency response due to the potential for accidents and injuries in flood events. • Increased insurance premiums.	• Road washouts and localized flooding, leading to loss of access to sections of the City. • Health and safety risks to users (e.g., physical injuries), leading to increased need for emergency response. • Overwhelmed drainage systems due to high water volume, leading to decreased capacity and localized flooding. • Increased usage of salts for de-icing due to freezing rain and ice accumulation, resulting in a decrease in the service life of roadways and sidewalks. • Ice accumulation on streetlights and traffic lights, which may require removal by maintenance crews.	• Loss of access to flood-damaged power systems, leading to delayed restoration.	• Sewer backup and overflow into surrounding areas due to high water volume. • Erosion of berms due to high volume of runoff. • Increased water volume in water and wastewater treatment systems due to heavy rainfall, leading to reduced efficiency of treatment.	• Waterlogging of vegetation due to high water volume. • Increase in localized flooding of open sites, resulting in a need for alternative land use considerations.
Winter Hazards (Snow, Extreme Cold, Freezing Rain, Freeze Thaw)	• Damage to building structure due to ground shifting and settlement caused by freeze thaw cycles. • Lake ice damming leading to potential flooding. • Increased snow load compromising structural integrity of existing building roofing.	• Deterioration of road, trail, and bridge structure due to ground shifting and settlement caused by freeze thaw cycles. • Ice and snow buildup in surface drainage and culverts, requiring thawing by maintenance staff to restore full functionality.	• Power outages due to freezing rain and ice accumulation weighing down transmission and distribution lines. • Damage and failure of sensitive equipment and communication systems due to ice and snow accumulation, temporarily limiting operations.	• Pipes and water mains freezing during extreme cold events and cold snaps. • Damage to underground piping and infrastructure due to ground shifting and settlement caused by freeze thaw cycles. • Degradation of berms around wastewater treatment facilities due to ground shifting resulting from freeze-thaw cycles.	• Increased snow load on vegetation branches, leading to breakage.

Reference: **Yellowknife CAP - CVA Preliminary Results**

Climate Hazard	Buildings	Transportation Networks	Power Supply	Water and Wastewater Systems	Natural Areas and Land Use
	• Ice and snow blockage of exterior HVAC components, leading to compromised functionality. • Blockage of drainage systems, leading to localized flooding during spring melt. • Increased ice buildup in surface drainage, requiring thawing by maintenance staff to restore full functionality. • Extreme cold leading to frost decay/deterioration of porous masonry materials. • Potential for roof damage due to ice dams and moisture damage.	• Increased need for maintenance to address degradation due to winter hazards. • Ice and snow accumulation on roads and parking areas, resulting in a health and safety risk to staff and users (e.g., increased potential for road accidents, slip-and-fall risk).	• Cracked insulators and flashovers due to extreme cold and freezing rain.	• Reduced efficiency of effluent processing systems. • Damage and failure of sensitive equipment and communication systems due to ice and snow accumulation, temporarily limiting operations. • Increased water volume in wastewater treatment ponds due to heavy rainfall, leading to snowmelt. • Blockage of water and wastewater intakes and discharge pipes, leading to reduced water flow and damaged pumps. • Increased blockages and wear-and-tear due to debris accumulation and increased sediment load resulting from rainfall run off.	
Permafrost Thaw	• Cracking and degradation of building foundations due to ground shifting and settlement.	• Cracking and degradation of road structure due to ground shifting and settlement.	• Shifting of poles and other electrical distribution infrastructure due to ground shifting and settlement.	• Shifting and damage to linear water and wastewater infrastructure due to ground shifting and settlement.	• Changes in soil hydrology and nutrients, leading to ecological shifts and increased need for alternative land use considerations.
High Winds	• Wind damage to building envelope, roof, and rooftop mechanical systems. • Windblown debris or trees falling on infrastructure resulting in damage. • Windblown debris in parking areas, requiring increased maintenance to clear potential obstacles. • Damage to external mechanical components leading to compromised building functionality (e.g., increased or decreased cooling and heating loads due to air leakage and impacts to air handling systems). • Health and safety risks to staff and users from high winds. • More frequent repairs and renewals to buildings due to damage and displacement of components. • Damage and displacement of signage and outdoor furniture. • Disruption of building and facility operations due to wind-related power outages.	• Blockage of roadways and trails by windblown debris (e.g., fallen trees). • Health and safety risks to users (e.g., physical injuries), leading to increased need for emergency response.	• Power outages due to damage to electricity distribution infrastructure (e.g., treefall on power lines). • Wind damage to communications equipment, leading to temporary inoperability of SCADA systems. • Conductor slapping resulting from high wind events.	• Wind damage to communications equipment, leading to temporary inoperability of SCADA systems.	• Damage to vegetation and uprooted trees.

Table 4 Overview of Climate Hazard-Asset Interactions Identified

Assets	Higher Average Temperatures	Heating Degree Day (HDD)	Cooling Degree Day (CDD)	Extreme Heat	Extreme Cold	Cold Snaps	Freeze Thaw - Winter	Freezing Rain	Relative Humidity	Short Duration High Intensity Rainfall	Long Duration Rainfall	Snowstorms	Seasonal Snow Cover	High Winds	Drought	Wildfire Interface / Smoke	Changes in Lake Level	Permafrost Thaw
Transportation network (roadways, bridges, bike lanes, sidewalks)	X			X	X	X	X	X		X	X	X	X	X		X		X
Land Use	X			X	X	X	X			X	X	X	X	X	X	X		X
Cemetery	X			X			X	X		X	X	X	X	X	X	X		X
Stormwater (including culverts and storm drains)					X	X	X	X		X	X	X	X	X		X		X
Yellowknife Bay water treatment plant and collection/distribution network	X	X	X		X	X	X			X	X				X	X	X	X
Wastewater treatment network (e.g., Fiddlers Lake sewage lagoon, wetland filtration area, sewage systems)	X	X	X		X	X	X			X	X					X		X
Solid Waste Facility (SWF)				X						X	X			X	X	X		X
Parks (green spaces, parks, playgrounds, trails)	X			X			X	X		X	X	X	X	X	X	X		X
Recreational facilities and associated equipment (e.g., the Multiplex, heritage monuments and other structures)	X	X	X	X	X	X	X	X		X	X	X	X	X		X		X
City-owned Administrative/operational buildings	X	X	X	X	X	X	X			X	X	X	X	X		X		X
Commercial/industrial buildings (e.g., Engle Business District)	X	X	X	X	X	X	X			X	X	X	X	X		X		X
Residential buildings	X	X	X	X	X	X	X		X	X	X	X	X	X		X		X
Yellowknife Airport	X	X	X	X	X	X	X	X		X	X	X	X	X		X		X
Power supply	X	X	X	X	X	X		X				X		X		X	X	X
Telecommunications and IT networks								X						X		X		X
North Slave Correctional Facility	X	X	X	X	X	X	X			X	X	X	X	X		X		X
Yellowknife Firehall	X	X	X	X	X	X	X			X	X	X	X	X		X		X
Stanton Territorial Hospital	X	X	X	X	X	X	X			X	X	X	X	X		X		X

3.4 Step 4: Vulnerability Assessment Results

Several vulnerabilities were identified through the desktop assessment and engagement with City staff and stakeholders, including the following:

- **Knowledge gaps** – The City's capacity to address its climate concerns is hindered by key knowledge gaps, which limit the development of plans specific to critical infrastructure and population groups. These gaps include:
  - A central critical infrastructure list clearly identifying assets and infrastructure the City is dependent on to maintain regular operations.
  - Identification and mapping of vulnerable populations and communities that may be disproportionately impacted by climate events.
  - City-specific climate change risk assessments and geotechnical studies identifying key concerns specific to the City's key infrastructure and operations.
  - Location data and mapping of permafrost, flood zones, geotechnical hazards, and natural resources for the City.
- **Capacity during emergencies** – Yellowknife serves as a hub for evacuations from surrounding communities during regional disasters. The primary locations for hosting evacuees are currently the Multiplex and Fieldhouse, with other sites being identified for larger community requirements. During these events, the City heavily depends on external partners for food, financial support, volunteer management, and other supports. Hosting puts a strain on the City's emergency response resources, food supplies, and shelter and staff capacity, which may not be sufficient for large regional events.
- **Key transportation and supply routes** – Yellowknife serves as a transportation and distribution hub to support supply chains to smaller, more remote NWT communities. Extreme events that limit use of the City's transportation routes impact not only supplies moving into and out of Yellowknife, but also hinder downstream supply chains to other communities. This makes the City's transportation routes sensitive to climate impacts due to the potential disruption of operations internal to the City and to other NWT communities dependent on Yellowknife for supplies.
- **Permafrost thaw** – Melting permafrost has been a challenge for development in much of the City due to associated changes in ground stability, soil structure, and hydrology. Increased ground shifting and settlement have led to ongoing deterioration and damage to City infrastructure (e.g., Yellowknife Airport, power supply infrastructure). Permafrost thaw is likely to continue into the future driven by rising temperatures, which may limit land development options, necessitate changes to construction practices, and increase maintenance costs.
- **Lack of climate adaptation policies and plans** – The City has been experiencing an increased pace of climate events accompanied by a lack of recovery time. While climate change has been recognised by the City as a major concern, climate risk assessment and adaptation have not yet been mainstreamed into the City's policies and capital planning. For example, there is currently no streamlined effort to complete building condition or climate risk assessments for City buildings, which limits the City's knowledge of where retrofits may be necessary and what assets may need immediate

resilience measures. The City currently has no risk management framework for the corporate risk evaluations that would inform the development of these policies but is in the process of developing one.

- **Resource limitations** – The City does not currently have adequate staff and resources for preparing for and responding to climate-related impacts. With respect to maintaining City assets, the City has an inadequate maintenance budget, no replacement budget, and high staff turnover. These factors pose a challenge to climate adaptation, especially if additional funding cannot be acquired by the City.
- **Population changes** –There has been an increase in NWT residents migrating to Yellowknife over time in search of employment and other opportunities, and nearly all the NWT's projected population growth is expected to occur in Yellowknife. This has led to a strain on the City's resources, an increase in economic hardships, and an increase in rates of homelessness. Population growth in the City has been particularly rapid among seniors. Along with the declining birth rate, this has resulted in an aging population that is increasingly dependent on City services and programming. These changes in demographics and economic development increase the proportion of the population most sensitive to changes in climate and increase the need for climate relief structures and resources, such as cooling centres, green spaces, and bus shelters.
- **Water levels determine power and water supply** – The City is sensitive to low water levels in surrounding water bodies due to its dependence on them for hydropower, particularly from the Snare and Bluefish hydroelectric plants. Loss of hydropower results in increased use of generators powered by diesel, which can be expensive. The City's sensitivity to low water levels also stems from its dependence on local water bodies for its water supply. The water treatment plant was constructed in 2015 to process water from Yellowknife's two major water sources, Yellowknife River and Yellowknife Bay. However, the main pipeline that carries potable water from Yellowknife River to the water treatment plant was built in 1969 and is nearing end of use, making it particularly vulnerable to corrosion and damage. While the City has decided to replace the pipeline, the replacement will be costly and time consuming. Water from Yellowknife Bay will be used in the interim. However, the 2019 Community Plan Update Background Report stated that there is a concern that arsenic contamination from the nearby Giant Mine site cannot be consistently controlled, which may compromise long-term safe water availability from Yellowknife Bay. The City currently conducts regular testing to monitor the arsenic content of the water.
- **Sewage and Wastewater treatment lagoon overflow** – The City's sewage and wastewater treatment system discharges into Fiddler's Lake (a natural lake lagoon and wetland system) and ultimately to Great Slave Lake. Sewage treatment is achieved naturally in the lagoon and downstream wetlands. The wastewater system is strongly impacted by overland flow associated with intense rainfall and snowmelt, given there are no surrounding berms to limit runoff into the lake. Increased inflow to the lagoon increases the need for decanting and decreases the treatment performance of the system. Additional resources may be required to upgrade wastewater management capacity and adapt the system to changes in precipitation intensity and frequency, particularly if the City's population continues to grow as expected.
- **Stormwater drainage capacity** – Drainage capacity has been impacted by development and associated paving around the City. The result has been a change in natural flow patterns of runoff and snowmelt and a decrease in natural ground infiltration. The capacity of existing drainage systems is

based on historical precipitation and levels of development. Considering the City's continued growth and development, the City is sensitive to localised flooding due to intense rainfall events and snowmelt.

- **Food security** – Food security has been recognised as a concern for both the City of Yellowknife and the NWT, particularly during disasters and extreme events when the City serves as an evacuation hub. There are high rates of food insecurity in Yellowknife (and generally in NWT) due to various factors, such as food costs, limited supply chains, and lack of suitable and available agricultural land. The City has taken steps to address these concerns through the 2015 Yellowknife Food Charter and the 2019 Yellowknife Food and Agriculture Strategy (GROW). However, the GROW initiative is currently on hold due to lack of funding. Climate change may also pose a challenge to future agricultural success if climate resilience is not integrated into agricultural land use planning, crop selection, protective structures (e.g., greenhouses), and other areas.
- **Wildfire management** – The City is in an area that is prone to wildfires and has been evacuated due to nearby wildfires in the past. Fuelbreaks were established around the City during the 2023 wildfire season, which the City would need to allocate its already limited resources to maintain. An additional concern for fire management in the City is the limited distribution of fire hydrants, which are only installed across approximately half of the City due to the terrain and permafrost. Areas without fire hydrants are serviced by portable water tanks and water shuttles in the event of a fire. The City does not currently have a specific debris management plan for post-disaster cleanup of debris generated by wildfires (e.g., burnt cabins, trees), which inhibits efficient removal of debris due to a lack of direct coordination. While there is no direct wildfire debris management plan, some amount of debris clearance is considered in the City's emergency planning.

Results of the CVA are shown in Table 4 for each of the assets and archetypes assessed. Of the 18 assets and archetypes assessed, 12 were found to have high vulnerability and 6 had medium vulnerability. No low vulnerability archetypes were identified in this assessment. In addition to the impacts noted in Section 3.3, specific vulnerabilities of each asset and archetype assessed are noted below.

High Vulnerabilities

- **Transportation Networks** are highly vulnerable to degradation and damage from ground settlement due to permafrost thaw and winter freeze thaw. Road conditions have also been hindered by ice and snow accumulation, which has hindered use of transportation and supply routes in winter months.

- The operations of **Yellowknife Water Treatment Plant and Collection/Distribution Network** are highly vulnerable due to the condition of the potable water pipeline and the water quality of Yellowknife Bay. There is potential for ground shifting and settlement to damage the submarine pipeline due to its poor condition. Low water levels may also lead to an increase in concentration of contaminants in Yellowknife Bay, decrease in water availability for residents of the City, challenges to maintaining water pressure, and functionality of fire hydrants.

- The **Wastewater Treatment Network** is highly vulnerable to weather events, particularly precipitation. While the City's sanitary sewer system has not historically been overloaded by

increased water volumes, runoff entering the Fiddler's Lake lagoon due to intense rainfall and snowmelt impact operations of the lagoon by extending the time needed for decanting, which can affect the system's performance and effluent quality. Higher temperatures may also impact operation by altering the effluent quality and increasing treatment requirements.

- **Parks** and natural areas are highly vulnerable due to their sensitivity to a wide range of hazards occurring in the area, particularly wildfires and drought.
- **Residential Buildings, Stanton Territorial Hospital,** and **North Slave Correctional Facility** are highly vulnerable to climate hazards because they are occupied by individuals who may be disproportionately affected by climate events (e.g., seniors, young children, individuals with illnesses, addiction, and mental health concerns). This increases their sensitivity to health and safety impacts, such as smoke-related respiratory issues, heat-related illnesses, and slip-and-fall accidents in winter conditions. These concerns are likely to be exacerbated as the population continues to increase. Buildings are also sensitive to physical damage and loss of component functionality.
- **Recreational Facilities** are highly vulnerable due to their users and age. Like residential buildings and hospitals, recreational facilities are used by a large cross-section of the City's population, which may consist of individuals who may be disproportionately affected by climate events. Heritage structures (e.g., buildings, monuments, statues) are likely to be highly sensitive to degradation and damage from climate hazards due to the age of these structures.
- **Yellowknife Airport** is highly vulnerable and has been impacted by ground shifting and settlement along its runway in the past, which has been attributed to permafrost thaw. The airport is also vulnerable due to the potential impacts of weather events to operations, such as loss of visibility due to wildfire smoke and storms, slippery surfaces due to ice and snow accumulation, failure of sensitive equipment due to extreme heat, and delays due to high winds. Given the large number of users and staff, health and safety concerns would be similar to those of recreational facilities and residential buildings.
- **Power Supply** to the City is highly vulnerable due to its dependence on hydropower. Extended periods of drought and low water levels have led to reduced output from local hydro stations (e.g., Snare Hydro system), resulting in loss of power to the City and increased dependence on generators. Power disruptions are also likely to occur from damage to electrical infrastructure caused by permafrost thaw, extreme events, and high temperatures.
- The **Yellowknife Firehall** is highly vulnerable because it is an older building and is a critical emergency response hub, as it is the only firehall in Yellowknife. A 2020 Firehall Building Study[2] identified some key issues that will be addressed in future renovations, including ineffective HVAC

[2] Dillon Consulting. 2020. City of Yellowknife Firehall Building Study.

systems, ponding on asphalt close to the building, no fire alarm or sprinkler system, and insufficient space for additional staff. Stress on the emergency response resources of the fire department may increase during local extreme events and during regional disasters, when the City becomes a hub for incoming evacuees from surrounding communities. Plans for future renovation of the firehall have been approved by the City and will soon be underway.

- **Telecommunications and IT Networks** are highly vulnerable due to their importance to the City's operation and sensitivity to damage from ground shifting and extreme events (e.g., high winds). Damage to telecommunications and IT networks would result in loss of communications for residents, disruption of City operations, and a potential need for large scale maintenance.

Medium Vulnerabilities

- **Land Use** and **Cemeteries** are vulnerable due to the potential for loss of access due to localized flooding and ground instability due to permafrost thaw, as well as damage from other climate events to which open areas are exposed (e.g., wildfire interface). These shifts may impact how land can be repurposed and whether cemeteries can be accessed but may not result in damage or total loss. Following completion of the cemetery, a columbarium park has been proposed to improve land usage and provide an alternative to in-ground burials.

- **Stormwater Systems** are vulnerable, particularly due to impacts from heavy rainfall, snow accumulation, and shifts due to permafrost thaw and freeze thaw cycles. Increased development in the City has led to an increase in runoff entering drainage systems, which were designed according to historical climate rather than future projections. Spring snowmelt increases the potential for drainage systems to become overwhelmed by high water volume. Stormwater piping may also become worn and damaged from ground shifting and settlement due to permafrost thaw and freeze thaw events.

- The **Solid Waste Facility** and **City-owned Administrative/Operational Buildings** are vulnerable to physical damage, loss of functionality of components, and service disruptions due to climate events. These buildings are maintained by the City and are not occupied by highly vulnerable individuals for prolonged periods, hence medium sensitivity.

- **Commercial/Industrial Buildings** (e.g., business districts) are also vulnerable to physical damage, loss of functionality of components, and service disruptions due to climate events. These buildings are maintained by the owners and are not occupied by highly vulnerable individuals for prolonged periods, hence medium sensitivity.

Table 5 Results of the Climate Vulnerability Assessment

Asset/Archetype	Transportation Networks	Land Use	Cemetery	Stormwater Systems	Water Treatment Plant and Collection/ Distribution Network	Wastewater Treatment Network	Solid Waste Facility	Parks	Recreational Facilities and Associated Equipment	City-Owned Administrative/ Operational Buildings	Yellowknife Firehall
Sensitivity	High	Medium	Medium	Medium	High	High	Medium	High	High	Medium	High
Adaptive Capacity	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Vulnerability	High	Medium	Medium	Medium	High	High	Medium	High	High	Medium	High

Asset/Archetype	Commercial/ Industrial Buildings	Residential Buildings	Yellowknife Airport	Power Supply	Telecommunications and IT Networks	North Slave Correctional Facility	Stanton Territorial Hospital
Sensitivity	Medium	High	High	High	High	High	High
Adaptive Capacity	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Vulnerability	Medium	High	High	High	High	High	High

4 Existing/Planned Adaptation Actions

The following is a list of some of the existing climate adaptation related actions currently underway in the City identified through a literature review of City documents and engagement with City staff and stakeholders (Table 6). The list is not exhaustive but demonstrates how the City has been addressing issues surrounding climate change and overall vulnerabilities that may indirectly exacerbate climate impacts. High level considerations for further enhancing adaptation planning in the CAP in response to the vulnerabilities identified for the City are also provided in Table 6. Actions will be further developed in later stages of the climate action planning process.

Table 6 Existing City Actions Influencing Climate Adaptation and Considerations for the CAP

Existing Actions Being Implemented by the City	Considerations for the CAP
• The City has formally recognized the need for integration of climate adaptation into its departments and operations. For example, Yellowknife joined the Federation of Canadian Municipalities Climate and Asset Management Network in 2017 and noted climate change as an asset management driver in its Asset Management Roadmap. • Asset management plans are scheduled to be developed in 2026. A risk management framework is currently in development. • The City is currently updating the Community Plan. • Feasibility studies have been conducted to identify potential options and costs to replace and repair key City systems (e.g., potable water pipeline from Yellowknife River, piped sewage service network, addition of treatment cells and berms at the Fiddler's Lake lagoon). • FireSmart building practices are considered for new City developments. • A fuel break was established in 2023 to protect the City against wildfire damage. The	• Enhance enforcement of current City policies and procedures that incorporate climate-related response (e.g., use of FireSmart in new development). • Increase consideration of climate risks to individual assets and infrastructure through climate risk assessments and incorporation of past and future climate change into City projects, planning, and standards (e.g., asset management plans). • Evaluate possible engineering options for vulnerable facilities and systems (e.g., water supply systems, drainage, wastewater treatment system). • Enhance operations and maintenance of City facilities to include climate-related monitoring and response. • Evaluate climate impacts on Yellowknife's natural areas. • Conduct additional studies to identify areas prone to climate-related impacts. • Explore opportunities for restoration of degraded green spaces and fuel breaks, while maintaining defensible zones for future fire protection.

Existing Actions Being Implemented by the City	Considerations for the CAP
City is beginning to explore options for how best to manage fuelbreaks. • The City is in the process of completing condition assessments for larger municipal facilities. • The City is working with the Territory to gather data on permafrost and the impacts of permafrost thaw in the region. • Two sites are currently designated as host sites for evacuees of regional emergencies (Multiplex and Fieldhouse). • Data collection is underway to identify the City's data gaps and develop a central information repository. • The City is currently evaluating its service level standards. • The 2024 Community Emergency Plan centralizes and guides the City's emergency response planning. • An updated Hazard Identification and Risk Assessment (HIRA) is expected to be conducted for the City in 2025. A HIRA was completed for the overall Territory in 2024. • The City conducted a community risk assessment in 2022, which included risks from climate hazards (e.g., permafrost thaw, localized flooding, winter storms) to infrastructure.	• Improve food security by exploring options for increased agriculture. • Enhance capacity for emergency response and hosting evacuees when regional extreme events occur. • Explore options for post-disaster debris management. • Explore opportunities to identify population groups that are more sensitive to the impacts of climate change. • Enhance climate-related public outreach to educate the Yellowknife community on climate impacts and how individuals can work towards adaptation and mitigation.

As part of the ongoing CAP development process, Stantec also completed a literature review of documents containing information on the City's, as well as the Northwest Territories', planned and proposed climate adaptation actions. A summary of these actions is provided in Table 7. This list represents a sample of the planned climate action in the City and Territory.

Reference: Yellowknife CAP - CVA Preliminary Results

Table 7 City of Yellowknife and Government of Northwest Territories Planned/Proposed Climate Adaptation Actions

Theme	City Strategies	Northwest Territories Strategies
Buildings and Infrastructure	• Consider future infrastructure development area suitability based on ground conditions and susceptibility to permafrost degradation • Create a built environment that lowers the risk of wildfire spread to structures and key infrastructure (e.g., FireSmarting throughout all development activities) • Conduct asset condition assessments and upgrade and/or replace City facilities and deteriorating assets • Install back-up power for critical infrastructure/facilities • Restore/construct wetlands and floodplains • Ensure new infrastructure exceeds the National Building Code and the National Energy Code for New Buildings • Improve housing equity and climate resiliency of housing • Ensure climate change considerations are incorporated in municipal decision making including in asset management planning and strategy, in engineering design of buildings and infrastructure and in terms of procurement contracts • Improve maintenance programs and activity along primary road corridors • Dedicate annual funding for trail maintenance and expansion • Consider impacts of road alignments and surface covers on permafrost	• Complete flood zone and fire risk mapping for vulnerable communities • Obtain accurate climate data sets for all regions in the NWT that account for regional variability to inform new infrastructure design and risk assessments for existing infrastructure • Develop a climate projection model to use for infrastructure design and risk assessments • Understand the climate vulnerability of existing and future infrastructure • Adapt existing infrastructure to climate change impacts through regular maintenance and upgrades • Complete community infrastructure risk assessments and high-level adaptation options • Develop a plan to undertake regional terrain sensitivity and geohazard mapping and monitoring for permafrost • Continue to implement the Climate Change Adaptation Plan to protect infrastructure and maintain transportation service levels with expected increased permafrost degradation and severe weather events • Enhance existing information technology systems and add new data collection platforms across the NWT transportation system to monitor traffic, weather and the condition of our infrastructure to improve asset management and service delivery • Continue to implement the Green Light environmental strategy to uphold high standards of environmental stewardship, including implementing an environmental management plan and supporting NWT greenhouse gas reduction targets through enhancing vehicle and equipment procurement, operations, maintenance and asset management procedures

Reference: Yellowknife CAP - CVA Preliminary Results

Theme	City Strategies	Northwest Territories Strategies
Land Use and Natural Areas	• Consider the impacts of extreme weather events, wildfires, changing permafrost, gradual warming and flood/drought conditions on wildlife and marine animals in lakes, parks and natural spaces • Create shoreline protection and natural vegetation policies for land use planning • Inventory degraded green spaces and brownfield sites and develop rehabilitation and monitoring plans • Implement FireSmart aligned vegetation management and vegetation-based wildfire risk mitigation activities •	• Complete vulnerability assessments that integrate research, monitoring and traditional knowledge to develop effective adaptation measures of aquatic and terrestrial ecosystems and all species at risk • Conduct research to understand where heritage resources, such as archeological sites, are at greatest risk of impact due to coastal erosion, thawing permafrost, melting alpine ice and wildland fires • Incorporate climate change considerations into conservation network planning and the establishment of existing candidate areas as protected areas • Increase the resilience of wildlife populations to climate change by mitigating other impacts and stressors • Conduct vulnerability assessments for forest landscape areas of interest • Conduct wildlife climate change vulnerability assessments • Continue monitoring invasive and nonindigenous species and assess impacts from range shifts on wildlife • Assess cumulative impacts to fish, including climate change, as reflected in the NWT Cumulative Impact Monitoring Program Fish Blueprint • Undertake NWT Wetland Inventory Mapping
Emergency Management	• Development, implementation and annual review of a local emergency plan and other measures with respect to emergency response management by a designated emergency management organization • Regularly review and update the City of Yellowknife Community Wildfire Protection Plan (and comparable wildfire risk management documentation) • Consider opportunities to coordinate with the GNWT and neighbouring communities on wildfire mitigation and risk reduction measures in advance of wildfire seasons	• Address climate-related hazards and adaptation measures in updated community emergency plans and operations and maintenance procedures.

Reference: Yellowknife CAP - CVA Preliminary Results

Theme	City Strategies	Northwest Territories Strategies
	• Conduct a physical risk assessment to identify risks to critical City services and potential impacts of disruptions on critical services and resources, to inform continuity planning efforts • Consider the needs of vulnerable populations in all evacuation planning, response and recovery activities and implement a system to register these individuals to ensure their safety during evacuation and re-entry • Develop continuity plans for the City across all departments, which include the identification of critical City services, and the staff required to ensure the continuity of these services • Develop a detailed wildfire evacuation plan that includes roles and responsibilities, procedures, logistics processes and recovery and re-entry processes and considerations • Utilize municipal assets for extreme weather events and coordinate with other levels of government as necessary	
Community Education and Engagement	• Create a central repository of climate adaptation related information and guide the public on how to access the information • Develop educational materials for the public related to preparation and response to emergencies • Develop a strategy for managing public information before, during and after evacuations to ensure that communications to the public are clear, accessible, informative, and timely • Support the sustainable growth of urban agriculture and related activities	• Develop a central repository to share and access climate change knowledge and information • Enhance the availability of climate and environmental information by providing data, along with products such as summaries of data trends and variability, and projections of future climate • Support community and Indigenous governments in the development and implementation of adaptation plans • Support the collection, analysis or synthesis of traditional knowledge through the NWT Cumulative Impact Monitoring Program to better understand environmental trends and cumulative impacts for use in decision-making

5 Next Steps

The CVA identified climate vulnerability of the assets and archetypes of the City of Yellowknife, providing an understanding of the potential climate impacts on the City's infrastructure. The vulnerabilities and knowledge gaps identified in the assessment will be used to inform the development of adaptation measures for the City of Yellowknife CAP, with consideration of the priorities noted by staff and stakeholders during engagement sessions.

Kimberly Stephenson Ph.D.
Climate Scientist
Mobile: 548-255-2978
Kimberly.Stephenson@stantec.com

Attachment: N/A

APPENDIX C: DOCUMENTS REVIEWED FOR LITERATURE REVIEW

CITY OF YELLOWKNIFE - **CLIMATE CHANGE ACTION PLAN**

Level of government	Document
City of Yellowknife	Community Energy Plan (2006)
	Development Incentive By-Law No. 4534 (2009)
	Franklin Avenue Bike Lane Consultation (2016)
	Corporate and Community Energy Action Plan 2015-2025 (2017)
	Active Transportation Strategy and Indicators (2018)
	Electric Vehicles in Yellowknife – An Overview for Policy Makers Presentation (2018)
	Strategic Waste Management Plan (2018)
	Transportation Infrastructure Study (2018)
	Trail Enhancement and Connectivity Study (2018)
	Asset Management Roadmap (2019)
	Emergency Management Plan By-Law No. 4996 (2019)
	GROW Yellowknife Food and Agriculture Strategy (2019)
	Community Plan By-Law No. 5007 (2020)
	Yellowknives Dene First Nation and City of Yellowknife Joint Economic Development Strategy, Implementation Plan, and Technical Report (2020)
	Asset Management Policy (2021)
	Building By-Law No. 5058 (2022)
	Climate Change Engagement Summary Report (2022)
	District Energy Policy Framework (2022)
	Wildfire Prevention and Mitigation Webpage (2022)
	Zoning By-Law No. 5045 (2022) (Amended 2024)
	Council Strategic Directions 2023-2026 (2023)
	After-Action Assessment: 2023 North Slave Complex Wildfires Final Report (2024)
	Community Emergency Plan (2024)
	Home Energy Finance Program – Program Design Report (2024)
GNWT	Northern Lands Northern Leadership: The GNWT Land Use and Sustainability Framework (2014)
	NWT Transportation Strategy 2015-2040 (2015)
	2030 NWT Climate Change Strategic Framework (2018)
	2030 NWT Climate Change Strategic Framework Action Plan 2019-2023 (2018)
	Northern Voices, Northern Waters: NWT Water Stewardship Strategy (2018)
	NWT 2030 Energy Strategy (2018)
	NWT Petroleum Resources – A Path to Northern Benefits and Energy Security (2018)
	NWT 2030 Energy Strategy Action Plan 2022-2025 (2022)
Federal government	Healthy Environment and a Healthy Economy (2020) – Government of Canada
	Canada's 2030 Emissions Reduction Plan (2022) – Government of Canada
	National Adaptation Strategy (2023) – Government of Canada

CITY OF YELLOWKNIFE

Physical Address: 4807 - 52 Street, Yellowknife, Northwest Territories.
Mailing Address: P.O. Box 580, Yellowknife, NT X1A 2N4.
Phone: (867) 920-5600.
Email: planningandenvironment@yellowknife.ca