CLIMATE ACTION PLAN

Revised Draft: May 2025

Whitehorse
THE WILDERNESS CITY

FOREWARD

The City of Whitehorse, a unique and vibrant community, is often referred to as 'The Wilderness City'. As the Yukon's capital city, Whitehorse plays a pivotal role in leading through innovation and action in the Territory. Whitehorse is home to diverse wildlife and breathtaking landscapes, and being located in the North, will be especially impacted by the most extreme of changes to the global climate.

The city's geographical location makes it particularly vulnerable to the impacts of climate change. Changes in temperature and precipitation patterns could alter the region's biodiversity, affecting the flora and fauna that form the basis of fragile ecosystems. Warmer temperatures means that soil is expected to be impacted by an increase in the frequency and severity of freeze-thaw cycles and groundwater saturation, resulting in changes to the landscape that will impact the City's infrastructure.

Moreover, climate change will likely influence some of the City's socio-economic aspects. Changes in the local climate could affect outdoor recreational activities, a significant part of the Whitehorse community's lifestyle and a contributor to the local economy, by making conditions unsuitable for specific activities or unsafe for participants. It could also impact the traditional ways of life of the Ta'an Kwäch'än Council and the Kwanlin Dün First Nation Citizens by altering the land- and water-based natural resources on which they depend.

However, it is important to note that change does not necessarily signify catastrophe. Change encourages adaptation and innovation. As a community, Whitehorse has the opportunity to come together and proactively address these challenges. By understanding the potential impacts of climate change, the community can develop strategies to adapt and ensure the sustainability of Whitehorse.

The City's *Official Community Plan 2040* (OCP), sets the stage with the following vision:

"Whitehorse in 2040 is a vibrant capital city. The City is an inclusive, innovative, entrepreneurial, and resourceful northern community. The growing community is diverse, liveable, and affordable. Whitehorse residents and visitors enjoy access to the land, some of the cleanest air in the country, and opportunities to gather for local, national, and international events. The City of Whitehorse is committed to providing equitable access to a range of residential, economic, social, cultural, recreational, mobility opportunities, and natural spaces. A vibrant social and cultural scene continues to strengthen the community's social fabric. The City's leadership

is recognized across the country for its meaningful and continued efforts towards truth and reconciliation with First Nations, and its actions to mitigate negative impacts and adapt to climate change. The City remains committed to sustainable development and planning for future generations."

This Climate Action Plan (CAP) will build on the work of the OCP recognizing that local actions form the fundamental solutions to international challenges. Climate change, a global phenomenon, has far-reaching impacts that are not confined to any geographical boundaries. It is a complex issue that affects various aspects of society, from the air we breathe, the water we drink, to the food we eat. For Whitehorse, a northern community with a rapidly growing population, the effects of climate change could be profound and multifaceted.

This plan aims to provide a comprehensive yet accessible overview of how climate change might shape the future of Whitehorse. It is intended for City staff and for the residents of Whitehorse, to help foster understanding and inspire action towards climate change adaptation and Greenhouse Gas (GHG) mitigation efforts.

There will be periodic reviews of the CAP. Although specific actions are defined in this plan, it is anticipated that they will be prioritized and implemented opportunistically (e.g., certain circumstances may accelerate a particular action, like new funding becoming available). Any actions with financial implications will be reviewed and approved by Senior Administration and Council.

In the following sections, this plan delves deeper into the projected changes for Whitehorse and discusses potential strategies that will help the City play its part in mitigating the causes of climate change (GHG emissions) and adapting to changes already underway and projected to occur. This Plan serves as a starting point for a broader conversation about the City's future in the face of climate change.

RECOGNITION OF TRADITIONAL LANDS, HISTORY, AND KNOWLEDGE

The City of Whitehorse acknowledges that it resides on the traditional territories of the Ta'an Kwäch'än Council and the Kwanlin Dün First Nation, as outlined in their Final and Self-Governing Agreements. We honour the deep and ongoing cultural, spiritual, and economic connection these Nations have with this land. Their contributions are essential to the City's prosperity, and we are committed to strengthening our relationship through the 2018 Declaration of Commitment.

We recognize that climate action plans developed by governments often rely heavily on global trends and Western science, which can overlook local perspectives and Indigenous knowledge. While the City of Whitehorse's Climate Action Plan has endeavoured to instill values that reflect our collective sense of place, it was required to adhere to the conventional structure of a government plan for technical consistency. We acknowledge that this may cause it to lack the spirit and local relevance that it aspires to encapsulate.

It should be noted that the Reconnection Vision[1], developed by the Yukon First Nation Climate Action Fellowship and supported by all Yukon First Nations, offers a more nuanced and empathetic approach to climate action, reflecting the wisdom and values of the Land and its People. We acknowledge the value of this work and express a sincere desire to learn from it.

The City of Whitehorse is committed to working alongside the Ta'an Kwäch'än Council and the Kwanlin Dün First Nation Governments to find ways to help advance Reconnection Vision goals through the implementation and evolution of the CAP. As we move forward, our goal is to infuse the CAP with inspiration and creativity, charting a path forward that reflects our shared values. The City considers the Reconnection Vision to be a compass to guide the actions outlined in the CAP, helping us to navigate challenges with humility and intentionality as we work together to plant the seeds for lasting social transformation.

[1] Yukon First Nations Climate Action Fellowship. (2023). Reconnection Vision. Yukon, Canada.

BACKGROUND

1. THE URGENT NEED FOR CLIMATE ACTION

Over the past century, the increase in greenhouse gas (GHG) emissions has caused significant changes to the Earth's climate, with noticeable impacts in regions located in the sub-Arctic such as Whitehorse. Scientific evidence shows that the human-induced production of GHG emissions since pre-industrial times poses significant current and future risks to human well-being[2]. Changes in climate have caused tangible challenges, including more frequent extreme weather events, which strain communities and economies. The effects on human health, livelihoods, and infrastructure are already being felt, and the financial costs of addressing these impacts are substantial[3]. Additionally, climate change is exacerbating existing issues, such as aging infrastructure and gaps in emergency preparedness. These challenges highlight the need for practical, short to long-term solutions to reduce emissions, improve resilience, and strengthen systems to better handle the changing climate.

2. CLIMATE CHANGE IMPACTS TO WHITEHORSE

The North is among the regions experiencing the greatest warming in Canada at an estimated three times the global rate, particularly during winter months[4]. Climate models project that other changes are likely to include an increase of precipitation, more extreme heat events that last longer in duration, increase potential for severe weather events, and increase frequency and magnitude of wildfires. At the local level, the City is projected to experience an increase in extreme hot days, heatwaves, extreme rainfall, and high winds[5]. This means an increase in heat related exposure and health conditions, an increase in the incidence of local and regional wildfires and related risks, damages to buildings and infrastructure and health related impacts, and an increase in the risk of overland and riverine flooding and associated damages.

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[2] Government of Canada. (2019). *Chapter 8: Changes in Canada's climate.* In Canada's changing climate report. Retrieved March 27, 2025 from https://changingclimate.ca/CCCR2019/chapter/8-0/

[3] Canadian Climate Institute. (2025). *Close to home: Facing the risks of climate change in Canada.* Retrieved March 27, 2025 from https://climateinstitute.ca/wp-content/uploads/2025/01/Close-to-Home-Canadian-Climate-Institute.pdf

[4] Government of Canada. (2019). *Chapter 4: Temperature change in Canada.* In Canada's changing climate report. Retrieved March 27, 2025 from https://changingclimate.ca/CCCR2019/chapter/8-0/

[5] Government of Yukon. (n.d.). *Assessing Climate Change: Risk and Resilience in the Yukon.* Yukon.ca. Retrieved March 26, 2025, from https://yukon.ca/en/climate-change-yukon

Snapshot of Whitehorse Historical and Projected Climate (Business As Usual Scenario)

Climate Variable	Historical (1991-2020)	2050s (2041-2070)	2080s (2071-2100)
Annual mean temperature	**0.2°C**	**3.3°C**	**5.8°C**
Number of days with a maximum temperature greater than 30°C	**0.9 days/year**	**6.3 days/year**	**21.1 days/year**
Heat wave of 2 or more consecutive days with a maximum temperature greater than 28°C and minimum temperature greater than 13°C	**0.1 events/year**	**1.3 events/year**	**3.8 events/year**
Number of days with a minimum temperature colder than -30°C	**13 days/year**	**3.6 days/year**	**~0 days/year**
Annual total precipitation	**279.6 mm**	**335.0 mm**	**378.6 mm**
1-day maximum precipitation	**18.5 mm**	**22.8 mm**	**27.0 mm**
Extreme rainfall (45 mm in 24 hours)	**1-in-50-year storm**	**~1-in-18-year storm**	**~1-in-7-year storm**
Annual number of freeze-thaw cycles	**86.8 cycles**	**69.0 cycles**	**56.8 cycles**
Frost-free season (growing season) length	**85 days**	**123.8 days**	**152.9 days**
Wildfire annual occurrence (Southwestern Yukon)[6]	**5 to 10 fires per 106 km2**	**~2-fold increase in fire occurrence**	**~3-fold increase in fire occurrence**
Wildfire annual area burned (Southwestern Yukon)[6]	**0.5 to 1.0% per year**	**~2-fold increase in area burned**	**~3-fold increase in area burned**
Average wildfire season length (Whitehorse region)	**150 to 175 days**	**165 to 190 days**	**180 to 205 days**

[6] Historical wildfire data for the 1961-1990 period

3. MITIGATING AND ADAPTING TO THE EFFECTS OF CLIMATE CHANGE

Addressing climate change requires long-term efforts at the global and local scale to reduce and/or eliminate sources of GHG emissions, known as climate mitigation, as well as efforts to prepare for changes locally that are irreversible and already underway, known as climate adaptation. The role of every community globally is important in innovating and demonstrating progress and possibility. Cities are centers of communication, commerce, and culture. While cities are a significant and growing source of energy consumption and GHG emissions, cities can affect considerable change on GHG emission levels on a global scale as they may have influence on approximately 50% of emissions in Canada[7].

Adaptation and mitigation are not mutually exclusive and can sometimes result in co-benefits and synergies when carefully considered and planned for. For instance, green roofs can improve on-site stormwater management, increase biodiversity in the area, improve the thermal retention of the roof and reduce summer cooling energy use, and reduce GHG emissions as a result. It should be noted that some adaptation measures may not have mitigation benefit and some mitigation measures may not improve resilience. However, both are worth doing, and without delay, knowing that future action will still be required.[8]

[7] Federation of Canadian Municipalities. (n.d.). *Climate and sustainability.* Retrieved March 26, 2025, from https://fcm.ca/en/focus-areas/climate-and-sustainability

[8] Federation of Canadian Municipalities. (2020). *Investing in Canada's future: The cost of climate adaptation.* Retrieved from https://data.fcm.ca/documents/reports/investing-in-canadas-future-the-cost-of-climate-adaptation.pdf

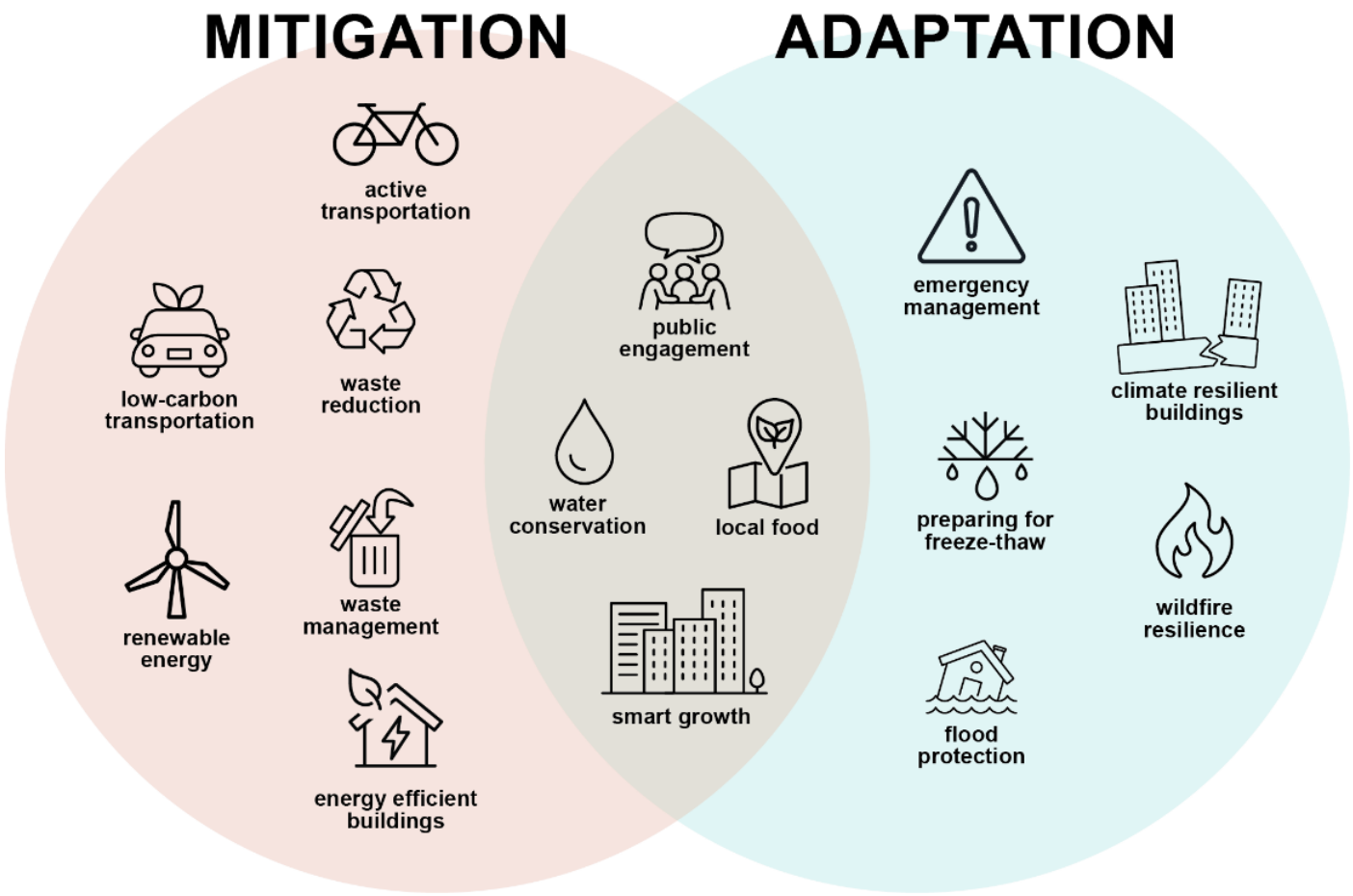

Figure 1 Example of the Differences and Synergies between Climate Mitigation and Climate Adaptation Measures

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[9] City of Whitehorse. (2014). *Whitehorse sustainability plan.* City of Whitehorse. https://www.whitehorse.ca/wp-content/uploads/2022/05/WSP.pdf.

[10] Government of Yukon. (2020, September 14). *Climate change, energy and green economy strategy for Yukon announced.* Government of Yukon. Retrieved from https://yukon.ca/en/news/climate-change-energy-and-green-economy-strategy-yukon-announced

[11] Canadian Climate Institute. (n.d.). *Climate change adaptation.* Retrieved March 26, 2025, from https://climateinstitute.ca/adaptation/

[12] Statistics Canada. (n.d.). *Ecosystems valuation.* Retrieved March 26, 2025, from https://www150.statcan.gc.ca/n1/pub/16-509-x/2016001/14-eng.htm

4. STRIVING FOR NET-ZERO EMISSIONS AND ENHANCED RESILIENCE BY 2050

Reducing GHG emissions and increasing climate resilience has been an important area of concern for the City. In 2014, as part of the adoption of the *Whitehorse Sustainability Plan 2015–2050*, City Council endorsed a target of an 80% reduction in corporate GHG emissions and a 16% reduction in community GHG emissions by 2050 (from 2014 levels).[9] These targets reflected the City's priorities and where influenced could be exerted at the time.

Given the climate assessments in the *IPCC Special Report*, the City's climate emergency declaration, and the recent updates to the Government of Yukon's GHG reduction commitments[10], this Climate Action Plan aims to update and align both corporate and community GHG emissions targets with the IPCC's recommended emissions reduction target to keep global temperatures from rising beyond 1.5ºC. To hit this target, it would mean that both corporate and community GHG emissions would need to reach net-zero by 2050 (see the Climate Action Plan line in Figure 2 which accounts for both corporate and community GHG emissions). This is an aspirational goal but an important one for which the City to strive.

Achieving net-zero would mean that little to no GHG emissions would be emitted by 2050 and any remaining GHG emissions would be removed from the atmosphere. At the community scale, GHG emissions reductions would likely be slower over the next decade and then would accelerate as the community and personal assets (buildings, cars, etc.) are renewed and new no-/ low-emissions technologies, as well as renewable-technologies, are adopted. This is illustrated by the steeper downward curve in the Climate Action Plan line in Figure 2 after 2037.

Climate action is considered a sound financial investment for municipalities: the Canadian Climate Institute estimates that for every dollar spent on proactive adaptation measures there is a return of $13 to $15 in direct and indirect savings and benefits.[11] This type of investment also fosters economic, social and environmental co-benefits (outlined on Page 17) that strengthen the community. For example, climate action supports ecosystems that provide valuable goods and services that are often not measured in capital frameworks (e.g., protection of habitat important for biodiversity and pollinator species but that doesn't have a traditional monetary value)[12].

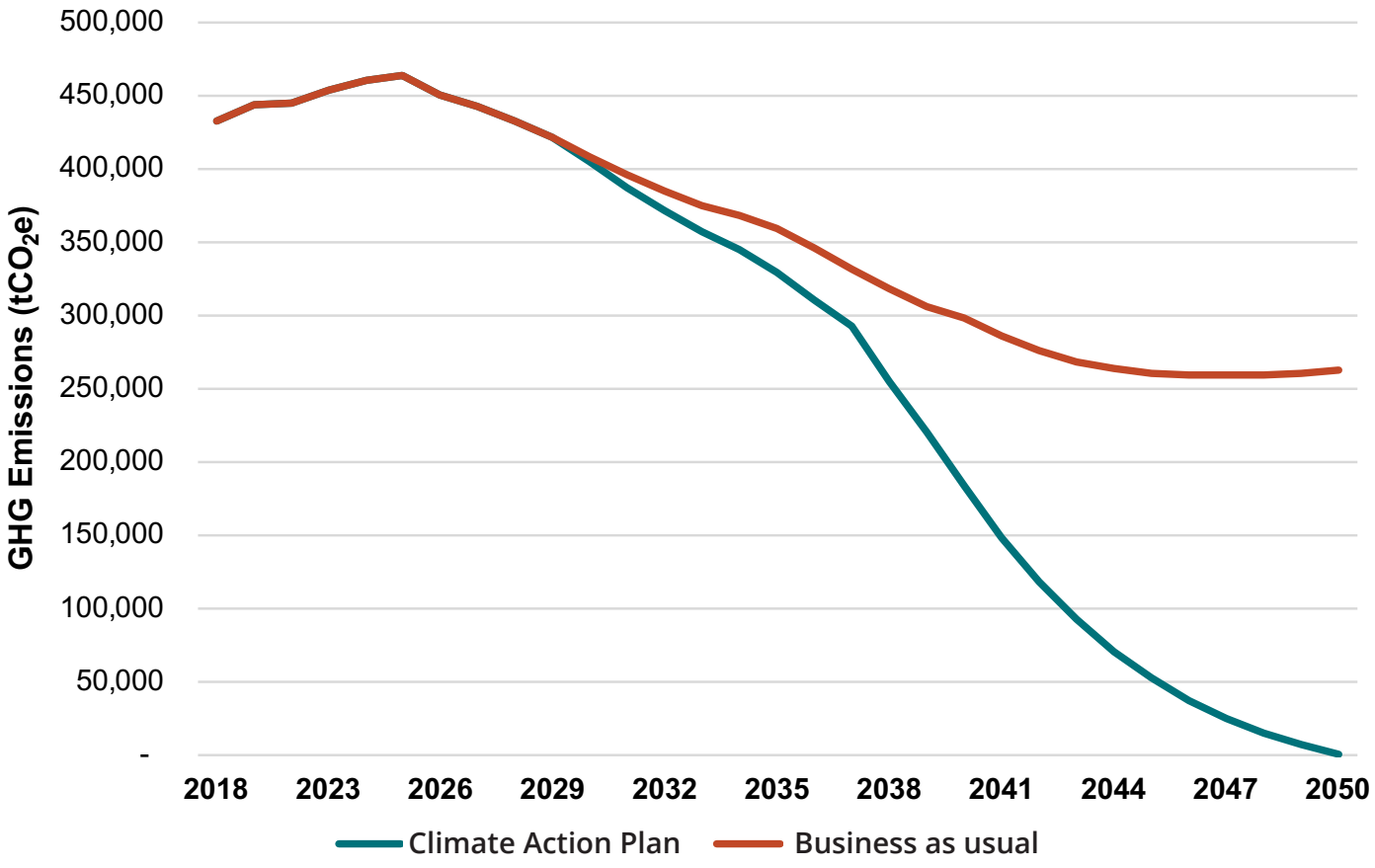

Figure 2 Business As Usual & New Climate Action Targets – Community Scale

WHITEHORSE CLIMATE ACTION PLAN

5. SCOPE OF THE PLAN

The CAP provides an overview of actions that relate to both the Corporation (the City of Whitehorse as a municipal or local government entity) and the community (which encompasses both the Corporation and all its businesses, residents, and their assets).

While the City's authority is primarily limited to assets and processes it owns or directly controls, this CAP emphasizes actions that are directly within the City's power to implement. These **Corporate Actions** represent initiatives that the City can fully manage and execute independently.

In contrast, **Community Actions** often involve stakeholders beyond the City's direct control, such as the Yukon government (YG), First Nation governments, federal agencies, third-party service providers (e.g. utility companies), or private sector industries. While these actions may be influenced by the City, they are generally more difficult to direct or enforce.

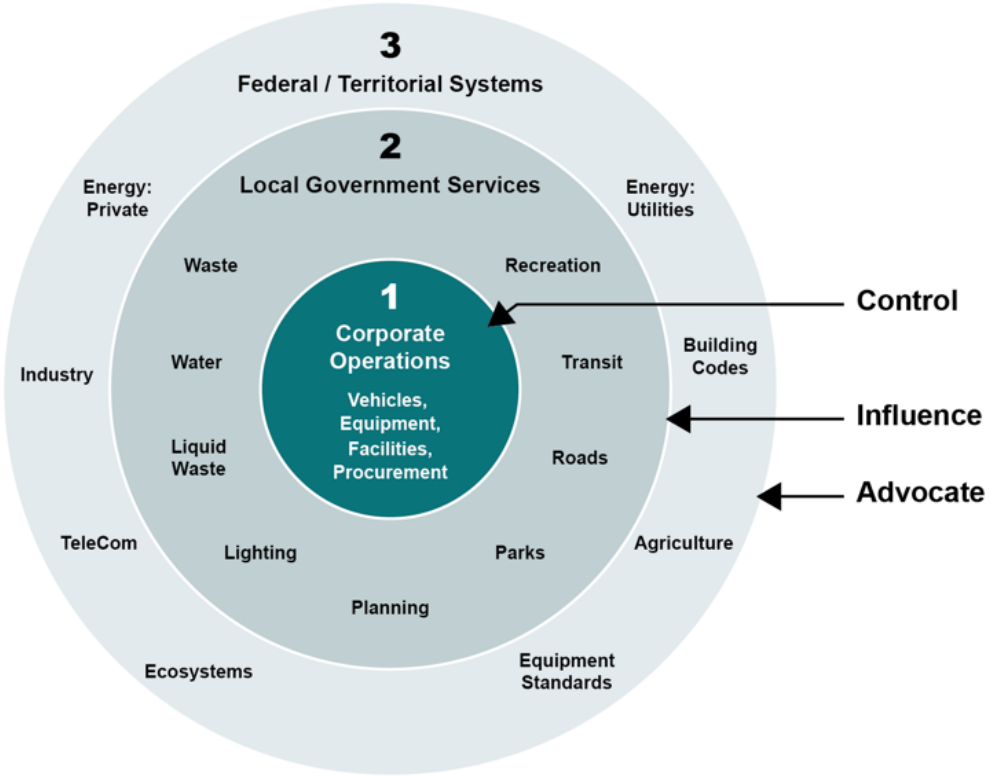

Figure 3 Focus of the Whitehorse Climate Action Plan

6. THE CITY'S ROLE IN CLIMATE ACTION

The City directly manages its own assets to reduce GHG emissions and improve resilience, such as upgrading stormwater systems to reduce flood risks. It also leads by example and partners with the Government of Yukon, the Government of the Ta'an Kwäch'än Council, the Kwanlin Dün First Nation Government, as well as local businesses, institutions, and community organizations to drive change.

Whitehorse's role in climate action is to help the community manage its energy consumption and reduce its contributions to climate change.

While the City of Whitehorse doesn't have full control over all aspects of development, it has significant influence through zoning, bylaws, and advocacy. By setting guidelines for land use, infrastructure, and environmental policies, the City can shape community behavior and support broader initiatives, such as local agriculture and electric vehicle infrastructure.

By leveraging policies, partnerships, and investments, the City can enable climate action while also achieving broader community benefits, including:

- **Better transportation** – shorter commutes and improved active transportation options.
- **Healthier communities** – reduced air pollution and wildfire smoke exposure.
- **Lower costs** – reduced energy and water bills through efficiency.
- **Stronger resilience** – improved infrastructure, disaster preparedness, and community connections.
- **Protected ecosystems** – continued services like water purification, carbon storage, and habitat conservation.

Through the implementation of the CAP the City commits to taking a proactive role as a motivator, a collaborator, a facilitator, a partner, a planner, an instigator, an educator, and a leader. But the City cannot succeed on its own. Residents, businesses, community organizations and institutions also have key roles in helping Whitehorse to be better positioned to prepare for and adapt to the impacts of climate change.

OBJECTIVE

The City has a crucial role to play in significantly reducing its impact on global climate change and in adapting the Whitehorse community to inevitable transformations. This Climate Action Plan integrates efforts to mitigate climate change by substantially reducing greenhouse gas (GHG) emissions by 2050, while also preparing for anticipated climate-related shifts and impacts in the Yukon. The Climate Action Plan serves as both an action plan and a strategic roadmap, outlining specific initiatives that the City will undertake over the next five years to become more resilient to the effects of climate change. As a strategic document, the vision and goals presented provide overarching direction for future decision-making regarding which climate action initiatives to pursue. This strategic vision is essential for evaluating innovative ideas and proposals that may arise in the future, even if they were not fully conceived or developed at the time of this Climate Action Plan. As no plan or strategy can operate in isolation, the Climate Action Plan purposely complements and supports key City plans including the:

Official Community Plan 2040 (2023);

Sustainability Plan 2015 – 2050 (2015);

Transportation Master Plan (2024);

Transit Master Plan (2018);

Emergency Management Plan (2022);

Solid Waste Action Plan (2013); and

Energy Management Plan (2012);

The Climate Action Plan aims to meet the following objectives:

- **Measure:** Define accurate community GHG and energy-use (baselines, modelling, and forecasts) as well as climate resilience metrics to inform all planning and priority decision-making;
- **Plan:** Establish effective plans and implement actions to considerably decrease the City's GHG emissions by 2050 (below 2018 levels) to achieve the necessary level of community resilience to reduce climate related risks across human and natural systems;
- **Mitigate:** Take aggressive and proactive action to tackle the most important GHG mitigation and adaptation priorities and programs;
- **Adapt:** To provide a strategy and action plan to minimize Whitehorse's financial, social, and environmental impacts due to climate change; and
- **Monitor and Improve:** Track progress towards the Climate Action Plan goals and objectives and inform future programs and initiatives.

INITIATIVES UNDERWAY

At the time of this publication, several City plans with key tie-ins to climate action are in the process of being developed and/or modernized (e.g. Zoning Bylaw Rewrite, Stormwater Management Plan, etc.), while others are in various phases of implementation (e.g. *Official Community Plan*, *Transportation Master Plan*, *Emergency Management Plan*, etc.).

These plans contribute greatly to the City's efforts to increase its resiliency to climate change and do so in different ways. Aspects of these plans are reflected in the CAP Actions - their linkages to the CAP will be even more defined at a later date as work is implemented and begins to evolve.

PLANNING TO 2050

The preparation of this Climate Action Plan is the City's next step towards reducing community GHG emissions. It is envisioned that the Climate Action Plan will be updated every five years as approaches and technologies change and each iteration will serve as a guide for the following 5 years.

In addition, an Interdepartmental CAP Working Group will oversee the day-to-day implementation of the CAP and will have the ability to provide recommendations to City leadership throughout the year on the direction of the CAP. This allows the City to consider emerging challenges and opportunities in real time and make proactive tweaks to the Plan to respond accordingly. Many factors will influence the behavior and actions of the Whitehorse community over the next 30+ years – and ultimately the trajectory of the community's GHG emissions. The Climate Action Plan will continuously monitor, assess, and adapt as needed.

[13] Earlier references to the City's efforts to reduce GHGs can be found in the Whitehorse Sustainability Plan: City of Whitehorse. (2015). *Whitehorse sustainability plan.* City of Whitehorse. https://www.whitehorse.ca/wp-content/uploads/2022/05/WSP.pdf

CLIMATE ACTION PLAN STRUCTURE

This Climate Action Plan is structured based on the City's Vision from the OCP, and is supported by 7 pillars, 13 goals, 17 strategies, and a suite of actions. A visual structure of the plan is shown below.

VISION

THE YUKON'S CAPITAL CITY

Whitehorse in 2040 is a vibrant capital city. The City is an inclusive, innovative, entrepreneurial, and resourceful northern community. The growing community is diverse, liveable, and affordable. Whitehorse residents and visitors enjoy access to the land, some of the cleanest air in the country, and opportunities to gather for local, national, and international events.

— City of Whitehorse Official Community Plan

PILLARS

Transportation	Buildings & Infrastructure	Waste & Materials	Natural Assets & Greenspaces	Emergency Management	Community Education & Engagement	Corporate Leadership

GOALS

Transportation	Buildings & Infrastructure	Waste & Materials	Natural Assets & Greenspaces	Emergency Management	Community Education & Engagement	Corporate Leadership
*The City will foster a sustainable, resilient, & efficient urban environment by continuing to enhance transportation safety & accessibility, through the ongoing development & management of transportation infrastructure & policies. *The City will work towards reducing GHG emissions produced by vehicles within City limits.	*Design and upgrade City infrastructure and buildings to account for projected changes in climate conditions, ensuring they have backup power (as applicable), and are energy efficient. *Increase the resiliency of housing.	*Minimize waste generation & promote proper waste source separation & diversion from the landfill.	*Local ecosystems continue to thrive, adapt, & provide critical services.	*Emergency preparedness is integrated in the everyday lives of Whitehorse residents. *The City can quickly and effectively respond to fires and other extreme events. *Recovery efforts following extreme events and disasters are equitable and impactful.	*The Whitehorse community is actively reducing personal GHG emissions through conservation and renewable energy and has taken proactive measures to protect themselves and their communities from the effects of climate change.	*Enhanced communication & collaboration among City departments & external agencies. *Increased partnerships & collaboration with First Nations, not-for-profits, & the Government of Yukon. *Incorporation of climate change considerations across all areas of municipal operations.

STRATEGIES

ACTIONS

CLIMATE ACTION PLAN VISION

The CAP is a plan with a path to 2050 but which will be reviewed and updated accordingly in 2030.

The Vision for the CAP is based on the City's Official Community Plan 2040 (OCP)[14] :

"Whitehorse in 2040 is a vibrant capital city. The City is an inclusive, innovative, entrepreneurial, and resourceful northern community. The growing community is diverse, liveable, and affordable. Whitehorse residents and visitors enjoy access to the land, some of the cleanest air in the country, and opportunities to gather for local, national, and international events.

The City of Whitehorse is committed to providing equitable access to a range of residential, economic, social, cultural, recreational, mobility opportunities, and natural spaces. A vibrant social and cultural scene continues to strengthen the community's social fabric. The City's leadership is recognized across the country for its meaningful and continued efforts towards truth and reconciliation with First Nations, and its actions to mitigate negative impacts and adapt to climate change. The City remains committed to sustainable development and planning for future generations."

Strategies and actions included in this Climate Action Plan have been derived from best practices demonstrated by cities across the globe working to reduce their GHG emissions. Through meetings with government partners, key stakeholder groups, and City staff as well as a community survey, the final suite of strategies and actions includes those with the most support and those that the City is most likely able to accomplish. Strategies and actions also reflect current market forces, such as increases in the number of electric vehicles and in the production of electricity from solar power. The GHG Emissions inventory also accounts for the growth of Whitehorse and its population.

This first version of the Climate Action Plan has a heavier emphasis on strategies and actions that is heavily focused on corporate actions as the City looks forward and works to demonstrate what is possible for the community. Future versions of the plan will work towards actions with more impact upon and more influence from the community.

[14] City of Whitehorse. (n.d.). *Official community plan.* City of Whitehorse. https://www.whitehorse.ca/whitehorse_project/official-community-plan/

Integrating the Reconnection Vision

The Yukon First Nations Climate Action Fellowship's Reconnection Vision emphasizes the need to address the root causes of climate change by healing our relationships with ourselves, each other, and the land. It asserts that the climate crisis is deeply connected to social and mental health challenges, all stemming from a disconnection from nature.

This vision promotes integrating Indigenous knowledge, community-led planning, and regenerative practices to create resilient communities where environmental, social, and economic well-being are interconnected.

By working to incorporate the principles of the Reconnection Vision into the Climate Action Plan, the City of Whitehorse aims to instill a greater sense of empathy and connectivity in the community. It is the City's hope that this will lead to greater social cohesion, environmental stewardship, and overall resilience to the effects of climate change.

CLIMATE ACTION PLAN PILLARS

To help the City move closer to significantly reducing its GHG emissions by 2050 and to increase resilience to the impacts of climate change, the City has identified the following seven pillars (Figure 4).

Figure 4 Climate Action Plan Pillars

CLIMATE ACTION PLAN GOALS & STRATEGIES

For each of the Climate Action Plan Pillars, goal statements have been developed to complement and encapsulate the intent of the goals and policies set out within the City's Official Community Plan (OCP) and the Sustainability Plan. Supporting the goal statements are a series of climate strategies and actions that the City will work to implement over the next 5 years.

KEY DETAILS FOR CONSIDERATION RE: CLIMATE ACTIONS

Each action in the Climate Action Plan has been assessed for its potential costs and benefits to the City.

Potential GHG Impact
Certain actions, when fully implemented, have the potential to lower corporate and/or community GHG emissions. This potential is highlighted for applicable actions.

Co-Benefits
Although the actions described in this Climate Action Plan are mainly mitigation and/or adaptation focused, several actions that reduce GHGs or increase resiliency will be driven by the co-benefits to the broader community and environment. For example, increasing the number of bike lanes results in only small GHG reductions, but has numerous co-benefits. These include reducing air pollution, increasing health and well-being, improving the livability and sustainability of Whitehorse, and reducing the indirect impacts to water ways through a reduction in non-point source pollution. The following are potential co-benefits each action could provide to the City and the Whitehorse community.

- High potential to support jobs and prosperity
- High potential to advance equity
- High potential to improve the resilience of the natural environment
- High potential to improve health and wellbeing
- High potential to reduce the consequences of climate impacts

Department Leads
To assist with implementation and accountability, City departments have been assigned to each of the actions identified. The lead department is responsible for initiating the implementation of the action and reporting on progress.

Timelines
This Climate Action Plan outlines actions to be considered to 2030. Some of the actions are underway whereas others will require time to plan and implement. The following timelines are used to indicate the timing / phase to which the action will be completed.

- Ongoing
- Initiate by 2026
- Initiate by 2028
- Initiate by 2030

Financial Resources Required
For each of the actions, an estimated level of effort is provided to help with financial and resource planning. These are as follows:

- Staff Time (High, Medium, Low)
- $0–$20,000
- $20,000–$100,000
- $100,000–$500,000
- Over $500,000

All actions included in the Climate Action Plan are subject to funding.

1. TRANSPORTATION

Goals:

- The City will foster a sustainable, resilient, and efficient urban environment by continuing to enhance transportation safety and accessibility, through the ongoing development and management of transportation infrastructure and policies.
- The City will work towards reducing GHG emissions produced by vehicles within city limits.

Community transportation is closely tied to land use planning. How urban areas are designed influences how people travel and the distances they must cover to reach work, school, and other destinations. This, in turn, impacts greenhouse gas (GHG) emissions generated by transportation.

To help make the transportation system more resilient to climate change, strategies include using heat- and weather-resistant materials, incorporating climate vulnerability into infrastructure planning, and mapping climate risks to communities and infrastructure. Reducing GHG emissions involves fewer fossil fuel-powered trips, improving access to public and active transportation, promoting carpooling, adopting zero-emission vehicles, and encouraging compact development.

Technology also plays a vital role, with low-carbon fuels, vehicle efficiency improvements, and vehicle electrification leading to lower emissions.

Geography, seasonality, safety, and accessibility all play a key role in determining transportation preferences. Compact transportation corridors —where residential areas are near workplaces and retail—promote higher rates of walking, cycling, and transit use. Investing in pedestrian and cycling infrastructure in ways that help enhance year-round functionality, reduces reliance on vehicles, particularly for shorter trips.

Ensuring that public transit and active transportation networks are safe and accessible is critical and will be increasingly important as the population grows. These measures will make transportation more sustainable, equitable, and efficient for everyone.

In alignment with this, the City has identified the following climate action strategies:

1.1 Improve accessibility to transit and active transportation options.

1.2 Enhance operations and maintenance procedures for High importance transportation infrastructure.

1.3 Enhance safety for active commuters.

1.4 Reduce transportation related GHG emissions.

1.1. Improve accessibility to transit and active transportation options

By enhancing transit services and increasing the infrastructure and supports needed to make active transportation more accessible, the City can reduce its reliance on cars, cutting down on GHG emissions and fostering a more vibrant community.

Table 1 Improve accessibility to transit and active transportation options - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
1.1.1	Continue to enhance public transportation by adding service options and improving the rider experience.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing	Transit (Lead) Fleet & Transportation Maintenance (Support)	Ongoing	Staff Time $TBD (Project Specific)
1.1.2	Improve Transit service between the Whistle Bend-Porter Creek-2nd Ave corridor.	Potential Co-Benefits: GHG Reduction; Equity	Transit (Lead) Engineering (Support)	Initiate by 2028	Staff Time $3 million (as per the TMP)
1.1.3	Increase the number of covered bus shelters.	Potential Co-Benefits: Equity; Health & Wellbeing; Reduce the consequences of climate impacts	Transit (Lead) Fleet & Transportation Maintenance (Support) Engineering (Support)	Ongoing	Staff Time $100k-$500k
1.1.4	Use Zoning regulations or incentives to support active transportation City-wide, by incorporating the following into residential and commercial building developments: • Ample, well-designed, secure, and weather protected bicycle parking in residential developments and places of employment. • E-bike charging stations (likely integrated with the bicycle parking) • End-of-trip-facilities (ideas to consider: lockers, showers/change rooms, etc.).	Potential Co-Benefits: GHG Reduction; Health & Wellbeing	Planning & Sustainability (Lead) Land & Development (Support)	Initiate by 2026	Staff Time
1.1.5	Make investments to improve end-of-trip active transportation infrastructure by continuing the Request a Rack program and identifying strategic locations for emergency bike repair stations, signage, and shelters.	Potential Co-Benefits: GHG Reduction; Health & Wellbeing	Parks (Lead) Engineering (Support) Fleet & Transportation Maintenance (Support)	Ongoing	Staff Time (Medium) 0-$20k
1.1.6	Develop a wayfinding plan for well-marked routes to key buildings/facilities from the street/active transportation network. *Budget approved in 2024	Potential Co-Benefits: GHG Reduction; Health & Wellbeing	Economic Development (Lead) Planning & Sustainability (Support)	Ongoing	Staff Time $20k-$100k
1.1.7	Improve the impact of active transportation and transit ridership campaigns (e.g. Active Commute Program, Active Transportation-Transit Safety Education).	Potential Co-Benefits: GHG Reduction; Health & Wellbeing	Planning & Sustainability (Lead) Various Departments (Support)	Ongoing	Staff Time

1.2 Enhance Operations & Maintenance procedures for high importance transportation infrastructure

Critical transportation systems are vital to the functioning of the City and the economy especially when there is an emergency or environmental disaster. However, due to its exposure to the impacts of climate change, the City's transportation systems are at a heightened risk to changes in future climate. To safeguard public safety, prevent disruptions, and ensure its resilience, it is imperative to conduct comprehensive vulnerability and risk assessments on critical infrastructure components and to implement more frequent inspections post-extreme weather events. To enhance operations and maintenance procedures for high importance transportation infrastructure (ie. bridges, roads, culverts, etc.), the following actions are proposed:

Table 2 Enhance Operations & Maintenance procedures for high-importance transportation infrastructure – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
1.2.1	Work with YG to identify high importance transportation infrastructure that requires government-to-government collaboration to effectively operate and maintain, and to create joint protocols to guide coordination of these efforts.	Potential Co-Benefits: Reduce consequences of climate impacts	Engineering (Lead) Fleet & Transportation Maintenance (Support) Emergency Management (Support)	Initiate by 2028	Staff Time
1.2.2	Update City procedures for inspecting high importance transportation infrastructure to address climate change impacts. These procedures should focus on identifying climate-related stress, damage, or blockages and prioritize repairs based on the increasing effects of climate change (e.g. Enhanced O&M on Robert Service Way: lock blocks, cones, slope scanner, camera, tensiometers, inspections, surveys, risk assessment, TARP to inform escarpment actions such as the need to shift lanes, etc.).	Potential Co-Benefits: Improve the resilience of the natural environment	Engineering (Lead) Emergency Management (Support)	Initiate by 2028	Staff Time
1.2.3	Track weather related trends and costs over time (e.g. potholes, increased snow clearing) and review budgets accordingly.	Potential Co-Benefits: Improve the resilience of the natural environment	Planning & Sustainability (Lead) Corporate Services-Asset Management (Support)	Initiate by 2028	Staff Time

Recognizing again that not all transportation assets are within the City's control, there is a need for multi-jurisdictional planning and coordination to support long-term resilience goals.

1.3 Enhance safety for active commuters

Enhancing safety for active commuters encourages more people of all ages to choose sustainable modes of transportation like walking and cycling. Safe, accessible active transportation networks not only support environmental goals but also promote social equity and physical well-being, making it easier for residents to adopt lower-carbon lifestyles.

Table 3 Enhance safety for active commuters - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
1.3.1	Conduct a safety audit of high-use active commute trails in areas with active transportation infrastructure to determine if streetlights need to be installed to ensure a safe level of visibility and which areas should receive priority funding allocation. Streetlights that are installed should use light emitting diode (LED) illumination bulbs that are dark-sky compliant.	Potential Co-Benefits: GHG Reduction; Health & Wellbeing	Engineering (Lead) Fleet & Transportation Maintenance (Support) Parks (Support)	Initiate by 2028	Staff Time $TBD (Project Specific)
1.3.2	Continue to build and improve the active transportation infrastructure network and implement relevant safety measures (e.g. protected lanes, improved signage and safety mirrors at high traffic points, etc.) that encourage the shift to active transportation modes year-round.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Jobs & Prosperity	Engineering (Lead) Fleet & Transportation Maintenance (Support) Parks (Support)	Ongoing	Staff Time (High) $TBD (Project Specific)

1.4 Reduce transportation-related GHG emissions

By expanding the active transportation network, increasing the efficiency of the transit system, and encouraging compact community development through land use planning, the City can support more commuting options for its residents and significantly reduce the amount of GHGs that are emitted from vehicles. Subsequently, the City can help reduce community GHGs attributed to transportation by taking steps to discourage single-occupancy vehicle trips through an effective mix of incentives and disincentives (ie. increased parking costs, more infrastructure to support active transportation, etc.).

The City can also mitigate the GHG emissions being produced by its own vehicles. No single measure – such as the procurement of electric vehicles – can reduce fleet GHG emissions to net zero, however, a suite of strategies and actions can put the City on a path towards more aggressive fuel switching and GHG reductions. Having a diverse fleet of vehicles using various fuel sources will also increase the corporation's climate resilience in the face of future fuel shortages or power outages.

Table 4 Reduce transportation-related GHG emissions - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
1.4.1	As non-emergency light to medium duty fleet vehicles reach their end of life, replace them with corporate electric vehicles (including Plug-In Hybrid and hybrid technologies) and e-bikes.	Potential Co-Benefits: GHG Reduction	Fleet & Transportation Maintenance (Lead)	Ongoing	Staff Time $100k-$500k
1.4.2	Explore opportunities to partner with manufacturers to pilot new technologies.	Potential Co-Benefits: GHG Reduction	Fleet & Transportation Maintenance (Lead) Transit (Support)	Initiate by 2030	Staff Time
1.4.3	Continue to seek out best practices from other municipalities and commercial operators who may have been early adopters of electric vehicle units.	Potential Co-Benefits: GHG Reduction	Fleet & Transportation Maintenance (Lead); Planning & Sustainability (Support)	Ongoing	Staff Time
1.4.4	Continue to increase the City's EV charging capacity and install EV infrastructure at all relevant City buildings & facilities - for City vehicles.	Potential Co-Benefits: GHG Reduction	Property Management (Lead) Fleet & Transportation Maintenance (Support)	Ongoing	Staff Time (Medium) $100k-$500k
1.4.5	Consider changes to the site design and parking regulations of the Zoning Bylaw to support Electric Vehicles and charging stations.	Potential Co-Benefits: GHG Reduction	Planning & Sustainability (Lead)	Initiate by 2026	Staff Time
1.4.6	Develop a plan for City buses that reviews opportunities for de-carbonization. *Budget approved in 2024	Potential Co-Benefits: GHG Reduction	Transit (Lead) Fleet & Transportation Maintenance (Support) Property Management (Support)	Ongoing	Staff Time $TBD

2. BUILDINGS & INFRASTRUCTURE

Goals:

- Design and upgrade City infrastructure and buildings to account for projected changes in climate conditions, ensuring they have backup power (as applicable), and are energy efficient.
- Increase the resiliency of housing.

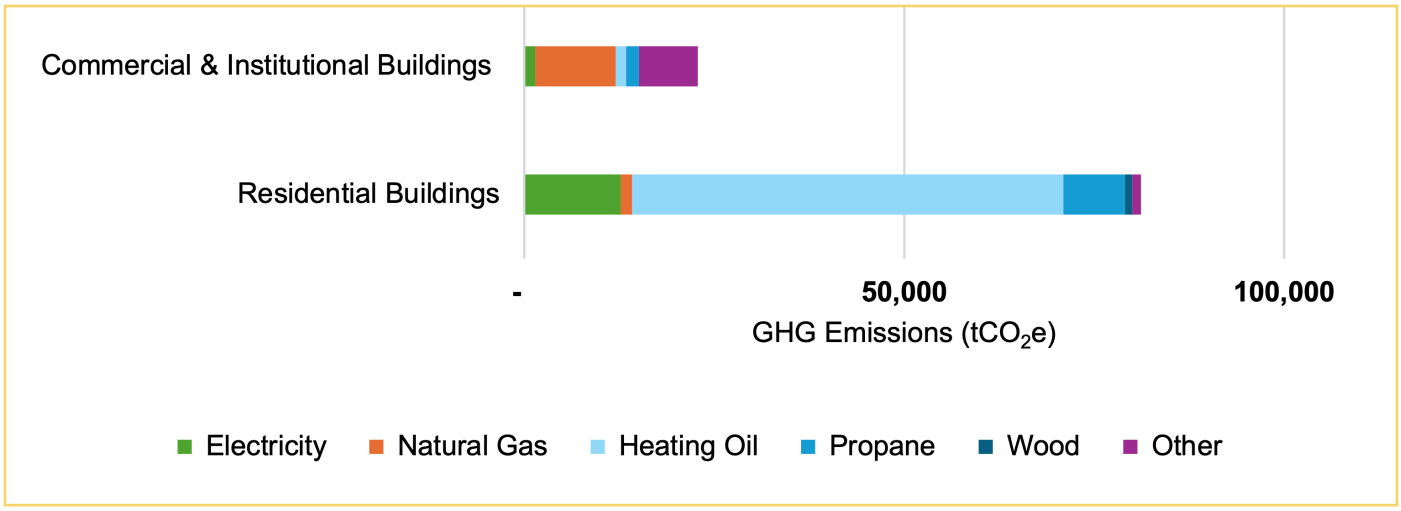

Figure 5 GHG Emissions from buildings in Whitehorse

As of 2021, approximately half of dwellings in Whitehorse are detached homes, while the remaining dwellings are a mix of apartments, semi-detached homes, and row houses[15]. The largest proportion of community GHG emissions come from residential buildings that use propane, wood, and heating oil as energy sources. (Figure 5). Many buildings still rely on oil furnaces, which produce significant GHG emissions.

Aging building conditions also contribute to poor energy performance and tend to be more vulnerable to the impacts of climate change. The majority of Whitehorse's current building stock was built in accordance with past building codes before any energy efficiency requirements existed (i.e., before 1990). The climate has changed since this time. While newer buildings are designed and constructed in accordance with the latest *National Building Code* and the City of Whitehorse's *Building and Plumbing Bylaw* which have led to greater energy efficiency, they too are exposed and at risk to the impacts of climate change. Because buildings last for many decades, most of the buildings in Whitehorse being constructed today will still be in operation in 2050. This means that if existing buildings can affordably and feasibly be retrofitted to improve heat and energy efficiency, it can substantially reduce overall community GHG emissions and increase resilience to the impacts of climate change.

To reduce GHG emissions and increase resilience of buildings in Whitehorse, the City has identified the following climate action strategies:

2.1. Reduce the City's building GHG emissions footprint.

2.2. Enhance the sustainability and resiliency of housing and neighbourhoods through City plans, policies, and infrastructure.

[15] RCAN Profile table, Census Profile, 2021 Census of Population - Whitehorse, City (CY) [Census subdivision], Yukon (statcan.gc.ca)

2.1. Reduce the City's building GHG emissions footprint

To encourage building owners in the community to upgrade their buildings to be low-carbon and/or net-zero, the City will take a leadership role and implement several actions to reduce energy and GHG emissions within its own building stock.

Table 5 Reduce the City's building GHG emissions footprint - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
2.1.1	Explore the use of widely accredited practices in infrastructure and planning such as the Northern Infrastructure Standardization Initiative (NISI) guidelines when considering City developments.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Engineering (Lead) Planning & Sustainability (Support)	Initiate by 2028	Staff Time
2.1.2	Update City building asset management plans and policies to include the objective of investing in and upgrading assets to mitigate and adapt to climate change.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Property Management (Lead) Corporate Services-Asset Management (Support)	Ongoing	Staff Time (Medium) $20k-$100k
2.1.3	Complete building condition assessments and American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Level III energy audits on all major City buildings and facilities.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Property Management (Lead)	Initiate by 2028	Staff Time (High) +$500k (total)
2.1.4	Develop a plan for all major City buildings and facilities that reviews opportunities for de-carbonization.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Property Management (Lead)	Initiate by 2030	Staff Time (Medium) $100k-$500k (total)
2.1.5	Explore funding sources to increase resources and staff capacity for conducting Building Condition Assessments (BCAs) on all major City buildings and facilities.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Property Management (Lead) Strategic Funding (Support)	Ongoing	Staff Time
2.1.6	Continually incorporate and improve climate adjusted design criteria for the construction or renovation of City assets and infrastructure as well as new residential developments.	Potential Co-Benefits: GHG Reduction; Improve the resilience of the natural environment; Reduce the consequences of climate impacts	Property Management; Engineering (Co-Leads); Water & Waste (Support) Planning & Sustainability (Support)	Ongoing	Staff Time (High) $100k-$500k (total)

2.2. Enhance the sustainability and resiliency of housing and neighbourhoods through City plans, policies, and infrastructure

By integrating climate sustainability and resilience into City plans, policies, and infrastructure, the City will work towards ensuring that homes and neighbourhoods can withstand changing environmental conditions and continue to support safe and reliable shelters for residents. These efforts will focus on improving building standards, supporting adaptive design, and ensuring that housing development is aligned with long-term climate goals.

Table 6 Enhance the sustainability and resiliency of housing and neighbourhoods through City plans, policies, and infrastructure - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
2.2.1	Designate geo-hazard areas as no-build zones or limit construction with specific conditions. This includes areas at risk of landslides along bluffs, flood-prone zones, and fire at/near the crest of slopes.	Potential Co-Benefits: Reduce the consequences of climate impacts	Planning & Sustainability (Lead) Engineering (Support)	Initiate by 2026	Staff Time
2.2.2	Work with the business community to foster affordable and accessible supply chains that support fire-resistant development.	Potential Co-Benefits: Reduce the consequences of climate impacts	Parks - FireSmart (Lead) Economic Development (Support)	Ongoing	Staff Time
2.2.3	Review City plans, policies, bylaws, and programs to support increased density and complete communities.	Potential Co-Benefits: GHG Reduction; Equity; Jobs & Prosperity; Reduce the consequences of climate impacts	Planning & Sustainability (Lead) Policy Development (Support) Various Departments (Supports)	Ongoing	Staff Time
2.2.4	Review and consider CSA wildfire resilient neighbourhood design and community drainage guidelines for new neighbourhoods	Potential Co-Benefits: Reduce the consequences of climate impacts	Planning & Sustainability (Lead) Engineering (Support) Parks-FireSmart (Support)	Initiate by 2028	Staff Time

3. WASTE & MATERIALS

Goal: Minimize waste generation and promote proper waste source separation and diversion from the landfill

To alleviate the strain on the City's landfill, the City must reduce waste generation. This entails designing or utilizing discarded materials—such as food waste, electronics, and clothing—as inputs for other processes, embracing the principles of the circular economy (see facing page). As the City's population grows, additional practices to minimize waste during product purchase, use, and disposal will need to be implemented. Corporate composting of organic waste and reducing food waste is vital to lowering GHG emissions while adhering to circular economy principles.

Further opportunities lie in transforming consumer and business behaviors and implementing better design and planning. In parallel with these initiatives, the City will also need to increase the resilience of these systems to the effects of climate change.

As it relates to reducing waste related GHG emissions, while increasing resilience, the following climate action strategies have been established:

3.1. Reduce GHG emissions from the Waste Management Facility.

3.2. Increase the resilience of the solid waste infrastructure system.

What is the Circular Economy?

Instead of the 'take, make and dispose' model typically used for producing goods, a circular economy approach reduces waste and avoids pollution by maximizing design and use of materials. Reducing production materials and waste materials is now a financial benefit[16].

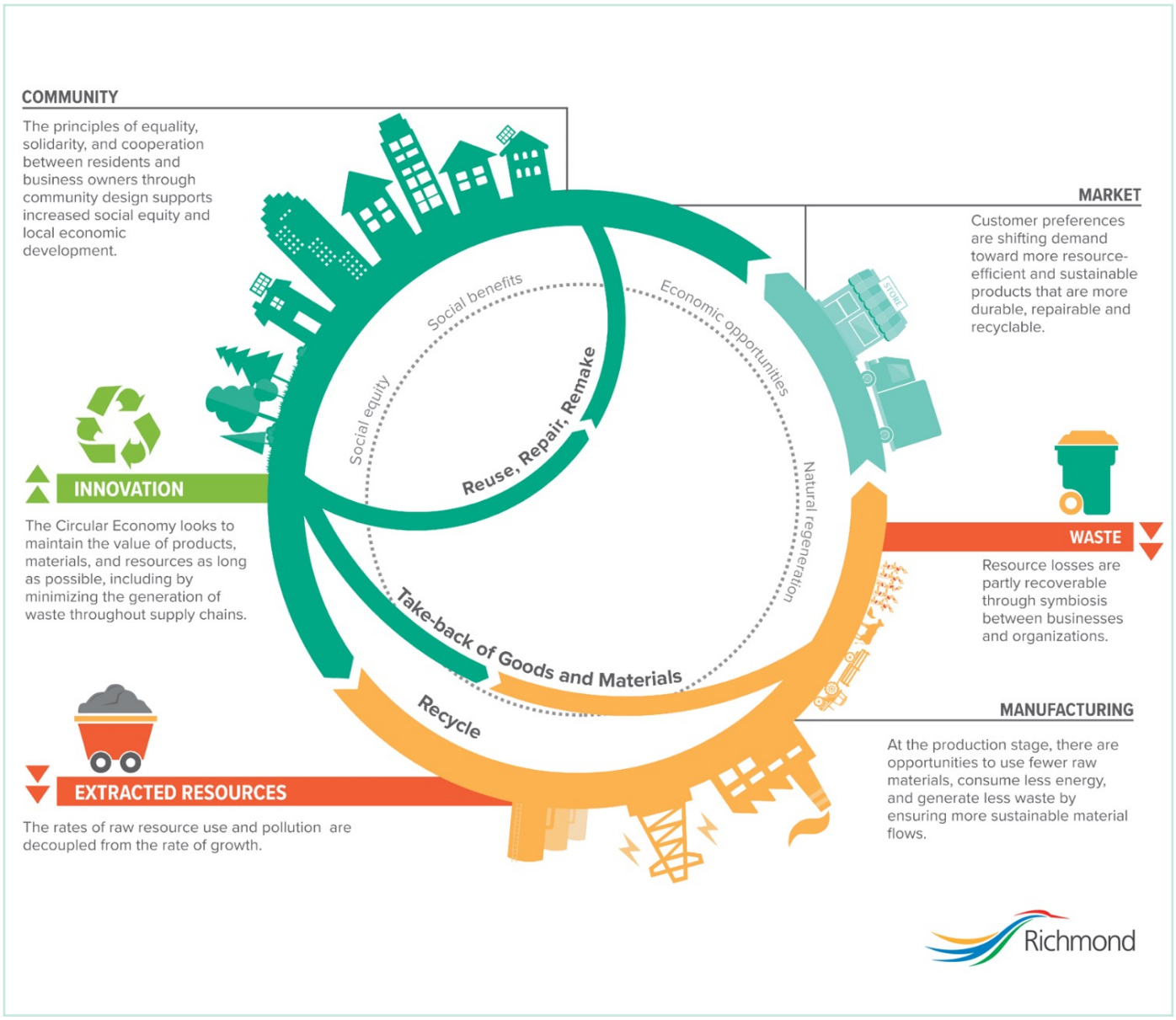

Figure 6 Explanation of the Circular Economy

[16] City of Richmond. (n.d.). *Circular economy.* City of Richmond. https://www.richmond.ca/sustainability/circulareconomy.htm

3.1. Reduce GHG emissions from the Waste Management Facility

Reducing the amount of waste created is a critical first step to reduce the burden on the landfill and reducing GHG emissions. Since the Waste Management Facility has been active for many years, the bulk of the community's GHG emissions currently stem from the breakdown of organic materials in the landfill. The following actions seek to reduce waste from entering the landfill and reduce GHG emissions related to the Waste Management Facility.

Table 7 Reduce GHG emissions from the Waste Management Facility - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
3.1.1	Consult with private industry and City departments and develop a Sustainable Development Checklist for developers which includes a source separation plan for waste produced from demolition, land clearing and construction activities.	Potential Co-Benefits: GHG Reduction; Improve the resilience of the natural environment	Land & Development (Lead) Water & Waste (Support) Economic Development (Support)	Initiate by 2028	Staff Time (Medium)
3.1.2	Explore the use of community-based social marketing (CBSM) to improve outreach of campaigns focused on waste reduction.	Potential Co-Benefits: GHG Reduction; Improve the resilience of the natural environment	Water & Waste (Lead) Planning & Sustainability (Support)	Initiate by 2028	Staff Time (Low)
3.1.3	Complete a Landfill Gas Assessment and review findings. Evaluate best practices implemented in comparable municipalities to minimize emissions within landfill sites.	Potential Co-Benefits: GHG Reduction; Improve the resilience of the natural environment	Water & Waste (Lead)	Initiate by 2026	Staff Time $20k-$100k
3.1.4	Continue to support the implementation of Extended Producer Responsibility (EPR) regulations and promote services that support recycling and diversion of paper, packaging and hazardous special products to ensure these materials are diverted from the landfill to the greatest extent feasible.	Potential Co-Benefits: GHG Reduction; Improve the resilience of the natural environment	Water & Waste (Lead)	Ongoing	Staff Time (Medium) $20-$100k

3.2. Increase the resilience of the solid waste infrastructure system

Landfills tend to be at risk and exposed to climate related impacts both directly and indirectly. Direct impacts like precipitation and extreme heat can result in increased site management, increased risk of fires, damage and failure of electrical equipment. Extreme rainfall can result in a large volume of landfill leachate being generated which can overwhelm the current treatment systems.

Indirect impacts tend to be related to the volume of waste generated in the community because of an environmental disaster. If no plan or strategy is in place for such an event, the management of the solid waste system can be compromised and result in other issues. To increase the resilience of the solid waste infrastructure system, the following actions are proposed.

Table 8 Increase the resilience of the solid waste infrastructure system – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
3.2.1	Develop a plan to handle and divert post-disaster event waste and to adapt to climate change (e.g. wildfire in Riverdale resulting in large scale clean-up of debris).	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Water & Waste (Lead) Emergency Management (Support)	Initiate by 2028	Staff Time 0-$20k
3.2.2	Complete an engineering level climate vulnerability and risk assessment on the landfill containment systems and implement the recommendations.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Engineering (Lead) Water & Waste (Support)	Initiate by 2030	Staff Time 0-$20k

4. NATURAL ASSETS & GREENSPACES

Goal: Local ecosystems continue to thrive, adapt, and provide critical services.

Natural assets are natural resources and/or ecosystems that contribute to health, well-being and long-term sustainability of Whitehorse and its residents. These include urban trees and forests, wetlands, water bodies, and wilderness corridors, which can act as carbon sinks, help prevent flooding and act as habitats and means for travel for native wildlife.

Reducing the risk of climate related impacts to natural assets requires re-thinking how cities are planned, constructed, and renovated / retrofitted and a mind-set that the climate risks cannot be defeated,

but rather accepted and mitigated as much as possible. Many cities are now recognizing the importance of protecting and rehabilitating existing ecosystems. They are incorporating natural assets into infrastructure projects, and are recognizing the value of natural assets in accounting and capital planning frameworks, given the ability of these systems to capture GHG emissions and subsequently help to advance GHG reduction.

Investments in green infrastructure (nature-based drainage and support structures such as trees and wetlands) can at times be used to replace grey infrastructure (conventional infrastructure such as concrete culverts and barriers) and provide both ecosystem and GHG sequestration benefits.

To be able to recognize the benefits from these systems, and to properly account and manage them in such a manner to maximize their co-benefits, the City has established the following climate action strategies:

4.1 Improve the protection, management, and conservation of water

4.2 Develop plans and policies for natural asset management to increase spread of natural areas and green infrastructure

4.1. Improve the protection, management, and conservation of water

Water is among the City's most valuable natural assets, but climate change poses a risk to both its quality and quantity. As weather patterns shift – bringing more intense rainstorms, longer dry spells, and rising temperatures – our water systems, including wastewater, stormwater, and drinking water, can face greater risks of flooding, contamination, and shortages. Protecting, managing, and conserving water are proactive measures to help mitigate these risks, which in turn helps make communities safer, improves the quality of life, and promotes biodiversity. To support this approach, the following actions are suggested.

Table 9 Improve the protection, management, and conservation of water – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
4.1.1	Continue incorporating climate change considerations and climate adaptation best practices into the Stormwater Management Plan (e.g. guidelines for green stormwater projects, recommendations for green roofs, updated landscaping rules, and plans for environmental restoration) to improve water detention/retention, conveyance, and ground permeability and reduce maintenance requirements for both new and existing developments within the City.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Engineering (Lead) Water & Waste (Support)	Ongoing	Staff Time
4.1.2	Explore incorporating green stormwater management principles into the site design requirements of the Zoning Bylaw.	Potential Co-Benefits: Improve the resilience of the natural environment	Planning & Sustainability (Lead)	Initiate by 2026	Staff Time
4.1.3	Upgrade water meters on commercial and multi-residential properties.	Potential Co-Benefits: Improve the resilience of the natural environment	Water & Waste (Lead)	Initiate by 2026	Staff Time +$500k
4.1.4	Consider the feasibility of implementing a residential water metering program.	Potential Co-Benefits: Improve the resilience of the natural environment	Water & Waste (Lead)	Initiate by 2026	Staff Time $20k-$100k
4.1.5	Explore opportunities for enhancing the resiliency of the City's water supply and quality (e.g. protecting the aquifer from contamination, upgrading wastewater treatment processes, protecting wetlands, etc.).	Potential Co-Benefits: Equity; Health & Wellbeing; Improve the resilience of the natural environment	Water & Waste (Lead) Planning & Sustainability (Support)	Ongoing	Staff Time

4.2. Develop plans and policies for natural asset management to increase spread of natural areas and green infrastructure

To be able to increase the amount of natural areas and green infrastructure, the City will first need to measure these systems and then seek opportunities to increase protected areas as new developments and infill development occurs. To support these initiatives, it will be important for the City to measure and recognize the benefits from these systems, and to properly account and manage them in such a manner to maximize the co-benefits. To support this strategy, the following actions are proposed:

Table 10 Develop plans and policies for natural asset management to increase spread of natural areas and green infrastructure – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
4.2.1	Implement natural asset management planning to identify, value and preserve natural assets and green infrastructure on public property.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Parks-FireSmart (Lead) Planning & Sustainability (Support)	Initiate by 2030	Staff Time $20k-$100k
4.2.2	Look for opportunities to increase native species of trees to reduce wildfire risk and increase riparian vegetation and appropriate native species to enhance the City's resiliency to erosion and flood risk.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Parks (Lead) Engineering (Support)	Ongoing	Staff Time
4.2.3	Conduct a neighborhood level analysis of parks, greenspaces, and other natural assets to understand baseline data (e.g. recreational opportunities, community access, heat islands, demands on stormwater), and set and monitor targets.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Parks-FireSmart (Lead) Planning & Sustainability (Support)	Initiate by 2028	Staff Time $100k-$500k
4.2.4	Look for opportunities to incorporate climate change considerations and climate adaptation best practices into regional park management plans within the City (e.g. Chasan Chua) to support biodiversity and improve resiliency to climate change impacts by preserving, conserving, and restoring natural areas and water quality, reducing GHG emissions, and increasing education, outreach, and environmental stewardship.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Parks (Lead) Planning & Sustainability (Support)	Ongoing	Staff Time

5. EMERGENCY MANAGEMENT

Goals:

- Emergency preparedness is integrated in the everyday lives of Whitehorse residents.
- The City can quickly and effectively respond to fires and other extreme events.
- Recovery efforts following extreme events and disasters are equitable and impactful.

As climate-related events become more frequent and severe, emergency management becomes increasingly crucial. Over the past decade, Whitehorse has witnessed rising average temperatures,

increased precipitation, and extreme weather phenomena. Given the accelerated pace of climatic changes and the growing frequency of extreme events, it is imperative to establish robust emergency response systems capable of swift and effective action. These systems should provide essential resources and support to the community and vulnerable populations.

Climate readiness extends to the community level, involving mitigation, preparedness, response, and recovery in the face of climate-related disasters.

As referenced in Section 12.2 of the City's *Official Community Plan* (OCP), the City and its partners have been proactively working to incorporate climate change considerations into emergency management with the objective to reduce the effects of climate change. To further support this work, the City has established the following climate action strategies:

5.1 Continue advancing wildfire risk reduction to improve wildfire protection, prevention, and preparedness and to help mitigate wildfire risk

5.2 Review and increase the City's capacity to maintain services during emergencies

5.1. Continue advancing wildfire risk reduction strategies to improve wildfire protection and preparedness, and to help reduce wildfire risk

The risk posed by wildfires to the city is anticipated to escalate in the coming decades due to ongoing development and the impacts of climate change. While it is impossible to eliminate the risk of wildfires, the City can take proactive measures to mitigate the impact of wildfires to the community.

Table 11 Continue advancing wildfire risk reduction strategies to improve wildfire protection and preparedness, and to help reduce wildfire risk – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
5.1.1	Enhance support of community FireSmarting by empowering residents through incentives and education to FireSmart their properties.	Parks-FireSmart (Lead)	Parks-FireSmart (Lead) Planning & Sustainability (Support)	Ongoing	Staff Time $0-$20k
5.1.2	Ensure new developments use fire resilient materials and incorporate adequate egress routes.	Potential Co-Benefits: Reduce the consequences of climate impacts	Parks - FireSmart (Lead) Building Services (Support) Planning & Sustainability (Support)	Initiate by 2028	Staff Time $20k-$100k *External Funding may be available
5.1.3	Conduct policy review of allowing residents to FireSmart green space adjacent to their property.	Potential Co-Benefits: Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Parks (Lead) Policy (Support)	Initiate by 2028	Staff Time (Medium)
5.1.4	Develop a Community Wildfire Protection Plan (CWPP). This would include: • Integration of the risk reduction activities outlined in the 2002 Fuel Management Plan to proactively reduce fuel load on public lands within 30m of residences. • Inclusion of the fuel reduction buffer around new developments (residential, commercial, and industrial) as recommended by the 2019 Risk Reduction Strategy, 2006 Whitehorse West Fuel Management Plan, and 2002 Fuel Management Plan.	Potential Co-Benefits: Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Emergency Management (Lead) Various Departments (Support)	Initiate by 2028	Staff Time (High) $20k-$100k Various departments
5.1.5	Maintain a permanent FireSmart Program This includes: • A continuation of the FireSmart Education program • Continuing to develop and support community FireSmart champions • Remove fuel in City greenspaces, with a focus on City critical infrastructure *Position approved in 2025 Budget	Potential Co-Benefits: Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Parks (Lead) Various Departments (Support)	Ongoing	Staff Time (High) $100k-$500k

5.2. Review and increase the City's capacity to maintain services during emergencies

While it is impossible to eliminate the risks and consequences of climate change, the City can enhance its preparedness and response mechanisms (e.g., increasing backup power, cross training staff, additional communication systems, etc.) to mitigate impacts and expedite recovery during climate-related emergencies, by implementing the following actions:

Table 12 Review and increase the City's capacity to maintain services during emergencies - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
5.2.1	Complete assessments on critical infrastructure and asset management plans.	Potential Co-Benefits: Reduce the consequences of climate impacts	Emergency Management (Lead) Corporate Services-Asset Management (Support) Property Management (Support)	Initiate by 2026 Complete by 2028	Staff Time (Medium)
5.2.2	Integrate emergency planning into City department protocols and update business continuity plans to reflect the risks and impacts of climate change (e.g. develop safe work practices to work in geohazard zones, update systems and procedures to better response to landslide events, etc.).	Potential Co-Benefits: Reduce the consequences of climate impacts	Emergency Management (Lead) All departments (Support)	Initiate by 2026 Complete by 2030	Staff Time (Low)
5.2.3	Develop a plan to prioritize and distribute fuel for City-owned backup generators and critical equipment (buses, large diesel equipment, etc.) during power outages.	Potential Co-Benefits: Reduce the consequences of climate impacts	Property Management (Lead)	Initiate by 2028	Staff Time (Low) $20k-$100k (total)
5.2.4	Continue to develop public education materials on emergency preparedness and planning (e.g. emergency kits, accessibility to warming/cooling/fresh air centres).	Potential Co-Benefits: Equity; Health & Wellbeing; Reduce the consequences of climate impacts	Emergency Management (Lead)	Ongoing	Staff Time (Low)
5.2.5	Continue to work with other Yukon communities and Yukon Government to ensure that the City has capacity to serve as a reception and/or lodging for non-City residents who may become displaced due to emergencies in other parts of the territory.	Potential Co-Benefits: Equity; Health & Wellbeing; Reduce the consequences of climate impacts	Emergency Management (Lead) Recreation (Support)	Ongoing	Staff Time (Low) $0-$20k (total)
5.2.6	Ensure drinking water fountains are available in high traffic locations throughout the city in times of extreme heat.	Potential Co-Benefits: Equity; Health & Wellbeing; Reduce the consequences of climate impacts	Emergency Management (Lead) Property Management (Support)	Initiate by 2028	Staff Time (Low) $0-$20k
5.2.7	Increase and monitor the capacity of high importance transportation infrastructure to maintain services during emergencies (e.g. DMAF funding secured for capital project to upgrade Robert Service Way to mitigate future geohazards).	Potential Co-Benefits: Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Engineering (Lead) Emergency Management (Support)	Ongoing	Staff Time +$500k

6. COMMUNITY EDUCATION & ENGAGEMENT

Goal:

- The Whitehorse community is actively reducing personal GHG emissions through conservation and renewable energy and has taken proactive measures to protect themselves and their communities from the effects of climate change.

Building a climate-resilient Whitehorse starts with an informed and engaged community. By increasing access to climate-related education and supporting community-led initiatives, residents can gain the knowledge and tools needed to reduce GHG emissions and protect their neighborhoods from climate impacts. At the same time, initiatives that promote

community engagement encourage stronger social connections, which help influence and empower individuals to make sustainable choices, such as conserving energy, adopting renewable technologies, or preparing for extreme weather.

Through training programs, public awareness campaigns, and local leadership opportunities, the City aims to foster a culture of proactive climate action, ensuring that all community members can contribute to a more sustainable and resilient future.

The City will use the following strategies to create a greater connection with the community on climate change and to encourage more residents to get involved in climate action related initiatives:

6.1. Increase availability of climate-related training and public education within the community

6.2. Create opportunities for community-led climate leadership

6.1. Increase availability of climate-related training and public education within the community

To increase availability of climate-related training and public education within the community to improve energy efficiency, emergency preparedness, and adaptation planning, the following actions are proposed.

Table 13 Increase availability of climate-related training and public education within the community – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
6.1.1	Utilize the City's website to provide information on climate related programming, actions and opportunities occurring within the community (e.g. providing messages to the public regarding geohazards during freshet).	Potential Co-Benefits: Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Strategic Communications (Lead) Planning & Sustainability (Support) Engineering (Support)	Initiate by 2028	Staff Time (Low) $20k-$100k
6.1.2	Develop an environmental public awareness program to inform the public of the importance of green spaces / natural areas.	Potential Co-Benefits: Equity; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Parks (Lead) Strategic Communications (Support)	Initiate by 2028	Staff Time (Low-Medium) $0-$20k
6.1.3	Continue to increase awareness of climate related programs / information sessions for children and youth and other demographics.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Planning & Sustainability (Lead)	Ongoing	Staff Time
6.1.4	Partner to support Government of Yukon Energy Solutions in disseminating information and developing tools and guidelines to help property owners and managers undertake deep energy and GHG emissions retrofits of existing buildings (e.g., green roofs, white roofs, renewable energy systems).	Potential Co-Benefits: GHG Reduction; Jobs & Prosperity; Reduce the consequences of climate impacts	Planning & Sustainability (Lead) Building Services (Support)	Initiate by 2026	Staff Time (Low) $20k-$100k (total)

6.2. Create opportunities for community-led climate leadership

It will be important for the City to support its residents in leading climate action initiatives, as this will help foster resident engagement and climate action leaders. To further this strategy, the following initiatives are proposed:

Table 14 Create opportunities for community-led climate leadership - Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
6.2.1	Explore opportunities to support community gardens, local food sources/production, and other community-led climate actions.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Planning & Sustainability - Sustainability (Lead) Land & Development (Support) Parks (Support) Economic Development (Support)	Initiate by 2028	Staff Time
6.2.2	Support community-based organizations and local businesses that empower and engage youth and residents by focusing resources for greater climate action impact in Whitehorse such as restructuring the annual Environmental Grant to include an increased funding allotment and a better alignment with the goals of the CAP.	Potential Co-Benefits: Equity; Health & Wellbeing; Support Jobs & Prosperity; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Planning & Sustainability (Lead) Economic Development (Support)	Initiate by 2028	Staff Time $20k-$100k

7. CORPORATE LEADERSHIP

Goals:

- Enhanced communication and collaboration among City departments and external agencies.
- Increased partnerships and collaboration with First Nations, not-for-profits, and the Government of Yukon.
- Incorporation of climate change considerations across all areas of municipal operations.

Through the strategic development and implementation of the CAP, the City will be able to take an important leadership step in curbing GHG emissions by effectively managing its own assets and processes while also supporting the reduction of community GHG emissions and increasing resilience to the impacts of climate change.

GHG reductions can be achieved through conservation-first actions like the building decarbonization plans, as well as changing how we internalize and prioritize climate-related actions. We will need to rely on solid evidence and best practices to identify climate risks from aging infrastructure, environmental degradation, and social inequity.

The City will be a leader in taking action on climate change and will employ the following strategies to direct change using a City-wide approach:

7.1. Good governance and strong partnerships

7.2. Sound financial management

7.3. Responsible and progressive policies

7.1. Good governance and strong partnerships

Partnerships with other governments, key organizations, and businesses will help support effective collaboration and communication. This will be crucial to help influence decisions on matters that are outside of the City's control and to make informed decisions using information that is accurate and up-to-date. To work towards this strategic objective, the following actions are proposed:

Table 15 Good governance and strong partnerships – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
7.1.1	Establish a CAP Inter-Departmental Working Group to oversee implementation of the actions developed.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Planning & Sustainability (Lead)	Initiate by 2026	Staff Time
7.1.2	Monitor changes in climate-related regulations and best practices developed by other governments.	Potential Co-Benefits: GHG Reduction	Planning & Sustainability (Lead) Policy Development (Support) Various Departments (Support)	Ongoing	Staff Time
7.1.3	Explore opportunities for collaboration on climate-related actions with other governments, institutions, private sector, and not-for-profits.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Planning & Sustainability (Lead)	Ongoing	Staff Time
7.1.4	Continue to work with the Government of Yukon on improving the quality of the data required to support future community GHG emissions inventories to track public GHG emissions.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Planning & Sustainability (Lead)	Ongoing	Staff Time (Low) $20k-$100k (to start) $0-$20k (per year)
7.1.5	Continue to work with the Yukon First Nation Climate Fellowship on finding ways to support its Reconnection Vision through the implementation of the CAP. For reference: https://reconnection.vision/	Potential Co-Benefits: Equity; Health & Wellbeing; Support for Jobs & Prosperity; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Planning & Sustainability (Lead)	Ongoing	Staff Time
7.1.6	Develop training and tools for staff to be able to consider climate change in their decision-making processes.	Potential Co-Benefits: Reduce the consequences of climate impacts	Planning & Sustainability (Lead) All Departments (Support)	Initiate by 2026	Staff Time $TBD (Project Specific)
7.1.7	Develop a 5-year monitoring plan for the CAP that includes periodic reviews.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Planning & Sustainability (Lead)	Initiate by 2026	Staff Time

7.2. Sound financial management

The City can have a positive impact on climate action through the way it designs and enacts its financial processes. To work towards this objective, the following actions are proposed:

Table 16 Sound financial management – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
7.2.1	Explore opportunities for disclosing information to the public within the City's annual report about the opportunities and risks presented by climate change.	Potential Co-Benefits: GHG Reduction; Equity; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Strategic Communications (Lead) Planning & Sustainability (Lead)	Initiate by 2028	Staff Time (Low-Medium)
7.2.2	Consider development of solicitation and contract requirements for third-party service providers to include an estimate of energy use and greenhouse gas emissions associated with their offered services, where possible.	Potential Co-Benefits: GHG Reduction	Financial Services (Lead) Policy Development (Support)	Initiate by 2030	Staff Time (Medium-High)
7.2.3	Explore funding opportunities for financing the costs associated with the CAP.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Planning & Sustainability (Lead) All Departments (Support)	Initiate by 2028	Staff Time
7.2.4	Continue to explore opportunities to advance climate adaptation and mitigation through City budget planning.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	All Departments (Lead)	Ongoing	Staff Time

7.3. Responsible and progressive policies

To take meaningful action on climate change, the CAP must be able to reflect the various needs and diverse socio-economic circumstances of Whitehorse residents. The City should make assertive efforts to be innovative and work to inspire by becoming a role model that will encourage the community to take a more active role in climate action. The City plans to achieve this strategy through the following actions:

Table 17 Responsible and progressive policies – Actions

	Action	Impact	Lead Department	Timeframe	Resources Needed
7.3.1	Explore options that the City can take as a corporation to Recycle, Repurpose, Reuse, and Reduce (e.g. improve energy and water efficiency; reduce GHG emissions and air contaminants; reduce hazardous waste; and reduce toxic and hazardous chemicals and substances).	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Planning & Sustainability (Lead) Water & Waste (Support) All Departments (Support)	Ongoing	Staff Time (Medium-High) $TBD (Project Specific)
7.3.2	Continue to implement measures and explore ideas for reducing corporate energy use during peak usage times (e.g. burning biomass from fire breaks).	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Property Management (Lead) Planning & Sustainability (Support)	Ongoing	Staff Time (Medium) $20-$100k (per year)
7.3.3	Continue to engage with local organizations to gather feedback from Whitehorse's vulnerable populations on climate change challenges and solutions. The findings will be published and used to shape City policy and programs.	Potential Co-Benefits: GHG Reduction; Equity; Health & Wellbeing; Support Jobs & Prosperity; Reduce the consequences of climate impacts; Improve the resilience of the natural environment	Planning & Sustainability (Lead) Inclusivity, Diversity, Equity & Accessibility (IDEA) (Support) Policy Development (Support)	Ongoing	Staff Time (Low-Medium) $20k-$100k
7.3.4	Continue to monitor and report on GHG emissions from City owned assets and infrastructure (e.g. buildings, vehicles, landfill) and use this data to help inform policy decisions.	Potential Co-Benefits: GHG Reduction; Reduce the consequences of climate impacts	Property Management (Lead) Planning & Sustainability (Support)	Ongoing	Staff Time (Medium)

IMPLEMENTATION FRAMEWORK

The preparation of this Climate Action Plan is the City's next step towards substantially reducing community GHG emissions by 2050. It is a forward-looking vision for GHG emission reductions in Whitehorse and must be considered a living document with the intent to be updated continuously, as approaches and technologies change. Ongoing measurement and review will be beneficial to reframe and refocus City efforts when new insights emerge because of ongoing stakeholder collaboration, new research and studies, new technologies, and changes to the political and economic landscape.

It is envisioned that the Climate Action Plan will be updated every five years. The following implementation framework focuses primarily on the five-year planning horizon. Changes to federal and territorial legislation and regulations, as well as technological advances are anticipated over the next decade that will impact the adoption and implementation of longer-term actions.

Governance & Collaboration

The Climate Action Plan will be championed by the Planning and Sustainability Services department; implementation will be overseen by an interdepartmental working group, with the mandate of ensuring that the Climate Action Plan remains a priority within the City. The structure of the Climate Action Plan Working Group enables for a more direct integration of the CAP with the management of the City's systems while creating the necessary culture of change within Whitehorse. Departmental level actions are led by departmental subject matter experts (SME) who are also responsible for energy and GHG tracking, engagement, communication, and adaptation measures to help the City prepare for and respond to the impacts of climate change (ie. wildfire, increased precipitation, extreme freeze/thaw cycles, etc.). With the commitment of the SMEs, each department can take a more active role in managing energy consumption and demand within Whitehorse, be more aware of the City's adaptation initiatives and how they are interconnected across departments, and subsequently have a greater influence on the community.

Success of the Climate Action Plan relies on ongoing collaboration and participation across departments and divisions. Staff from all departments are required to use the Climate Action Plan as a guide for decision-making, as it contains actions that will help bring the City closer towards the City's GHG reduction goal.

As part of the Climate Action Plan, the implemented processes improvements, program implementation and projects will continue to be documented and reviewed bi-annually to update departmental consumption savings. By regularly monitoring and reporting consumption and dollar savings and/or avoidance to each department, the outcomes of their participation in energy management actions can be demonstrated, and feedback can be obtained for any new ideas. Reporting on the overall corporate GHG inventory, progress towards GHG reduction, and Climate Action Plan actions will continue to be reviewed bi-annually. Along with the preparation of a bi-annual Corporate Energy and GHG Emissions Report, these activities will be rolled up into a bi-annual Climate Action Plan work plan, which will be reported to Council.

The Climate Action Plan should be updated every 5 years with the next update to occur in 2030.

Funding Opportunities & Challenges

Wherever possible, the City should take advantage of funds to speed up the implementation of project initiatives. These programs are subject to Council Priorities. The proposed actions will require further business case development, are contingent on future Council approval, and future staff and budget (capital and operating) availability. The City will need to dedicate staff time and annual funding for the Climate Action Plan actions to be successful in its implementation.

It will also need to collaborate with the community and stakeholders to ensure that the identified vision, goals, and GHG reduction targets are reached. As part of the implementation of the actions in this plan, the following risks would need to be considered and addressed:

- Increasing capital and operating costs, as well as lower than expected saving and revenues.
- Regulatory barriers and compliance issues that impede the implementation of the actions (e.g., taxes on wind turbines within Whitehorse).
- Competing Council and departmental priorities including current operational mandates of impacted services and how mandates must change to achieve energy and greenhouse gas reductions.

CONCLUSION

The City of Whitehorse's Climate Action Plan (CAP) hinges on collective action—from the City, its partners, and its residents—working together to implement climate solutions and embrace sustainable practices. Ultimately, the Climate Action Plan is not just a roadmap for the City of Whitehorse; it is a call to action for the entire community. Together, we can create a resilient, thriving city that stands as a model of sustainability and climate leadership in the North.

APPENDICES

Whitehorse
THE WILDERNESS CITY

Revised Draft
May 2025

CLIMATE ACTION PLAN

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APPENDIX A

City of Whitehorse 2022 Global Protocol for Community (GPC) Scale Emission Inventories Protocol

Overview

The GPC Protocol is the result of a collaborative effort between the GHG Protocol at the World Resources Institute (WRI), C40 Cities Climate Leadership Group (C40), and ICLEI—Local Governments for Sustainability (ICLEI). The GPC Protocol is recognized as one of the first set of standardized global rules for cities to measure and publicly report city-wide GHG emissions. It sets out requirements and provides guidance for calculating and reporting city-wide GHG emissions, consistent with the 2006 IPCC guidelines on how to estimate GHG emissions (IPCC, 2006). Specifically, the GPC Protocol seeks to:

- Help cities develop a comprehensive and robust GHG inventory to support climate action planning.
- Help cities establish a Base Year GHG emissions inventory, set GHG reduction targets, and track performance.
- Ensure consistent and transparent measurement and reporting of GHG emissions between cities, following internationally recognized GHG accounting and reporting principles.
- Enable city-wide GHG inventories to be aggregated at subnational and national levels.
- Demonstrate the important role that cities play in tackling climate change and facilitate insight through benchmarking—and aggregation—of comparable GHG data.

GPC Protocol Structure

Under the GPC Protocol, there are two ways to report a city's GHG emissions inventory under the GPC Protocol:

- **BASIC** – This level covers stationary energy and transportation GHG emissions that physically occur within a city (Scope 1) and those that occur from the use of electricity, steam, and/or heating/cooling supplied by grids which may or may not cross city boundaries (Scope 2). The BASIC level also includes waste GHG emissions that may occur outside of a city but are driven by activities taking place within a city's boundaries (Scope 3). The BASIC level aligns with the current GHG reporting requirements of most voluntary reporting programs for local governments.
- **BASIC+** – This level covers the same scopes as BASIC and includes more in-depth and data dependent methodologies. Specifically, it expands the reporting scope to include Scope 1 emissions from Industrial Process and Product Use (IPPU), Agriculture, Forestry, and Other Land-Use (AFOLU), and Scope 3 GHG emissions from transboundary transportation. The sources covered in BASIC+ also align with sources required for national reporting in IPCC guidelines.

Activities taking place within a city can generate GHG emissions that occur inside the city boundary as well as outside the city boundary. To distinguish between these, the GPC Protocol groups emissions into three categories based on where they occur: Scope 1, Scope 2, or Scope 3 emissions. The GPC Protocol distinguishes between emissions that physically occur within the city (Scope 1), from those that occur outside the city but are driven by activities taking place within the city's boundaries (Scope 3), from those that occur from the use of electricity, steam, and/or heating/cooling supplied by grids which may or may not cross city boundaries (Scope 2). Scope 1 emissions may also be termed "territorial" emissions, because they are produced solely within the territory defined by the geographic boundary (see Figure A.1).

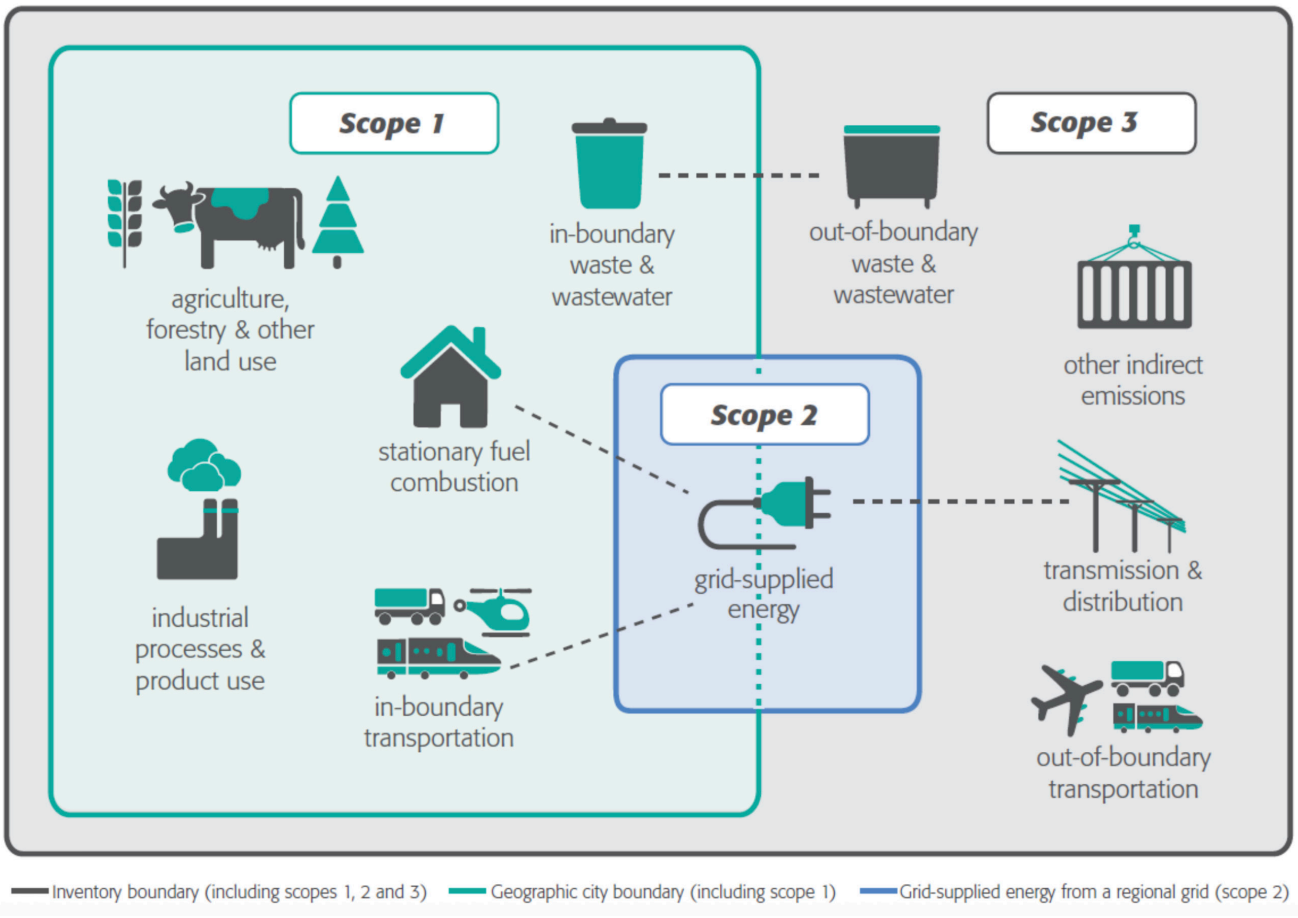

Figure A.1 Sources and Boundaries of a City's GHG Emissions (GPC 2014)

GHG Emission Categories

As noted previously, the GPC Protocol requires that different emission sources to be categorized into six main reporting sectors. These high-level categories are briefly described in the following sections. More information on how GHG emissions are captured within the GPC Protocol is available on the Greenhouse Gas Protocol website.

Stationary Energy

Stationery energy sources are typically one of the largest contributors to a city's GHG emissions. In general, these emissions come from fuel combustion and fugitive emissions. They include the emissions from energy to heat and cool residential, commercial, and industrial buildings, as well as the activities that occur within these residences and facilities. Emissions associated with distribution losses from grid-supplied electricity/steam/heating/cooling are also included, as are some fugitive emissions from sources such as coal piles, natural gas Stationary Energy GHG emission sources are typically one of the largest contributors to a city's GHG emissions. In general, these emissions come from fuel and coal combustion, and fugitive emissions of natural gas. They include the emissions from energy to heat and cool residential, commercial, and industrial buildings, as well as the activities that occur within the residences and facilities. Emissions associated with distribution losses from grid-supplied electricity/steam/heating/cooling are also included, as are fugitive emissions from sources such as coal piles, natural gas pipelines, and related Off-road Transportation GHG emission sources.

The Stationary Energy sector includes the following sub-sectors:

- Residential buildings
- Commercial and institutional buildings and facilities
- Manufacturing industries and construction
- Energy industries
- Energy generation supplied to the grid
- Agriculture, forestry, and fishing activities
- Non-specific sources
- Fugitive emissions from mining, processing, storage, and transportation of coal
- Fugitive emissions from oil and natural gas systems

Transportation

The GHGs released to the atmosphere to be reported in the Transportation sector are those from combustion of fuels in journeys by on-road, railways, waterborne navigation, aviation, and off-road. GHG emissions are produced directly by the combustion of fuel, and indirectly using grid-supplied electricity. Unlike the Stationary Energy sector, transit is mobile and can pose challenges in both accurately calculating GHG emissions and allocating them to a specific sub-sector. This is particularly true when it comes to transboundary transportation, which includes GHG emissions from trips that either start or finish within a city's boundaries (e.g., departing flight emissions from an airport outside the city boundaries)

(GPC, 2014). Transboundary GHG emissions are only required for GPC BASIC+ GHG reporting.

The Transportation sector includes the following sub-sectors:

- On-road
- Railways
- Waterborne
- Aviation
- Off-road

Waste

Cities produce GHG emissions that arise from activities related to the disposal and management of solid waste. Waste does not directly consume energy, but releases GHG emissions because of decomposition, burning, incineration, and other management methods.

The Waste sector includes the following sub-sectors:

- Solid waste disposal
- Incineration and open burning
- Biological treatment of waste
- Wastewater treatment and discharge

Industrial Processes and Product Use (IPPU)

Emissions from this sector are only required for BASIC+ GHG reporting under the GPC Protocol. This sector encompasses GHG emissions produced from industrial processes that chemically or physically transform materials and using products by industry and end-consumers (e.g., refrigerants, foams, aerosol cans) (GPC, 2014).

The IPPU sector includes the following sub-sectors:

- Industrial processes
- Product use

Any GHG emissions associated with energy use for industrial processes are not reported in the IPPU Sector; rather, they are reported under the appropriated Stationary Energy sub-category.

Agriculture, Forestry, and Other Land Use (AFOLU)

Emissions from the AFOLU sector are only required for BASIC+ GHG reporting. AFOLU GHG emissions are those that are captured or released because of land-management activities. These activities can range from the preservation of forested lands to the development of crop land. Specifically, this sector includes GHG emissions from land-use change, manure management, livestock, and the direct and indirect release of nitrous oxides (N2O) from soil management, rice cultivation, biomass burning, urea application, fertilizer, and manure application (GPC, 2014).

The AFOLU sector includes the following sub-sectors:

- Livestock
- Land
- Aggregate sources and non-CO2 emission sources on land

GHG Assessment Boundaries: 2022 Reporting year

This section sets out the reporting boundaries and requirements of the City of Whitehorse 2022 GHG emissions inventory.

Spatial Boundary

The GHG inventory is defined geographically by the City of Whitehorse municipal boundary, as shown in Figure A.2.

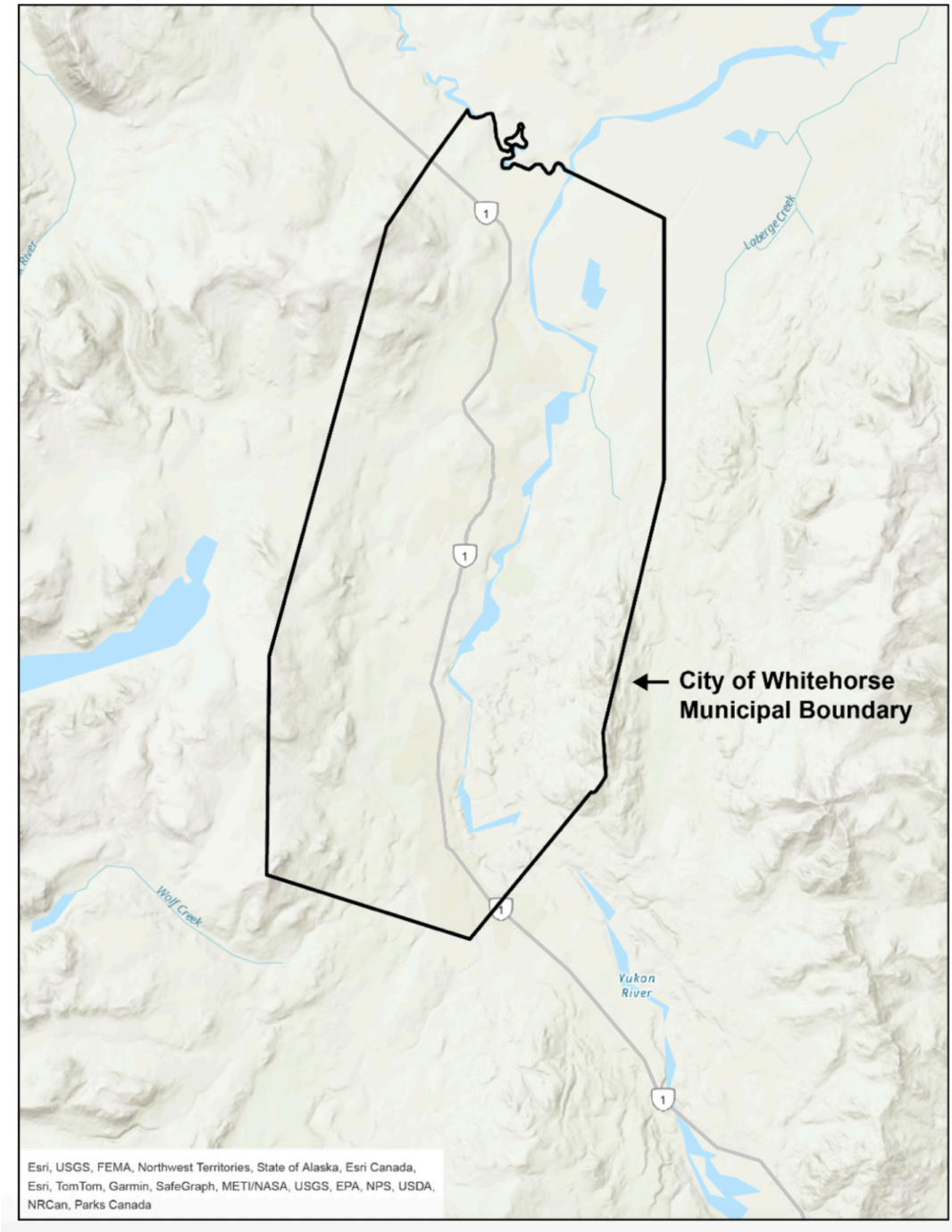

Figure A.2 City of Whitehorse Municipal Boundary

Temporal Boundary

The City's GHG emissions inventory covers all GHG emissions for the 2022 reporting year. Where 2022 data was not available, the most recent year's data has been used (e.g., 2021) and the timescale noted.

GHG Emissions Quantification

The City has elected to report at the GPC BASIC level which encompasses GHG emissions from the following sectors:

- Stationary Energy
- Transportation
- Waste

The GHG inventory is required to include all seven Kyoto Protocol GHGs occurring within the geographic boundary of the City. No GHG emissions from HFCs, PFCs, SF6 or, NF3 ere estimated for the 2022 reporting year due to the lack of available data.

Each GHG has a different global warming potential (GWP) due to its ability to absorb and re-emit infrared radiation. This chemical property is recognized by the GWP set out by the IPCC Fourth Assessment Report. A larger GWP value means the substance has a greater affinity to absorb and re-emit infrared radiation. The GWP of these GHGs are CO2 = 1.0, CH4 = 28, N2O = 265 (IPCC, 2014).

Total GHG emissions are normally reported as CO2e, whereby emissions of each of the GHGs are multiplied by their GWP and are reported as tonnes of CO2e.

GHG Emissions Data Sources / Assumptions

To remain accurate and reflective of the current community conditions, the City should revise and improve its GHG emissions inventory either annually or in line with capital planning cycles (i.e., every 3-4 years), to which there are the following aspects should be focused on:

- Improving activity data collection and management, including Sector and Sub-Sector allocations.
- Performing recalculations, where applicable, and tracking GHG emissions over time.
- Reviewing methodologies and data to assess for opportunities to improve the estimates.
- Assessing changes to boundaries, methodologies, assumptions, or data that may be material and require a base year restatement.

The following table provides a summary of the GHG emissions data used, any assumptions made and recommended improvements.

Table A.1 Summary of Summary of GHG Inventory Data Sources, Assumptions, and Recommended Improvements

Sector and Sub-Sector	Data	Assumption	Recommended Improvements
All	Emission factors were taken from the Environment and Climate Change Canada (ECCC) National Inventory Report[A1] for the 2022 reporting year.	None. This is the best available data.	N/A
Stationary Energy: Residential, Commercial and Institutional Buildings	ATCO Energy provided total electricity consumption for residential and commercial buildings within Whitehorse.	None. This is the best available data.	N/A
Stationary Energy: Residential Buildings	The Government of Yukon provided a breakdown of heating loads for residential building in its Yukon Energy Facts[A2] document and an assumption that each residential building has an average non-heating energy load of 1,000 kWh per year.	It is assumed that the non-heating energy load is correct. Using this assumption, the following residential energy split was derived: • Electricity: 32% • Natural Gas: 0% • Heating Oil: 57% • Propane: 5% • Wood: 5%	Work with the Government of Yukon and utility on deriving a methodology to refine the energy split estimate.
Stationary Energy: Commercial and Institutional Buildings	Only electricity consumption data was available for commercial buildings, and no proxy value (like residential buildings) was available from the Government of Yukon. As such, no other GHG emissions related to heating (e.g., heating oil, etc.) were included in the estimate.	None	Work with the Government of Yukon and utility on deriving a methodology to develop an energy split estimate for commercial buildings.

[A1] Environment and Climate Change Canada. (2025). *National Inventory Report 1990–2023: Greenhouse Gas Sources and Sinks in Canada.* Government of Canada. https://publications.gc.ca/collections/collection_2025/eccc/En81-4-2023-1-eng.pdf

[A2] Yukon Bureau of Statistics. (2022, July 12). *Yukon Energy Facts, 2022.* Government of Yukon. https://yukon.ca/en/yukon-energy-facts-2022

Sector & Sub-Sector	Data	Assumption	Recommended Improvements
Transportation: In-Boundary On-road Transportation & Trans-Boundary On-road Transportation	Statistics Canada vehicle registration data[A3], and ECCC vehicle kilometers travelled (VKT) data from ECCCs NIR[A4] was used to estimate on-road GHG emissions.	Because there was no City specific vehicle registration data, the Yukon vehicle population was assigned to the City on a per-capita basis. A 12/88 split between in-boundary and trans-boundary GHG emissions was assumed. This split is based on cities like Whitehorse in remote locations. Note that the GHG split has no impact on total GHG emissions.	Work with the Government of Yukon to get access to vehicle registration data for Whitehorse.
Transportation: Waterborne	Total number of registered boats in Whitehorse as reported in the Transport Canada database.[A5]	GHG emissions were based on the total number of registered boats in Whitehorse as reported in the Transport Canada Database and ECCC emission factors.	None - This is an immaterial GHG emissions source and could be refined, but it would require a lot of effort for low benefit.
Transportation: Aviation	Total aviation fuel at the Whitehorse Airport as reported by the Government of Yukon.[A6]	As with best practice, only 1/3 of the fuel consumed is assumed to be combusted within the city limits.	None
Transportation: Off-Road	Total Government of Yukon Other Off-Road GHG emissions as reported in the Environment and Climate Change Canada (ECCC) National Inventory Report for the 2022 reporting year. [A7]	Other Off-Road Transportation GHG Emissions were prorated to the City on a per capita basis.	Work with the Government of Yukon to refine this estimate.
Waste: Solid Waste	The City provided an estimate for this GHG emissions source.[A8]	None. This is the best available data.	N/A

[A3] Statistics Canada. (2025, March 13). *Table 20-10-0024-01: New motor vehicle registrations, quarterly.* https://doi.org/10.25318/2010002401-eng

[A4] Environment and Climate Change Canada. (2024). *National inventory report 1990–2022: Greenhouse gas sources and sinks in Canada.* Government of Canada. https://data-donnees.az.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory/

[A5] Transport Canada. (2024, April 2). *Vessel licensing and registration.* Government of Canada. https://tc.canada.ca/en/marine-transportation/vessel-licensing-registration

[A6] Government of Yukon. (2021, January 8). *Yukon's Flight Path: 2020–2030 Aviation System Investment Strategy.* Stantec Consulting Ltd. https://yukon.ca/sites/default/files/final_aviation_system_investment_strategy_jan_8_2021__0.pdf

Sector & Sub-Sector	Data	Assumption	Recommended Improvements
Waste: Biological Treatment of Waste	The City provided an estimate for this GHG emissions source.[A9]	None. This is the best available data.	N/A
Waste: Wastewater Treatment & Discharge	The City provided an estimate for this GHG emissions source.[A10]	None. This is the best available data.	N/A

2022 GHG Emissions Summary

Under the BASIC method, the City's community emissions totaled 444,152 tCO2e. On a per capita basis, this works out to 15.4 tCO2e per person.

Table A.2 City of Whitehorse 2022 Total Energy and GHG Emissions Per Person by Sector

Sector	Sub-Sector	Energy (GJ)	GHG Emissions (tCO2e)	GJ Per Capita	tCO2e Per Capita
Stationary Energy	Residential Buildings	1,783,124	95,911	52	2.8
	Commercial & Institutional Buildings	167,000	9,063	5	0.3
Transportation	In-Boundary On-road Transportation	2,994,502	212,009	88	6.2
	Trans-Boundary On-road Transportation	382,660	27,092	11	0.8
	Waterborne Navigation	56,860	3,427	2	0.1
	Aviation	299,474	22,280	9	0.7
	Off-road Transportation	216,828	16,718	6	0.5
Waste	Solid Waste		50,584		1.5
	Biological Treatment of Waste		723		0.0
	Wastewater Treatment & Discharge		6,345		0.2
Total		**5,900,448**	**444,152**	**173.2**	**15.4**

[A7] Environment and Climate Change Canada. (n.d.). *Canada's official greenhouse gas inventory.* Retrieved April 30, 2025, from https://data-donnees.az.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory/

[A8] City of Whitehorse. (2021, June 28). *Corporate greenhouse gas emissions inventory – 2020 update.* https://emrlibrary.gov.yk.ca/city-of-whitehorse/corporate-greenhouse-gas-emissions-inventory/2020.pdf

[A9] City of Whitehorse. (2021, June 28). *Corporate greenhouse gas emissions inventory* – 2020 update. https://emrlibrary.gov.yk.ca/city-of-whitehorse/corporate-greenhouse-gas-emissions-inventory/2020.pdf

[A10] City of Whitehorse. (2021, June 28). *Corporate greenhouse gas emissions inventory – 2020 update.* https://emrlibrary.gov.yk.ca/city-of-whitehorse/corporate-greenhouse-gas-emissions-inventory/2020.pdf

APPENDIX B

As the risks of more frequent and severe climate-related hazards escalate, the Intergovernmental Panel on Climate Change (IPCC) issued a special report in its sixth assessment detailing the substantial and more severe global consequences linked to increases in global temperature compared to a 1.5°C increase by the year 2100[A11]. The report examined 3 climate scenarios:

- Continuing business-as-usual (greater than a 4°C increase)
- Optimistic policy projections (a 3°C increase)
- Tracking towards a 'safe climate' (a 1.5°C increase)

The report's conclusion was that a swift transition to sustainable practices and aggressive GHG emission reductions is essential to avoid the most severe impacts of climate change.

While it may appear that there is a range of allowable temperatures, a two- or three-degree change is predicted to result in serious and catastrophic impacts. The report concluded that even a seemingly small difference of 0.5°C can significantly amplify extreme weather events. By missing the 1.5°C target by 0.5°C, the IPCC predicts drastic and severe global implications, including:

- Almost three times as many people exposed to severe heat at least once every five years;
- Higher risk to human health, including heat-related morbidity and mortality in urban areas;
- An additional 457 million people exposed to climate risks and related poverty;
- Habitat loss for twice as many plants and vertebrates and three times as many insects;
- Double the rate of ecosystem loss or change from one ecosystem to another;
- Double the decline in global fisheries;
- Ice-free summers in the Arctic Ocean every 10 years instead of every 100 years;
- Greater rise in sea levels and up to 79 million people exposed to flooding; and
- Greater economic losses resulting from extreme weather events.

To substantially reduce the risks and effects of climate change, and limit global warming to 1.5°C, the IPCC report indicates and policy makers have come to the agreement that global society must dramatically reduce greenhouse gas (GHG) emissions 50–60%

[A11] Intergovernmental Panel on Climate Change. (2018). *Global warming of 1.5°C: An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.* https://www.ipcc.ch/sr15/

by 2030, 80% by 2040, more than 90% by 2050 with the remaining emissions being offset or neutralized (e.g., direct air capture, reforestation, etc.) and be net-negative in the second half of the century. Net-negative GHG emissions involves getting to net-zero GHG emissions and then removing more GHG emissions through land use conservation and rehabilitation and direct capture technologies from the atmosphere than are emitted. Essentially, achieving net-negative emissions means not only halting the contribution to climate change but actively aiding in its reversal (A.3).

Achieving these targets will involve decarbonizing agriculture, energy, transportation, buildings, and industrial systems at an unprecedented scale – it will require a reduction in energy consumption and a transition away from fossil fuels towards renewable energy and energy storage. Governments will need to incentivize clean technologies, invest in research for breakthrough technologies, foster collaboration between academia, industry, and startups and protect and support vulnerable communities and workers so that they are not penalized for

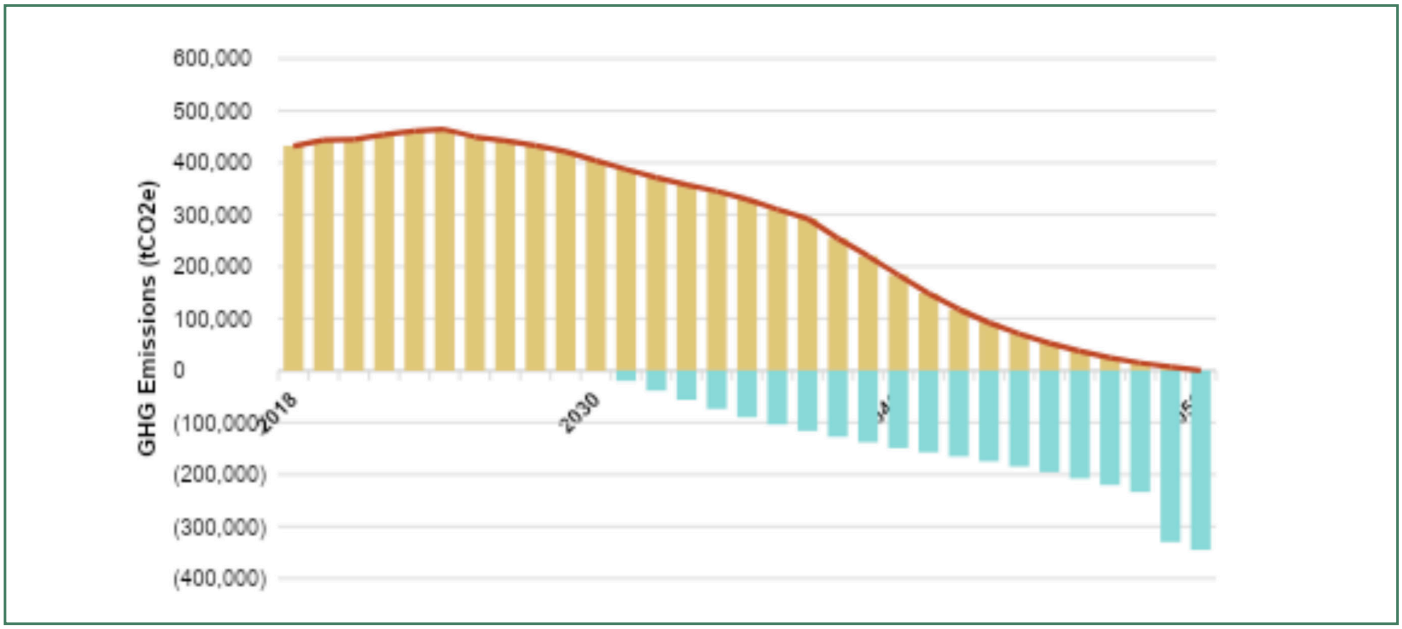

Figure A.3 Example of Net-Zero to Net-Negative GHG Emissions for Whitehorse

not being able to transition away from fossil fuel energy sources or transition to clean energy jobs.

In addition to emissions reductions, carbon dioxide removal from the atmosphere will be needed through measures such as reforestation, ecosystem restoration, and projects that capture and store carbon. Consumption and waste patterns must also change to reduce the GHG emissions and harmful effects on the environment and humans that material extraction, consumption and waste disposal can have. This will require a shift towards actions that achieve the long-term goal of becoming a circular economy.

Since the release of the IPCC Special Report and as the impacts of climate change become more prevalent (2022 was the hottest year on record and most costly in terms of weather-related insurance claims[A12]), a growing number of municipalities and organizations representing more than $23 trillion in market capitalization across the globe have declared a climate emergency and set aggressive net-zero GHG reduction targets. Locally, City Council responded with a climate emergency declaration on September 24, 2019.

The IPCC Special Report examined various scenarios related to global warming and their implications. Three key scenarios were explored in the report:

Continuing business-as-usual: This scenario represents the trajectory if society persists with current material and fossil fuel consumption practices without significant changes. In this scenario, the temperature is projected to rise by over 4°C by the year 2100 and is projected to result in more frequent and intense heatwaves, rising sea levels, and disruptions to ecosystems.

Optimistic policy projections: In this scenario, decisive actions are taken to mitigate GHG emissions. It assumes ambitious policies, cleaner energy sources, and sustainable practices and is projected to limit temperature rise by 3°C by 2100. While better than the business-as-usual scenario, global society would still face extreme weather events, biodiversity loss, and challenges in adapting to changing conditions.

Tracking towards a 'safe climate': This scenario is the desirable outcome and involves aggressive GHG emission reductions and global cooperation. The outcome would be a 1.5°C increase in temperatures by 2100 and would minimize climate risks, preserve ecosystems, and protect vulnerable communities.

[A12] United Nations. (2023, January 12). *Climate change set to transform nature, posing 'existential threat': UN.* UN News. https://news.un.org/en/story/2023/01/1132387

APPENDIX C

A series of indicators is presented in A.3 and A.4.

Table A.3 List of Primary Indicators

Memo

Goal / Metric	Indicator	Measurement Units
Community Net-Zero GHG Emissions by 2050	Total GHG emissions from buildings in the community	Tonnes of carbon dioxide equivalent (tCO2e)
	Total GHG emissions from transportation in the community	Tonnes of carbon dioxide equivalent (tCO2e)
	Total GHG emission from waste in the community	Tonnes of carbon dioxide equivalent (tCO2e)
	Total GHG emissions per resident	Tonnes of carbon dioxide equivalent (tCO2e)
	Total renewable energy consumption in the community	Gigajoules (GJ)
Corporate Net-Zero GHG Emissions by 2050	Total GHG emissions from Corporate buildings operations	Tonnes of carbon dioxide equivalent (tCO2e)
	Total GHG emissions from Corporate transportation operations	Tonnes of carbon dioxide equivalent (tCO2e)
	Total GHG emissions from Corporate transportation operations	Tonnes of carbon dioxide equivalent (tCO2e)

Table A.4 List of Secondary Indicators

Indicator	Measurement Units
GDP per capita is maintained or increases	Change in Gross Domestic Product (GDP)
Incidents of weather related infrastructure and service delivery failure do not increase.	Number of infrastructure service delivery incidents (electrical, water) that are longer than 12 hours in duration per annum
Hazard, risk and vulnerability assessments are performed every five years or when new climate information indicates risks have changed.	Completion of hazard and vulnerability assessment
Tree canopy cover remains stable or increases and ecological diversity remains stable or increases.	Tree cover (percentage) Species diversity. Genus diversity. 10/20/30 Rule: This rule suggests that an urban forest should be no more than 10% of one species, 20% of one genus, and 30% of one family
Total area of greenway network	Total area of greenway network
Total area of green infrastructure	Total area of green infrastructure

Indicator	Measurement Units
Rate of avoidable injuries and property damages due to extreme weather events remains stable or declines on a per capita basis.	Cost of damages because of climate events
The number of people who have used one or more emergency shelters due to climate related events at least one time over the preceding year	Number of people
Total commercial building energy use by square meter	Gigajoules (GJ) / m2
Total commercial building energy spend per square meter	CAD$ / m2
Percentage of commercial buildings registered in voluntary building energy benchmarking program.	Percent (%)
Percentage of commercial buildings exceeding an Energy Score of 80.	Percent (%)
Percentage of residential buildings exceeding an Energy Score of 80.	Percent (%)
Average household spend on energy usage per year	CAD$/Household/Annum
Residential per capita propane consumption	Gigajoules (GJ) / resident / year
Residential per capita heating oil consumption	Gigajoules (GJ) / resident / year
Residential per capita electricity consumption	Gigajoules (GJ) / resident / year
Percentage of buildings operating on renewable energy	Percent (%)
Total GJ of net renewable energy generated per annum	Gigajoules (GJ)
Number of net-zero ready buildings	Number of net-zero ready buildings
Number of heating oil systems removed per annum	Total number removals / year
Ratio of renewable energy generated in the community to total energy used in the community	Percent (%)
Number of building scale renewable energy systems installed	Total number of systems installed
Percentage of food waste diverted by sector	Percent (%)
Total organics per capita	Tonnes / capita / year
Total percentage of construction waste diverted from landfill	Percent (%)
Total material recycled per capita	Tonnes / capita / year
Total percentage of material recycled in waste stream	Percent (%)
Total material sent to landfill per capita	Tonnes / capita / year

Indicator	Measurement Units
Percent of City facilities that are renewably powered	Percent (%)
Percent of City fleet that is renewably powered	Percent (%)
Percentage of City staff that have attended education sessions on climate change, energy and GHG management	Percent (%)
Number of City plans and policies that address GHG emission reductions and climate risks	Qualitative response
Percent of registered electric vehicles in City Fleet	Percent (%)
Ratio of EV-infrastructure capacity to actual use	Percent (%)
Kilometers of sidewalk, designated bicycle facilities / amenities, and multi-use trails	Kilometers (km)
Number of car share vehicles available for use in the City	Number of car share vehicles in the City
Commuting distance	Kilometers (km)
Percent of trips by mode of transportation for journey-to-work, or journey-to-school trips	Percent (%)
The average number of vehicles owned per household by type (car, truck, motorcycle, bicycle)	Number of vehicles per household
Ambient Air Quality	Ambient Air Quality Index AQI
Dwelling Unit Density	Units / hectare (ha)
Transit ridership	Average annual number of transit-rider trips per capita

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APPENDIX D

Stantec Memo

**NOTE: The following report is a Climate Vulnerability Assessment compiled by Stantec for the City of Whitehorse. The content is unchanged, however, some of the formatting, footnote details, and numbering of tables and figures have been modified to better align with the Appendices.*

January, 2024

Reference: Whitehorse CAP – CVA Results

1. Overview

The City of Whitehorse ("the City") has engaged Stantec to develop a Climate Action Plan (CAP). Climate mitigation and adaptation are critical to the City's 2022-24 Strategic Priorities given its historical experience with the impacts of climate change. The goals of the plan are to:

- Determine the extent to which climate change is already considered in the City's targets.
- Develop a plan for mainstreaming climate mitigation and adaptation actions throughout the City's short and long-term planning.

As part of this project, a climate vulnerability assessment (CVA) is being 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. It is acknowledged that additional information may be available within the City's institutional knowledge which should be incorporated in the CVA.

2. The CVA Process

A high-level, portfolio CVA is being conducted for the City of Whitehorse. The portfolio CVA process follows the ISO 14091 and ISO 14092 Adaptation to Climate Change standardsA and involves the following steps, also shown in Figure A4:

- **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.

[A13] **ISO 14091:2021** – International Organization for Standardization. (2021). *Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment.* ISO. Available at: https://www.iso.org/standard/68508.html

ISO/TS 14092:2020 – International Organization for Standardization. (2020). *Adaptation to climate change — Requirements and guidance on adaptation planning for local governments and communities.* ISO. Available at: https://www.iso.org/standard/68509.html

- **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 interview 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 socio-economic factors such as population and social equity. Indicators of sensitivity can encompass geographical conditions, land use, demographic characteristics, etc.
- **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.

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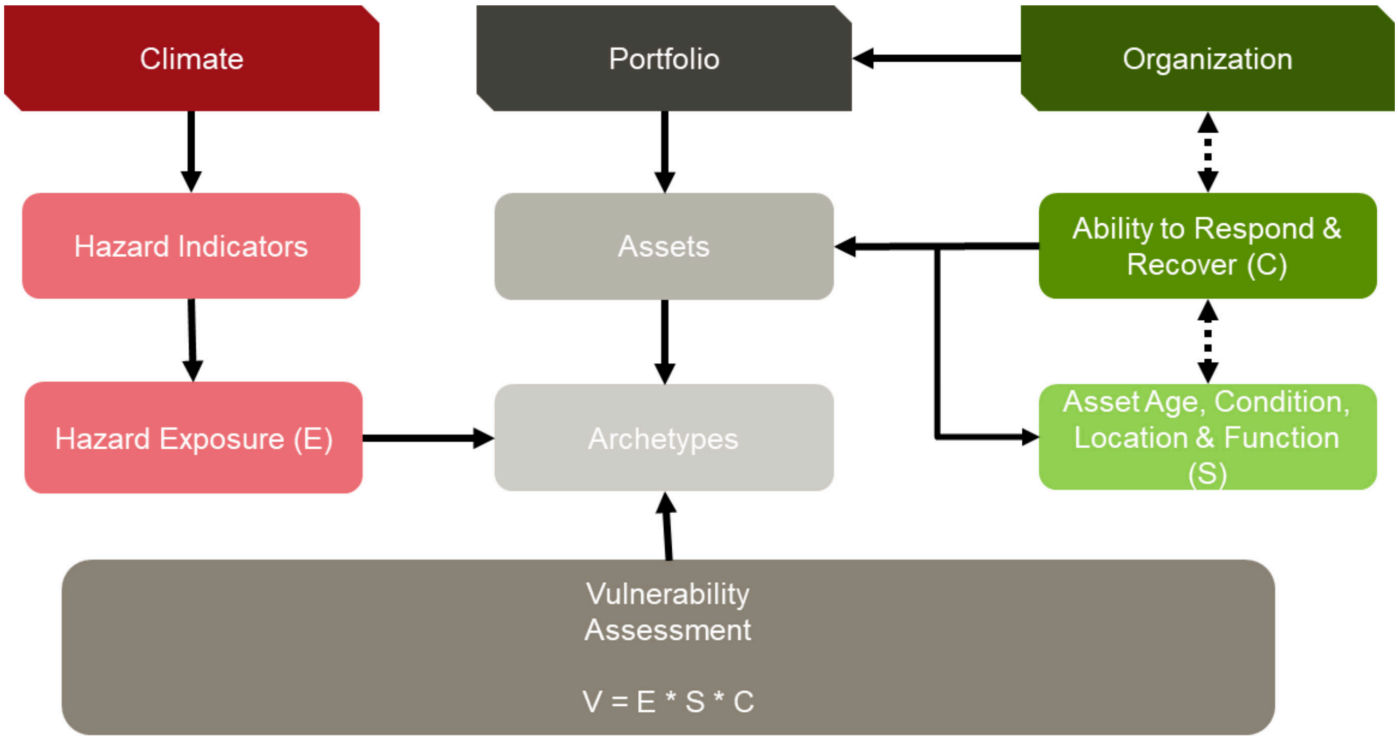

Figure A4 Schematic Diagram of the PIEVC Vulnerability Assessment Process

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 A5. 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 A5 Vulnerability Assessment Matrix

		Impact Rating		
		Sensitivity		
		Low Vulnerability	Medium	High
Adaptive Capacity	High	Low Vulnerability	Low Vulnerability	Medium Vulnerability
	Medium	Low Vulnerability	Medium Vulnerability	High Vulnerability
	Low	Medium Vulnerability	High Vulnerability	High Vulnerability

3. Interview Sessions

Interview sessions were held with City of Whitehorse staff (Table A6) in December 2023. The primary objectives of the interview sessions were to:

- Gather information on the City's assets\ and infrastructure systems.
- Identify how past climate and extreme weather events have impacted the City's assets and infrastructure systems.
- Evaluate the capacity the City has to respond to climate related events.
- Fill in knowledge gaps from the initial background review of City provided documents.

The results of the interview sessions were utilized in the CVA to help identify assets and/or systems that may be vulnerable to the impacts of climate change today and in the future.

Table A6 City of Whitehorse Personnel Interviewed

Personnel	Department
Mélodie Simard, Manager, Parks and Community Development, MCIP RPP	Parks and Community Development
Karmen Whitbread, Senior Planner	Senior Planner, Planning & Sustainability
Steven Hebert, Project Coordinator, Fleet and Transportation Maintenance	Transportation & Fleet Maintenance
Peter O'Blenes, Manager, Property Management	Property Management
Prakash Poorun, Supervisor, Asset Management	Asset Management & Engineering Services
Sara Bos, Environmental Coordinator II	Water & Waste Services
Jason Wolsky, Deputy Fire Chief	Fire Services

4. CVA Preliminary Results

The CVA was completed using information gathered from City provided documents and the interview sessions. Preliminary results of the CVA are presented in the following subsections.

4.1. Infrastructure and Assets

A preliminary list of assets, infrastructure, and systems for consideration in the CAP was developed from City provided documents and reviewed during the interview sessions. The preliminary list consists to archetypes (e.g., roads/transportation, city-owned buildings) as well as individual, unique assets (e.g., airport, LNG plant) and is as follows:

- City-owned
    - Roads/transportation (roadways, bridges, sidewalks)
    - Land use
    - Stormwater (including culverts and storm drains)

    - Water treatment plant and distribution network (e.g., Riverdale Aquifer)
    - Wastewater treatment plant and network (e.g., sewage lagoon system)
    - Waste management facility
    - Organics processing and compost production facility
    - Parks (green spaces, parks, playgrounds, trails)
    - Recreational facilities and associated equipment (e.g., Canada Games Centre)
    - City-owned Administrative/operational buildings
- Not City-owned
    - Commercial/industrial buildings
    - Residential buildings
    - Airport
    - LNG plant
    - Power supply
    - Telecommunications and IT networks
    - Whitehorse hydroelectric dam
    - Whitehorse General Hospital
    - Escarpment

4.2. Climate Hazards

A preliminary list of climate and climate-related hazards was developed from City provided documents (e.g., Hazard Identification and Risk Analysis report[A14]), interview sessions, and Stantec climate science expertise. The preliminary list of climate and climate-related hazards relevant to the City of Whitehorse was reviewed and validated during the interview sessions. The final climate and climate-related hazards list is presented below.

- Gradual warming
- Extreme hot days
- Heat waves
- Cold days
- Cold snaps
- Gradual changes in total precipitation
- More frequent and intense rainfall events
- Windy days
- Freeze-thaw cycles
- Change in the permafrost profile
- Wildfire occurrence
- Changes in riverine flooding
- Snowstorms

[A14] City of Whitehorse. (2017). *Hazard Identification and Risk Analysis (HIRA) – City of Whitehorse 2017.* Prepared by Calian Emergency Management Solutions. Retrieved from https://emrlibrary.gov.yk.ca/city-of-whitehorse/

- Seasonal snow cover
- Freezing rain
- Severe thunderstorms-related hazards (e.g., lightning, hail)
- Drought
- Landslides

During the interview sessions, participants identified the following climate hazards as key concerns for the City: wildfire, riverine flooding, increased precipitation (including winter rain), extreme rainfall, freezing rain, windy days, landslides, and seasonal snow cover.

Based on the Yukon Permafrost Database's Permafrost Model[A15], the Whitehorse region is 10-30% discontinuous permafrost. During the interview sessions, participants noted that, within the city, a section of Hamilton Boulevard extension is the only asset that was influenced by permafrost. Following the thaw of the permafrost, the Yukon Government reconstructed the impacted section of the Hamilton Boulevard[A16]. Due to lack of assets influenced by permafrost within the city, permafrost was not considered further in the CVA. However, it should be noted that permafrost thaw can influence the Alaska Highway outside the city; for example, a section of the Alaska Highway in the Ibex Valley, ~30 km northwest of Whitehorse, is being realigned due to the "Takhini Slump"[A17].

4.3. Past Impacts of Climate Hazards

During the interview sessions, City personnel were asked to discuss the impacts of past climate hazards that have interacted with infrastructure, asset systems, and/or services within the city. Interviewees were also asked to discuss climate-related hazards they foresee possibly impacting the city under climate change. The following are some excerpts from the interview sessions.

- While Whitehorse has not been directly impacted by wildfire in the recent past, wildfire risk was highlighted as a main concern by various City personnel. Concerns related to wildfire impact to the city include the following:
    - There is concern for wildfire impact to the Riverdale aquifer and wells. A wildfire impacting the Riverdale aquifer could potentially result in the loss of water supply to the City.
    - There is concern for wildfire impact to the KBL hazardous waste disposal facility.
    - There are concerns regarding the City's ability to evacuate in the event of a large wildfire (e.g., wildfire threat from the south). Additionally, other cities, such as Dawson City, do not have the capacity to accept the population of Whitehorse in the event of a city-wide evacuation.

[A15] Government of Yukon. (n.d.). *Yukon Permafrost Database.* Retrieved April 30, 2025, from https://service.yukon.ca/permafrost/

[A16] Government of Yukon. (2020, August 14). *Reconstruction of Hamilton Boulevard extension begins.* Retrieved April 30, 2025, from https://yukon.ca/en/news/reconstruction-hamilton-boulevard-extension-begins

[A17] CBC News. (2023, July 20). *Growing permafrost slump threatens part of Alaska Highway, road to be moved. Eye on the Arctic.* Retrieved April 30, 2025, from https://www.rcinet.ca/eye-on-the-arctic/2023/07/20/growing-permafrost-slump-threatens-part-of-alaska-highway-road-to-be-moved/

    - There are concerns regarding the City's ability to be resilient to wildfires (e.g., protection of structures and assets), particularly in areas that are heavily forested.

- The Marwell Lift Station, which is located in a low-lying area next to the Yukon River, has experienced localized flooding, particularly during spring peak flows.
- Stormwater drainage systems can be impacted during heavy rainfall events.
- Pipes and water mains can freeze during extreme cold events and cold snaps.
- Snowfall loading concerns for the Canada Game Centre roof; previous increased loading events have caused stretching of the membrane.
- Slumping of wastewater system pipes (sewer pipe outfalls).
- Wetter winters and warmer springs result in embankment movement, including escarpment slumping and slides. Escarpment slides can result in road closures, including a recent 1-month road closure.
- Changes in precipitation and extreme rainfall events may impact landfill operations (due to changes in rainwater entering landfilled waste). Changes in seasonal snow cover, which provides a natural cover November to April, could also impact operations and O&M Budget.
- Transportation within the city, including City operations (e.g., public transit, waste collection fleet), have been impacted by climate hazards that influence road conditions, such as snowfall and freezing rain.
- Proximity of assets, such as City Hall, to the Yukon River increases possible exposure to riverine flooding events.
- "Unprecedented" freeze-thaw cycles in recent years has lead to more ice on roads and trails.
- Increased high wind events could result in more downed trees resulting in power outages and increased O&M to clear debris.
- Warmer summer temperatures are putting increased pressure on parks resources (e.g., lakes, splash pad).
- Loss of power supply due to, e.g., high winds or freezing rain, results in concerns for public safety.

Table A7 presents an overview of the climate hazard-asset interactions (exposure points) identified for the City of Whitehorse. Based on the total number of asset interactions (exposure points) for each climate hazard as identified in Table 3, the top 10 climate hazards for the City of Whitehorse were identified (Figure 2). Wildfire was identified as the top climate hazard for the City with potential interactions with all 19 asset/archetypes considered in the CVA. Freeze-thaw cycles and extreme temperature (heat and cold) climate hazards round out the top 10 climate hazards.

Table A7 Overview of Climate Hazard-Asset Interactions Identified

Assets	Gradual warming	Extreme hot days	Heat waves	Cold days	Gradual Changes in Total Precipitation	Extreme rainfall	Windy days	Freeze-thaw cycles	Wildfire	Riverine flooding	Snowstorms	Seasonal snow cover	Freezing rain	Severe thunderstorm-related hazards	Drought	Landslides
Roads/transportation (roadways, bridges, sidewalks)	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
Stormwater (including culverts and storm drains)				X	X	X	X	X	X	X	X		X			X
Water treatment plant and distribution network (e.g., Riverdale Aquifer)	X			X	X	X		X	X	X					X	X
Wastewater treatment plant and network (e.g., sewage lagoon system)	X			X	X	X		X	X	X						X
Waste management facility		X	X		X	X	X		X			X		X	X	
Organics processing and compost production facility									X						X	
Parks (green spaces, parks, playgrounds, trails)	X	X	X		X	X	X	X	X	X	X	X	X		X	X
Recreational facilities and associated equipment	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		
Commercial/industrial buildings	X	X	X	X		X		X	X	X	X			X		
Residential buildings	X	X	X	X		X	X	X	X	X	X			X		X
Airport	X	X	X	X		X	X	X	X		X		X	X		
LNG plant		X	X	X				X	X							
Power supply	X	X	X	X			X		X		X		X	X		
Telecommunications and IT networks							X		X		X		X	X		
Whitehorse Dam						X		X	X	X						
Whitehorse General Hospital	X	X	X	X			X	X	X		X		X	X		
Escarpment					X	X		X	X						X	X

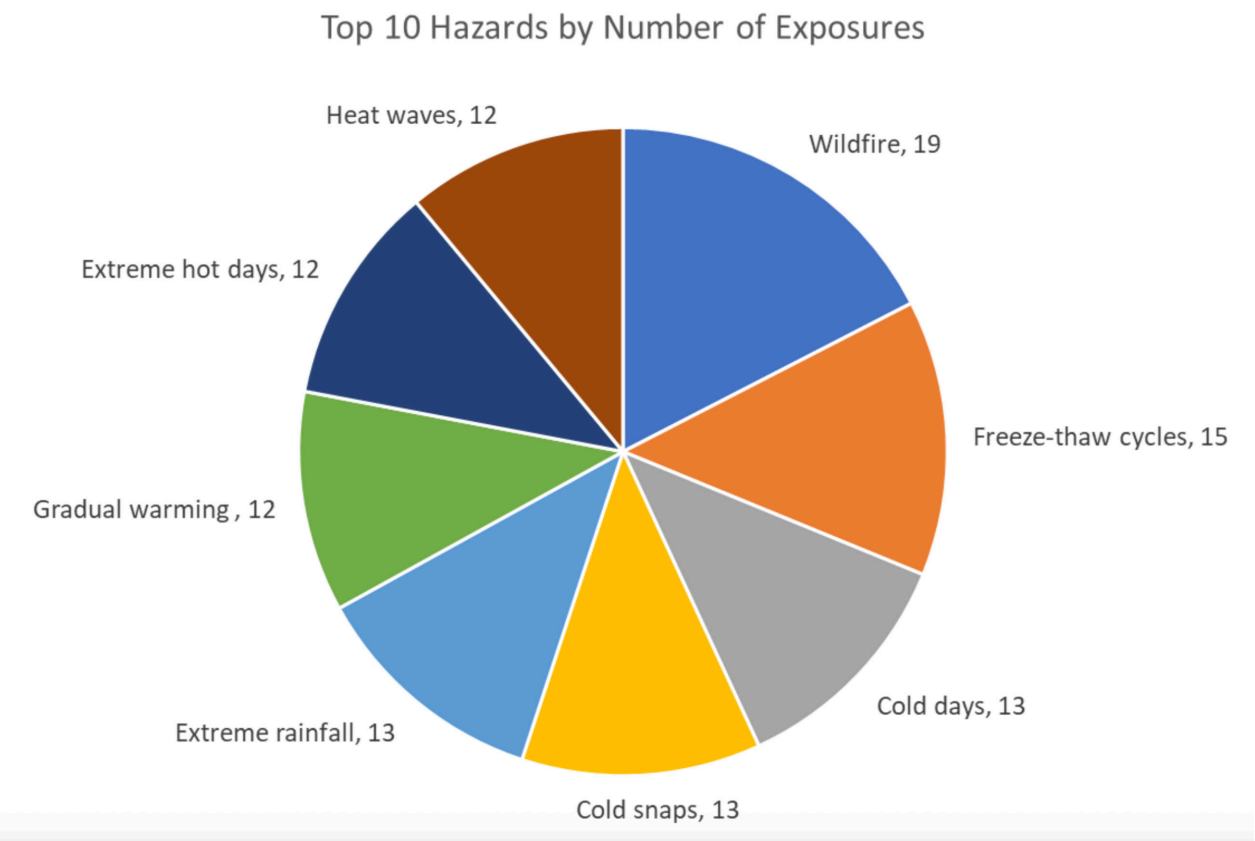

Figure A5 Top 10 Climate Hazards by Number of Exposures (Climate Hazard-Asset Interactions). The Values Indicate the Number of Assets/Archetypes Potentially Impacted by the Respective Climate Hazard (as identified in Table A7.)

4.4 Vulnerability of Assets

The sensitivity assessment considered the following factors as main contributions to the sensitivity rating:

- General age of the asset/archetype
- General condition of the asset/archetype
- Complexity of the asset/archetype
- Previous exposure to climate impacts

The Canadian Infrastructure Report card system (A8) was used as a guide for assessing general condition of the asset/archetype.

Table A8 Canadian Infrastructure Report Card Rating Scale for Asset Condition

Condition Rating	Description	Criteria
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life
Fair	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration
Very Poor	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable

The adaptive capacity assessment considered the following factors as main contributions of recovery efforts to the adaptive capacity rating:

- Emergency response/preparedness plans
- Budget and contingency plans
- Redundancy (e.g., power supply, access routes)
- Location of asset
- Supply chain and supply security
- Duration of response and recovery activities

Key adaptive capacity concerns, challenges, and barriers identified during interview sessions include the following:

- Lack of available backup power systems, including for one fire station and a number of water and waste assets. Citizens are also, generally, not prepared for a 72-hour power outage.
- Food, fuel, and supply security is highly dependent on Alaska Highway access.
- The City is in an infrastructure deficit with much of the infrastructure reaching end of life or past that.
- Lack of redundancy in infrastructure systems (e.g., Lewes Blvd. bridge access to Riverdale subdivision/Whitehorse General Hospital/Riverdale aquifer, neighbourhood access, water distribution system, fibre optic connection, power systems), the proximity to the river, and the vulnerabilities that these create during an emergency.
- Budget, including lack of contingency funds for events (e.g., escarpment slides).

- Activation of the City Emergency Operating Centre requires major resource mobilization. Previous activations have been in response to flooding, escarpment slides, and distant wildfires. 24- to 48-hour response time for military support.
- Increased population growth has increased demand on fire and emergency services.
- Lewes Blvd. bridge to Riverdale subdivision and Whitehorse General Hospital presents a chokepoint for emergency services and evacuation.
- Limited main transportation arteries to facilitate emergency services and evacuations.
- A large event on the Alaska Highway near the airport could result in temporary shutdown of airport operations.
- Cities, such as Dawson City, do not have the capacity to accept the population of Whitehorse in the event of a city-wide evacuation (e.g., due to wildfire threat from the south).

Results of the CVA are presented in Table A9. The Lewes Boulevard bridge and the section of Robert Service Way adjacent to the escarpment are assessed separately from the roads/transportation archetype due to the criticality of the assets (the bridge provides connection to assets east of the river) and high impacts during past events (including prolonged road closures due to escarpment slides).

Of the 20 assets/archetypes, 14 were found to have a high vulnerability to climate-related hazard impacts, 3 assets/archetypes with medium vulnerability, and 3 assets/archetypes with low vulnerability. The assets/archetypes with high vulnerability tend to be older or near end of life, in fair to poor condition, and have a high sensitivity to climate-related hazards. Due to the various adaptive capacity challenges (e.g., remote location of Whitehorse, supply chain, budget, lack of redundancy), a baseline adaptive capacity rating of medium was assigned for all assets/archetypes and then adjusted based on asset/archetype-specific considerations as appropriate. While Table A9 presents overall adaptive capacity (and subsequently vulnerability) for the assets/archetypes, climate hazard-specific ratings can vary. For example, many assets/archetypes would have low adaptive capacity for wildfire occurrence but medium adaptive capacity to snowstorms.

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Table A9Preliminary Results of the Climate Vulnerability Assessment

Asset/Archetype	Roads/ transportation	Lewes Blvd. bridge/ Robert Service Way adjacent to escarpment	Land use	Stormwater	Water treatment plant and distribution network	Wastewater treatment plan and network	Waste management facility	Organics processing and compost production facility	Parks	Recreational facilities and asssociated equipment
Sensitivity	High	High	Low	Medium	High	High	Medium	Low	High	High
Adaptive Capacity	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Overall Vulnerability	High	High	Low	Medium	High	High	Medium	Low	High	High

Asset/Archetype	City-owned administrative/ operational buildings	Commercial/ industrial buildings	Residential buildings	Airport	LNG plant	Power supply	Telecommunications and IT networks	Whitehorse Hydroelectric Dam	Whitehorse General Hospital	Escarpment
Sensitivity	High	High	High	High	Low	High	High	High	Medium	High
Adaptive Capacity	Medium	Medium	Medium	Medium	Medium	Low	Low	Medium	Medium	Low
Overall Vulnerability	High	High	High	High	Low	High	High	High	Medium	High

5. Existing/Planned Adaptation Actions

During the interview sessions, participants were also asked to discuss existing and planned adaptation actions that have been implemented to reduce the City's vulnerabilities to climate-related hazards. The following are some excerpts from the interview sessions.

- FireSmarting of City-owed facilities is currently being planned. It is also anticipated that FireSmarting will be expanded to residential and commercial facilities in the future.
- Updates to the Building Code will improve efficiency and resilience.
- Litter blockers and routine litter clean up operations are in place at the landfill to reduce the spread of litter (including microplastics) during high wind events.
- The Hamilton Boulevard permafrost issue has been resolved by the Yukon Government.
- Public education is being delivered on snow removal and ice treatment services to manage public expectations.
- The City is looking to partner with the Yukon Government to lead power outage awareness building.
- New subdivisions are to include two access routes, FireSmarting, and densification.
- Yukon Government loans are available to support energy retrofits within the City (e.g., solar, heat pumps).
- The City is exploring satellite backup tele-connectivity.

It was also noted, however, that implementation of goals and adaptation actions is constrained by City capacity and time constraints. For instance, adaptation planning in response to the Hazard Identification and Risk Analysis report has not occurred yet due to time constraints.

6. Knowledge Gaps Identified

Knowledge gaps identified during the completion of the CVA are outlined below.

- Critical infrastructure list to be developed by the City.
- Asset management system is under development by the City. Unless professionally assessed, asset condition is estimated by on asset age in the management system.
- Formal documentation of management actions is under development by the City.
- Improvements to decision making processes around climate vulnerability (i.e., budget) is needed.

Guide to Citations in Appendices

Appendix A

A1. Summary of data from *National Inventory Report 1990–2023: Greenhouse Gas Sources and Sinks in Canada* (Environment and Climate Change Canada, 2025).

A2. Summary of data from *Yukon Energy Facts, 2022* (Yukon Bureau of Statistics, 2022).

A3. Summary of data from *New Motor Vehicle Registrations, Quarterly* (Statistics Canada, 2025).

A4. Summary of data from *National Inventory Report 1990–2022: Greenhouse Gas Sources and Sinks in Canada* (Environment and Climate Change Canada, 2024).

A5. Overview of federal processes from *Vessel Licensing and Registration* (Transport Canada, 2024).

A6. Summary of strategic priorities from *Yukon's Flight Path: 2020–2030 Aviation System Investment Strategy* (Government of Yukon, 2021).

A7. Overview of emissions data from *Canada's Official Greenhouse Gas Inventory* (Environment and Climate Change Canada, n.d.).

A8. Summary of findings from *Corporate Greenhouse Gas Emissions Inventory – 2020 Update* (City of Whitehorse, 2021).

A9. & A10. Summary of findings from *Corporate Greenhouse Gas Emissions Inventory – 2020 Update* (City of Whitehorse, 2021).

Appendix B

A11. Summary of key findings from *Global Warming of 1.5°C* (Intergovernmental Panel on Climate Change, 2018).

A12. Excerpt from *Climate change set to transform nature, posing 'existential threat': UN* (United Nations, 2023).

Appendix D

A13. Overview of methodology from *Adaptation to Climate Change – Guidelines on Vulnerability, Impacts and Risk Assessment and Requirements and Guidance on Adaptation Planning for Local Governments and Communities* (International Organization for Standardization, 2020, 2021).

A14. Summary of findings from *Hazard Identification and Risk Analysis (HIRA) – City of Whitehorse 2017* (Calian Emergency Management Solutions, 2017).

A15. Summary of data from *Yukon Permafrost Database* (Yukon Geological Survey, n.d.).

A16. Overview of infrastructure adaptation from *Reconstruction of Hamilton Boulevard Extension Begins* (Government of Yukon, 2020).

A17. Case study on permafrost impact from *Growing Permafrost Slump Threatens Part of Alaska Highway, Road to Be Moved* (CBC News, 2023).

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