

# City of Kawartha Lakes Healthy Environment Plan



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The preparation of this Healthy Environment Plan was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

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# 1. Executive Summary

## Purpose of the Healthy Environment Plan

Our climate affects us each and every day – impacting our health, safety and livelihood. Locally, Kawartha Lakes and other communities in Ontario have experienced the impacts of severe weather, flooding, and increasing hot and cold days. Internationally, we are close to passing the 2°C threshold that many scientists and organizations identify as the “safe” upper limit for global warming above pre-industrial levels.<sup>1</sup> To stay below this limit, global greenhouse gas (GHG) emissions must peak and begin to decline within the next 10 years.<sup>2</sup> We have a very short window of time in which to act.

As a community and corporately, the City of Kawartha Lakes has committed to understanding the risks that climate change poses locally and most importantly, taking action. The aim of the Healthy Environment Plan (HEP) is to reduce GHG emissions and better prepare, respond and adapt to a warmer, wetter and more unpredictable climate. Through this plan, Kawartha Lakes has identified twenty-four strategies to invest in and enhance the resiliency of our community and City assets, human and environmental health, and the protection of vulnerable populations.

The HEP builds upon the Integrated Community Sustainability Plan (ICSP) and Strategic Plan prepared in 2014 and 2016 respectively. Both of these plans highlight the importance of fostering a vibrant economy and contributing to quality of life, and maintaining a healthy environment which includes addressing climate impacts. The HEP is a comprehensive community-wide strategy. As a community plan, action is needed from individuals, businesses, schools and as well as the City itself – all sectors have an important role to play to support community resilience to climate change and a healthy environment in Kawartha Lakes.

## How the Plan was Developed

The City of Kawartha Lakes’ approach to climate action is unique for a number of reasons, primarily because the Healthy Environment Plan considers integrated climate action – *addressing mitigation and adaptation holistically*. Like many other Ontario municipalities, Kawartha Lakes is geographically dispersed and the local economy is heavily dependent on agriculture, adding a distinctive rural lens to our climate approach.

The HEP was developed over a two-year period under the guidance of a Steering Committee and multi-stakeholder Working Group. The Steering Committee was comprised of City staff, and representatives from Kawartha Conservation, Kawartha Lakes Environmental Advisory Committee, and Fleming College with support from LURA Consulting and ICLEI Canada. The Working Group represented a cross section of local organizations and provided a broader sense of community interests and priorities as the plan was developed.

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<sup>1</sup> IPCC (2007): Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

<sup>2</sup> Ibid.

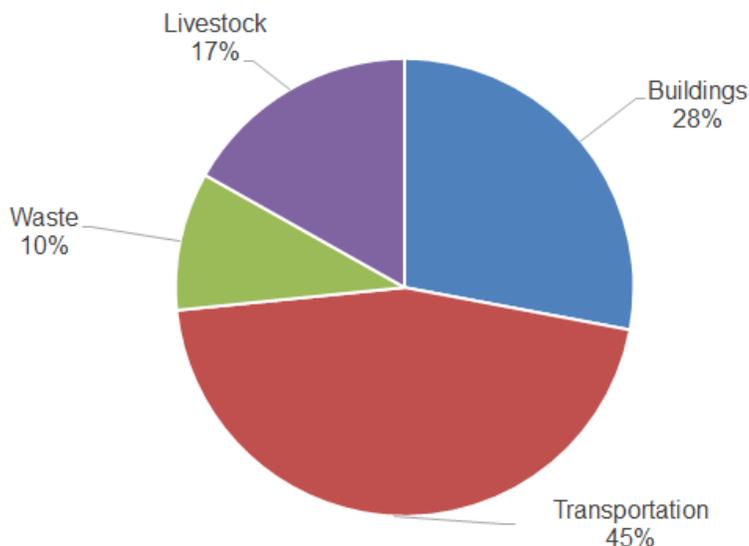
## City of Kawartha Lakes Healthy Environment Plan

Community members contributed throughout the planning process, providing input on the proposed vision, goals and strategies. Overall, the HEP was shaped through conversations with over 2,600 people and 40 organizations, institutions and community groups.

Development of the HEP was supported with funding from the Federation of Canadian Municipalities (FCM) Municipalities for Climate Innovation Program.<sup>3</sup> For the mitigation of GHG emissions, the planning process followed the FCM Partners for Climate Protection's (PCP) five-milestone framework.<sup>4</sup> From an adaptation perspective, the plan followed the Building Adaptive and Resilient Communities (BARC) framework, and Kawartha Lakes joins over 20 Canadian municipalities which have completed a similar process.

## Kawartha Lakes' Climate Snapshot

In 2015, the City of Kawartha Lakes' residents, businesses, institutions, and industries produced approximately 647,470 tonnes of CO<sub>2</sub>e (carbon dioxide equivalent) or 7.8 tonnes of CO<sub>2</sub>e per person – equivalent to nearly 137,370 cars driven for one year.<sup>5</sup> This includes emissions from activities taking place within the City's boundary, including fuel and electricity use (from transportation and buildings), waste generated, and livestock emissions (Figure 1).



*Figure 1: Community GHG emissions in the City of Kawartha Lakes in 2015, by community sector.*

Looking at municipally-owned buildings and facilities, fleet vehicles, street and traffic lights, and energy used during the delivery and treatment of water and wastewater (Figure 2), the City generated a total of 7,500 tonnes CO<sub>2</sub>e. The City's emissions represent only 1% of the total emissions in the community, highlighting the need for a community-wide response to climate change and action by all in Kawartha Lakes.

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<sup>3</sup> MCIP was created in 2016 as a five-year \$75 million national initiative aimed to enable Canadian municipalities to accelerate action to reduce greenhouse gas emissions and to reduce their vulnerability to climate change impacts.

<sup>4</sup> The PCP program is a network of more than 350 communities across Canada committed to reducing GHG emissions from both municipal operations and in the community.

<sup>5</sup> The year 2015 was selected as the baseline as it was the most recent year for which complete dataset for GHGs was available. Equivalency calculation is from <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

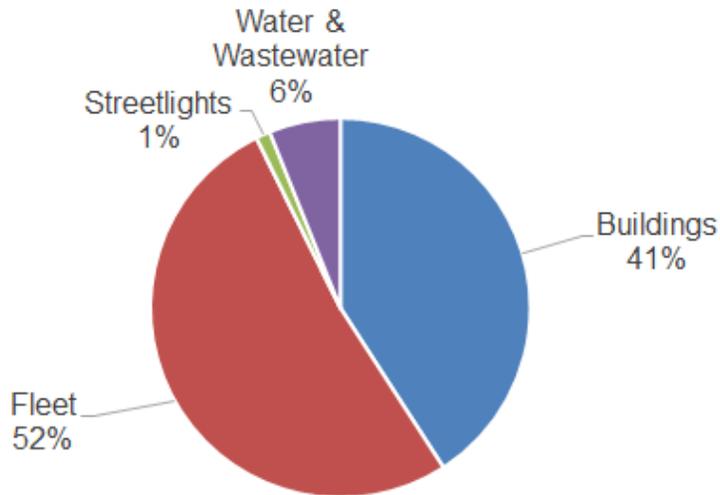


Figure 2: Corporate GHG emissions in the City of Kawartha Lakes in 2015, by sector.

While emissions from municipally-owned assets account for a very small portion of the total emissions in our community, areas where the City has a significant influence such as transportation, land use planning and waste management all are captured within the community inventory.

## Kawartha Lakes' Climate Future

In terms of local changes in our climate, it is anticipated that we will experience:

- Warmer temperatures;
- More temperature extremes, both hot and cold;
- More invasive species and associated diseases;
- More frequent and intense rainfall;
- More frequent flooding and extreme precipitation;
- More frequent extreme weather events including extreme heat days, ice storms and freezing rain; and
- Longer growing seasons coupled with increased stress on local water supplies.

As a result of the changing climate, there are potential impacts to the local economy, recreation and tourism:

- Lower crop yields that impact farmers;
- Damage to municipal infrastructure (i.e.: roads, culverts, bridges);
- Damage to power systems or power system failures that impact businesses;
- Closure of public buildings and facilities;
- Increased runoff that adds to nutrient, sediment, and contaminant loading in rivers and lakes;
- Increased operating cost to maintain ice rinks year-round;
- Increased need for salting, increased wear and tear on City-owned infrastructure;
- Loss of outdoor recreational opportunities such as skating, skiing, and ice fishing; and
- Impacts to summer tourism as a result of lower water levels.

## Our Opportunity for Action

The HEP provides an opportunity to not only contribute to reducing greenhouse gas emissions, it aims to reduce community risks and increase safety as a result of progressive climate action. Municipalities are responsible for a variety of functions, programs and services that support local residents and visitors. This includes accountability for assets such as roads, bridges, buildings, and services such as transit, wastewater treatment, stormwater management, waste management, as well as emergency services. Maintenance and improvements to these assets ensure that communities are resilient to more severe weather events and flooding. At the same time, considering the changing climate allows the municipality to consider how investments in infrastructure can ensure that emergency services are able to respond as needed. Taking a proactive approach to considering impacts of climate change on assets, aligns with the City's commitment to fiscal responsibility, municipal service excellence and efficient infrastructure and asset management. In 2015, residents and businesses spent approximately \$150 million on fuel to heat and power for their homes, businesses, and vehicles, most of which leaves the local community. According to the National Roundtable on the Environment and the Economy it is estimated that every \$1 spent on adaptation will result in between \$9 and \$38 worth of avoided damages in the future.<sup>6</sup> Similarly, "Energy NorthEast (now Acadia Centre) found that efficiency programs in Canada return \$3 to \$5 in savings for every \$1 of program spending, and generate 30 to 52 job-years per million dollars of program spending".<sup>7</sup> By taking action now, the City and community will benefit from approximately \$142 million in cost savings by 2030.

As a result, the City has a key role to play in reducing climate risks and addressing GHG emissions by:

- Influencing change, through the local regulatory frameworks such as assessments and approval processes, the use of surcharges and rebates, integrating the strategies into existing plans and policies and the enforcement of adaptive policies that address community climate impacts.
- Implementing the provincial Planning Act, and through adopting land use policies that support climate mitigation and adaptation principles and result in long lasting impacts to reducing emissions while creating safe and sustainable places to live.
- Actively demonstrating leadership through action as a municipality to ensure climate change considerations are integrated into service delivery and asset management.
- Playing a strong role in communicating with and providing opportunities for residents and businesses to take part in collective action.

Although GHG emissions will decline slightly (6.6% for community and 7.7% for municipal operations) as a result of technological advances, increased efficiency in new buildings, building retrofits, more efficient vehicles, and a cleaner energy grid offer major opportunities for the City to reduce its emissions.<sup>8</sup> Further efforts are needed for the City to align with the federal and provincial governments targets which translate to a 20% reduction below 2015 levels by 2030.<sup>9</sup> This leaves a gap of 86,550 tonnes (approximately 13.4%) for

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<sup>6</sup> <http://nrt-trn.ca/wp-content/uploads/2011/09/paying-the-price.pdf>

<sup>7</sup> Community Emissions Reduction Planning: A Guide for Municipalities, p.37

<sup>8</sup> Business-as-planned (BAP) is based upon the best estimates of population and employment projections available. As such, the BAP may change subject to changes in population and/or employment growth projections.

<sup>9</sup> The provincial and federal targets of reducing emission by 30% by 2030 are based on a 2005 baseline year. Using a consistent annual rate of reduction, this translates to a 20% overall reduction for a 2015 baseline.

## City of Kawartha Lakes Healthy Environment Plan

community emissions, and a gap of 920 tonnes (approximately 12.3%) for corporate emissions, to be met by additional policy and action at the municipal level.

Similarly, other sectors of the community will benefit from a review of their assets and services in light of a changing climate. Action can be taken by:

- Businesses to reduce GHG emissions and operating costs, increase resiliency to weather events, and/or take advantage of climate changes as opportunities to innovate and offer new services and products to meet community needs.
- Fleming College to continue to actively preparing students for new opportunities linked to climate change. To date they have developed programs related to high efficiency and resiliency building construction practices, developed forestry programs that support resiliency, as well as training programs to advance efficiency in wastewater management.
- Conservation authorities to continue to protect and enhance natural assets that support carbon sequestration and resiliency.
- The Haliburton, Kawartha, Pine Ridge District Health Unit to continue to deliver education, programs and services to mitigate risks from heat-related illness, diseases (e.g., Lyme disease), food and waterborne illnesses, etc.
- Individuals can take action by choosing low-carbon technologies, while adopting practices that increase resiliency at home, at work and in the community, and participating and promoting actions within the HEP.

## Vision, Goals, Strategies

Looking forward, the City and community stakeholders have worked together over two years to craft a blueprint for action.

Our Vision: “We will be leaders in addressing our changing climate to ensure a healthy environment and a prosperous community.”

The vision is supported by a series of seventeen goals and twenty-four strategies that were developed in collaboration with the Steering Committee, Working Group and consulting team. The strategies are accompanied by supporting actions that are linked to the overall vision and goals. Each strategy identifies education and financing considerations, the impacts addressed and/or potential GHG emission reductions, as well as the timing for implementation. Potential primary partners who may have an interest in implementation are identified as a starting point for the initial steps towards implementation. A key next step will be to solidify community partnerships for community actions.

There are a number of actions integrated into the strategies that are low or no cost, or that have been captured through existing planning processes. For those strategies and actions that require additional capital or operational budgets, the City will look to integrate them into annual workplans and budgets, explore funding and partnership opportunities and bring forward these initiatives for approval. Community organizations that opt to lead strategies will also define detailed approaches, budgets and seek approvals as required.

## Goals and Strategies

Themes	Goals	Strategies
<b>Cross-Cutting</b> <sup>10</sup>	<ul style="list-style-type: none"> <li>• Incorporate climate change mitigation and adaptation considerations into existing and future plans and policies.</li> <li>• Develop and implement education and awareness strategies to ensure that the community of Kawartha Lakes reacts to and prepares for climate change.</li> <li>• Support local businesses and the tourism industry in adapting to climate changes.</li> </ul>	<ul style="list-style-type: none"> <li>• Actions to educate residents as well as financing options have been included for each of the strategies below.</li> </ul>
<b>Agriculture</b>	<ul style="list-style-type: none"> <li>• Improve agricultural resiliency to climate changes to support long-term food security.</li> <li>• Optimize sustainable agricultural practices that reduce greenhouse gas emissions and maximize sequestration.<sup>11</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Implement agricultural management best practices.</li> <li>• Implement manure management best practices.</li> <li>• Improve feed digestibility.</li> <li>• Increase carbon sequestration.</li> </ul>
<b>Buildings</b>	<ul style="list-style-type: none"> <li>• Integrate adaptive measures into the construction, retrofit, and maintenance of new and existing buildings.</li> <li>• Increase share of new construction and existing buildings that have high energy efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage efficient and resilient new buildings (community and corporate).</li> <li>• Encourage efficient and resilient existing buildings (community and corporate).</li> <li>• Embed climate change risks into the inspection, maintenance, and design of municipal infrastructure.</li> </ul>
<b>Energy Systems</b>	<ul style="list-style-type: none"> <li>• Foster a culture of energy conservation that is resilient to climatic threats.</li> </ul>	<ul style="list-style-type: none"> <li>• Increase energy reliability and security.</li> </ul>
<b>Land Use</b>	<ul style="list-style-type: none"> <li>• Implement smart, dense, mixed-use growth to reduce sprawl.</li> <li>• Increase the use of green infrastructure and reduce hardscaping to improve stormwater management, reduce the urban heat island effect and other associated benefits.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage compact neighbourhood design.</li> <li>• Integrate urban heat reduction, air quality improvement, and flood risk reduction.</li> </ul>
<b>Natural Environment</b>	<ul style="list-style-type: none"> <li>• Protect and enhance the City’s natural environment assets and ecosystems and enhance carbon sequestration.</li> <li>• Ensure the resiliency of Kawartha Lakes’ natural environment such as forests, bodies of water, open spaces and natural heritage features.</li> </ul>	<ul style="list-style-type: none"> <li>• Protect natural assets.</li> <li>• Develop and implement a tree management and resiliency program.</li> </ul>

<sup>10</sup> Note: Cross-cutting goals apply to all themes and issues addressed in the Plan.

<sup>11</sup> Sequestration refers to removing carbon from the atmosphere, and storing that carbon in plants, the ocean, soils, etc.

Themes	Goals	Strategies
<b>People, Safety &amp; Health</b>	<ul style="list-style-type: none"> <li>Ensure the health, safety and resilience of the community by preparing for an increase in climate change related health impacts.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a response program for vulnerable population.</li> <li>Communicate climate readiness initiatives.</li> </ul>
<b>Transportation</b>	<ul style="list-style-type: none"> <li>Cultivate sustainable, low-carbon transportation options which adhere to responsible, environmentally friendly transportation operations.</li> <li>Minimize the potential for disruption to transportation networks from climate change impacts and extreme weather events.</li> </ul>	<ul style="list-style-type: none"> <li>Support and encourage the uptake of electric and low-emission vehicles.</li> <li>Encourage the use of transit, walk, bicycle and carpool.</li> <li>Transition the municipal fleet and equipment to emit less carbon.</li> </ul>
<b>Waste</b>	<ul style="list-style-type: none"> <li>Increase waste diversion from the landfill.</li> </ul>	<ul style="list-style-type: none"> <li>Reduce the amount of waste to landfills.</li> </ul>
<b>Water, Wastewater and Stormwater Management</b>	<ul style="list-style-type: none"> <li>Protect water resources and water treatment infrastructure capacity from changing climatic conditions and continue to provide clean, safe drinking water and water-based recreation for the community to enjoy.</li> </ul>	<ul style="list-style-type: none"> <li>Increase the operational efficiency and resiliency of water and wastewater systems.</li> <li>Update Stormwater Design Requirements and the Stormwater Management Plan.</li> </ul>

Together, it is estimated that these strategies will result in 87,220 tonnes of CO<sub>2</sub>e of community emissions and a savings of approximately \$142 million, with a savings of approximately \$2.6 million and reduction of 880 tonnes of CO<sub>2</sub>e of corporate emissions. Through the implementation of the actions laid out in this plan, Kawartha Lakes will be on track to meet the federal and provincial emission reduction targets by 2030.

## Implementation

Most importantly, the plan contains an effective implementation approach to ensure the desired outcomes are realized, while being widely accepted by the community and key stakeholders.

The HEP is a community-wide plan and will require the coordination and collaboration of City staff, organizations and agencies throughout our great community. As such, the plan includes strategies for how the City and community partners will work together to implement the HEP, generate broad awareness and participation in the community, and track progress as the plan is rolled out. Together, we can improve our City’s resiliency and decrease our contributions to the changing climate both locally and throughout the region.

## List of Acronyms

Acronym	Meaning	Acronym	Meaning
BAP	Business-as-planned	IWMS	Integrated Waste Management Strategy
BARC	Building Adaptive and Resilient Communities	LAS	Local Authority Services
CEMP	Corporate Energy Management Plan	LEED	Leadership in Energy and Environmental Design
CH <sub>4</sub>	Methane	LIC	Local Improvement Charge
CIPEC	Canadian Industry Program for Energy Conservation	LID	Low Impact Development
CIP	Community Improvement Plan	MCIP	Municipalities for Climate Innovation Program
CNG	Compressed natural gas	MECP	Ministry of Environment, Community and Parks
CO <sub>2</sub>	Carbon dioxide	N <sub>2</sub> O	Nitrogen oxide
CO <sub>2</sub> e	Carbon dioxide equivalent	NGO	Non-governmental organization
EAB	Emerald Ash Borer	NRCan	Natural Resources Canada
EPL	Energy performance labelling	OBC	Ontario Building Code
EV	Electric vehicle	O&M	Operations and maintenance
FCM	Federation of Canadian Municipalities	OMAFRA	Ontario Ministry of Food and Rural Affairs
GHG	Greenhouse gas	OSCIA	Ontario Soil and Crop Improvement Association
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories	PCP	Partners for Climate Protection
HEP	Healthy Environment Plan	PIEVC	Public Infrastructure Engineering Vulnerability Committee
IAP	Industrial Accelerator Program	PPS	Provincial Policy Statement
IDF	Intensity duration frequency curve	tCO <sub>2</sub> e	Tonnes of carbon dioxide equivalent
IESO	Independent Electricity System Operator	UNFCCC	United Nations Framework Convention on Climate Change

## Message from the Mayor

At the Kawartha Lakes, our environment is our namesake. Our municipality is named after our famous lakes, and we're known for our beautiful rivers, woodlands and farmlands. From the Kawartha Lakes cottage country to the agriculture industry, our environment is who we are – it's what makes us unique. This is why the Healthy Environment Plan (HEP) is so important. More than 2,500 people and organizations have taken part in shaping and carrying out the HEP which provides us with the tools to help us face the changing climate and protect vulnerable people and resources.

By looking after the citizens of the Kawartha Lakes and reducing the economic impact of the changing climate, the HEP directly aligns with the municipality's Strategic Plan. The Plan allows us to keep those dollars in our community where we can put them towards our needs. Councillor Miller was a past champion of the HEP and Councillor Richardson has since taken up the mantle, as the Kawartha Lakes Council looks forward to working towards a cleaner, healthier and more sustainable Canada. We all have a role to play. Let's work together to carry out this plan as it takes shape.

Mayor Andy Letham

## Message from the Chief Administrative Officer

A Healthy Environment is one of the City's three strategic goals. We are excited to have a community climate change action plan that incorporates both the reduction of greenhouse gases (climate mitigation) and preparing for the impacts of climate changes (climate adaptation). The Kawartha Lakes Healthy Environment Plan (HEP) is one of few plans that addresses both mitigation and adaptation in a single strategy. After extensive consultation with the community, we are confident that the HEP is truly representative of the uniqueness of our community. The HEP provides a road map for our community to build resilience, protect our assets and people as the climate changes.

The community has chosen an emissions reduction target of 20% which aligns with the federal and provincial target to be achieved by 2030. Achieving this target will require the continued efforts of everyone in our community to make important changes that have big impacts.

While the creation of the plan was municipally led, it is important to acknowledge the contributions of the many groups who were involved. The Federation of Canadian Municipalities (FCM) funded this plan and provided us with the Partners for Climate Protection's (PCP) five-milestone framework to guide our efforts to reduce the greenhouse gas emissions. ICLEI Canada provided a five-milestone framework for us to follow to address climate adaptation called "Building Adaptive and Resilient Communities (BARC)". ICLEI Canada calculated how much greenhouse gases the residents of the City of Kawartha Lakes produce each year. Development of the plan was greatly assisted by City staff leaders, representation from Kawartha Lakes Environmental Advisory Committee, Kawartha Region Conservation Authority and Fleming College's Office of Sustainability who formed the Steering Committee. Numerous community volunteers representing various sectors of our society (e.g. agricultural community, energy, development, health, education, etc.) formed our Working Group. The City's Office of Strategy Management and LURA Consulting led the project on schedule and on budget. As project champion/CAO, I look forward to working with City Council, our staff and our progressive community partners and organizations to address climate change and implement the HEP over the next ten years.

Ron Taylor, CAO

## Acknowledgements

### Indigenous Land Acknowledgement

The City of Kawartha Lakes acknowledges it is situated on traditional Michi Saagiig Territory and lands included in the Williams Treaty and Treaty 20.

### Council Champions

We would like to thank the leadership and encouragement of our Council Champions – the late Councillor Gordon Miller and Councillor Tracy Richardson.

### Steering Committee

Working closely with the consulting team, the following individuals and organizations contributed their valuable knowledge and expertise to develop the Healthy Environment Plan:

Adam Found – City of Kawartha Lakes – Manager, Corporate Assets

David Kerr – City of Kawartha Lakes – Manager, Environmental Services

Kelly Maloney – City of Kawartha Lakes – Agricultural Development Officer

Chris Marshall – City of Kawartha Lakes – Director, Development Services

Bryan Robinson – City of Kawartha Lakes – Director, Public Works

Juan Rojas – City of Kawartha Lakes – Director, Engineering and Assets

Ron Taylor – City of Kawartha Lakes – Chief Administrative Officer

Denise Williams – City of Kawartha Lakes – Strategy and Performance Specialist

Mark Majchrowski – Kawartha Region Conservation Authority – Chief Administrative Officer

Trish O'Connor – Fleming College – Director, Office of Sustainability

Pat Warren – Kawartha Lakes Environmental Advisory Committee – Chair

### Working Group Members & Member Organizations

Don Armitage – Enbridge

Paul Brown – Agricultural Development Advisory Board

Paul Buckley – Ontario Federation of Agriculture

Graham Clark – Balsam Lake Association

Tania Clerac – Fleming College

Kyle Chivers – Curve Lake First Nation

Ginny Colling – Kawartha Cycling Club

Federation of Ontario Cottagers' Associations

Richard Fedy – Environmental Action Bobcaygeon

Enzo Ingridelli – Lindsay Transit

Debbie Keenan – City of Kawartha Lakes – Building Services

John Kintare – Peterborough and the Kawarthas Home Builders Association

Keith Kirkpatrick – City of Kawartha Lakes – Paramedic Chief

Hope Lee – City of Kawartha Lakes, Human Services

Gillian Lind – HydroOne

Lloyd McEwan – Kawartha Field Naturalists

Michael Nasello – Peterborough-Victoria, Northumberland and Clarington Catholic District School Board

Jon Orpana – Ministry of the Environment, Conservation and Parks

## City of Kawartha Lakes Healthy Environment Plan

Deborah Pearson – Kawartha Lakes Environmental Advisory Committee

Jordan Prosper – Community Care City of Kawartha Lakes

Steve Rankin – Capstone Infrastructure

Sue Shikaze – Haliburton Kawartha Pine Ridge District Health Unit

Holly Shipclark – Kawartha Conservation

Iryna Shulyarenko – Kawartha Conservation

Marc Sorenson – Ross Memorial Hospital

Vic Tavaszi – Ross Memorial Hospital

Bill Thompson – Lake Simcoe Region Conservation Authority

Lee Anna Thornbury – City of Kawartha Lakes – Community Services

Mark Torrey – Ontario Federation of Agriculture

Dan Whalen – Trillium Lakelands District Schoolboard

Jeff Wiltshire – Ministry of Natural Resources and Forestry

## Additional Contributors

Enbridge – Lisa Dumond and Tim Short

Ganaraska Region Conservation Authority – Pam Lancaster

Otonabee Region Conservation Authority – Meredith Carter and Dan Marinigh

Ontario Clean Water Agency – Natalie Baker, Indra Maharjan, Geoff Redden and Cindy Spence

City of Kawartha Lakes Corporate Communications

City of Kawartha Lakes Police Services

## Project Team

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## Project Funders

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## About This Plan

The Kawartha Lakes Healthy Environment Plan (HEP) Plan or “the Plan” is organized as follows:

- Section 1 highlights the City’s commitment to taking action on climate change.
- Section 2 presents the vision and goals for the community.
- Section 3 provides an overview of the current climate conditions in Kawartha Lakes, including the planning context and current greenhouse gas (GHG) emissions for each community sector as well as the inventory of emissions for municipal operations using a baseline of 2015.
- Section 4 introduces the future climate changes expected in the community and highlights what will happen by the year 2030 if the community does not address GHG emissions at the local level.
- Section 5 presents a series of nine themes where climate action can have impacts. Each one includes proposed community and municipal strategies, recommended actions as well as implementation considerations. Appendix A includes plans and policies that the HEP strategies should be aligned and integrated with. Appendix B includes potential partners for implementation.<sup>12</sup>
- Section 6 identifies the total expected impacts of the mitigation and adaptation strategies.
- Section 7 outlines considerations for implementing the strategies as a whole and includes recommendations relating to oversight and governance, outreach and education, tracking and monitoring, funding, celebration, and plan renewal.

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<sup>12</sup> Potential roles and responsibilities have not been confirmed by agencies and do not reflect a commitment to implementation at this time.

## 2. Introduction

Across Canada, Ontario, and the City of Kawartha Lakes, the impacts of climate change are becoming more apparent and profound every year. The window for avoiding the serious impacts of climate change – heat waves, droughts, floods and storms, rising sea levels and widespread loss of plant and animal species – is shrinking. Internationally, we are close to passing the 2°C threshold that many scientists and organizations identify as the “safe” upper limit for global warming above pre-industrial levels.<sup>13</sup> To stay below this limit, global greenhouse gas (GHG) emissions must peak and begin to decline within the next 10 years.<sup>14</sup>

### City of Kawartha Lakes’ Commitment to Climate Change

In 2014, the City of Kawartha Lakes developed an Integrated Community Sustainability Plan (ICSP), which provided direction and objectives relating to environment, culture, society and, economy.<sup>15</sup> “A Healthy Environment” is one of three strategic goals identified in the City of Kawartha Lakes’ Strategic Plan and a key driver behind the development of an Economic Development Strategy.<sup>16</sup> The City has now developed this Kawartha Lakes Healthy Environment Plan (HEP) – a comprehensive community-wide strategy to take action on climate change locally. The aim of the HEP is to help the Kawartha Lakes community reduce greenhouse gas (GHG) emissions and better prepare, respond and adapt to a changing climate. This plan is about mitigating risks and creating a safe community. As a community plan, action is needed from individuals, businesses, schools and all levels of government.

Development of the Healthy Environment Plan was guided by two planning frameworks. For the mitigation of GHG emissions, the planning process follows the Partners for Climate Protection’s (PCP) five-milestone framework. For adapting to a changing climate, the plan follows the Building Adaptive and Resilient Communities (BARC) framework. More detail on these planning frameworks is provided in Section 7.

### Climate Change Adaptation & Mitigation

Although the earth’s climate has always experienced change, it is well understood that recent changes in climate are caused by humans – drastically different from any other time in the earth’s known history. This is caused by an increase in the amount of GHGs released over the last century as a result of human activity.<sup>17</sup> While these elements are naturally found in our atmosphere, human-caused sources of GHGs are contributing large quantities into the environment. GHGs from human activity include the burning of fossil fuels – like coal,

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<sup>13</sup> IPCC (2007): Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

<sup>14</sup> Ibid.

<sup>15</sup> City of Kawartha Lakes. (2014). *Integrated Community Sustainability Plan for the City of Kawartha Lakes*. Retrieved from [https://www.kawarthalakes.ca/en/business-growth/resources/2014.04.12\\_-\\_ICSP\\_AND\\_LAP\\_FINAL-2.pdf](https://www.kawarthalakes.ca/en/business-growth/resources/2014.04.12_-_ICSP_AND_LAP_FINAL-2.pdf)

<sup>16</sup> City of Kawartha Lakes. (2016). *City of Kawartha Lakes 2016-2019 Strategic Plan*. Retrieved from: <https://www.kawarthalakes.ca/en/resourcesGeneral/Documents/Reports-and-Studies/City-of-Kawartha-Lakes-2016-2019-Strategic-Plan.pdf>; City of Kawartha Lakes. (2017). *City of Kawartha Lakes Economic Development Strategy*. Retrieved from: <https://www.kawarthalakes.ca/en/business-growth/resources/Ec-Dev/Economic-Development-Strategy-accessible.pdf>

<sup>17</sup> Including water vapour, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), among others.

oil, and natural gas – to power our homes, cars, workplaces, and community. Community GHGs are typically emitted from powering and heating our homes and business, as well as transportation, and the generation of waste. When released, GHGs absorb and hold heat from the sun in our atmosphere, essentially turning the planet into a “greenhouse” that raises global temperatures over time.

The HEP provides a comprehensive approach to addressing climate change, focusing on both mitigating (or reducing) future GHGs and adapting to and planning for a warmer, wetter and more unpredictable climate that is expected in the future as a result of our changing climate. The City of Kawartha Lakes is unique, producing one of the few plans in Ontario or across Canada that looks to address climate change from the perspective of both mitigation and adaptation.

### 3. Vision, Goals and GHG Reduction Target

#### Vision

“We will be leaders in addressing our changing climate to ensure a healthy environment and a prosperous community.”

#### Goals

##### Cross-Cutting<sup>18</sup>

**GOAL 1:** Incorporate climate change mitigation and adaptation considerations into existing and future plans and policies.

**GOAL 2:** Develop and implement education and awareness strategies to ensure that the community of Kawartha Lakes reacts to and prepares for climate change.

**GOAL 3:** Support local businesses and the tourism industry in adapting to climate changes.

##### Agriculture

**GOAL 4:** Improve agricultural resiliency to climate changes to support long-term food security.

**GOAL 5:** Optimize sustainable agricultural practices that reduce greenhouse gas emissions and maximize sequestration.<sup>19</sup>

##### Buildings

**GOAL 6:** Integrate adaptive measures into the construction, retrofit, and maintenance of new and existing buildings.

#### GHG Reduction Target

Through the implementation of the actions laid out in this plan, Kawartha Lakes will be on track to meet the emissions reduction target established by the federal and provincial governments by 2030.

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<sup>18</sup> Note: Cross-cutting goals apply to all themes and issues addressed in the Plan.

<sup>19</sup> Sequestration refers to removing carbon from the atmosphere, and storing that carbon in plants, the ocean, soils, etc.

## City of Kawartha Lakes Healthy Environment Plan

**GOAL 7.** Increase share of new construction and existing buildings that have high energy efficiency.

### Energy Systems

**GOAL 8.** Foster a culture of energy conservation that is resilient to climatic threats.

### Land Use

**GOAL 9.** Implement smart, dense, mixed-use growth to reduce sprawl.

**GOAL 10.** Increase the use of green infrastructure and reduce hardscaping to improve stormwater management, reduce the urban heat island effect and other associated benefits.

### Natural Environment

**GOAL 11.** Protect and enhance the City's natural environment assets and ecosystems and enhance carbon sequestration.

**GOAL 12.** Ensure the resiliency of Kawartha Lakes' natural environment such as forests, bodies of water, open spaces and natural heritage features.

### People, Safety & Health

**GOAL 13.** Ensure the health, safety and resilience of the community by preparing for an increase in climate change related health impacts.

### Transportation

**GOAL 14.** Cultivate sustainable, low-carbon transportation options which adhere to responsible, environmentally friendly transportation operations.

**GOAL 15.** Minimize the potential for disruption to transportation networks from climate change impacts and extreme weather events.

### Waste

**GOAL 16.** Increase waste diversion from the landfill.

### Water, Wastewater and Stormwater Management

**GOAL 17.** Protect water resources and water treatment infrastructure capacity from changing climatic conditions and continue to provide clean, safe drinking water and water-based recreation for the community to enjoy.

## 4. Our Current Climate in Context

### International and Federal Direction

In 2015, Canada participated in the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) and committed to the Paris Agreement. The COP21 target aims to keep a global temperature rise this century well below two degrees Celsius and to drive efforts to limit the temperature increase even further to 1.5 degrees Celsius above pre-industrial levels.<sup>20</sup>

In a recent report, the Intergovernmental Panel on Climate Change further emphasized the need to limit global warming to 1.5 degrees Celsius, a transition that would require “rapid and far-reaching” transitions in how we use our lands, energy, industry, buildings, transportation and design our cities.<sup>21</sup>

In recent years, the Canadian government also made several commitments to address climate change, including:<sup>22</sup>

- Setting a GHG emissions reduction target of 30% below 2005 by 2030.
- Establishing the Low-Carbon Economy Trust Fund to fund projects that reduce carbon, fulfilling Canada’s commitment to phase out subsidies for the fossil fuel industry, and invest in clean energy and clean technology. Canada also committed to phasing-out traditional coal-fired electricity, by 2030.
- Providing \$75 million over 5 years through the Federation of Canadian Municipalities (FCM) Municipalities for Climate Innovation Program to help municipalities adapt to climate change impacts and reduce their GHG emissions. The program also provides municipalities with access to technical expertise and training relating to climate change mitigation and adaptation.
- Launching the Expert Panel on Climate Change Adaptation and Resilience, aimed to define how to measure Canada’s progress in preparing for climate change.
- Releasing the Pan Canadian Framework on Clean Growth and Climate Change which outlines the pathways to meeting Canada’s 2030 target, while growing the economy and building resilience to adapt to a changing climate. This includes putting a price on carbon pollution effective 2019.

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<sup>20</sup> Government of Canada. (2016). *The Paris Agreement*. Retrieved from: <https://www.canada.ca/en/environment-climate-change/services/climate-change/paris-agreement.html>

<sup>21</sup> IPCC, 2018: Summary for Policymakers. In: 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 [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.

<sup>22</sup> Government of Canada. (2018). *Canada’s Climate Plan*. Retrieved from: <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan.html>

## City of Kawartha Lakes Healthy Environment Plan

- Participating in COP24 Katowice, where countries came together to finalize the rules for the implementation of the Paris Agreement. Canada has committed to contribute \$2.65 billion to support developing countries in mitigating and adapting to climate change.<sup>23</sup>

## Provincial Direction

In June 2018, a new provincial government was elected in Ontario. In November 2018, the newly formed Ministry of Environment, Community and Parks (MECP) released its proposal for a Made-in-Ontario Environment Plan.<sup>24</sup> Within the proposal, the MECP outlines the government's promise to hold polluters accountable through stricter enforcement and penalties. The Environment Plan suggests that Ontario does its share to address climate change, while protecting the economy and respecting the community. The Plan does not include carbon pricing; however, climate change is one of four key environmental challenges addressed. Ontario's target for emissions reduction (30% below 2005 levels by 2030) aligns with Canada's 2030 target. The Environment Plan outlines a number of climate-related actions including the Ontario Carbon Trust – and emission reduction fund for investment in clean technologies – and updated policies to build climate resilience.

In addition to the newly proposed Environment Plan, there are a number of initiatives that support climate action across Ontario, including:

- The Provincial Policy Statement (2014) provides direction on land use for municipalities.<sup>25</sup> The PPS directs municipalities to support energy conservation and efficiency, improved air quality, reduced GHG emissions, and climate change adaptation through land use and development patterns.
- The Growth Plan for the Greater Golden Horseshoe (2017) established under the Places to Grow Act, 2005, is a long-term framework for where and how municipalities will grow.<sup>26</sup> The plan requires municipalities to develop policies in their official plans to identify actions to reduce GHG emissions and address climate change adaptation goals. It also encourages municipalities to complete GHG inventories, set reduction targets, and outline actions to reduce GHG emissions.
- Updates to the Ontario Building Code in 2017 include increased energy efficiency standards for new buildings; requiring low-rise houses to increase energy efficiency by 15%, and large buildings to increase energy efficiency by 13%.<sup>27</sup> It is anticipated that further updates will be released in 2019.

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<sup>23</sup> Government of Canada. (2018). *COP24 Katowice: annual UN conference on climate change*. Retrieved from: <https://www.canada.ca/en/services/environment/weather/climatechange/canada-international-action/un-climate-change-conference/cop24-katowice.html>

<sup>24</sup> Government of Ontario. (2018). *Made-in-Ontario Environment Plan*. Retrieved from: <https://www.ontario.ca/page/made-in-ontario-environment-plan>.

<sup>25</sup> Ministry of Municipal Affairs and Housing. (2014). *Provincial Policy Statement*. Retrieved from: <http://www.mah.gov.on.ca/AssetFactory.aspx?did=10463>

<sup>26</sup> Government of Ontario. (2017). *Growth Plan for the Greater Golden Horseshoe*. Retrieved from: [https://files.ontario.ca/appendix\\_-\\_growth\\_plan\\_2017\\_-\\_oc-10242017.pdf](https://files.ontario.ca/appendix_-_growth_plan_2017_-_oc-10242017.pdf)

<sup>27</sup> Government of Ontario. (2017). *Ontario Building Code*. Retrieved from: <https://www.ontario.ca/laws/regulation/120332>

## City of Kawartha Lakes Healthy Environment Plan

- Portions of City of Kawartha Lakes are located in Ontario's Greenbelt. The Greenbelt Plan (2017) helps to build resilience to climate change and encourages mitigation.<sup>28</sup> Climate change considerations are integrated into the planning and management of both natural systems and growth.

## Local Context

Municipalities are in a unique position to design and implement approaches to address climate change, based on their unique set of emission sources and climate-related impacts. They have the tools and mechanisms that are needed to respond to and prepare for the impacts of a changing climate at the local level, and are on the front lines of response efforts when impacts hit.

The City of Kawartha Lakes has been actively preparing for, and responding to climate change by developing and implementing complementary plans, policies and initiatives:

- Identified a Healthy Environment as one of the three core pillars of its Strategic Plan.
- Updated storm and stormwater management guidelines to enhance current management by-laws in response to significant flood damage in recent years.<sup>29</sup>
- Intensified weather monitoring and flood forecasting to help the City communicate risks of heavy rain, snow, or floods to the public.<sup>30</sup> Communicating low water tables (through Kawartha Conservation) and heat advisories to residents along with options for cooling centres.
- Ongoing maintenance of 5,400 lane kilometres of roads and 170 kilometres of sidewalks as part of the winter maintenance program.<sup>31</sup>
- Developed a Salt Management Plan to reduce the environmental impacts of road salting and improve winter clean-up and maintenance.
- Developed and implemented a Forestry Strategy to guide the City in adapting to increased stress on tree canopy.
- Pursued tree planting programs in conjunction with Kawartha Conservation, such as the Tree Seedling Program, to rebuild and enhance the City's tree canopy.
- Developed and commenced the implemented of Lake Management Plans in partnership with the Kawartha Conservation.

Looking to the future, the City has a key role to play in addressing climate change. The City can:

- Set the vision for addressing climate change through the HEP. In this case, the City has established a vision with the guidance of a Steering Committee and Working Group representing local community organizations.

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<sup>28</sup> Ministry of Municipal Affairs and Housing. (2017). *Greenbelt Plan*. Retrieved from: <http://www.mah.gov.on.ca/Page13783.aspx>

<sup>29</sup> City of Kawartha Lakes. (2017). *Infrastructure Guidelines: Storm and Stormwater*. Retrieved from: <https://www.kawarthalakes.ca/en/business-growth/resources/20170804-Storm-and-Stormwater-Management-Guidelines---Final.pdf>

<sup>30</sup> Kawartha Conservation. (n.d). *Flood Forecasting and Warning Program*. Retrieved from: <https://www.kawarthaconservation.com/watershed/flood-forecasting>

<sup>31</sup> City of Kawartha Lakes. (2019). *Snowplowing and Winter Maintenance*. Retrieved from: [https://www.kawarthalakes.ca/en/living-here/snowplowing--and-winter-maintenance.aspx?\\_mid=26236](https://www.kawarthalakes.ca/en/living-here/snowplowing--and-winter-maintenance.aspx?_mid=26236)

## City of Kawartha Lakes Healthy Environment Plan

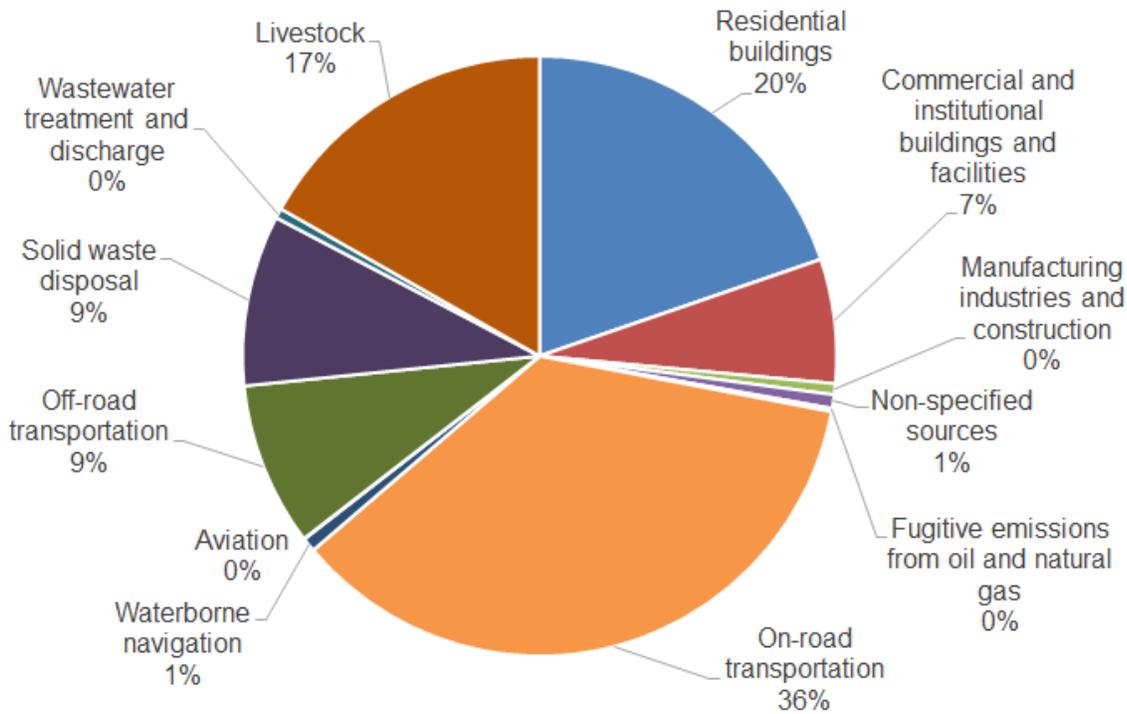
- Demonstrate leadership and awareness through the actions they take as a municipality to ensure climate change considerations are integrated into service delivery and asset management. The response from these actions can be used to develop a shared understanding and encourage community-wide responses to climate change.
- Influence change through the establishment of the local regulatory framework. This may include: assessments and approval processes, the use of surcharges and rebates, integrating the strategies into existing plans and policies and the enforcement of by-laws to implement and enforce adaptive policies that address community climate impacts.
- Implement the provincial Planning Act, and adopt land use policies that support climate mitigation and adaptation principles. Municipalities are responsible for managing local places in a coordinated and planned way that will have long lasting impacts to reducing emissions while creating safe and sustainable places to live.
- Play a strong role in communicating with and providing opportunities for residents and businesses about the importance of climate change initiatives and opportunities for individual action.

## Current Greenhouse Gas Emissions in Kawartha Lakes

For the purposes of the HEP, 2015 was selected as the baseline year as it is the most recent year for which a complete dataset for GHGs is available. In 2015, the City of Kawartha Lake's residents, businesses, institutions, and industries produced approximately 647,470 tonnes of CO<sub>2</sub>e (carbon dioxide equivalent) or 7.8 tonnes of CO<sub>2</sub>e per person. This includes emissions from activities taking place within the City's boundary, including fuel and electricity use, waste generated, and livestock emissions. Figure 3, below, outlines each sector's emissions in 2015:

Transportation (including on-road vehicles, off-road vehicles (ATVs, bulldozers), boats and aircrafts travelling within the City) is the largest source of emissions, accounting for approximately 45% of all GHG emissions. Livestock emissions make up approximately 17% of the total GHG emissions, while energy used in residential, commercial, and industrial buildings accounts for approximately 27%. GHGs from the treatment and disposal of waste and wastewater accounts for approximately 10%.

## City of Kawartha Lakes Healthy Environment Plan



*Figure 3: Community GHG emissions in the City of Kawartha Lakes in 2015, by community subsectors.*

An inventory of GHG emissions generated from all municipal operations in the City of Kawartha Lakes was also completed for 2015. This corporate inventory estimates emissions associated with activities under operational control of the City, such as municipal buildings and facilities, fleet vehicles, street and traffic lights, and energy consumed during the delivery and treatment of water and wastewater. In 2015, these sources of emissions generated a total of 7,500 tonnes of CO<sub>2</sub>e, representing approximately 1% of the total emissions generated in the community. Of those emissions generated by the municipality, the corporate fleet and municipal buildings are responsible for approximately 52% and 41% of municipal emissions, respectively (Figure 4).

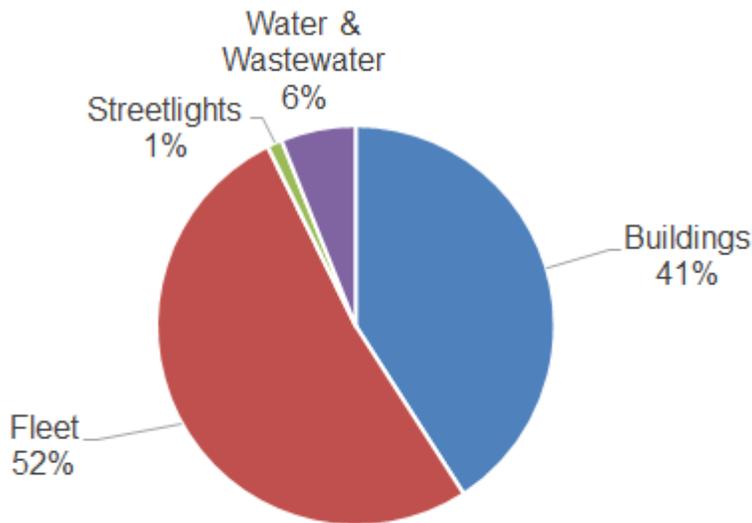


Figure 4: GHG emissions from City of Kawartha Lakes municipal operations (2015)

## 5. Changing Climate – What We Can Expect

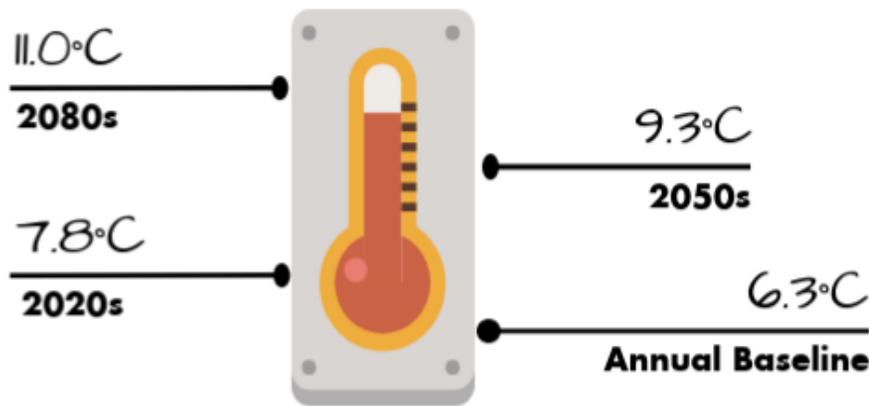
### Warmer Temperatures

Over the last six decades, Canada has become warmer, with average temperatures increasing by 1.5°C between 1950 and 2010.<sup>32</sup> Average temperatures across Ontario are expected to increase 2.3°C by the 2020s, 4.1°C by the 2050s, and 5.6°C by the 2080s, respectively.<sup>33</sup> Warmer average temperatures in Canada have been seen in all seasons, with the greatest warming taking place in winter and spring. From 1971-2000, the annual average temperature in Kawartha Lakes was 6.3°C. It is anticipated that there will be a temperature increase of anywhere from 1.6°C in the 2020s to 4.7°C in the 2080s in Kawartha Lakes.

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<sup>32</sup> Warren, F.J. and Egginton, P.A. (2008). Background Information; *in* From Impacts to Adaptation: Canada in a Changing Climate, 2007, *edited by* D.S. Lemmen, F.J. Warren, J. Lacroix and E. Bush; Government of Canada, Ottawa, ON, p. 27-56.

<sup>33</sup> McDermid, J., Fera, S., and Hogg, A. (2015). *Climate Change Projections for Ontario: An Updated Synthesis for Policymakers and Planners*. Queen's Printer for Ontario. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, Ontario. Climate Change Research Report CCRR-44.



### ANNUAL MEAN TEMPERATURES

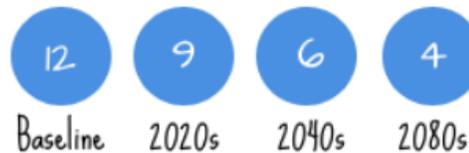
Mean, minimum & maximum daily temperatures are projected to significantly increase in every season.

Temperature extremes and “hot days” (i.e.: days where the temperature goes above 30°C) are also expected to increase. Kawartha Lakes has already experienced extreme heat events during the summers of 2015 to 2017, the fall of 2017 and the summer of 2018, where temperatures ranged between 31°C and 40°C depending on the year. Health risks for vulnerable populations such as seniors, increased energy demand from air conditioners, and infrastructure damage are just some of the impacts associated with extreme heat. Kawartha Lakes can expect an increase in the number of “hot days” to 16 in the 2020s, 31 in the 2050s, and 54 in the 2080s in comparison to the 6 “hot days” between 1971 – 2000. Warmer temperatures and humid summers are already experienced in Kawartha Lakes.

### DAYS ABOVE 30°C



### DAYS BELOW -10°C



### TEMPERATURE EXTREMES

More hot days, fewer cold days.

### More Invasive Species

As the climate becomes warmer, aquatic and terrestrial invasive species are better able to establish in the area. For example, the Emerald Ash Borer (EAB) is an introduced insect pest from Asia that attacks and kills all species of ash trees. This invasive insect has devastated tens of millions of ash trees in North America

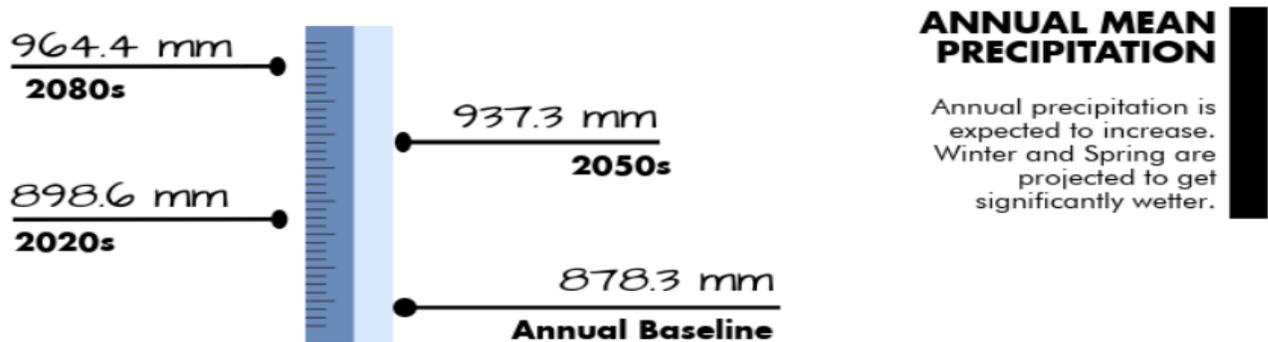
since its discovery in Detroit, Michigan in 2002. The Emerald Ash Borer poses a significant threat to the City of Kawartha Lakes as there are an estimated 24,000 ash trees on public property.<sup>34</sup>

The loss of ash trees will have a significant impact on the local economy and environment, including an estimated \$3 million full ash tree removal cost, public safety hazards and a loss of ecosystem services (the goods that benefit humans, such as food, timber, drinkable water, pollination, flood regulation, and clean air).<sup>35</sup> A healthy and resilient urban forest is required to reduce the impacts of climate change, improve local air quality, reduce stormwater runoff, provide habitat for local wildlife, and promote physical and psychological well-being in the community.

A warmer climate has also been shown to increase the spread of blacklegged ticks carrying Lyme disease to new areas of the province.<sup>36</sup> The changing climate has also impacted the distribution of other pests, such as biting midges, which can spread bluetongue virus.<sup>37</sup> Bluetongue virus poses no risk to humans, but the disease can affect a range of farm animals, including cattle and goats, and is particularly harmful to sheep. Bluetongue virus was first found in southwestern Ontario in 2015.<sup>38</sup>

### More Frequent and Intense Rain

Canada has, on average, become wetter during the past half century, with average precipitation across the country increasing by approximately 13%.<sup>39</sup> For Kawartha Lakes, the annual precipitation is expected to increase by 20 mm in the 2020s, 59 mm in the 2050s, and 86 mm in the 2080s.



<sup>34</sup> Kawartha 411. (April 24, 2017). *Kawartha Lakes looking at plans to deal with Emerald Ash Borer*. Retrieved from: <https://www.kawartha411.ca/2017/04/24/kawartha-lakes-looking-at-plans-to-deal-with-emerald-ash-borer/>

<sup>35</sup> Ibid.

<sup>36</sup> Government of Ontario. (2018). *Lyme Disease*. Retrieved from: <https://www.ontario.ca/page/lyme-disease>

<sup>37</sup> Samy, A. M., & Peterson, A. T. (2016). *Climate Change Influences on the Global Potential Distribution of Bluetongue*

<sup>38</sup> Canadian Food Inspection Agency. (2015). *Fact Sheet – Bluetongue*. Retrieved from: <http://www.inspection.gc.ca/animals/terrestrial-animals/diseases/reportable/bluetongue/fact-sheet/eng/1306116803992/1306121522520>.

<sup>39</sup> Warren, F.J. and Egginton, P.A. (2008).

## More Frequent Flooding

As the intensity of rainfall increases in urban areas, increased pressure is placed on stormwater systems as well as rivers and streams and waterways. These systems are not necessarily able to manage the increased flows in a short period of time, and flooding can occur. The April 2013 and May 2017 flooding events are the most recent examples of intense flooding in the City of Kawartha Lakes. These floods caused road washout, erosion, damage to private homes and property, increased property damage claims, health impacts due to disease spread by floodwaters and increased road accidents, and a host of social impacts.<sup>40</sup> Further, road washouts and blockages meant that people could not move through or access the City, impacting the local economy. Local recreational and community events have also experienced loss of attendance and revenue due to flooding. Flooding leads to increased runoff, causing increased nutrient, sediment and contaminant loading in rivers and lakes. Combined with warmer lake temperatures, this can lead to an increase in lake vegetation and algal blooms.

Flooding also means potential disruption to the City's emergency response services. For example, power outages caused by thunderstorms can put a strain on vulnerable populations and municipal operations. During the April 2013 flood, which is referred to as the worst flooding since 1998, the City had to evacuate residents from the Burnt River, Black River, and Gull River watershed areas.

Flooding has important budget implications. The increase in the City's 2018 Operating Budget suggests a greater need for stormwater management, emergency planning and services, infrastructure, land use, and development. This is further highlighted by the "poor" infrastructure rating of the City's stormwater sewer system.<sup>41</sup> Flooding impacts can also be seen in waterfront areas, impacting the tourism industry.

## More Frequent Extreme Weather Events

Canada has seen more frequent and intense extreme weather events over the last 50-60 years than ever before. Extreme weather includes extreme heat days, more instances of extreme precipitation and flooding, wind storms, and ice storms. In Canada, models show shorter return periods of extreme events – that is, the estimated length of time between events is becoming shorter.<sup>42</sup> It is anticipated that more intense rainfall events will occur more often, with more rain falling in a shorter period of time than in the past.

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<sup>40</sup> Rain Community Solutions. (2017). Urban Flooding in Ontario: Toward Collective Impact Solutions. Peterborough, ON.

<sup>41</sup> City of Kawartha Lakes. (2017). *The 2017 Asset Management Plan for the City of Kawartha Lakes*. Retrieved from: [https://www.kawarthalakes.ca/en/municipal-services/resources/Asset\\_Management\\_Plan\\_-\\_2017\\_Draft\\_3.pdf](https://www.kawarthalakes.ca/en/municipal-services/resources/Asset_Management_Plan_-_2017_Draft_3.pdf)

<sup>42</sup> McBean, G. and Henstra, D. (2009). Background Report: Climate Change and Extreme Weather: Designing Adaptation Policy. Retrieved from: [http://act-adapt.org/wp-content/uploads/2011/03/PDF-WeatherSession\\_BackgroundReport.pdf](http://act-adapt.org/wp-content/uploads/2011/03/PDF-WeatherSession_BackgroundReport.pdf)



Precipitation will fall at a faster rate (mm/h)



Shorter storms will have an increasingly high intensity



Return periods of heavy storms will shorten, meaning increased frequency

## PRECIPITATION EVENTS

Precipitation events in general are projected to become more intense and extreme.

In addition to extreme rain events, Kawartha Lakes has also experienced ice storms that have consequences for residents. For example, the December 2013 ice storm – often called one of the most severe weather events in Kawartha Lakes’ recent history – resulted in power outages, service disruption, damage to trees and natural areas, and road closures. Since 2013, freezing rain events are an area of priority for City staff. Ice storms and freezing rain events are expected to increase by about 35% in southern Ontario.<sup>43</sup>

Ice storms are difficult to manage at the municipal level as they can often be combined with rapid changes in temperature. During these types of events, some homes and buildings will become uninhabitable and can suffer infrastructure breakdown when power and heat is not available for an extended period of time. Ice storms can be particularly hard on vulnerable populations (such as seniors) when power and heat is lost. Freezing rain also leads to the increased use of road salt, which pollutes local waterways.

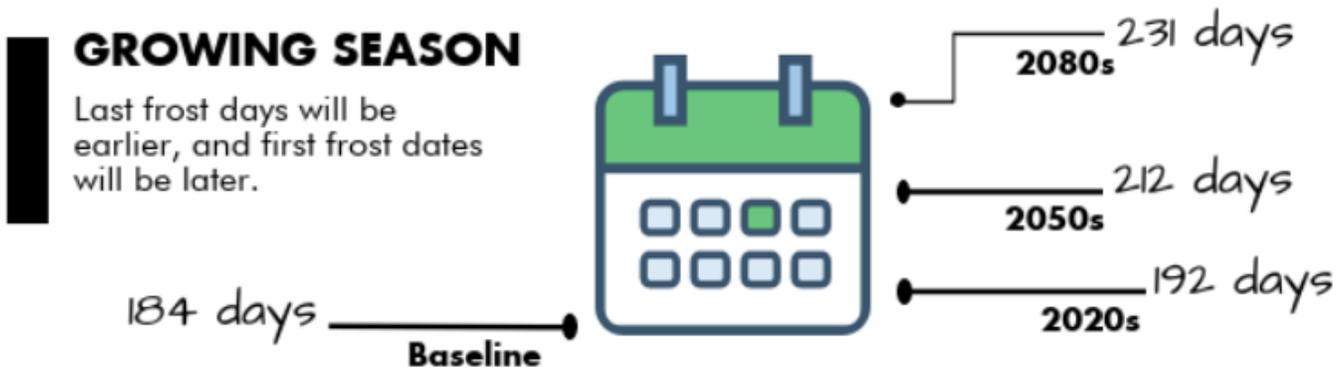
Wind storms have also caused damage to infrastructure and property in the City in the past, such as the May 2018 wind storm, which resulted in thousands of residents losing power. Strong winds can have significant effects on the economy, with power outages causing service and business disruption in the City, as well as school closures and transportation hazards. More wind storms also put pressure on municipal operations, with more demand for cleanup of debris and road hazards caused by windy conditions.

## Longer Growing Seasons

From 1971-2000, the typical growing season was 184 days in Kawartha Lakes. The growing season is expected to increase by 8 days a year by the 2020s, 28 days by the 2050s and 47 days by the 2080s.

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<sup>43</sup> Kawartha Conservation. (2015). *Changing Climate – A Challenge and an Opportunity* (Background Paper). City of Kawartha Lakes: Kawartha Conservation.



In some ways, this may seem like a positive impact for agriculture. However, agriculture is extremely sensitive to climate variations and small to moderate changes in temperature, precipitation, and soil moisture can affect the location, timing, and productivity of agricultural systems.<sup>44</sup> This can have economic consequences for, and effects on, food security in the area. Drier conditions during the growing season are important for the growth of healthy crops; however, long periods without precipitation can severely diminish groundwater and can lead to strain on crop yields. If dry conditions increase in future decades, farmers may need to adapt their crop rotation or incorporate more diverse and resilient plants.

### Impacts to the Local Economy, Recreation and Tourism Opportunities

Extreme weather, increased precipitation and more unpredictable weather events have impacts to the local economy, City operations, recreation and tourism opportunities. There is an increased operating cost to maintain ice rinks year-round, particularly in high temperatures in the summer, as seen in the Council-approved 15% increase in ice rental fees in 2017. With temperatures nearing the freezing mark more frequently in the winter months, there is an increased need for salting, causing damage to local infrastructure.

Additionally, more rapid freeze-thaw cycles are also a concern in the City, causing wear and tear on City-owned infrastructure (such as water main breaks, cracking asphalt and concrete, and potholes). Warmer winters can also result in a loss of outdoor recreational opportunities such as skating, skiing, and ice fishing. Shorter and warmer winters can pose a threat to the City's maple syrup industry.

What's more, lower water levels or drought have affected businesses, the environment, and local communities in Kawartha Lakes. The prolonged drought in 2016 has been described as one the most severe events over the past 25-30 years. Lower water tables have put a strain on summer tourism, an important source of revenue for the City, and agriculture – with lower crop yields and producers feeding winter feed to livestock in the summer.

<sup>44</sup> Environmental Protection Agency. (2017). *Climate Action Benefits Report: Agriculture and Forestry*. Retrieved from: <https://www.epa.gov/cira/climate-action-benefits-agriculture-and-forestry>

## Small Emissions Reductions with Business-As-Planned (BAP)

It is estimated that without any action at the local level, community greenhouse gas emissions will decline by 6.6% from 2015 to 2030 levels, an overall emissions reduction of approximately 42,950 tonnes of CO<sub>2</sub>e (Figure 5). This estimation of future emissions is known as the “business-as-planned” scenario or BAP.<sup>45</sup> The BAP assumes that population and employment levels will grow from the 2011 population of 73,219 (including the census undercount) to 100,000 by 2031 based on the current Provincially-approved growth projections.<sup>46</sup>

As populations grow, so do the emissions from buildings, vehicle kilometers travelled, and waste streams. Similarly, as employment grows, the emissions from commercial, industrial, and other non-residential buildings, increase accordingly. The anticipated 20% increase in population in Kawartha Lakes will drive new building construction, new economic activity, new waste streams, and increase the number of vehicles on the road.<sup>47</sup> At the same time, as technologies advance and policies and programs from other levels of government are implemented, there will be increased efficiency in new buildings, retrofits to existing buildings, more efficient vehicles, and a cleaner energy grid, which leads to an overall reduction in emissions levels. From a municipal operations perspective, the BAP predicts an 7.7% reduction in emissions to 2030 from 2015 levels, or a reduction of approximately 580 tonnes of CO<sub>2</sub>e (Figure 6). This is associated with an increase in municipal operations and services consistent with population growth, as well as increased efficiency in new buildings, more efficient vehicles, and a cleaner energy grid. Should population and employment growth occur at a slower rate than predicted, emissions will also decrease more rapidly.

Current federal and provincial targets call for emission reductions of 30% below 2005 levels by 2030, which translates to a 20% reduction from 2015 levels.<sup>48</sup> This leaves a gap of 86,550 tonnes (approximately 13.4%) for community emissions, and a gap of 920 tonnes (approximately 12.3%) for corporate emissions, to be met by additional policy and action at the municipal level.

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<sup>45</sup> BAP is based upon the best estimates of population and employment projections available. As such, the BAP may change subject to changes in population and/or employment growth projections.

<sup>46</sup> City of Kawartha Lakes. (2016). *Population Growth*. Retrieved from: <https://www.kawarthalakes.ca/en/business-growth/population-growth.aspx>

<sup>47</sup> Ibid

<sup>48</sup> Since the baseline year for Kawartha Lakes emissions profile is 2015, and the federal and provincial baselines are 2005 when emissions were substantially lower, reducing emissions by 30% below Kawartha Lakes 2015 baseline year would be significantly more challenging. Instead, the federal and provincial annual reduction rate was used (roughly 1% per year between 2015 and 2030), which translates into 20% below 2015 levels by 2030.

City of Kawartha Lakes Healthy Environment Plan

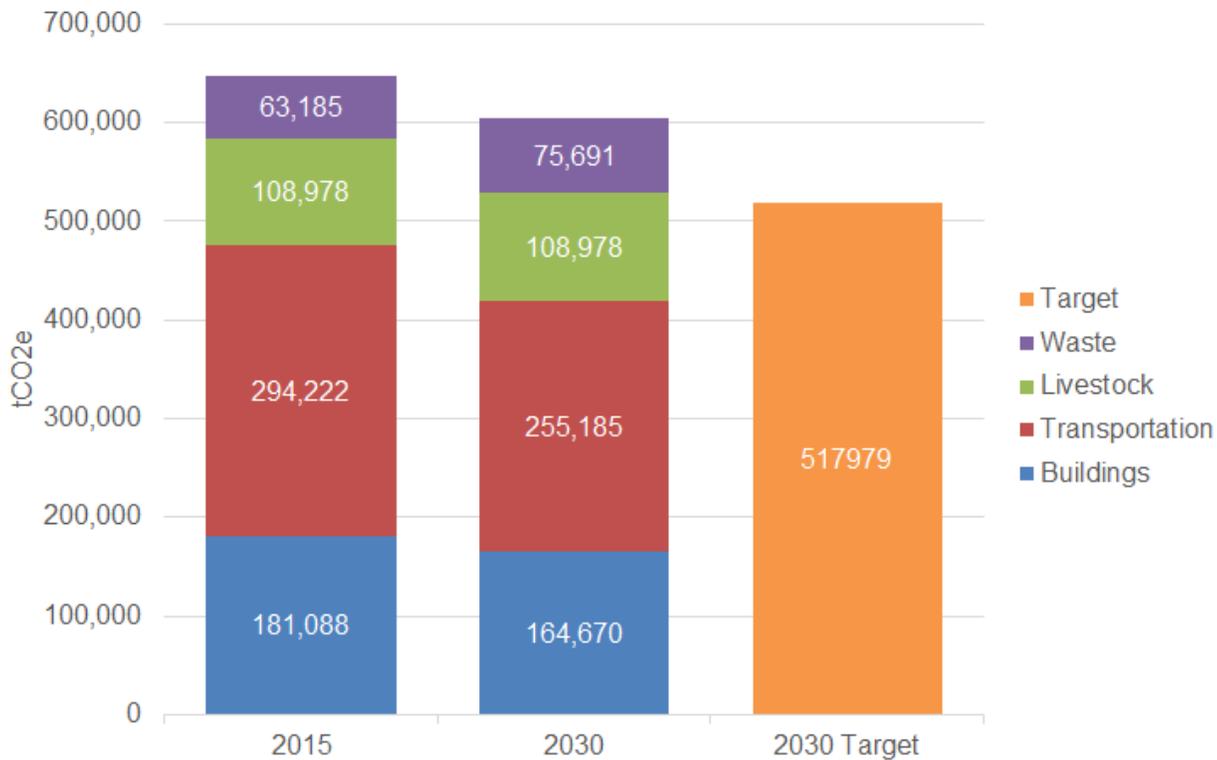


Figure 5: Business-as-planned projections from 2015 to 2030 for the City of Kawartha Lakes' community emissions, relative to the federal and provincial targets

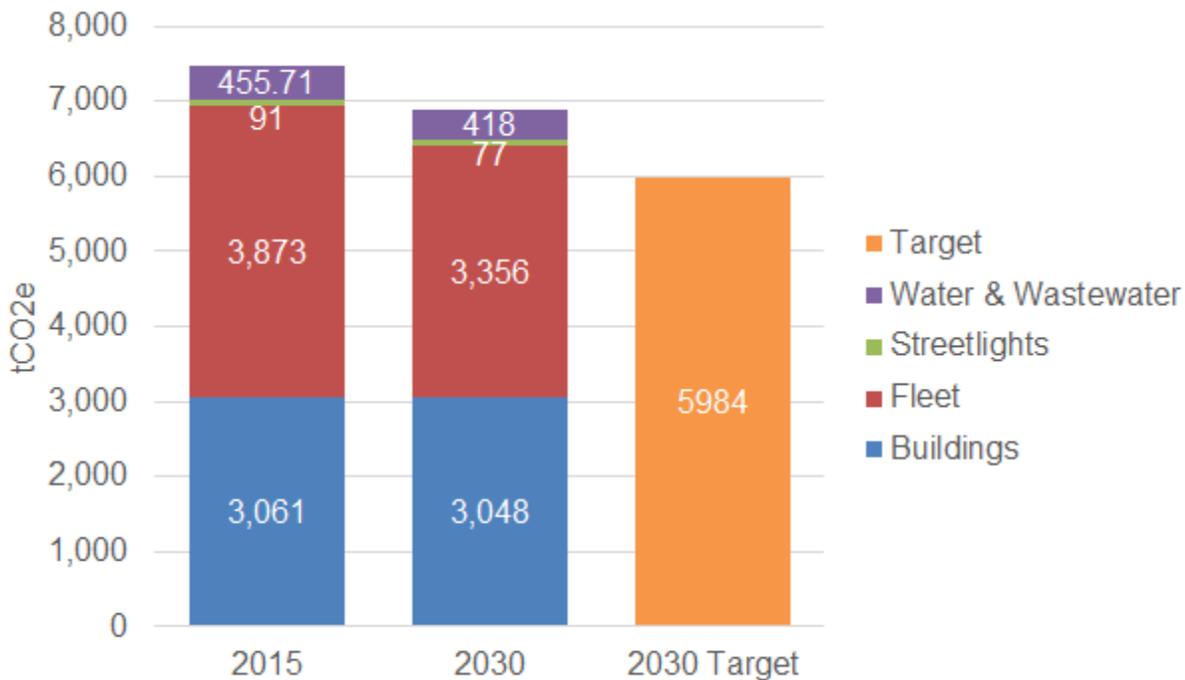


Figure 6: Business-as-planned projections from 2015 to 2030 for the City of Kawartha Lakes' corporate emissions, relative to the federal and provincial targets

## 6. Strategies to Address Climate Change

The following presents a series of strategies to address climate change locally. Strategies are organized by goal area. A brief overview of the current state is provided for each goal area, as well as a number of strategies for mitigation and adaption. Strategies are presented for both the municipality and the community as a whole. Each strategy has a series of recommended actions, as well as supporting information. While some strategies will address climate impacts and GHG emissions, others do not. As such, strategies that do not address climate impacts or GHG emissions do not include this information. The cost of strategies has not been included at this time. Costing for the strategies and actions will occur during the business and budget planning processes of each of the lead agencies and/or departments.

Through these activities, Kawartha Lakes is aligned with the rate of emissions reduction established by the federal and provincial targets by 2030. The implementation of all community mitigation strategies not only have a significant environmental benefit, but provide economic value to the community.

Although the implementation of all mitigation strategies is ambitious, further reductions are needed to reach the absolute 30% federal and provincial emissions reduction targets. To further reduce GHG emissions within the community, each of the strategies would require greater levels of uptake in shorter periods of time, particularly in the areas of building efficiency and transportation.

### Agriculture

Agriculture is a key part of the local economy. In 2016, the City had approximately 1,270 farms with 168,270 acres in crop production and 25,230 acres in pasture, representing a 3.5% increase in the land in crop production as well as a 23% drop in the acres used for pasture since 2011.<sup>49</sup> Sales of farm products in Kawartha Lakes also continue to increase, reaching more than \$149.5 million in 2015, a 40% increase since 2010. Agri-food and related industries employ approximately 8,390 people in the area year-round and 4,010 seasonally. It is estimated that, for every dollar of agricultural products sold, \$2.20 is added to the regional economy.<sup>50</sup>

#### A Call to Action

Throughout the City of Kawartha Lakes, we have seen an appetite for change and local climate action. We welcome members of the public, organizations and other potential partners from across the community to help us realize our vision for a healthy environment and a prosperous community.

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<sup>49</sup> City of Kawartha Lakes. (2017). *Agriculture Production Profile*. Retrieved from: <https://www.kawarthalakes.ca/en/business-growth/agriculture.aspx>

<sup>50</sup> Ibid.

## City of Kawartha Lakes Healthy Environment Plan

Farmers are often recognized as environmental stewards, with many voluntarily completing Environmental Farm Plans to improve the environmental conditions of their operations by adopting best practices that benefit the environment.<sup>51</sup>

Technology improvements in livestock farming have significantly reduced the emissions intensity of operations in recent decades.<sup>52</sup> Local post-secondary institutions offer programs in Sustainable Agriculture and Food Systems (Trent University) and Sustainable Agriculture (Fleming College) that contribute to the local economy.

The changing climate presents both opportunities and risks for Kawartha Lakes' agri-food sector. Warmer temperatures and longer growing seasons suggest that growing conditions may improve but changing climate can also lead to increased water stress by increasing flood and/or drought conditions. Adaptive measures for crop selection, soil, and water management have been developed and continue to be further researched. Farm operators may continue to need to adapt to climatic changes by selecting plant varieties that are more suitable for new climatic conditions and adopt different soil and water management techniques (i.e. irrigation, cover crops, tile drainage/controlled drainage) to enhance agricultural yields while protecting production from climate risks. Management practices that are responsive to climate changes have many benefits for the agricultural sector, including enhanced production, climate resilience, and more efficient use of resources.

### Emissions from Livestock

Emissions from livestock remain a key emission source in Kawartha Lakes. Addressing these emissions while maintaining the cultural and economic values produced by livestock farming is an important part of this Plan. Livestock emissions account for 17% of all community emissions, generating approximately 108,980 tonnes of GHGs in 2015 in Kawartha Lakes. Of this, 80% of emissions are from enteric fermentation (i.e. digestion), while 20% are from manure management. Agri-businesses can contribute to reducing emissions through manure management, the improving digestibility of feed, and soil management techniques that remove and store carbon (carbon sequestration) in the soil.

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<sup>51</sup> <http://www.omafra.gov.on.ca/english/environment/efp/efp.htm> Ministry of Agriculture, Food and Rural Affairs. (2016). *Canada-Ontario Environmental Farm Plan*. Retrieved from: <http://www.omafra.gov.on.ca/english/environment/efp/efp.htm>

<sup>52</sup> <http://www.beefresearch.ca/research-topic.cfm/environmental-footprint-of-beef-production-6> McAllister, T. (2018). *Environmental Footprint of beef production-6 Beef Production*. Retrieved from: <http://www.beefresearch.ca/research-topic.cfm/environmental-footprint-of-beef-production-6>

## Strategy AG1: Implement best practices within agriculture management systems, which improve efficiency and resilience to climate impacts

### Recommended Community Adaptation Actions:

- Encourage mapping of existing crop varieties against future climate projections such as extreme heat, drought risk, and flood risk, and continue to develop varieties which address those future needs.
- Select crop varieties which are disease, extreme heat, and drought-resistant. Investigate the use of crop varieties that are currently being grown in climates similar to future projections for Kawartha Lakes (e.g. U.S.).
- Use no-till and cover crops to control agricultural run-off, conserve water, reduce pollution, and prevent soil erosion and sedimentation.
- Implement overhead or subsurface drip irrigation (where feasible/appropriate) to improve drought resilience and conserve water resources.
- Increase the use of tile drainage systems or controlled drainage systems and/or additional sustainable water management practices (such as water storage) to improve water use efficiency, conservation, and drainage. These drainage systems can contribute to higher yields and improved crop quality, earlier planting, reduced nitrogen loss, and reduced soil erosion.
- Continue to improve energy efficiency of farming practices, equipment, and buildings.
- Encourage networking amongst producers to share resources, tools, and knowledge about sustainable, efficient and resilient agricultural practices.
- Track and share local success stories to promote uptake of sustainable, resilient agricultural practices.
- Pursue other innovative agricultural practices (e.g. precision farming).

#### **Education Actions**

- Recommend best practice for sustainable agriculture, crop diversification and new technologies, to protect seasonal yields from climate impacts and improve efficiency.
- Provide water conservation and water use efficiency education and awareness programs.
- Provide resources and information on energy efficiency best practices.

#### **Financing Options**

- Sustain and increase financial support for farmers to install sustainable and resilient management practices (e.g. Canadian Agricultural Partnership Program – Environmental Farm Plan, OMAFRA programs such as the Tile Loan Program).

#### **Potential Primary Partners/ Departments\***

- Kawartha Lakes agricultural community (farmers)
- Ontario Soil and Crop Improvement Association (OSCIA)
- Victoria Soil and Crop Improvement Association
- Kawartha Farm Stewardship Collaborative
- Conservation Authorities

### **Municipal Role**

- Integrate agritourism into the economic development strategy to showcase best practices amongst farmers and the public.

### **Impacts Addressed**

- Flooding in rural areas, leading to washout of fields and lower crop yield.
- Heat stress on crops and livestock leading to loss of agricultural productivity.
- Longer growing season leading to new crop opportunities.
- Increased runoff causing increased nutrient, sediment, and contaminant loading in rivers and lakes.
- More winter days above 0 degrees, lowering productivity of winter-reliant industries (such as maple syrup,).
- Decreased evapotranspiration and increased runoff from precipitation events, leading to reduced groundwater recharge.
- Increased water demand causing stress on water treatment and delivery systems.

### **Adaptation/ Mitigation Co-benefits**

- Sustainable water and soil management practice improve energy efficiency and reduce water use, while increasing preparedness for flooding and/or drought conditions by protecting source water and reducing runoff and erosion.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Proportion of acres with tile and/or controlled drainage systems; acres with irrigated crops (where practice is applicable).
- Ratio of no-till and cover crop versus tilled areas.
- Percentage of crop yields lost due to extreme heat, drought, and flood events; average amount of changes made to plant varieties per farm each season.

\* Note potential partners not been confirmed by agencies and do not reflect a commitment to implementation at this time.

## Strategy AG2: Implement best practices for manure management to reduce GHG emissions and nutrient losses from livestock production systems

### Recommended Community Mitigation Actions:

- Facilitate forums, training sessions, and capacity-building activities for local farms to continue to implement manure management best practices, including:
  - Improved manure collection and storage (i.e.: aerating stored manure and storing manure at lower temperatures);
  - Manure application to reduce N<sub>2</sub>O emissions (i.e.: avoiding application on wet or frozen soils, considering artificial fertilizers or manure already applied when applying additional fertilizer or manure to fields, shifting towards manure application earlier in the season when fields are most productive, add urease and nitrification inhibitors to manure to reduce nitrogen loss); and
  - Consider anaerobic digestion to capture methane from manure, converting it to renewable natural gas, where economically feasible.
- Promote participation in the Canada-Ontario Environmental Farm Program to encourage farmers to prepare and implement Environmental Farm Plans and increase knowledge of mitigation best practices.
- Promote use of the Agriculture and Agri-Food Canada's GHG emissions modeling tool to help farmers assess their GHG emissions and explore farm management options.
- Encourage networking within the agricultural community to share resources, tools, and knowledge about manure management best practices; track and share local success stories.
- Encourage farmers and other key partners to pursue innovative agricultural practices (e.g. manure storage covers).

#### **Education Actions**

- *See recommended actions from AG1.*

#### **Financing Options**

- Sustain and increase financial support for farmers to continue and to expand manure management best practices (e.g. Canadian Agricultural Partnership – Environmental Farm Plan).

#### **Potential Primary Partners/ Departments**

- Kawartha Lakes agricultural community (farmers)
- Ontario Soil and Crop Improvement Association
- Victoria Soil and Crop Improvement Association
- City of Kawartha Lakes Agriculture Development
- KC Agriculture Stewardship

#### **Municipal Role**

- Integrate agritourism into the economic development strategy to showcase best practices amongst farmers and the public.

### **GHG Reduction**

- 12,520 tonnes (in combination with AG3).
- Opportunity to achieve greater reductions with more advancements in low emission practices and technologies.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Proportion of farms creating and implementing Environmental Farm Plans.
- Reduced livestock GHG emissions.

## Strategy AG3: Implement best practices to improve the digestibility of feed and to reduce emissions from enteric fermentation

### Recommended Community Mitigation Actions:

- Facilitate forums, training sessions, and capacity-building activities for local farms to continue to implement best practices that reduce enteric fermentation emissions and improve feed digestibility, including:
  - Selecting livestock to genetically improve the efficiency of food conversion, animal productivity, and reproductive efficiency;
  - Improving forage quality and diet (more grains, legumes, and some fats) to reduce emissions and improve animal productivity;
  - Adopting precision feeding, based on age, reproductive stage, and other considerations;
  - Adding ionophores (compounds added to cattle feed to increase feed efficiency) to reduce methane production;<sup>53</sup> and
  - Considering mechanical and biological processing of food to improve feed digestibility.
- Promote participation in the Canada-Ontario Environmental Farm Program to encourage farmers to prepare and implement Environmental Farm Plans and increase knowledge of mitigation best practices.
- Promote use of the Agriculture and Agri-Food Canada's GHG emissions modeling tool to help farmers assess their GHG emissions and exploring various farm management options.
- Encourage networking within the agricultural community for sharing resources, tools, and knowledge about sustainable agricultural practices; track and share local success stories.
- Encourage farmers and other key partners to pursue innovative agricultural practices (e.g. nitrification inhibitors).

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<sup>53</sup> Hersom, M. and Thrift, T. (2012). *Application of Ionophores in Cattle Diets*. Retrieved from: <http://edis.ifas.ufl.edu/pdffiles/AN/AN28500.pdf>

### **Education Actions**

*See recommended actions from AG1.*

### **Financing Options**

- Sustain and increase financial support for farmers to continue and to expand mitigation best practices.

### **Potential Primary Partners/ Departments**

- Kawartha Lakes agricultural community (farmers)
- Beef Farmers of Ontario; Victoria Beef Farmers
- Ontario Sheep; Victoria Sheep Producers
- Dairy Farmers of Ontario; Kawartha Lakes Milk Producers
- Ministry of Agriculture, Food and Rural Affairs (OMAFRA)

### **Municipal Role**

- Integrate agritourism into the economic development strategy to showcase best practices amongst farmers and the public.

### **GHG Reduction**

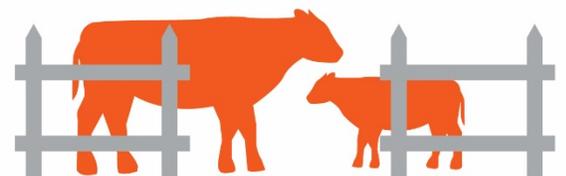
- 12,520 tonnes (in combination with AG2).
- Opportunity to achieve greater reductions with advancements in low emission practices and technologies.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Proportion of farms creating and implementing Environmental Farm Plans.
- Reduced livestock GHG emissions.



## Strategy AG4: Encourage agricultural practices that increase the amount of carbon that is removed and stored (carbon sequestration) in soil and farm land

### Recommended Community Mitigation Actions:

- Facilitate forums, training sessions, and capacity-building activities for local farms on best practices, and new/emerging practices and technologies, to increase soil carbon sequestration and storage including:
  - Improved cropland management, including crop selection and rotation, nutrient management, tillage/residue management, and water management (including irrigation, drainage), agroforestry, etc.; and
  - Restoration of degraded lands (using erosion control, organic and nutrient amendments), conversion of marginal farmland to perennial grasses or trees, and restoration of wetlands.
- Continue to review current research and methodologies to quantify carbon sequestration through agriculture. Once determined, begin regularly quantifying agricultural sources of carbon sinks.

#### **Education Actions**

- *See recommended actions from AG1.*

#### **Financing Options**

- Sustain and increase financial support for farmers to increase soil carbon sequestration and storage best practices (e.g. Canadian Agricultural Partnership – Environmental Farm Plan).

#### **Potential Primary Partners/ Departments**

- Kawartha Lakes agricultural community (farmers)
- Ontario Soil and Crop Improvement Association
- Victoria Soil and Crop Improvement Association
- Conservation Authorities

#### **Municipal Role**

- Integrate agritourism into the economic development strategy to showcase best practices amongst farmers and the public.

#### **Adaptation/Mitigation Co-benefits**

- Carbon sequestration and storage through restoration of degraded land and enhancement of natural features that contribute to flood control, erosion prevention, water filtration, and increase in suitable habitat for plant and animal communities.

#### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

#### **Indicators**

- Appropriate methodology identified to quantify carbon sequestration in Kawartha Lakes.
- Amount of, and economic value of carbon sequestered.

## BUILDINGS AND INFRASTRUCTURE

### Residential and Commercial Buildings

As the City of Kawartha Lakes continues to grow, new homes will be built. Although new construction accounts for a small percentage of the total contributions from the residential sector (assuming a rate of 1%/year), it is the City's role to continue to ensure new development complies with the most current Ontario Building Code (OBC). Updates to the OBC in 2012 included specifications for increased energy efficiency. Further updates to the OBC in 2017 specified an additional 15% increase efficiency. In addition, changes in 2018 include the inclusion of rough-ins for electric vehicle charging stations (to make installation easier in the future) in new houses and new non-residential buildings such as workplaces with integrated parking spaces. Further changes to the Building Code are expected to continue to increase energy efficiency. Through these Building Code changes, developers and builders will continue to increase the efficiency of new buildings and contribute to overall efficiency of Kawartha's building stock in the future.

In 2016, the City of Kawartha Lakes had a total of 31,105 private dwellings, of which 25,990 were single detached houses.<sup>54</sup> This represents 86% of all houses in the city. Most of these houses are older with just under 60% having been built before 1990 and 40% dating to before 1975. The commercial sector includes office, retail, hotels and restaurants within the City of Kawartha Lakes. The institutional sector includes the: Ross Memorial Hospital, Victoria Manor Long Term Care Home, Frost Campus of Fleming College (located in Lindsay), 22 public schools and 5 catholic schools (elementary and high schools), as well as 216 municipal buildings and facilities.

### Industrial

The industrial sector in Kawartha Lakes is comprised of a number of niche market manufacturers, including steel fabrication, woodworking and automotive industries. Manufacturing also includes dairy products, seed products and paper products. Kawartha Lakes' industrial sector also includes construction, distribution and fabrication.<sup>55</sup>

### Infrastructure

Infrastructure includes a number of things, such as roads, buildings, bridges and culverts owned and operated by the City, as well as water and wastewater treatment plants. The municipality owns 190 structures, 97% of which have at least 10 years of usable life remaining.<sup>56</sup> The municipality's road network is in "good" condition

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<sup>54</sup> Statistics Canada. (2016). *Kawartha Lakes, CDR [Census division], Ontario and Saskatchewan [Province] (table)*.

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<sup>55</sup> <https://www.kawarthalakes.ca/en/business-growth/key-sectors-and-major-employers.aspx> Kawartha Lakes. (2017). *Key Sectors and Major Employers*. Retrieved from: <https://www.kawarthalakes.ca/en/business-growth/key-sectors-and-major-employers.aspx>

<sup>56</sup> Ibid.

while buildings and facilities are in “fair” condition.<sup>57</sup> The bridges and large culverts in the City received a “poor” rating, which means that significant deterioration is evident and service is at risk.<sup>58</sup> Overall, 70% of assets with a total valuation of \$1.2 billion, are in “good” to “very good” condition but 18% are in “poor” to “very poor” condition.<sup>59</sup>

## Emissions from Buildings and Infrastructure

At the community level, emissions from all residential, commercial, institutional and industrial buildings, manufacturing and construction, and fugitive emissions (due to leaks or other unintended releases) from natural gas transmission account for 28% of the total emissions in Kawartha Lakes.<sup>60</sup>

Residential buildings account for approximately 128,060 tonnes of CO<sub>2</sub>e emissions. This represents 71% of the total emissions from buildings and 20% of emissions overall (Figure 7). Of the housing mix, 96% of homes are older than 2012, presenting an opportunity to increase energy efficiency and reduce greenhouse gas emissions from existing buildings.

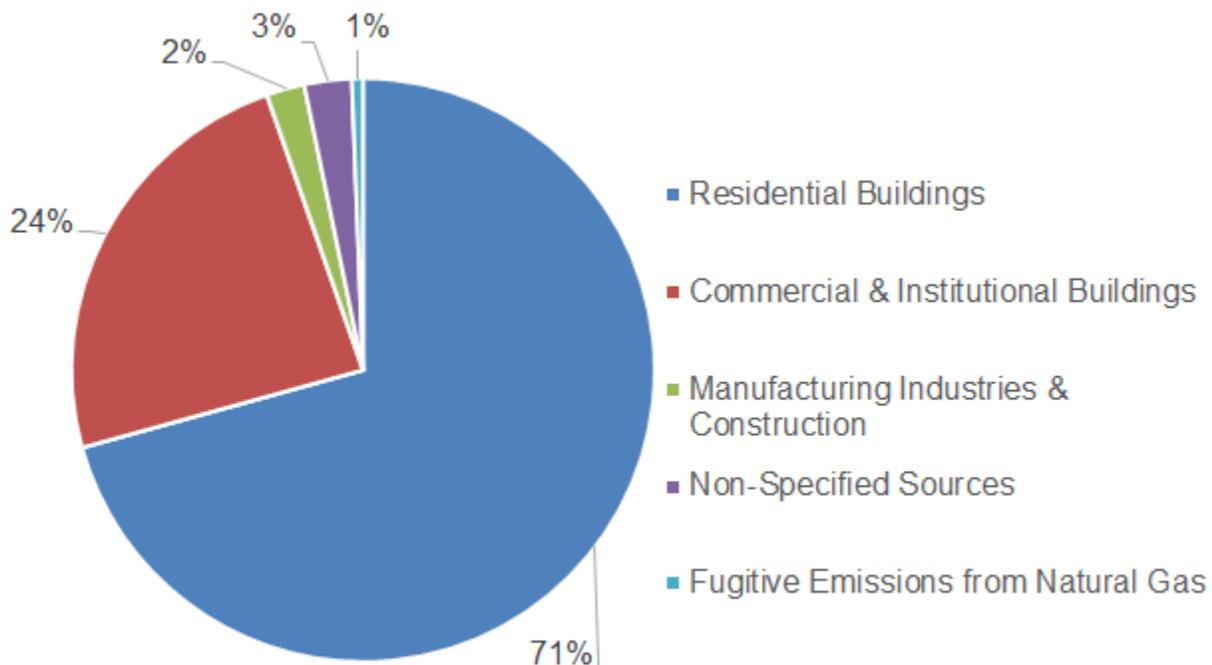


Figure 7: GHG emissions from buildings and infrastructure in Kawartha Lakes

<sup>57</sup> City of Kawartha Lakes. (2017). *The 2017 Asset Management Plan for the City of Kawartha Lakes*. Retrieved from: [https://www.kawarthalakes.ca/en/municipal-services/resources/Asset\\_Management\\_Plan\\_-\\_2017\\_Draft\\_3.pdf](https://www.kawarthalakes.ca/en/municipal-services/resources/Asset_Management_Plan_-_2017_Draft_3.pdf)

<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

<sup>60</sup> Fugitive emissions are methane released through equipment leaks, evaporation, venting, flaring, and accidental releases that occur when natural gas is collected, processed, and delivered to market.

## City of Kawartha Lakes Healthy Environment Plan

Together the commercial and institutional sector generated 43,330 tonnes of CO<sub>2</sub>e which accounts for 24% of the total emissions from buildings and 7% of emissions overall.

The industrial sector is responsible for 3,800 tonnes of CO<sub>2</sub>e which accounts for 2% of the total emissions from buildings and just under 1% of emissions overall. Although the industrial sector represents a smaller portion of the emission from buildings, it still plays an important role in emissions reduction.

At the corporate level, municipally owned buildings and facilities generated 3,060 tonnes of CO<sub>2</sub>e in 2015, which accounted for 41% of corporate emissions. The City has a Corporate Energy Management Plan (CEMP), which includes a target reduction of energy intensity by 10% between 2016 and 2021. The Plan, which is championed by the Energy Stewards Team, outlines a series of demand management initiatives. To date, the largest consuming municipal facilities have reduced their energy consumption by nearly 10%, equating to a savings of \$116,000.<sup>61</sup> The CEMP will be updated in 2019 to align with the HEP.

Older homes, commercial and institutional buildings, and municipally-owned facilities present an opportunity to increase the efficiency of buildings through a voluntary retrofit program.

Such a program is appealing to homeowners who are looking to increase the energy efficiency of their homes, reduce their energy costs and improve the value of their property. The deep retrofit concept specifically looks to review the energy performance of the 'whole-home' rather than incremental changes, and achieve energy efficiency improvements of 65%. The program would aim to have 35% of all homes participating by 2030.

Similarly, for the commercial sector, the retrofit program would be offered in standardized packages targeting the highest energy uses in commercial building including heating, cooling, insulation, and water heating with an objective of increasing energy efficiency by approximately 65%. The program would need to allow time upfront for the detailed planning to occur including having trained contractors to deliver the retrofits. As a result, it is anticipated to start in 2020 for both homes and businesses. Once initiated, it is anticipated that there would be 35% of buildings retrofitted per year.

### Deep Retrofit Program

A deep retrofit package would be designed to: manage the amount of heat loss in the home or businesses (i.e.: increased insulation, weather-stripping); reduce the amount of energy used by appliances and lighting; and integrating automatic controls (i.e.: lighting and thermostats). The deep retrofit packages could also include elements (i.e. solar PV/thermal, ground source heating, etc.), which further reduce traditional energy use. The package would also increase the resiliency of homes and businesses through the integration of lot-level climate adaptation measures. These measures would decrease urban heat island effect, and reduce runoff and flood risk. Lot-level climate adaptation can be accomplished by using rain gardens, backwater valve, sump pump, downspout disconnect, re-grading the property, permeable pavement, etc. The program should also include adoption of an energy performance labelling program (i.e.: Natural Resources Canada EnerGuide Rating System<sup>1</sup>) as noted for new construction.

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<sup>61</sup>City of Kawartha Lakes. (2016) *Corporate Energy Management Plan*. Retrieved from: <https://www.kawarthalakes.ca/en/living-here/resources/Documents/Corporate-Energy-Management-Plan.pdf>

## City of Kawartha Lakes Healthy Environment Plan

There is an opportunity to facilitate energy efficiency improvements and climate resiliency in the industrial sector. Most industries have a systematic approach to managing energy and increasing energy efficiency, to improve productivity and efficiency of their operations. Best practices demonstrate that industrial energy efficiency improves by roughly 1-2% per year in Canada, through education and training programs, networks and peer-to-peer learning, and capacity-building programs and funding opportunities from all levels of government.

There is an opportunity for a more in-depth infrastructure assessment with up-to-date climate change projections (including precipitation, temperature, and extreme weather). Integrating up-to-date climatic projections can help identify critical vulnerabilities in infrastructure and ensure that infrastructure maintenance is in keeping with future weather events and stressors.

### Strategy B1: Encourage all new buildings to be energy efficient and climate resilient

#### Recommended Municipal Mitigation and Adaptation Actions:

- Continue to enforce the Ontario Building Code for all new buildings in Kawartha Lakes.
- Continue to encourage developers to demonstrate how they have incorporated energy efficiency, climate change adaptation and green infrastructure (i.e. green and/or cool roofs, low impact development (LID) landscaping, permeable pavement, and tree and native species plantings) measures into new builds.
- Continue to encourage developers to construct new builds that are energy efficient and climate resilient (i.e.: checklists for developers, expedited approval processes, points systems used in other municipalities) with features such as:
  - Building design that reduces energy demand and increases efficiency (e.g. passive cooling, air source heat pumps, ground source heat pumps, triple-pane windows, light coloured roofs, etc.);
  - Back-up power generation;
  - Solar-ready design considerations that allow the building owner to easily install solar thermal systems or solar photovoltaic systems in the future;
  - Green infrastructure and natural features installed to the maximum extent possible in residential, commercial, and institutional buildings; and
  - Electric vehicle chargers in residential, commercial, and institutional buildings installed to the maximum extent possible.
- Promote existing programs to go beyond building code, such as Enbridge's Savings by Design Program.
- Encourage the adoption of an energy performance labelling program (i.e.: NRCan EnerGuide Rating System) for new and existing buildings that reflect energy performance. Energy labeling will help occupants and building owners understand the relative energy efficiency of the building before entering into an agreement to buy or rent the property. For new buildings this would be applied prior to sale, while existing buildings the energy performance would be applied after retrofits are completed.
- Encourage local businesses and commercial building owners to participate in energy benchmarking through NRCan.

### **Education Actions**

- Provide checklists to developers and contractors on energy efficient and adaptation actions in building construction.
- Communicate the benefits of energy conservation in new construction under the OBC to residents, businesses, and building owners.
- Provide education and resources to inspectors on green building standards and compliance (i.e. LEED building certification, net-zero).

### **Financing Options**

- Investigate existing incentives and rebates for integration of Low Impact Development and green infrastructure technology in new builds on private properties.
- Conduct a review of policy approaches to provide financial and non-monetary incentives to support the improvement of building performance (for contractors, homeowners, tenants/landlords, etc.).

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Development Services

### **Municipal Role**

- The City of Kawartha Lakes' Development Services department will continue to work with local developers, Peterborough and the Kawartha Home Builders Association, Ontario Home Builders Associations, ensuring compliance with the OBC.

### **GHG Reduction**

- 8,640 tonnes (assumes efficiency gains of 65%, with renewables providing 10% of electricity by 2030)
- Opportunity to achieve greater reductions with higher efficiency buildings (e.g. 75% efficiency gains) and more on-site renewable energy

### **Adaptation/Mitigation Co-benefits**

- Property and buildings that incorporate green infrastructure can assist with water filtration, flood and erosion prevention, and other ecosystem services that improve resilience to climate and weather-related risks.

### **Anticipated Timeframe**

- Continuously over the short-term (<5 years).

### **Indicators**

- GHG emissions reduced through efficient new builds.
- Proportion of new buildings that include green infrastructure and natural features.

## Strategy B2: Develop and implement a voluntary deep retrofit program for existing residential buildings to improve their climate resiliency and energy efficiency

### Recommended Municipal and Community Mitigation and Adaptation Actions:

- Identify key partners (i.e.: interested utilities and neighbouring municipalities) to co-design the program. This would include looking to integrate existing programs offered by local utilities wherever possible.
- Identify a lead agency to serve as the program administrator. The program administrator would be responsible for designing the program, building a detailed business plan, then administering the program. This would include promotion, screening of those who are interested in participating, securing start-up funding. They would administer contracts with contractors and establish a pre-qualified list to ensure that those selected are trained to deliver deep retrofits.
- Investigate funding mechanisms which could include incentive-based programs) that have completed a voluntary deep retrofit, or loans through local improvement charges (LIC). As a voluntary program, the intent is to make it easy for homeowners to participate. Through the use of the LIC, the homeowner volunteers to enter into an agreement with the City to apply the LIC on their property tax bill. The LIC charge would be attached to the property itself, not the homeowner and would stay with the property until the cost of the retrofit is recovered. If the home is sold, the LIC continues with the new home owner until the full value is recovered, reducing the risk to the City.<sup>62</sup>
- Train contractors to deliver the service at a competitive rate. There is a need for qualified, trained contractors to deliver the program. This would create new skill sets, employment and expertise in the community that are transferable to similar programs across Ontario, Canada and internationally. There is potential to draw on the talent from Fleming College.
- Once the program design is complete, identify target areas with the City to initiate the program. The goal would be to prioritize older and low-efficiency houses and neighbourhoods first, then expanding the program later. Such an approach would target efficiency by postal code, tacking advantage of economies of scale.
- Once the program is up and running, the program administrator would continuously monitor the program to ensure its sustainability and apply energy performance labelling to those homes that participate.
- In parallel, the municipality can:
  - Establish and implement a policy that ensures regular review and update to infrastructure design standards, development by-laws, zoning, and infrastructure assessment processes to account for new climate change projections; and
  - Lobby provincial and federal governments to support deep retrofit programs through funding and/or policy.
- In parallel building owners, landlords, tenants and operators can:
  - Continuously monitor and mitigate climate-related risks for existing residential buildings; and
  - Inspect high risk buildings for damage after severe weather events and temperature extremes.

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<sup>62</sup> Persram, S. (2013). *LIC Primer: Using Local Improvement Charges to Finance Residential Energy Upgrades*. Retrieved from: <http://www.cleanairpartnership.org/wp-content/uploads/2016/08/Primer.pdf>

### **Education Actions**

- Facilitate conversations with homeowners, landlords and tenants about adaptation best practices, green infrastructure, energy conservation and expected savings to support the retrofit of existing buildings.
- Leverage Fleming College's Continuing Education course in Home Flood Risk Assessment Training.
- Promote existing home conservation programs such as Enbridge's Home Energy Conservation Program.

### **Financing Options**

- Develop a funding strategy to finance retrofits in combination with B3.

### **Potential Primary Partners/ Departments**

- To be determined.

### **Municipal Role**

- Initiate the process to develop the program, including identifying key partners, at partnership and financing options linked to municipal tools.

### **GHG Reduction**

- 21,320 tonnes (35% of homes retrofitted to achieve efficiency gains of 65%, with renewables providing 10% of electricity needs by 2030).
- Opportunity to achieve greater reductions with a greater proportion of homes participating.

### **Adaptation/Mitigation Co-benefits**

- Property and buildings that incorporate green infrastructure can assist with water filtration, flood and erosion prevention, and other ecosystem services that improve resilience to climate and weather-related risks.

### **Anticipated Timeframe**

- Long Term (10+ years).

### **Indicators**

- GHG emissions reduced through retrofits.
- Percentage of homes retrofitted relative to 2015 baseline.
- Percentage of retrofits that include green infrastructure and natural features.

## Strategy B3: Develop and implement a voluntary deep retrofit program for commercial and institutional buildings to improve their climate resiliency and energy efficiency

### Recommended Municipal and Community Mitigation and Adaptation Actions:

- Actions are the same as those identified in Strategy B2 above.
- While a deep retrofit program is being considered, businesses can take action by:
  - Inspecting high risk buildings for damage after severe weather events and temperature extremes;
  - Continuously monitoring and mitigating climate-related risks; and
  - Participating in energy benchmarking through NRCan.
- In parallel, the municipality can establish and implement a policy that ensures regular review and update to infrastructure design standards, development by-laws, zoning, and infrastructure assessment processes to account for new climate change projections.

#### **Education Actions**

- Facilitate conversations with developers about adaptation best practices and green infrastructure to support the retrofit of existing buildings.

#### **Financing Options**

- Develop a funding strategy to finance retrofits in combination with B2.
- Develop incentives for businesses to adapt their property using rain gardens, rain barrels, regrading, backwater valve, etc.

#### **Potential Primary Partners/ Departments**

- To be determined.

#### **Municipal Role**

- Initiate the process to develop the program, including identifying key partners, looking at partnership and financing options linked to municipal tools.

#### **GHG Reduction**

- 5,170 tonnes (35% of commercial and institutional buildings retrofitted to achieve efficiency gains of 65%, with renewables providing 10% of electricity needs by 2030)
- Opportunity to achieve greater reductions with a greater proportion of buildings participating.

#### **Adaptation/Mitigation Co-benefits**

- Property and buildings that incorporate green infrastructure can assist with water filtration, flood and erosion prevention, and other ecosystem services that improve resilience to climate and weather-related risks.

### Anticipated Timeframe

- Continuously over the long-term (10+ years).

### Indicators

- GHG emissions reduced through retrofits.
- Percentage of commercial and institutional buildings retrofitted relative to 2015 baseline.
- Percentage of retrofits that include green infrastructure and natural features.

## Strategy B4: Facilitate energy efficiency improvements and climate resiliency in the industrial sector

### Recommended Industry Mitigation Actions:

- Leverage utilities, Independent Electricity System Operator (IESO), and other levels of government programs that assist industries to reduce energy consumption and improve efficiency, such as:
  - Ontario's SaveON Energy Programs (*some funding available*)
  - IESO's Industrial Accelerator Program (IAP) (*funding available*)
  - Enbridge's Industrial Energy Solutions (*funding available*)
  - The Federal Canadian Industry Program for Energy Conservation (CIPEC) (*capacity building*)
  - ecoENERGY Efficiency for Industry (*funding available*)
  - Canada Revenue Agency tax incentives for industrial investments in energy conservation and clean energy generation
- Establish a best practice network for local industries to build resiliency and improve efficiency.

### **Education Actions**

- Deliver educational and training program on industrial operations and maintenance best practices.

### **Financing Options**

- Use existing funding programs from the provincial and federal governments, utilities, and IESO, as well as tax incentives.

### **Potential Primary Partners/ Departments**

- Strategy will be led by local industries, with assistance from provincial, federal, utility, and IESO capacity-building programs and funding opportunities.

### **GHG Reduction**

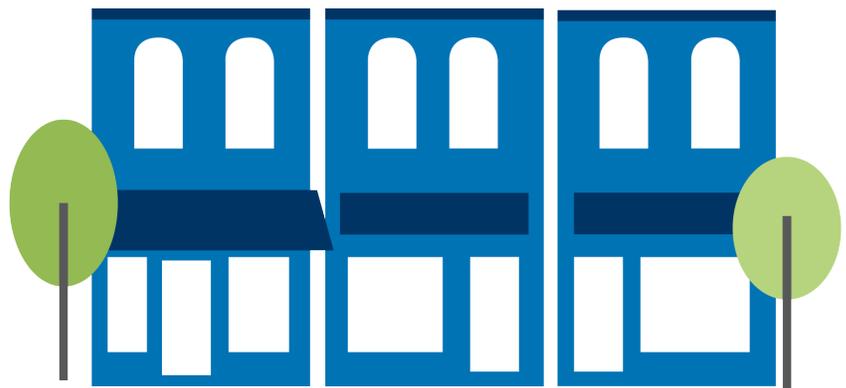
- 320 tonnes (assumes 1% efficiency improvements per year, with renewables providing 5% of electricity by 2030).
- Opportunity to achieve greater reductions with greater annual efficiency improvements (e.g. 2-3%).

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- GHG emissions reduced through efficiency improvements.
- Proportion of industrial buildings pursuing efficiency improvements.



## Strategy B5: Require all city-owned new buildings to be energy efficient and climate resilient

### Recommended Municipal Mitigation Actions:

- Establish a policy to require new buildings be built to a high energy efficiency standard (e.g. 65% more efficient than existing buildings and that integrate solar-ready design considerations).
- Require green infrastructure to be integrated (where feasible) in all new city-owned developments.
- Use results from assessment of climate-related impacts on municipal infrastructure, operations, and services (see strategy B7) to identify opportunities for green infrastructure to support drainage, water filtration and storage, flood risk/erosion reduction, shade/cooling, etc.
- Ensure regular review and update to new build design standards development by-laws, zoning, and infrastructure assessment processes to account for new climate change projections.
- Implement energy monitoring systems in all new municipally-owned buildings and facilities to identify opportunities to increase efficiency at the site-level.

### **Education Actions**

- Provide resources and training to municipal building and equipment operators), decision makers, developers and contractors on energy efficiency construction and performance.
- Provide resources on energy conservation to building occupants and staff.
- Update Purchasing policies to include language that encourages energy efficiency, climate mitigation and adaptation criteria.
- Schedule updates and reviews of the Corporate Energy Management Plan with the Energy Steward Team to inform workplans and budgets.

### **Financing Options**

- Continue to leverage internal sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year Operating Budget Plan).

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Community Services, Human Services, Engineering and Corporate Assets, and Development Services

### **Municipal Role**

- Lead.

### **GHG Reduction**

- 120 tonnes (assumes efficiency gains of 65%, with renewables providing 10% of electricity by 2030).
- Opportunity to achieve greater reductions with greater efficiency gains and/or use of renewable energy.

### **Adaptation/Mitigation Co-benefits**

- Property and buildings that incorporate green infrastructure can assist with water filtration, flood and erosion prevention, and other ecosystem services that improve resilience to climate and weather-related risks.

### **Anticipated Timeframe**

- Long-Term (10+ years).

### **Indicators**

- GHG emissions reduced through efficient new buildings.
- Money saved through energy efficiency measures.
- Percentage of municipally-owned new buildings that incorporate green infrastructure.

Strategy B6: Develop and implement a deep retrofit plan for all existing municipal buildings, facilities, and streetlights to improve their climate resiliency and energy efficiency

### Recommended Municipal Mitigation Actions:

- Prepare a schedule of assessments to be completed each year.
- Conduct detailed assessments and develop retrofit plans specific to each city-owned building, based on age, type, energy consumption, and climate-related impacts/risks. Prioritize buildings and facilities with the highest energy use per area.
- Install energy monitoring systems in all existing municipally-owned buildings and facilities to identify opportunities to increase efficiency at the site-level.
- Implement building improvements through a comprehensive retrofit program that applies a whole-buildings approach including:
  - High efficiency windows and appliances, supplementary insulation, lighting upgrades, weather-stripping, building automation, etc. to achieve efficiency gains of 65%;
  - Integrate solar-ready design considerations (prepared for the future installation of solar thermal systems or solar photovoltaic systems);
  - Integrate green infrastructure (i.e.: green and/or cool roofs, low impact development landscaping, permeable pavement, and tree and native species plantings) where feasible; and
  - Use results from assessment of climate-related impacts on municipal infrastructure, operations, and services to identify opportunities for green infrastructure to support drainage, water filtration and storage, flood risk/erosion reduction, shade/cooling, etc.
- Ensure regular review and update to retrofit design standards, development by-laws, zoning, and infrastructure assessment processes to account for new climate change projections.
- Complete the retrofit of streetlights and outdoor lighting with LED lights in Lindsay.

### **Education Actions**

- Provide resources and training to City staff, developers and contractors on energy efficient and adaptation actions in building retrofits and renovations.
- Develop a comprehensive training program and communication plan (that includes visual representation) of building energy consumption and conservation for building occupants and staff.
- Incorporate energy data and corporate energy knowledge in the asset management system for use in decision making city-wide.

### **Financing Options**

- Continue to leverage internal sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year Operating Budget Plan).
- Maximize partnerships such as the Local Authority Services (LAS) membership for opportunities.
- Adopt an Energy Reserve fund that has financial savings deposited for future use in staff training and energy projects championed by the Energy Stewards.

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Community Services, Public Works, Human Services, Engineering and Corporate Assets

### **Municipal Role**

- Lead

### **GHG Reduction**

- 360 tonnes (35% of facilities retrofitted to achieve efficiency gains of 65%, with renewables providing 10% of electricity by 2030).
- Opportunity to achieve greater reductions with a greater proportion of buildings participating, greater efficiency gains, and use of renewable energy.

### **Adaptation/Mitigation Co-benefits**

- Property and buildings that incorporate green infrastructure can assist with water filtration, flood and erosion prevention, and other ecosystem services that improve resilience to climate and weather-related risks.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- GHG emissions reduced through retrofits.
- Money saved through energy efficiency measures.
- Percentage of buildings retrofitted relative to 2015 baseline.
- Percentage of municipally owned retrofits that incorporate green infrastructure.
- Number of new green infrastructure or low impact development projects and pilots undertaken on existing municipal infrastructure.

Strategy B7: Develop, implement and embed climate change risks and projections into the inspection, maintenance, and design of municipal roads, bridges, and culverts, and buildings and asset management procedures

Recommended Municipal Adaptation Actions:

- Conduct a detailed assessment of climate-related impacts on municipal infrastructure, operations, and services (e.g. extreme precipitation, salting, heat, etc.). This assessment can include the following:
  - Continue to conduct infrastructure condition assessments at the site level, and identify potential hazards related to flooding, extreme weather and/or heat. Incorporate into inventory of high-risk, priority assets;
  - Map municipal infrastructure by location with respect to flood and heat hazard maps (existing via conservation authorities) and incorporate climate change projections into an inventory of high-risk, priority assets; and,
  - Inspect high-risk, priority assets for damage after extreme weather events and temperature extremes.
- Consider implementing the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Engineering Protocol for select, high-risk, priority assets to determine vulnerable infrastructure components and adaptation measures.
- Integrate climate change risks and projections identified for municipal infrastructure into the Asset Management Plan and other capital plans, financial plans, service plans and master plans with this new information to prioritize high-risk assets.
- Continue to prioritize high-risk assets for maintenance, upgrades, and restoration. Integrate design adjustments and changes to operational or maintenance procedures where needed to improve resilience of the infrastructure to climate risks.
- Embed climate resilience considerations into requirements and specifications for infrastructure in procurement processes.
- Ensure regular review and update to infrastructure design standards, development by-laws, zoning, and infrastructure assessment processes to account for new climate change projections.



### **Education Actions**

- Train City staff on climate-related impacts to infrastructure.
- Provide best practice materials for adaptation measures that can be implemented for built infrastructure.

### **Financing Options**

- Continue to leverage internal sources of financing to incorporate adaptation actions in regular infrastructure upgrading cycles, and leverage reserve funds for larger capital investment projects.
- Apply for federal funding for large projects, from sources such as Disaster Mitigation and Adaptation Fund and Infrastructure Canada's Investing in Canada Infrastructure Program.

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Engineering and Corporate Assets and Public Works

### **Municipal Role**

- Lead.

### **Impacts Addressed**

- Increased frequency of heavy rainfall and urban flooding, causing damage to infrastructure.
- Overland flooding, leading to closure of public buildings and facilities.
- Temperatures near the freezing mark, causing increased need for salting, damaging infrastructure.
- Increased road base deterioration and pot holes.
- Increased flow in riverine systems, causing damage to bridge and culvert infrastructure.

### **Anticipated Timeframe**

- Continuously over the medium-term (5-10 years).

### **Indicators**

- Percentage of total city infrastructure spending directed to building resilience towards locally-identified high priority climate risks (as identified by community climate vulnerability assessments).

## ENERGY SYSTEMS

Within the City of Kawartha Lakes, natural gas service is provided by Enbridge and electricity is provided by HydroOne.

Planning for and preventing power outages during extreme heat events is a key concern for the City. During the summer months, there is often an increased strain on the power grid with more households using air conditioning. Power outages can have a major effect on local businesses and flow of goods and services. These outages can be especially threatening to vulnerable populations, who are disproportionately affected by heat-related risks. There is currently no inventory identifying which locations across the city have access to back-up power generation. Of those sites assumed to have back-up power, the capacity of generation is unknown.

While there is some extreme summer heat response planning and protocol within the municipality, there are opportunities to expand planning as frequency extreme weather events are expected to increase in the future. One of the key initiatives the City can take is to equip more facilities with back-up generators/batteries and define cooling centres to accommodate those without air conditioning. The City can also consider short-term responses that provide immediate relief from extreme heat such as: using portable water stations; distributing fans to vulnerable populations; or requesting utility companies to stop service cancellations during extreme heat events. Alongside these efforts, communications protocols for delivering this information to the public (including part and full-time residents, businesses, schools, and vulnerable populations) can streamline the process, raise awareness, and increase uptake.

### Strategy E1: Increase energy reliability and security to buildings and assets that deliver critical services to the community

#### Recommended Municipal and Community Adaptation Actions:

- Conduct a review of existing energy infrastructure and utilities for vulnerability to climate impacts and extreme weather.
- Provide detailed heat, cold and flood maps to identify high-risk areas for blackouts or brownouts, particularly areas with vulnerable residents.
- Communicate with long-term health care providers and other health related facilities to determine the capacity of existing back-up generators.
- Ensure key buildings have on-site back-up power, and implement clean/renewable back-up power systems where feasible, with priority given to facilities in vulnerable areas and those serving vulnerable populations.
- Enhance the reliability of the energy grid to ensure energy security, including ongoing investment in technologies such as automated switching, self-healing grids and back-up power systems, drawing on best practices from other municipalities.
- Explore opportunities to generate energy at point of use, through renewables, combined heat and power, district energy, etc.
- Implement adaptive measures for existing and future back-up power systems (e.g. moving generators out of basements, etc.). For increased resiliency, consider diversified types of generators (e.g. diesel, natural gas), as well as batteries for renewable sources (e.g. solar).

### **Education Actions**

- Prepare and equip residents and building owners for what to do during a blackout in both hot and cold temperature extremes.
- Facilitate community resiliency workshops and opportunities to engage the community in the Kawartha Lakes Healthy Environment Plan.

### **Financing Options**

- Continue to leverage internal sources of financing to incorporate adaptation actions in regular infrastructure upgrade cycles, and leverage reserve funds for larger capital investment projects.
- Apply for federal funding for large projects, from sources such as Disaster Mitigation and Adaptation Fund and Infrastructure Canada's Investing in Canada Infrastructure Program.
- Seek funding for a staff position that focuses on implementing the HEP.

### **Potential Primary Partners/ Departments**

- Enbridge
- Hydro One
- Property owners

### **Municipal Role**

- Establish on site back-up power (clean/renewable where feasible) in all municipally-owned buildings.
- Be responsible for integrating the need to improve energy reliability and security into corporate strategies including but not limited to Corporate Energy, Asset Management, Waste Management, Transportation Management, and Emergency Management plans.

### **Impacts Addressed**

- Infrastructure and power system damage, causing closure of businesses.
- Damage to tree canopy, causing power outages and disruptions.
- Increased demand on electricity grid, causing more frequent power interruptions and outages.

### **Adaptation/Mitigation Co-benefits**

- Through the adaptation measures above, energy systems will become more resilient to extreme weather impacts. By becoming increasingly self-sufficient and decentralized, and with greater integration of clean/renewable sources, emissions from buildings will be reduced.

### **Anticipated Timeframe**

- Short term (< 5 years).

### **Indicators**

- Proportion of key city and community facilities with back-up generators installed.
- Proportion of city buildings and facilities, and residential, commercial, and institutional buildings that use clean/renewable back-up power.
- Number of community resiliency workshops held by the municipality and level of attendance.



## LAND-USE PLANNING

At the local level, land use planning is governed by the City of Kawartha Lakes Official Plan (2012). The Official Plan contains an 'Environment First Principle', which recognizes that "the environment is the base upon which all land use activities take place and that it should be considered in all land use planning decisions".<sup>63</sup> Section 3.6 calls for incremental reduction of overall GHG gases generated by the City's corporate activities and functions, as well as the promotion of energy efficient development and infrastructure.<sup>64</sup> The Official Plan also contains an Environmental Protection Designation, which aims to protect against flooding by preventing development or site alteration on lands prone to flooding.<sup>65</sup> Many sections within the Official Plan reference intensification, however, a number of these sections have been appealed (e.g. Section 4.1).<sup>66</sup> A goal of Section 28, Infrastructure and Service Policies, is "to plan for growth that takes into account the availability and location of existing and planned community infrastructure so that infrastructure can be provided efficiently and effectively."<sup>67</sup>

The City of Kawartha Lakes has the potential to reduce emissions and improve resilience by designing, building, and revitalizing neighbourhoods as complete communities that have higher densities, offer different transportation options, and preserve green space to absorb and filter rainwater, reduce flooding and stormwater drainage needs, and lower pollutant runoff into groundwater, streams, rivers and lakes. Preserving green space also limits the urban heat island effect – paved surfaces and buildings absorb and trap more heat than natural ecosystems, raising the temperature in urban areas.<sup>68</sup> Mixed-use development combines residential, commercial, industrial and institutional developments into one area. This allows for more efficient use of land and resources, promotes public health and safety via public transit and active transportation, reduces transportation emissions and commuting distances, and provides economic and social benefits through the retention and addition of housing, services, and jobs.

Increased urbanization and development are a stress on natural systems. As communities grow more surfaces are covered by buildings, roadways, parking lots, etc. that are impervious and stop water from beginning absorbed by the land and can increase flood risk when there is heavy rain.

As development in Kawartha Lakes continues, flood plain maps need to be regularly updated. Development near flood-prone areas as well as loss of pervious surfaces may lead to higher flood risk. There is an opportunity to layer flood risk data with heat mapping and air quality information to identify vulnerable areas within the community, and when considering the design and location of new developments.

Green infrastructure can be integrated into community planning to increase resilience. Trees, green roofs and walls, rain gardens and healthy soil systems can capture stormwater, improve water quality, and reduce flooding, reducing the need for costly expansion of traditional stormwater infrastructure.

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<sup>63</sup> City of Kawartha Lakes. (2012). *Official Plan*. p.13.

<sup>64</sup> Ibid.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid, p. 101.

<sup>68</sup> Climate Atlas of Canada. (2018). *Urban Heat Island Effect*. Retrieved from: <http://www.cleanairpartnership.org/wp-content/uploads/2016/08/Primer.pdf>.

## City of Kawartha Lakes Healthy Environment Plan

By implementing additional green infrastructure, the City of Kawartha Lakes can:

- Reduce the amount of water going into our stormwater facilities, therefore reducing development and maintenance costs;
- Increase the recharge of our groundwater systems to ensure future supply of drinking water;
- Filter pollutants out of the water;
- Reduce flooding and erosion risks;
- Protect aquatic animals and habitats; and
- Reduce the amount of ground covered by hard surfaces, and protect green spaces.

**Strategy L1: Ensure land-use policies and planning encourage the development of compact neighbourhoods that integrate residential, office, and retail developments and promote transit and active transportation**

Recommended Municipal Mitigation and Adaptation Actions:

- Identify areas where higher density residential development should occur, considering the proximity to commercial and institutional buildings, community services, and transit.
- Provide regulatory and financial incentives through existing municipal or approval processes (i.e. density bonus allowances, parking requirements reduction, etc.), to encourage developers to complete compact and mixed-use projects in higher density areas.
- Acquire and/or retain land that can be included into future mixed-use projects and create neighbourhood parks, trails, public art, and pedestrian facilities.
- Require that new municipal developments, such as public housing, community centres, etc., as well as municipal revitalization projects are advancing the percentage of compact, mixed-use development across the City of Kawartha Lakes.

### **Education Actions**

- Provide training and educational material for municipal decision-makers and developers on the characteristics of compact, mixed use developments and the benefits of such projects.
- Promote compact, mixed neighbourhoods to residents, institutions, and businesses on the benefits of living and working within mixed-use, higher-density areas.

### **Financing Options**

- Continue to leverage internal sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year Operating Budget Plan).

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Development Services.

### **Municipal Role**

- Integrate compact, mixed use, transit-oriented land use planning requirements and recommendations into Secondary Plans, Official Plans, development guidelines, etc.

### **GHG Reductions**

- GHG reductions are indirect, and would be captured under the transportation and building sectors.

### **Adaptation/Mitigation Co-benefits**

- Compact, mixed use neighbourhoods promote community resilience by improving access to essential services and resources (such as grocery stores, clothing, health services, recreation centers, etc.), and by building social capital among closely-connected services, businesses, and community members. Mixed use neighbourhoods also promote physical activity and provide increased safety for active transportation.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Proportion of units approved and built that are compact, mixed use.
- Population density (people/km, rooms/km) in new developments compared to existing developments.

Strategy L2: Integrate measures for urban heat reduction, air quality improvement, and flood risk reduction into municipal land use planning and design

Recommended Municipal Mitigation and Adaptation Actions:

- Evaluate and map city planning against climate projections, impacts, and risks to identify vulnerable areas within the community (e.g. areas that are more polluted, urban heat island, significant sun exposure, etc.). This process can be layered into the detailed assessment of climate-related impacts on stormwater drainage and municipal infrastructure, operations, and services.
- Consult climate change projections and updated flood risk and heat mapping when determining the design and location of new developments and redevelopments in urban areas. Establish this practice via municipal by-laws, development guidelines, and zoning regulations.
- Integrate green infrastructure into community planning and street design to mimic natural habitat and functions whenever possible and prioritize areas that are vulnerable to heat and flooding.
- Monitor the effectiveness of LID pilot projects in addressing rainfall-related risks and reducing operational expenses for traditional stormwater infrastructure.

### **Education Actions**

- Educate city planners and decision makers about design measures that can improve air quality, reduce the urban heat island effect, and minimize flood risk.

### **Financing Options**

- Continue to leverage internal sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year Operating Budget Plan).

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Development Services

### **Municipal Role**

- Lead.

### **Impacts Addressed**

- Infrastructure and power system damage, causing closure of businesses.
- Overland flooding, leading to closure of public buildings and facilities.
- Overland flooding causing evacuation and/or displacement of residents.
- Heavy rain and/or overland flooding causing physical injuries and mental health stress to residents.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Number of projects implemented to address urban heat islands.
- Number of projects implemented to improve air quality.
- Number of projects implemented to reduce floods (i.e. green infrastructure).



## NATURAL ENVIRONMENT

The City works closely with its conservation authorities, including: Kawartha Conservation; Otonabee Conservation; Ganaraska Conservation; and, Lake Simcoe Conservation. The City is officially recognized as a “Bee City”, and has made efforts to support healthy pollinator populations through the preservation and conservation of pollinator habitats. Natural assets (including forests, aggregates and land) produce a number of ecological goods and services, including: carbon storage, air and water purification, waste treatment, soil formation, pollination, recreation, erosion control, and animal habitat. A report currently in development by Kawartha Conservation estimates the value of these ecological goods and services at \$1.19 billion per year across the watershed, of which natural assets are valued at \$910,409,000 per year for the approximately 170,800 hectares (54%) of the City of Kawartha Lakes which is present within the Kawartha watershed.

Forest cover in the Kawartha Lakes region includes mixed deciduous and coniferous forest cover. The major watercourses running through the City of Kawartha Lakes include: the Trent River (including the Kawartha Lakes) and feeder streams to this major system including Pigeon and Scugog Rivers, the Talbot River, Pigeon River, Scugog River and the Severn River. Approximately 60% of the City of Kawartha Lakes is covered by a conservation authority, which identify regulated areas which protect areas such as wetlands and watercourses. These natural areas are vital in supporting the agricultural, economic, and natural systems in the Kawartha Lakes Region.

Kawartha Conservation and Lake Simcoe Region Conservation Authority have developed a series of Lake and Watershed Management Plans. These plans involve detailed field inventories of subwatersheds, rivers, and lakes to identify natural features and factors affecting their health. The goal of these plans is to maintain and enhance the environmental health and economic sustainability of these lakes and the lands that drain to them. They recommend site-specific protection, enhancement, restoration, and management programs. A number of the plans, contain actions aimed at increasing forest cover and streamside vegetation, decreasing phosphorus pollution, and improving the management of agriculture, urban and shoreline areas.<sup>69</sup> The City of Kawartha Lakes, conservation authorities, Kawartha Land Trust and other partners have also recognized the value of natural systems on the landscape and have defined a natural heritage system through the “Kawartha’s Naturally Connected” project. This project aims to strengthen planning protection identified in the Provincial Policy Statement for new development related to natural assets.

The effects of climate change are expected to put a strain on both man-made and natural assets to deliver community services. Extreme precipitation and temperatures can threaten the health and function of important ecosystems (such as wetlands) and can impact human health, safety and our interactions with the natural environment. To continue providing community services in a cost effective and sustainable manner now and in the future, it will be critical to ensure that all natural assets that contribute to community services (i.e.: lakes, wetlands, green spaces and trees) are identified and managed.

Trees benefit the community by reducing flooding, controlling erosion, filtering water, regulating climate, removing and storing carbon, and cycling nutrients. Trees are affected by climate change in many ways,

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<sup>69</sup> Kawartha Conservation. (2015). *Balsam and Cameron Lake Management Plan*. Retrieved from: <http://kawarthaconservation.com/watershed/management-plans>

## City of Kawartha Lakes Healthy Environment Plan

including diseases and pests that thrive in warmer temperatures, extreme weather, and stress from drought. Loss of tree canopy through damage and deforestation will exacerbate costs of climate change felt by the entire community. A U.S. study found that there is a 20% increase in water treatment costs for each 10% loss in forest cover.<sup>70</sup> Increasing the number of trees in Kawartha Lakes can reduce costs to the City over the long term (such as energy demand for cooling, water filtration, etc.) and provide economic opportunities through incentive programs and nature-based and agritourism opportunities.

### Strategy N1: Enhance the protection of natural assets and ecosystems, while expanding the City's natural capital and building climate resilience in the environment

#### Recommended Municipal and Community Adaptation Actions:

- Update the identification and evaluation of natural assets, green spaces, and natural features to quantify climate change risks, using Ecological Land Classification data, for example. Use this information to restore and protect the features and functions of the natural environment, prioritizing highly sensitive and/or valuable areas.
- Evaluate ecosystem service benefits provided by natural assets in Kawartha Lakes. Use results to inform decision making in planning, development, and environmental projects and policies.
- Continue to implement the natural systems actions identified in the Integrated Community Sustainability Plan, prioritizing ecologically sensitive areas.
- Pursue shoreline protection along lakes and streams and erosion control across the landscape, enhancing the work occurring within the Lake Management Plans.
- Expand naturalization programs and integrate these within existing planning processes to increase the number of trees, parks and green spaces, ensuring equitable access for all residents, particularly vulnerable populations.
- Acquire and manage ecologically sensitive areas using tools such as easements, buffers, and by-laws.
- Coordinate implementation and updates of existing watershed plans and lake plans.
- Work collaboratively to integrate new management plans and strategies that protect and enhance natural areas. Ensure the information is understood by relevant municipal and agency staff, developers and the public.
- Continue to create and preserve pollinator habitat and to support healthy pollinator populations.
- Coordinate new opportunities for outdoor recreation, tourism, and education alongside the protection of natural assets.

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<sup>70</sup> Ernst, C., Gullick, R. and Nixon, K. 2007. "Protecting the Source: Conserving forest to protect water." In The Economic Benefits of Land Conservation. The Trust for Public Land. [www.tpl.org](http://www.tpl.org)

### **Education Actions**

- Educate the community about the unique value of the ecosystems in Kawartha Lakes, and what they can do to protect them.
- Provide resources for private landowners to implement actions on the landscape.
- Develop and support outdoor education program for children, youth, adults and, vulnerable groups.
- Educate residents on invasive species management, and the importance of choosing native plant species.
- Educate residents on property maintenance best practices to promote a healthy natural environment (e.g. managing stormwater, limiting pesticide use, composting to promote soil health, green infrastructure, stormwater landscaping, etc.).
- Educate farmers about the Alternative Land Use Services (ALUS) Program and other benefit programs.

### **Financing Options**

- Consider incentive or subsidy programs that encourage developers to integrate natural assets (e.g., wetlands) and conservation measures into new developments.
- Ensure 10-year Capital Budget reflects the value of protecting ecosystem services provided by natural assets.
- Seek funding opportunities, in partnership with the four local Conservation Authorities, for restoration and rehabilitation of natural features.

### **Potential Primary Partners/ Departments**

- Conservation Authorities
- Fleming College
- City of Kawartha Lakes – Community Services

### **Municipal Role**

- Involved with actions pertaining to municipally-owned (and municipal acquisition of) natural assets and areas, and their subsequent restoration and protection.
- Responsible for implementing the actions identified in the Lake Management Plans, the Asset Management Plan, the Official Plan and the ICSP.

### **Impacts Addressed**

- Warmer lake temperatures, causing increase in lake vegetation and algal blooms.
- Increase in lake and river temperatures, causing stress or loss of aquatic species.
- Increased runoff causing increased nutrient, sediment, and contaminant loading in rivers and lakes.
- Shifting eco-regions for flora and fauna, causing introduction of new species into ecosystems and stress on native species.
- Increased runoff and evaporation from precipitation events, leading to reduced groundwater recharge.
- Increase in heat stress on trees, vegetation and native species, leading to higher mortality.

### **Adaptation/Mitigation Co-benefits**

- Protection and enhancement of Kawartha Lakes natural assets will also preserve the ecosystem services that inherently offer adaptation and mitigation co-benefits while contributing to a healthy, resilient environment. Examples include:
  - Trees and green spaces provide carbon storage and sequestration (carbon dioxide is removed from the atmosphere), air filtration, nutrient cycling, and climate regulation.
  - Wetlands provide carbon sequestration, water storage, filtration and purification (which may improve water use efficiency), flood protection, support rich biodiversity, and more.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- For natural systems actions within ICSP refer to indicators established for each:
  - Percentage of privately-owned natural assets protected under up-to-date management plans and procedures.
  - Presence/absence of coldwater fisheries.
  - Thermal stability in streams.
  - Levels of nutrients and sedimentation in lakes and streams.
  - Percentage of naturalized areas in Kawartha Lakes and surrounding regions.



## Strategy N2: Develop and implement a community-wide tree management and resilience program to increase tree canopy and protect existing canopy from climate and weather-related risks

### Recommended Municipality and Community Adaptation Actions:

- Develop an Urban Forestry Plan, which guides the planning and development of the urban forest canopy.
- Protect the existing urban tree canopy through the development of a Tree Inventory and Preservation Plan and/or tree by-law.
- Work with conservation authorities to quantify existing tree cover and trends over time, as per Environmental Land Classification. Conduct additional research into urban tree canopy to identify areas in urban boundaries where planting should occur, and conduct ongoing management of the existing tree inventory.
- Use City by-laws, standards, and permitting processes to optimize soil and root growth conditions for shade trees on public and private property (e.g. soil quality, quantity and moisture content), particularly for new developments and their lots.
- Ensure species and location selection criteria in the tree planting strategies reflect future climate projections and any urban heat island effect mapping to improve shade coverage (e.g. planting large shade trees in priority heat island areas).
- Promote and increase planting of native tree species or resilience species (e.g. salt-tolerant trees) through initiatives such as community plantings programs and subsidies for plantings on private property.
- Consider planting edible tree species to promote local food security.
- Undertake proactive tree monitoring and maintenance to lessen damage during and after extreme weather events, particularly for trees that may cause damage to power lines.

#### **Education Actions**

- Educate residents and community stakeholders on the health and environmental benefits of the urban canopy.
- Provide education materials about where and how to plant trees with details on resilient species selection, optimal soil, root crown, and root growth space.
- Provide information to property owners on how to manage forested land and trees.

#### **Financing Options**

- Implement a tree planting incentive program with rebates for native and/or climate-resilient trees and shrubs (ongoing).
- Apply for grants and funding to increase tree planting.

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Community Services
- Conservation Authorities
- Kawartha Lakes Environmental Advisory Committee
- Fleming College

### **Municipal Role**

- Co-lead.

### **Adaptation/Mitigation Co-benefits**

- Protection and enhancement of Kawartha Lakes tree canopy will also preserve the ecosystem services that inherently offer adaptation and mitigation co-benefits while contributing to a healthy, resilient environment.

### **Impacts Addressed**

- Damage to tree canopy, causing power outages and disruptions.
- Spread of Emerald Ash Borer and other pests, causing damage to tree canopy.
- Increase in heat stress on trees, vegetation and native species, leading to higher mortality.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Percentage of municipality with tree canopy coverage.



## PEOPLE, SAFETY AND HEALTH

In 2016, the average age of residents in Kawartha Lakes was 46.7 years compared to 41.0 for the province as a whole and there are 25,865 residents over the age of 60.<sup>71</sup> The number of residents over the age of 50 is expected to increase in the coming years. The City is drawing more retirees from larger urban centres each year.<sup>72</sup>

The current housing demand in Kawartha Lakes is for families and couples. Kawartha Lakes households have an average household income is \$41,487 and in 2017, the average price of a home was around \$375,000 – an increase of 50% since 2008.<sup>73</sup> The prices of homes in the City of Kawartha Lakes are increasing, and home ownership is becoming less affordable to households with low to moderate incomes.

There is an emerging need for options for seniors, persons with disabilities, and smaller households. Research suggests that one-person and lone-parent family households are most often facing housing affordability issues. There are currently limited rental options in the City of Kawartha Lakes, the primary housing type needed by low-income households. Rental options make up only 11.9% of the total housing stock and average rents are unaffordable to low-income households.<sup>74</sup>

The City of Kawartha Lakes administers a number of social services, including: Ontario Works; Children's Services; and, homelessness prevention. Kawartha Lakes and Haliburton County have established a joint Poverty Reduction Strategy, which focuses on children and youth; employment and education; food security; housing; and, transportation. In 2016, the Haliburton-Kawartha Lakes Community Roundtable for Poverty Reduction was formed to reduce the prevalence and impact of poverty in the area. The City is serviced by the Haliburton, Kawartha, Pine Ridge District Health Unit, which provides public health programs, services and resources to promote and protect health in the area.

The City of Kawartha Lakes maintains its own Fire Rescue, Paramedic and Police Services. Police services outside of Lindsay and Ops Township are provided by the Ontario Provincial Police's Kawartha Lakes Detachment. Emergency preparedness procedures are outlined by the City's Emergency Plan, which aims to limit or prevent the damage and destruction of property, infrastructure and the environment when faced with a major emergency situation. Working in collaboration with in collaboration with the local Health Unit and Emergency Services, Corporate Communications leads communications about weather-related events year-round, such as, winter storms and extreme heat in order to promote community safety. Beginning in 2019, an Emergency Management Coordinator will be hired. This person will be will be responsible for coordinating all

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<sup>71</sup> Statistics Canada. (2016). *Kawartha Lakes, CDR [Census division], Ontario and Saskatchewan [Province] (table). Census Profile*. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. Retrieved from: <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=EandGeo1=CDandCode1=3516andGeo2=PRandCode2=47andData=CountandSearchType=BeginandSearchPR=01andB1=AllandTABID=1>

<sup>72</sup> City of Kawartha Lakes. (2012). *City of Kawartha Lakes Age-friendly Project Assessment*. Retrieved from: <http://kawartha.safecommunities.parachutecanada.org/files/Age%20Friendly%20Report%20CKL%20released%202012.pdf>

<sup>73</sup> Statistics Canada. (2016) and The Canadian Real Estate Association. (2008, 2017). *Kawartha Lakes Real Estate Association Residential Sales Activity [SLIDES]*. Retrieved from: <http://creastats.crea.ca/kawa/>

<sup>74</sup> City of Kawartha Lakes. (2014). *City of Kawartha Lakes Housing and Homelessness Plan 2014-2023*. Retrieved from: <https://www.kawarthalakes.ca/en/living-here/resources/Documents/Housing/City-of-Kawartha-Lakes-Housing-and-Homelessness-Plan.pdf>

## City of Kawartha Lakes Healthy Environment Plan

emergency response plans in an effort to improve the City's ability to respond appropriately and generate proactive messaging. They will liaise with all groups identified in the emergency management plan, including Corporate Communications.

There is an opportunity for the City of Kawartha Lakes to provide additional support during extreme weather events, particularly for vulnerable populations. More detailed plans regarding evacuation and shelter procedures for vulnerable populations should be considered, especially given the higher average age of the local population. Since the City is divided into many communities, it would be beneficial to create area-specific plans that correlate with a standard City of Kawartha Lakes Response Program Plan.

### Strategy PH1: Develop and implement a response program for vulnerable population to protect residents from climate-related risks, creating a safer community

#### Recommended Municipal and Community Adaptation Actions:

- Identify who is vulnerable to climate-related risks; conduct vulnerable population mapping in relation to flood and heat mapping (e.g. urban heat island areas, flood plains), building on maps that already exist through community housing services.
- Identify and establish municipal and/or community buildings that can serve as hubs (warming and cooling stations) in vulnerable areas. These centres would include space within buildings to provide temporary shelter, back-up electricity, fresh water, sanitary systems and access to resources such as food, ice, and charging stations.
- Conduct check-ins and provide emergency preparedness resources directly to vulnerable populations.
- Leverage existing community nursing programs to reduce demand on EMS and police.
- Establish evacuation and displacement plans for public spaces and public events.
- Require that healthcare support and service organizations develop emergency response plans (e.g., the hospital and long-term care facilities). These organizations need to inform emergency services of their respective plans.

Outlined below are additional plans that could improve community's resilience to the impacts of climate change:

- Shelter Plan: to indicate the location of each shelter and measures to be implemented at each shelter for the care of all evacuees. It is also recommended that other facilities become warming and cooling centres for the community, alongside the development of a plan that documents which facilities are nearby and what the evacuation procedure should be.
- Evacuation Decision Plan: to address how decisions to issue warnings or evacuation orders are made.
- Warning Plan: to provide details about the communication of flood warnings to public, implementation of preparatory measures. A Flood Warning System is ongoing through the Kawartha Lakes Communications department and the City's conservation authorities.
- Evacuation Plan: more detailed plans regarding evacuation and shelter procedures should be considered. Although this is outlined as the responsibility of the Health and Social Services Officer in the Kawartha Lakes Emergency Plan, it is important to formally set up this information, so it is readily available for those who will be responding during the emergency.

## City of Kawartha Lakes Healthy Environment Plan

- Vulnerable Population Mapping: to include detailed area mapping highlighting areas with higher concentrations of vulnerable populations, particularly those that are vulnerable to climate impacts (i.e. flood plains) or areas which could become isolated during power outages, without heating or cooling.

### **Education Actions**

- Work with health agencies, community service organizations, housing services, and community nursing programs to better identify and respond to the needs of vulnerable populations, specific to preparing for climate-related health risks.

### **Financing Options**

- Continue to leverage internal sources of financing (e.g. 5-year Operating Budget Plan).

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Human Services, Housing Help, Social Services, Fire, EMS, and Police Services
- Halliburton Kawartha Pine Ridge District Health Unit

### **Municipal Role**

- Support community organizations who service vulnerable population to provide public spaces that can be used during emergencies/extreme weather.
- Serve as a convener of joint initiatives run by emergency services and community service organizations to support vulnerable populations.

### **Impacts Addressed**

- Poor air quality, causing health risks for vulnerable populations and outdoor workers.
- Overland flooding causing evacuation and/or displacement of residents.
- Heavy rain and/or overland flooding causing physical injuries and mental health stress to residents.
- Road closures and service disruptions causing isolation of rural and vulnerable populations.
- Reduced exposure to extreme heat and cold.

### **Adaptation/Mitigation Co-benefits**

- Protection and enhancement of Kawartha Lakes tree canopy will also preserve the ecosystem services that inherently offer adaptation and mitigation co-benefits while contributing to a healthy, resilient environment.

### Indicators

- Proportion of organizations and/or institutions and/or facilities with evacuation and displacement plans.
- Proportion of healthcare facilities that have emergency and management plans that include climate hazards.
- Increase in the number of warming and cooling centres.

Strategy PH2: Create key messages, resources and a streamlined and integrated system to communicate climate readiness initiatives that help residents prepare for or respond to climate events

Recommended Municipal and Community Adaptation Actions:

- Continue to use Ontario Heat Alert system to issue heat-related media releases.
- Update City communications procedures to share climate change and extreme weather alerts (such as extreme precipitation, flood risk) to all residents via email, phone, and text message; and coordinate communications with key partners to avoid duplication. Develop pre-fabricated materials for quick release from the communications department.
- Consider investing in a patch system that can increase interoperability so that emergency services departments can communicate seamlessly.
- Create an online climate change resource platform, which acts as a central resource to coordinate information being done by various organizations, with important information for residents on warming and cooling centres, emergency procedures, what to do in a power outage, 72-hour preparedness kits, etc.



### **Education Actions**

- Provide educational material for residents about climate risks and how to prepare for extreme weather, power outages, extreme temperatures, etc.
- Provide educational material for businesses, schools, and seniors' homes about climate risks, how to ensure public safety, and emergency preparedness.

### **Financing Options**

- Continue to leverage internal sources of financing (e.g. 5-year Operating Budget Plan, Emergency Plan).

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Corporate Communications
- Haliburton Kawartha Pine Ridge District Health Unit
- Conservation Authorities

### **Municipal Role**

- Continue to participate in the development of climate change education and communication materials, online resources related to climate change preparedness, and host information for residents on municipal website.

### **Impacts Addressed**

- Overland flooding causing evacuation and/or displacement of residents.
- Heavy rain and/or overland flooding causing physical injuries and mental health stress to residents.
- Hazardous road and sidewalk conditions leading to more accidents and emergencies.
- Potential health hazards associated with power outages.

### **Anticipated Timeframe**

- Short-term (<5 years).

### **Indicators**

- Percentage of population with access to local information on climate change, weather patterns, and associated impacts.
- Number of educational trainings conducted in organizations, schools, etc. related to climate change preparedness.

## TRANSPORTATION

The City's transportation network is made up of approximately 2,700 kilometres of road, 165 bridges and 130 culverts, sidewalks, signs, streetlights, and traffic signals. In total, the municipality's road assets are valued at \$1.5 billion.<sup>75</sup>

According to the National Household Survey, 41% of Kawartha Lakes' total labour force commuted outside of Kawartha Lakes for work in 2011.<sup>76</sup> In comparison, 88% of individuals who worked in Kawartha Lakes lived within the City.<sup>77</sup>

Public transit and other specialized transportation services is provided by Lindsay Transit. In 2018, the City completed a Lindsay Transit Master Plan. The purpose of the 10-year master plan was to build on recent successes, improve reliability and accessibility, and expand reach and improve existing routes. Lindsay Transit currently operates three routes, and a specialized, accessible transit system. Between 2012 and 2016, Lindsay Transit experienced a 22.1% growth in ridership compared to 7.2% population growth within the service area.<sup>78</sup>

The City's Official Plan, includes policies to encourage active transportation and connectivity for all modes of transportation, and to develop a safe, convenient, efficient and accessible transportation system.<sup>79</sup> As per the 2018 Lindsay Transit Master Plan, Kawartha Lakes plans to expand transit service between 2018-2027, which will include the addition of Sunday service, a new additional route, weekday evening service until 11pm, the addition of daily round trips to and from Bobcaygeon and Lindsay, and a weekday commuter service from Lindsay to the GO bus stop at highway 35/115.<sup>80</sup>

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<sup>75</sup> City of Kawartha Lakes. (2017). *The 2017 Asset Management Plan for the City of Kawartha Lakes*. Retrieved from: [https://www.kawarthalakes.ca/en/municipal-services/resources/Asset\\_Management\\_Plan\\_-\\_2017\\_Draft\\_3.pdf](https://www.kawarthalakes.ca/en/municipal-services/resources/Asset_Management_Plan_-_2017_Draft_3.pdf)

<sup>76</sup> Statistics Canada. 2013. *Kawartha Lakes, CA, Ontario (Code 530) (table). National Household Survey (NHS) Profile. 2011 National Household Survey*. Statistics Canada Catalogue no. 99-004-XWE. Ottawa. Released September 11, 2013. <http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/index.cfm?Lang=E> (accessed January 5, 2019).

<sup>77</sup> Ibid.

<sup>78</sup> City of Kawartha Lakes. (2017). *Transportation*. Retrieved from: <https://www.kawarthalakes.ca/en/living-here/transportation-and-transit.aspx>

<sup>79</sup> City of Kawartha Lakes. (2012). *Official Plan*.

<sup>80</sup> City of Kawartha Lakes. (2018). *Lindsay Transit Master Plan*. Retrieved from:

<https://www.kawarthalakes.ca/en/municipal-services/resources/Budget-and-Finance/Transit-Master-Plan-accessible.pdf>

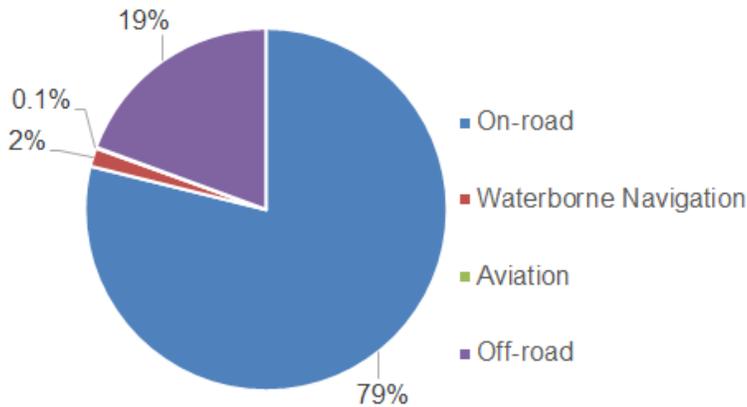


Figure 8: Transportation GHG emissions by subsector

Transportation accounts for 45% of emissions in Kawartha Lakes, as the majority of residents rely on fossil-fuel powered personal vehicles. The majority of transportation emissions (79%) are from on-road transport, while 19% are from off-road transportation. The remaining emissions are attributable to waterborne and aviation trips within the municipal boundary. Figure 8 shows the contributions of each sub sector to transportation emissions. According to the Environmental Commissioner of Ontario, transportation represented 35% of the total emissions for Ontario, which is somewhat lower to the Kawartha Lakes share.<sup>81</sup>

One of the ways residents can contribute to reducing GHG emissions is to switch from gasoline or diesel-powered vehicles to hybrid or electric vehicles. Over the next 15 years, the number of electric vehicles is expected to grow in Ontario. The price of electric vehicles continues to fall, many car manufacturers have committed to phasing out internal combustion engines, and many large corporations in Canada and abroad have committed to electrifying their fleet over the next decade. While municipalities have limited capacity to influence personal vehicle choices, they can support change in a number of ways.

The City of Kawartha Lakes can also implement a number of actions to change travel patterns and continue to play a key role in reducing the frequency and length of single-occupancy vehicle trips. By expanding and promoting more public transit, encouraging carpooling, and ensuring trips on foot or by bicycle are convenient and safe, Kawartha Lakes will also benefit from reduced air pollution, traffic congestion, and more livable communities.

## Strategies T1: Support and encourage the uptake of electric and low-emission vehicles

### Recommended Municipal and Community Mitigation Actions:

- Where feasible, continue to install electric vehicle charging stations for public use in Kawartha Lakes, including at City facilities and parking lots.
- Encourage developers to integrate electric vehicle charging stations into new developments.

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<sup>81</sup> Environmental Commissioner of Ontario. (2018). *Ontario's Climate Act, From Plan to Progress: Annual Greenhouse Gas Progress Report 2017*. Retrieved from: <http://docs.assets.eco.on.ca/reports/climate-change/2017/From-Plan-to-Progress.pdf>

## City of Kawartha Lakes Healthy Environment Plan

- Encourage local institutions and commercial/retail/industrial owners to install electric vehicle (EV) charging stations for public use.
- Encourage utilities and the province to explore the installation of electric vehicle charging stations and alternative fuel stations, such as compressed natural gas (CNG), on major roads and highways for residents, freight vehicles, and tourists.
- Offer preferred parking for low emission or electric vehicles.
- Work with local businesses and institutions to encourage the adoption of electric and low-emission vehicles in their corporate fleets.

### **Education Actions**

- Support electric vehicle advocacy organizations, such (i.e. EV Society, Plug'n Drive) to help showcase and promote electric and low-emissions transportation options.
- Partner with car dealers to educate and promote electric and low-emission vehicles.

### **Financing Options**

- Investigate and access existing incentive programs and rebates available for electric vehicle charging infrastructure.

### **Potential Primary Partners/ Departments**

- Enbridge
- City of Kawartha Lakes – Engineering and Corporate Assets and Community Services

### **Municipal Role**

- Lead initiatives to expand the number of EV charging stations on City property.

### **GHG Reduction**

- 10,640 tonnes (assumes a 5% uptake in electric vehicles).
- Opportunity for greater emissions reduction through greater uptake in electric vehicle use.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- GHG emissions reduced through electric vehicle uptake.
- Proportion of vehicle trips taken using electric vehicles.

### **Indicators**

- GHG emissions reduced through electric vehicle uptake.
- Number of charges at charging stations of vehicle trips taken using electric vehicles.

## Strategy T2: Encourage residents and visitors to use transit, walk, bicycle and carpool

### Recommended Municipal Mitigation Actions:

- Improve public transit service and increase transit ridership by:
  - Continuing to enhance public transit services within Lindsay and review expanded community services as identified in the Transit Master Plan;
  - Implementing a trip planning program/service for public transit, and technology for real-time bus tracking. Make these applications available on the web and smartphones;
  - Explore opportunities to partner with Fleming College to plan and offer routes that encourage and increase ridership among students and staff travelling between the College and Lindsay or other neighbouring communities;
  - Considering alternative public transit options, especially for rural areas, such as fixed-route taxi-bus systems, demand-response services, and transit options for special events and fairs, among others;
  - Ensuring intermodal accessibility, such as transit buses with bicycle racks, bus stops connecting to the bike network, providing safe bicycle racks, etc.; and,
  - Explore opportunities to attract a bike share program to the City.
- Expand active transportation infrastructure and networks within and between urban centres that are safe, convenient, and connected by:
  - Developing an active transportation plan to guide active transportation decisions and planning, and to identify highest priority routes or areas for expansion;
  - Expanding on-road bikeways, dedicated bike lanes, as well as multi-purpose off-road trails to increase the interconnectivity of trails and bike routes throughout the City; and,
  - Maintaining sidewalks and pedestrian walkways (i.e. snow removal) that facilitate convenient and safe pedestrian travel.
- Support and encourage carpooling and facilitate a shift away from single-occupancy vehicle trips among commuters in Kawartha Lakes, by:
  - Developing a carpool lot network and incentivizing carpooling with preferred parking;
  - Engaging employers to promote and/or offer incentives for employees who use active transportation, public transit, carpooling, or who tele-commute; and,
  - Establishing shared working spaces in centralized locations to reduce need to travel by car and promote telecommuting.

### **Education Actions**

- Educate residents about sustainable transportation options and benefits, and encourage adoption.
- Support of “Safe Routes to School” for walking and biking where appropriate.
- Promote walking and bicycling trails to tourists using signage, maps, and partnerships with tourism agencies.
- Promote existing ride-matching and carpooling services to commuters.

### **Financing Options**

- Continue to leverage internal sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year Operating Budget Plan).
- Explore a co-financed transit pass programs with large institutions.

### **Potential Primary Partners/ Departments**

- Lindsay Transit
- City of Kawartha Lakes – Development Services, Public Works, and Engineering and Corporate Assets
- City of Kawartha Lakes – Environmental Advisory Committee
- Fleming College

### **Municipal Role**

- Ensure that transit is servicing existing and emerging neighbourhoods in ways that provides easy access to essential goods and services, reduces the amount of single-occupancy vehicle trips, and supports mixed-use developments.
- Lead initiatives to expand public transportation options in the City, and initiatives to encourage carpooling, active transportation.

### **GHG Reduction**

- 8,500 tonnes (assumes a 5% shift from single-occupancy vehicle trips).
- Opportunity for greater emissions reduction through greater shift away from single-occupancy vehicles.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Total transit ridership, transit ridership per capita.
- Use of carpool lots (number of cars parked, etc.).
- Kilometres of bike lanes.
- Mode share for walking and cycling (for travel to work, school, etc.).

## Strategy T3: Transition the City of Kawartha Lakes' municipal fleet and equipment to be more efficient and emit less carbon

### Recommended Municipal Mitigation Actions:

- Accelerate the retirement of the least fuel-efficient vehicles and equipment.
- As vehicles are replaced, ensure right-sizing of vehicles and equipment, to ensure that new vehicles meet the specific job function requirements (e.g.: consider replacing mid-sized cars and vans with hatchbacks and other compact cars, or downsizing pickup trucks).
- Where feasible, transition to low emission and other alternative fuels (electric, hybrid, compressed natural gas, propane, hydrogen fuel cells, etc.) as vehicles are retired and replaced.
- Continue to improve fleet monitoring and maintenance as well-maintained vehicles ensure optimal fuel economy and reduce emissions.
- Review the feasibility of implementing a fleet management system to track maintenance, and to monitor and evaluate the performance of existing vehicles to support future decision-making.
- Require preventative and advanced maintenance practices, including storage tank fuel level monitoring, tire audits, using nitrogen to inflate tires and reduce tire wear.
- Consider joining a fleet accreditation program, such as E3 Fleet Program or North American Fleet Association's Sustainable Fleet Accreditation Program, which provide tools and resources to reduce environmental impacts, and garner recognition of the City's sustainability commitments.
- Introduce anti-idling technologies and implement and enforce an anti-idling policy for corporate vehicles.
- Monitor new and emerging technologies that improve fleet efficiency.
- Encourage telecommuting among City staff, and encourage carpooling to off-site meetings and visits.

#### **Education Actions**

- Provide operator training and education to staff, which promotes fuel-efficient driving habits including anti-idling, optimal driving behaviours, efficient stopping and acceleration techniques, etc.

#### **Financing Options**

- Continue to leverage sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year Operating Budget Plan).
- Reallocate fuel cost savings to a reserve fund for future fleet improvements.

#### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Public Works

#### **Municipal Role**

- Lead.

### **GHG Reduction**

- 310 tonnes (assumes 3% uptake of alternative fuel vehicles including hybrids and electric vehicles, a 35% improvement in fuel efficiency, 2.5% fuel savings from anti-idling technologies and practices).

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Reduction in the total amount and cost of fuel used.
- Fleet GHGs reduced.
- Proportion of staff trained on efficient vehicle use.



## WASTE

The effective management of the City of Kawartha Lakes' waste and recycling programs is essential to build a more sustainable community. As a result, the City has put significant effort into their waste management program. In the early 1990s the City had a waste diversion rate of 7%, by 2013 the rate was up to 39%.<sup>82</sup> A waste diversion rate is a measure of the amount of waste that is recycled, composted or otherwise not sent to landfill, relative to the total amount of waste disposed.<sup>83</sup> Currently the City' waste management program includes curbside collection and disposal at the landfills. Curbside collection comprises blue box (containers), green box (papers and cardboard), leaf/yard waste, large items and garbage. The City uses school programs, social media and the MyWaste app to further engage residents.

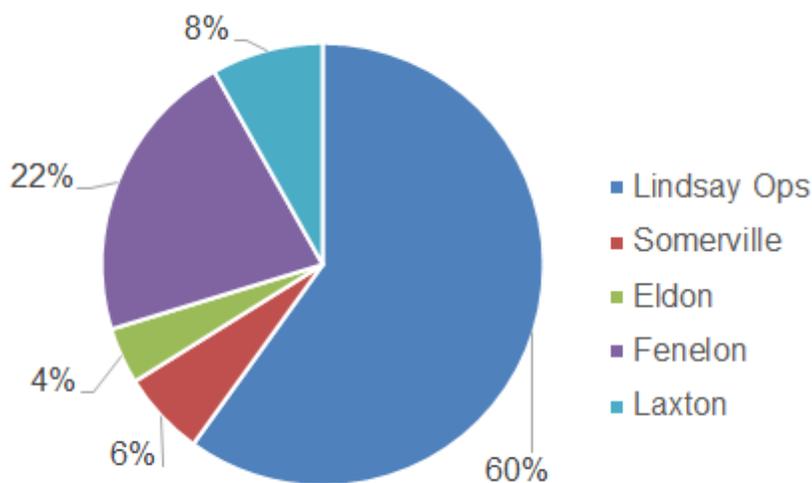


Figure 9: GHG emissions from landfill

In August 2015 the City published an Integrated Waste Management Plan titled "Making Waste Matter". This strategy outlined the City's short-term and long-term strategies to increase their waste diversion rate to 70% by 2048. The City plans to achieve this by recycling, reducing, reusing, innovation and public engagement. Given the anticipated growth rate, the number of households is expected to increase to 42,516 by 2032.<sup>84</sup> If the diversion rate remains at 39% then the municipality would be generating 56,000 tonnes of waste by 2048.<sup>85</sup> Increasing the diversion rate will reduce emissions, provide increased revenue for the City, and extend landfill capacity.

<sup>82</sup> City of Kawartha Lakes. (2015). *Making Waste Matter*. Retrieved from: <https://www.kawarthalakes.ca/en/living-here/resources/Documents/Waste/Making-Waste-Matter--Aug-2015.pdf>

<sup>83</sup> Government of Canada. (2018). *Solid waste diversion and disposal*. Retrieved from: <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/solid-waste-diversion-disposal.html>

<sup>84</sup> City of Kawartha Lakes. (2015). *Making Waste Matter*.

<sup>85</sup> Ibid.

## City of Kawartha Lakes Healthy Environment Plan

It is estimated that City of Kawartha Lakes produced 41,804 tonnes of solid waste, emitting 59,730 tonnes of GHGs from all landfill, which accounts for 10% of the City of Kawartha Lakes' total emissions in 2015 (Figure 9).

### Strategy W1: Reduce the amount of waste and emissions associated with landfills

#### Recommended Municipal Mitigation Actions:

- Continue to implement measures to increase the waste diversion rate from 39% to 70% by 2048, as identified in the City of Kawartha Lakes Integrated Waste Management Plan.
- Regularly review the effectiveness of waste collection programs and implement changes to improve residential waste diversion.
- Regularly review additional waste diversion programs such as organic waste, and/or consider collaborating with neighbouring communities for organic waste programs and disposal.
- Continue to improve the efficiency of the existing landfill gas capture system, and assess the feasibility of expanding landfill gas capture systems to other landfills, especially as landfill facilities are centralized to Lindsay Ops and Somerville landfill in the longer term (as planned).
- Explore partnership opportunities with neighbouring municipalities to develop a regional waste diversion program.

#### **Education Actions**

- Continue to develop educational programs and behavioural change campaigns to encourage waste reduction and reuse among residents and businesses.
- Provide information about existing waste diversion programs, such as backyard composting, electronics recycling, and re-use programs.

#### **Financing Options**

- Continue to leverage internal sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year Operating Budget Plan).
- Partner with neighbouring municipalities to leverage funds for larger backyard composting program.

#### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Public Works and Engineering and Corporate Assets
- City of Kawartha Lakes – Environmental Advisory Committee

#### **Municipal Role**

- Lead.

#### **GHG Reduction**

- 20,110 tonnes (assumes 28% per capita waste reduction, in accordance with the IWMS targets).
- Opportunity for greater emissions reduction if going beyond IWMS targets.

### Anticipated Timeframe

- Continuously over the long-term (10+ years).

### Indicators

- Total tonnes of solid waste to landfill.
- Total residential diversion rate.
- Generation per capita.
- Remaining landfill capacity.
- Financial saving realized.

## WATER, WASTEWATER and STORMWATER

The City of Kawartha Lakes treats and distributes safe and reliable drinking water to residents and businesses, and collects and treats wastewater, all of which requires energy and generates GHG emissions. The 2016 replacement value of the City's water and wastewater systems is \$251 million and \$279 million respectively.<sup>86</sup> Implementing operational and maintenance best practices on an ongoing basis can improve energy efficiency, reduce emissions, and lower energy costs. Water conservation initiatives by residents, businesses, and the City reduces the volume of water and wastewater treated and associated energy costs.

In the City of Kawartha Lakes, stormwater drainage areas fall under municipal, conservation authority, and private land ownership. Climate-related impacts to drainage systems should be addressed in a coordinated effort, integrating the use of green infrastructure to improve stormwater management across the community.

In the most recent Asset Management Plan, the storm management units received a rating of "F" or "very poor".<sup>87</sup> The City has identified the need to "implement a condition assessment program of its storm mains to further define field needs and to assist the prioritization of the short and long-term capital budget". They also identified the need to establish key storm network performance indicators to track annually as part of an overall level of service model.<sup>88</sup> These actions are crucial as more frequent and severe rain events have been affecting the City in recent years.

With respect to drinking water, the City maintains a Source Water Protection program and is a member of the Ontario Water Wastewater Response network – increasing the safety and security of the water supply for its residents. Municipal water is treated and tested in accordance with the requirements set out by the Ministry of Environment Community and Parks. In order to further protect the City's water supply, Kawartha Lakes practices water conservation. Conservation measures help to: use less water and energy; lower long-term infrastructure costs; improve water sustainability; and, protect the environment.

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<sup>86</sup> City of Kawartha Lakes. (2017). *The 2017 Asset Management Plan for the City of Kawartha Lakes*. Retrieved from: [https://www.kawarthalakes.ca/en/municipal-services/resources/Asset\\_Management\\_Plan\\_-\\_2017\\_Draft\\_3.pdf](https://www.kawarthalakes.ca/en/municipal-services/resources/Asset_Management_Plan_-_2017_Draft_3.pdf)

<sup>87</sup> Ibid.

<sup>88</sup> Ibid.

## City of Kawartha Lakes Healthy Environment Plan

From the community inventory, 3,460 tonnes of GHG emissions are emitted from wastewater decomposition. Emissions from wastewater primarily result from methane and nitrous oxide released in the process of storing and treating waste are captured in the community inventory.

In addition, there is energy used by the municipality to collect treat and deliver water and wastewater in the city, which contributes an additional 460 tonnes of GHGs from the energy used to water and wastewater services.

### Strategy WW1: Increase the operational efficiency and resiliency of water and wastewater systems in response to climatic changes

#### Recommended Municipal Mitigation and Adaptation Actions:

- Implement operations and maintenance optimization best practices to reduce energy consumption at water and wastewater treatment facilities, including:
  - Regularly reviewing energy performance of water and wastewater facilities;
  - Consider implementing an energy monitoring system and benchmarking program;
  - Providing facility operator training on operational and maintenance best practices;
  - Continuing to upgrade water and wastewater facilities to improve operations, such as the installation of aeration blower upgrades, installation of variable frequency drives on pumps, ultra-fine bubble diffusers etc.,
  - Continue to investigate innovative technologies to reduce energy and GHG emissions in water and wastewater treatment facilities;
  - Continuing to optimize processes that consumed significant amount of energy, such as pumps and filtration systems; and,
  - Continuing investment in optimization of water and wastewater treatment facilities.
- Conduct feasibility assessment of biosolid management and energy recovery to offset both electricity and natural gas requirements.
- Explore renewable energy (i.e. solar generation, energy storage, biogas, or heat recovery from waste) that leverage existing infrastructure.
- Integrate intensity, duration, frequency (IDF) data and other climate projections into the inspection, maintenance and upgrades of all facilities.
- Implement actions upstream of water treatment plants to reduce sediment loads, decreasing the amount of energy required to treat drinking water.
- Building on the CEMP, develop an integrated energy management plan specifically for the City's wastewater treatment plants to develop further efficiencies.
- Maintain and update the water distribution and wastewater collection systems that consider climate risks.

### **Education Actions**

- Develop and provide resources and water consumption reports to businesses, institutions, and residents, to educate residents and businesses about technological and behavioural ways to reduce water consumption.
- Educate water and wastewater facility operators on maintenance and operations best practices.

### **Financing Options**

- Continue to leverage internal sources of financing and leverage reserve funds for larger capital projects (e.g. into 10-year Capital Budget Plan and 5-year and annual Operating Budget Plan). Consider funding from provincial and federal sources, as well as private investment.

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Public Works, Engineering and Corporate Assets, and Community Services

### **Municipal Role**

- Lead.

### **GHG Reduction**

- Approximately 90 tonnes (assumes a 10% efficiency improvement from O&M best practices). This action also includes Strategy B6 energy retrofits (lights, insulation, windows, etc.), which assume 35% of water and wastewater buildings are retrofitted to achieve efficiency gains of 65%.
- Opportunity for greater emissions reduction with greater energy savings from improved O&M practices, a larger percentage of buildings undergoing efficiency improvements, and higher efficiency building retrofits.

### **Adaptation/Mitigation Co-benefits**

- In addition to increasing efficiency, regular maintenance will increase the resiliency of the City's water and wastewater systems.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Energy use per unit output (litres of water treated, litres of wastewater treated).
- GHGs reduced through efficiency measures.
- Cost savings from energy efficiency measures.
- Percentage of buildings retrofitted relative to 2015 baseline.

## Strategy WW2: Update Stormwater Design Requirements and the Stormwater Management Plan to reduce flood risk in development and redevelopment and expand the use of green infrastructure for stormwater management to reduce flood risk

### Recommended Municipal Adaptation Actions:

- Regularly update rainfall intensity-duration-frequency (IDF) curve, integrating projections into stormwater management design requirements, the Stormwater Management Plan, and the approval process for new and existing developments on municipal property, with the assistance of the local conservation authorities.
- In partnership with conservation authorities, conduct a detailed assessment of climate impacts on stormwater drainage areas. This assessment can include the following:
  - Mapping stormwater drainage, water collection and distribution infrastructure and associated risks in relation to flood maps (existing via conservation authorities) and incorporating climate change projections into inventory of stormwater drainage areas;
  - Conduct an inflow/infiltration study to identify issues with stormwater management, and justify investment for improvements;
  - Continuing to conduct stormwater drainage assessments and identify potential hazards related to blockages and flooding. Incorporating findings into an inventory of high-risk, priority areas;
  - Inspecting high-risk, priority areas for flooding and/or damage after extreme weather events; and
  - Assessing potential damages and losses to high-risk, priority assets resulting from climate change and including such considerations in stormwater design requirements, Stormwater Management Plan, flood plain mapping and other capital, financial, and service plans.
- Consider re-establishing the Lindsay Filtration Plant rain gauge to provide consistent monitoring information.
- Integrate climate change projections and flood risks identified for stormwater drainage areas into site-specific Stormwater Management Plans and other capital plans, financial plans, service plans and master plans, using this new information to prioritize high-risk areas.
- Continue to prioritize high-risk assets for maintenance, upgrades, and restoration. Integrate design adjustments and changes to operational or maintenance procedures where needed to improve flood resilience.
- Explore the needs and feasibility of implementing grey and/or green infrastructure within existing developed watersheds to reduce flooding, where needed.
- Increase the implementation of low impact development and green infrastructure for stormwater management on public and private property, buildings, and roads in high-risk areas. Inform decision-making on green infrastructure projects using guiding documents such as the: Lake Simcoe Region Conservation Authority Technical Guidelines for Stormwater Management Submissions, Ontario Ministry of Environment, and Credit Valley Conservation Authority Low Impact Development Design Guidance, and Credit Valley Conservation Greening Corporate Grounds. Examples include the following:
  - Implementing road retrofits for improved stormwater drainage, including the use of LID (low impact development) in flood vulnerable areas; and

## City of Kawartha Lakes Healthy Environment Plan

- Considering and addressing impacts associated with increased disease vectors in design of stormwater infrastructure (e.g. limit ponding/standing water).
- Monitor the effectiveness of LID pilot projects in addressing rainfall-related risks and reducing operational expenses.
- Embed climate resilience considerations into requirements and specifications for stormwater infrastructure in procurement processes.
- Ensure regular review and update to stormwater design standards, development by-laws, zoning, and infrastructure assessment processes to account for new climate change projections.
- Update the design standards to ensure LID is included in the design standards for new development.

### **Education Actions**

- Support the implementation of LID and green infrastructure features into private property through education and incentives for private landowners and developers (e.g. through Kawartha Conservation's BlueScaping program).
- Educate home and building owners about how to reduce runoff and flood risk on property (e.g. building a rain garden, how to disconnect a downspout, etc.).

### **Financing Options**

- Consider seeking external funding and/or programs and/ or grants from provincial government, conservation authorities, or NGOs.
- Consider development of local improvement charges for stormwater improvements.

### **Potential Primary Partners/ Departments**

- City of Kawartha Lakes – Engineering and Corporate Assets and Public Works
- Conservation Authorities

### **Municipal Role**

- Lead.

### **Impacts Addressed**

- Stress on stormwater management infrastructure leading to insufficient capacity and localized flooding.
- Increased risk of extreme drop in water level between storm events, causing surface water intakes for drinking water to be above water.
- Increased frequency of heavy rainfall and urban flooding, causing damage to infrastructure.
- Overland flooding, leading to closure of public buildings and facilities.

### **Adaptation/Mitigation Co-benefits**

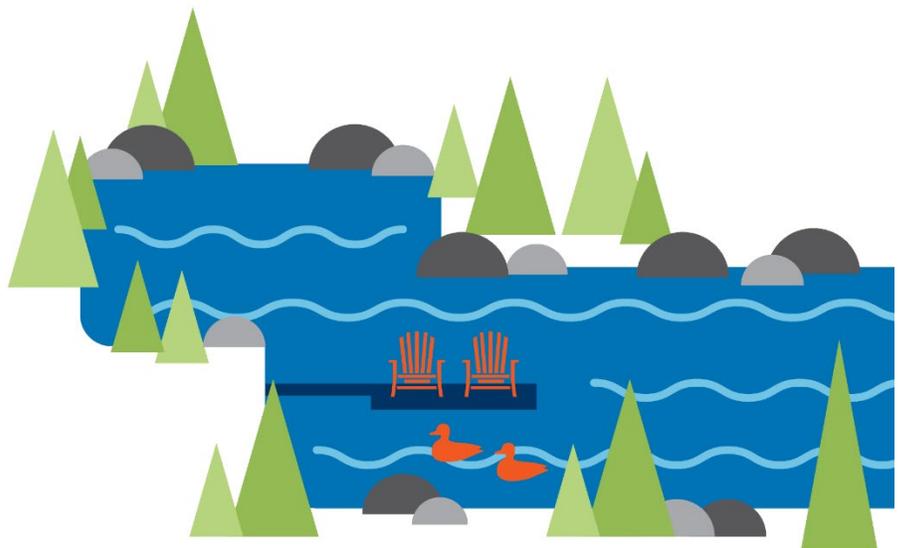
- Improvements to the stormwater management design and operations offers several adaptation benefits such as reducing flooding and erosion, filtering pollutants out of water, and enhancing green space and plant and animal habitat. Expanding low impact development and green infrastructure will also reduce the amount of water going into stormwater facilities, therefore reducing the energy and maintenance costs of stormwater management infrastructure.

### **Anticipated Timeframe**

- Continuously over the long-term (10+ years).

### **Indicators**

- Number and impact of LID and green infrastructure projects and/or pilot projects undertaken on municipal property.
- Proportion of new developments integrating LID and/or green infrastructure.



## 7. Impacts of Strategies

Based on the implementation of the community strategies outlined in Section 5, a total of 87,220 tCO<sub>2</sub>e of community emissions can be reduced and approximately \$142 million in energy costs can be avoided and reinvested in the community by 2030. Table 1 shows the cumulative impacts of community mitigation activities on the levels of greenhouse gas emissions in the community.

*Table 1: Impacts of Community Mitigation Strategies*

Sector	Reduction amount from 2015 by 2030	Total tCO <sub>2</sub> e	Estimated Total Savings from Reduced Energy Consumption (\$)
Agriculture	Annual GHG intensity improvements per livestock type (~1%/year).	12,520	N/A
New Residential & Commercial Buildings	Efficiency gains of 65%, with renewables providing 10% of electricity by 2030.	8,640	33M
Existing Residential Buildings	Deep energy retrofit (35% of homes retrofitted to achieve efficiency gains of 65%, with renewables providing 10% of electricity needs by 2030).	21,320 <sup>89</sup>	70M
Existing Commercial Buildings	Deep energy retrofit (35% of buildings retrofitted to achieve efficiency gains of 65%, with renewables providing 10% of electricity needs by 2030).	5,170	27M
Industry	1% efficiency improvements per year, with renewables providing 5% of electricity by 2030.	320	0.8M
Transportation: Alternative Fuel Adoption	5% uptake in electric vehicles.	10,640	5M
Transportation: Mode Shift	5% shift from single-occupancy vehicle trips.	8,500	6M
Waste Reduction	28% per capita waste reduction (IWMS).	20,110	N/A
<b>Total</b>		<b>87,220</b>	<b>\$141.8 million</b>

<sup>89</sup> As shown, strategy B2 – retrofits to existing residential buildings – has the potential for the greatest reduction in GHG emissions.

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As shown in Table 1, implementing the mitigation strategies will result in avoiding approximately \$142 million for the community over the course of the plan (2015-2030). The estimated costs avoided include the costs of all electricity, natural gas, gasoline, and diesel used within the City boundaries by all sectors. In 2015, residents and businesses spent approximately \$150 million on fuel to heat and power for their homes, businesses, and vehicles.

Although the implementation of all mitigation strategies is ambitious, further reductions are needed to reach the absolute 30% federal and provincial emissions reduction targets. To further reduce GHG emissions within the community, each of the strategies would require greater levels of uptake in shorter periods of time, particularly in the areas of building efficiency and transportation.

By implementing all municipal strategies, the City also has the potential to reduce emissions by 880 tonnes of CO<sub>2</sub>e as shown in Table 2 and save up to an estimated \$2.6 million.

*Table 2: Impacts of Mitigation Strategies for Municipal Operations and Services*

Sector	Reduction from 2015 by 2030	Total tCO <sub>2</sub> e	Estimated Total Savings from Reduced Energy Consumption (\$)
New Buildings	Efficiency gains of 65%.	120	0.4M
Existing Buildings	35% of floorspace retrofitted to achieve efficiency gains of 65%.	360	1.3M
Transportation	3% uptake of alternative fuel vehicles including hybrids and electric vehicles.  35% improvement in fuel efficiency, 2.5% fuel savings from anti-idling technologies and practices.	310	0.14M
Water, Wastewater	10% efficiency improvement from O&M best practices.  This action also includes Strategy B6 energy retrofits (lights, insulation, windows, etc.), which assume 36% of water and wastewater buildings are retrofitted to achieve efficiency gains of 65%.	90	0.76M
<b>Total</b>		<b>880</b>	<b>\$2.6 million</b>

In addition to the mitigation impacts described above, the strategies outlined in this Plan will help build resiliency to a changing climate within Kawartha Lakes. Table 3 outlines the adaptation impacts addressed by various strategies.

Table 3: Impacts of Adaptation Strategies

Strategy	Impacts Addressed
<b>AG1: Agricultural management systems</b>	<ul style="list-style-type: none"> <li>• Flooding in rural areas, leading to washout of fields and lower crop yield.</li> <li>• Heat stress on crops and livestock leading to loss of agricultural productivity.</li> <li>• Longer growing season leading to new crop opportunities.</li> <li>• Increased runoff causing increased nutrient, sediment, and contaminant loading in rivers and lakes.</li> <li>• More winter days above 0 degrees, lowering productivity of winter-reliant industries.</li> <li>• Decreased evapotranspiration and increased runoff from precipitation events, leading to reduced groundwater recharge.</li> <li>• Increased water demand causing stress on water treatment and delivery systems.</li> </ul>
<b>B7: Climate risks in infrastructure</b>	<ul style="list-style-type: none"> <li>• Increased frequency of heavy rainfall and urban flooding, causing damage to infrastructure.</li> <li>• Overland flooding, leading to closure of public buildings and facilities.</li> <li>• Temperatures near the freezing mark, causing increased need for salting, damaging infrastructure.</li> <li>• Increased road base deterioration and pot holes.</li> <li>• Increased flow in riverine systems, causing damage to bridge and culvert infrastructure.</li> </ul>
<b>E1: Energy reliability and security</b>	<ul style="list-style-type: none"> <li>• Infrastructure and power system damage, causing closure of businesses.</li> <li>• Damage to tree canopy, causing power outages and disruptions.</li> <li>• Increased demand on electricity grid, causing more frequent power interruptions and outages.</li> </ul>
<b>L2: Health islands, air quality in land use</b>	<ul style="list-style-type: none"> <li>• Infrastructure and power system damage, causing closure of businesses.</li> <li>• Overland flooding, leading to closure of public buildings and facilities.</li> <li>• Overland flooding causing evacuation and/or displacement of residents.</li> <li>• Heavy rain and/or overland flooding causing physical injuries and mental health stress to residents.</li> </ul>
<b>N1: Enhance natural assets</b>	<ul style="list-style-type: none"> <li>• Warmer lake temperatures, causing increase in lake vegetation and algal blooms.</li> <li>• Increase in lake and river temperatures, causing stress or loss of aquatic species.</li> <li>• Increased runoff causing increased nutrient, sediment, and contaminant loading in rivers and lakes.</li> <li>• Shifting eco-regions for flora and fauna, causing introduction of new species into ecosystems and stress on native species.</li> <li>• Increased runoff and evaporation from precipitation events, leading to reduced groundwater recharge.</li> <li>• Increase in heat stress on trees, vegetation and native species, leading to higher mortality.</li> </ul>

Strategy	Impacts Addressed
<b>N2: Community-wide tree management program</b>	<ul style="list-style-type: none"> <li>• Damage to tree canopy, causing power outages and disruptions.</li> <li>• Spread of Emerald Ash Borer and other pests, causing damage to tree canopy.</li> <li>• Increase in heat stress on trees, vegetation and native species, leading to higher mortality.</li> </ul>
<b>PH1: Climate readiness toolkit</b>	<ul style="list-style-type: none"> <li>• Poor air quality, causing health risks for vulnerable populations and outdoor workers.</li> <li>• Overland flooding causing evacuation and/or displacement of residents.</li> <li>• Heavy rain and/or overland flooding causing physical injuries and mental health stress to residents.</li> <li>• Road closures and service disruptions causing isolation of rural and vulnerable populations.</li> <li>• Reduced exposure to extreme heat and cold.</li> </ul>
<b>PH2: Vulnerable population response</b>	<ul style="list-style-type: none"> <li>• Overland flooding causing evacuation and/or displacement of residents.</li> <li>• Heavy rain and/or overland flooding causing physical injuries and mental health stress to residents.</li> <li>• Hazardous road and sidewalk conditions leading to more accidents and emergencies.</li> <li>• Potential health hazards associated with power outages.</li> </ul>
<b>WW2: Update stormwater requirements and plan</b>	<ul style="list-style-type: none"> <li>• Stress on stormwater management infrastructure leading to insufficient capacity and localized flooding.</li> <li>• Increased risk of extreme drop in water level between storm events, causing surface water intakes for drinking water to be above water.</li> <li>• Increased frequency of heavy rainfall and urban flooding, causing damage to infrastructure.</li> <li>• Overland flooding, leading to closure of public buildings and facilities.</li> </ul>

## 8. Implementing the Plan

This HEP is intended to guide the City of Kawartha Lakes and community agencies to reduce community greenhouse gas emissions. A strong focus on implementation, governance, and monitoring is essential to the Plan’s success. The implementation framework includes guidance for:

- Oversight and governance;
- Education and outreach;
- Partnerships;
- Integration with existing plans and policies;
- Securing funding; and
- Annual summit, reporting and plan renewal.

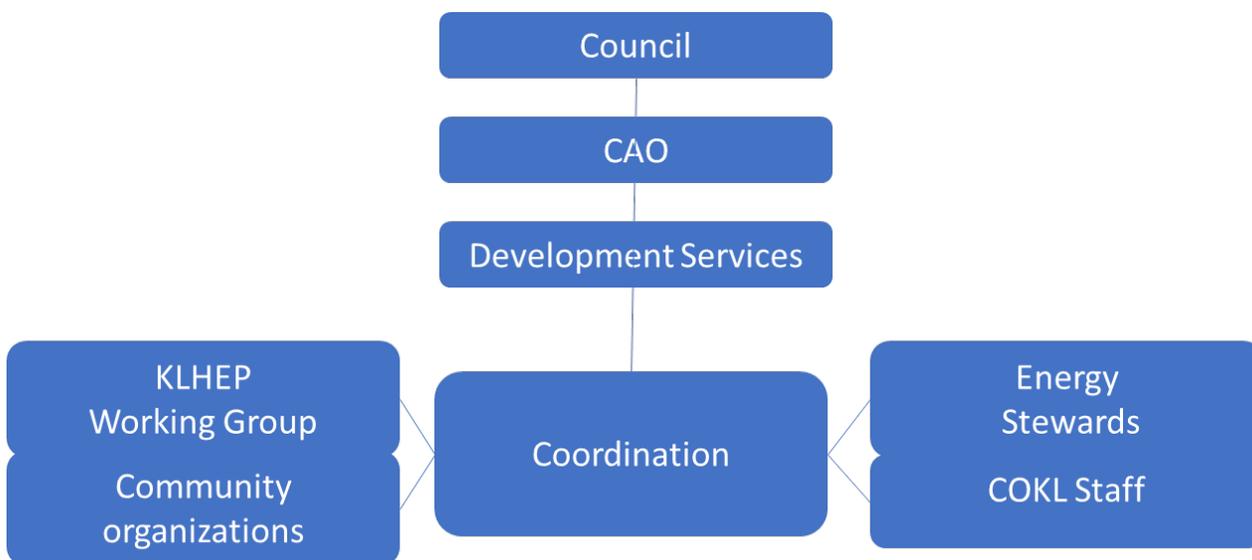
## City of Kawartha Lakes Healthy Environment Plan

Changes to federal and provincial legislation and regulations, as well as technological advances, are anticipated over the plan horizon; this will impact the long-range strategies, underscoring the importance of periodic review and adjustments to the HEP.

### Oversight and Governance

The organizational model supporting the implementation of the HEP can be characterized as ‘Municipal-led and Community supported.’ The benefits of this model are that it enables the City to play a leadership role, while sharing the responsibility for plan implementation, and leveraging the capital of the community for those strategies that are beyond municipal responsibility.

Potential roles for implementation are highlighted in the graphic below. This suggested governance structure will need to be confirmed with community partners and relevant City departments prior to implementation.



#### City Council

Council will be responsible for the official adoption of this Healthy Environment Plan. Council will also approve subsequent annual work plans as developed by the External Working Group and Energy Stewards Team.

#### Development Services

Development Services will continue as the champions of the HEP and will be responsible for overseeing its implementation.

## Healthy Environment External Working Group

It is suggested that an external working group be formed to guide the implementation of the HEP. The Working Group would be comprised of key implementation organizations, identified within the plan's strategies (i.e. utilities, conservation authorities, etc.). As such, the Working Group would represent the interest of these partner organizations. The Working Group would also welcome members of the wider community and interested staff members.

It is anticipated that this Working Group would meet throughout the year, with a minimum of two meetings per year. The purpose of the two annual meetings would be to: (1) develop the annual work plan and, (2) to report on progress at year-end. More regular meetings may be required at the outset, as the implementation process begins.

## Energy Stewards Team

The Energy Stewards Team is an internal team with representation from the Community Services, Public Works, Engineering and Assets and Development Services departments. Formed in 2016, the team is responsible for championing the City's Corporate Energy Management Plan. The CAO is an active member of the Energy Stewards Team and champions the corporate energy plan.

In the context of the HEP, the Energy Stewards Team will have a continued role in reporting on corporate actions. The team will be responsible for integrating corporate strategies of the HEP into annual work plans and aligning the Corporate Energy Management Plan with the HEP.

## Coordination

It is recommended that a coordinator position be established as a main point of contact for the HEP. The coordinator would convene, facilitate and lead working group meetings, and act as a liaison between the Working Group, Council, Energy Stewards Team, Municipal staff, and the general public. The coordinator would also prepare funding applications and facilitate education and outreach efforts related to the plan.

## Partnerships

As the HEP is a community-wide plan, the City of Kawartha Lakes will need to rely on the knowledge, expertise and abilities of community organizations and partners to affect action on the ground. Not all actions in this plan have a municipal role. For each strategy in the HEP, the role of the municipality as well as potential lead agencies has been identified. A key next step for the City will be to confirm partnerships to ensure that implementation moves forward. Community partners can play an important role in:

- Building support for implementation within their sectors;
- Sharing best practices;
- Educating the community about the importance of reducing GHG emissions;
- Resourcing and sharing expertise as utilities and technical service providers have a wealth of knowledge and expertise that can continue to shape the actions and opportunities identified in the plan;
- Aligning the strategies identified with their organization's mandates, priorities and targets;
- Delivering strategies;
- Supporting funding for strategies; and

## City of Kawartha Lakes Healthy Environment Plan

- Monitoring and reporting.

As an important next step, the following organizations should be engaged in further discussions about their role in design and delivering the strategies identified. **It should be noted that respective roles will need to be confirmed with each community partner prior to implementation. This is also not an exhaustive list of potential partners.**

- Conservation Authorities
- Enbridge
- Fleming College
- HydroOne
- IESO
- Lindsay Transit
- Local agricultural community
- Ministry of Agriculture, Food and Rural Affairs
- Ontario Cattle Association
- Ontario Soil and Crop Association
- Peterborough Construction Association
- Peterborough Kawartha Home Builders Association

Through the planning process, a number of additional partners for implementation have been identified. It is anticipated that more partners will be identified and additional partnerships realized as the plan is implemented. A preliminary listing of prospective partners has been compiled and is included in Appendix B.

## Integration with City Department and Agency Business Plans and Budgets

Climate change impacts service delivery and outcomes for most departments across the City and aligns with the mandate of many community organizations. As such, it will take some time to integrate the strategies and actions into the business plans and budget of City departments and external agencies. A key first step in implementation for the City will be to identify no or low-cost actions as well as identifying actions that require additional resources so they can be evaluated and a select number can be prioritized for inclusion in the 2020 budget cycle. As noted previously, the HEP does not provide cost estimates for strategies given the potential for multiple agencies to move strategies forward. The City and any other lead implementation partner, will identify the costs for strategies and actions, potential partners for implementation, and funding sources as appropriate.

## Integration with City Plans and Policies

There is an opportunity to integrate HEP strategies across the organization through the following plans, policies and initiatives:

- Updating procurement policies to assess implications on GHG emissions and climate risks when selecting products, services, and vendors. This has the ability to influence the supply chain in support of climate change objectives;
- Updating the Corporate Energy Management Plan (CEMP) to align with the strategies, activities and targets in the HEP;

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- Including energy management of water and wastewater facilities within the CEMP;
- Creating Official Plan amendments to incorporate low carbon, climate resilient considerations and expansion of EV charging infrastructure in development applications;
- Integrating energy efficiency and climate resiliency into newly adopted Community Improvement Plans;
- Integrating the need to improve energy reliability and security into various corporate strategies;
- Integrating urban ecosystems and green infrastructure into the Asset Management Plan;
- Integrating climate risks and relevant strategies into City of Kawartha Lakes Emergency Plan and procedures;
- Integrating climate change projections and flood risks identified for stormwater drainage areas into the Stormwater Management Plan and other capital plans; and
- Integrating climate change awareness in staff training.

In addition, a number of opportunities were identified to align the HEP strategies with both City plans and policies as well as those of community organizations and the province. These are captured in Appendix A.

## Funding

It is recommended that the City continue to maximize available funding opportunities to advance implementation of strategy components. There are a number of avenues for funding actions that align with the strategy components identified in the HEP, including but not limited to:

- BLOOM Clean Technology Demonstration Program;
- Canada Revenue Agency tax incentives for industrial investments in energy conservation and clean energy generation;
- ecoENERGY Efficiency for Industry;
- Enbridge and Hydro One (e.g. Retrofit incentives);
- Federation of Canadian Municipalities (e.g. Green Municipal Fund);
- Forests Ontario (e.g. 50 Million Tree Program);
- IESO (e.g. Conservation Fund, Industrial Accelerator Program);
- Infrastructure Canada (e.g. Investing in Canada Infrastructure Program, Disaster Mitigation and Adaptation Fund);
- Ontario Centres of Excellence;
- Ontario Ministry of Agriculture, Food and Rural Affairs;
- Ontario's Low Carbon Innovation Fund;
- Ontario's SaveON Energy Programs;
- The Federal Canadian Industry Program for Energy Conservation (CIPEC); and
- Trees Canada (e.g. Community Tree Grants).

## Communication, Education and Outreach

Creating a shared understanding about the importance of maintaining a healthy environment, climate mitigation and adaptation to be integrated into the mainstream practices and thinking of all community groups, residents, visitors and municipal staff. Engaging all audiences in an ongoing conversation about the benefits of climate action is critical for the long-term success of the Plan. Efforts to engage and mobilize the Kawartha Lakes community are necessary to help build an understanding of the benefits of mitigating and adapting to climate

## City of Kawartha Lakes Healthy Environment Plan

change and the potential impacts to residents' quality of life. It is recommended that the City of Kawartha Lakes, working with community partners, develop a communication strategy that both keeps residents informed about the progress of the HEP as well as provide them with opportunities for action at home and in the community.

### Annual Summit, Reporting and Plan Renewal

As changes to provincial and federal climate change direction occur, population growth projections are updated and technological advances are made, the HEP can be updated and adapted. Renewal of the HEP should occur at four-year intervals, in the year following municipal elections. The first renewal of the HEP should occur in 2023, following the 2022 municipal election.

Annual reporting on the HEP's progress will be delivered to Council, via the Working Group's reporting process. Annual reports will include an update on the indicators (identified above), as well as progress towards its the overall GHG reduction target.

To build excitement and momentum in the community, it is recommended that the City of Kawartha Lakes host an annual climate change summit to communicate and celebrate the success of the HEP and gather community inputs to new priorities for action.

## Appendix A: Plan Alignment

There is an opportunity to integrate HEP strategies across the organization when the following plans, policies and initiatives are reviewed and/or updated:

	AG1: Agricultural management systems	AG2: Manure Management and Anaerobic Digestion	AG3: Digestibility of Feed and Enteric Fermentation	AG4: Carbon Sequestration	B1: Community New construction	B2: Deep Retrofit - Residential	B3: Deep Retrofit – Commercial/ Institutional	B4: Industry efficiency	B5: Municipal building new construction	B6: Deep retrofit - municipal	B7: Climate risks in infrastructure	E1: Energy reliability and security	L1: Compact, mixed-use land use	L2: Heat islands, air quality in land use	N1: Enhance natural assets	N2: Community-wide tree management program	PH1: Climate readiness toolkit	PH2: Vulnerable Population response	T1: EV and low emission vehicles	T2: Alternative transportation	T3: Low emission Municipal Fleet	W1: Waste reduction and diversion	WW1: Optimize water and wastewater systems	WW2: Update Stormwater requirements and plan
<b>Plans with Opportunities for Climate Change Integration</b>																								
Strategic Plan	✓			✓						✓			✓		✓				✓			✓	✓	✓
Integrated Community Sustainability Plan <sup>1</sup>					✓	✓	✓	✓	✓	✓			✓	✓	✓					✓	✓	✓	✓	✓
Official Plan, Urban Settlement Area Official Plans, Secondary Plans					✓								✓	✓	✓				✓	✓				
Community Improvement Plan					✓	✓	✓	✓																
Heritage District Conservation Plan						✓	✓																	
Lake Management Plans						✓	✓								✓	✓								✓
Kawartha Conservation Stewardship Strategy						✓	✓									✓								
Economic Development Strategy								✓							✓					✓				
Corporate Energy Management Plan									✓	✓		✓												
Corporate Asset Management Plan									✓	✓	✓	✓			✓						✓		✓	✓
Purchasing Policy									✓												✓		✓	
Emergency Management Plan												✓					✓	✓						
Housing and Homelessness Strategy, Poverty Reduction Strategy												✓	✓			✓	✓							
Waste Management Plan												✓										✓		
Transportation Master Plan, Active Transportation Plan												✓								✓				
Growth Management Strategy													✓	✓										
Climate Change Health Vulnerability and Adaptation Assessment																	✓	✓						

<sup>1</sup> If updated in the future.

**Plans with Opportunities for Climate Change Integration**

Lindsay Transit Master Plan

Stormwater Management Plans

Parks, Recreation, and Cultural Facilities Strategic Plan, Trails Master Plan

Floodplain Policies/Mapping

AG1: Agricultural management systems	
AG2: Manure Management and Anaerobic Digestion	
AG3: Digestibility of Feed and Enteric Fermentation	
AG4: Carbon Sequestration	
B1: Community New construction	
B2: Deep Retrofit - Residential	
B3: Deep Retrofit – Commercial/ Institutional	
B4: Industry efficiency	
B5: Municipal building new construction	
B6: Deep retrofit - municipal	
B7: Climate risks in infrastructure	
E1: Energy reliability and security	
L1: Compact, mixed-use land use	
L2: Heat islands, air quality in land use	
N1: Enhance natural assets	
N2: Community-wide tree management program	
PH1: Climate readiness toolkit	
PH2: Vulnerable Population response	
T1: EV and low emission vehicles	✓
T2: Alternative transportation	
T3: Low emission Municipal Fleet	
W1: Waste reduction and diversion	
WW1: Optimize water and wastewater systems	
WW2: Update Stormwater requirements and plan	✓





<b>Potential Partner</b> Victoria Soil and Crop Improvement Association	AG1: Agricultural management ✓ AG2: Manure Management and ✓ AG3: Digestibility of Feed and Enteric AG4: Carbon Sequestration ✓ B1: Community New construction B2: Deep Retrofit - Residential B3: Deep Retrofit – Commercial/ B4: Industry efficiency B5: Municipal building new B6: Deep retrofit - municipal B7: Climate risks in infrastructure E1: Energy reliability and security L1: Compact, mixed-use land use L2: Heat islands, air quality in land use N1: Enhance natural assets N2: Community-wide tree PH1: Climate readiness toolkit PH2: Vulnerable Population response T1: EV and low emission vehicles T2: Alternative transportation T3: Low emission Municipal Fleet W1: Waste reduction and diversion WW1: Optimize water and WW2: Update Stormwater
Waste Management Providers	✓

## Appendix C: How the Plan Was Developed

### How the Plan was Developed

Partners for Climate Protection (PCP) and Building Adaptive and Resilient Communities (BARC) Frameworks Development of the Healthy Environment Plan was guided by two planning frameworks. For the mitigation of GHG emissions, the planning process follows the Partners for Climate Protection's (PCP) five-milestone framework (Figure 1).



Figure 1: Partners for Climate Protection process

The PCP program is a network of Canadian local governments that have made a commitment to reduce GHG emissions and act on climate change. Administered by the Federation of Canadian Municipalities (FCM), the program has over 225 local and regional governments participating. The five-milestone framework is a performance-based model used to guide communities to reduce GHG emissions. Through this project the City of Kawartha Lakes will be completing Milestones 1 through 3 for community and corporate emissions.

### GHG Inventory & Baseline Methodology

The inventory follows the methodologies outlined in the Global Protocol for Community Scale Greenhouse Gas Emissions Inventories (GPC)<sup>1</sup> for community sources of emission and the Partners for Climate Protection (PCP) Protocol for emissions from municipal operations and services.

The City of Kawartha Lakes' 2015 inventory covers emissions from activities occurring within the municipal boundary, and GHG emissions occurring as a consequence of the use of grid-supplied electricity within the city. The inventory covers the three most common greenhouse gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). The gases were converted to carbon dioxide equivalents (CO<sub>2</sub>e), and are represented as such throughout the HEP.

Data on community energy use and waste was obtained from local utility companies and the City of Kawartha Lakes. Where data was unavailable, data was modelled using robust assumptions. GHG emissions were calculated by multiplying energy use or waste data by emission factors, derived from Canada's 2017 National Inventory Report<sup>2</sup>.

On the climate adaptation side, the planning process followed ICLEI Canada's five-milestone Adaptation Methodology. This framework applies a comprehensive planning methodology, including research and climate impact assessment methods, plan development, action-setting processes, implementation planning, and monitoring and review strategies (Figure 2).

<sup>1</sup> World Resources Institute. (2014). *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories*. Retrieved from: [https://ghgprotocol.org/sites/default/files/standards/GHGP\\_GPC\\_0.pdf](https://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf).

<sup>2</sup> Government of Canada. (2017). *National Inventory Report*. Retrieved from: <http://www.publications.gc.ca/site/eng/9.506002/publication.html>

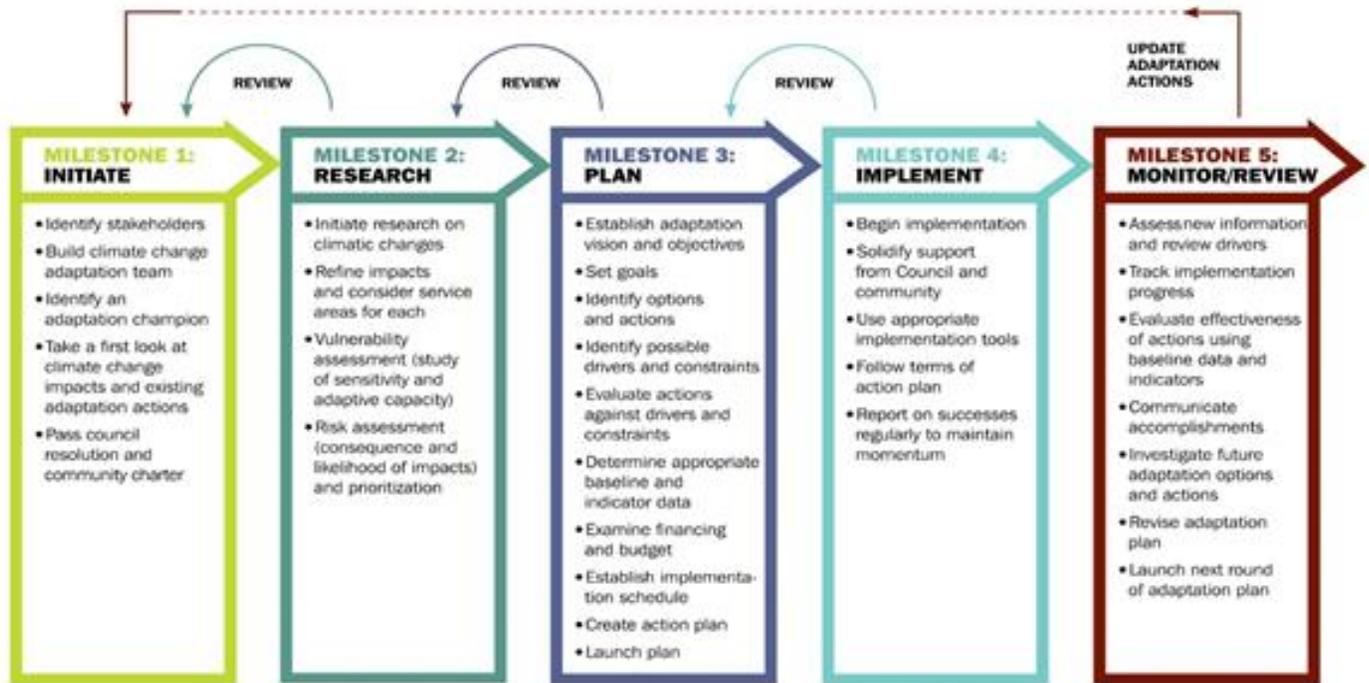


Figure 2: ICLEI Canada's Five-Milestone Adaptation Methodology – "Building Adaptive and Resilient Communities" (BARC)

### Process to Assess Vulnerability and Risk

A core element of ICLEI's Building Adaptive and Resilient Communities Program, is to consider projected climatic threats and their effects on built, natural, social and economic systems. Working with the Steering Committee, a list of 38 impact statements were developed. These impact statements are reflective of local risks resulting from climate change. Using these impacts, a Sensitivity and Adaptive Capacity assessment was completed. Vulnerability refers to the susceptibility of the community to harm arising from climate impacts. It is a function of the sensitivity of the community to each impact, as well as the adaptive capacity to respond to that impact. This exercise resulted in preliminary Vulnerability Rankings for each of the impact statements. Impacts ranked medium to high vulnerability were carried forward into a more thorough assessment of consequences across social, economic, and natural systems.

Twenty-nine impacts were carried forward to the risk assessment stage. Risk is defined as the combination of the probability of an impact occurring and its negative consequences. Risk is a function of likelihood (the probability of the projected impact occurring) and consequence (the known or estimated consequences of a particular climate change impact). Risk rankings are based on score of likelihood and consequence. The results provide a risk ranking as extreme, high, medium, or low.

### Engagement

The HEP was developed in partnership with the Kawartha Lakes community. The project was overseen by a Steering Committee made up various departmental leads from the municipality, the Kawartha Lakes Environmental Advisory Committee, Fleming College and Kawartha Conservation. The Steering Committee was responsible for providing direction and making decisions regarding the progress of the plan through all stages of the its development. A multi-stakeholder Working Group was also formed to act as a sounding board for the Steering Committee. The mandate of the Working Group was to provide an ongoing mechanism for input and advice to the Project Team on key points in the development of the Healthy Environment Plan.

A robust community engagement program was developed to complement consultation with the Steering Committee and Working Group. The objective of this engagement program was to generate ideas on what can could be done locally to address climate change through both mitigation and adaptation measures. Discussions with community members and stakeholders took place through informal pop-ups at community events and festivals and through scheduled workshop presentations with a selection of interested community groups. The input collected through community engagement fed into the database for potential actions that informed the development of the HEP. Overall, the HEP was shaped from conversations with over 2,600 people and 40 organizations, institutions and community groups.

City Council was engaged early in the process to ensure their understanding of the project and was presented the final HEP for approval in early 2019.