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The Regional Municipality of Durham Report

To: Finance and Administration Committee
From: Chief Administrative Officer
Report: #2019-A-34
Date: November 12, 2019

Subject:

2018-2019 Climate Change Update

Recommendation:

That the Finance and Administration Committee recommends to Regional Council:

- A) That Regional Council receive this 2018-2019 Climate Change Update.
 - B) That this report be forwarded for information to the Durham Region Roundtable on Climate Change (DRRCC).
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Report:

1. Purpose

1.1 This report provides a summary of the progress made in implementing the Region's corporate and community climate change initiatives over the period from November 2018-October 2019. This report, along with previous annual reports (e.g. [Report #2017-COW-216](#)), will serve as input into the development and implementation of future climate change initiatives at the Region, including November 2019-October 2020 priority initiatives.

2. Background

2.1 The Durham Region Roundtable on Climate Change (DRRCC) was established in 2008 as an advisory committee of Durham Regional Council. In 2009 it established a recommended vision, mission and targets for climate action in the Region.

2.2 In 2009, Regional Council unanimously adopted the position that "Scientific evidence overwhelmingly supports the conclusion that human activities are fundamentally altering the conditions for life on earth. Climate change and associated global

warming is recognized as a severe threat to global systems with the potential for catastrophic outcomes”.

- 2.3 In 2010 Regional Council adopted community-wide greenhouse gas (GHG) emission reduction targets consistent with the Intergovernmental Panel on Climate Change consensus on levels of decarbonization necessary to limit global warming to below 2°C and prevent catastrophic climate change:
- a. 5% below 2007 levels by 2015 (3,686 thousand tonnes carbon dioxide equivalent CO₂e)
 - b. 20% below 2007 levels by 2020 (3,104 thousand tonnes CO₂e)
 - c. 80% below 2007 levels by 2050 (766 thousand tonnes CO₂e)
- 2.4 In 2012 Council endorsed the Durham Community Climate Change Local Action Plan (LAP) which established a long-term vision of “Durham Region is a carbon-neutral, sustainable, prosperous and resilient community with a high quality of life” and mission to work with our community to develop and advocate innovative policies, strategies and actions that address the threat of climate change.”
- 2.5 Implementation of the LAP’s 18 programs was limited, and the LAP has subsequently been replaced by two Council-endorsed community climate adaptation and mitigation plans, as well as two corporate-facing plans, as outlined in table 1 below.

Table 1 Outline of Current Durham Region Climate Change Plans

	Adaptation (i.e. preparing for climate impacts)	Mitigation (reducing GHGs)
Corporate-focused	Durham Corporate Climate Adaptation Plan, 2014-2019 <ul style="list-style-type: none"> • Based upon International Council for Local Environmental Initiatives (ICLEI) 5 milestone adaptation planning process • Annual cross divisional staff engagement workshops to identify risks and vulnerabilities facing corporate operations and assets • Integration of climate adaptation considerations into Regional asset management policy, planning and reporting is a key success to date 	Corporate Energy Conservation and Demand Management (ECDM) Plan, 2019-2024 <ul style="list-style-type: none"> • Municipalities are required by provincial regulation to develop and implement an ECDM plan on a 5-year basis • Covers Regionally-controlled buildings and facilities, as well as infrastructure (traffic signals, water supply, and wastewater) • Identifies organizational (e.g. policy, procedures), behavioural (e.g. awareness and engagement) and capital (e.g. new equipment) initiatives to reduce energy consumption

	Adaptation (i.e. preparing for climate impacts)	Mitigation (reducing GHGs)
Community-wide	<p>Durham Community Climate Adaptation Plan (DCCAP), “Towards Resilience”, 2016</p> <ul style="list-style-type: none"> • Won 2018 Sustainable Communities Award from the Federation of Canadian Municipalities • Collaborative plan developed in partnership with local area municipalities, Conservation Authorities, and other stakeholders • Includes 18 proposed programs across seven theme areas • Based on future climate projections for the Region 	<p>Durham Community Energy Plan (DCEP), “The Clean Energy Economy in Durham”, 2019</p> <ul style="list-style-type: none"> • Collaborative plan developed in partnership with local area municipalities and local energy utilities • Contains 6 proposed programs addressing key GHG emissions sources • Low carbon pathway charts a path towards Durham’s 80% GHG reduction target, while also realizing cost savings and job creation co-benefits

- 2.6 As a leader in the community, the Region is taking steps within its own corporate operations, assets and facilities to address climate change. From an operational perspective, the Region’s Finance Department coordinates corporate-wide initiatives to reduce energy and emissions and address climate risks associated with regional operations and assets. The CAO’s Office administers the broader community climate change program in partnership with local area municipalities, utilities, post-secondary institutions, and other key community stakeholders. Work is now underway to streamline these efforts for maximum impact and results, with a focus on:
- a. **Deep Retrofit program:** a coordinated program to enable deep energy retrofits across the existing built environment to reduce GHG emissions and build resilience to a changing climate. Launching a community-facing program targeting the residential building sector is a key priority for 2020.
 - b. **Standards for new buildings, facilities and infrastructure:** standards for new corporate and community-wide development, incorporating climate and sustainability considerations such as low carbon energy, electric vehicle charging, stormwater management, and green infrastructure solutions.
- 2.7 The Climate and Sustainability Community of Practice (Community of Practice), a multi-disciplinary team of senior management and staff, collaborates across program areas to integrate and implement corporate and community climate change initiatives. The Community of Practice has two sub-committees - Energy and Adaptation. The sub-committees liaise with business planning, risk and asset management staff and program areas to identify and address climate-related priorities. Beginning in 2019-2020, the Community of Practice will facilitate alignment and coordination between

the four Council-endorsed plans, to best leverage available resources and capacity across the organization.

- 2.8 The Durham Community Energy Plan steering committee, chaired by the Region and with representation from area municipalities and local energy utilities, is driving the formation of strategic multi-sectoral partnerships to support detailed program development, budgeting, governance and an implementation workplan for 2020-2025.
- 2.9 The Region has established the following high-level goal statements related to climate action:
- a. Regional infrastructure, programs and services are low carbon and resilient to climate impacts.
 - b. Climate change considerations are incorporated into the business planning of both the public sector (e.g municipal government, and broader public sector) and private sector organizations.
 - c. Citizens, businesses, and public sector organizations are aware of climate change, and have the knowledge, skills and resources to take action.
 - d. Initiatives with the greatest value-added are implemented based on cost effectiveness and co-benefits related to economic and social priorities of the Region.
 - e. Durham Region sustains itself as an attractive place to live and invest.
 - f. Durham Region is a leader on climate action.

3. Provincial and Federal Policy Framework

- 3.1 There is a comprehensive legislative framework in Ontario that guides and directs municipalities to act on climate change mitigation and adaptation.
- 3.2 Ontario Regulation (O. Reg 588/17), under the *Infrastructure for Jobs and Prosperity Act, 2015* requires municipalities to consider climate-related impacts as part of asset management planning/reporting. Furthermore, Ontario Regulation (O. Reg 507/18), under the *Electricity Act, 2018*, requires municipalities and other broader public sector organizations to develop Energy Conservation and Demand Management Plans, and to report annually on energy consumption and greenhouse gas emissions related to their operations.
- 3.3 From a community perspective, the Municipal Act, empowers single-, upper-, and lower-tier municipalities to pass by-laws respecting climate change as part of their powers relating to the economic, social, and environmental well-being. *The Provincial Policy Statement, 2014* and *the Growth Plan for the Greater Golden Horseshoe, 2019* both articulate a role for municipalities as planning authorities to have regard for climate change mitigation and adaptation. In 2018, the province also released “The Healthy Environments and Climate Change Guideline” under the authority of the *Health Protection and Promotion Act* which presents existing and new population-based activities to address environmental health, including climate impacts.

3.4 The federal government, as part of the Pan-Canadian framework on Clean Growth and Climate Change, recognizes the essential leadership role that municipalities play in addressing energy and GHG emissions, as well as adaptation and climate resilience, at the community scale. Federal funding has been provided for municipal climate action, much of it through the Federation of Canadian Municipalities' Green Municipal Fund (GMF) and Municipal Climate Innovation Program (MCIP). The federal government, through Infrastructure Canada, has also developed a "climate lens assessment" through which infrastructure funding transfers are now, as of 2019, being reviewed for contributions to climate change mitigation and adaptation.

4. Leveraging Provincial and Federal Funding for Regional Climate Priorities

4.1 In recent years the Region has been proactive in accessing close to \$60 million in senior government funding for Regional initiatives, many of which provide climate and environmental co-benefits, including but not limited to:

- a. Disaster Mitigation and Adaptation Fund – The Region is eligible to proceed to the "full application phase" for funding to make climate change resiliency upgrades to Whitby Water Supply Plant and the recreational waterfront along the Lake Ontario shoreline (up to 40% of an estimated \$80 million cost).
- b. Green Municipal Fund – A \$0.35 million federal contribution towards the Blackstock Landfill Mining Pilot Project is approved subject to project completion. Also, a \$0.18 million GMF grant was received in 2018 toward the solid waste management Anaerobic Digestion Feasibility study (\$0.18 million) and in 2013 for the Investigation of Eco-station Implementation and Feasibility (\$0.1 million).
- c. Clean Water and Wastewater Fund – Approximately \$33 million in federal and provincial funding has been approved for various Regional water and sewer projects, a large portion addresses system resiliency through watermain and sewer replacements, structural lining of watermains, polybutylene water service connection replacement and identification of mitigation strategies through the Courtice Integrated Resource Recovery (IRR) Phase 2 study.
- d. Investing in Canada Infrastructure Program (ICIP) - Approx. \$17.5 million in federal funding has been approved for various Regional transit projects, a large portion for the enhancement of Highway 2 PULSE, replacement and procurement of new fleet and commuter lot improvements, all of which serve to mitigate emissions through delivery of more sustainable travel options.
- e. Ontario Municipal Commuter Cycling Program – Approximately \$2.2 million in provincial funding has been approved for various Regional cycling projects which aim to achieve greater levels of active transportation within the Region.
- f. Canada 150 Infrastructure – Approximately \$400,000 in federal funding has been approved for cycling infrastructure on Regional Road #8.
- g. Community Sustainability programs – Approximately \$238,000 was obtained to complete the DCEP, including \$148,000 from the provincial government and local utilities.
- h. Approximately \$5.6 million of grants/incentives were received or are to be received from senior government and/or local electrical and natural gas utilities

or the Independent Electricity System Operator (IESO) for energy reduction initiatives/retrofits.

- 4.2 Regional staff are working with local area municipalities and other key stakeholders to position new program development to leverage anticipated funding programs from the federal and provincial governments, with a focus on transformational levels of joint investment. For example, staff are developing a Durham Deep Retrofit Program, as outlined in both DCEP and DCCAP, with a view to leveraging funding from the \$300 million FCM Community Eco-Efficiency Acceleration Program, and the \$350 million Sustainable Affordable Housing Innovation Fund, both of which are anticipated to be launched Q2 2020.

5. Regional Greenhouse Gas (GHG) Inventory and Forecast

- 5.1 The most recent community GHG inventory was completed in 2018 to provide a 2016 energy and emissions baseline for the Durham Community Energy Plan. Total 2016 emissions were estimated at approximately 5 million tonnes CO₂e. Figure 1 below provides a snapshot of 2016 community-wide energy-related GHG emissions by sector.

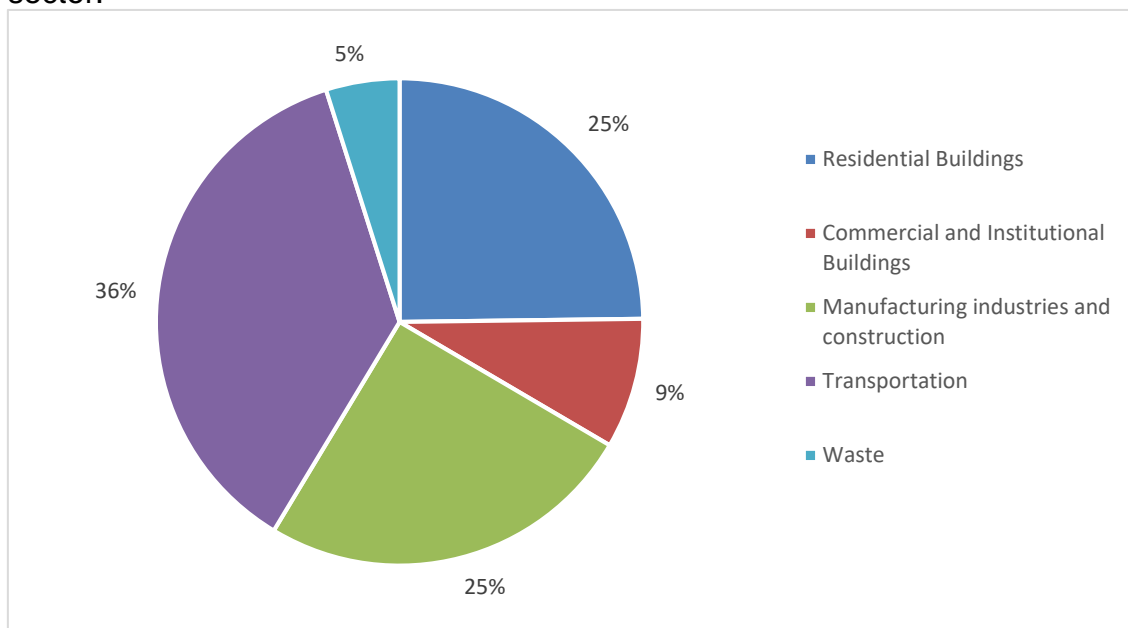


Figure 1 Durham Region Community-wide GHG Emissions by Sector (2016)

- 5.2 The Durham Community Energy Plan outlines a **Low Carbon Pathway (LCP)** comprised of 24 ambitious actions designed to achieve the Region's 80% GHG reduction target by 2050. Key actions include: new building efficiency standards, extensive building retrofit programs, installation of heat pumps, photovoltaic and wind generation, energy storage, electrification of personal, commercial and transit vehicles, land-use changes and industrial efficiencies.

- 5.3 Assuming full implementation of the DCEP low carbon pathway, community emissions in the Region are projected to decline by 65% over 2016 levels, leaving an estimated 1 megatonne gap to meet Durham's 2050 target of 80% reductions.
- 5.4 The most significant community GHG reductions occur in the transportation sector in the low carbon pathway (electric vehicles, and mode shift to active and public transit), followed by the residential building sector (retrofits, and high-performance new development).

Durham Community Energy Plan: Successes To-date and Next Steps

- 5.5 Following Regional Council endorsement of DCEP in April 2019, staff have begun developing workplans to support the design and implementation of the six programs identified in the plan, including:
- a. Durham Green Standard for new development.
 - b. Deep retrofit program for existing buildings.
 - c. Renewable energy co-op.
 - d. Electric Vehicle (EV) strategy.
 - e. Community mobilization.
 - f. Coordinated land use planning policies.
- 5.6 To date, notable progress has been made on the EV strategy, which addresses the largest source of community-wide emissions in the Region. The Region has begun deployment of Regional EV charging infrastructure and in 2019, installing six Level 2 EV chargers for staff and public use at the Regional Headquarters, and an additional charging station at a DRT facility. To further expand EV charging infrastructure, Regional staff collaborated with several local municipalities on a joint funding application to Natural Resources Canada for an additional 60 charging stations (32 of which are at Regional facilities). If successful, provisions will be made in 2020 Business Plans and Budgets to deploy charging stations across the Region.
- 5.7 Staff are prioritizing the development of a deep retrofit program for existing residential buildings, including a focus on the social and affordable housing sub-sector. This requires a collaborative effort with local area municipalities, and local energy utilities to develop and implement a coordinated program that supports residents, and affordable housing providers in making deep energy upgrades to single family homes and multi-unit residential buildings. A business case and feasibility study for such a program will be undertaken in Q4 2019-Q1 2020, with launch of a pilot phase program in 2020.
- 5.8 The Region has leveraged a collaborative partnership with Ontario Tech University to host a practicum student examining best practices for the design of a deep retrofit program.
- 5.9 Consistent with Council direction ([Report #2019-A-18](#)), staff are incorporating climate change elements related to land-use planning into the new Regional Official Plan

through the “Envision Durham – Municipal Comprehensive Review process”, where appropriate. To date, [discussion papers](#) have been released on:

- a. Agriculture and Rural system
- b. Climate Change and Sustainability
- c. The Urban System
- d. Environment and Greenlands System
- e. The Transportation System

Corporate Energy and Emissions Management

- 5.10 The Region’s corporate GHG emissions inventory is updated annually and accounts for emissions in Regionally owned and leased facilities, vehicle fleets, traffic signals and related infrastructure, water supply and sanitary sewerage treatment, pumping and storage operations and Regional solid waste management, including the Durham York Energy Centre (DYEC). Table 3 provides the updated corporate GHG emissions inventory (base year 2007 to 2018). In total, Regional corporate emissions are estimated to represent approximately 3.5% of total region-wide emissions.

**Table 3 - Corporate Greenhouse Gas Emissions Inventory
(tonnes of carbon equivalent – CO₂e) 2007 to 2018 (estimated and rounded)**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Facilities and Traffic Signals	19,400	18,400	15,100	15,700	14,600	13,700	13,700	13,000	11,800	11,800	11,200	12,000
Vehicle Fleets	24,500	24,700	23,700	24,000	25,200	25,800	29,000	30,900	29,400	30,100	30,100	30,900
Water and Sewer	34,800	36,900	28,800	29,900	29,100	30,000	31,800	29,400	27,500	27,700	22,800	25,000
Solid Waste Landfill & DYEC	82,400	80,800	78,100	75,500	72,900	70,300	68,500	67,800	66,100	119,000	116,000	115,400
Total Corporate GHG	161,100	160,800	145,700	145,100	141,800	139,800	143,000	141,100	134,800	188,600	180,100	183,300

Notes: The Facilities category includes administrative, child care, Works’ depots, Region of Durham Paramedic Services (RDPS), Durham Regional Police Service (DRPS), solid waste management (excludes disposal facilities shown separately) transit, long-term care, social services, Durham Regional Local Housing Corporation (DRLHC). The Vehicle Fleets category includes each of DRT, RDPS, DRPS and Works fleet and operations. The Water Supply and Sanitary Sewer category includes Regionally-owned and operated water supply and sanitary sewerage facilities e.g. plants, pumping stations, reservoirs, and Durham’s share of Duffin Creek WPCP.

- 5.11 From a corporate perspective, increasing service demands associated with population growth result in projected increases in emissions from expansions to facilities and fleet, including new water and wastewater treatment capacities. However, such investments in Regional facilities and fleets enable broader community-wide emissions reductions. For example, the largest corporate fleet GHG increases are associated with DRT service growth. However public transit, as an alternative to private vehicle travel, reduces broader community-based emissions. There are opportunities to reduce DRT GHG emissions by electrifying transit vehicles.
- 5.12 Significant carbon emissions reductions result from the Region’s integrated waste management programs, including: blue box recycling, reuse, organics diversion; resident education; and, energy and material recovery from post-diversion residual waste.

- 5.13 Methane from the Region's closed landfills, a significant proportion of corporate GHG emissions, is naturally declining over time. In 2019, the Region completed a landfill mining pilot at Blackstock Landfill which demonstrated environmental benefits, including estimated elimination of over 300 tonnes of CO₂e per year (accounted for in the carbon footprint projection). This \$1.4 million initiative is being assessed for future applications, potentially including Scott Landfill, included at \$4.2 million in the current forecast (2020/21).
- 5.14 The Region's recently approved [2019-2024 ECDM Plan](#) outlined energy and related cost and emissions savings benefits since 2014, including:
- Avoided electricity usage of almost 37 million kilowatt hours;
 - Avoided natural gas usage of almost 12 million metres cubed;
 - Energy avoidance of just under 0.6 million gigajoules and related cost avoidance of over \$8 million;
 - Emissions avoidance of over 23,000 tonnes of CO₂e due to energy reductions; and,
 - An additional \$10.6 million of electricity cost avoidance through peak demand curtailment initiatives.
- 5.15 The Region's updated ECDM Plan outlines renewed areas of focus to 2024 for Regional energy conservation and demand management which target behavioural and organizational elements through the following goals:
- Formalize a corporate network that establishes clear lines of authority and accountability for energy management;
 - Enhance corporate energy awareness, education and information sharing;
 - Standardize approaches and continue to strengthen the integration of energy conservation into asset management, financial planning and budget processes; and,
 - Enhance energy monitoring, performance measurement and reporting.

Other Climate Change and Sustainability Initiatives

- 5.16 The Durham Transportation Master Plan (TMP) includes walking and cycling as alternate modes of transportation. The following initiatives are underway to enhance regional cycling infrastructure and opportunities:
- Implementation of the long-term primary cycling network (PCN);
 - Consideration of stand-alone projects to complete critical links in short-term cycling routes;
 - A Regional Cycling Plan update to consider cycling-related recommendations in the TMP and review and update the PCN; and,
 - Implementation of Ontario Municipal Commuter Cycling Program projects (\$2.7 million), including infill projects identified to 2020.
- 5.17 On June 26, 2019, Council directed staff to proceed ([Report #2019-COW-17](#)) with a mixed waste transfer/pre-sort facility and anaerobic digestion facility (AD). The

diversion of organic materials from disposal to AD will further reduce GHG emissions and generate renewable energy through biogas production. Additional opportunities for biogas production are being explored at the region's wastewater treatment plants.

- 5.18 Work is underway for the completion of a Water Efficiency Strategy for Durham Region which will help Regional services areas and Durham residents use water efficiently. The study is expected to be complete in late-2019/early-2020 and will provide recommendations around water efficiency measures and programs based on current demands and projections, as well as and related impacts to the water treatment and distribution system.

6. Climate Adaptation (infrastructure and program resiliency) Initiatives Update

Overview

- 6.1 This section provides a sample of the various climate adaptation initiatives being planned, undertaken and/or completed since the last Regional Program Climate Change Update report ([Report #2017-COW-216](#)).
- 6.2 The Region has implemented initiatives to enhance resiliency to expected climactic changes, including: more intense and frequent precipitation; rising lake levels; temperature extremes; rising ambient temperatures (water and air); more frequent and severe extreme storms; and, increasing freeze thaw cycle events.

Natural Environment and Climate Change Working Group

- 6.3 As part of the implementation of the Durham Community Climate Adaptation Plan, the Natural Environment Climate Change Collaborative (NECCC) was established to support implementation of programs to build resiliency of the natural environment within Durham Region. The NECCC has representation from the Region, all 8 local area municipalities and 5 conservation authorities in Durham, and is working to better coordinate natural heritage system plans and policies, as well as ecosystem stewardship, education and outreach activities.
- 6.4 In 2019 the NECCC hosted a Summit that brought together experts from across the Region to discuss natural environment climate change adaptation. 100 staff from NECCC member organizations attended the event which showcased the latest in natural environment climate adaptation science and projects happening within Durham Region. The NECCC Summit stimulated important discussions on the work needed to make Durham's natural environment resilient to the changing climate.

Updated Future Climate Modelling

- 6.5 The NECCC has identified the need for updated climate projections that consider the effect of Lake Ontario on Regional climate. Funding was received from the Greenbelt Foundation, and the Great Lakes Integrated Sciences and Assessment (GLISA) centre, based at the University of Michigan, to undertake this update.

- 6.6 The Ontario Climate Consortium, based within the Toronto and Region Conservation Authority, has been commissioned to develop updated climate projections for the Region, which are expected to be completed later in 2019. This work builds upon the SENES study, "[Durham Region's Future Climate 2040-2049](#)," and will assist with long-term planning/forecasting and risk identification. Training and guidance around how to use the updated climate projections in departmental planning will be provided in 2020.

Community Tree Planting Initiatives

- 6.7 Local Enhancement & Appreciation of Forests (LEAF), is a non-profit organization helping to improve the urban forest through the delivery of a subsidized Backyard Tree Planting Program. The LEAF program has been available in Ajax since 2015. Regional staff are collaborating with local area municipal partners in an effort to expand the availability of the LEAF Program Region-wide.
- 6.8 The LEAF program can build upon previous efforts through the Durham 5 Million trees program, operated in partnership with Forests Ontario. While provincial funding for the Durham 5 million trees program was cancelled in 2018, Forests Ontario continues to administer the program, which is delivered through a funding partnership with a local battery recycling facility. Just over 500,000 trees were planted over the past 10 years.

Evaluating Corporate Climate Risk and Vulnerability

- 6.9 Since the first Corporate Climate Adaptation Plan was approved in 2014, the Region has seen measurable results and improvements to the Region's adaptive capacity, including:
- a. Completion of the International Council for Local Environmental Initiatives (ICLEI) Building Adaptive and Resilient Communities Program;
 - b. Integration/prioritization of climate adaptation initiatives through business planning and budgets, risk management, asset management and long-term financial planning studies, processes and reporting;
 - c. Regular consideration of climate change risks and adaptation within the annual decision-making and resource allocation process; and,
 - d. Cost-effective implementation/financing of value-added resiliency and climate adaptation strategies prioritized over the last five years to ensure the Region's adaptive capacity is measurably improved.
- 6.10 Assessments and workshops conducted in the summer 2019, in consultation with senior management, included over 40 staff participants from individual program areas. The goal was to update previous vulnerability assessments, assess existing risk controls, rank impact and likelihood, and identify program-based risk control gaps and trends for consideration in 2020 long-term planning. Through these workshops the following next steps were identified to improve the Region's state of climate adaptation readiness:

- a. Development and Council approval of a new multi-year corporate adaptation plan;
 - b. Building upon the existing links between the Corporate Climate Adaptation Plan, Durham's two community-wide climate change plans, the Corporate Strategic Asset Management Policy and pending new Durham Region Strategic Plan;
 - c. Establishment of performance measures to enable effective monitoring of the Region's performance in addressing corporate and community climate risks;
 - d. Continuous improvements in the management of climate risks, including enhanced data collection and analytical tools to better understand climate impacts over the long-term; and,
 - e. Continued assessments of climate adaptation alternatives, benefits and costs with prudent recommendations to effectively address priority risks to assets and levels of service.
- 6.11 During the 2020 Business and Financial Planning process, corporate climate adaptation priorities will be presented for approval by Council. The planning process will involve more detailed assessments of climate risks, including risk mitigation priorities identified by staff which include:
- a. Continued implementation of standby power to manage potential disruptions/consequences of increased severe storms;
 - b. Increased expenditures on water treatment and the adoption of new technologies (currently under investigation) to address algae growth impacts on water quality (algae toxins removal) and algae impacts to equipment (e.g. blocking of intakes);
 - c. Continued public works to address sanitary sewer inflow and infiltration, including studies, data collection and remedial works (e.g. storage, capacity upgrades and improvements in high risk areas);
 - d. Increased inspections and enhanced proactive maintenance programs in asset management to ensure equipment readiness (e.g. facilities' sump pumps) and enhanced risk management (e.g. inspection programs for high-risk water and sewer pipes subjected to erosion at creek crossings); and,
 - e. Increased 10-year capital requirements to address higher lake levels and flooding risks (e.g. Whitby Water Supply Plant) and the increasing frequency and intensity of precipitation with potential overflows within the water and sewer systems (e.g. at pumping stations).
- 7. Conclusions and Next Steps**
- 7.1 Significant focus and investments have been made by the Region over the last five years to address climate change mitigation and adaptation goals. Regional staff will continue to ensure climate change initiatives are considered, reported and effectively and efficiently implemented through the Region's existing annual asset management, risk management and business and financial planning processes.

- 7.2 A new \$5 million climate mitigation and environment reserve fund has been established to support initiatives to enhance the Region's response to climate change and environment concerns.
- 7.3 Senior management continues to support the integration, information sharing and collaboration across program areas to support a multidisciplinary corporate-wide approach to climate mitigation and climate resiliency and ensure:
- a. Implementation of climate mitigation and adaptation initiatives with the greatest benefits to long-term sustainability (environmental, technical and financial);
 - b. Improved energy efficiency, innovation and climate resiliency (service delivery and infrastructure-related);
 - c. Co-ordination and integration of corporate and community climate mitigation and adaptation initiatives;
 - d. Co- ordination and effective communication of initiatives across program areas and to Regional Council, DRRCC and the public; and,
 - e. Continuous monitoring and review of potential vulnerabilities in the Regional corporation related to potential climate impacts to infrastructure and service delivery.
- 7.4 This report has been prepared with the assistance of all Regional Departments, Durham Region Transit and Durham Regional Police Service.

8. Attachments:

Attachment 1: Climate Change and Sustainability Update: Specific Initiatives by Program Area

Attachment 2: Acronyms List

Respectfully submitted,

Original signed by:

Elaine Baxter-Trahair

Chief Administrative Officer

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Climate change and sustainability update: Specific Initiatives by Program Area

The following highlights annually budgeted climate resiliency measures as well as more specific program area updates on initiatives, studies and priorities since the last update. Initiatives are implemented for maximum co-benefits and effectiveness and may enhance resiliency to climate while also addressing other identified risks, goals and objectives (e.g. safety, security, service quality, effectiveness, efficiencies, environmental protection, compliance etc.).

Regional Programs: Annually Budgeted Resiliency Priorities

- Policies developed by Corporate Services include procedures for extreme weather events, records retention, electronic security, storage and redundancy measures
- The Region's Contingency Plan details departmental responsibilities to maintain services in the event of work stoppage.
- Program areas also have specific contingency, health and safety plans and conduct business continuity analysis based on program requirements. For example, the Region's Social Services Department has mandatory compliance requirements for emergency management including: Social Services Emergency Operations Centre; a comprehensive Infection Control Program; and, homelessness prevention emergency hostels and funding.
- Durham Emergency Management Office (DEMO) administers the Region's Emergency Operations Centre and Emergency Master Plan and works with Departments, local municipalities and community stakeholders to administer emergency plans/response, training and exercises and public education to ensure:
 - An effective and up-to-date emergency response structure;
 - Coordinated emergency plans and procedures;
 - Regular tests of communications and alerting systems and annual Regional Control Group response training;
 - An on-call Duty Officer on a 24/7 basis and a designated Emergency Information Officer;
 - Public education materials to promote preparedness;
 - Up-dated emergency contact lists and databases; and,
 - Courses for staff and an annual Emergency Operations Centre exercise.
- The Region's Pandemic Plan details actions and resources to maintain operations and essential services.

- Annual climate adaptation assessments by staff are used to identify operational and capital requirements through asset management planning and inform: operations; maintenance; capital rehabilitation, replacements; and inventory management.
- Key corporate resiliency considerations continue to include: proactive assurance of reliable back-up power for all critical systems; effective service and infrastructure redundancy plans; and, staff training to ensure essential services and critical infrastructure support.

Planning and Policy

The Durham Regional Official Plan (ROP) guides the Region’s growth and development to 2031 and its policies promote a more sustainable community design, providing for more compact communities with increased densities, and a more efficient use of the transportation network.

Implementation will be achieved through area municipal planning instruments, including Official Plans, zoning bylaws, site plans and building permits. Key elements of the ROP will assist the Region in adapting to changes in climate include:

- An urban system with mixed-use cores and corridors that support transit use and pedestrian movements;
- Prime agricultural areas which help community food security;
- A transportation system that is efficient and reliable and supports all modes, including transit and active transportation; and,
- A greenland system that protects the areas highest concentration of significant ecological and hydrological features and functions.

The ROP protects ground and surface water resources through wellhead protection, high aquifer vulnerability, and stormwater management policies. Policies regarding development restrictions in natural hazard areas help to protect people and property from damage caused by flooding.

The ROP also encourages the development and retrofit of more energy efficient buildings and infrastructure. Regional Departments partner with outside agencies to implement the Clean Water Act and regulations, including Source Water Protection Plans and implementation of the Lake Simcoe Protection Plan and partner on studies and plans e.g. the York-Peel-Durham-Toronto Groundwater Study.

Consistent with Council direction (Report #2019-A-18), staff are incorporating climate change in the new ROP through the “Envision Durham – Municipal Comprehensive Review process”. The Climate Change and Sustainability Discussion Paper, released

as part of Envision Durham, the Municipal Comprehensive Review (MCR), and the ROP, sought comments for a 90-day period on how climate change adaptation and mitigation can be addressed by the ROP, as well as updating goals and objectives and updating definitions (and associated policies) to reflect current provincial policies. As noted in the detailed report, staff are considering elements of the DCEP related to land-use planning into the new ROP through the Envision Durham – Municipal Comprehensive Review process.

Project and Development Approvals

Municipal infrastructure projects such as extensions of sewers and the construction of watermains, roads and transit systems are subject to provincial Environmental Assessment (EA) requirements. EAs, Environmental Impact Studies (EISs) and other forms of environmental review consider climate related impacts, trends and specific localized risk factors. The Durham Regional Official Plan requires EIS as part of the evaluation of development proposals. An EIS is required for all applications for development on land designated as a key natural heritage feature or key hydrologic feature. The EIS must evaluate adverse potential impacts and establish appropriate actions to mitigate those impacts. The scope and process for EIS depends on the nature of a proposed development, location, extent and sensitivity of the site's environmental conditions, and applicable legislation. In 2003, the Canadian Environmental Assessment Agency issued guidelines for incorporating climate change considerations into EAs, one of the first federal agencies in the world to do so.

Conservation Authority Funding

The Region funds Conservation Authorities (\$8.2 million in 2019) who have flood management responsibilities at the watershed level to ensure community safety and climate resiliency.

Conservation Authority funding by municipalities also provides for:

- Watershed monitoring (including fish species, aquatic habitat, algae, benthic invertebrates, West Nile Virus, surface water quality, base and stream flow, precipitation, groundwater, terrestrial natural heritage, water temperature and climate).
- Maintenance of a flood warning system. Flood is a leading cause of public emergencies in Ontario and both Ministry of Natural Resources and Forestry and municipalities have compliance requirements to respond to and manage flooding;
- Lessons learned policies implemented to reduce risks to life and property.
- Dam Safety Reviews (DSRs) are conducted for all dams in Regional jurisdiction.
- Watershed Specific Projects.

- Natural Hazard Mapping.
- Infrastructure / water budget modeling.
- Natural heritage.
- Meteorological information from climate stations, evaporation pans and instrumentation.

Land securement funding is provided based on Regional Policy (\$0.6 million in 2019).

Lake Simcoe Conservation Authority manages Durham Regional Forest (607 acres), a resource management area valued for maintenance of water levels and stream flows, and prevention of erosion and floods.

Flood Control and Protection

Regional policy and by-laws, partnerships and funding assist in keeping development outside of floodplains. Emergency management and planning reduce response times to reach people in flood-prone areas when a flood does occur. Education informs the public on how they can protect themselves.

Based upon studies and capital plans, changes can also be made to the way water flows: flood control dams, flood control channels and other structures (e.g. berms and dykes).

Conservation Authorities employ asset management and flood risk management including:

- Focus on planning, programming and building for improvement
- Flood protection and capital works projects and funding
- Long term planning, inspection and maintenance activities
- Reacting to unplanned and emergency asset maintenance requirements

Durham Region's partners work closely to ensure a sustainable long-term program for flood control asset management.

Water Supply and Sanitary Sewerage

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> • Infiltration & Inflow studies and remedial works. • Household drainage surveys. • Inflow and infiltration education. • Minimizing water retention on Regional water supply and sanitary sewerage system sites. • Regional Sewer Use Bylaw. • Backflow Prevention Program and Bylaw. • Management and uninterrupted access to essential supervisory control and data systems (SCADA). • Reliable backup power for critical water and sewer systems. • Continuous monitoring and assured facility processing capacities and performance. • System redundancies, including pipe twinning programs to increase resiliency and mitigate risk, including climate change. • Wellhead protection and management. • Source Water Protection Plans. • Phosphorous Reduction Strategy. • Erosion protection at creek crossings to protect watermains and sanitary sewer systems • Engineering, hydrology, design and erosion studies and strategies for resiliency planning. • As part of asset management planning, proactive maintenance, repairs and capital replacements reduce risks and improve resilience. 	<ul style="list-style-type: none"> • \$0.5 million is projected annually over the 10-year forecast for continuation of inflow and infiltration studies and remedial works at various locations of the sanitary sewerage collection system to ensure continued understanding of risk and plans to mitigate flooding and inflow risk. • Standby power is scheduled for 2020 at Carruthers Creek pumping station with \$0.3 million of financing previously approved and \$1.7 million proposed for 2020). • A new well and pumphouse with standby power will be constructed for the Sunderland system (\$1.3 million of financing previously approved and \$4.5 million within the forecast. • In 2019, an additional \$0.8 million was approved for wellhead protection plus \$0.4 million for well interference work. • An inventory of water and sewer system creek crossings is ongoing, and a condition assessment and remediation program is underway. Annual inspections will be done more frequently at locations deemed higher erosion risk. • In 2019, the Region expended \$2.4 million on structural pipe lining as part of its strategy, with \$21.6 million proposed over the forecast to prevent leaks and extend the linear asset life. • The polybutylene and lead pipe elimination strategies are in place with the 10-year polybutylene water service replacement program to be completed in 2019 (total \$92.4 million).

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> Spill Control Procedures and Leak Detection Programs and remediation measures protect the environment and prevent water loss. 	<ul style="list-style-type: none"> Chlorine lines will be replaced at Beaverton Water Supply Plant with detailed design in 2019 and construction commencing 2020 (\$0.3 million). Numerous investments in the rehabilitation and/or replacement of existing linear infrastructure for both water supply and sanitary sewerage (e.g. watermains, service connections, water meters, hydrants, valves and sanitary sewers) with 2019 investments totalling \$44.1 million.

Transportation

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> Road shoulders utilize recycled asphalt grindings and liquid asphalt and liquid calcium chloride to control erosion. More frequent inspections are conducted in erosion prone areas of the transportation system. The new 2019 Transportation Master Plan includes paved shoulders for rural road construction where feasible. Ditch, embankment and road proactive maintenance reduces deterioration and increases drainage. The Region utilizes visual and closed-circuit camera inspections and cleaning programs for storm sewers to prevent blockages that can lead to flooding. Specifications and design criteria reviews are conducted to ensure long-term capacity needs. Specific plans, programs and protocols keep the system safe and proactively address climate resiliency risks, including the: 	<ul style="list-style-type: none"> Staff are currently focused on: <ul style="list-style-type: none"> Monitoring and assessing the impacts of climate change on the performance of asphalt/concrete products; Considering enhanced erosion control (roads, shoulders, structures) within the Region's current design review; Reviewing best practice and available adaptation measures to improve the future resilience of critical road assets against extreme storm events projected 2040 to 2050; Consulting with Conservation Authorities and undertaking a vulnerability assessments of Regional storm structures for resiliency to extreme storm events projected 2040 to 2050; and, Monitoring impacts from increased storm intensity on capacity and integrity to ensure adaptive structures (culverts, bridges and storm sewers). The Region's new Strategic Road Safety Action Plan will be finalized in late 2019

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> ○ Winter Control Program; ○ Salt Management Plan (including new technologies e.g. liquid salt brine for pre-wetting and anti-icing); ○ Roadway Condition Advisory System; ○ Roadway Event Management System (including condition warnings); and, ● The Post Storm Clean-up Protocol. ● Proper training ensures effective utilization of technology, results analysis and control programs; ● State-of-the-art road weather information systems are used to monitor weather/pavement conditions (e.g. infrared road temperature sensors). ● Roadside visibility and safety are maintained including: <ul style="list-style-type: none"> ○ Increased vegetation and tree removal/trimming; ○ Cleaning/re-grading ditches and catch basins; ○ Cleaning entrance culverts (on a cost-recovery basis); etc. ● Inspections and patrols and proactive detours, repairs and closures implemented as required. ● Asset management includes proactive maintenance and rehabilitations, including patching of potholes, ruts and depressions, and rehabilitations and replacements ● Reliable backup power is in place for traffic systems and control. 	<p>and \$0.7 million was approved in 2019 to enhance roadway safety.</p> <ul style="list-style-type: none"> ● In 2019, \$0.2 million was approved for continuation of the uninterrupted power supply (UPS) Signal Installation Program to ensure adequate backup power for key intersections and standby power is being installed at the Region’s Traffic Operations Centre.

Facilities

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> • Climate adaptation requirements are assessed by the facilities management divisions of Works, Durham Region Police Service and Social Services who have responsibility for: <ul style="list-style-type: none"> ○ Ensuring the effective operation, security, maintenance, refurbishment or replacement of Regional facilities. ○ Condition and inspection programs to identify and prioritize work based upon: condition audits, inspections, mechanical and electrical system requirements, interior fitments, facility age, condition and risk assessments. ○ Analysis is based on comprehensive inspections, analysis, reports and environmental testing. • Climate adaptation measures include erosion control, temperature management, standby power management and storm water management, considered both in new facility and retrofit designs. • The Region’s current building standards ensure new facilities are built at a level comparable to or higher than Leadership in Energy and Environmental Design (LEED) Silver Certification. Facilities staff construct to a minimum American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 90.1 (2007) standard, with elements of ASHRAE 189.1 (2009) for the design of new buildings also employed on a case-by-case basis. Within this approach, DRT Raleigh Maintenance Facility (Oshawa) and the Clarington Police Complex were built LEED Silver Standard, 	<ul style="list-style-type: none"> • Facilities staff are currently engaged in a process to update design standards ahead of ASHRAE and Ontario Building Code changes, including design of more energy efficient and climate resilient buildings. • The Region is working towards completion of Building Condition Assessments for all Regionally owned facilities by 2023 (70 per cent complete). • As part of asset management planning and for the purpose of meeting requirements per Ontario Regulation 588/17 “Asset Management Planning for Municipal Infrastructure,” Facilities has implemented an asset management and planning software system which also facilitates the consideration of asset vulnerabilities for asset management planning. • Asset management is based on a long-term asset life-cycle approach and investigations of maintenance, repair, refurbishment and capital replacement options for facilities infrastructure owned by the Region increasingly includes consideration of potential for mitigation against climate risks.

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<p>while Fairview Lodge long-term care facility achieved LEEDS Gold certification.</p> <ul style="list-style-type: none"> Climate risk mitigation activities also include site salt management and winter control; sewer backflow prevention; and environmental health measures for staff and residents, including: sealed units and quarantine protocols; inspections and preventative maintenance; service contracts; pest control; cleaning protocols and preventative spraying; and, smooth surfaces and materials management. 	

Health Protection

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> Providing accurate, timely information on health protection/environmental health to community stakeholders, including community awareness of climate/environmental risk. Communicating with Source Protection Committees on drinking water supplies. Alerts and information to the community on air pollution and extreme heat and cold exposure (e.g. utilizing the Harmonized Heat Warning and Information System). Timely responses to public inquiries and promotion of the Help Line and website. Inspections of private sewage systems and response to inquiries/complaints regarding malfunctioning sewage systems. Assessment of public and private drinking water supplies, interpretation of results, and promotion of proper well maintenance. Assessment and monitoring of the increasing prevalence and risks from vector 	<ul style="list-style-type: none"> The Health Protection Division is working towards meeting the “Healthy Environments and Climate Change Guideline,” released by the Ministry of Health and Long-term Care (effective January 1, 2019). Additional resources (e.g. staffing/consulting) are forecast by 2020/21 to complete required community vulnerability assessments, including determination of the public’s vulnerability status related to rising temperatures, vector-borne illness, food and water illnesses, forest fires and air pollution. Work continues to address other local air quality and safety impacts (e.g. open fires, wood burning stoves); and, climate change and mitigation of exposure to environmental health hazards (e.g. air and ground water quality/protection, integration of green space, shade policy and extreme heat and flood protection).

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<p>borne disease, including Lyme disease (tick surveillance services), West-Nile Virus, Zika virus, Powassan virus, Eastern Equine Encephalitis (including on-going surveillance, incidence reporting and reduction of larval mosquito breeding sites through Integrated Mosquito Management to reduce risk to humans.</p> <ul style="list-style-type: none"> • Established working relationships with community and local municipalities ensure an integrated approach to local healthy environment strategies, including the following initiatives: <ul style="list-style-type: none"> ○ Collaborative reviews of property standards, housing conditions, rental unit temperature control, and pest and vermin control have been completed. ○ Monitoring of climate change impacts will inform future local vulnerability plans using existing indicators such as: surveillance report data for vector-borne illness rates (e.g. West Nile Virus, Lyme disease); ○ Number of heat alerts is currently tracked annually; ○ Completed a Cold Alert Pilot with community partners in preparation for the launch of a future public cold warning information system, including event tracking; ○ New indicators currently under investigation include: the number of smog advisories (currently seeking data access); and, syndromic surveillance data (e.g. hospital admissions coinciding with extreme temperatures). • The Region’s Public Health Department provides an integrated singular response to local planning authorities for all ROP review 	<ul style="list-style-type: none"> • Implementing a new Cold Warning Information System (CWIS) for the Region. • Staff are preparing for future local vulnerability assessments, including data collection, planning and identification of resource requirements.

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<p>requests and ensures stakeholder collaboration in the creation of healthy community designs.</p> <ul style="list-style-type: none"> Health Protection has staff on call 24/7 to respond to urgent public health issues and ensures annual training in emergency management and infection prevention and control and participates in emergency planning and exercises. 	

Solid Waste Management

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> Monitoring and inspection of former landfill sites; Regular environmental monitoring and reporting; Remediation of former closed Regional landfill sites, including consultations with the public and ensuring environmental protection which meets or exceeds regulatory compliance. Well-water testing adjacent to closed Regional landfill sites; and, Undertaking necessary repairs or improvements to protect the environment/groundwater resources, including preventing rainfall infiltration and leachate springs from forming around the landfill. 	<ul style="list-style-type: none"> The Region completed the remediation of Blackstock Landfill in October 2019. Excavating the Blackstock Landfill resulted in 98 tonnes of metal for recycling and approximately 450 tires for recycling. All waste has been removed for recycling or disposal. Removing the waste minimizes environmental risks and requirements for future leachate control. Consideration is also being given to the remediation of Scott Landfill in 2021. If landfill mining is not feasible, traditional options for leachate control could include the purchase of containment attenuation zones.

Regional Fleets

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<p>Fleets are protected from risks associated with the changing climate through:</p> <ul style="list-style-type: none"> • Safety codes, warranties and guidelines; • Extreme temperature alerts and control programs, including extreme heat and winter control; • Proper vehicle storage, including sheltered garages and maintenance facilities; • Fleet service and asset redundancies; and, • Driver and staff training, inspections, checklists and accreditations. 	<ul style="list-style-type: none"> • DRT has identified increased requirements due to heating and cooling extremes and related costs to maintain adequate heating, ventilation and cooling on buses and in transit facilities. This increases program pressures to address passenger comfort, health and safety on transit vehicles, at stops/stations and transfer amenities, particularly for vulnerable populations. DRT must also address service demand peaks, due to an increased frequency of “bad weather days” in addition to heightened snow and ice clearing requirements.

Community Sustainability Initiatives

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> • Developing and implementing community sustainability initiatives in partnership with stakeholders including the local area municipalities, utilities and community organizations. • Collaborating with, and providing guidance to local municipalities, industry, businesses, energy sector, academic partners and other key stakeholders. • Providing strategic support to the Durham Region Roundtable on Climate Change (DRRCC)—the volunteer advisory committee to Durham Region on climate change matters. • Participating in and offering guidance to corporate climate change programs and initiatives. 	<ul style="list-style-type: none"> • Community climate change programs are developed specifically to realize a range of economic and social co-benefits, with potential programs evaluated to offer the greatest contribution to GHG reductions. • Environmental benefits: GHG reduction; reduction in local air pollutants; increases in vegetation cover; reduced summer heating. Reducing GHG emissions results in improved local air quality and a greener, cooler local landscape. • Economic benefits: community climate resiliency programs are anticipated to stimulate capital investment in energy efficiency technologies and retrofits, renewable energy development, new

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<ul style="list-style-type: none"> • Guiding the development and implementation of broader community climate change programs, including: <ul style="list-style-type: none"> ○ Durham Community Climate Change Local Action Plan (2012)—18 climate mitigation potential programs across six themes with distinct goals and objectives, including: the built environment; energy; food system; natural systems and resources; transportation; and waste. This Plan launched initiatives including Durham Partners in Project Green, Regional Reuse Days, and the Durham Five Million Trees program. ○ Durham Community Climate Adaptation Plan (DCCAP, 2016)—18 proposed programs across seven sectors including the building sector, electrical sector, flooding sector, human health sector, roads sector, natural environment sector and cross-sectoral programs, with addenda for agricultural and food security sectors. ○ The report, Keeping Our Cool, examines urban heat islands in the context of risks and concerns for Durham Region. A series of explanatory videos were produced for public education purposes. ○ The Natural Environment Climate Change Collaborative (NECCC) was launched with participation from local conservation authorities, municipalities, and the Region of Durham to focus on natural based solutions to adapt to climate change. Current work includes: an annual summit; completion of an ensemble climate change model to produce projections that account for 	<p>agricultural production, tree planting and other forms of economic activity.</p> <ul style="list-style-type: none"> • Social benefits: cohesion and the quality of life in Durham can be impacted through local employment, energy efficiency, improving indoor air quality, and more pleasant, people-oriented communities. • Initiatives have been developed to prepare for a climate that will be significantly different than when most roads, bridges, buildings, electricity grids and storm water systems were built, or when public health systems were designed. • Community initiatives reflect coordination of key sectors across Durham to consider the risks (and opportunities) to Durham from the changing climate. Program proposals are developed to proactively address this future. • In 2019, increased funding was provided for the program design and public education components of implementing community climate mitigation and adaptation plans.

Annually Budgeted Adaptation Priorities	Initiatives with Climate Resiliency Co-Benefits
<p>extremes and averages, are replicable and transferrable; natural systems vulnerability assessment; and the translation of technical climate information into practical tools for community decision makers.</p> <ul style="list-style-type: none"> ○ Support is provided for area municipal climate change focused events and public education. ○ Plans are underway for the subsequent development, approval and funding of additional DCCAP programs. ○ Durham Community Energy Plan (2019)—developed with all area municipalities and energy utilities to recommend a low carbon pathway to accelerate the transition to a clean energy economy, while simultaneously achieving multiple economic and social benefits. Six recommended programs, including: Durham Green Standard for New Buildings; Durham Deep Retrofit Program; Renewable Energy Cooperative; Electric Vehicle Joint Venture Program; Education and Outreach Program; and Coordinating Land-Use Policies. ● Producing long-term studies of future climate changes, including projections by local area municipality (e.g. SENES study, Durham Region’s Future Climate 2040-2049) ● Conducting community engagement, promotion and public education programs to increase awareness of Regional plans to mitigate and adapt to climate change. 	

Acronyms list

CO₂e – Carbon Dioxide Equivalents

CSCoP – Climate and Sustainability Community of Practice

DCCAP – Durham Community Climate Adaptation Plan

DCEP – Durham Community Energy Plan

DRRCC - Durham Region Roundtable on Climate Change

DRT – Durham Region Transit

DYEC – Durham York Energy Centre

ECDM – Energy Conservation and Demand Management

EV – Electric Vehicle

GHG – Greenhouse Gas

GMF – Green Municipal Fund

ICIP – Investing in Canada Infrastructure Program

ICLEI - International Council for Local Environmental Initiatives

IESO – Independent Electricity System Operator

IRR – Integrated Resource Recovery

LAP – Local Action Plan

LCP – Low Carbon Pathway

LEAF - Local Enhancement & Appreciation of Forests

MCIP – Municipal Climate Innovation Program

NECCC - Natural Environment Climate Change Collaborative

TMP - Transportation Master Plan

PCN - Primary Cycling Network