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The Regional Municipality of Durham Report

To:	Planning and Economic Development Committee
From:	Commissioner of Planning and Economic Development
Report:	#2019-P-26
Date:	May 7, 2019

Subject:

Envision Durham – Climate Change and Sustainability Discussion Paper, File D12-01

Recommendation:

That the Planning and Economic Development Committee recommends to Regional Council:

A) That a copy of Report #2019-P-26 be received for information; and

B) That a copy of Report #2019-P-26 be forwarded to Durham's area municipalities; conservation authorities; the Ministry of Municipal Affairs and Housing; the Ministry of Environment, Conservation and Parks, the Durham Region Roundtable on Climate Change, and the Durham Environmental Advisory Committee for review and comment.

Report:

1. Purpose

1.1 The purpose of this report is to present the Climate Change and Sustainability Discussion Paper which is the second in a series to be released as part of Envision Durham, the Municipal Comprehensive Review (MCR) of the Regional Official Plan (ROP) (see Attachment 1).

1.2 Comments on this Discussion Paper are requested by August 5, 2019 (90-day commenting period).

2. Background

2.1 On May 2, 2018, Regional Council authorized staff to proceed with Envision Durham, as detailed in Commissioner's Report #2018-COW-93.

2.2 On February 5, 2019, the Planning Division initiated the first stage ("Discover") of the public engagement program for Envision Durham by launching a project web page and public opinion survey, as detailed in Commissioner's Report #2019-P-4. With the release of the first Discussion Paper (Agriculture and Rural System, Commissioner's Report #2019-P-12) on March 5, 2019, the Planning Division initiated the second stage ("Discuss"), wherein participants are being asked to provide input on various theme-based Discussion Papers, of which the Climate Change and Sustainability Paper is the second one.

2.3 The Discussion Paper topics are as follows:

a. Agriculture and Rural System (released March 5, 2019);
b. Climate Change and Sustainability;
c. Growth Management, including but not limited to reports on:
    - The Urban System;
    - Land Needs Assessment (LNA) and related technical studies, i.e. Employment Strategy, Intensification Strategy, Designated Greenfield Area Density Analysis, etc.; and
    - Additional feasibility studies, if required based on the results of the LNA.
d. Environment and Greenlands System;
e. Transportation System; and
f. Housing.

2.4 Each Paper will contain discussion questions, with a supplemental workbook, to help facilitate discussion and input.

3. Climate Change and Sustainability Discussion Paper

3.1 The Discussion Paper provides an overview of the trends and long-term impacts that climate change will have on Durham. It highlights the current ROP policy framework related to climate change and sustainability, recognizes Provincial policy requirements since the last ROP review, and identifies preliminary approaches and questions for discussion and feedback.

3.2 Climate change and its long-term weather patterns can result in a variety of impacts such as floods, droughts, and severe weather events. These impacts speak to the

need for appropriate mitigation and adaptation mechanisms. Municipalities are some of the many key players positioned to respond to climate change risks to help improve community resiliency.

3.3 The Discussion Paper is intended to serve as a starting point for stakeholder input on potential strategic directions, and to evoke discussion on how climate adaptation and mitigation issues can be addressed and translated into ROP goals and policies. Relevant topics that have implications on climate change policies today include:

- Urban built form;
- Energy infrastructure;
- Transportation; and
- Natural environment.

3.4 Through Envision Durham, the Region will review its climate change and sustainability policies by:

a. Exploring how climate change adaptation and mitigation that may be addressed by the ROP;
b. Updating goals and objectives for these subject areas; and
c. Updating definitions (and associated policies) to reflect current provincial policies.

3.5 This Discussion Paper was prepared by Regional planning staff in consultation with staff from the Office of the CAO, Envision Durham's Area Municipal and Conservation Authority Working Groups, and the Durham Environmental Advisory Committee.

3.6 The Discussion Papers do not present positions on potential changes that may be part of the ROP, but rather provide information and pose questions for consideration.

4. Next Steps

4.1 Each of the Discussion Papers will be posted to the project web page at durham.ca/EnvisionDurham for public input. Interested parties are encouraged to subscribe for project updates and email notifications through this web page. The Discussion Papers will be announced by way of:

a. News releases and public service announcements;
b. Social media platforms, including Facebook, Twitter and LinkedIn;

c. Email notifications;
d. Publications in internal and external newsletters; and
e. Materials published online.

4.2 Comments on the Climate Change and Sustainability Discussion Paper are requested by August 5, 2019 (90-day commenting period). Regional staff will report to Committee on the results of the Discussion Papers through future Policy Proposal Reports during the next stage of the public engagement process.

4.3 It is recommended that a copy of this report be forwarded to Regional Council for information, and forwarded to Durham's area municipalities, Conservation Authorities, the Ministry of Municipal Affairs and Housing, the Ministry of Environment, Conservation and Parks, the Durham Region Roundtable on Climate Change, and the Durham Environmental Advisory Committee for review and comment.

5. Attachments

Attachment #1: Climate Change and Sustainability Discussion Paper

Respectfully submitted,

Original signed by

Brian Bridgeman, MCIP, RPP
Commissioner of Planning and
Economic Development

Recommended for Presentation to Committee

Original signed by

Elaine C. Baxter-Trahair
Chief Administrative Officer

Climate Change & Sustainability

Discussion Paper

ENVISION DURHAM

May 2019

Durham Region
Planning and Economic
Development Department

This Discussion Paper is published for public and agency comment as part of Envision Durham, the Municipal Comprehensive Review of the Regional Official Plan.

Report contents, discussion questions, and proposed directions, where applicable, do not necessarily represent the position of Regional Council on changes that may be considered to the Regional Official Plan.

All information reported and/or collected through this Discussion Paper will help inform, and be used as part of the Municipal Comprehensive Review.

Please provide your comments on this Climate Change & Sustainability Discussion Paper by August 5, 2019.

About Durham Region

Durham Region is the eastern anchor of the Greater Toronto Area, in the Greater Golden Horseshoe area of Ontario. At over 2,590 square kilometres, Durham offers a variety of landscapes and communities, with a mix of rural, urban, and natural areas. The southern lakeshore communities of Pickering, Ajax, Whitby, Oshawa, and Clarington provide urban areas and a diverse employment base. The northern townships of Scugog, Uxbridge, and Brock are predominantly rural, with a thriving agricultural sector. The region is the home of the Mississaugas of Scugog Island First Nation and spans a portion of the territories covered by the Williams Treaties of 1923.[1]

Over 80 per cent of the region lies within the provincially-designated Greenbelt which also contains the environmentally significant Oak Ridges Moraine. With access to ample green space and lakes, rivers, and urban amenities, Durham Region offers a high quality of life for both city and rural residents.

Today, Durham is home to just under 700,000 people. By the year 2041, our population is expected to grow to 1.2 million people, with over 430,000 jobs. Our vision is to create healthy and complete, sustainable communities; shaping Durham into a great place to live, work, play, grow, and invest.

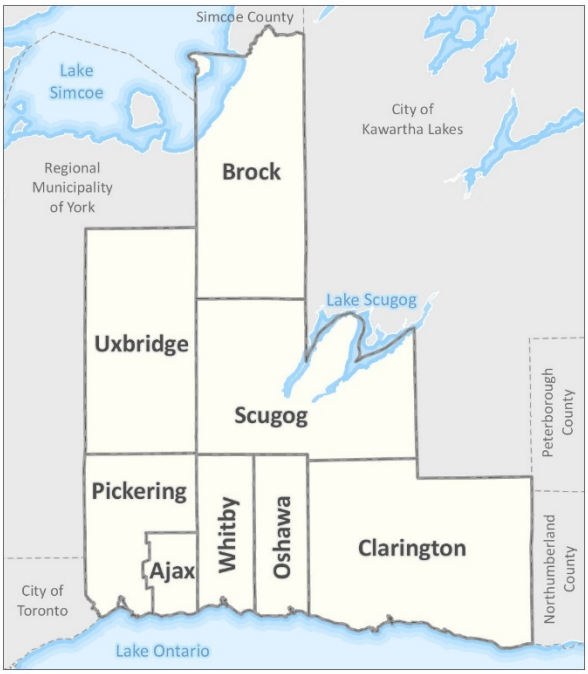

Figure 1: Map of the Region of Durham

About Envision Durham

Envision Durham, the Municipal Comprehensive Review (MCR) of the Regional Official Plan (ROP), is an opportunity to plan for fundamental change, by replacing the current ROP and establishing a progressive and forward-looking planning vision for the Region to 2041.

Over the next few years, the Region is undertaking Envision Durham to review:

- How and where our cities and towns may grow.
- How to use and protect our land and resources.

[1] The Williams Treaties include traditional territories of seven First Nations, including the Chippewas of Beausoleil, Georgina Island and Rama and the Mississaugas of Alderville, Curve Lake, Hiawatha, and Scugog Island.

- What housing types and job opportunities are needed for our residents.
- How people and goods move within, across, and beyond our region.

We're planning for an attractive place to live, work, play, grow, and invest – and we're asking for your help.

Why review the Official Plan?

The ROP guides decisions on long-term growth, infrastructure investment, and development – providing policies to ensure an improved quality of life – to secure the health, safety, convenience, and well-being of present and future residents of Durham.

Under the Planning Act, there is a legislative requirement to review the existing ROP every five years. Since the approval of the last ROP update (January 2013), the Province of Ontario has completed several significant Provincial policy initiatives, including the co-ordinated review and update to the following provincial plans:

- The Growth Plan for the Greater Golden Horseshoe, 2017 (Growth Plan), which is proposed to be further amended by Proposed Amendment 1.
- The Greenbelt Plan, 2017.
- The Oak Ridges Moraine Conservation Plan, 2017 (ORMCP).

The Planning Act requires the Region to complete a Provincial Plan conformity exercise to amend the ROP to ensure that it:

- Conforms with Provincial Plans or does not conflict with them.
- Has regard to matters of Provincial interest.
- Is consistent with the Provincial Policy Statement.

Envision Durham constitutes Durham's Provincial Plan conformity exercise and its five-year review of the ROP, satisfying these legislative requirements.

How to get involved

Public input is integral to the success of Envision Durham – we want to hear from you!

Please use this opportunity to share your vision for Durham – tell us your thoughts and opinions on the key Discussion Questions raised throughout this document (Appendix A).

Join the conversation by visiting durham.ca/EnvisionDurham to submit your comments.

To receive timely notifications on the Envision Durham process, please visit durham.ca/EnvisionDurham to subscribe for project updates.

Table of Contents

Executive summary

Global warming describes the recent rise in the average global temperature as being caused by increased concentrations of greenhouse gas (GHG) trapped in the atmosphere. GHG emissions are largely caused by burning fossil fuels to produce energy.

Climate change is defined as a significant change in long-term weather patterns. It can apply to any major change in temperature, wind patterns, or precipitation that occurs over time. These changes can result in impacts, such as floods, droughts, and severe weather events, including thunderstorms, ice storms, blizzards, and tornadoes. Urban and rural areas in Ontario, and their interdependent infrastructure networks, are vulnerable to the threat of these climate hazards.[2] These impacts signal that our climate is changing. Regions and area municipalities are some of the many key players positioned to respond to climate change risks, and can help improve our resiliency.

As a leader in climate change, the Region of Durham is committed to understanding and responding to climate change. The policies of the Durham Regional Official Plan (ROP) are one of the many tools that can help in this effort.

Many of Durham's area municipalities have also completed reviews and updates of their local official plans. The Region will be considering recent updates and resulting policies in the Envision Durham exercise.

The following paper is the second in a series of discussion papers that will be released as part of the Envision Durham exercise. It provides an overview of the climate change policy framework in the current ROP, various Regional initiatives related to climate change, and examines its role in climate change adaptation and mitigation.

This paper highlights trends and provincial policy requirements that will inform the ROP review. It identifies potential strategic directions and approaches to climate change adaptation and mitigation in the context of existing Regional climate change initiatives from:

- Durham Region's Strategic Plan.
- Durham Community Climate Change Local Action Plan.

It also includes implementation measures identified within:

- The Durham Community Climate Adaptation Plan.
- Keeping Our Cool: Managing Urban Heat Islands in Durham Region.
- The Durham Community Energy Plan.

This paper is intended to serve as a starting point for stakeholder input on potential strategic directions, and evoke discussion on which adaptation and mitigation issues the

[2] Henstra, D., & Thistlethwaite, J. (2017). Climate change, floods, and municipal risk sharing in Canada. *IDEAS Working Paper Series from RePEc,* IDEAS Working Paper Series from RePEc, 2017.

Region should address; and how they may be translated into ROP goals and policies.

Relevant topics that have implications on climate change policies today include:

- Urban built form.
- Energy infrastructure.
- Transportation.
- Natural environment.

Through Envision Durham, the Region will review its climate change and sustainability policies by:

- Exploring the scope of climate change adaptation and mitigation measures that may be included in the ROP.
- Updating goals and objectives for these subject areas.
- Updating definitions (and associated policies) to reflect current provincial policies.

The Region is committed to working collaboratively with all stakeholders, including Durham's area municipalities; conservation authorities; the Ontario Ministry of the Environment, Conservation and Parks; and other key stakeholders (such as development community, and public) to develop climate change and sustainability policies that implement provincial direction that is tailored to Durham's context.

How to get involved

Public input is integral to the success of Envision Durham – we want to hear from you!

Please use this opportunity to share your vision for Durham – tell us your thoughts and opinions on the key Discussion Questions raised throughout this document (Appendix A).

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1.0 Introduction

Climate change is an alteration to the composition of the global atmosphere beyond natural climate variability as a direct or indirect result of human activity.[3] The Intergovernmental Panel on Climate Change (IPCC) has concluded that the last three decades have been successively warmer at the Earth's surface than any decade since 1850.

1.1 Climate change: A global challenge

Climate change extends beyond just temperature and includes sea-level shifts, storm surges, irregular flooding, heavy precipitation events, prolonged droughts, spreading of disease, and resource depletion around the globe.[4] Although these changes are likely to impact local communities the most, determining how to best ensure resiliency speaks to co-ordinated and co-operative action on many fronts, involving governments, agencies, employers, builders, and individuals.

In 2015, the province released updated climate change projections that highlighted significant future greenhouse gas (GHG) concentrations, hotter and dryer summers, and warmer winters with more precipitation. The impacts of these climate shifts are now being felt across a variety of economic and social sectors, ranging from:

- Agriculture: including crop productivity.
- Forestry: including regional changes in timber supply and the increased frequency and extent of forest fires.
- Public health: including increased water and air quality issues, and the emergence of new insect-borne diseases.
- Power generation: including higher maximum summer power requirements and reduced hydroelectric power generation due to lower flow rates and lake levels.
- Tourism: including fewer winter outdoor recreation-based economic activities.
- Transportation: including shipping disruptions and infrastructure fatigue.
- Ecological integrity: including increased difficulties for species at risk.[5]

Discussion Question:

Are there any other areas or sectors where you have experienced the impacts of climate change first-hand?

1.2 Local trends and impacts

In 2009, the Region commissioned an inventory of community GHG emissions, which projected emissions to 2020. The inventory shows that if we did not implement any adaptation or mitigation measures and

[3] 1771 UNTS 107; S. Treaty Doc No. 102-38; U.N. Doc. A/AC.237/18 (Part II)/Add.1; 31 ILM 849 (1992).
[4] Hunt, A., & Watkiss, P. (2011). Climate change impacts and adaptation in cities: A review of the literature. *Climatic Change, 104*(1), 13-49. doi: 10.1007/s10584-010-9975-9976.

[5] Colombo, S.J, McKenney, D.W., Lawrence, K.M., & Gray, P.A. (2007). Climate Change Projections for Ontario: Practical Information for Policymakers and Planners. *Climate Change Research Report CCRR-05*. Ontario Ministry of Resources.

continue down a "business as usual" path, both our energy use and GHG emissions will increase.

Figure 2: Summary of energy consumption and eCO2 emissions in the Region of Durham

In response, Regional Council adopted three emission-reduction targets to tackle climate change:

- A 5 per cent by 2015.
- A 20 per cent by 2020.
- An 80 per cent by 2050.

Best efforts are being made to meet these targets. Achieving the goals of the Low Carbon Pathway outlined in the Durham Community Energy Plan is projected to result in 70 per cent emission reductions by 2050.[6]

The Region also commissioned a study entitled "Durham Region's Future Climate (2040-2049)" using town halls in all eight area municipalities as representative sites. Expected changes to the Region's overall climate include:

- A 4°C average increase in annual temperatures.
- Substantial increases in the number of days of rain greater than 25 millimetres.
- More extreme rainstorm events, including a 15 per cent increase in the potential for violent storms.

Projections indicate a **warmer, wetter, and wilder** climate in Durham.

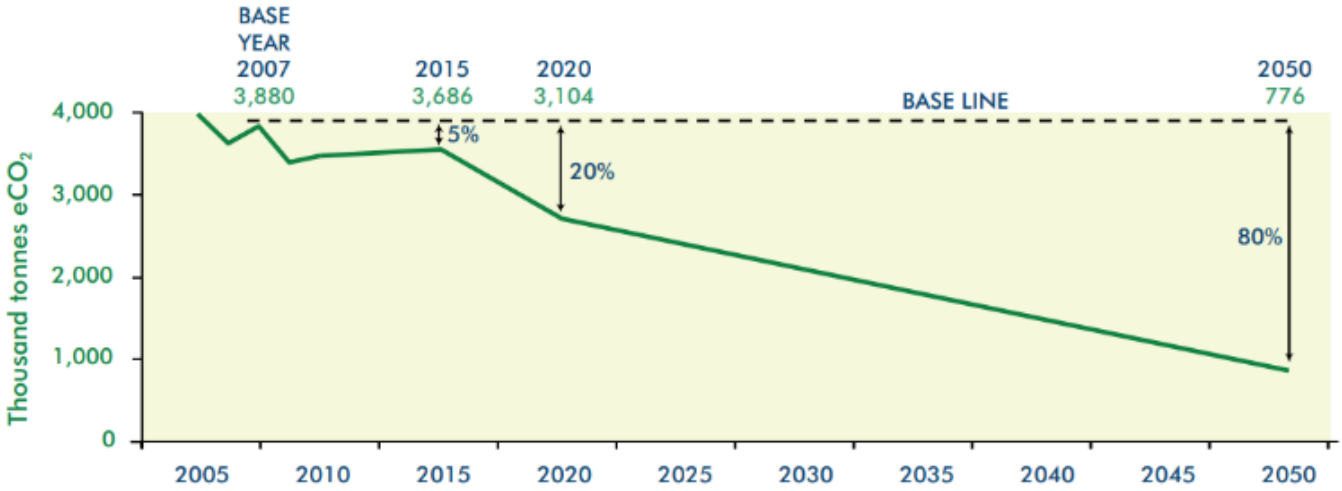

Figure 3: Graph illustrating Region of Durham Projected Community Emissions Reduction Targets

[6] Durham Community Energy Plan (2019). Region of Durham.

Municipalities and conservation authorities have historically relied on statutory approaches such as a hazard-based model, that separates people and assets from known hazards. This model uses standards (such as the likelihood of a 100-year flood) as a basis for public infrastructure decisions. Using flood mitigation as an example, structural flood control elements such as dams may be incorporated to reduce flood risks in developed floodplain areas, while financial assistance programs are in place to compensate communities in the event of a flooding event.[7]

This approach, in and of itself, is insufficient for building resilient communities. It relies heavily on sharing the financial and social cost of losses through public compensation, insurance, and restoration following an extreme weather event; but does not allow for sufficient resource allocation towards proactively reducing future risks. Its sustainability, as a model, assumes that such events are few and far between.[8] However, evidence of increasing long-term severe weather patterns and the risks they pose, suggests this approach is proving to be costly and unsustainable in the long-term.[9]

Combining various approaches encourages the participation of various stakeholders in the decision-making process, and incorporates a host of technological, social, economic, and institutional measures towards climate change adaptation, mitigation, and resiliency.[10] The policies in the ROP can play a role as part of a broad and holistic approach.

One such example is through new development, where various elements such as Low Impact Development measures, the application of "cool" or "green" roofs, the use of water efficient fixtures, grey water recycling, improved efficiency of on-site lighting, the use of permeable pavements to assist with water infiltration, etc. can be included as adaptation or mitigation measures.

Many approaches appear to be necessary if a continued commitment for further adaptation and mitigation is to be maintained.

"Climate change" was identified by several respondents in the public opinion survey as being one of the most important land use planning issues in Durham Region today.

The Region can play a role in establishing approaches to advance adaptation and mitigation measures that can help lessen the severity of climate change impacts on Durham residents.

[7] Henstra, D., & Thistlethwaite, J. (2017). Climate change, floods, and municipal risk sharing in Canada. *IDEAS Working Paper Series from RePEc,* IDEAS Working Paper Series from RePEc, 2017.
[8] Tucker, Chris. 2000. "Floods in Canada: An Emergency Preparedness Canada (EPC) Perspective." Environments 28 (1): 75–87
[9] Henstra, D., & Thistlethwaite, J. (2017). Climate change, floods, and municipal risk sharing in Canada. IDEAS Working Paper Series from RePEc, IDEAS Working Paper Series from RePEc, 2017.
Climate Change." Macleans.ca. June 24. Retrieved from http://www.macleans.ca/news/canada/alberta-flooding-sets-records-prompts-calls-for-action-on-climate-change/
[10] Simonovic, Slobodan P. 2013. Floods in a Changing Climate: Risk Management. Cambridge, UK: Cambridge University Press.

1.3 Adaptation and mitigation

Adaptation and mitigation are key to managing risks associated with climate change. The IPCC recognizes that developing capacities to adapt and mitigate are foundational to ensuring that local communities remain strong and resilient, as the climate shifts.

Climate change adaptation
Actions taken to reduce our vulnerability and protect against possible adverse impacts of climate change. For example, enhanced stormwater management or tree planting.

Climate change mitigation
Actions taken to reduce greenhouse gas (GHG) emissions from entering the atmosphere, thus reducing the likelihood and magnitude of increases in temperature and extreme weather events. For example, switching to electric vehicles or solar panels.

Options for adaptation exist in all sectors and policy areas, including infrastructure development, technological innovation, natural resource management, food production, social service provision, etc. A broad range of approaches, with supportive policies will help the Region to continue to build resiliency in the face of climate change. ROP policies also need to be supported through individual and collective adaptation measures and mitigation plans as the next step towards implementation.

Options to address mitigation can range between regulatory approaches to incentives that encourage eco-friendly practices. They can also be more specific to include action items that may be identified within local sustainability initiatives or region-wide climate change action plans.

The Ontario Climate Consortium (OCC), identifies official plans as one of many relevant documents for addressing climate change in Durham. The framework outlined in their report, Integrating Climate Change Considerations into Plans and Policies in Durham Region, views the purpose of an official plan as providing broad vision statements and goals related to climate change adaptation and mitigation, encompassing broad land use planning activities, and increasing awareness of climate change while providing high-level governance.[11]

Ontario Climate Consortium (OCC)

The OCC was established in 2011 to work collaboratively with municipalities, conservation authorities, university researchers, and other public, private, and NGO sectors to understand how climate change may impact Ontario. It aims to provide regionally specific climate data, intelligence, and adaptation services that enable decision makers to respond effectively to climate change through policy and investment.[12]

[11] Ontario Climate Consortium. (2018). *Integrating Climate Change Considerations into Plans and Policies in Durham Region. Toronto, Ontario.* *<https://climateconnections.ca/app/uploads/2018/10/Integrating-CC-in-Durham.pdf>*

[12] About Us – OCC, *Ontario Climate Consortium*. <https://climateconnections.ca/about-us/>

The current ROP contains an overall foundation for climate change adaptation and mitigation in various policy areas including: energy efficiency, air quality through reduced emissions, compact urban form, and mitigation through the protection and enhancement of natural features.

Section 2 of the current ROP (Environment) recognizes the implications of climate change in the region. It encourages adaptation and mitigation practices, such as tree planting, as a key tool for improving air quality, health, and reducing energy use by way of the natural shading and sheltering that trees provide. This section further encourages energy efficiency by supporting:

- Alternative, renewable energy sources and green technology.
- Retrofits of existing buildings to more energy efficient standards.
- The reduction of GHG emissions generated by the Region's corporate activities.
- Area municipal official plan policies adopting energy efficiency standards, and green roofs.
- Building orientation to maximize exposure to sunlight to balance energy efficiency, and cost.

Energy efficiency is currently addressed in the ROP through promoting good urban design principles by orienting and designing buildings to maximize exposure to direct sunlight, and balancing energy efficiency and cost.

Other policies currently identified in Section 7 of the ROP include:

- Achieving compact urban areas which support the development of healthy and complete, sustainable communities.
- Efficiently using the land, resources, and finances of the Region.
- Supporting Transportation Demand Management (TDM) by promoting sustainable transportation options in Section 11 (Transportation).

The Envision Durham exercise provides an opportunity to explore various considerations, including:

- A lens for considering climate change-specific adaptation and mitigation measures.
- Provincial requirements that can be incorporated into the ROP.
- Appropriate land use planning-related recommendations from Regionally led climate change plans and reports.

Discussion Question:

What is your vision for climate change adaptation and mitigation in Durham?

2.0 Land use planning policy context

2.1 The hierarchy of planning in Ontario

Land use planning in Ontario is a hierarchy, with policy direction stemming from the province to be implemented by the Regional Official Plan, and furthermore by local area municipal official plans and zoning by-laws.

Figure 4: Hierarchy of provincial planning in Ontario

The Planning Act, 1990 sets out the broad polices for land use planning in the province. It describes how and by whom land uses may be controlled. The Planning Act was amended in 2015 to require official plans to contain policies that identify goals, objectives, and actions to mitigate GHG emissions, and provide policies for adaptation to a changing climate, including through increasing resiliency.

The Provincial Policy Statement, 2014 (PPS) outlines the government's policies on land use planning. Municipalities apply the PPS when developing their official plans and to guide and inform decisions on land use planning matters. The PPS contains planning policies that facilitate the development of a prosperous economy, healthy and strong communities, and preserve and protect the environment and natural resources. It also includes some high-level approaches to help address climate change such as:

- Compact urban form.
- Permeable surfaces through urban design.
- Strengthened stormwater management requirements.
- Active transportation, such as cycling, walking, etc.
- Transit.
- Renewable and alternative energy systems.

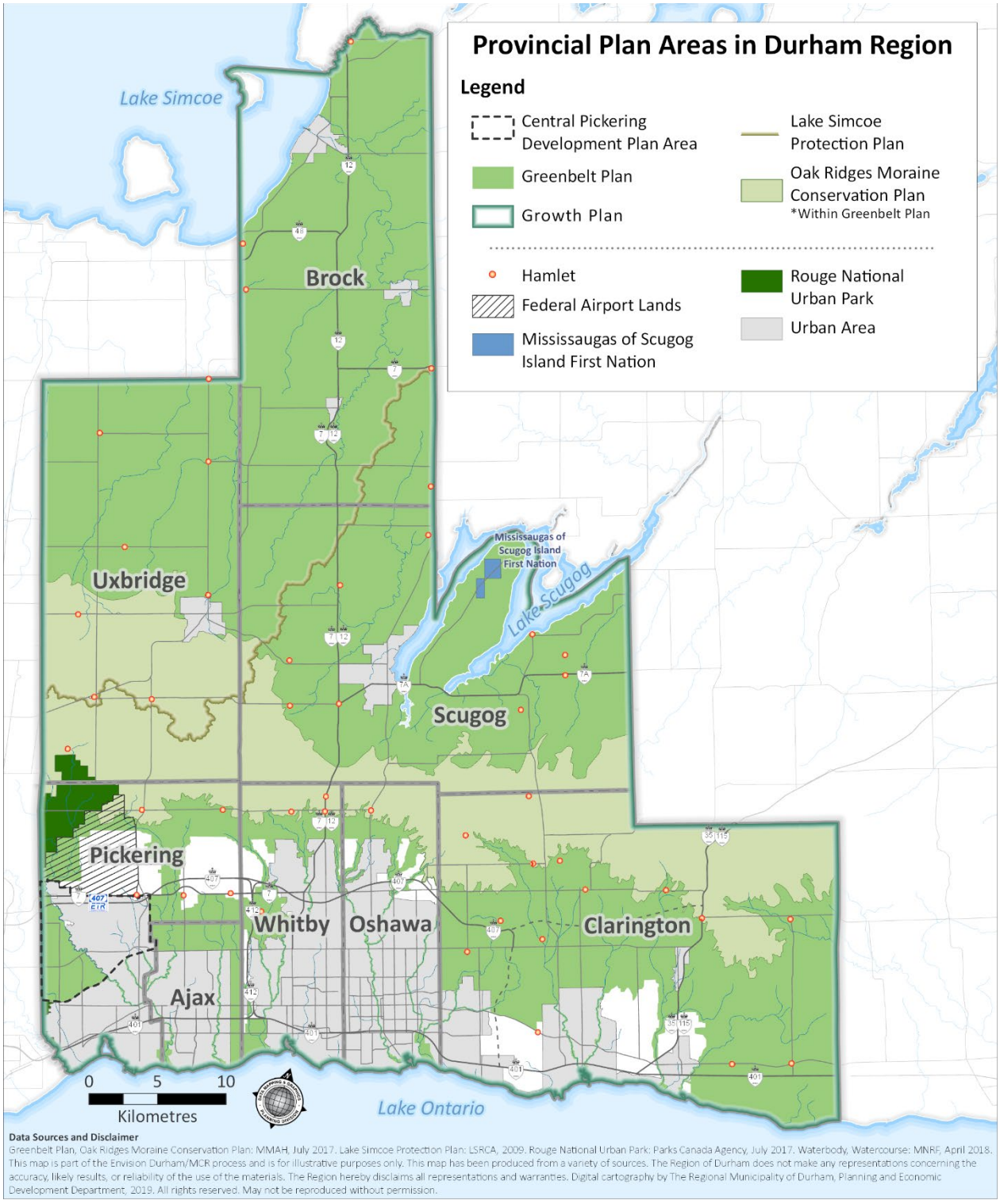

Figure 5: Context map of the Region with ORMCP, Greenbelt, Growth Plan, LSPP, and CPDP areas

The following area-specific provincial plans stem from the Planning Act and the PPS, and apply to lands within Durham:

- Lake Simcoe Protection Plan, 2009 (LSPP).
- Growth Plan for the Greater Golden Horseshoe, 2017 (Growth Plan).
- Greenbelt Plan, 2017.
- Oak Ridges Moraine Conservation Plan, 2017 (ORMCP).
- Central Pickering Development Plan, 2006 (CPDP).

2.2 A new direction for planning in Ontario

In 2014, the province released an updated PPS and in 2017, it updated the Growth Plan, Greenbelt Plan, and Oak Ridges Moraine Conservation Plan following its Coordinated Provincial Land Use Plans Review (the Review). Climate change was considered as one of the most significant challenges facing the Greater Golden Horseshoe at the time. As a result of the review, key climate change policies were added to the plans.

The updated plans were intended to work in conjunction with Ontario's previous Climate Change Strategy (2015) which was aimed at reducing GHG emissions and achieving net-zero communities.

As of the date of this paper, the PPS and Planning Act remain under review. The outcome or implications on the provincial climate change direction are yet to be known.

2.2.1 Growth Plan, 2017

A key vision of the Growth Plan is to support climate change mitigation and adaptation in the Greater Golden Horseshoe through natural areas, agricultural lands, and urban centres; and integrate climate change considerations into the planning and management of growth as a guiding principle.

> *"Natural areas and agricultural lands will provide a significant contribution to the region's resilience and our ability to adapt to a changing climate. Unique and high quality agricultural lands will be protected for the provision of healthy, local food for future generations. Farming will be productive, diverse, and sustainable.*
>
> *Urban centres will be vibrant and characterized by more compact development patterns that support climate change mitigation and adaptation, and provide a diversity of opportunities for living, working, and enjoying culture."*
>
> **Vision for the GGH**
> Section 1.2, Growth Plan

As such, the Growth Plan requires municipalities to include policies in their official plans to reduce GHG emissions by:

- Balancing jobs and housing to reduce automobile dependency, and the need for long distance commuting.
- Encouraging alternative travel, such as transit and active transportation.
- Minimizing land consumption through compact built form in greenfield areas

and intensifying in the existing built-up areas.
- Completing infrastructure vulnerability risk assessments and identifying actions and investments to address these challenges.
- Requiring stormwater management planning that assesses the impacts of extreme weather, and incorporating green infrastructure and low impact development.
- Recognizing the importance of watershed planning for identifying hydrologic features and the protection of the quality and quantity of water.
- Protecting the Natural Heritage System and water resource systems.
- Protecting agricultural lands and promoting local food and food security.
- Providing direction that supports a culture of conservation.

In addition, the Growth Plan encourages municipalities to reduce GHG emissions by including policies in their official plans through:

- Creating GHG reduction strategies.
- Developing GHG inventories.
- Creating interim and long-term GHG reduction targets.

In January 2019, the province released a proposed Amendment 1 to the Growth Plan (2017) that amongst other matters, would replace the achievement of low-carbon and net-zero communities with "environmentally sustainable communities" as a long-term goal. The amendment is expected to be released in spring 2019.

2.2.2 Greenbelt Plan, 2017

The Greenbelt Plan requires municipalities to develop official plan policies identifying actions that will reduce GHG emissions and address climate change adaption goals, while also providing further direction for municipalities on how to meet these goals. The Greenbelt Plan requires municipalities in the GGH to:

- Integrate climate change considerations into planning and managing growth in settlement areas in official plans, in accordance with the policies of the Growth Plan.
- Develop stormwater management plans.
- Conduct climate change vulnerability risk assessments when planning or replacing infrastructure.

Furthermore, it encourages municipalities to develop greenhouse gas inventories, emission reduction strategies, and related targets and performance measures, as also noted in the Growth Plan.

Discussion Question:

Should the additional GHG reduction policies that are encouraged in the Growth Plan and Greenbelt Plan be incorporated into the Regional Official Plan? How do you think this topic should be addressed?

2.2.3 Oak Ridges Moraine Conservation Plan, 2017

The Oak Ridges Moraine Conservation Plan (ORMCP) was updated to align better with the climate change policies in the 2014

Provincial Policy Statement. It includes a renewed focus on maintaining and restoring the ecological and hydrological integrity of the Moraine and contributing to climate change mitigation through carbon sequestering.

The plan also mandates climate change considerations in watershed plans, GHG emissions reduction actions in infrastructure development, and the use of Low Impact Development (LID) to mitigate potential flood risks. The moraine as a natural environment plays a key role in climate change adaptation and mitigation.

Through Envision Durham, the Region will implement the PPS and provincial plans, as well as other legislation and plans that will help achieve the province's climate change adaptation and mitigation goals.

Figure 6: Covers of Provincial Plans

3.0 The land use planning and climate change connection

3.1 Urbanization

Where and how growth is directed within municipalities has significant implications related to climate change. The connection between human settlement and climate change is linked to the pattern and density of urban development.

Ainsbury Avenue and Kerrison Drive, Ajax. Source: Toronto Star

Source: Wide Open Spaces

Figure 7: Examples of low-density ground related housing that spans large areas

Approximately 35 per cent of Durham's residential growth in 2018 was in the form of low-density, single-family homes. This form of development depends on automobiles, as it spans large geographical areas. It makes active transportation (such as walking and cycling) less practical, decreases transit efficiency, and increases dependency on personal vehicles, which are key contributors to carbon pollution.

Low density urban development – including ground-related housing, low density warehousing and other space expansive uses, auto-oriented retail centres and extensive roads for vehicular travel – increases the requirement to provide and maintain servicing infrastructure over large areas (roads, highways, sewers etc.), and related consumption of energy-intensive materials (such as asphalt). The conversion of undeveloped areas for development increases the urban heat island effect.

3.2 Transportation

Road transportation produces 47 per cent of Ontario's carbon pollution. A large proportion of GHG emissions are caused by personal vehicles. The type, distribution, and density of land uses along with the availability and reliability of alternative travel options directly affects how and where residents choose to travel.

Compact land use patterns with higher densities and a mix of uses, that are designed to support transit and encourage active transportation such as walking and cycling, allow for more efficient utilization of existing infrastructure overall (when compared to ground related development patterns). The Growth Plan refers to "Complete Communities," which is a key consideration when planning for growth in the Greater Golden Horseshoe.

Complete communities
The Growth Plan defines complete communities as "places such as mixed-use neighbourhoods or other areas within cities, towns, and settlement areas that offer and support opportunities for people of all ages and abilities to conveniently access most of the necessities for daily living, including an appropriate mix of jobs, local stores, and services, a full range of housing, transportation options and public service facilities. Complete communities are age-friendly and may take different shapes and forms appropriate to their contexts."

Transportation Demand Management (TDM) is one approach that can help decrease the use of less sustainable forms of transportation (specifically, driving alone in a vehicle) in new and existing communities. It pairs infrastructure development with other approaches, such as marketing and education, to promote behavioural shifts and encourage residents to choose sustainable modes of transportation. This can include approaches like carpooling, supporting and providing cycling amenities at places of work, implementing car-share programs, or supporting alternative work arrangements to reduce commuting pressures.

Transportation Demand Management measures
Durham works with local employers and schools to provide employees and students with strategies that support the use of sustainable modes of transportation to improve air quality and traffic in Durham Region, while reducing transportation costs for commuters.

Cycle Durham program
A Regional communications strategy that supports current cyclists, encourages more people to try cycling, and educates all road users on how to safely share the road.

Figure 8: Breakdown of emissions by sector (Source: Data Source: Durham Community Energy Plan Baseline Energy Study for 2015, Final Report, May 2017)

Discussion Question:

Do you see bike lanes, transit stops, sidewalks, etc. and other infrastructure in your own neighbourhood that provide a safe place to cycle, walk, or take transit to your destinations? Does the availability of this infrastructure impact your travel choices?

3.3 Energy

Sustainable energy and energy efficiency/conservation practices are important to adapt to, and mitigate climate change impacts. Energy used today for transportation, home heating/cooling, and electricity mainly comes from the following sources:

- Nuclear.
- Coal.
- Oil.
- Natural gas.
- Hydro-electric.

Energy from these sources are transferred and distributed through a centralized generation model. The energy consumed by industry and households typically comes from a power plant that is distributed via a transmission network.

Renewable energy and energy efficiency/conservation models includes the generation of electricity from a variety of sources, including the following:

- Photovoltaics.
- Wind.
- Biomass.
- Geothermal.
- Solar thermal.
- Combined heat and power.
- District energy.
- Low impact hydro-electric.

Renewable energy sources present the opportunity for a distributed generation model – meaning the energy is produced, stored, and used near where it will be consumed. This approach can create a more efficient and resilient system, and can be applied to residential, commercial, and/or industrial uses. It is especially effective in intensifying communities where planned or existing higher density and mixed-use environments predominate.

Figure 9: Examples of the various forms of renewable energy/energy efficiency infrastructure, including solar and wind. (Source: National Energy Board)

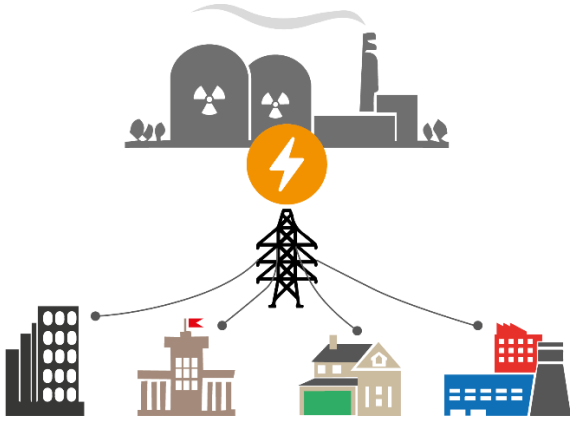

Figure 10: Diagram of a centralized generation model

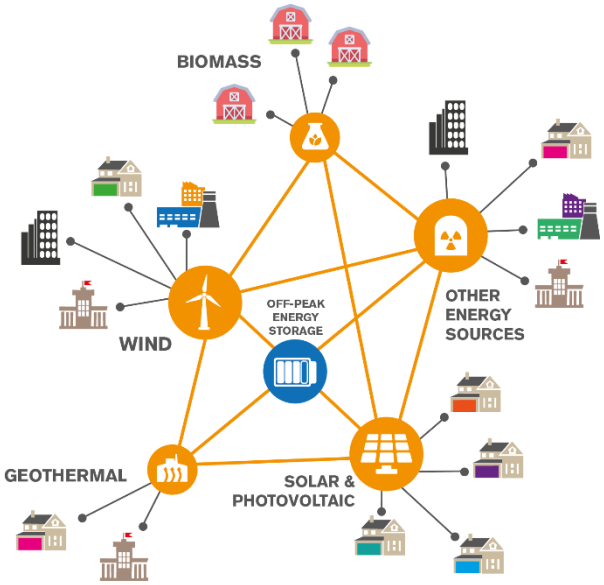

Figure 11: Diagram of a distributed generation model

Discussion Question:

To what extent should the Regional Official Plan have policies that support the development of alternative energy production?

The Region may wish to consider a more significant role in the project siting and approval process. For example, through the consideration of siting renewable energy projects, it would be important to have regard for natural hazards and the natural heritage and hydrological systems in Durham; and minimize the potential environmental risk that new infrastructure projects may have on surrounding areas, including adjacent communities and natural habitats.

Discussion Question:

Do you see additional opportunities for sustainable energy development in Durham?

Energy efficiency and conservation can also be realized through the design of buildings (heating, cooling, and electricity). Net-zero and/or passive building designs are energy efficient, and can become net energy producers from onsite renewables, such as solar, wind, geothermal, and/or solar water heating, etc. These designs can apply to residential, commercial, and/or industrial buildings.

Net-zero refers to a building or community that is highly energy efficient and fully powered from on-site and/or off-site renewable energy sources.[13] Net-zero buildings are designed and constructed to produce at least as much energy as they consume on an annual basis.[14]

[13] World Green Building Council <https://www.worldgbc.org/advancing-net-zero/what-net-zero>

[14] Natural Resources Canada, 2015. *Net Zero Energy (NZE) Housing.* Accessed March 9, 2019.

Sustainable development measures can be implemented through various methods, including: applying green development standards; constructing LEED (Leadership in Energy and Environmental Design) buildings; implementing community energy plans, such as the Durham Community Energy Plan (DCEP); as well as integrating appropriate measures as official plan policy.

Area municipal green development approaches

Priority Green Clarington: Establishes policies, criteria, a process, and incentives to encourage green development.

Pickering Sustainable Development Guidelines: Set of standards and targets achieved via a scoring system (modelled on LEED), with a mandatory minimum to ensure a minimum level of performance for all new developments.

Whitby Sustainable Design Guidelines: Currently finalizing the Terms of Reference with development of the Guidelines expected in 2019.

Ajax Green Development and Environmental Design Guidelines: Initiated work on the development of a points-based system.

Ajax Fire Hall (LEED Platinum). (Source: IPM Canada)

Oshawa City Hall (LEED Silver) (Source: IPM Canada)

Figure 12: LEED building examples in Durham

Leadership in Energy and Environmental Design (LEED)

Green certification program that can be applied to both buildings and neighbourhood developments. LEED rates a building on green design, construction, operation and maintenance and gives the development a designation based an overall score.

<https://www.nrcan.gc.ca/energy/efficiency/housing/research/5131>

3.4 Natural Environment

Preserving, protecting, and enhancing our natural areas plays a significant role in climate change adaptation and mitigation.

Natural areas assist with mitigating the impacts of climate change in the following ways:

- Forests and agricultural soils remove carbon dioxide from the atmosphere.
- Green spaces can provide protection from storms, flooding, and erosion.
- Wetlands filter and regulate water supplies.

One key tool for climate change adaptation is landscape restoration, such as tree planting. Trees produce oxygen and improve urban air quality by absorbing pollution. Tree species that once thrived in our region may not survive in future decades due to rising temperatures that create an unsuitable climate.

One measure to ensure trees remain an effective adaptation measure is to plant native species in urban and forested areas that are known to be adaptable to the overall changes in climate and thrive in warmer temperatures. Some area municipalities and conservation authorities within Durham have introduced programs that take adaptable species into consideration as part of tree planting initiatives.

Trees located along road corridors can also help reduce dust, ice build-up, wind, and blowing snow. Trees can reduce the amount of road salt required for winter maintenance, which also reduces the environmental risks that excess salt may pose on soil and groundwater and runoff to lakes, rivers, and streams.

Ajax Urban Forest programs

With the many benefits that trees provide, the Town of Ajax offers programs to help increase its urban forest, which includes planting trees (on boulevards and in parks), community tree planting events, private property planting, and full-service backyard planting through the Local Enhancement & Appreciation of Forests (LEAF) Backyard Planting Program.

LEAF is a not-for-profit organization helping to protect and improve Ajax's urban forest through the delivery of a subsidized Full Service Backyard Tree Planting Program in partnership with the Town of Ajax, the Region of Durham, and Ontario Power Generation.

The Rouge National Urban Park, an area of natural capital in our region, provides $115 million dollars[15] in non-market economic benefits to the Greater Toronto Area every year through cleaner air, filtered water, and an improved habitat for agricultural pollinators and wildlife.

Figure 13: Tree planting as part of urban forest programs (Sources: Durham Community Climate Change Local Action Plan, and Clarington Trees for Rural Roads)

3.5 Growth management strategies

Implementing compact and mixed-use development in correct locations can be significantly beneficial to achieving climate adaptation.

Compact built form that emphasizes a mix of land uses (residential, retail, workplaces, schools, and areas of recreation) – located within proximity to each other – encourages sustainable and active transportation, such as walking, cycling, and public transit. This approach can reduce a neighbourhood's overall reliance on personal vehicles, and associated GHG emissions to improve air quality.

Compact built forms, such as townhomes and apartments, take up less land than single detached homes. Intensification can reduce the rate at which additional land is consumed by development and preserve agricultural and ecologically-sensitive areas, while also reducing the need for additional infrastructure.

Intensification includes:

- Expanding or converting existing buildings to new uses.
- Redeveloping underutilized sites.
- Developing vacant land in between existing developments (infill).

Compact built form and intensification are encouraged throughout the Growth Plan as key considerations for growth in the GGH.

[15] Natural Capital Research and Consulting (2012). *Canada's Wealth of Natural Capital: Rouge National Park.* Vancouver, British Columbia: David Suzuki Foundation.

The province defines Compact Built Form in the Growth Plan as: A land use pattern that encourages the efficient use of land, walkable neighbourhoods; mixed land uses (residential, retail, workplace, and institutional) all within one neighbourhood; proximity to transit; and reduced need for infrastructure. Compact built form can include detached and semi-detached houses on small lots, as well as townhouses and walk-up apartments, multi-storey commercial developments, and apartments or offices above retail. Walkable neighbourhoods can be characterized by roads laid out in a well-connected network, destinations that are easily accessible by transit and active transportation, sidewalks with minimal interruptions for vehicle access, and a pedestrian-friendly environment along roads to encourage active transportation.

4.0 The Provincial Climate Change Approach

2007 | 2009 | 2015 | 2017

ONTARIO'S CLIMATE CHANGE ACTION PLAN

The province released its initial Climate Change Action Plan (Action Plan), which set a goal of reducing Ontario's GHG emissions by six per cent below 1990 levels by 2014. This goal was met by implementing initiatives such as: closing Ontario's coal-fired electricity generating stations; mandating smart growth planning; and increasing emission-free renewable energy.

GREEN ENERGY ACT

The Green Energy Act was enacted to promote renewable energy, grow a green economy, and ensure public sector energy conservation and efficiency. Specific to land use planning, the Green Energy Act, 2009 gave the province the authority to approve and site renewable energy projects, regardless of resident or municipal government opinion. This resulted in numerous wind and solar energy projects being implemented across the province.

ONTARIO'S CLIMATE CHANGE STRATEGY

Based on the Action Plan, this strategy set a target to reduce GHG emissions by 80 per cent below 1990 levels by 2050.

BILL 172: CLIMATE CHANGE MITIGATION AND LOW-CARBON ECONOMY ACT

Bill 172 established a requirement for the province to develop an updated Climate Change Action Plan and outlined the legal framework for the establishment of a Cap and Trade Program.

CAP AND TRADE PROGRAM STARTS

The Ontario Cap and Trade Program began in January 2017, with the first auction held in March of that year; raising almost $500 million for emissions reductions projects. Overall, the Cap and Trade Program raised close to $3 billion. A 2018 report by the Environmental Commissioner of Ontario concluded that, "despite some inefficiencies, cap and trade was on its way to producing many economic and environmental benefits."

ONTARIO'S CLIMATE CHANGE ACTION PLAN UPDATE (2016-2022)

Developed as a requirement of Bill 172, this updated the proposed policies and programs required in the Climate Change Action Plan to achieve the provincial GHG reduction targets that were to be partially subsidized through funding generated by the Cap and Trade Program.

2017 (continued)

2018

BILL 68: MODERNIZING ONTARIO'S MUNICIPAL LEGISLATION ACT

A key land use planning direction, proposed within the new Action Plan, sought to amend the Municipal Act, 2001, to make mitigation of GHG emissions and adaptation to a changing climate a matter of provincial interest in Ontario's Planning Act, 1990. This change was realized through Bill 68, Modernizing Ontario's Municipal Legislation Act, 2017.

BILL 4: CAP AND TRADE CANCELLATION ACT

Bill 4 revoked the Cap and Trade Program and proposed to set new provincial GHG emission reduction targets through a new climate change plan.

REPEAL OF THE GREEN ENERGY ACT

This repeal will result in amendments to the Planning Act, 1990; removing exemptions for renewable energy projects from most land use planning instruments, restoring municipal authority, and providing immunity from litigation over the siting of renewable energy projects. This change requires that Envision Durham consider the Region's position on renewable energy projects.

UPDATE TO ONTARIO ELECTRICITY ACT (1998)

Following the repeal of the Green Energy Act, the province updated the Ontario Electricity Act to include certain elements that were in previously in the Green Energy Act, such as conservation and energy efficiency initiatives, including an energy reporting regulation.

PRESERVING AND PROTECTING OUR ENVIRONMENT FOR FUTURE GENERATIONS: A MADE-IN-ONTARIO ENVIRONMENT PLAN

The province released its Environment Plan in late 2018, which includes a section on climate change.

FEDERAL GOVERNMENT INTRODUCES CARBON TAX

A price of $20 per tonne of GHG emissions, produced from fossil fuel sources, will be levied from provinces not part of the Pan-Canadian Framework on Clean Growth and Climate Change, including Ontario.

4.1 Current directions

The current draft "Made-in-Ontario" Environment Plan, introduced in late 2018, includes a section on addressing climate change. Actions include, but are not limited to:

- Improving our understanding of climate change impacts through climate data collection and sharing.
- Updating government policies, including the Ontario Building Code to improve resiliency.
- Reviewing land use planning policies and laws related to climate resilience.
- An emissions reduction target of 30 per cent below 2005 levels by 2030.
- Establishing the Ontario Carbon Trust (emissions reduction fund).
- Emission performance standards for large emitters primarily within the industrial sector.
- Encouraging private investments in clean technologies and green infrastructure.
- Providing home-owners with data about their home energy use.
- Increasing access to clean energy.
- Making climate change a cross-government priority and empowering effective local leadership on climate change.
- Improving public transportation.

Details surrounding the implementation of these actions have not yet been released. As a result, the connections between the actions and the ROP are unknown. Further direction from the province will aid in establishing key considerations and next steps through Envision Durham.

The repeal of the Green Energy Act, will result in amendments to the Planning Act, removing exemptions for renewable energy projects from most land use planning instruments, restoring municipal authority, and providing immunity from litigation over the siting of renewable energy projects. Following this change, the Region may consider its own role in the siting of renewable energy projects through Envision Durham, as previously discussed in section 3.3.

Discussion Question:

What role should regional and area municipal planning have in regulating the siting of renewable energy projects?

4.1.1 Provincial guidance material

Low Impact Development Stormwater Management Guidance Manual (Draft, April 2017)

Low Impact Development (LID) plays an important role in mitigating the effects of climate change. In 2017, the province released a draft Low Impact Development Stormwater Management Guidance Manual (LID Manual). The intent of this piece is to build upon the previously released 2003 Stormwater Management Planning and Design Manual, to help municipalities implement LID measures.

The LID Manual promotes LID as an innovative approach to managing stormwater, by treating runoff at its source, and recognizing stormwater as a resource to be managed and protected rather than as a waste. To this end, the LID Manual

encourages the design of roads, parks, grassed areas, sidewalks, etc. as elements that could effectively protect existing hydrologic features and functions, create habitat, and support complete, livable communities.

Source: City of London, ON

Source: KCI Technologies

Source: University of Arkansas Community Design Center

Figure 14: Examples of LID initiatives

Community Emissions Reduction Planning: A Guide for Municipalities

Recognizing that municipalities have both direct and indirect control and influence over GHG emissions – through land use planning policies, infrastructure, and investment – the province released Community Emissions Reduction Planning: A Guide for Municipalities in 2018 (the Guide).

The guide is intended to support provincial land use planning direction related to the completion of energy and emissions plans. The Growth Plan encourages municipalities to incorporate emission reduction strategies into their official plans (see Discussion Paper Section 2.2.1). To achieve these reductions, the Region's Community Energy Plan has a focus on reducing energy consumption, improving efficiency, and shifting towards low carbon sources of energy (see Discussion Paper Section 6.3).

5.0 Federal context

Federal Carbon Tax

In October 2018, the Government of Canada introduced a federal carbon tax to levy a price of $20 per tonne of GHG emissions produced from fossil fuel sources. The price will increase annually by $10 per tonne until it reaches $50 per tonne by 2022.[16]

If it moves forward, the tax could be collected from provinces that are not currently part of the Pan-Canadian Framework on Clean Growth Climate Change, including Ontario. The federal carbon tax could reduce GHG emissions by 80 to 90 million tonnes by 2022 once all provinces and territories are able to implement it. That is the equivalent of taking nearly 23 to 26 million cars off the road for a year.[17] This program has an indirect impact on achieving regional GHG emission reduction targets.

Federal Sustainable Development Strategy

In 2016, the Government of Canada introduced the Federal Sustainable Development Strategy (the Strategy) for Canada. It is a three-year strategy that is currently being updated for 2019-2022. The current draft strategy sets out environmental sustainability priorities, establishes goals and targets, and identifies actions. It includes 13 long-term goals in various areas such as energy, agriculture, natural environment, infrastructure, etc.

The strategy identifies municipalities as essential partners in the decision-making and implementation process. The following goals in the strategy relate directly to municipal land use planning and support key climate change themes that are also included in provincial legislation:

- Effective action on climate change.
- Clean growth.
- Modern and resilient infrastructure.
- Clean energy.
- Safe and healthy communities.

As part of achieving these long-term goals, the strategy identifies municipal planning bodies as key partners in helping to reduce GHG emissions in the following ways:

- Identifying adaptation measures in municipal plans, strategies, and reports.
- Advancing energy efficient, low-carbon, and green infrastructure, such as water and wastewater systems.
- Encouraging the adoption of clean energy technologies and renewable energy infrastructure.
- Municipal planning decisions related to public transit, waste management,

[16] Government of Canada (2017). *Pricing carbon pollution in Canada: how it will work. <https://www.canada.ca/en/environment-climate-change/news/2017/05/pricing_carbon_pollutionincanadahowitwillwork.html>*

[17] Government of Canada (2018). *Estimated impacts of the Federal Carbon Pollution Pricing System.* < https://www.canada.ca/en/services/environment/weather/climatechange/climate-action/pricing-carbon-pollution/estimated-impacts-federal-system.html>

buildings, and other areas that contribute to air quality.

Pan-Canadian Framework on Clean Growth and Climate Change

The Pan-Canadian Framework on Clean Growth and Climate Change was established in 2016 as a partnership between the Government of Canada and many provinces and territories as a collective effort to meet our national GHG emissions reduction targets, grow the economy, and build resilience to a changing climate.[18]

6.0 Regional climate change initiatives

6.1 Strategic directions on climate change

Durham Region Strategic Plan

Durham Regional Council introduced its first Community Strategic Plan in 2003. Beginning with its update in 2008, there was a notable shift to include an increased awareness of climate change and its potential effects on current and future residents. As a result, the update introduced "protecting and enhancing our environment through stewardship of our natural resources" as a strategic theme. A key goal of "implementing strategies to use energy efficiently and reduce light pollution" was identified with respect to the development of a community-based action plan to mitigate and adapt to climate change.

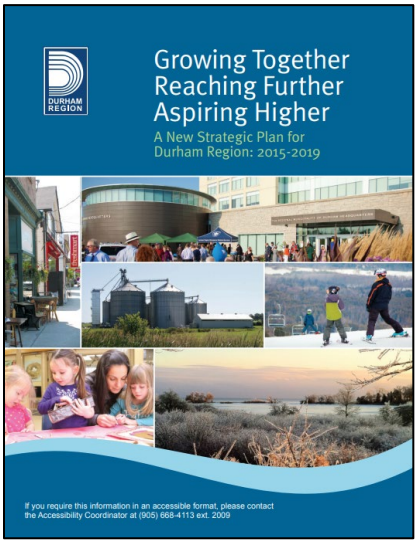

Figure 15: The cover of Growing Together

Durham Region Roundtable on Climate Change

In 2009, Regional Council established the Durham Region Roundtable on Climate Change (DRRCC) with direction to "position the Region of Durham as a leader in addressing climate change issues by preparing and recommending a comprehensive strategy with detailed actions that can be undertaken across the region to address climate change." The DRRCC achieves this by co-ordinating the development of various plans and programs to bring the climate conversation to the forefront and help the Region contribute to the fight against global climate change.

[18] Government of Canada (2019). *Pan-Canadian Framework on Clean Growth and Climate Change. <https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html>*

Climate Change & Sustainability

Following its 2015 update, "Healthy Environment & Sustainable Communities" emerged as a key theme with an explicit commitment to "invest in efforts to mitigate and adapt to climate change to build resiliency across the region."

Regional Council is undertaking a review of the Durham Region Strategic Plan, which will identify priorities for this Council term.

Over 80 per cent of survey respondents think that investing in efforts to build resiliency from the effects of climate change is "very" to "extremely important."

(Based on the Envision Durham public opinion survey results, 391 respondents).

Engagement and outreach activities of Envision Durham will align with the Region's Strategic Plan exercise, and address any potential shifts in vision, goals, and strategies that may affect this exercise.

Durham Community Climate Change Local Action Plan

Led by the DRRCC (and adopted by Regional Council in 2012), "From Vision to Action: Region of Durham Community Climate Change Local Action Plan" (LAP) identifies programs that could help to achieve the Region's GHG emission reduction targets. The LAP also identified the various roles that the Region, area municipalities, and community partners play through a shared effort. The mission of the LAP is "to work with our community to develop and advocate innovative policies, strategies, and actions that address the threat of climate change."

Regional GHG Emission Reduction Targets:

A 5 per cent by 2015.
A 20 per cent by 2020.
An 80 per cent by 2050.

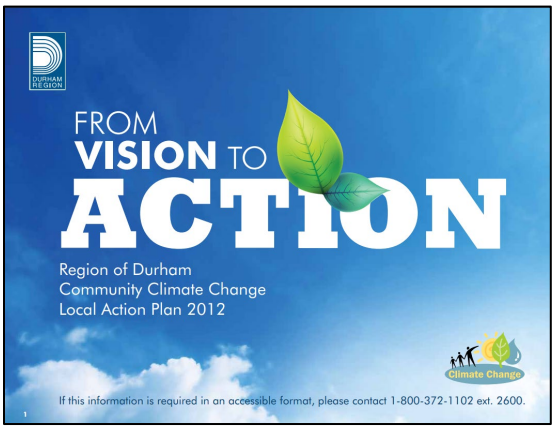

Figure 16: Cover of the LAP

Programs outlined in the LAP fall within six key themes:

1. Built environment (e.g. residential retrofits, green affordable housing).
2. Energy (e.g. offshore wind power generation, biofuel program).
3. Food system (e.g. urban agriculture program, local food hub).
4. Natural systems and resources (e.g. tree planting, source water protection).
5. Transportation (e.g. active transportation or transit programs).
6. Waste (e.g. freecycle programming).

It highlights the environmental, economic, and social impacts that potential programming in these areas will have on the Region, while also identifying implementation methods, including using ROP policies to further facilitate compact and

efficient community design that will help achieve our reduction targets.

While the ROP contains key policies that relate to the six themes of the LAP and contribute to GHG emissions reductions, through Envision Durham, the Region will continue to review and consider policies around climate change adaptation, mitigation, and resiliency.

Discussion Question:

Have you seen evidence of mitigation and adaptation efforts to climate change in your community? Moving forward, what are some good examples that you think would be beneficial if implemented in Durham?

6.2 How we plan to adapt

Durham Community Climate Adaptation Plan

In 2016, Regional Council approved, in principle, the Durham Community Climate Adaptation Plan (Adaptation Plan). The Adaptation Plan's goals, to be achieved through the implementation of various sectoral programs, include:

- Increasing the resiliency of public infrastructure (for example, roads and sewers), programs, and services.
- Promoting and facilitating the incorporation of the proposed programs and climate change information into the business planning of the responsible agencies.
- Improving emergency planning for weather extremes.
- Improving the awareness, knowledge, skills, and resources of government, citizens, and business people regarding climate adaptation.
- Improving the sustainability of Durham Region and its attraction as a place to invest, live, work, and play.
- Facilitating the recognition of Durham Region as a leader in climate adaptation planning and implementation.

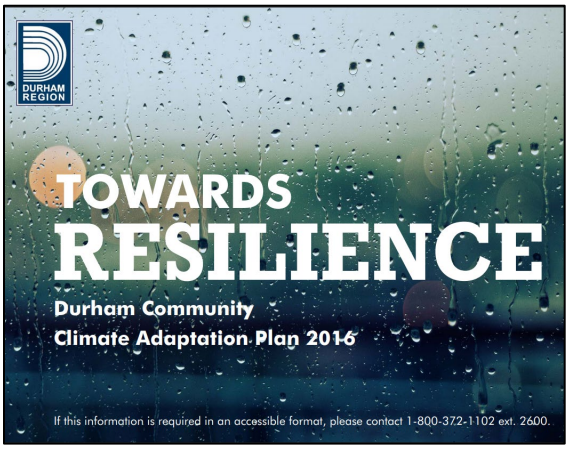

Figure 17: Cover of the Durham Community Climate Adaptation Plan

Responsibility for implementation is varied, ranging from the Region, local municipalities, electrical utilities, conservation authorities, and provincial and federal agencies.

Over three quarters of survey respondents (76 per cent) think that promoting green infrastructure strategies, such as low impact development, is "very" to "extremely important."

(Based on the Envision Durham public opinion survey results, 390 of 391 respondents).

Envision Durham will consider the following elements as subjects for investigation, and the form that potential future policies may

take in consultation with affected stakeholders:

- Green infrastructure and LID.
- Climate Resilience Standards.
- Less land consumptive roads and parking areas.
- A Regional Natural Heritage System (NHS).
- Policies that consider cumulative impacts to the NHS.
- Updated Regional climate projections.

Durham Region Wins FCM Sustainable Communities Award

In 2018, the Region of Durham was awarded a Federation of Canadian Municipalities (FCM) Sustainable Communities Award in the Climate Change category for the Adaptation Plan.

Discussion Question:

In your view, is there anything else that the Regional Official Plan should do to encourage adaptation to climate change in Durham?

6.3 How we plan to mitigate

Keeping Our Cool: Managing Urban Heat Islands in Durham Region (2018)

A key consequence of climate change is the development of "Urban Heat Islands." This term refers to urban areas with higher temperatures, typically caused by heat-absorbing buildings, roads, and other "hard" surfaces, resulting in social, economic, health, and environmental impacts.

Many of Durham Region's urban areas are experiencing some of these impacts. Keeping Our Cool: Managing Urban Heat Islands in Durham Region (Keeping Our Cool) identifies the causes, impacts, and measures that can lessen their effects.

Causes of Urban Heat Islands

Removal of vegetation: Bare soil absorbs and retains more heat than vegetated landscape (such as trees that provide shade and absorb solar energy).

Dark surface materials: Typically used on roads, roofs, parking lots, and sidewalks, darker materials absorb and hold more solar energy.

Urban form: Urban form can affect wind flow and the amount of heat that is naturally removed. Tall buildings trap heat, and their large, extensive asphalt, concrete, and flat roofs absorb more of the sun's energy.

Waste heat: Heat produced by machines, such as air conditioners and ventilation, cooling and refrigeration appliances, vehicles, and industrial activities.

Weather: Calm winds and clear skies provide more of an opportunity for urban areas to absorb energy. Temperatures are also moderated near bodies of water or mountains.

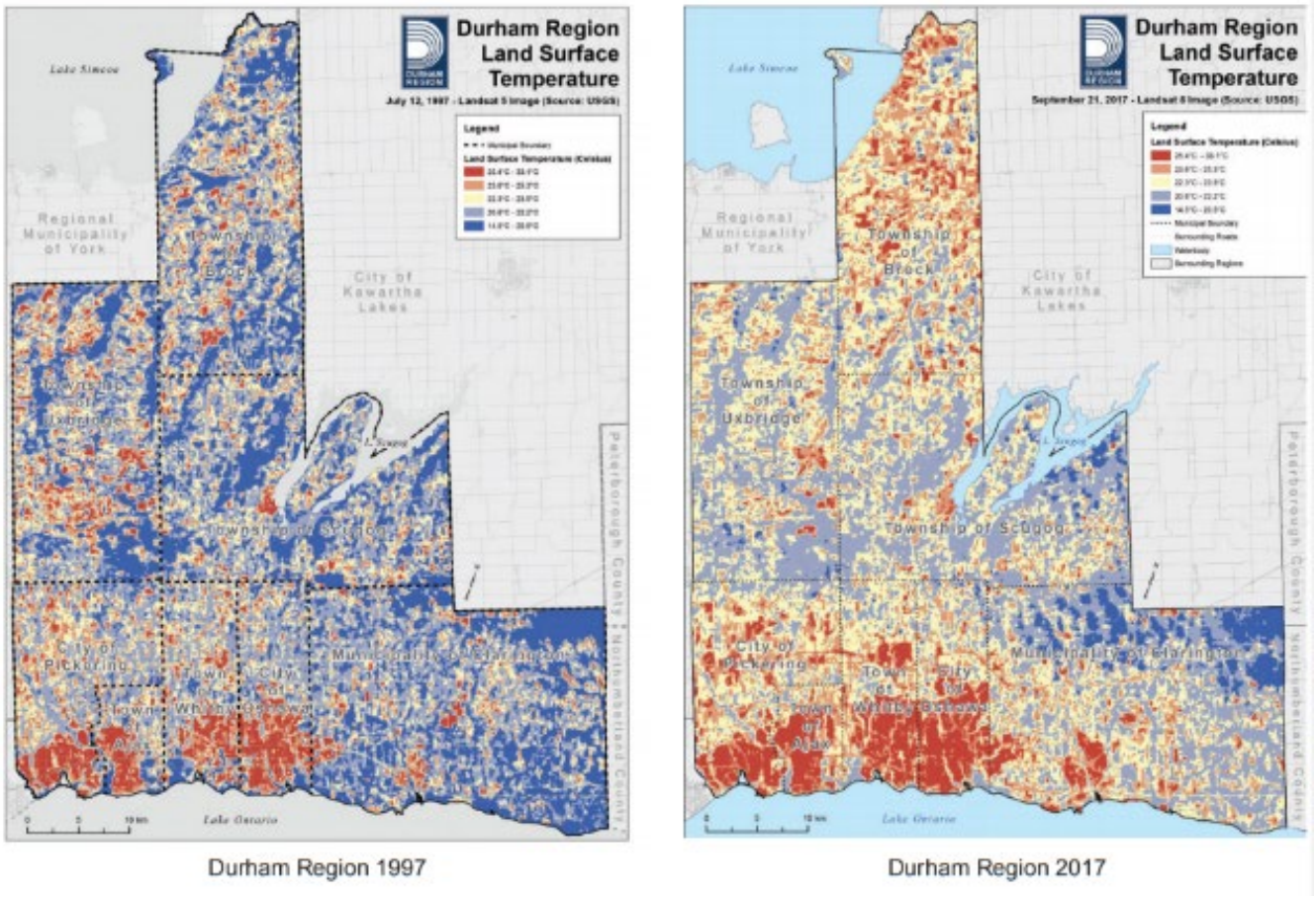

Figure 18: Comparative maps illustrating urban vs. rural surface temperatures between 1997 and 2017

Pickering, Ajax, Whitby, and Oshawa have higher land surface temperatures, on average, than rural municipalities in the region (due to their urban landscape).

The Region predicts that the number of days per year over 30 degrees Celsius will increase by an average of five to 23 days by 2040, along with a sharp increase in humidity. This means the effects of urban heat islands will not only increase in intensity, but also frequency.

Population growth may also result in more conversion of lands from cooler vegetated spaces to hotter areas with pavement, roads, and dark roofs, worsening the urban heat island effect.

Responding to urban heat islands requires strategies related to both the built and natural environment. Envision Durham can investigate the ROP's potential role in:

- Promoting green or white roofs.
- Establishing a tree canopy target.
- Encouraging area municipalities to develop green building standards.

Durham Community Energy Plan

The DCEP identifies ways to improve sustainable energy production and efficiency, while reducing GHG emissions at the local level. It also serves to help Durham's green economy move forward with clean energy production. The DCEP further supports a range of approaches, including:

- Building retrofits.
- Electric vehicle use and charging station installation.
- Investigating, identifying, and planning for the potential for projects across the region for district energy, combined heat and power, geothermal, etc.
- General education and outreach.

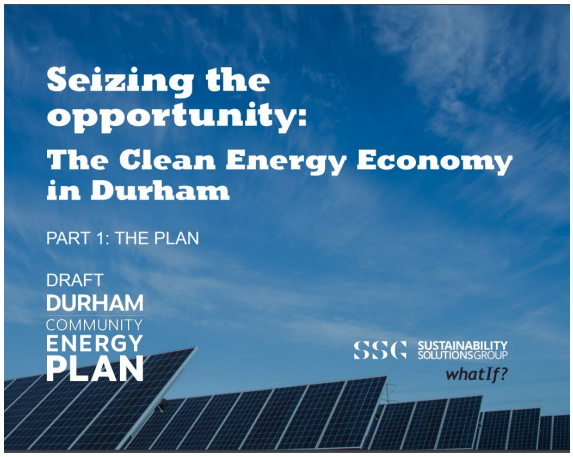

Figure 19: Cover of the DCEP

Through the Health Neighbourhoods initiative, the Durham Region Health Department identified seven priority neighbourhoods where emergency room visits for asthma and cardiovascular disease are highest. These indicators should be taken into consideration when planning to reduce extreme heat and urban heat islands.

Discussion Question:

Should a tree canopy target be established? If so should there be separate targets for urban versus rural areas?

Oshawa Centre white roof (Source: Oshawa Centre)

University of Ontario Institute of Technology green roof (Source: Kalvin Taylor/UOIT)

White roof and walls on new GO Rail Maintenance Facility in Whitby (Source: Town of Whitby and Metrolinx))

Figure 20: Examples of measures in Durham that combat urban heat islands

7.0 Next steps

This discussion paper is the second in a series of documents being released over the course of 2019. These discussion papers provide an overview and background on theme-based land use planning matters and pose various questions to gather opinions and help shape future policy.

Your feedback is important to us. The Regional Planning Division appreciates your interest and encourages your participation throughout the Envision Durham process. To submit your comments, please visit durham.ca/EnvisionDurham.

Following the release of these discussion papers, interested parties will also have opportunities to provide feedback on theme-based policy proposals and, a future draft of the Regional Official Plan.

To stay up-to-date on Envision Durham, please visit durham.ca/EnvisionDurham and subscribe to receive email updates.

Appendix A: Discussion questions workbook

Discussion questions are posed throughout the Climate Change & Sustainability Discussion Paper. We are interested in hearing from you on these topics or any others that are important to you, and which have not been addressed. The following is a summary of the questions contained within this discussion paper:

1. **Are there any other areas or sectors where you have experienced the impacts of climate change first-hand? (Page 7)**

   _____

   _____

   _____

   _____

2. **What is your vision for climate change adaptation and mitigation in Durham? (Page 11)**

   _____

   _____

   _____

   _____

3. **Should the additional GHG reduction policies that are encouraged in the Growth Plan and Greenbelt Plan be incorporated into the Regional Official Plan? How do you think this topic should be addressed? (Page 15)**

   _____

   _____

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4. **Do you see bike lanes, transit stops, sidewalks, etc. and other infrastructure in your own neighbourhood that provide a safe place to cycle, walk, or take transit to your destinations? Does the availability of this infrastructure impact your travel choices? (Page 19)**

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5. **To what extent should the Regional Official Plan have policies that support the development of alternative energy production? (Page 20)**

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6. **Do you see additional opportunities for sustainable energy development in Durham? (Page 20)**

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7. **What role should regional and area municipal planning have in regulating the siting of renewable energy projects? (Page 27)**

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8. **Have you seen evidence of mitigation and adaptation efforts to climate change in your community? Moving forward, what are some good examples that you think would be beneficial if implemented in Durham? (Page 32)**

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9. **In your view, is there anything else that the Regional Official Plan should do to encourage adaptation to climate change in Durham? (Page 33)**

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10. **Should a tree canopy target be established? If so should there be separate targets for urban versus rural areas? (Page 35)**

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Appendix B: Glossary

Adaptation: Actions taken to reduce our vulnerability and protect against possible adverse impacts of climate change. For example, enhanced stormwater management or tree planting.

Alternative transportation: Refers to transportation modes alternative to a personal vehicle. It can include, but is not limited to: public transit, walking, or cycling.

Carbon sequestering: A clean energy technology that aims to capture emissions of carbon dioxide (CO_2), a greenhouse gas (GHG), before they are released into the atmosphere from fossil-fuelled power plants and industrial facilities.[19]

Compact built form: A land use pattern that encourages the efficient use of land, walkable neighbourhoods, mixed land uses (residential, retail, workplace, and institutional) all within one neighbourhood, proximity to transit and reduced need for infrastructure. Compact built form can include detached and semi-detached houses on small lots as well as townhouses and walk-up apartments, multi-storey commercial developments, and apartments or offices above retail. Walkable neighbourhoods can be characterized by roads laid out in a well-connected network, destinations that are easily accessible by transit and active transportation, sidewalks with minimal interruptions for vehicle access, and a pedestrian-friendly environment along roads to encourage active transportation. (Growth Plan, 2014)

Complete communities: Places such as mixed-use neighbourhoods or other areas within cities, towns, and settlement areas that offer and support opportunities for people of all ages and abilities to conveniently access most of the necessities for daily living, including an appropriate mix of jobs, local stores, and services, a full range of housing, transportation options and public service facilities. Complete communities are age-friendly and may take different shapes and forms appropriate to their contexts. (Growth Plan, 2014)

Cool roof: Reflects the sun's rays and reduce heat build-up through a coating applied over an existing roof system, or a new single-ply waterproofing membrane.[20]

District energy: Systems that distribute thermal energy to multiple buildings in an area or neighbourhood. These systems typically consist of a heating and cooling centre, and a thermal network of pipes connected to a group of buildings.[21] It is an example of a distributed energy model.

Global warming: The sudden heating of the Earth's temperatures due to human activity. It is the sudden departure from the

[19] Natural Resources Canada. 2015. *Carbon Capture and Storage: Canada's Technology Demonstration Leadership.* Accessed April 16, 2019. < https://www.nrcan.gc.ca/energy/publications/16226>

[20] City of Toronto. 2019. *Eco-Roof Incentive Program.* Accessed April 16, 2019. <https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives-2/green-your-roof/>

[21] City of Toronto. 2019. *District Energy.* Accessed April 16, 2019. <https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/district-energy/>

temperatures that have been typical for the past 10,000 years.[22]

Greenhouse gas (GHG): Gases such as carbon dioxide and methane that trap heat and warm the planet.[23] Climate change is caused by the increase in concentrations of greenhouse gases in the atmosphere. These increases are primarily due to human activities such as the use of fossil fuels.[24]

Green infrastructure: Means natural and human-made elements that provide ecological and hydrologic functions and processes. Green infrastructure can include components such as natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs. (PPS, 2014)

Green roof: Supports the growth of vegetation and consists of a waterproofing membrane, drainage layer, organic growing medium (soil), and vegetation.[25]

Green technology (or clean technology): Any process, product, or service that reduces environmental impacts through:

a) Environmental protection activities that prevent, reduce, or eliminate pollution or any other degradation of the environment.
b) Resource management activities that result in a more efficient use of natural resources.
c) The use of goods that have been modified or adapted to be significantly less energy or resource intensive than the industry standard.[26]

Grey water: Recycled shower, dishwasher, or laundry water suitable for toilets and irrigation.[27]

Ground-related housing: Refers to low-density, single-family residential built form that spans large areas. This housing type provides residents with ground-level access and a yard or patio (or both) at the ground level.[28]

Infrastructure: Physical structures (facilities and corridors) that form the foundation for development. Infrastructure includes: sewage and water systems, septage treatment systems, stormwater management systems, waste management systems, electricity generation facilities, electricity transmission and distribution systems, communications/telecommunications, transit and transportation corridors and facilities, oil

[22] Climate Atlas of Canada. 2018. *Climate Change: The Basics.* Accessed April 16, 2019. <https://climateatlas.ca/climate-change-basics>
[23] Climate Atlas of Canada. 2018. *Greenhouse gases.* Accessed April 16, 2019. <https://climateatlas.ca/greenhouse-gases>
[24] Government of Canada. 2018. *Greenhouse gas emissions.* Accessed April 16, 2019. <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html>
[25] City of Toronto. 2019. *Eco-Roof Incentive Program.* Accessed April 16, 2019. <https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives-2/green-your-roof/>
[26] Government of Ontario. 2019. *Ontario's Cleantech Strategy.* Accessed April 16, 2019. <https://www.ontario.ca/page/ontarios-cleantech-strategy>
[27] Canada Green Building Council. 2019. *Urban Water Solutions.* Accessed April 16, 2019. <http://www.cagbctoronto.org/4-professional-resources/home/290-urban-water-solutions>
[28] Centre for Urban Research & Land Development. 2016. *Will GTA Homebuyers Really Give UP Ground-Related Homes for Apartments?* Ryerson University.

and gas pipelines and associated facilities. (PPS, 2014)

Intensification: The development of a property, site or area at a higher density than currently exists through:

a) Redevelopment, including the reuse of brownfield sites.
b) The development of vacant and/or underutilized lots within previously developed areas.
c) Infill development.
d) The expansion or conversion of existing buildings. (PPS, 2014)

Low impact development (LID): An approach to stormwater management that seeks to manage rain and other precipitation as close as possible to where it falls to mitigate the impacts of increased runoff and stormwater pollution. It includes a set of site design strategies and distributed, small-scale structural practices to mimic the natural hydrology to the greatest extent possible through infiltration, evapotranspiration, harvesting, filtration, and detention of stormwater. Low impact development can include: bio-swales, permeable pavement, rain gardens, green roofs, and exfiltration systems. Low impact development often employs vegetation and soil in its design, however, that does not always have to be the case. (Growth Plan, 2014)

Mitigation: Actions taken to reduce greenhouse gas (GHG) emissions from entering the atmosphere, thus reducing the likelihood and magnitude of increases in temperature and extreme weather events. For example, switching to electric vehicles or solar panels.

Municipal comprehensive review: A new official plan, or an official plan amendment, initiated by an upper- or single-tier municipality under section 26 of the Planning Act that comprehensively applies the policies and schedules of the Growth Plan. (Growth Plan, 2014)

Natural heritage system (NHS): The system mapped and issued by the Province in accordance with the Growth Plan, comprised of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems. The system can include key natural heritage features, key hydrologic features, federal and provincial parks and conservation reserves, other natural heritage features and areas, lands that have been restored or have the potential to be restored to a natural state, associated areas that support hydrologic functions, and working landscapes that enable ecological functions to continue. (Growth Plan, 2014)

Net-zero: Means a building or community that is highly energy efficient and fully powered from on-site and/or off-site renewable energy sources. Net-zero buildings are designed and constructed to produce at least as much energy as they consume on an annual basis.

Renewable energy: A system that generates electricity, heat and/or cooling from a renewable energy source. For the purposes of this definition: A renewable energy source is an energy source that is renewed by natural processes and includes wind, water,

biomass, biogas, biofuel, solar energy, geothermal energy and tidal forces. (PPS, 2014)

Resiliency: Can be generally defined as the capacity to:

a) Absorb stresses and maintain function in the face of external stresses imposed upon it by climate change.
b) Adapt, reorganize, and evolve, and improve the sustainability of the system, leaving it better prepared for future climate change impacts.[29]

Retrofits: Upgrading a building's energy-consumption system to ensure its preservation, continued operation, and maintenance of energy efficiency technologies. Retrofitting may involve improving or replacing lighting fixtures, ventilation systems or windows and doors, or adding insulation where it makes economic sense.[30]

Stormwater management plan: A plan that provides direction to avoid or minimize and mitigate stormwater volume, contaminant loads, and impacts on receiving water courses to: maintain groundwater quality and flow and stream baseflow; protect water quality; minimize the disruption of pre-existing (natural) drainage patterns wherever possible; prevent increases in stream channel erosion; prevent any increase in flood risk; and protect aquatic species and their habitat. (Growth Plan, 2014)

Transportation Demand Management (TDM): A set of strategies that result in more efficient use of the transportation system by influencing travel behaviour by mode, time of day, frequency, trip length, regulation, route, or cost. (PPS, 2014)

Tree canopy: The layer of leaves, branches, and stems of trees that cover the ground when viewed from above. In urban areas, the tree canopy provides an important stormwater management function by intercepting rainfall that would otherwise run off of paved surfaces and be transported into local waters though the storm drainage system, picking up various pollutants along the way. A tree canopy also reduces the urban heat island effect, reduces heating/cooling costs, lowers air temperatures, reduces air pollution, increases property values, provides wildlife habitat, and provides aesthetic and community benefits such as improved quality of life.[31]

Urban Heat Islands: Refers to urban areas with higher temperatures, typically caused by heat-absorbing buildings, roads and other "hard" surfaces, resulting in social, economic, health and environmental impacts.

Watershed planning: Planning that provides a framework for establishing goals, objectives, and direction for the protection of water resources, the management of human activities, land, water, aquatic life, and resources within a watershed and for the

[29] Folke, C (2006). "Resilience: The emergence of a perspective for social-ecological systems analyses". Global Environmental Change. 16 (3): 253–267.

[30] Natural Resources Canada. (2019). *Retrofitting.* Accessed April 16, 2019. <https://www.nrcan.gc.ca/energy/efficiency/buildings/20707>

[31] Center for Watershed Protection. 2018. *Urban Tree Canopy.* <https://www.cwp.org/urban-tree-canopy/>

assessment of cumulative, cross-jurisdictional, and cross-watershed impacts. Watershed planning typically includes: watershed characterization, a water budget, and conservation plan; nutrient loading assessments; consideration of climate change impacts and severe weather events; land and water use management objectives and strategies; scenario modelling to evaluate the impacts of forecasted growth and servicing options, and mitigation measures; an environmental monitoring plan; requirements for the use of environmental best management practices, programs, and performance measures; criteria for evaluating the protection of quality and quantity of water; the identification and protection of hydrologic features, areas, and functions and the interrelationships between or among them; and targets for the protection and restoration of riparian areas. Watershed planning is undertaken at many scales, and considers cross-jurisdictional and cross-watershed impacts. The level of analysis and specificity generally increases for smaller geographic areas such as subwatersheds and tributaries. (Greenbelt Plan)

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