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Town of Aurora General Committee Report No. PDS22-123

Subject:	Climate Change Adaptation Plan (CCAP)
Prepared by:	Sebastian Contarin, Energy and Climate Change Analyst
Department:	Planning and Development Services
Date:	September 13, 2022

Recommendation

- 1. That Report No. PDS22-123 be received; and
- 2. That the attached Town of Aurora Climate Change Adaptation Plan be endorsed; and
- That the future capital and operating budget requirements as listed in the Plan (Tables 9-12, pages 24-47) be included in the Town's future capital and operating budgets on a priority basis for consideration as part of the budget process.

Executive Summary

The purpose of this report is to seek Council endorsement of the attached Climate Change Adaptation Plan (CCAP). The Town retained WSP to prepare the plan, having considerable experience in climate risk assessment and resiliency planning. The adaptation plan is based on a climate risk assessment of Town-owned infrastructure as defined in the Town of Aurora 2021 Second Generation Asset Management Plan. The adaptation plan builds upon work done locally by York Region and the Lake Simcoe Region Conservation Authority (LSRCA) and will help Aurora align with provincial and regional direction on climate change including the Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure, and the Town's Asset Management Policy and climate change initiatives. The assets, and therefore the assessment, was divided into four infrastructure categories: linear engineering, water infrastructure, parks and natural heritage, and facilities.

To determine the potential impacts of climate change on the infrastructure in the Town, localized climate projections were analyzed. WSP identified climate trends that are expected to materialize in the near term, between 2021 and 2050.

- The climate change adaptation plan aligns with policy directions on climate change mitigation and adaptation established by the Town of Aurora, Regional Municipality of York, and the Government of Ontario.
- Climate trends that were expected to materialize in the near term, between 2021 and 2050, were identified by the consultants.
- The risk and vulnerability assessment, conducted by the consultants, identified low to medium risk areas across the Town's four asset types; no high-risk areas were identified in Aurora.
- A list of recommendations was prepared by consultants, to address the risks associated with the Town's four asset types.
- An Implementation Plan, including a proposed list of thirty-three (33) asset specific adaptation actions, was developed identifying Town roles and responsibilities, actions, and budget implications for Town's asset categories.

Background

Climate Change Adaptation Plan Development

Infrastructure is fundamental to community wellbeing and supports the services a municipality provides to its residents. The Town owns and operates many types of infrastructure from roads to parks and recreation facilities. Much of the Town's infrastructure is exposed to the environment and therefore could be impacted by the changing weather patterns associated with climate change. Understanding how infrastructure will be affected by a changing climate is an important step for the Town to improve its service delivery and manage risks to its assets. To that end, the Town engaged WSP to develop a Climate Change Adaptation Plan for the infrastructure assets within the Town's municipal asset inventory.

WSP was retained to develop the plan, having considerable experience in climate risk assessment and resiliency planning. The adaptation plan builds upon work done locally by York Region and the Lake Simcoe Region Conservation Authority (LSRCA) and will help Aurora align with provincial and regional direction on climate change including the Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure September 13, 2022

filed under the *Infrastructure for Jobs and Prosperity Act, 2015* (O.Reg 588/17), and the Town's Asset Management Policy and climate change initiatives.

The Adaptation Plan is informed by a climate change risk and vulnerability assessment completed using the Public Infrastructure Engineering Vulnerability Committee (PIEVC) protocol. The PIEVC protocol is a nationally recognized tool for assessing infrastructure risk due to climate change. The PIEVC protocol, and therefore the risk assessment, consists of a five (5) step approach and includes, project definition, data collection, risk assessment, engineering analysis, and conclusions/recommendations. WSP's team of resilience specialists and engineering discipline Subject Matter Experts (SMEs) completed Steps 1, 2, 3, and 5 with input from Town staff along the way. Step 4, Engineering Analysis, is only implemented where there is insufficient information to evaluate risks and complete the study. This was not the case for this project, so Step 4 was not performed.

The PIEVC protocol and therefore this Adaptation Plan maintain a specific focus on infrastructure and operation of Town assets. It does not consider the full extent of social and environmental impacts that may occur in Aurora because of climate change.

The adaptation plan is based on a climate risk assessment of Town-owned infrastructure as defined in the Town of Aurora 2021 Asset Management Plan. The assets, and therefore the assessment, was divided into four infrastructure categories: linear engineering, water infrastructure, parks and natural heritage, and facilities. Table 1 below summarizes the list of Town-owned assets included in the plan.

Asset Type	Asset Category	Asset Sub-Category		
Linear Engineering	Road Network	Pavement and curbs	Signage	
		Pedestrian paths	Traffia cignala	
		Road luminaires		
	Stormwater Network	Sewers	Headwalls	
		Maintenance chambers	Equalization tanks	
		Catch basins	Stormwater management ponds	
		Laterals	Bridges and culverts	
		Oil grit separators	Cleanouts	

Table 1: Summary List of Town-Owned Assets Represented as Part of the ClimateChange Adaptation Plan

Asset Type	Asset Category	Asset Sub-Category		
Water Infrastructure		Water mains	Service connections	
	Water Network	Water valves	Bulk water filling stations	
		Underground enclosures Fire Hydrants	Booster stations	
	Sanitary Network	Sewers	Equalization tanks	
		Maintenance chambers	Pumping Stations	
		Laterals		
Parks and Natural Heritage System		Open space and parkland	Off-road trails	
		Land associated with municipal facilities	Park structures	
		Land maintained for environmental purposes	Natural capital	
Town-Owned Facilities		HVAC systems	Building envelope systems	
		Building structural systems	Electrical systems	
		Plumbing systems	Hardscaping	

Provincial, regional, and privately owned assets within the Town are excluded from this assessment.

This assessment consisted of a desktop study with virtual engagement with Town staff and did not include a site visit. Assumptions and infrastructure condition descriptions are based on the Town of Aurora Asset Management Plan and Town staff input, and the results are intended to inform future asset management planning.

Analysis

The climate change adaptation plan aligns with policy directions on climate change mitigation and adaptation established by the Town of Aurora, Regional Municipality of York, and the Government of Ontario.

Table 2 below provides a summary of key policy documents relevant to this Climate Change Adaptation Plan.

Table 2: Summary of Key Policy Documents Relevant to the Climate Change Adaptation

Policy Document	Key Statement(s)
A Place to Grow: Growth Plan for the Greater Golden Horseshoe (Government of Ontario, 2020)	"Municipalities will assess infrastructure risks and vulnerabilities, including those caused by the impacts of a changing climate, and identify actions and investments to address these challenges, which could be identified as part of municipal asset management planning."
Provincial Policy Statement (Government of Ontario, 2020)	"Infrastructure and public service facilities shall be provided in an efficient manner that prepares for the impacts of a changing climate while accommodating projected needs."
Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17)	 "5. The municipality's commitment to consider, as part of its asset management planning, i. the actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets, in respect of such matters as, A. operations, such as increased maintenance schedules, B. levels of service, and C. lifecycle management"
Draft York Region Official Plan (Regional Municipality of York, 2021)	"Climate change and adaptation goals cannot be achieved by the Region alone and will require partnership and efforts from all levels of government, conservation authorities, community stakeholders, businesses, the development industry, and the public"
Strategic Asset Management Policy (Town of Aurora)	In alignment with the Town's strategic direction, "preparing a Climate Change Adaptation Plan" is a key priority.

Climate trends that were expected to materialize in the near term, between 2021 and 2050, were identified by the consultants.

To determine the potential impacts of climate change on the infrastructure in the Town, localized climate projections were analyzed. The most likely trend of occurrence is an increase in temperatures, which is expected to impact several climate and weather parameters:

- Mean summer maximum temperatures are projected to increase by 9%,
- The number of heat waves are projected to increase from 1.2 to 3.6 per year,

- **Cooling Degree Days** (used for cooling system design and planning) are projected to **almost double (increase of 86%)**,
- Winter temperatures are expected to increase, leading to a reduction in extreme cold risks, snow depth, and annual freeze-thaw cycles (although freeze-thaw cycles concentrated in winter months may still be damaging to infrastructure).

Otherwise, precipitation, wind, and low air quality events associated with wildfires are also projected to increase in the future.

The risk and vulnerability assessment, conducted by the consultants, identified low to medium risk areas across the Town's four asset types; no high-risk areas were identified in Aurora.

Interactions between each asset category and these climate trends were evaluated to determine where vulnerabilities may exist. The risk assessment identified 185 relevant climate-infrastructure interactions using available data, scientific literature, Town staff input, and the professional judgment of WSP's project team. Of the 185 interactions assessed, **97 correspond to a low risk**, **59 to a low medium risk**, and **29 correspond to an opportunity**. **No high medium risks, high risks, or special cases were identified**. The highest risks identified in this assessment were associated with the stormwater and sanitary systems due to potential risk of flooding and backups, HVAC systems in facilities needing to manage higher temperatures in the future and playing field maintenance after both heatwaves and flooding events which may become more frequent in the future.

All risk results were reviewed by WSP and Town staff, and based on the relative risk scoring, recommendations for adaptation actions were developed. These actions are intended to guide further climate change adaptation planning for Town infrastructure with specific actions identified for the short, medium, and long term.

A set of recommendations was generated, by the consultants, to address the risks associated with the Town's four asset types

The final stage of the PIEVC process, otherwise known as Step 5, is to provide recommendations and conclusions based on the risk assessment conducted by the consultants at WSP. Potential adaptation actions were proposed for all risks rated medium or above identified through the risk assessment process. These actions were informed by feedback from the risk workshop and input from the WSP project team with expertise related to each risk. Table 3 below provides a summary of the recommendations provided by the consultants across the Town's four asset types.

Table 3: Summary of Risk Levels and Recommended Mitigation Measures Across Town Owned Assets

Asset Type	Recommendation(s)			
Linear Engineered Assets	 Risks (moderate) extreme precipitation that may overwhelm stormwater systems leading to localized flooding and erosion of stormwater channels and roadsides. Actions required: improving the resilience of the stormwater system to both extreme precipitation and drought events. improving road maintenance and operations to manage increasing degradation from shifting temperatures and extreme events. 			
Water Infrastructure Assets	 Risks (moderate): increasing precipitation and flooding during extreme events. Actions required: understanding the capacity and vulnerability of water and sanitary networks to manage risk related to heavy precipitation and severe weather events that may damage components, overload systems capacity, or cause indirect issues like power outages. 			
Parks and Natural Heritage Systems	 Risks (moderate): damaged landscaping from increasing temperatures and severe weather events. Increasing temperatures may also impact the operation of recreation facilities like ice rinks, requiring more maintenance and increasing operating costs. Actions required: focus on operations and maintenance changes. exploring solutions, such as green infrastructure integration, to improve water use and storage for landscaping needs. Green infrastructure assets serve as a dual benefit to climate action, providing adaptation and mitigation-based solutions to combat rapid changes in temperature and precipitation. Common functions such as stormwater management, canopy shading, evaporative cooling, and carbon sequestration allow green infrastructure to provide support in moderating extreme temperature and stormwater runoff events. 			
Facilities (Buildings)	Risks (moderate) • increases in extreme summer temperatures which may exceed			
(Buildings)	building cooling capacities.			

Asset Type	Recommendation(s)
	 damage related to heavy precipitation and severe weather events. Actions required: incorporating future climate projections into future cooling system upgrades improving operation and maintenance procedures to identify
	and correct weather-related damage to facilities before major repairs are required.

An Implementation Plan, including a proposed list of thirty-three (33) asset specific adaptation actions, was developed identifying Town roles and responsibilities, actions, and budget implications for Town's asset categories

Included in the recommendations, **specifically tables 9-12 on pages 24-47**, as part of the climate adaptation plan, is an Implementation Plan. A proposed list of asset specific climate adaptation actions, along with its priority, risk rating, approximate duration for delivery, cost, and the Town's staff responsible for delivery were recommended in the plan.

Cost estimates for the proposed actions established by the consultants were developed based on similar projects and current market conditions at that time. The estimated cost range for each of the proposed actions were represented symbolically. Tables 4-6 below provide a summary of the risk rating, priority and cost criteria implemented by the consultants.

Risk Range	Threshold	Response		
0 - 11	Low Risk	No action necessary.		
12 26	Low medium risk (12-25)	Action and/or an engineering analysis ma		
12-30	High medium risk (26-36)	be required.		
> 36	High Risk	Action required.		
= 7	Special Case	Requires special attention in risk assessment to determine if action is necessary.		

Table 4: Risk Rating Categorization

Priority Type	Description
Short-term	Actions should be implemented within the next 1-5 years
Medium-term	Actions should be planned and budgeted soon, but implemented in the next 5-10 years
Long-term	Actions should be evaluated and planned for over time and implemented on an ongoing basis or in the long-term (>10 years)

Table 6: Cost Estimate Categorization

Symbology	Cost Range
\$	<\$10,000
\$\$	\$10,000-\$100,000
\$\$\$	\$100,000-\$1M
\$\$\$\$	\$1M+

From the list of recommendations presented in the Climate Change Adaptation Plan, several proposed actions have either already been incorporated into the Town's 10-year capital plan or are currently in development. Future capital and operating budget requests, listed in the plan, will be considered, as mentioned above, as part of the Town's 10-year capital plan and funding will be considered as part of the budget process.

Advisory Committee Review

The Climate Change Adaptation Plan was presented to the Environmental Advisory Committee (EAC) on May 4th and June 22nd of this year. The first meeting with EAC on May 4th provided an overview of the Climate Change Adaption Plan, including project scope, climate change overview, risk assessment process, top risks, recommendations, and conclusions. The second meeting with EAC on June 22nd presented an overview of the proposed list of recommendations included in the Implementation Plan of the Climate Change Adaptation Plan. Throughout both meetings, the Committee provided invaluable feedback on various aspects of the Plan, its tie to the Town's GHG commitments, and endorsed the Plan.

Legal Considerations

Pursuant to O. Reg. 588/17, the Town is required to consider as part of its asset management planning, actions that may be required to address the vulnerabilities that

may be caused by climate change to its infrastructure assets. The adoption of a Climate Change Adaptation Plan will enable the Town to meet this requirement.

Furthermore, the proposed Climate Change Adaptation Plan that staff is recommending aligns with the provincial and municipal policy directions as stated above.

Financial Implications

The Climate Change Adaptation Plan identifies a total of \$680,000 to \$7,620,000 in incremental funding requirements over a ten-year period. Table 7 presents a summary of these estimated requirements by key asset type.

Table 7: Climate Change Adaptation Plan Estimated Requirements

Proposed Action		Cost (\$'s)			
		Low		High	
Linear Engineered Assets	\$	170,000	\$	1,720,000	
Water Infrastructure Assets	\$	150,000	\$	1,600,000	
Parks and Natural Heritage System	\$	30,000	\$	700,000	
Facilities	\$	330,000	\$	3,600,000	
Overall		680,000	\$	7,620,000	

Should the proposed plan be endorsed by Council, these noted requirements will be inserted into future operating and capital budgets on a priority basis based upon current inflated prices at that time for Council's review and approval.

These requirement funding sources will differ by expenditure type and the budget that they are inserted into. As these requirements were not previously planned for, the Town's funding strategy will need to be adjusted to accommodate these incremental amounts.

Communications Considerations

The Town will inform residents and businesses on various components of the plan as they rollout, and any associated service disruptions, through regular communications channels when appropriate.

Climate Change Considerations

A Climate Change Adaptation Plan enables communities to deal with the impacts, risks and opportunities posed by a changing climate. The recommendations presented in this report serve to advance the Town's adaptive capacity on asset management strategies to address the potential areas of risk identified from the risk assessment conducted. Through construction and other operating activities, the proposed actions when implemented, are expected to generate immediate sources of GHG emissions.

In the longevity of program instalment, however, the proposed actions, as recommended in this report, will support the Town's ability to meet GHG emission reduction commitments, as stated in the Community Energy Plan, Corporate Environmental Action Plan, and Energy Conservation and Demand Management Plan. Furthermore, adherence to the recommendations of this report will enable the Town to continue to meet the Provincial requirements of asset management planning for municipal infrastructure, as stated by O.Reg. 588/17.

Link to Strategic Plan

Implementing the Climate Change Adaptation Plan, and thus undertaking the proposed actions to develop community-wide adaptive capacity to climate change and advancement of the Town's asset management strategies to more sustainable measures, contribute to:

- The Strategic Plan guiding principle of "Progressive corporate excellence, innovation and continuous improvement";
- Supporting an exceptional quality of life for all Invest in Sustainable Infrastructure).
- Supporting an exceptional quality of life for all Promoting service accountability, excellence, and innovation.
- Enabling a diverse, creative, and resilient economy Supporting small business and encouraging a more sustainable business environment; and
- Supporting environmental stewardship and sustainability Encouraging the stewardship of Aurora's natural resources; and Promoting and advancing green initiatives

Alternative(s) to the Recommendation

1. That Council provide direction.

Conclusions

This report seeks Council's endorsement of the Climate Change Adaptation Plan. Much of the Town's infrastructure is exposed to the environment and therefore could be

impacted by the changing weather patterns associated with climate change. Understanding how infrastructure will be affected by a changing climate is an important step for the Town to improve its service delivery and manage risks to its assets.

The Plan presents a road map, which determined priorities, technologies, projects, and opportunities for the Town to incorporate into their future capital and operating budget to advance asset and risk management strategies.

Consideration should be given to integrating climate risks and adaptation into the Town of Aurora's asset management policy to inform decision-making about the operations and maintenance of Town assets and prioritize future investments to reduce climate change risks. To take climate action further, Aurora can start to coordinate its efforts for both adaptation and mitigation to develop policies and actions that simultaneously reduce community emissions and risks while supporting social, economic, and environmental co-benefits. Approaching climate action in this way will support the Town's journey toward Low Carbon Resilience.

Attachments

Attachment 1 – Climate Change Adaptation Plan (Full pdf Report)

Previous Reports

None.

Pre-submission Review

Agenda Management Team review on August 25, 2022

Approvals

Approved by Marco Ramunno, Director, Planning & Development Services

Approved by Doug Nadorozny, Chief Administrative Officer