Climate Change Adaptation

Recommendation
That the Standing Policy Committee on Environment, Utilities and Corporate Services recommend to City Council:

1. That information pertaining to the Corporate Adaptation Strategy be received;
2. That $32,000 from Capital Project #2183, Energy and Greenhouse Gas Management Plan, in addition to $125,000 of Federation of Canadian Municipalities grant funding, be designated to a new Adaptation Capital Project to support development of the Corporate Adaptation Strategy.

Topic and Purpose

The purpose of this interim report is to provide an update on the City of Saskatoon's (City's) preparation for, and response to, severe weather events as it relates to key infrastructure assets.

Report Highlights

1. A Climate Change Adaptation Strategy is required as part of the signed commitment to the Global Covenant of Mayors for Climate and Energy.
2. The Corporate Adaptation Strategy will build on the Resiliency model created by the Province of Saskatchewan.
3. Addressing climate change adaptation increases resilience in assets and services.
4. A Corporate Adaptation Strategy complements other corporate initiatives in the City.

Strategic Goals

Climate Change Adaptation supports the four-year priority to consider mitigation strategies for the impact of severe weather events on the City's infrastructure under the Strategic Goal of Environmental Leadership. Asset and Financial Sustainability is supported through creating a strategy to increase resilience of corporate infrastructure.

Background

City Council, at its meeting held on September 28, 2015, considered the Inquiry – Councillor M. Loewen (October 11, 2011) Climate Change Adaptation Strategy report and resolved, in part,

> "2. That the Administration report back as soon as possible with the following information:
>
> - steps for implementing systems in key departments which would evaluate new infrastructure and projects (and retrofits to existing infrastructure/projects) to ensure adequate performance in a variety of weather conditions including extreme events.

- additional information speaking to the adequacy of current funding approaches to dealing with possible changing weather conditions and their impacts on civic assets and services."

In November 2015, the City became a signatory to the Compact of Mayors, now known as the Global Covenant of Mayors for Climate and Energy, which commits the City of Saskatoon to address climate change by reducing greenhouse gas emissions and creating a climate change adaptation action plan.

The Standing Policy Committee on Environment, Utilities & Corporate Services, at its meeting held on March 8, 2016, received further information about the City's preparedness to address climate change impacts to protect key infrastructure.

The Standing Policy Committee on Environment, Utilities & Corporate Services, at its meeting held on June 12, 2017, received communication from Administration that Capital Project #2183 would leverage funding for a Corporate Adaptation Strategy pending approved grant funding to address Climate Change Mitigation and Natural Capital Asset Valuation, both of which have been approved for grant funding through the Federation of Canadian Municipalities (FCM).

The Standing Policy Committee on Environment, Utilities & Corporate Services, at its meeting held on September 11, 2017, received a report outlining how $80,000 would be used to develop a plan for a corporate-wide Environmental Management System (EMS). Administration has identified an opportunity for efficiencies by aligning the Climate Change Adaptation Strategy with this initiative.

Report

The Saskatchewan Government has created a Resilience Model to respond to climate change in the Province. The model has developed climate change policies for natural systems, physical infrastructure, economic sustainability and community preparedness. The adaptation strategy in the City of Saskatoon will build on the policies developed by the province to address the effects of climate change on our community in a region-specific way.

In 2017, the City engaged in a partnership with the University of Saskatchewan to test a tool for documenting and analyzing the implications of climate change on corporate assets and services as a pilot project. Expansion of the pilot project will:

1. Identify the climate change risks to which our community is most vulnerable.
2. Identify high risk assets.
3. Identify high risk services.
4. Identify civic divisions responsible for the greatest vulnerabilities to climate change.
5. Actions to reduce identified risks.

Attachment 1, Climate Change Adaptation Assessment, summarizes the adaptation assessment process, including a summary of the risk and vulnerability assessment. The Corporate Adaptation Strategy will prepare an action plan to prevent unnecessary stress to assets and services, and provide a response strategy if the effects of climate change are unavoidable. These actions mitigate the need for large reserve balances as assets are less likely to require emergency response funding when the Adaption Strategy is integrated into the overall asset management framework and asset management plans. The Adaptation Strategy will connect the risk with the appropriate level of financial reserve necessary and recommend an appropriate balance for the reserve to mitigate the financial exposure of climate change to the City. A recommendation report for the reserve will be delivered in 2019.

The Climate Change Adaptation project is expected to collaborate closely with other on-going civic initiatives:

1. Corporate Asset Management Framework – The Corporate Asset Management Framework outlines a strategy to manage assets in a way that minimizes risk and optimizes the investment to those assets. This initiative also received funding support from FCM through the new Municipal Asset Management Program, which requires the City to produce an asset management framework that specifically identifies climate change response and preparedness as part of a sound asset management strategy. Climate change planning provides attention to resiliency by evaluating risk and vulnerability based on a region specific analysis.

   The risk and vulnerability assessments completed through the Climate Change Adaptation project will feed into the condition and life cycle assessments required to appropriately manage, plan, and invest in corporate infrastructure. For example, if weather events are predicted to become more frequent or severe, the effect on assets must be recorded, with maintenance, renewal and replacement timelines adjusted to minimize the negative impact.

2. Green Infrastructure Strategy – Green (or natural asset-based) infrastructure, in many cases, is more resilient to climate change than built infrastructure. Additionally, green infrastructure provides a buffer for built infrastructure to make it more resilient. The Adaptation project will provide the foundation to identify cases where green infrastructure can be used to replace and/or make built infrastructure more resilient in a strategic way.

3. Climate Change Mitigation and Environmental Management System (EMS) – the risk and vulnerability assessments completed through the Climate Change Adaptation project will provide important inputs into identifying greenhouse gas reduction (mitigation) options, environmental protection initiatives, and create priority areas for divisions to adopt and monitor within an environmental management system. Efficiencies achieved by integrating the Adaptation and EMS projects is anticipated to produce results in 18-24 months.

Options to the Recommendation

City Council could choose to postpone work on the Climate Adaptation Strategy. Administration does not recommend this, as climate change risks and response are not currently well understood, creating the potential for significant impacts to civic assets, services and budgets.

Public and/or Stakeholder Involvement

The Climate Change Adaptation strategy requires a collaborative process due to the wide variety of assets within the city, and the unique impact climate change has on the assets. The Adaptation project will, therefore, include and link engagement with the Asset Management Framework, Green Infrastructure Strategy and EMS development initiatives. The project also includes consultation with external groups to determine vulnerability and risk on City owned assets. These groups include climate change modeling groups as well as insurance companies, which will determine future cost of insurance, based on expected liability. Additionally, comprehensive engagement and consultation with various civic work groups will discuss the preventative and reactive measures that the City must employ to make civic assets more resilient to climate change into the future, based on climate change modelling.

Communication Plan

A communications plan will be developed to support engagement, most of which is focussed on civic operations. Further communications are also expected to be developed as part of on-going operations when the Corporate Climate Change Adaptation Action Plan is complete.

Policy Implications

In addition to a review of policies, a review, scope, and analysis will be required to determine if reserves are appropriate to respond to the risk created by climate change. Further discussion on the Major Natural Event Reserve is included in the Financial Implications section.

Financial Implications

The Climate Adaptation project is eligible for up to $125,000 of funding through FCM. Capital Project #2183 – Energy and Greenhouse Gas Management Plan has currently allocated $32,000, as a requirement to receive FCM funds, and an additional $50,000 will be required to complete the adaptation action plan in 2019 and will be part of the 2019 Business Plan and Budget deliberations.

Environmental Implications

Adaptation will positively affect the risk of climate change events and scenarios on corporate assets and services. The action plan will identify environmentally responsible methods to creating resiliency in the Saskatoon community in an operationally feasible way.

Other Considerations/Implications

There are no privacy or CPTED considerations at this time.

Due Date for Follow-up and/or Project Completion

The Corporate Adaptation Strategy is expected to be completed in 2019 and the action plan brought to the Standing Policy Committee on Environment, Utilities and Corporate Service for review by September, 2019.

Public Notice

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

Attachment

1. Climate Change Adaptation Assessment

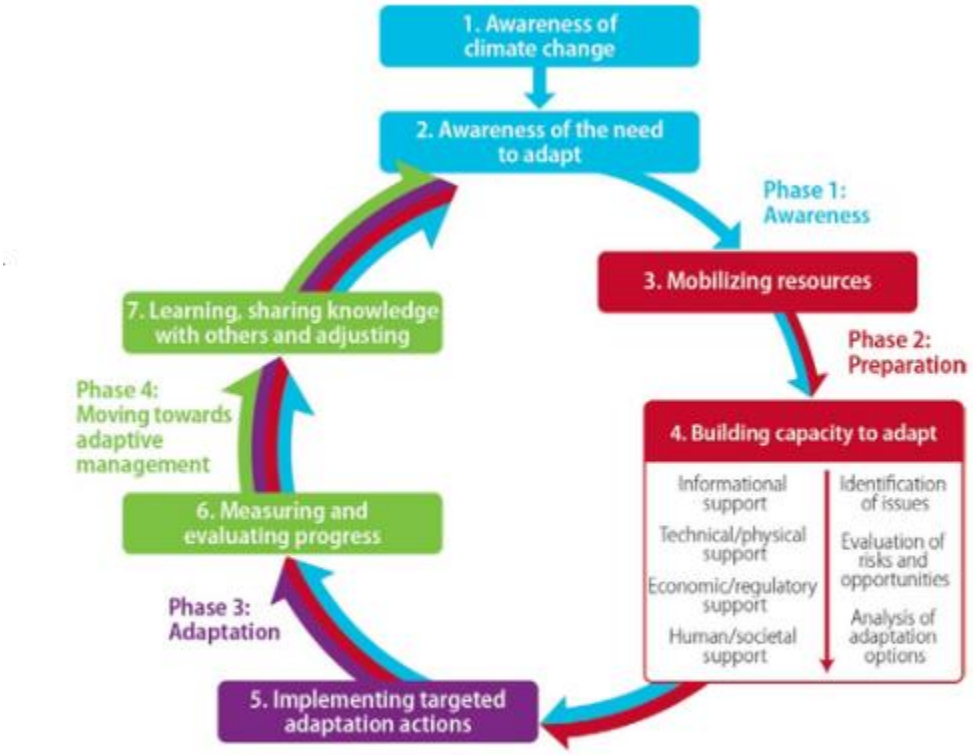
Report Approval

Written by:	Nasha Spence, Environmental Accounting Manager
Reviewed by:	Brenda Wallace, Director of Environmental and Corporate Initiatives
Approved by:	Dan Willems, A/General Manager, Corporate Performance Dept.

Admin Report - Climate Change Adaptation.docx

Climate Change Adaptation Assessment

Climate change adaptation starts with awareness of how climate impacts our assets and service areas, and generates knowledge and strategies for adapting our infrastructure and services to be more resilient.



SOURCE: NATURAL RESOURCES CANADA. (2014). CANADA IN A CHANGING CLIMATE: SECTOR PERSPECTIVES ON IMPACTS AND ADAPTATION.

The four distinct steps to assessing the effect of climate change on infrastructure and service areas include:

1. Record Climatic Changes – The data for determining climate changes in the region include engagement with local academic and environmental centres. More specifically, consultation will occur with the Prairie Climate Centre, based out of the University of Winnipeg, and the School of Environment and Sustainability at the University of Saskatchewan will provide the climate model for Saskatoon.

2. Define Climate Change Impacts on Service Areas – Climate change impacts to service areas and assets will be assessed to determine if assets and services are directly, indirectly or not affected by climate impacts. The analysis will assist with adjusting life cycle timelines for assets, such as maintenance, renewal and replacement timelines.

3. Vulnerability Assessment – Vulnerability is assessed through determining Sensitivity and Adaptive Capacity of the assets and service areas to the climate change (i.e. If the impact occurs, will it affect the functionality of the asset/ service area) and Adaptive Capacity of the assets and service areas (i.e. will the asset/service be capable of adjusting to the climate change impact with minimal cost and disruption).

Sensitivity Scale				
If the impact occurs, will it affect the functionality of the service area?				
No - Functionality will stay the same	Unlikely - Functionality will likely stay the same	Yes - Functionality is likely to get worse	Yes - Functionality willl get worse	Yes - Functionality will become unmanageable
S1	**S2**	**S3**	**S4**	**S5**

Source: ICLEI Canada

Adaptive Capacity Scale				
Can the service area adjust to the projected impact with minimal cost and disruption				
No - Will require substantial costs ($$$$$) and staff intervention	No - Will require significant costs ($$$$) and staff intervention	Maybe - Will require some costs ($$$) and staff interventions	Yes - But will require some slight costs ($$) and staff intervention	Yes - No to little costs ($) and staff intervention are necessary
AC1	**AC2**	**AC3**	**AC4**	**AC5**

Source: ICLEI Canada

The sensitivity and adaptive capacity of the assets and service areas will be combined, based on engagement with the work groups that oversee the assets and services to develop a vulnerability rating. Those assets and service areas that are rated as being significantly affected by climate change impact through their function and with significant cost and resources, will be rated as highly vulnerable. Highly vulnerable assets and services will be prioritized for requiring intervention to decrease risk to climate change.

Sensitivity and Adaptive Capacity Mix					
	S1	S2	S3	S4	S5
AC1	V2	V2	V4	V5	V5
AC2	V2	V2	V3	V4	V5
AC3	V2	V2	V3	V4	V4
AC4	V1	V2	V2	V3	V3
AC5	V1	V1	V2	V3	V3

Source: ICLEI Canada

4. Risk Assessment – Risk is determined by assessing Consequence (i.e. the community level consequence of climate impacts) and Likelihood (i.e. the probability and frequency of the impact).

Consequence is determined through evaluating six service areas within the community:

1. Health and Safety
2. Local Economy and Growth
3. Community and Lifestyle
4. Environment and Sustainability
5. Financial Impact on the Community
6. Public Administration

and five service areas within the municipal corporation:

1. Policy and Reputation Impact
2. Human Capital Impact
3. Infrastructure/ Service Delivery Impact
4. Citizen Impact
5. Financial Impact on Administration

An example of consequence impacts taken from the University of Saskatchewan pilot project is presented below:

Increases in Annual Temperatures	Increase in Summer Temperature			Increase in Annual Precipitation		Increase in 1-3 day Precipitation Totals	
Increased frequency of freeze/thaw cycles impacting road infrastructure	Increased risk of blackouts due to demand for electricity	Increased demand for water - irrigation and personal use	Higher risk of fires close to Saskatoon	Increased risk of flooding to basements, roads, and other infrastructure	Increased cost for storm water management	Increased risk of flooding to basements and roads, caused by sewer overflows or waste water bypasses	Increase in demand to city operations when responding to severe precipitation

Likelihood ratings are based on climate change impact information. It evaluates if a climate change impact is likely to be ongoing or unlikely to occur frequently.

Likelihood Rating	Recurrent Impact	Single Event
Almost Certain - 5	Could occur several times per year	More likely than not - probability greater than 50%
Likely - 4	May arise about once per year	As likely as not - 50/50 chance
Possible - 3	May arise once in 10 years	Less likely than not but still appreciable - probability less than 50% but still quite high
Unlikely - 2	May arise once in 10-25 years	Unlikely but not negligible - probability low but noticeably greater than zero
Rare - 1	Unlikely during the next 25 years	Negligible - probability very small, close to zero

Source: ICLEI Canada

Consequence ratings and Likelihood ratings are then combined to produce a score, such as the one below taken from the University of Saskatchewan pilot project. Events that indicate a high score will be prioritized for response to bring the risk to an acceptable level.

Climate Change Impacts	Consequence Rating Total	Likelihood Rating	Total Risk Assessment Score
Increased frequency of freeze/thaw cycles impacting road infrastructure	50	1	**50**
Increased risk of blackouts due to demand for electricity	90	3	**270**
Increased demand for water - irrigation and personal use	48	5	**240**
Higher risk of fires close to Saskatoon	70	5	**350**
Increased risk of flooding to basements, roads, and other infrastructure	60	5	**300**
Increased cost for storm water management	54	5	**270**
Increased risk of flooding to basements and roads, caused by sewer overflows or waste water bypasses	75	5	**375**
Increase in demand to city operations when responding to severe precipitation	72	5	**360**

The intent of climate change adaptation assessment on assets and service areas is meant to identify climate change impacts specific to Saskatoon, and the effect of those impacts. The analysis engages divisions at all levels to identify high-risk infrastructure or services, prioritize those high risk areas, and create an action plan to mediate the risk of climate change impacts on the community. The adaptation process is meant to collaborate closely with the Climate and Asset Management process to ensure that condition assessments, maintenance, renewal and replacement timelines and costing, and service levels consider changes in the climate as part of the full life cycle analysis. The Adaptation Strategy may also be able to identify where natural infrastructure may support built infrastructure in a more cost effective and resilient way.