
Interim Report – Climate Adaptation Strategies – Infrastructure

Recommendation

That the information be received.

Topic and Purpose

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

Report Highlights

1. There are several measures in place or in progress to prepare for, and respond to, severe weather events in relation to key infrastructure and through the Corporate Risk Program and Corporate Asset Management Plan. Further refinement to asset planning and the retrofitting of existing assets will ensure infrastructure can be resilient during extreme weather events.
2. The Major Natural Events Reserve has a zero balance, and there are no regular or budgeted contributions to this reserve.

Strategic Goal

This report 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.

Background

On September 28, 2015, the Standing Policy Committee on Environment, Utilities & Corporate Services resolved:

“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.”

At the January 11, 2016, meeting of the Standing Policy Committee on Environment, Utilities & Corporate Services, a question regarding the current balance and purpose of the Major Natural Event Reserve was raised.

Report

Current Strategies and Gap Identification

As an interim measure, the Administration has prepared this status report outlining the initiatives, design of infrastructure and maintenance standards that currently mitigate the impact of severe weather events on the City's infrastructure.

For the purpose of this assessment, the following major climate change risk conditions and extreme events were identified:

- prolonged drought;
- prolonged wet weather conditions;
- intense rain events with flooding;
- damaging winds;
- heavy snowfall event/blizzard;
- mild winter with freeze/thaw cycles and icing;
- extreme heat or cold; and
- pests and invasive species.

Attachment 1 is a summary of the actions taken and implemented to date, as well as plans to address the readiness and risk mitigation strategies related to the climate change impact on the City's key infrastructure (e.g. water system, wastewater system, storm water system, parks, urban forestry, electrical system and roadways/traffic signals).

The strategies related to Saskatoon Light & Power are in place for the City's franchise area only. SaskPower, which is responsible for all infrastructure outside the franchise area, was not contacted for this interim assessment.

These initiatives and risk mitigation strategies will constantly be updated through the Corporate Risk Program and the Corporate Asset Management Plan. The adjustment to asset condition and the investment in assets based on agreed upon service levels will take into account future requirements related to climate impacts. Over time these adjustments will answer the question regarding new infrastructure and projects, including retrofits, to address extreme weather events. Through the Administration's continuing work on these plans, any gaps to address the issue should be reduced or eliminated over time.

Major Natural Event Reserve

At the January 11, 2016, meeting of the Standing Policy Committee on Environment, Utilities & Corporate Services, the Major Natural Event Reserve was discussed.

The provisions of the Major Natural Event Reserve are included in Council Policy No. C03-003, Reserve for Future Expenditures. The purpose of the Reserve is "to assist in offsetting operational and capital expenditures required due to a major natural event. Major natural events include, but are not limited to, blizzards, plough winds/tornado, heat wave, severe rain, river flood event and extreme cold."

The reserve is funded through the operating budget and is capped at \$250,000. The reserve was fully funded to \$250,000 in 2010 and was fully utilized in 2014 to offset over

expenditures in the Snow and Ice Management program due to a heavy snowfall season. The current reserve balance is \$0 and there are no planned or regular budget contributions to this reserve.

The funding of the reserve has not been aligned with infrastructure needs and a reserve sufficiency plan has not been developed. Of note, with a cap of \$250,000, the reserve would likely not be sufficient to respond to a major natural event of any magnitude. The Administration plans to bring forward a report for consideration of options regarding this reserve during the 2017 Business Plan and Budget deliberations.

Communication Plan

At the present time, the City informs citizens of severe weather through Service Alerts, News Releases, social media, Notifynow (mass notification system) and dedicated news conferences for media as required. A Communications staff person is on call 24/7 to coordinate these responses.

Improved communication between Environment Canada and key divisions has resulted in a new severe weather advance notification system. This service provides program areas with earlier information received directly from Environment Canada when certain trigger weather conditions exist that may impact service levels. This notification allows divisions to prepare operational responses as early as possible.

Financial Implications

Many of the measures that are being developed to improve the City's ability to prepare for, and respond to, severe weather events are being implemented as part of ongoing operations, including the Corporate Risk Program and Corporate Asset Management Plan. Specific measures that require additional resources will be brought forward by individual departments as required within the individual asset management plans.

Other Considerations/Implications

There are no policy, environmental, privacy, CPTED or other implications or considerations.

Due Date for Follow-up and/or Project Completion

Further reports on mitigation of climate change through GHG reduction will be provided to the Standing Policy Committee on Environment, Utilities & Corporate Services at its meeting on July 19, 2016.

Through the Corporate Risk Program and the Corporate Asset Management Plan, further reports will be brought forward by the Administration that will evaluate new infrastructure or retrofits to existing infrastructure to address climate impacts.

The process for incorporating climate adaptation strategies into regular business reporting is also currently being developed to be included in the 2017 Business Plan and Budget deliberations.

A report reviewing options for changes to the Major Natural Event Reserve will be prepared for inclusion in the 2017 Business Plan and Budget deliberations.

Public Notice

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

Attachment

1. Summary of Current Climate Adaptation Strategies

Report Approval

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Summary of Current Climate Adaptation Strategies

RISK EVENT: PROLONGED DROUGHT		
Planning	Design/Construction	Maintenance
<p><u>Water</u></p> <ul style="list-style-type: none"> • Expansion planning for additional treatment and reservoir capacity <p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Retaining more naturalized areas • <u>In progress</u>: a storm water management plan is being developed (will address erosion, reduce reliance on potable water for irrigation) 	<p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Species diversification, increasing hardiness of plants through cultural practices • <u>In progress</u>: new landscaping design & construction specifications are being developed to ensure all new park development considers this risk event 	<p><u>Water</u></p> <ul style="list-style-type: none"> • Conservation programs, enforced water use restrictions and rate structures can be used to manage peak demands • Access to in-house and contracted resources to respond to water main breaks; provision of alternative water supply for affected households <p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Irrigation systems • More effective water management practices (e.g. mulching, composting, water bags on new plantings) • Prescribed/controlled burns
RISK EVENT: PROLONGED WET WEATHER CONDITIONS		
Planning	Design/Construction	Maintenance
<p><u>Wastewater</u></p> <ul style="list-style-type: none"> • Infill/redevelopment is intensifying use along corridors which may lead to capacity issues <p><u>Storm Water</u></p> <ul style="list-style-type: none"> • New neighborhood design standards and wetlands policy, including dry and wet storm water retention ponds • <u>In progress</u>: low impact development guidelines are being developed <p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Capital remediation could be accelerated <p><u>Parks</u></p> <ul style="list-style-type: none"> • <u>In progress</u>: a storm water management plan is being developed (will address erosion, reduce reliance on potable water for irrigation) 	<p><u>Wastewater</u></p> <ul style="list-style-type: none"> • Upgrades to the Spadina lift station increased capacity • Extra capacity is built into the system (an extra settlement basin, extra pump in the lift station) • The grit removal facility has a bypass to treatment to avoid direct discharge to the river • Infiltration and inflow initiatives are being pursued to decrease demand on the Wastewater Treatment Plant <p><u>Storm Water</u></p> <ul style="list-style-type: none"> • Sub drainage to decrease ground water tables in some areas <p><u>Parks</u></p> <ul style="list-style-type: none"> • <u>In progress</u>: new landscaping design & construction specifications are being developed to ensure all new park development considers this risk event <p><u>Urban Forestry</u></p> <ul style="list-style-type: none"> • Species diversification, increasing hardiness of plants through cultural practices 	<p><u>Wastewater and Storm Water</u></p> <ul style="list-style-type: none"> • Routine preventive maintenance programs • Preventive rehabilitation program <p><u>Urban Forestry</u></p> <ul style="list-style-type: none"> • Routine pruning and inspection activities <ul style="list-style-type: none"> ○ Desired pruning cycles are not being met due to funding constraints; this results in a weaker tree that is more susceptible to damage <p><u>Roadways</u></p> <ul style="list-style-type: none"> • Pothole program could be enhanced

PROLONGED WET WEATHER CONDITIONS (con't)		
Planning	Design/Construction	Maintenance
	<p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Secure pole footings/pilings • Contingency plans allow for the bypass of damaged lines <p><u>Roadways</u></p> <ul style="list-style-type: none"> • Roadway design standards are now based on saturated ground/high water table conditions • Subsurface drainage is mandatory for all new roadway construction; discretionary for rehabilitation projects 	
RISK EVENT: INTENSE RAIN EVENTS WITH FLOODING		
Planning	Design/Construction	Maintenance
<p><u>Wastewater</u></p> <ul style="list-style-type: none"> • Infill/redevelopment is intensifying use along corridors which may lead to capacity issues <p><u>Storm Water</u></p> <ul style="list-style-type: none"> • New neighborhood design standards and wetlands policy, including dry and wet storm water retention ponds • <u>In progress</u>: low impact development guidelines are being developed • <u>In progress</u>: a Storm Water Utility Business Plan is being prepared in 2016 <p><u>Roadways</u></p> <ul style="list-style-type: none"> • New neighborhood design standards include roadways as part of the overland drainage system 	<p><u>Wastewater</u></p> <ul style="list-style-type: none"> • Upgrades to the Spadina lift station increased capacity • Extra capacity is built into the system (an extra settlement basin, extra pump in the lift station) • The grit removal facility has a bypass to treatment to avoid direct discharge to the river • Superpipe capacity improvements to avoid storm water infiltration into sanitary sewer • Infiltration and inflow initiatives are being pursued to decrease demand on the Wastewater Treatment Plant <p><u>Storm Water</u></p> <ul style="list-style-type: none"> • Sub drainage to decrease ground water tables in some areas • Infrastructure upgrades have been made based on risk rankings • Storm water service connections would reduce the impact of certain drainage issues • <u>In progress</u>: A new predictive model was developed with the University of Saskatchewan to more accurately predict future rainfall patterns. This model produced various future rainfall scenarios under potential climate change conditions and is being applied to existing infrastructure to assess adequacy. 	<p><u>Storm Water</u></p> <ul style="list-style-type: none"> • Routine maintenance programs <p><u>Roadways and Traffic Signals</u></p> <ul style="list-style-type: none"> • Closure/detouring plans are in place for pre-existing low spots that are prone to flooding • 24 hour on call service for traffic signal problems • Priority based response plans (major/critical intersections and roadways are responded to on a priority basis) • Real-time monitoring for certain traffic signal locations

INTENSE RAIN EVENTS WITH FLOODING (con't)		
Planning	Design/Construction	Maintenance
	<p><u>Parks</u></p> <ul style="list-style-type: none"> • Durable pathway surfaces are being installed in high risk areas (e.g. washout areas, steep grades) • <u>In progress</u>: new landscaping design & construction specifications are being developed to ensure all new park development considers this risk event <p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • In the downtown core, underground vaults are designed to be fully submerged for a prolonged period of time 	
RISK EVENT: DAMAGING WINDS		
Planning	Design/Construction	Maintenance
<p><u>Water</u></p> <ul style="list-style-type: none"> • <u>In progress</u>: a third backup generator is planned for the long term 	<p><u>Wastewater</u></p> <ul style="list-style-type: none"> • If power was lost, there are backup generators at the Plant (allows for operation of the Plant for at least 72 hours) and at critical lift stations <p><u>Water</u></p> <ul style="list-style-type: none"> • If power was lost, there are backup generators at two locations <p><u>Storm Water</u></p> <ul style="list-style-type: none"> • If power was lost, there are backup generators at the lift stations <p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Selection of plantings that are better able to withstand wind <p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Contingency plans allow for the bypass of downed lines • Portable generators can provide short-term backup power <p><u>Roadways and Traffic Signals</u></p> <ul style="list-style-type: none"> • Infrastructure is installed in compliance with national codes for wind load 	<p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Routine pruning and inspection activities <ul style="list-style-type: none"> ○ Desired pruning cycles are not being met due to funding constraints; this results in a weaker tree that is more susceptible to damage • A Weather Event Response Plan has been developed <p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Routine pruning and inspection activities <ul style="list-style-type: none"> ○ Desired pruning cycles are not being met due to resource constraints <p><u>Roadways and Traffic Signals</u></p> <ul style="list-style-type: none"> • 24 hour on call service for traffic signal problems • Priority based response plans (major/critical intersections and roadways are responded to on a priority basis) • Real-time monitoring for certain traffic signal locations

RISK EVENT: HEAVY SNOWFALL EVENT/BLIZZARD

Planning	Design/Construction	Maintenance
<p><u>Traffic Signals</u></p> <ul style="list-style-type: none"> • <u>In progress</u>: alternative traffic signal timing plans to accomplish certain broad goals (e.g. clear the downtown core, bypass a major corridor/intersection/interchange) will be incorporated into the new Automated Traffic Management System 	<p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Selection of plantings that are better able to withstand heavy snow <p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Contingency plans allow for the bypass of downed lines • Portable generators can provide short-term backup power <p><u>Roadways</u></p> <ul style="list-style-type: none"> • Roadway design standards now require sufficient space for temporary snow storage 	<p><u>Water</u></p> <ul style="list-style-type: none"> • A one week supply of critical chemicals is maintained • Notification and inspection processes maintain hydrant accessibility <p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Routine pruning and inspection activities <ul style="list-style-type: none"> ○ Desired pruning cycles are not being met due to funding constraints; this results in a weaker tree that is more susceptible to damage <p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Routine pruning and inspection activities <ul style="list-style-type: none"> ○ Desired pruning cycles are not being met due to resource constraints <p><u>Roadways and Traffic Signals</u></p> <ul style="list-style-type: none"> • 24 hour access to in-house and contracted resources (staff, equipment) • 5 snow routes established and signed; can be declared independently to facilitate clearing • 24 hour on call service for traffic signal problems • Priority based response plans (major/critical intersections and roadways are responded to on a priority basis) • Real-time monitoring for certain traffic signal locations • <u>In progress</u>: an annual analysis of resource constraints versus the ability to respond to severe weather events should be performed (sensitivity/what if scenarios, Monte Carlo simulation, probability analysis)

RISK EVENT: MILD WINTER WITH FREEZE/THAW CYCLES AND ICING		
Planning	Design/Construction	Maintenance
	<u>Water</u> <ul style="list-style-type: none"> • Backup intake <u>Saskatoon Light & Power</u> <ul style="list-style-type: none"> • Conductors designed to withstand 2" thick coating of ice with an 80km/hr wind • Contingency plans allow for the bypass of downed lines • Portable generators can provide short-term backup power 	<u>Water</u> <ul style="list-style-type: none"> • Ongoing monitoring to ensure unobstructed flow at intake <u>Storm Water</u> <ul style="list-style-type: none"> • Routine spring maintenance and catch basin monitoring • Steam thawing program <u>Parks and Urban Forestry</u> <ul style="list-style-type: none"> • Routine pruning and inspection activities <ul style="list-style-type: none"> ○ Desired pruning cycles are not being met due to funding constraints; this results in a weaker tree that is more susceptible to damage <u>Roadways</u> <ul style="list-style-type: none"> • Pothole program can be enhanced • Sanding/salting activities can be enhanced and/or be conducted proactively • <u>In progress</u>: an annual analysis of resource constraints versus the ability to respond to severe weather events should be performed (sensitivity/what if scenarios, Monte Carlo simulation, probability analysis)
RISK EVENT: EXTREME HEAT OR COLD		
Planning	Design/Construction	Maintenance
<u>Saskatoon Light & Power</u> <ul style="list-style-type: none"> • Relationship with SaskPower, could access spare parts if SL&P's inventory was depleted • Development of emergency plans for vulnerable populations with EMO 	<u>Wastewater</u> <ul style="list-style-type: none"> • Climate control for certain areas (heating, cooling) <u>Water</u> <ul style="list-style-type: none"> • Climate control for certain areas (heating, cooling) • Risk-based replacement program (mains & connections) • Accelerated lead connection replacement program 	<u>Wastewater, Parks, Urban Forestry, Roadways and Traffic Signals</u> <ul style="list-style-type: none"> • Safe work practices for staff <u>Water</u> <ul style="list-style-type: none"> • Safe work practices for staff • Access to in-house and contracted resources to respond to water main breaks; provision of alternative water supply for affected households

RISK EVENT: EXTREME HEAT OR COLD (con't)		
Planning	Design/Construction	Maintenance
	<p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Selection of hardy plant material and trees • <u>In progress</u>: new landscaping design & construction specifications are being developed to ensure all new park development considers this risk event (e.g. soil depth) <p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Contingency plans allow for the bypass of affected areas • Portable generators can provide short-term backup power <p><u>Roadways and Traffic Signals</u></p> <ul style="list-style-type: none"> • Different grades of asphalt are available that are better able to withstand extreme heat • Climate control for traffic signal cabinets (heating, cooling) 	<p><u>Saskatoon Light & Power</u></p> <ul style="list-style-type: none"> • Safe work practices for staff • Critical spare parts inventory • Service alerts and communications <p><u>Roadways</u></p> <p>Indoor winter storage for equipment to ensure hydraulics function properly</p>
RISK EVENT: PESTS AND INVASIVE SPECIES		
Planning	Design/Construction	Maintenance
<p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Public education programs • Infill/redevelopment is intensifying use along corridors which may adversely affect the health of street trees 		<p><u>Water and Storm Water</u></p> <ul style="list-style-type: none"> • Routine surveillance and inspection activities • Provincial boat inspections <p><u>Parks and Urban Forestry</u></p> <ul style="list-style-type: none"> • Routine pruning, treatment and surveillance activities <ul style="list-style-type: none"> ○ Desired pruning cycles are not being met due to funding constraints; this results in a weaker tree that is more susceptible to damage • Local, regional and Provincial surveillance of emerging threats • Timely cleanup of noxious weeds, debris, overgrowth • Prescribed/controlled burns • Response Plans have been developed for certain threats