

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