Storm Water Flood Resiliency

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

1. That a Home Flood Protection Program pilot project be developed for high flood risk areas in 2018;
2. That $200,000 be allocated in 2018 from the Storm Water Capital Reserve to fund the pilot Home Flood Protection Program; and
3. That the Administration refine infrastructure options with funding strategies and report back by mid-2018.

Topic and Purpose

The purpose of this report is to outline options to increase flood resiliency to reduce the risk of flooding in high-risk flood areas.

Report Highlights

1. Thirty high-risk flood areas in Saskatoon were prioritized, and concept level options and costs for increasing service levels for the top three flood risk areas were evaluated.
2. A Home Flood Protection Program pilot is recommended to offer subsidized home inspections for citizens in the top 30 high-risk flood areas.
3. Based on the concept level costs and service level, funding options to increase storm water infrastructure capacity are included for consideration.
4. Incentives to increase on-site storm water management will be reviewed in 2018.

Strategic Goals

This report supports the Strategic Goal of Quality of Life through reduced flood damage risk to properties, and diminished stress and anxiety associated with intense rainfalls. This report also supports the Strategic Goal of Environmental Leadership through adaptation to climate change.

Background

At its meeting held on August 28, 2017, City Council approved four recommendations regarding the Storm Water Utility Business Plan, as presented by the Administration, and made four additional directives to address surface flooding in high-risk flood areas:

> "1. That the Storm Water Utility focus resources on maintenance and preservation of existing storm water assets;
> 2. That $3 million be maintained in the Storm Water Utility's capital reserve to protect strategic public infrastructure from damage caused by riverbank slumping and other emergency storm water repairs;

3. That the Equivalent Runoff Unit used for Storm Water Management charges be increased by $13.50 annually from 2019 to 2022, and utilized for projects to maintain and preserve storm water infrastructure;
4. That the temporary Flood Protection Program be extended and phased out by $13.50 annually from 2019 to 2022;
5. That the Administration report prior to 2018 budget consideration on the impact of an increase to the ERU to generate funds for flood mitigation;
6. That the City identify this situation as a further request for Federal Funding;
7. That the Administration report on a funding and infrastructure strategy to systematically deal with the top risk priority areas.
8. That the Administration report back outlining possible incentives to residential and/or commercial/industrial property owners to promote demonstrated onsite storm water management not only for new development/infill development, but for retrofit with possible emphasis on established and flood-prone areas."

Report

Intense rainfalls on July 10, 2017, and August 8, 2017, caused surface flooding in 11 of the prioritized 30 surface flood risk areas in south-central Saskatoon. According to the storm water model, both rain events were rated as "1-in-25 year" in localized areas and up to "1-in-2 year" rainfall in most other areas of the city. A survey of property owners in the highest impact areas was conducted to verify the model results (Attachment 1). The survey results of actual flooding in 2017 provided valuable information that will assist in recalibrating the storm water model and reassessing the cost of infrastructure options for different rain events.

Surface Flood Control Strategy

In 2014, 30 areas at risk of flooding were evaluated and rated. The Surface Flooding Control Strategy Report – Storm Water Management (Attachment 2) provides more information about the prioritization.

Conceptual options to reduce the risk of surface flooding and estimated costs for different service levels were assessed for the following three highest ranked areas:

- Ruth Street/Cairns Avenue
- First Street/Dufferin Avenue
- Cascade Street/Dufferin Avenue

The following options were evaluated:

- Flood walls
- Up-size pipes
- Storm water ponds and underground storage
- Redevelop flood-prone areas
- Combination of ponds/underground storage and redeveloping flood-prone areas

The infrastructure solutions are complex because of the capital intensive work required to retrofit the storm water management systems in areas with existing development. As a result, options for residents to make improvements to their properties to increase flood resiliency were assessed.

Home Flood Protection Program

Homeowners can increase flood resiliency by understanding flood risks and taking preventative actions. The Home Flood Protection Program developed by the University of Waterloo's Intact Centre for Climate Adaptation (ICCA) was introduced in 2017 to southern Ontario municipalities, which experienced severe basement flooding. The program offers free online self-help resources and a Home Flood Protection Assessment. Citizens pay $125 (approximately one-third of the cost) for an inspection and report with ways they can reduce sewer backup and overland flood risks, reduce moisture content, minimize damage to valuables, wisely manage water on site, and understand insurance coverage. The ICCA has indicated that a similar pilot program could be offered in Saskatoon in 2018.

The Administration is recommending that a Home Flood Protection Program, in cooperation with ICCA, be implemented in high-risk flood areas in Saskatoon. Information from the assessments will provide the City with valuable information to develop further programs that may include subsidization of recommendations from the assessments.

A review of other municipal programs found three cities that offer a credit program to residential properties for on-site storage of storm water runoff. Some municipalities offer cost-shared programs to reduce the risk of sewer back-ups but not surface flooding. Increasing Flood Resiliency through Private Property Improvements (Attachment 3) provides more details.

Infrastructure Options to Enhance Storm Water Capacity

The flooding impacts of each rain event are different. A "1-in-10 year" storm water retention solution likely would have prevented most of the basement flooding in 2017; however, infrastructure solutions to reduce surface flooding will not prevent the foundation seepage or sanitary sewer back-ups that occurred. Continued actions will also be needed by individual property owners to make their properties more flood resilient as rainfall events greater than "1-in-10 year" are expected in the future.

Based on modelling, the most effective infrastructure option is to direct runoff from intense rain events to a new retention system, which could include dry storm water ponds and possibly underground storage.

Two service level options for infrastructure to enhance storm capacity are summarized as follows:

1. Implement a "1-in-10 year" storm water capacity expansion service level. The $19.0 million high-level concept cost to implement the expansion in three areas could be funded through one of three options:

- A dedicated 0.6% annual mill rate increase for five years (3.04% compounded);
- Make the Flood Protection Program (FPP) permanent and increase the fee to $66 per meter; or
- Increase the Storm Water Utility Equivalent Runoff Unit (ERU) by 30%, in addition to previously approved ERU increases.

These options would generate approximately $154 million over 25 years to increase capacity for 30 areas.

The following table summarizes potential funding strategies for a "1-in-10 year" service level of storm water capacity expansion for three flood risk areas. Further details for infrastructure options are shown in High Level Conceptual Remediation Options and Costs by Service Level (Attachment 4).

Funding Options for "1-in-10 Year" Storm Water Capacity Expansion (Revenue In Millions)						
Funding Options	2018	2019	2020	2021	2022	Total (2018 to 2022)
Mill Rate (0.6% Annual Increase)	$ 1.3	$ 2.7	$ 4.0	$ 5.3	$ 6.7	$ 20.0
Flood Protection Program (FPP) ($66/meter)	$ 0.6	$ 5.0	$ 5.1	$ 5.1	$ 5.2	$ 21.0
ERU Increase (30%) & FPP Re-allocation	$ 1.9	$ 5.2	$ 5.0	$ 4.6	$ 4.1	$ 20.8

2. Implement a "1-in-25 year" storm water capacity expansion service level. The $36.6 million high-level concept cost to implement the expansion in three areas could be funded through one of three options:
   - A dedicated 1.2% annual mill rate increase for five years (6.12% compounded);
   - Make the FPP permanent and increase the fee to $114 per meter; or
   - Increase the Storm Water Utility ERU by 67%, in addition to previously approved ERU increases.

   These options would generate approximately $311 million over 25 years to increase capacity for 30 areas.

Conceptual Storm Water Capacity Expansion and Funding Options (Attachment 5) provides more details on the funding strategy options for different service level options and a high-level implementation plan, if one of these options is desired in the future.

Although solutions and costs have not been developed for the other 27 flood risk areas, if costs for each area are a similar order of magnitude (average of $6.3 million per area), in some areas, the infrastructure solution will exceed the total value of the houses protected and the most cost-effective option may be to redevelop flood-prone areas. The solution complexity, cost, number of properties, and cost to protect each property will vary significantly for each area. Each zone needs to be looked at on a case-by-case basis to determine the most cost-effective solution for the unique circumstances.

If a new retention system is constructed, efforts will be made to maintain recreation usage of parks after reconstruction. However, current recreation activities in these parks are expected to be impacted and park maintenance costs may increase.

Incentives to Promote On-site Storm Water Management

Commercial and industrial property owners in Saskatoon can reduce their Storm Water Utility Bill by reducing permeability. The program will be further assessed in 2018 to determine possible changes to increase uptake and encourage on-site storm water runoff storage, particularly in flood risk areas.

Options to the Recommendation

An option is to purchase the houses in the high-risk areas. This option is generally more expensive than the infrastructure options in more intensive rainfall scenarios; therefore, not recommended for the top three risk areas. This option may be the most cost-effective option in some of the 30 high-risk flood areas but will require further analysis.

Public and/or Stakeholder Involvement

Extensive consultations were undertaken in 2014 with residents in the top flood risk areas about the impacts of property flooding and options to reduce flood risks. Citizens' preferred solutions were storm water retention and upsizing pipes.

Many citizens who were impacted by the July and August 2017 flooding contacted City Council members and the Administration about concerns with flooding in their area. Citizens who presented to the August 15, 2017, Standing Policy Committee on Environment, Utilities and Corporate Services and the August 28, 2017, City Council meeting provided personal accounts of the impact of flooding and requested timely action.

Communication Plan

Flyers were delivered to 480 properties at risk of flooding to provide information about the Provincial Disaster Assistance Program funding, to invite feedback on the extent of the 2017 flooding through an online survey, and to acquire email addresses from citizens for future engagement. The flyers were followed up with phone calls and e-mails to residents in the highest risk areas. Information about flood mitigation is available at saskatoon.ca/flooding.

When a decision about flood resiliency is made, a more detailed communication plan will be developed to inform residents in areas at risk of flooding.

Communication about increases to property taxes or other charges will focus on the importance of enhancing capacity to reduce the risk of property damage, in light of climate change and the likelihood of more frequent intense storms. The communication will also focus on the importance of asset maintenance and preservation to prevent future higher costs.

Financial Implications

The cost to subsidize up to 600 Home Flood Protection Assessments to eligible properties in the 30 high-risk flood areas by $250 each, would be $150,000 and approximately $50,000 to set up, communicate, and administer the assessment program for a total cost of $200,000. The Storm Water Capital Reserve has sufficient funding available in 2018 to support this program.

Estimated resources of $500,000 will be required from the Storm Water Capital Reserve for community engagement and internal engineering design work to support the infrastructure options. A reallocation from the Storm Water Capital Reserve will reduce funding available for emergency remediation of storm water assets and slope stability funding.

If the detailed engineering shows that costs for capacity expansion are more than the concept level costs, adjustments to the Asset Preservation Plan, construction schedule extension, and further mill rate or fee increase will be evaluated and presented.

Environmental Implications

The proposed program supports climate adaptation measures to mitigate flood damage associated with longer-term climate change impacts (e.g. more frequent and intense rainfall events). Storm water infrastructure options would generate greenhouse gas emissions resulting from construction-related activities; however, the overall impact on greenhouse gas emissions has not been quantified.

Other Considerations/Implications

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

Due Date for Follow-up and/or Project Completion

A report summarizing the details and eligibility of the Home Flood Protection Program will be presented in early 2018.

Public Notice

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

Attachments

1. 2017 Rain Events
2. Surface Flooding Control Strategy Report – Storm Water Management
3. Increasing Flood Resiliency Through Private Property Improvements
4. High Level Conceptual Remediation Options and Costs by Service Level
5. Conceptual Storm Water Capacity Expansion and Funding Options

Report Approval

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