

DATE: May 10, 2021

TO: MAYOR AND COUNCIL

NAME AND TITLE: Ian Wells, Acting Deputy City Manager

SUBJECT: Integrated Stormwater Management Plan–Engineering & Asset Management

ATTACHMENT(S): ISMP Technical Working Paper #2 – Engineering & AM Issues
Powerpoint Presentation

RECOMMENDATION(S):

That Council RECEIVES FOR INFORMATION the report dated May 10, 2021, from the Acting Deputy City Manager, titled “Integrated Stormwater Management Plan–Engineering & Asset Management”.

PURPOSE:

To provide the results of the second technical working paper developed for the Integrated Stormwater Management Plan (ISMP).

PROJECT BACKGROUND:

On March 8, 2021, an overview of the Integrated Stormwater Management Plan (ISMP) and the results of the first stage of the project was presented to Council. This stage prioritized the actions from the City’s various watershed drainage plans and reviewed opportunities to improve the City’s stormwater asset inventory. The second stage of the ISMP focuses on engineering and asset management related topics.

STRATEGIC PRIORITIES:

This work was identified as a priority under the Environmental Leadership and Climate Action myPG pillar. It assists with three of Council’s Focus areas:

- Incorporate adaptation to climate change in relevant operations;
- Prioritize infrastructure re-investment and renewal to ensure the delivery of critical recreation, emergency, transportation, and utility services; and
- Maintain fiscal sustainability, balance service levels with the affordability of the City’s services, facilities, and operations.

TECHNICAL WORKING PAPER #2 HIGHLIGHTS:

This working paper primarily consists of the following topics:

- a) Developing a rain gauge monitoring program;
- b) Identifying existing green infrastructure, also known as Low Impact Development (LID) features, and determining further LID options for the City;

- c) Proposing amendments to the Subdivision and Development Servicing Bylaw and associated Draft Design Guidelines;
- d) Estimating lifecycle costs for development contributed assets;
- e) Assessing stormwater network risk;
- f) Identifying best practices for an asset condition program; and,
- g) Identifying asset renewal options.

The growing concern of municipalities towards effective stormwater management emerge from the increasing frequency and amplitude of problems related to rainwater runoff. Issues such as creek erosion, flooding, and pollution of natural water bodies can lead to significant costs for municipalities. One of the most important factors to consider when managing stormwater is the increase in precipitation intensity and number of days with heavy rainfall we are experiencing, including dealing with rain-on-snow events causing flooding. **Rain gauge monitoring** provides essential technical information for infrastructure design, tracks local scale changes in precipitation, and provides an estimation of the long-term trends.

Green infrastructure is a term commonly used for “engineered” assets, such as rain gardens, that have a natural component and are designed to mimic nature. These assets are also called Low Impact Development features (LID’s). They intercept, absorb, and hold stormwater, helping reduce the amount of runoff entering sewers or flooding roads during rain events. The absorption and storage process also filters pollutants, which improves water quality. A summary of the broad range of LID feature types that may be considered by the City is provided in Table 14 in the attached working paper. Features such as bioswales, soil systems, permeable interlocking concrete pavement, and rain gardens have been found to work in northern climates under the right conditions.

The way for a municipality to ensure it can withstand more intense storms and other factors in a changing climate, is to include design criteria, allowances, and requirements within its **bylaws and infrastructure design standards**. Since most stormwater infrastructure currently being installed is designed to last over 50 years, it is important that infrastructure design considers future increases in rainfall intensities, considers alternatives that require less maintenance, and includes standards for installing infrastructure that mimics nature. Another important factor to consider when approving development or replacing infrastructure is the full **lifecycle cost** of the various types of stormwater assets that the City will eventually have to operate and maintain.

A **risk** prioritization framework was developed during this portion of the ISMP. It includes the probability of an asset failing and the consequences if it does. Criteria including pipe size, age, material, adjacent road type and landuse was applied to the various stormwater assets owned by the City. The risk scores range between 0 and 10, with 10 having the highest risk. Overall, 14% of the system has a moderate to very high risk if failure occurred. The risk assessment includes stormwater pipes, culverts, pumping stations, catchbasins, ditches, inlets, outfalls, and ponds.

Condition assessments provide crucial information on how an asset is performing. This data is one of the primary steps in prioritizing maintenance, rehabilitation and replacement activities. This knowledge can help avoid infrastructure failures and allow for cost-effective rehabilitation activities to extend the assets life before it is completely deteriorated and needs to be fully replaced at a much higher cost. **Renewal activities**, such as, full length relining can add an additional 50 years to the pipe’s life at a significantly lower cost than traditional open-cut pipe replacement. The City has started a regular inspection program for some of its stormwater assets; including cross culverts, treatment ponds, outfalls, and pumping stations. A variety of tools and equipment are available to

conduct condition assessments, including; Closed Circuit Television Cameras (CCTV), sonar acoustical technology, and visual inspection.

RECOMMENDATIONS & NEXT STEPS:

A number of items have been recommended in this working paper that can assist the City in its stormwater management:

1. In order to be more resilient to changes in climate, better precipitation data is needed for infrastructure design and development. Using the existing Environment Canada rain gauges in the Massey and Airport areas, plus installing a City owned rain gauge in the Hart area, will allow for more accurate analysis of precipitation trends over time.
2. Although the City has existing LID features in its asset inventory, it is recommended that an LID strategy for new development and infrastructure replacement alternatives be established. This strategy will focus on features that have been found to work in northern climates.
3. There are several recommended additions to the City's Subdivision & Development Servicing Bylaw and Design Guidelines, including:
 - Improving design standards and post-construction requirements for stormwater treatment ponds;
 - Requiring erosion and sediment control measures where construction and development is occurring; and,
 - Expanding the types of LID features as options for stormwater management.
4. The identified Risk scores for the City's stormwater assets will be added to the City's Geographical Information System (GIS) to be used in its various asset management planning processes.
5. Condition assessments for all types of the stormwater network, including, natural assets should be conducted on a five (5) year cycle. Approximately 5% of the stormwater pipe network should be assessed annually using a CCTV camera. The assessments will be stored and analyzed within the City's computerized maintenance management system, Cityworks.

The outcomes from the next two working papers, Policy & Regulations and Financial Options, will be brought to Council in June/July.

SUMMARY AND CONCLUSION:

The second stage of the ISMP relates to various engineering and asset management topics associated with the City's stormwater system. The topics include; implementing a rain gauge monitoring program, identifying existing green infrastructure, proposing amendments to the City's standards, estimating lifecycle costs, assessing risk, identifying best practices for an asset condition program and asset renewal options.

This working paper resulted in a variety of recommendations the City can use to ensure healthy watersheds and sustainable stormwater service delivery. The next working papers focus on policy & regulations and financing options.

RESPECTFULLY SUBMITTED:

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APPROVED:

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Meeting Date: 2021/05/10